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STOMATOLOGICA

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Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

# XXI CONGRESSO NAZIONALE Odontoiatria Traslazionale

Roma, 10-12 Aprile 2014



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# MINERVA STOMATOLOGICA

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XXI CONGRESSO NAZIONALE



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ROMA  
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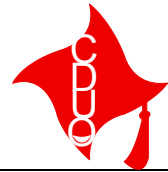
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# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

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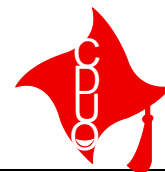
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## CHIRURGIA MAXILLO FACCIALE

SESSIONI >>>

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F. Spallaccia, A. Rivaroli, M. Gualtieri, C. Rinna, PECRAM, P. Cascone

### WAVE TECHNIQUE IN LOWER LIP CANCER

P. Bellini, A.C. Salgarelli, G. Setti, C. Magnoni, U. Consolo



### AIRWAYS VOLUMETRIC ASSESSMENT BEFORE AND AFTER FEMOD PROTOCOL IN PATIENTS AFFECTED BY PIERRE ROBIN SEQUENCE

V. Ramieri, E. Basile, A. Facchini, L. Manganiello, C. Lofaro, PECRAM, P. Cascone

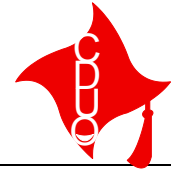
*Dipartimento di Scienze Odontostomatologiche e Maxillo-Facciali, Sapienza Università di Roma, Italia*

**Aim.** Children affected by Pierre Robin Sequence (PRS) frequently have airways obstruction due to micrognathia and glossoptosis. Clinical manifestations are heterogenous, ranging from mild respiratory difficulties to severe crises of apnoea, requiring different degrees of intervention. Although airway obstruction can be usually treated with non invasive treatment, some patients may necessitate more invasive interventions: tongue-lip adhesion, tracheostomy and mandibular distraction osteogenesis. Fast and early mandibular osteogenetic distraction (F.E.M.O.D.) allows to increase airways volume in these patients, by gradually lengthening the mandible and correcting the posterior tongue base position. The aim of this study is to quantify 3D changes in airway anatomy in patients with micrognathia who underwent mandibular advancement using FEMOD.

**Materials and methods.** A retrospective assessment of severe PRS patients at the Dipartimento di Scienze Odontostomatologiche e Maxillo Facciali, Università Sapienza di Roma, Italia, was conducted. Forty-six patients with congenital micrognathia underwent mandibular lengthening by FEMOD. Of these patients, only 7 satisfied inclusion criteria for completeness of data. All of them underwent FEMOD obtaining an average mandibular elongation of 20 mm. Although all patients had breathing difficulties preoperatively, not all required a tracheostomy. Pre and post distraction maxillofacial CT scans were performed. A volumetric evaluation was realized with Dolphin Imaging. Retro-palatal and retro-glossal measurements were performed.

**Results.** 3D model reconstructions of the airways were created to allow the volumetric comparison between the pre and post-operative airways. The CT scan data showed a significant increase in volumetric terms in all of the three sections analysed. Retroglossal volume average increase was of 346% and retropalatal volume average increase was 169%.

**Conclusions.** As a result of micrognathia and glossoptosis, many PRS newborns present in the neonatal period varying degrees of upper airway obstruction. FEMOD is an efficient method to relieve the upper airway obstruction in these patients. The three-dimensional volume rendering represents a useful method to evaluate airways volume and to compare the increase in terms of size before and after surgery.



### BILATERAL HYPERPLASIA OF THE CORONOID PROCESSES. CASE REPORT

S. Badia, A. Cassoni, M.T. Fadda, F. Giovannetti, D. Bartoli, P. Priore, A. Cardarola, V. Valentini

Department of Odontostomatology and Maxillofacial Surgery. Hospital Umberto I. Sapienza-University of Rome, Rome, Italy

**Aim.** The aim of this technical report is to illustrate the advantages of endoscopic assistance for bilateral coronoidectomy through the classic intraoral approach and emphasize this minimally invasive approach. Differential diagnosis is important to guide treatment and increase patient's quality of life.

**Materials and methods.** A 24-year-old male patient presented to our clinic after a long history of mandibular opening reduction, pain and noises in the temporomandibular joint (TMJ) region with no recent trauma. There were no signs of muscular contracture in the forced opening. Previous radiological studies didn't show any maxillofacial disorders. On clinical examination the patient's inter-incisal opening was limited to 13 mm and diverted 2 mm to the left side; fibrous cord was palpable over the insertion of temporalis muscle on the coronoid processes.

**Results** Intraoral approach with endoscopical bilateral coronoidectomy were performed under general anesthesia. Histopathologic examination of the removed coronoid processes showed a normal mature bone, consistent with hyperplasia. There were no intraoperative and postoperative complications. Approximately 5 days after surgical treatment, the use of a mechanical device (Therabite) and the physiotherapy increased the mouth opening and at the 3-month follow-up, it had stabilized.

**Conclusions** Monolateral or bilateral coronoid hyperplasia is a rare disorder resulting in reduction of mouth opening because of the unnatural contact of the coronoid process with the zygomatic bones. It is macroscopically characterized by an increase in the dimensions of the coronoid process resulting from an abnormal bony elongation of histologically normal bone. The etiology of bilateral forms is unknown and several hypotheses have been proposed: temporalis hyperactivity, hormonal stimulus, trauma, genetic components, TMJ disorders and cartilage growth centers persistence. The poor specificity of signs and symptoms associated with coronoid hyperplasia, which are similar to those of other more frequent forms of TMJ disorders and odontogenic or non odontogenic diseases, presents some problems of differential diagnosis. An accurate valuation must start from a clinical and anamnestic approach to identify pathognomonic clinical symptoms. Improved technology, such as Computed Tomography (CT), it's essential to show bilateral symmetrical enlargement of the coronoid processes that extended above the zygomatic arch and to reveal the surrounding tissue shapes and structure. Many authors agree on intraoral endoscopical assisted bilateral coronoidectomy approach as best treatment because it provides many advantages: magnification and direct vision of lesion, easy and safe osteotomy control, minimal risk of damage to the contiguous tissues, bloodless operative field, fast surgery, brief hospitalization, no external access. In conclusion, in bilateral coronoid hyperplasia, progressive reduction of the mouth opening is caused by the mechanical impingement of the enlarged coronoid processes on the posterior surface of the zygomatic bone. Therefore surgical treatment is always recommended. In author's experience an intraoral endoscopical assisted bilateral coronoidectomy in association with early postoperative rehabilitation allows satisfactory long-term results.





### CONDYLECTOMY FOR THE TREATMENT OF CONDYLAR HYPERPLASIA

**P. Cascone P; R. Pucci; L. Manganiello; D. Angeletti; V. Ramieri**

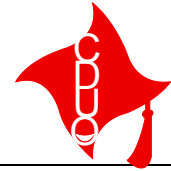
*Dipartimento di Scienze Odontostomatologiche e Maxillo-Facciali, Sapienza Università di Roma*

**Aim.** Condylar hyperplasia of mandible is overdevelopment of condyle characterized by a large spectrum of different clinical conditions. There are several classifications for this pathological proliferation of the condyle. Nitzan contemplates three different growth models: vertical, transverse, or combined. The purpose of this work is to present a diagnostic and surgical protocol for the treatment of condylar hyperplasia.

**Materials and methods.** Cephalometric and clinical data were collected in patients who underwent only condylectomy. Pre and postoperative results are analysed and discussed.

**Results.** Condylectomy alone permit a three-dimensional adjustment of the mandible. This result is difficult to gain with traditional orthognathic surgery.

**Discussion and conclusions.** According to our experience the condylectomy is the most suitable treatment in the presence of an active development of the condyle in patients in the growth phase. Adults with major asymmetries may require orthognathic surgery in conjunction with condylectomy.



### CONSERVATIVE MANAGEMENT OF A LARGE MAXILLARY DENTIGEROUS CYST IN MIXED DENTITION

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**Aim.** The purpose of this article is to present a case report about the conservative management of a large dentigerous cyst in mixed dentition by a decompression of the osteolytic lesion and to report the eruption of involved impacted permanent maxillary right canine in a 11-year old male patient. Several treatment modalities have been mentioned in the literature for management of dentigerous cysts. The treatment modalities range from marsupialization to enucleation of the lesion and are based on the involvement of the lesion with the adjacent structures. Even if enucleation is the treatment of choice, a conservative approach as marsupialization is the best option for large cysts in pediatric patients with the aim of saving unerupted permanent teeth which should not be sacrificed.

**Materials and methods.** A panoramic radiograph revealed a well-defined unilocular radiolucency with sclerotic border. Considering the age of the patient, the size and the position of the cyst, the developmental stage of the root of the involved tooth, decompression was required to eliminate the lesion and to allow the eruption of the permanent canine into its proper position. No drainage was inserted to keep the orifices open. Patient rinsed the cystic cavity using hydrogen peroxide and sterile saline solution for five or six times a day until the complete reduction of the cyst.

**Results.** The histologic test confirmed the diagnosis of "dentigerous cyst". Clinical and radiographical findings after 12 and 16 months had shown that the bone is completely regenerated and the right maxillary canine is in an ectopic position so the patient is waiting for an orthodontic treatment.

**Conclusions.** In the mixed dentition period, a conservative surgical approach is preferred for the treatment of large dentigerous cyst. When the cystic lesion is near to permanent tooth buds, marsupialization is an effective method that is indicated to preserve and promote the eruption of the dislocated permanent teeth associated with the cystic lesion; conservative approach is preferable to enucleation in children also because pediatric patient is not subjected to a more invasive surgery.



### EXTERNAL FIXATION FOR CONDYLAR FRACTURES. A 22 YEARS EXPERIENCE

P. Cascone, F. Spallaccia, C. Rinna, F. Calvani, R. Pucci, V. Ramieri

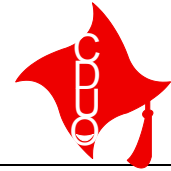
Dipartimento di Scienze Odontostomatologiche e Maxillo-Facciali, Sapienza Università di Roma, Italia

**Aim.** Condylar fractures are estimated being between 21% and 49% of all mandibular fractures, hence they play a primary importance role in maxillo – facial surgery; Average age ranges between 25 and 34 years old. Nevertheless, their treatment remains controversial. The aim of this study is to evaluate the outcomes after a 22-years long-term follow up of condylar fractures treated with external fixation system.

**Materials and methods.** A retrospective study was performed to evaluate the use of the external fixation system as surgical therapy for condylar fractures on patients treated at Dipartimento di Scienze Odontostomatologiche e Maxillo – Facciale, Sapienza Università di Roma between 1990 and 2012. We collected relevant data from hospital archive and we classified the fractures according to Cascone et al. (2008). Short – term follow up at 1, 6 and 12 months after surgery and long – term follow up at 2, 4, 8, 12, and 15 years involved a clinical evaluation (parameters: MMO, pain and/or articular noises or rumors, headache, chewing and speech difficulties, facial nerve injuries), a functional evaluation (with computerized gnathography of maximum mouth opening, lateral and protrusive movements, and chewing velocity), and a morphologic evaluation with orthopantomography, TMJ CT, and three-dimensional CT scans.

**Results.** A total number of 203 patients were treated at our unit with external fixation system from 1990 to 2012; 13 (6,4%) patients were excluded from the sample because complete data were not available. The group of patients was made from 121 males (63,6%) and 69 females (36,3%) and the condylar fractures were divided in bicondilar (47 patients: 24,7%) and monocondylar (143 patients: 75,2%). At the 12 – month follow up, 96 % of treated patients showed up; unfortunately the long term follow up (20 years) accounted only for 11% of patients. Occlusion was restored to the pre traumatic condition in 94% of treated patients with good functional results (MMO: 100% >30 mm, 85% >35mm, 62% >40mm), In less then 6% of cases we observed a temporary paresis of the facial nerve; infection of the surgical wound occurred in <1%. TMJ dysfunction was observed in 12 patients after the longest follow up consisting in disc dislocation with reduction but no one showed dislocation without reduction.

**Conclusions.** We believe that the rigid external fixation system is a viable option for the treatment of mandibular condyle fractures; according to our point of view, the most important advantages provided are the following: it allows immediate mobilization of the TMJ, which favors functional recovery and minimizes the formation of intra articular scarring ensuring condylar remodelling under functional stimulation; moreover it is possible to adjust the alignment in the postoperative period; and it is easily removed without the need for a general anesthesia.



### FACIAL COMPONENTS AND SEXUAL DIMORPHISM

M. Raffaini<sup>1,2</sup>, A.S. Magri<sup>3</sup>

<sup>1</sup>Professor of Maxillo-Facial Surgery, University of Florence, Florence, Italy

<sup>2</sup>Director of Face Surgery Center, Parma, Italy

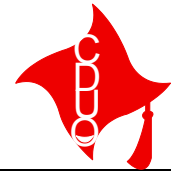
<sup>3</sup>Specialist in Maxillo-Facial Surgery, Private practice, Parma, Italy

**Aim.** Certain facial characteristics can be oriented to sexual identity group; thus have to be considered when there is the will of emphasize the femininity in a female or change gender male to female. Especially in the last group, there is a desire to live and be accepted as a member of the opposite gender; thus it increase the psychological participation and expectation to have a face much more similar to identity perceived of himself. Increasing feminine facial appearance can be obtained by matching different surgical procedures commonly done in plastic and maxillo-facial surgery. Only a few studies have been published to assess timing and procedure able to perform facial feminization. The authors present our surgical protocol and results.

**Materials and methods.** Thirty patients aged 19 to 25 years were referred for facial feminization procedure between 2000 and 2012. Clinical examination and preoperative standardized frontal and lateral photographs were done. A surgical timing of choice was as follow: management of dento-skeletal deformity (if present), simultaneous rhinoplasty, zygoma projection, wide mandible sculpturing, and soft tissue contouring. Afterwards, surgical options to correct masculine stigma of the superior third were performed, the frontal reduction, orbital molding, hairline lowering, eyebrow lift, and temporal area filling, at the same time. A thyroid cartilage reduction is done during the second above mentioned step, because of there is not a swelling of the mandibular-neck angle caused from jaw osteotomy that could interfered with correct evaluation. Preoperative and postoperative facial appearances were compared through photographic analysis and postoperative clinical evaluation (at least two years of follow-up). The overall patient satisfaction with the operation was scored on a numerical scale with a patient questionnaire.

**Results.** All patient showed excellent cosmetic results; frontal view and profile view achieved a loss of them masculine features and a good satisfaction was attained. The combined procedure was well tailored for each patient with individual surgical pattern.

**Conclusions.** Feminization is considerable, the degree of improvement is obtained with widely accepted surgical procedures applied in order to emphasize feminine features. The choice to start from medial third and inferior third of the face, to move on at superior one, permit to have a good relationship of each segment.



### MALIGNANT MINOR SALIVARY GLANDS TUMORS OF THE PALATE

P. Salvatori, R. Perfile, S. Paradisi, S. Colombo, R. Pareschi

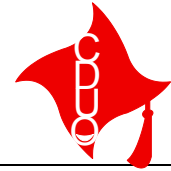
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**Aim.** The aim of our present work is to highlight the diagnostic and therapeutic criteria to apply in case of malignant minor salivary glands tumors of the palate. Dental examination may provide an opportunity for early detection. Malignant forms are about 50% and the most affected site is the oral cavity (64%). The most frequent histological type are mucoepidermoid carcinoma (45%) and adenoid cystic carcinoma (28%). The most typical aspect is a slow-growing submucosal node with a central ulcer. The symptoms may be absent. The 5-years and 10-years survival rate are 73% and 58% respectively. It is easy to undervalue the disease because of presence of capsule and absence of marginal infiltration. Instead these forms have a considerable tendency to the centripetal nervous diffusion.

**Materials and methods.** The AA present two surgical cases: one case of adenoid cystic carcinoma in a 80 year old female and one case of muco epidermoid carcinoma in a 37 year old female. In the first case the patient had a palatal tumor for about 1 year without symptoms. Pace-maker implantation did not allow MRI. CT was negative. FNAB and histological exam after excisional biopsy confirmed the diagnosis. Cancer resection and reconstruction with FAMM flap and Bichat fat were made. In the second case the young patient had a painless tumor on the hard palate for 2 months. CT and histological exam confirmed the diagnosis. An hemimaxillectomy and reconstruction with microvascular re-anastomosed fibular free-flap were made.

**Results.** The excisional biopsy and the instrumental exams allows a correct diagnosis. The MRI and the CT are currently the ideal instrumental exams in the evaluation of the salivary glands lesions for a better definition respectively of soft and hard tissue. Both MRI and CT provide reliable informations about the inside or outside location of the gland and the extent of the disease.

**Conclusions.** The choise of surgery is the gold standard in therapy for these tumor forms. In the clinically and radiologically evidence of lymph node metastasis, the cervical lymph node excision could improve the survival. Radiotherapy plays an adjuvant role after the surgery in case of high risk for recurrence. Lately it is been suggested to use the adrotherapy like radiant therapy but its effectiveness is still to be demonstrated.



### MANAGEMENT OF FACIAL BALLISTIC TRAUMAS. A CASE SERIES REPORT

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V. Valentini, D. Bartoli

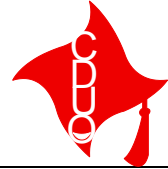
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**Aim.** Facial ballistic injuries often result in relevant soft and bone tissues destruction and represent a challenge for both cranio-maxillo-facial surgeons and dentists. There can be a lot of clinical presentations related to the great variety of traumas caused by this kind of weapon. The purpose of this study is to present the authors' experience concerning the management of five patients who underwent a severe gunshot wound of facial skull.

**Materials and methods.** Five case reports about ballistic traumas of craniofacial district are presented. Three patients underwent the avulsion of some dental elements. The other two patients received, respectively, a superior and inferior maxillary bone lesion. The first, a 33 year-old male involved in an accidental gunshot, had a comminuted fracture of mandibular bone and the loss of a part of oral mucosa and dental elements from 3.1 to 3.7. The second patient, a 29 year-old male, reported an avulsion of the alveolar crest and right premaxilla, therefore many dental elements (2.1, 1.1, 1.2, 1.3, 1.4, 1.5) were lost.

**Results.** Patients who had only lost dental elements were treated with dental implants and gold-ceramic prosthesis. For the 33 year-old patient, reduction and contention of the comminuted fracture of mandibular bone were carried out through the use of two metal straight plates (10 holes with 5 screws for each plate). 8 months later, a fornix deepening and a mucosal repairing was performed in order to prepare the site for implant positioning. At mucosal healing, 7 implants (3i Biomet) were inserted. After 4 months a temporary prosthesis was performed to rehabilitate the correct oral function; a final gold-ceramic prosthesis was delivered 2 months later. The whole implant and prosthetic treatment was completed in 8 months and the one-year follow-up was uneventful. The last patient's management, on the other hand, was more complex because a significant portion of the right maxilla was lost. At first we proceeded with the closure of the wound, after which a surgical reconstruction of the lost bone and soft tissue was carried out. The loss of substance in the right maxilla was fixed with a fibula bone graft. Four months later, the patient underwent the positioning of 6 implants. While waiting the implant osseointegration, another surgical procedure was executed in order to modelling the soft tissue in superior lip area through an Abbè flap. A portion of the uninvolved lip, the lower one, was rotated across the mouth and into the defect of the upper lip, while maintaining the blood supply from the labial artery. After one month, a titanium prosthesis covered by composite material was applied. The whole reconstruction, including both surgery and prosthetic rehabilitation, in this case, was concluded in 14 months and the one-year follow up was free from complications.

**Conclusions.** Management of facial ballistic traumas goes from minimal fixing or reduction of limited fractures to substantial soft tissue and/or bone reconstruction. Discriminating between maxillo-facial lesions with or without loss of substance has a primary role. Firstly, this distinction is justified by the fact that healing requires a longer treatment in cases with severe soft and bone tissue avulsion; secondly, the surgical techniques are quite different, including the employment of bone grafts and local free flaps to fix facial defects. The reported case series represent some possible outcomes of facial ballistic injuries. Rehabilitation was achieved in all patients with satisfactory aesthetic and functional results.



### MRI EVALUATION OF SWALLOWING IN PATIENTS AFFECTED BY PIERRE ROBIN SEQUENCE

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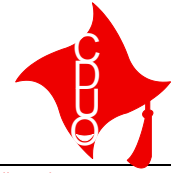
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**Aim.** The current guidelines for the evaluation of feeding improvement after Fast and Early Mandibular Osteo Distraction (FEMOD), include Video fluoroscopic Swallow Study (VFSS), fiberoptic endoscopic evaluation of swallowing (FEES) and esophageal manometry. In order to avoid the exposure to x-rays and to obtain anatomical and dynamic functional information, the authors propose the use of MRI to investigate the deglutition in patients affected by Pierre Robin Sequence (PRS). In these patients, the glossoptosis prevents the forward displacement of the tongue required for sucking. The lack of an effective sucking-swallowing coordination frequently led to bronchial aspiration and pulmonary infection. Moreover the cleft palate prevents the creation of negative pressure in the oropharynx. The authors propose a MRI protocol to investigate swallowing pattern in Pierre Robin Sequence patients.

**Materials and methods.** The Authors carried out the study at Dipartimento di Scienze Odontostomatologiche e Maxillo Facciali, Università Sapienza di Roma, Italia. Five patients who underwent FEMOD, aged between 1 and 5 months old, were investigate. All subjects underwent dynamic MRI study of swallowing function using a 3 Tesla magnet. In order to highlight anatomical structures, gadolinium has been added into milk and patients were fed by bottle. Oral cavity, tongue, soft palate, pharynx, epiglottis, larynx, hyoid bone were investigate and a dynamic assessment of swallowing and bolus progression was performed.

**Results.** The evaluation of MRI sequence has been performed with the help of radiologists. The evaluation of the anatomical structures showed the absence of glossoptosis and the increase of airways volume. Dynamic assessment highlighted the improvement of the suction due to forward displacement of the tongue. Then, the pharynx contraction push the bolus into the esophagus. The contrast material was well tolerated and no patient showed reflux bolus and aspiration into the low airways.

**Conclusions.** The authors think that MRI investigation of swallowing could represent an attractive and safe alternative to current methods. The exiguity of the sample is the major limitation of the method together with the low temporal resolution. Further studies are required with wither samples and healty controls.



### NEURALGIA IN MONOSTOTIC MANDIBULAR FIBROUS DYSPLASIA. CASE REPORT

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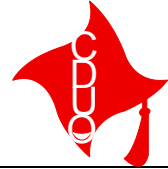
**Aim.** Trigeminal neuralgia may have several causes. The presence of a dysplastic lesion along the pathway of the mandibular nerve could determine compression and, consequently, pain. Mandibular neuralgia is particularly disabling, so it's fundamental to treat it effectively for decreasing the discomfort of the patient as much as possible. After all conservative treatment have been exhausted, surgery was administered. The aim of our study is to establish the efficacy of affected site alveolar nerve neurectomy and direct microvascular neurorrhaphy with contralateral alveolar nerve in a case of monostotic mandibular fibrous dysplasia with acute pain.

**Materials and methods.** A 19 years old woman with minimal monostotic fibrous dysplasia located in the right mandible and involving the mandibular canal came to our attention. Her chief complaint was spontaneous trigeminal neuralgia and associated mild swelling at the right branch of the mandible, which had appeared about 2 years previously. The orthodontist diagnosed an odontogenic abscess and treated her with antibiotics and devitalization of the second inferior right premolar. Due to the persistence of pain, dental extraction and a bone biopsy were carried out. Histological examination diagnosed fibrous dysplasia. At the discharge of the patient, corticosteroid therapy and indication for surgery were set. The patient came to our observation one year later presenting persistence of pain and the onset of iatrogenic Cushing syndrome. First of all, surgical decompression of the right mandibular canal and the extraction of the inferior right third molar were performed. The pain started again one week later so, we decided to carry out a troncular anesthesia of the right mandibular nerve and relief of pain was observed. Then a right mandibular nerve neurectomy at the Spix's spine with direct microvascular neurorrhaphy between the distal branch of the same nerve and contralateral right alveolar nerve were performed.

**Results.** No serious complications were reported. After the surgery, the patient has no more pain and she doesn't need medical therapy. Eight months after surgery the patient showed recovery of the sensitivity in right lower lip area.

**Conclusions.** Fibrous dysplasia is a benign bone lesion characterized by replacement of normal bone with fibro-osseous connective tissue. When the lesion involves the mandibular canal, a trigeminal neuralgia can occur. Accurate etiological diagnosis of trigeminal neuralgia is essential in choosing the most suitable therapeutic approach in order to limit the discomfort of the patient and the possible negative effects of a continuous pharmacological therapy employed in controlling pain. The affected site alveolar nerve neurectomy and direct microvascular neurorrhaphy with contralateral alveolar nerve it's the suitable treatment when the pain is still present.





### NON SYNDROMIC CRANIOSYNOSTOSIS. MORPHOLOGICAL AND VOLUMETRIC EVALUATION OF BRAIN BEFORE AND AFTER SURGICAL TREATMENT

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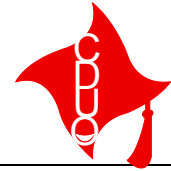
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**Aim.** Craniosynostosis consists of a premature fusion of the sutures in an infant skull that restricts skull and brain growth. It can result in an alteration of intracranial pressure and brain development. The cranial sutures are active sites of bone deposition and growth under the pressure of the brain which increase its volume in the first three years of life: therefore the main objective of early surgery is the release of the sutures in order to allow the brain to reshape the cranial vault. The aim of the study is to evaluate the restoring of brain morphology and to quantify the volumetric changes before and after surgery.

**Materials and methods.** Analysis of 10 patients affected by non syndromic craniosynostosis and treated at the Oral and Maxillo Facial Department of 'Sapienza' University of Rome, Italy has been performed. The analyzed sample is composed by 4 trigonocephaly, 4 scaphocephaly and 2 plagiocephaly. All of them were treated by cranial vault remodeling. Each patient performed CT scan pre and post surgical treatment. Intracranial volumes of these patients before surgery, immediately after and at longest follow up available (mean age 3 years) were analyzed with the help of MINT software.

**Results.** The comparison between the pre and post operative CT scan data showed volume variation and immediate brain remodeling. Brain volume average increase of Trigonocephaly sample was 54,1%, of scaphocephaly sample was 35,65% and plagiocephaly was 27,65%. We observed each patient resumed the physiological brain growth, reaching normal brain volume.

**Conclusions.** Early cranial vault remodeling leads volumetric increase of brain to reach physiological value. Above all, this surgical treatment outlocks the remodeling power of brain, ensuring a physiological growth and normal morphology.



### ORAL REHABILITATION IN POST ABLATIVE AND RECONSTRUCTIVE MAXILLOFACIAL SURGERY

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**Aim.** Treatment for patients with diagnosis of neoplasia in the oral cavity is safety margins surgical removal of the tumor and reconstruction in one time. Prosthesis-based oral rehabilitation of such tumor cases represents a challenge because is difficult to obtain satisfactory results in oral rehabilitation of these patients. Aim of this paper is to evaluate the possibilities of prosthetic rehabilitation on these patients and present our method.

**Materials and methods.** This study analyses four cases of patients who underwent ablative, reconstructive and rehabilitation oral surgery in the Oral and Maxillo-Facial Department of Sapienza University, in Rome. The approach to these cases was influenced by the different anatomic situations after reconstruction procedure. In the first case the surgical site was covered with temporal muscle flap, and the patient was rehabilitated with an implant-supported removable prosthesis. The second, third and fourth have received a fibula free vascularised flap: the second was rehabilitated with a removable prosthesis fixed on the residual teeth, while the third with an implant supported prosthesis. In the fourth case the maxilla was reconstructed with a fibula vascularized free flap, and the patient was rehabilitated with an implant supported prosthesis screwed to a titanium bar solidarizing the implants. Therefore, this prosthesis was fixed, but could be removed by the dentist.

**Results.** When possible, fixed prostheses are the best option, because they guarantee stability, but they should be made so that the operator can remove them periodically to check the health of the oral cavity.

**Conclusions.** The implant rehabilitation allow to complete the reconstructive technique of the flaps or grafts permanently with excellent aesthetic and functional result. Indeed osteointegration eliminates the problems associated with the instability of the prosthesis and ensures a better masticatory function, comparable to the physiological one. It is important for the dentist to approach these patients knowing the kind of surgery they received because this aspect will influence rehabilitative choices. Rehabilitation should be planned, when possible, before surgical treatment, cooperating with the maxillo-facial surgeon in order to choose the most appropriate restorative treatment. In case of oral cavity tumors resection, the removable prosthesis guarantees a simplification in dental care operations. On the other hand, irradiated mucosa is frequently unable to tolerate the friction created by the acrylic base. However, the fixed prosthesis can limit the view during follow-up controls. In our school, according to all exposed reasons, we consider the implant supported overdenture prosthesis to be the best choice for those patients.



### PEDIATRIC MAXILLOFACIAL FRACTURES. MANAGEMENT THROUGH CONVENTIONAL METHODS AND RESORBABLE MATERIALS

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**Aim.** Pediatric maxillofacial fractures (PMF) are uncommon if compared with those in adult population and with other bones fractures of the body. In children, because of the age-related features - such as the peculiar anatomy, the dentition, the small-sized face, the extent of the paranasal sinus pneumatization, the bone growth and the greater cranio-maxillofacial mass to body ratio, the management requires a treatment ranging from soft diet to open reduction and internal fixation.

During the last 30 years, the most common treatment consisted in the application of metal plates and screws, both for adults and for children.

Bioresorbable devices have revolutionized the treatment of PMF, with the development and use of polylactic (PLA), polyglycolic (PGA) and polydioxanone acid plates.

Resorbable materials have recently been used in the treatment of pediatric maxillofacial fractures (PMF). We compared the outcomes between the use of resorbable plates and screws and the conventional methods in children with PMF.

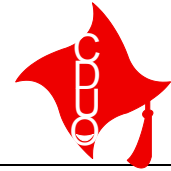
**Materials and methods.** A retrospective observational study was designed using clinical charts from the Pediatric Maxillofacial Surgery Department of the Civil Hospital of Brescia, Italy from June 2008 and June 2012. Among over 3800 admissions in four years, all cases of PMF were selected. The collected data included demographic characteristics, location and type of fractures, treatment provided, intraoperative data, follow-up and outcomes. A total of 1793 pediatric patients with a diagnosis of maxillofacial fracture, ranging in age from 0 to 17 years, was studied; 512 patients were excluded because they underwent a non-operative approach and 159 patients because they had an uncompleted documentation or a too short follow-up. The final sample, composed by 1122 patients, was divided in two groups: children treated by conventional methods (n=912) and children treated by resorbable screws and plates (n=210).

Furthermore, at the end of the treatment, patient's parents or caregivers were asked to give their evaluation on the surgical outcome through a questionnaire including symptoms during healing, outcome and personal opinion (bad, adequate, good or excellent result).

All data were entered into a Database Microsoft Excel 2007 for Macintosh. Analysis was performed using statistical software Stata 9.0. Descriptive statistics and bivariate analysis through chi-squared test were performed. Results were considered to be statistically significant when  $P < 0.05$ .

**Results.** A total of 1122 children (0-17 years old) were enrolled. Children treated by conventional methods were 912 and those by resorbable materials were 210. The frequency of complications during healing was similar and no statistical significant difference was noted. The satisfaction questionnaire revealed percentages of satisfaction similar, with a high degree of satisfaction.

**Conclusion.** Our experience suggests that the resorbable devices should be considered as a possibility of treatment, limiting hospital spending and increasing children's quality of life.



### REVERSE CHEWING CYCLES BEFORE AND AFTER ORTHODONTIC-SURGICAL CORRECTION IN CLASS III PATIENTS

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**Aim.** Patients with severe jaw discrepancies require orthodontic therapy and orthognathic surgery to correct their altered facial morphology and occlusion. Skeletal, occlusal and esthetic outcomes are predictable, but disagreement exists with regard to the functional effect on the stomatognathic system. The aim of this study was to investigate the prevalence of reverse-sequence chewing cycles in adult skeletal class III patients before and after orthodontic-surgical therapy to evaluate whether the occlusal and skeletal correction is followed by functional improvement.

**Materials and methods.** Twenty skeletal class III adult patients (11 males and 9 females,  $22.7 \pm 3.0$  years old) were recruited for this study. Inclusion criteria were as follows: presence of skeletal and dental severe, surgical class III and presence of all teeth (with the exception of third molars), absence of fixed or removable dental prosthesis, of periodontal disease and of craniofacial syndromes or cleft.

All patients underwent the following:

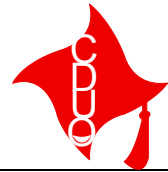
1. Chewing cycle recording before orthodontic treatment (T0);
2. Orthodontic pre-surgical treatment for  $36 \pm 12$  months with fixed appliance;
3. Surgical correction of skeletal class III malocclusion (four patients received bilateral sagittal split – BSSO – to reduce mandibular excess, three patients received LeFort I osteotomy for maxillary advancement, and 13 patients received combined BSSO and LeFort I osteotomy.
4. Orthodontic refinement after surgery;
5. Postorthodontic chewing cycle evaluation (T1).

Chewing cycles were recorded with a kinesiograph (K7 Myotronics Inc.) interfaced with a computer for data storage and subsequent analysis. Patients were instructed to chew a soft bolus and then a hard bolus, deliberately on the right and left sides.

Statistical analysis was performed with the  $X^2$  test to compare data at T0 and T1.

**Results.** A significant decrease in the number of reverse chewing cycles after surgical correction was exhibited in all recordings, when chewing either soft or hard boluses, on both the right and the left side (soft bolus right side: 267 pre and 120 post,  $p < 0,05$ ; soft bolus left side: 276 pre and 144 post,  $p < 0,05$ ; hard bolus right side: 346 pre and 143 post,  $p < 0,05$ ; hard bolus left side: 258 pre and 123 post,  $p < 0,05$ )

**Conclusions.** The changes occurring in dentition after orthognathic surgery are dramatic and the precise knowledge of the adaptation taking place in the motor control of the masticatory function after surgery is of interest for both orthodontists and surgeons. For this reason, the evaluation of the prevalence of reverse chewing cycles before and after orthodontic-surgical correction could be considered an indicator of functional adaptation after therapy and a method for the early detection of nonresponding patients who may require further consideration using a different approach.



### SENTINEL LYMPH NODE BIOPSY IN LOWER LIP CANCER

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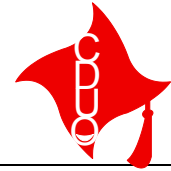
<sup>2</sup>Unit of Dermatology, Head and Neck Skin Cancer Service, University of Modena and Reggio Emilia, Modena, Italy

**Aim.** Lip squamous cell carcinoma constitutes 15–30% of all oral cavity cancers, and the lower lip is involved in 80% of cases. Lower lip cancer (excluding non-melanoma skin cancer) constitutes 5% of all head-and-neck cancers. Lip cancer is a slowly developing tumor, and the frequency of lymph node metastasis is 3-29%. Metastasis is initially noted in level I nodes (the submental and submandibular nodes), later extending to nodes at lower levels. The 5-year survival rate is 85-99% in patients with stage T1N0 cancer, but decreases markedly (to 25–50%) in patients who are in the cN+ stage at presentation. Last National Comprehensive Cancer Network guidelines don't refer to occult metastases investigation strategy. We report application and results of sentinel node biopsy as diagnostic method in cN0 lesions.

**Materials and methods.** The study was based on 24 patients, average age 76 years old, with lower lip squamous cell carcinoma (T>0,5 cm), treated by the Unit of Oral-Maxillofacial Surgery and the Unit of Dermatology, Head and Neck Department, from January 2009 to February 2014. Lymphoscintigraphy technique, widely used in melanoma skin cancer and breast cancer surgery, was performed with colloidal <sup>99</sup>Tc. The radio-isotope was injected in the main lesion; no vital staining as blue dye was used. All patient were cN0 and negative to ultrasonography investigation. Surgical sentinel node excision was performed after localization with a gamma-finder. Tumor staging varies from T1 (73,2%) to T4. Tumor excision was performed at the same surgical time, with functional and esthetic reconstruction of lower lip. Clean and safe margins of resection were always researched.

**Results.** It was possible to find sentinel nodes in 100% of treated patients. Only three cases, all T2 at current staging, results positive to micro metastases investigation; monoclonal anti-body MNF 116 was used as marker and 200µm microtome sections were performed. Either undergo to neck dissection which allowed to identify respectively 1 pN+ each, same neck level of sentinel node. No disease recurrences has been detected in 5 years follow-up with clinical and ultrasonography investigation.

**Conclusions.** To avoid needless elective neck dissection or a delay of treatment in occult N+ cases, biopsy method can identify metastases presence in cN0 cases, though we suggest expanding the method also to all T1 > 0,5 cm.



### TEMPOROMANDIBULAR JOINT RE-ANKYLOSIS IN A 7-YEARS-OLD PATIENT WITH TEMPOROMANDIBULAR JOINT PROSTHESIS TREATED WITH INTRAORAL ENDOSCOPIC APPROACH

C. Bianca, R. Pucci, M. Castrechini, D. Angeletti, Pecram, P. Cascone

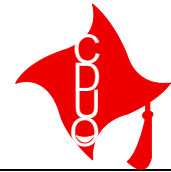
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**Aim.** Ankylosis of the temporomandibular joint (TMJ) is the bony or fibrous adhesion of the anatomic joint components. Consequences of temporomandibular joint ankylosis include mouth opening limitation, malocclusion, retrognathia, mandibular asymmetry, maxillary cant, malnutrition and serious oral hygiene. Moreover in growing patients it affects the growth and the development of the mandible, resulting in an alteration of entire maxillofacial complex. Mandibular hypomobility and retrognathia induce the collapse of posterior airway space which may result in breathing difficulties and obstructive sleep apnea syndrome (OSAS). The authors report the case of a 7 years old patient with TMJ prosthesis affected by bilateral TMJ re-ankylosis conservatively treated with intraoral endoscopic approach.

**Materials and methods.** A case of a 6 years old patient affected by temporomandibular joint ankylosis, who underwent multiple surgery for recurrence of the pathology, is reported. The patient was finally treated by bilateral total reconstruction of the temporomandibular joint (TMJ) with custom made prosthesis. At 7 years of age, the patient showed reankylosis of the TMJ medial aspect. The authors decided to approach the bony block intraorally with endoscopic assistance, in order to avoid the removal of the prosthesis and eventual infections. Piezosurgery has been used to remove the ankylotic block without damaging the adjacent soft tissues.

**Results.** Surgery led to an improvement in mandibular mobility, in fact the Maximum Incisal Opening (MIO) increased from 10 to 25 mm. The 1 year post-operative follow up demonstrated a significant improvement of the patency of the upper airway space and a good mandibular growth as well as the range of mandibular function stable on 25 mm.

**Conclusions.** When TMJ ankylosis occurs during the developmental age, it may be responsible for major growth problems for the patient. Treatment of TMJ ankylosis in children, to maintain a normal growth and the development of the face, is important to provide a satisfactory mouth opening. In order to obtain a good mandibular mobility the removal of the ankylotic block should be radical and complete. We think that endoscopic approach is a safe and minimally invasive technique in some selected cases.



### **TWO-NEEDLE VS. SINGLE-NEEDLE TECHNIQUE FOR TMJ ARTHROCENTESIS PLUS HYALURONIC ACID INJECTIONS: A COMPARATIVE TRIAL OVER A SIX-MONTH FOLLOW UP**

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Arthrocentesis of the temporomandibular joint (TMJ) has emerged over the years as a useful technique to manage restricted mouth opening. The discovery of the importance of hyaluronic acid (HA) in joint lubrication and the addition of HA injections immediately following joint lavage has allowed extending the indications to inflammatory-degenerative disorders, such as osteoarthritis. The literature findings are inconclusive regarding the best treatment protocol for each specific clinical condition and further investigations are needed. Protocols for symptom management in larger joints provided the adoption of a cycle of five weekly HA injections immediately following arthrocentesis, and encouraging findings also emerged from long-term case series on patients with TMJ disorders. The classical technique to perform TMJ arthrocentesis before injecting HA uses two needles, one for saline inflow and one for outflow. Several papers refer to the most suitable technique for needle placement within the joint cavity. Recently, other approaches to arthrocentesis have been proposed and reviewed. A technique using a single needle for both fluid injection and ejection has been described and gave interesting results over a short period. The single needle approach for washing the TMJ was based on the rationale that pumping saline injection into the superior joint compartment with the patient in an open mouth position provides enough pressure to release joint adhesions and to allow fluid outflow when the patient closes their mouth. The two-needle and the single-needle techniques were compared as part of a short-term investigation comparing six protocols for performing TMJ arthrocentesis with or without additional drug injections, but there was no evidence of the superiority of one technique over the other. In general, there is little information on the relative efficacy of the different techniques. The present investigation aimed to provide more data over a longer follow up period, focusing on the comparison of the effectiveness of five weekly two-needle vs. single-needle arthrocentesis plus HA injections in patients with inflammatory-degenerative disorders of the TMJ.

The aim of the study was to compare the effectiveness of five weekly two-needle arthrocentesis plus hyaluronic injections vs. the same protocol performed with a single-needle technique in patients with inflammatory-degenerative disorders of the temporomandibular joint (TMJ). 80 patients with TMJ osteoarthritis were randomly assigned to the two-needle or single-needle protocol and followed up for 6 months after treatment. Several outcome parameters, such as maximum pain at rest and maximum pain on chewing, subjective chewing efficiency, limitation in jaw function, jaw range of motion in mm, were recorded at baseline and multiple follow up assessments. Both treatment groups recorded significant improvement with respect to baseline levels in almost all outcome variables. The rate of improvement was not significantly different between the treatment protocols in any of the outcome variables (p-values between 0.143 and 0.970). No between-group differences emerged for the perceived subjective efficacy (p=0.321) and the treatment tolerability (p=0.783). The present investigation did not support the existence of significant differences in the treatment effectiveness for inflammatory-degenerative TMJ disorders of a cycle of five weekly injections of arthrocentesis plus hyaluronic acid injections performed according to the classical two-needle or the single-needle technique.



### USE OF RIGID EXTERNAL FIXATION IN CONDILAR FRACTURES IN THE AGE OF GROWTH

F. Spallaccia, A. Rivaroli, M. Gualtieri, C. Rinna, PECRAM, P. Cascone

Dipartimento di Scienze Odontostomatologiche e Maxillo-Facciali, Sapienza Università di Roma, Italia

**Aim.** Condylar fractures treatment represent 20% to 35% of all mandibular fractures. The presence of facial nerve that runs just over the break point of the condilar neck makes its surgical treatment very debated in literature both for the surgical approach and for the fixation devices system. This debate is even more controversial for the condilar fractures during the growth. This retrospective study was set up to evaluate the outcomes of the surgical treatment based on open reduction and external fixation applied to patients in the age of growth with dislocated or displaced mandibular condylar fractures.

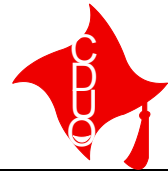
**Materials and methods.** We selected 6 patients with less than twelve years old (6, 8, 9, 10, 11, 11 years old). They were treated at Maxillo-Facial and Odontostomatologic science Department, Sapienza University of Rome, between 1990 and 2012. The choice of treatment was open repositioning and external fixation to all six patients through a preauricular skin approach.

The vertical height loss that caused "the dropback mandible" is the inclusion criteria of this study. Short – term follow up at 1, 6 and 12 months after surgery and long – term follow up at 2, 4, 8, 12, and 15 years involved a clinical evaluation (MMO, pain and/or articular noises, headache, chewing and speech difficulties, facial nerve injuries), a functional evaluation (with computerized gnathography of maximum mouth opening, lateral and protrusive movements, and chewing velocity), and a morphostructural evaluation with orthopantomography and 3 – dimensional CT scans.

**Results.** At the 1 year follow-up, 5 (83%) of treated patients regained their pre-trauma occlusion with satisfactory functional results (MMO: 100% >30 mm, 81% >35mm, 59% >40mm); only 1 patient needed orthodontic treatment in order to regain the pre – trauma occlusion. A very encouraging feature was the absence of cases that showed permanent paralysis of the facial nerve.

**Conclusions.** The specialistic literature has demonstrated that the condilar fractures with height loss can be treated or not but the non surgical approach to this patient must be followed by a very long orthopedic and orthognathic therapy until the end of growth. Moreover the children shouldn't be treated with rigid fixation systems (titanium plates and screws) that remain in the growing bone or to be forced to another surgical procedure to remove them. So we propose a semi-rigid external fixation system that allows the reduction of the condyle fractures and can be removed totally after 15-21 days of fixation. With this surgical procedure we can reduce the fracture, restore the correct vertical height of the mandible and avoid enduring and expensive therapy during their teenage life.





### WAVE TECHNIQUE IN LOWER LIP CANCER

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**Aim.** We present our experience with treatment of lower lip cancer using the wave technique. The wave technique for closure of full-thickness defects of the lower lip takes origin from the staircase technique. After excision of the cancer, reconstruction of the lower lip is performed with an advancement wave shape flap from the lateral parts of the lip and chin.

**Materials and methods.** Fifty-seven patients (39 males, 18 females), ranging from 33 to 96 years of age, were treated using the wave technique from September 2009 to August 2013. Patients undergoing the procedure had tumors classified as T1N0M0 or T2N0M0. Surgery was performed in the operating room under local anesthesia or narcosis when sentinel lymph node biopsy (LNSB) is required. All operations were performed using the wave technique designed on the basis of the staircase technique. The tumor was removed using a full-thickness excision. The resection margins usually undergo frozen section examination intraoperatively. Lateral defects less than 2 cm in size are generally treated with a unilateral flap and median defects are closed with bilateral symmetric flaps. If the defect is paramedian and greater than 2 cm in width, 2 asymmetric flaps are used.

**Results.** Patients underwent a 6- to 48-month follow-up. No recurrences were observed during this period. All patients showed excellent aesthetic results and no microstomia. Patients had no particular complaints except for mild "numbness" in the chin area, which resolved in all cases after 6 months.

**Conclusions.** The lips play an essential role in the appearance of the face, facial expression, language function, and the ability to speak. The surgical treatment of lip cancer involves full thickness tumor excision, while leaving an adequate margin of healthy tissue. The ideal scar should be flat, narrow, level with the surrounding skin, have good color match, and be within or parallel to relaxed skin tension lines. These characteristics make a scar less conspicuous. Therefore, techniques that break up or make the line of the scar irregular provide greater camouflage. Based on this principle, we modified the straight lines of the staircase technique into round lines of the wave technique it allows the improvement of the aesthetical result. The goal of the broken lines and round lines is allow to get less visible scars. Because of these good results, we suggest that this technique be used routinely for surgical treatment and reconstruction for tumors involving up to 60% of the lower lip.



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## CHIRURGIA ODONTOSTOMATOLOGICA

SESSIONI >>>

### **A COMPARISON BETWEEN POLYAMIDE AND SILK SUTURES IN THE HEALING OF POSTEXTRACTION SOCKETS**

E. Quaglia, L. Moscufo, F. Mussano, I. Baldi, D. Coscia, S. Carossa

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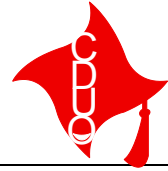
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### STAGE 3 BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE POSTERIOR MAXILLA: SURGICAL TREATMENT USING THE PEDICLED BUCCAL FAT PAD FLAP

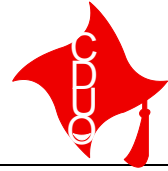
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F.C. Dede, A. Castaldo, A. Corsello, G.L. Sfasciotti

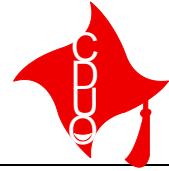
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A. De Carlo, V. Zizzari, S. Tetè, A. Piattelli

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## CHIRURGIA ODONTOSTOMATOLOGICA

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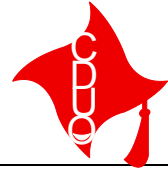
### RADICAL SINUS SURGERY APPROACH FOR RETRIEVAL OF DISPLACED ROOT: A CASE REPORT

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R. Pippi, F. Fino, R. Patini, D. Vitolo





### A COMPARISON BETWEEN POLYAMIDE AND SILK SUTURES IN THE HEALING OF POSTEXTRACTION SOCKETS

E. Quaglia<sup>1</sup>, L. Moscufo<sup>1</sup>, F. Mussano<sup>1</sup>, I. Baldi<sup>2</sup>, D. Coscia<sup>1</sup>, S. Carossa<sup>1</sup>

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**Aim.** To compare polyamide sutures with traditional silk sutures after tooth extraction.

**Materials and methods.** A split-mouth study was designed and implemented. Post-extractive sockets were sutured either with polyamide sutures (Polimid, Swden & Martina Due Carrare (PD), Italy; investigation site), or with silk suture (Silkam, Silkam Non Absorbable Aesculap Aesculap, Inc. Center Valley, PA; control site). The choice of the socket was randomized recurring to a software. The study population consisted entirely of patients referred to the Department of Surgery at the Dental School of the University of Turin from September 2012 to April 2013. The inclusion criteria were: good general health conditions, attendance of the preoperative professional hygiene program; need for bilateral extractions of homologous teeth; compliance to the study protocol. The exclusion criteria were platelet dysfunction, thrombocytopenia or treatment with corticosteroids. Follow-up included one post-extraction checkup at 7 days for the suture removal. After the extractions, each patient was recalled at day 7. To estimate socket healing without primary closure, a modified version of the HI was used.

**Results.** Thirty patients underwent contemporary bilateral extractions of homologous teeth. The treatment-versus-control postoperative comparison showed that polyamide sutures resulted in significantly smaller residual socket areas and better Healing Indices at day 7.

**Conclusions.** The primary goals of this study were to measure socket reduction and the Healing Index (HI) at a 7 day postextraction checkup. Based on the results here reported, the polyamide sutures performed better than the silk sutures.



### A NEW FLAP IN PARTIALLY IMPACTED MANDIBULAR THIRD MOLAR SURGERY: THE PARRINI-CAPUANO FLAP

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**Aim.** Many flaps have been proposed in literature for mandibular third molar surgery: triangular, L-shape and more. This paper presents the use of a new flap (Parrini-Capuano flap) in management of soft tissues for surgery of partially impacted lower third molars affected by pericoronitis, in order to reduce the soft tissue trauma and postoperative patient discomfort, and improve first intention recovery. The present flap has been compared with a previous third molar flap, the Cogswell flap, and the different results have been compared.

**Materials and methods.** A total of 40 healthy patients with partially impacted mandibular third molar were enrolled in this study and randomly divided into two different groups : 20 patients received the triangular Cogswell flap for third molar surgery, while the others 20 received the brand new Parrini-Capuano flap. Both groups received a preoperative antibiotic prophylaxis and postoperative 0.12% chlorhexidine rinses. Aim of both flap was first intention recovery, measured with postoperative swelling at 7 and 14 days after surgery. All wounds that did not recover as first intention were classified as secondary closure, and considered a failure. Bootstrap BCa (Bias Corrected Accelerated), Z-Test, Chi-square Test, Pearson's phi index, di Goodman e Kruskal lambda index were used to assess significancy of results. P-values under 0.05 were considered significant.

**Results.** Cogswell flap resulted in a first intention recovery 35% at day 7 and 15% at day 14, while Parrini-Capuano flap resulted in a first intention recovery 85% at day 7 and 55% at day 14, resulting  $p=0.0012$  at day 7 and  $p=0.008$  at day 14, showing a significant difference between the two flaps. The remaining cases recovered with a secondary closure. No significant differences were observed in postoperative swelling. No complications occurred in both groups.

**Conclusions.** The new Parrini-Capuano flap, consisting in a modified trasposed triangular Cogswell flap, represents a new technique for the oral surgeon for the management of the soft tissues in partially impacted lower third molar surgery. The first intention closure is generally preferred to the secondary one, as ensures a faster recovery and reduced infection rate. This flap ensures first intention recovery and reduce complication risk rate, as swelling. We suggest the use of this flap in all conditions where a first intention recovery is preferred to secondary closure.



### AN AUDIT OF CASES AT THE WARD OF TEETH EXTRACTIONS OF THE DENTAL SCHOOL OF TURIN IN THE YEARS 2012 AND 2013

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**Aim.** The Ward of Teeth Extractions of the Dental School of Turin manages with simple teeth extractions in healthy and un-healthy patients. Indeed, this Service is directed to Hospitalised patients, patients waiting for organ transplantations, affected by cancer, heart diseases, patients in anticoagulants, poliallergic patients, and so on... The Service has five dental chairs in use. There is an anaesthetist in the Dental School. Aim of this paper is to describe composition of the population attending to, analyse most relevant clinical characteristics, identify outcomes, complications and sequelae and compare these with recent scientific literature.

**Materials and methods.** in average, flow of people to our Service is 50 patients every day; of these, 18 for tooth extractions. 25 tooth are extracted in average, every day. More than 20000 passages were realised complessively in two years 2012 and 2013; more than 4000 simple tooth extractions were performed.

**Results.** about a half of people attending to our Service are unhealthy; they are affected mostly by diabetes, ischemic cardiopathy, cardiac failure, oncological problems, haemorrhagic diathesis from different causes, renal or liver failure, patients waiting for organ transplantation, poliallergic patients. Even if this patient population is at high risk of local and general complications, very few undesired sequelae were seen. Between these, minor complications, easy to treat are prevalent, but wound healing is prolonged and medications and controls are needed in time: infections and alveolar osteitis cured with local medications and sometimes general antibiotic therapy and oral—nasal communications, especially after extraction of superior third molars, treated with immediate closure plastics are the most common. Bleeding and swelling are possible; nerve injuries were never seen. Simple losses of consciousness happened, but all were spontaneously remitted, only positioning patients in anti-shock position. Intervention of the anaesthetist was never needed excepted for simple surveillance.

**Conclusions.** even if our Tooth Extractions Service has an attending population represented in great part from at risk patients, very low frequency of local and general complications were seen, in agree with frequency described in scientific literature for healthy people. Atrophy of the upper jaws: sinus lift technique with heterologous bone grafts (Bio-Oss®) mixed with pure-phase beta-tricalcium phosphate (Sintoss) and platelet rich fibrin (PRF®).



### ATHROPHY OF THE UPPER JAWS: SINUS LIFT TECHNIQUE WITH HETEROLOGOUS BONE GRAFTS (BIO-OSS®) MIXED WITH PURE-PHASE BETA-TRICALCIUM PHOSPHATE (SINTOSS) AND PLATELET RICH FIBRIN (PRF®)

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**Aim.** the aim of the present study is to evaluate the regenerative capacity of PRF® with Bio-Oss® particulate heterologous bone grafts mixed with 50% of cortical and medullary grafts and 50% of pure-phase beta-tricalcium phosphate (β-TCP) and SintOss, compared with the use of Bio-Oss® mixed with 50% of cortical and medullary grafts and 50% of β-TCP and SintOss, in the treatment of maxillary atrophy with Tatum's sinus lift technique.

**Materials and methods.** 32 patients aged between 42 and 75 years were selected, 12 females and 20 males. 37 sinus lift surgeries were performed (with placement of 84 fixtures), which can be classified into two groups according to the graft material used: in the study group (21 patients with placement of 59 fixtures) the combination of PRF/Bio-Oss (equally mixed with cortical and medullary grafts and pure β-TCP) and SintOss was used, while in the control group (11 patients and with placement of 25 fixtures) only Bio-Oss and SintOss (β-TCP) were used.

**Results.** Healing was assessed by clinical and radiological examinations (OPT x-ray, CT, DentaScan). The 12-month X-ray control revealed the presence of well integrated new bone tissue, as well as an intimate contact of implants with the newly formed bone. The histological report showed that the bone tissue specimens taken from the site treated with the association PRF/ Bio-Oss and β-TCP after only 4 months consisted of lamellar bone tissue with an intensely-eosinophilic bone matrix to be ascribed to the newly-formed bone tissue; osteocytes were disposed horizontally. The stroma was relaxed and richly vascularized. Specimens from the control group taken after 8 months fragments were constituted by trabeculae of lamellar bone tissue with inhabited osteocyte lacunae, immersed in a dense poorly-cellular fibrous stroma, in which are included fragments of lamellar bone with empty osteocyte lacunae as a result of the granules of Bio-Oss not yet integrated into the bone matrix, and with an intensely-eosinophilic bone matrix. Histomorphometric analysis showed the presence of mineralized trabecular bone in both groups. In the study group there was the presence of osteocytes, osteoblasts and osteocytic materials, in small quantity but higher than specimens taken from the group control.

**Conclusions.** the use of Bio-Oss mixed with β-TCP and associated with the growth factors of PRF reduced the healing time and resulted in a faster bone regeneration, which allowed to place implants already after 4 months. Bovine bone grafts (equally mixed with cortical and medullary grafts and pure β-TCP) and PRF allowed to place fixtures in sinus lift with basal bone measuring less than 5 mm. Moreover, its gelatinous consistency favors clot stability and the membranous shape allows to create a natural "barrier effect" on the bone breaches that were opened in the surgical areas, and it also improves tissue healing. Clinical and radiographic controls were performed every 12 months for 48 months and DentaScan CT every 24 months. Only one fixture failed out of 59 placed in the study group.



### BONE LID TECHNIQUE WITH PIEZOELECTRIC SURGERY: A CASE SERIES

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**Aim.** To describe a technique to access the alveolar bone in patients needing surgical intervention for several different pathologies such as impacted teeth, cysts or tumors, or displaced materials in maxillary sinus. This technique is known as "bone lid technique". In the present case series, a piezoelectric surgical device equipped with a thin cutting insert was used to perform the osteotomy for the bone lid. This method may reduce the entity of bone loss and prevent the damage to the soft tissues during the bone window osteotomy, when compared to other methods such as surgical saws or burs.

**Materials and methods.** From 2008 to 2013, fifteen patients were consecutively treated with the bone lid technique for various indications: 11 for cyst, 2 for impacted mandibular third molar, 1 for dental implant dislocated in maxillary sinus, 1 for impacted upper first molar. In each case the following method was adopted: preparation of a bone lid using a piezosurgical device associated with a thin osteotomic insert (Piezosurgery®, Mectron Medical Technology, Carasco, Italy - Insert OT7); reposition of the bone lid at the end of the planned surgery using fixation microplates or, alternatively, resorbable sutures. After 7 days post-operative sutures were removed and clinical conditions were checked out. 6-month clinical and 12-month clinical and radiological (ortopantomography and CT scan) assessments were performed to evaluate bone healing and record complications, if present.

**Results.** For all cases, immediate and late post-operative conditions were considered normal. In cases of mandibular surgery involving the inferior alveolar nerve, its function was always completely maintained. In 7 cases surgical removal of fixation plates and screws was needed for various reasons (e.g. reentry for implant surgery, or subjective discomfort). Computer tomographies and panoramic radiographies showed no signs of infection, bone resorption, or recurrence. A complete ossification of the bone lid margins was observed in almost all cases.

**Conclusions.** Results from this case series seem to demonstrate that the bone lid technique with piezoelectric surgery is a safe and reliable alternative to classical bone osteotomy. This procedure allows a good visibility and no damage to delicate structures such as the inferior alveolar nerve. The replacement of the bone lid in its original position and its fixation seems to enhance the healing of the underlying bone defect.



### BUCCAL BONE DEFICIENCY IN FRESH EXTRACTION SOCKETS: A PROSPECTIVE SINGLE COHORT STUDY

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**Aim.** The purpose of this prospective single cohort study was to evaluate the use of xenograft and collagen membranes in treating full or partial buccal bone defects of fresh extraction sockets in the aesthetic zone.

**Materials and methods.** Thirty-three patients requiring tooth extraction in the anterior maxillary area and showing a complete or partial buccal bone plate deficiency (more than 2 mm) were consecutively enrolled and treated. Corticocancellous porcine bone and platelet-rich fibrin (PRF) with a collagen membrane were used to graft the extraction sockets and the membranes were left exposed to the oral cavity with a secondary soft tissue healing. The outcome variables were as follows: width of keratinized mucosa, facial soft tissue levels, clinical bone changes (measured with a clinical splint), implant and prosthesis failures and peri-implant marginal bone changes.

**Results.** All treated sites allowed the placement of implants; the width of keratinized mucosa at the mid-facial aspect showed an increase of 2.3 mm 5 months after the grafting procedure and its value was  $3.2 \pm 0.6$  mm at 1 year follow-up. The mean values of the facial soft tissue level indicated an increase over time. The bone level showed an improvement of  $0.8 \pm 0.1$  mm and  $0.7 \pm 0.1$  mm at mesial and distal sites, respectively, when compared to the baseline measurements. Finally, in the palatal area no bone changes were observed. No implant failed during the entire observation period.

**Conclusions.** Findings from this study showed that xenograft and PRF, used for ridge preservation of the extraction sockets with buccal bone plate dehiscence in the aesthetic zone, can be considered effective in repairing bone defects before implant placement. The secondary soft tissue healing over the grafted sockets did not compromise bone formation; moreover, the soft tissue level and the width of keratinized gingiva showed a significant improvement over time.



#### CARCINOMA OF THE LIP: CLINICAL CASES

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**Aim.** Carcinoma of the lip is the most common neoplasm of the oral cavity; it mainly affects males, especially after the fifth decade of life, with an history of prolonged exposure to sunlight, poor oral hygiene, inadequate diet, abuse of alcohol and smoking. The most frequent are squamous cell carcinomas, while more infrequent are basal cell carcinomas and adenocarcinomas; melanomas are frequent only in exceptional cases. Early diagnosis is essential to prevent the worsening of the disease and malignancy. The therapeutic approach is contrasting: radiation therapy is recommended in case of small lesions especially in the upper lip or in the labial commissure, even though surgery seems to be the first choice especially for invasive lesions. The aim of the present study is to document three cases of carcinoma of the lip without early diagnosis.

**Materials and methods.** Two male patients, respectively with 74 and 65 years of age, presented with a small lesion; the physical examination was performed after taking their medical history; then, surgery was performed with a reduced aesthetic damage for the patients, since the two lesions were less than 2 cm and they did not affect the lymph node regions. After excluding the location of tumor into other areas (stage I), the tumor was removed with a margin of healthy tissue. The third 78-year-old patient required a destructive surgery given the extent of the lesion up to the chin area (Berard's surgery). The greatest difficulty that the surgeon encountered during reconstruction was to ensure a good reconstruction of the lower lip in order to obtain an adequate lip competence. Physical examination revealed a layer of abnormal oral mucosa in the three lesions; the histological examination showed cell changes after biopsy.

**Results.** Lip cancer affects males over the age of 40, white race more than black race, probably due to the protection provided by melanin. The initial lesions are not painful, they have undefined margins and infiltrate only a little in the surrounding tissue; they may be dyskeratotic areas with superficial crusting that can be easily removed with minimal bleeding, or they may be infiltrating and vegetating with a slow growth. Histologically, both the epithelium and the underlying connective tissue are involved.

**Conclusions.** tumors of the lip and of the oral cavity are often diagnosed during a dental check-up. It is essential to go to the specialist in case of a small protuberance on the lip, in the mouth or gums, in case of a small lesion in the mouth that does not heal or with a white-reddish stain that does not disappear. The differential diagnosis is crucial with ulcerating inflammatory lesions, since they are chronic, symmetric and non-infiltrating, as well as the "diagnostic delay" according to the medical staff involved and to the objective assessment of the lesion: the presence of a tumefaction persisting on the oral mucosa or a wound that does not heal can be a warning sign of a pre-tumor or tumor lesion of the oral cavity.

It is advisable to follow the indications of the oncologist in case he/she recommends to participate in clinical trials aiming at the evaluation of new combinations of anticancer products and/or new therapeutic protocols.



#### COLLABORATION SPOTTING FOR DENTAL SCIENCE

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**Aim.** Collaboration Spotting is a project of the CERN Laboratories, Geneva (CH). Goal of the project is to create an automatic system to collect information about publications and patents related to a given technology, to identify the key players involved in the technology, to spot collaborations among the players, and to identify related or similar technologies. The collected information can be visualized in a web browser as interactive graphical maps showing in an intuitive way the players and their collaborations (Sociogram) and the relations among the technologies (Technogram). A prototype of the system is already active and is collecting information about technologies related to High Energy Physics and Medical Imaging. We propose to use the system to study technologies related to Dental Science.

**Materials and methods.** In order to create a Sociogram, we create a logical filter based on a set of keywords related to the technology under study. This filter is used to extract from the Thomson-Reuters' "Web of Knowledge" database an exhaustive list of publications related to the technology. The list includes the article title, full authorship (names and institutions), abstract, and journal. To weed-off unrelated publications, the list is validated by an expert in the technology. We then send the list to CERN where it is inserted in the Collaboration Spotting main database. Here, an automatic software system uses the data to generate the final Sociogram which can then be dynamically visualized from any standard web browser.

**Results.** As an initial test, we studied a set of recent technologies related to bone regeneration procedures of oro-maxillo-facial critical size defects, namely the use of Porous HydroxyApatite (HA) as a bone substitute alone (bone graft) or as a tridimensional support (scaffold) for insemination and differentiation ex-vivo of the Mesenchymal Stem Cells (tissue engineering). We produced the lists of publications for these technologies and the related Sociograms. The resulting maps are now accessible on-line.

**Conclusions.** The Collaboration Spotting system allows the automatic creation of interactive maps (Sociograms) to show the current and historical state of research on a specific technology, highlighting the participating institutions and their collaboration relations. The ease of use and intuitiveness of these maps make them an ideal tool both for researchers who want to assess the status of the art in a given technology, and for supervising entities who want to evaluate the contribution of an institution to the technological development in a given field. We demonstrated that, with very little effort, the system can be used for Oral Science and produced the Sociograms for an initial set of technologies in this field. We now plan to enlarge the set of mapped technologies in order to make the Collaboration Spotting system a useful reference tool for Oral Science research.





### COMPARISON BETWEEN TWO TEETH EXTRACTION PROTOCOLS USING PLASMA RICH IN GROWTH FACTORS (PRGF) IN BISPHOSPHONATE TREATED PATIENTS

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**Aim.** The aim of this study was to test the validity of a new surgical protocol for teeth extraction in patients taking intravenous bisphosphonates, relying on regenerating properties of PRGF System. Bisphosphonates are known for their clinical efficiency especially in oncologic patients for the treatment of bone diseases such as bone metastases starting from solid tumors, Multiple Myeloma and Paget's disease. Nevertheless Bisphosphonates are also known for the risk of occurrence of Bisphosphonates Related Osteonecrosis of the Jaw (BRONJ). Literature in the last 10 years has shown how teeth extractions is the injury that most of all is associated with the appearance of osteonecrotic wounds. In the prevention of BRONJ occurrences at San Giovanni Battista Hospital of Turin, department of Oral Surgery, since 2005 were developed and used year by year 2 different extraction protocol, that have proven their successes to reduce the BRONJ incidence thanks to a quick post-surgical healing of soft and hard tissues by using Plasma Rich in Growth Factors (PRGF).

**Materials and methods.** The first protocol applied provided a surgical extraction under antibiotic coverage. When necessary osteoplasty by piezosurgery technique was made. The extraction site was filled with PRGF in order to support hard and soft tissue healing. A flap was made to ensure primary closure of the surgical site to protect the bone from oral bacteria. Considering the good results achieved with the first protocol and the barrier propriety of PRGF System (Anitua et al., 2010-2012), a new protocol with decreased surgical invasion, was introduced; it consists in atraumatic tooth extraction under antibiotic coverage, post extraction alveolar socket cleaning and its filling with PRGF.

**Results.** In the first protocol 68 patients took part in the study and 231 extractions were performed in a surgical setting; we had 6 post extraction BRONJ. In the second protocol 97 patients took part in the study. 310 extractions were performed in a surgical setting; we had bone healing complications in 5 post extraction sites, quickly treated and solved with Piezosurgery technique. No statistical differences could be reported regarding age, gender, duration of Bisphosphonate treatment, concomitant corticosteroid therapy, men surgical time.

**Conclusions.** The results gained with the second protocol seem to be better in the management of the post surgical complications. Besides the operative technique is easier and faster than the earlier one.



### DENTAL EXTRACTION IN THE DIABETIC PATIENT: EVALUATION OF THE GLYCEMIA BEFORE AND AFTER THE INTERVENTION

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**Aim.** The purpose of the study was to evaluate the influence local anesthetics either with or without epinephrine may have on glycemia during the tooth extraction in the diabetic patients. The null hypothesis was that the post-operative values of the group treated with epinephrine were equal to those of the group treated without vasoconstrictor.

**Materials and methods.** 82 diabetic patients needing tooth extraction were enrolled in this randomized clinical study at the Surgery Department of the Dental School of the University of Turin between June 1<sup>st</sup> 2013 and December 31<sup>st</sup> 2013. The patients were subdivided into two homogeneous groups of 41 subjects each. The parameters taken into consideration at the baseline for ensuring homogeneity of the groups were: gender, age, blood glucose and glycated haemoglobin. With the only difference of the use of anesthetics with epinephrine (study group) and without epinephrine (control group), the patients of both groups underwent the same protocol as follows: 1) glucose test prior to tooth extraction, plexus anesthesia, dental avulsion by means of lever and calliper, suture, glucose test at the end of the procedure.

**Results.** As expected, the homogeneity of the groups was maintained after the intervention. A normal distribution of the parameters considered was found. After tooth extraction, the blood glucose values decreased of  $0.07 \pm 0.04$  ( $p < 0.0005$ ) in both groups in about one third of the patients ( $N=53$ ), while in only one third of the patients ( $N=29$ ) a higher glycemia could be tested  $+0.05 \pm 0.04$  ( $p < 0.0005$ ). As for the statistical analysis the Wilcoxon Test and the Mann-Whitney Test were used.

**Conclusions and discussions.** From the results it can be concluded that in both groups the post-operative blood glucose value did not increase in a statistically significant way, both in the total sample and in the 2 groups each (this including the group treated with epinephrine, that is considered a hyperglycaemic). In addition, blood glucose levels, albeit with very low variations, demonstrate a greater decrease in post-operative blood glucose values in both groups, although in the group treated without epinephrine decreased more than in the group with epinephrine. In light of the results portrayed in our study, it could be possible to issue new guidelines on the protocol used in the diabetic patient, as the gold standard in oral surgery remains the use of local anesthetics with vessel constrictors, these can bring numerous benefits such as depth of effectiveness, durability and local effect limited at the operative field.



### DISLOCATION OF AN IMPLANT FIXTURE IN THE NASAL FLOOR

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**Aim.** Prosthetic rehabilitation with implant supported prostheses is considered to be a routine procedure with high success rate. Five-year implants survival ratio is approximately 95%. Complications that can result in the loss of a implant fixture can be divided into: biological and technical complications. One of the technical complications is represented by the bad placement of the implant in the jaws. In the maxilla these technical errors may lead to the displacement of the implant in the maxillary sinus or nasal floor. A case of 62-year-old male with a wrong positioning of the implant is reported.

**Materials and methods.** A 62-year-old male referred at the dental clinic and reported the presence of persistent fever and chronic sinusitis. The patient did not present additional sistemyc disease. The patient declared that he had performed implant placement in the anterior region of the maxilla approximately 40 days earlier. This surgical procedure had presented some problems related to the lack of primary implant stability with dislocation of the implant in nasal floor. At the intraoral examination no one alteration of the oral mucosa were noticed and it is showed the absence of the 1.2 dental element.

**Results.** Orthopantomography (OPT) and Computed Tomography (CT) were performed as diagnostic exams. OPT revealed the absence of the implant in 1.2 side. At CT examination it is showed the presence of an implant fixture, between the epithelium of the nasal mucosa and bone of the nasal floor. These instrumental examinations didn't show other important alterations.

**Conclusions.** After the execution of antibiotic therapy for a period of one week an intraoral surgical procedure was performed. The procedure consisted in the execution of an paramarginal incision between elements 1.1 and 1.3 and two vertical incision at the end of the orizontal incisions . After flap elevation it was shown the alveolar bone and the floor of nasal cavity. Implant fixture was removed from nasal floor through the use of a hemostat Klemmer and a surgical aspirator. The flap was ripositioned in the original side and it was sutured.



### DOES CHLORHEXIDINE-HYALURONIC ACID MOUTHRINSE IMPROVE POST SURGICAL SOFT TISSUE HEALING?

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**Aim.** Purpose of this study is to evaluate the effect of adjunctive hyaluronic acid in a chlorhexidine mouthrinse after periodontal surgery.

**Materials and methods.** After periodontal surgery, 19 subjects (12 women), were randomly allocated either in test group (CHX + hyaluronic acid) or in control group (no alcohol CHX 0.2%). Subjects were instructed to rinse with 10 ml solution twice/day for 14 days during 60 seconds. An in vivo wound healing model was used. Participants were asked to record in a specific form the frequency of rinsing (0, 1 or 2). Clinical examinations were performed to evaluate plaque index (PI) and recession (REC) at 0, 3, 7, 14 days. In the same days soft tissue healing was evaluated with the Wachtel scale of wound healing. Intra-group analysis was performed with Paired T-test whereas independent T-test was used for inter-group analysis (REC).

**Results.** A total of 52 teeth in 19 patients were successfully analysed. At the end of the study control group displays more plaque accumulation (PI) in comparison to test group ( $p < 0.05$ ). An increase of REC was shown in both in CTRL and in TEST group between baseline and T14 (intragroup analysis  $p > 0.05$ ). Any statistically significant difference was observed intergroup ( $p > 0.05$ ). At 14 days, wound healing was completed according to Watchel classification in both groups. TEST groups presented higher level of wound closure during the early healing period, both at 3 days (1.77 (0.97) test and 2.60 (0.69) control) and at 7 days (1.22 (0.44) test and 1.70 (0.82) control).

**Conclusions.** Within the limitations of the current study we may assert that Hyaluronic acid mouthrinse may enhance early postoperative wound healing. Moreover, a significant effect on plaque control was noted. Further studies are needed to validate these preliminary data.



### DOES VITAMIN D3 HAVE AN IMPACT ON CLINICAL AND BIOCHEMICAL PARAMETERS OF THIRD MOLAR SURGERY? A RANDOMIZED SPLIT-MOUTH SINGLE-BLIND STUDY

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**Aim.** The purpose of this study was to evaluate the clinical effect and the influence on the biochemical inflammatory markers of cholecalciferol administration in vitamin D-deficient patients undergoing surgical removal of lower third molars.

**Materials and methods.** A randomized, split-mouth, single-blind study was conducted on 36 Vitamin D-deficient patients ranging between 18 and 40 years of age requiring lower third molars extraction and referred at the Oral Surgery Unit of the School of Dentistry of the University of Messina. Patients underwent bilateral surgical removal in a preordered sequence: the first extraction (control group) being conducted with the administration of a placebo, the second one (test group) being conducted with the preliminary administration of 300000 IU of cholecalciferol 4 days before the procedure. At each surgery, the following parameters were evaluated: clinical indexes: pain (assessed by a scoring system), edema (measuring the tragus-gonion and tragus-pogonion distances), and functional limitation (measuring the interincisal distance); inflammatory indexes (VES, PCR, Alpha-1-glycoprotein, IL-1-beta, IL-6, TNF-alpha). Clinical and biochemical parameters were registered 4 days before, immediately after, 3 and 7 days after the surgical procedure. The data obtained were processed using analysis of variance and Spearman correlation.

**Results.** The clinical outcome parameters (Pain, edema, functional limitation) showed similar results between the Vitamin-D treatment group and the control, but a strong correlation between percentage fluctuation of Vitamin D3 serum levels and inflammatory indexes values has been assessed, with lower IL-1-beta, IL-6, and TNF-alpha values showed by the test group, thus suggesting an impact of the Vitamin D concentration on the inflammatory response of the patient. After the administration of Vitamin D, every patient recovered from the hypovitaminosis D condition.

**Conclusions.** The hypovitaminosis D is a condition frequently observed during cold seasons, even in insulated areas like Sicily, which can lead to bone mineralization and metabolic disorders. Impacted lower third molars have a high prevalence among the general population, and often requires surgical treatment. The increase of Vitamin D serum levels hadn't a strong impact on the clinical outcome of the third molar surgery, suggesting that the considered parameters are mostly influenced by the soft tissue management rather than the hypovitaminosis D condition/status. On the other hand higher serum level of Vitamin D seems to elicit a less pronounced inflammatory response, auspiciously leading to a better and faster healing process.



### ESTHETIC REHABILITATION WITH ZIRCONIUM DENTAL IMPLANTS. CASE REPORT AND 5 YEAR-FOLLOW-UP RESULTS

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**Aim.** the aim of this work is to evaluate the clinical, esthetic and functional outcomes of an implant-prosthetic rehabilitation with zirconium implants in the anterior area of the mandible. In particular, marginal bone loss, periodontal indexes and survival and success rates were considered at 5 years of follow-up.

**Materials and methods.** A 60-year-old healthy patient, A.F., male, was selected and 2 one-piece dental implants made of sintered and yttrium-stabilized zirconium oxide were placed in zone 3.2 and 4.2 for the rehabilitation of a partially edentulous ridge in the esthetic area of the mandible. After surgery, a temporary restoration was immediately placed and six months after surgery, clinical-radiographic evaluation was performed, including periodontal evaluation and radiographic control. In particular, the periodontal indexes (Plaque Index, Probing Pocket Depth and Bleeding On Probing) were recorded whereas the radiographic images were processed with a specific software (Corel-draw 10) in order to evaluate the radiographic marginal bone loss. This follow-up-protocol was repeated every 6 months. Five years after surgery, the success and survival rates were calculated in according to Albrektsson criteria.

**Results.** The implant prosthetic rehabilitation was successful at 5 years of follow-up. No clinical complication was recorded and the survival and success rates were 100%. The average marginal bone loss from baseline to 5 years after surgery was + 1.4 mm. The mode and the median for visible Plaque Index and Bleeding On Probing was 1 whereas Probing Pocket Depth amounted to 3 mm.

**Conclusions.** Zirconia dental implants present excellent characteristics such as superior mechanical properties, good osseointegration and high biocompatibility. These implants are particularly indicated in the esthetic regions of the jaws because of their aesthetic appearance. Moreover zirconia implant design characterized by the absence of micro-gap but allows successful results in terms of bone preservation and peri-implant tissue health.



## FIBRO-LIPOMA OF THE ORAL CAVITY: A CASE REPORT IN AN UNUSUAL LOCALIZATION

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**Aim.** Lipoma is a benign mesenchymal soft tissue neoplasm. 20% of lipomas occurs in the head and neck region but oral cavity involvement is rare, with lipomas corresponding to less than 4.4% of all benign oral soft tissue tumors. The buccal mucosa, the tongue and the floor of the mouth are the most common sites of occurrence. These lesions usually occur as painless, well-circumscribed, slow-growing sub-mucosal masses or superficial lesions. These tumors are usually composed of mature adipocytes, surrounded by a thin fibrous capsule. The fibro-lipoma (FL) is an histological variant of lipoma in which the fibrous capsule is much more thicker and variably sized typical adipocytes are interspersed with dense collagen fibers in a connective tissue stroma. FL has been infrequently found in the oral cavity. The most recent review of the literature revealed a total of 33 cases of intraoral FL.

**Case report.** A 65-year-old male patient was admitted to the Oral Surgery Unit of "Sapienza" – University of Rome in July 2012 because of a slowly continuous enlarging swelling, firstly noticed two years before and located on the lingual side of the lower left canine buccal mucosa. The patient referred no difficulty in mastication, speech, and deglutition. Intraoral examination revealed a pinkish, well-defined round swelling with a diameter slightly greater than 0.5 mm, just apical to the muco-gingival line. The swelling was soft, painless and pseudo-fluctuant to palpation. Routine blood analysis were found to be normal. No bone involvement by the lesion was found on the performed peri-apical radiograph. A provisional diagnosis of intraoral lipoma was established. The lesion was excised under local anesthesia. After the envelope flap was elevated, a well-encapsulated tissue with a diameter of 0.6 mm was easily isolated from the surrounding tissues and then removed. The excised tissue was sent for the histo-pathological examination, which revealed an adipose tissue with compressed blood vessels embedded within dense collagen fibers. Proliferating fibroblasts were evident in the connective tissue stroma. The definitive diagnosis of fibro-lipoma was made. The postoperative course was uneventful. No recurrence of the lesion has been observed at one year follow-up.

**Discussion.** Although the FL is usually excised by an incision of the overlying mucosa, in the present case an envelope flap was elevated. Actually, the incision of the alveolar mucosa on the lingual side of the anterior mandible usually makes the excision of the pathological tissue more difficult. Furthermore, in that condition the surgical wound is not easily sutured and may experience a dehiscence, caused by the tongue interference on the suture. On the contrary, the intra-sulcular incision allowed the best access to the pathological tissue, the optimal flap repositioning, and had no risks of post-surgical wound dehiscence. Moreover, although the lipo-sarcoma of the oral cavity is an exceedingly rare entity which at early stage cannot be distinguished from its benign counterpart at clinical examination, this kind of approach allows to clinically verify that no involvement of the bone wall was present at all, despite the mobility on palpation and the negative radiographic appearance of the lesion. The accurate histological examination of all the excised tissue is mandatory. The differential diagnosis is based on the detection of the following features: no lobular architecture, areas of prominent fibrosis and, most important, variable number of multi-vacuolated lipoblasts.



#### FOREIGN BODY MIMICKING AN ORAL PATHOLOGY

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**Aim.** Several types of objects have been removed from the palates of children including nutshells, screw covers, clothing buttons, artificial nails, billiard cue tips, bottle and pen caps, toy parts, and even coins. The diagnosis of a palatal foreign body is difficult because clinical symptoms are absent or non-specific. Anamnestic histories are variable and often confused. Imaging techniques may mislead and so an examination under sedation or anaesthesia is often necessary to make a proper diagnosis. Palatal lesions in neonates and infants are extremely rare, but a wide variety of pathological lesions should be considered in the differential diagnosis including leukemic infiltrates, lymphoma, eosinophilic granuloma, basal encephalocele, congenital lipomas, neuroectodermal tumour of infancy, sarcomas, odontogenic cyst, torus palatinus, infection, and inflammatory disorder.

**Materials and methods.** A 2-year-old boy presented with a strange lesion on the hard palate, noted by his mother approximately 2 weeks before the visit. The child had previously been seen by his family physician who made a presumptive diagnosis of a hard palate tumour. The mother did not report a history of feeding, voice, or airway abnormalities. A head and neck examination was within normal limits: the soft palate, maxilla, and midface were normally developed, and there was no lymphadenopathy. However, the patient was extremely irritated during the visit and it was impossible to make a complete oral exam. We were able to see only briefly a yellowish lesion, without palpating it. According to the position and the appearance of the mass, we took into consideration various diagnostic possibilities: giant-cell granuloma, inflammatory reaction, lipoma, neuroectodermal tumor, vascular disorder, dentigerous cysts, keratocysts, odontogenic tumor, sarcoma and other benign or malignant neoplastic lesions. Before undertaking a biopsy, we requested an MRI, but the result was not diagnostic. We decided to perform an incisional biopsy under general anaesthesia. The mass measured approximately 1×1.5 cm, it was yellowish and translucent, it appeared tender, fixed, and non-pulsatile to touch. The lesion borders were not palpable because the surrounding erythematous mucosa had covered them.

**Results.** A periosteal elevator was used to palpate the lesion and gentle manipulation was sufficient to dislodge a small translucent mass that turned out to be a piece of plastic adhered to the hard palate. Histological examination revealed only the presence of an inflammatory reaction, with no neoplastic cells. The patient was discharged without complications and 1 month later, the mucosa had recovered fully.

**Conclusions.** Foreign bodies of the hard palate are an unusual occurrence; however, they should be considered in a differential diagnosis of palatal masses in infants. As a result of poor and often confusing medical history and a lack of cooperation from young patients, foreign bodies are often misdiagnosed, and they are determined to be a foreign body only on removal. From this, we deduce the need to ask direct, specific questions of the parents, investigating the tendency of the child to put things in his mouth and the eventual disappearance of small objects. A complete initial examination of the oral cavity could also avoid the use of radiographs. Some objects can be removed in the clinic but often the clinician must resort to general anaesthesia due to a lack of cooperation on the part of the child and because some objects adhere strongly to the mucosa and are, therefore, difficult to pull off.





### FORNIX DEEPENING IN CAUSTIC TRAUMA TO LOWER LIP

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**Aim.** Outpatient treatment with 810 nm diode laser for fornix reconstruction.

**Materials and methods.** Male coloured patient without mandibular fornix for direct trauma with caustics. Local anaesthesia with Mepivacaine without vasoconstrictors was supplied in order to minimize mucosae ischemical effects altering the ideal diode target. Lower lip totally joined to keratinized gum was dissected by skimming tissues with Fibre Optics according to sweeping technique. Continuous mode 2.5W power was applied under surgical aspiration as to obtain a complete hemostasis.

**Results.** Despite the presence of cicatricial tissues covering the whole area a satisfactory fornix depth was finally reached. The little patient after initial fear was quiet and painless. In order to avoid relapse and protect the surgical wound a soft resin bite with vestibular bump was realized and applied with the aid of vaseline gauzes. The patient was also recommended to massage the area several times a day in order to ease the rooting of a new favourable labial insertion. An antibiotic and anti-inflammatory therapy was prescribed together with topic application of spray Clorexidine 20%.

**Conclusions.** Six weeks later the vestibular fornix was one centimetre wider, allowing the patient a better mouth opening, a satisfactory oral hygiene and the enhancement of labial and phonetic expressions. We wish to remarke the simplicity of the 15 minutes' operation completely bleedingless both during and after surgery, the moderate pain in absence of suture and the quicker healing generated by the biostimulation through diode laser together with the absence of retracing scars which would compromise the final result.



### HEALING, BONE REGENERATION AND IMPLANT THERAPY AFTER SURGICAL TREATMENT OF A WIDE CYST: A CASE REPORT

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**Aim.** Implant placement after surgical treatment of odontogenic cysts is a reliably and commonly performed practice, even though shortage of a suitable bone quantity after healing can cause some problems. The aim of this report is to describe the bone healing outcomes and the implant success after surgical treatment of a wide cyst in the upper maxilla.

**Materials and methods.** A 38 years-old healthy male patient was affected by an inflammatory odontogenic cyst coming from 2.3. He came to us worried for a buccal tumefaction, soft at palpation, covered in rosy mucosa, not painful. We observed a radiolucent area with clean borders at the orthopantomography. A surgical treatment through the Partsch II method was planned. Extraction of canine radicular residue and cyst enucleation were contextually performed keeping the patient in a conscious sedation. First of all, we extracted radicular residue, then we performed mucoperiosteal flap, enucleation of the cyst, curettage of the residual bone cavity, application of oxidized regenerate cellulose (used as local hemostatic) and suture. Before discharge, we gave the patient the following advices: to continue antibiotic prophylaxis with amoxicillin and clavulanic acid, to avoid using toothbrush on the surgical site and to use collutory with 2% chlorhexidine for the following 7 days. Four months later, we performed a CT Dentascan to evaluate the spontaneous bone regeneration in prevision of a implant prosthetic rehabilitation. CT showed a good bone density and highness. After 6 month, a functional rehabilitation with two metal ceramic element supported by two dental implant was proposed to patient. He refused this planning preferring the placement of only one dental implant in region 2.4 and the realization of a metal ceramic prosthesis cantilever with an element in medial extension. It was necessary to use particulate form of deproteinized bovine bone mineral and a resorbable membrane to prevent a vestibular defenestration of the implant.

**Results.** A clinical and radiographic follow up was performed in the first six months and three years after the prosthetic rehabilitation. We observed absence of pain or tenderness upon function, implant mobility, peri-implant radiolucency and exudates history.

**Conclusions.** There are few articles in Literature describing implant success after surgical treatment of odontogenic cysts. This case report suggests the possibility to achieve good healing and bone regeneration after enucleation of a wide cyst. This will allow the new formed bone to receive implant fixtures.



### IMMEDIATE LOAD ELECTRO-WELDED MONOPHASIC IMPLANTOLOGY

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**Aim.** Monophasic electro-welded implantology is a method in which titanium bone screws are soldered with a syncrystallizer after placement; it allows to weld the titanium components directly into the patient's mouth, without heat and with the maximum comfort for the patient. This method, associated to the technique of immediate loading, involves the transmission of masticatory forces to the bone immediately after implant surgery, with consequent biological stimulation of natural bone which allows to increase the stability already provided by the cortical bone.

In this present work, we aim at describing the validity of a simple and minimally invasive therapeutic approach, which allows to place endosseous electro-welded implants and a resin temporary prosthesis within the same surgical operation, resulting in a functional and aesthetic recovery of the patient.

**Materials and methods.** The systems used are screws composed by a central axis called core, by a series of spirals with a variable diameter, a collar and an abutment which, thanks to their morphology, allow to transmit occlusal loads to the surrounding bone by exploiting bicorticalism, similarly to the dental root. Stability and retention ensure a long-lasting result.

In the present work, we report two clinical cases, a patient with compromised periodontal health and another with a situation of edentulism. After studying the case with intraoral X-rays, OPT and DentaScan, titanium screws were placed without opening any surgical flap, in order to achieve bicorticalism; then, we proceeded with parallelization of stumps and formation of the welded joint with titanium bars or wires by means of an intraoral welder (syncrystallizer). Immediately after the surgical phase, we made a provisional resin prosthesis, which was cemented to the removable partial denture with resin cement. The definitive prosthesis was placed a few months later.

**Results.** With the insertion of electro-welded implants we could notice a high primary stability, which allowed an immediate placement of the provisional restoration, together with a significantly reduced healing time of peri-implant soft tissues, thanks to the use of a flapless surgical technique. In the postoperative visit six months after surgery we could observe, in both cases, a complete osseointegration that allowed the functionalization of the definitive prosthesis and consequent occlusal and aesthetic recovery of the patient. The validity of this technique was confirmed also by 24-, 36- and 48-month follow-up.

**Conclusions.** This technique is recommended for patients with total edentulism who refuse to undergo traumatic and invasive surgical procedures and for patients affected by systemic diseases (diabetes, heart failure, hemopathy). It is an approach that guarantees a significant reduction of healing time and, consequently, a greater patient satisfaction.



### IMMEDIATE LOADING: "ALL-ON-FOUR" AS PREDICTABLE TECHNIQUE IN EDENTULOUS PATIENTS

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**Aim.** The aim of the present study is to assess the possible success of an immediately loaded technique called "All on Four" in patients exhibiting complete and partial edentulism, the latter subjected to avulsions of residual teeth prior to implant placement.

**Materials and methods.** The present study, conducted between June 2009 and December 2013, involved a cohort of 103 patients aged between 41 and 68 years, both males and females, selected following inclusion and exclusion criteria. They were candidates for immediately loaded implant-prosthetic rehabilitation of 48 lower arches and 55 upper arches, for a total of 412 implants.

In partially edentulous patients, preliminary avulsions of the residual teeth were performed, most of which were severely compromised.

The implants were placed with a minimum torque of 35 N/cm and had a rough surface, a minimum length of 10 mm and a diameter between 3.75 and 5.3.

The temporary prosthesis screwed to the 4 implants showed a wide centric occlusion.

**Results.** Following the implementation of pre-surgical, surgical and prosthetic protocols required by Dr. Paulo Malo's "All-on-Four" technique, the definitive prosthesis was finished at 6 months, after tissue healing. 7 implants failed in 3 patients with a patient-related success rate of 99.06% and an implant-related success rate of 98.79% at 1 year. At 48 months, the success rate was 97.09% and 98.31%, respectively.

These data were obtained on the basis of a careful follow-up protocol and several radiographic investigations that document the successful osseointegration and the absence of peri-implant disease.

**Conclusions.** Through these data, we can conclude that the immediately loaded rehabilitation treatment called "All on Four", following Dr. Paulo Malò's protocol, is a valid alternative to the traditional prosthetic implant treatment, since it provides patients with a greater comfort through the improvement of their psychological state, it reduces the number of surgeries and the healing time of peri-implant soft tissues, and offers a quicker recovery of the chewing function.



### INFLUENCE OF CLINICAL PARAMETERS ON ALVEOLAR AND BASAL BONE MORPHOLOGY IN THE LOWER ANTERIOR MANDIBLE: LANDMARKS EMERGING FROM A CASE-CONTROL STUDY

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**Aim.** Many clinical parameters have been advocated as possible predictors of the morphology of alveolar and basal jaw bones. The aim of this study is to evaluate the influence of some clinical parameters on alveolar and basal bone thickness in a case control study.

**Materials and methods.** 50 consecutive healthy patients with a thin biotype (Group 1) and 50 with a thick biotype (Group 2) were enrolled in one-year period. Patients were recruited among subjects who needed surgery in the posterior mandible and had to have CT scans for treatment planning. General information were collected for each patient; gingival biotype, Little's index for anterior crowding, molar and canine class relationship, previous orthodontic treatment, gingival recession (GR) and width of keratinized gingiva (KBW) were collected for each of the six mandible anterior teeth (from 33 to 43). On the most midbuccal CT slice of each tooth the following parameters were measured: CEJ to bone crest distance (CEJ-BC), buccal bone width at 2, 4, 6, 8, 10, 12, 14, 16 from bone crest (measures were divided according whether those were taken in the alveolar - MABT - or in the basal bone - MBBT), tooth inclination. Data were analyzed with Intercooled Stata 8.0 (StataCorp, College Station, TX). Significance was set at the  $P \leq 0.05$ .

**Results.** Group 1: mean age was 36,8 (SD=11,9), 15 were males and 35 females, 30 were non smokers and 20 smokers; 27 received previous orthodontic therapy and 23 did not; Group 2: mean age was 43,2 (SD=13,2), 25 were males and 25 females, 26 were non smokers and 24 smokers, 12 received previous orthodontic therapy and 38 did not. Element 43: MABT was 6,66mm (SD=1,46) and MBBT 8,58mm (SD=2,14); element 42: MABT was 5,31mm (SD=1,16) and MBBT 8,2mm (SD=2,06); element 41: MABT was 4,51mm (SD=1,01) and MBBT 8,43mm (SD=2,09); element 31, MABT was 4,86mm (SD=1,19) and MBBT 8,59mm (SD=2,32); element 32: MABT was 5,27mm (SD=1,13) and MBBT 8,32mm (SD=2,14); element 33, MABT was 6,37mm (SD=1,52) and MBBT 8,9mm (SD=2,06). No statistical significant differences were detected between biotypes, whereas for element 43: gender, tooth inclinations and CEJ-BC were predictors for MABT ( $P < 0,05$ ) and GR and tooth inclination for MBBT ( $P < 0,05$ ); for element 42 gender, age and tooth inclination were predictors for MABT ( $P < 0,05$ ) and tooth inclination for MBBT ( $P < 0,05$ ); for element 41 GR and tooth inclination were predictors for MABT ( $P < 0,05$ ) and age, tooth inclinations and KBW for MBBT ( $P < 0,05$ ); for element 31 age, KBW and tooth inclination were predictors for both MABT ( $P < 0,05$ ) and MBBT ( $P < 0,05$ ); for element 32 age, smoking habit and KBW were predictors for MABT ( $P < 0,05$ ) and gender, age, KBW and tooth inclination for MBBT ( $P < 0,05$ ); for element 33, tooth inclination were predictors for both MABT ( $P < 0,05$ ) and MBBT ( $P < 0,05$ ).

**Conclusions.** Data emerging from this case-control study confirm that many variables influence alveolar bone and the basal bone thickness. In this population, biotype does not seem to play a fundamental role in influencing alveolar and bone thickness. Further studies are needed to better understand different roles played by clinical variables.



### LESIONS OF THE RETROMOLAR TRIGONE (RMT): DIAGNOSIS AND SURGICAL TRENDS

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**Aim.** The RMT is a triangular region of mucosa posterior to the last mandibular molar. Radiolucency areas of the RMT associated with the third, included or erupted, lower molar can be commonly misinterpreted especially if associated with atypical clinical and radiographic characteristics, and, as a consequence, they may cause diagnostic matters. Based on this problem, the study of the lesions in this oral region, seemed important in surgical and current dental practice. Furthermore, the correlation between clinical, radiographic and histologic findings is also of great value in obtaining accurate diagnosis. The aim of this study is to try establishing when, according to certain dimensional and symptomatological characteristics, the operator can intervene with a biopsy to make a diagnosis of lesion of retromolar trigone.

**Materials and methods.** We have selected 50 patients showing on the rx-panoramic radiograph a radiolucent lesion in RMT distal to the lower third molar. Our intent was to select the radiolucent areas with a potential pathological meaning); this is the reason why we have selected only the areas between 3mm e 1cm. Patients within those parameters were subjected to excisional biopsy of considered pathological bone tissue(mandible), mucous or both. In a preoperative interview, all patients have issued appropriate informed consent, rejecting a possible follow-up. Specimens obtained by biopsy have been sent to histological examination at the Department of Pathology of the Second University of Naples.

**Results.** We have identified the following issues :in 27 cases (54%) fibrous tissue (32%), flogistic tissue (28%), granulation tissue (12%), acanthosis (12%), dysplasia (8%), neo-angiogenesis (5%), hyperkeratosis (3%). In 23 cases (46%), we have established several diagnoses as certain. More specifically, we have found periodontal cysts ( 20% ), follicular cysts (40%), giant cell tissue (15%), papillomas (10%), one ameloblastoma (5%), one keratocyst (5%), one plasmacellular epulis (5%).

**Conclusions.** The variability between differential diagnoses found in our study, always suggests a careful evaluation of the lesion, according to radiological criteria of size and tissue characteristics, intraoperatively observed by the surgeon. Therefore, our thought is that the lesion should be submit to biopsy and histological examination placed distal to the lower third molar involving the bone tissue, the mucous or both relying on size of "radiological minus" ,on clinical or intraoperative appearance of the tissue.



## MAXILLARY KERATOCYSTIC ODONTOGENIC TUMOR (KCOT) IN PEDIATRIC AGE: A CASE REPORT

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**Aim.** The aim of this study is to report a rare case of KCOT-Keratocystic Odontogenic Tumor (WHO 2005, World Health Organization) in a paediatric patient in maxillary position with an impacted canine.

**Materials and methods.** The KOCTs represents 3-10% of all the odontogenic cysts lesions. Different studies of molecular biology have demonstrate that those benignous tumors are characterized by many mutations of DNA with a loss of eterozigosity of genes suppressor (P16,TP53,PTCH,MCC). KCOT is predominantly a disease of white individuals,primarily Northern Europeans and there is a reported male-to-famele ratio of 1.6:1. Different studies show the incidence of KCOT to be 3-11%of the odontogenic cyst. The KCOT have been detected whit a great frequency (60 %) in the second and third decade, and with a great preference for the posterior portion of mandibular branch (2/3 of all cases). It can be found in the mandible and the maxilla but are twice as common in the mandible.Maxillary KCOT may involve the sinus and floor of the nose.The youngest patient reported at age of five years. This pathology without threatmeant had the potential to reach enormous dimension, destroying a huge quantity of bone and also in 30-40% of cases is associated with an included tooth. The radiological aspects of KCOTs are characterized by uni or multilocular images of lesions with sharp outline. If KCOT are multiple or detected in children they could be associated Gorlin Syndrom; that is characterized by multiples KCOT , others serious malformations and tumors.-This syndrome show a high penetrance and variable expresivness:,multiple pigmentated basocellular carcinomas, KCOT in jaws palmar and/or plantar pits and calcification of flaxcerebri.It is fundamental to know its carachteristics in order to make an earlier diagnosis. The case is represented by a female patient of 12 y.o. Clinically the tooth 2.3 was not present, the deciduous canine was retained and teeth 2.2 and 2.4 severely malposed. The Authors could appreciate in the OPT and CT (dental-scan cone beam) a lesion whit sharp outlines at level of the 23 (included tooth) with a dimension of cm 2,5 x 2,5. Possibles differential diagnostics with the KCOT were mainly: fulicular cyst, ameloblastoma, ameloblastic fibroma, adenoblastoma. The Authors decided to actuate in two steps:

- surgical excision of the lesion through a vestibular approach with histological exams of enucleated tissue;
- after few weeks, surgical (via palatal approach)-orthodontic repositioning of the impacted 23.

**Results.** The first step was the enucleation of the lesion that appeared to be unilocular. A vestibular approach with mesial and distal release incisions was chosen. The deciduous canine was extracted. The buccal bone plate was completely resorbed in the coronal portion and paper thin -blowed in the apical part of the cyst. Soft tissues were carefully and completely dissected from bone and 2.3 and removed in toto. Suture was performed with a primary closing and removed at one week. Healing fas uneventful. The soft and hard tissue of the lesion were sent for histological examination and resulted in a KCOT with cm 2,5x2,5 of soft tissue and a bone fragment of cm 1.3 x 0,7. An accurate exam performed with the collaboration with pediatricians showed no signs or symptoms of Gorlin-Golz syndrome. After few weeks an orthodontic arch was placed and a space management was started for the subsequent surgical-orthodontic repositioning of the canine in the arch.

**Conclusions.** KOCT is an uncommon pathology mainly occurring in the third molar area of the mandible at age 20-30. Even if more rare, impacted maxillary canines in pediatric age can involve a KOCT, thus a complete evaluation and conventional x-rays as long as CT scans when necessary need to be done to make a correct diagnosis. Histological exams of the enucleated tissue must always be performed to confirm diagnosis.

A protocol of examination and follow-up must be followed to unwrap the possibility of Gorlin-Golz Syndrome. Impacted canines due to a KOCT can be placed in arch with an orthodontic treatment after surgery.



### **MOST COMMON CAUSES OF DENTAL EXTRACTIONS RELATED TO SYSTEMIC DISEASES. A CLINICAL STUDY ON 800 CASES**

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**Aim.** Dental extraction is the most common procedure in dental surgery. The tooth loss is an important discomfort for the patient. There are no rules that establish univocally the indication to extraction, although guidelines do exist. Patients' compliance, clinical (anatomic variability; systemic diseases; neighboring teeth) and radiographic evaluations (caries, root form large restorations) are necessary to lead the surgeon to the right diagnosis and therapy. The aim of this study was to estimate the etiology of extractions in a representative sample, while delineating the profile of the typical patient needing dental extraction.

**Materials and methods.** Seven hundred and seventy patients received dental extraction (800 teeth) at the Dental Surgery Department of the Dental School of the University of Turin, from July 1<sup>st</sup> 2013 to December 1<sup>st</sup> 2013. Data were collected by surgeons through a questionnaire (age, related diseases, sex, hygiene, habit of smoke, type of tooth). The use of suture, post extraction antibacterial therapy and compliance were collected. Data were analyzed recurring to ANOVA.

**Results.** The most common cause of dental extraction were caries (51.7%) and periodontal disease (29.6%). The remaining causes were uniformly distributed as follows: root fractures (3.8%), eruptive anomalies (3.4%), orthodontic causes (2.7%), endodontic failures (2.6%), trauma (2.1%), occlusal anomalies (1.9%), prosthetic causes (0.9%). The comparison between teeth extracted because of caries and teeth extracted owing to periodontal disease led to the consideration that systemic diseases were more strongly associated to periodontal disease. Instead caries was more strongly associated to tabagism. The possible confounding role of age was investigated leading to the observation that patients having dental avulsions due to caries were younger (53.5% < 50 years and 46.5% > 50 years) than those having extraction due to periodontal disease (17.1% < 50 years and 82.9% > 50 years).

**Conclusions.** As reported in the results section, the most common causes of dental extraction were destroying caries associated to the habit of smoke and periodontal diseases associated to systemic diseases. It is no surprise that in this latter case higher age was linked to cardiopathy, diabetes and hypertension. Also young females were less likely to need dental extraction than (no disease, good hygiene) than older males. Young male patients were healthy, but showed oral hygiene poorer than young females.





## ORAL SMALL-SIZED PERIPHERAL ANEURYSMAL CYSTS: SURGICAL MANAGEMENT AND STUDY BY CONFOCAL LASER SCANNING MICROSCOPE (CLSM)

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**Aim.** Peripheral Aneurysmal cyst (PAC) is a recently recognized entity; except for its extraosseous location, the histological features are essentially identical to those of an aneurysmal bone cyst. PAC etiology remains unknown and none of the patients had a history of any previous trauma. Although the pathogenesis of an aneurysmal bone cyst and its variants PAC is still unclear, there is general agreement that both represent a nonprogressive benign process without any neoplastic potential. PACs tend to occur in the shoulder, arm, thigh, and carotid artery. This work is aimed at describing the first cases of PACs in the oral cavity, with regards to management and histological analysis with Confocal Laser Scanning Microscope (CLSM).

**Materials and methods.** Four patients (<18 years) with oral PAC referred to Oral Surgery Unit, Policlinico of Bari. Three were female and one male; in the 75% of the cases lesions were in the posterior mandible. Two cases were associated with giant cell granuloma. They appear as rapid growth mass often bleeding mimicking a reactive lesion. The overlying mucosa showed a variable colour from white to reddish. Radiographically lesion appeared as an unilocular or multilocular osteolytic area sometimes in continuity with periodontal space. The lesion had a peripheral calcified capsule surrounding a radiolucent center, which was divided by intralesional septa, resembling a "soap bubble" appearance. In a first session, under local anesthesia, a diode laser photocoagulation was performed to reduce lesion size; in a second session we did a wide local excision with healthy bony and soft tissues margins. Macroscopically, the soft tissue lesion was delineated by a thin rim of bone and consisted of blood-filled cavities separated by septa of various thickness. Surgical samples were sent for histological analysis, carried out with CLSM, Nikon Eclipse E600 microscope (Nikon Corporation, Tokyo – Japan), equipped with Argon-ion and Helio-Neon lasers, emitting at 488- and 543 nm wavelengths, which allows both optical and confocal laser scanning analysis. The Nikon EZ C1 software (Nikon Corporation, ver. 2.10 Coord Automatisering) was used for bi-dimensional image processing.

**Results.** The local wide excision after laser photocoagulation allowed complete healing of the lesions without recurrence. Histological examination showed cystic spaces, filled with blood, surrounded by elastic lining with great dimensions and muscle cells. We noticed the presence of thrombosis in the vascular cystic spaces. The cyst peripheral wall was composed of dense fibrous, collagenous tissue with scattered areas of immature lamellar bone trabeculae, flattened spindle-shaped fibroblasts that were admixed with inflammatory cells, multinucleated giant cells and areas of calcification. Multinucleated giant cells were organized in multinodular aggregate, or could be diffuse in the pathological tissue.

**Conclusions.** PACs are rare lesions that could be successfully treated firstly with diode laser photocoagulation reducing the size of the lesion and bleeding risk, then with a wide local excision. CLSM analysis confirms the diagnosis and highlights the conspicuous vascular component that is the target of laser photocoagulation.



### PIEZOSURGERY OSTEOTOMY FOR ORTHODONTIC DENTOALVEOLAR DISPLACEMENT OF AN ANKYLOSED MAXILLARY CENTRAL INCISOR

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**Aim.** Permanent incisors frequently become ankylosed when the periodontal ligament is traumatically damaged, such as in the case of reimplantation. Osteocorticotomy is a surgical procedure in which both the ankylosed tooth and the adjacent bone can be either repositioned in only one step or moved orthodontically. Piezosurgery is a technique used to perform safe and effective osteotomies using piezoelectric ultrasonic vibrations. This device allows precise cuts to be made in bone structures without provoking lesions of adjacent soft tissues and at the same time offering excellent visibility within the surgical field. The purpose of this clinical report was to show the treatment of a growing patient with an ankylosed maxillary central incisor treated by intraoral alveolar bone distraction osteogenesis using piezosurgery osteotomy and orthodontic dento-alveolar displacement to correct both the osseous and gingival defects before any further rehabilitation therapy.

**Materials and methods.** The treatment of a 13-year-old girl, whose maxillary right central incisor had been lost due to a trauma and reimplanted 4 years earlier, is reported. Ankylosis of the tooth and adjacent alveolar process led to the development of tooth infraocclusion, migration of adjacent teeth, midline deviation, unesthetic smile line, occlusal disharmony and a vertical alveolar bone defect. Maxillary right central incisor with post-traumatic outcome showed an overbite value of -4mm and appeared slightly dyschromic. Other elements from the anterior area showed a dental open bite tendency (average overbite value is 0.5 mm). There was also a situation of slightly crowded teeth, more appreciable in the 1.1 tooth area. Cephalometric analysis results showed a mesofacial patient, slight tending to dolichofacial, with a situation of skeletal class I, and so with neutron-occlusion of jaw bones and dental arches. A treatment of the ankylosed tooth by means of piezosurgery osteotomy and orthodontic dentoalveolar displacement was planned and accepted by the patient's parents. The osteotomies were performed with a piezoelectric microsaw osteotome by means of the Piezosurgery system (Mectron Medical Technology, Carasco - GE, Italy), through the buccal cortex; the bone cuts involved the medullary and the palatal bones. After adequate mobilization and repositioning of the tooth with the supporting bone through osteotomies, the distraction was performed by a customized orthodontic device. After 1 week from surgery, the distractor was activated 3 quarter turns per day (0.75 mm/day) till the incisor came to the planes of occlusion. The orthodontic device was left in situ for 2 months after surgery to consolidate the newly formed bone. The total treatment period was 18 months.

**Results.** Clinical and radiological outcomes showed that the treatment was successful and the dento-osseous segment was repositioned with satisfactory periodontal results. Post-treatment records show an improved and pleasant smile because of the alignment and levelling of the maxillary anterior teeth. The ankylosed tooth was successfully led along the maxillary arch with a harmonic gingival margin. Distraction osteogenesis allowed to obtain controlled and gradual displacement of a surgically created fracture. The results were acceptable at 16 months after debonding and showed stability of dento-alveolar segment distraction.

**Conclusions.** The use of piezoelectric osteotomy in alveolar distraction appears to simplify surgery and reduce the incidence of intraoperative complications maintaining the alveolar bone width, height and continuity. Furthermore this procedure may simplify future prosthetic solutions reducing the need of complex regenerative procedures since it provides bone volume and soft tissue adequate for a functional as well as esthetic tooth or implant supported restoration.



### PRELIMINARY REPORT ON CRESTAL WINDOW SINUS LIFT OF ALVEOLAR RIDGES UNDER 3 MM HIGH WITH SHORT IMPLANTS

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**Aim.** We explored a new technique in order to avoid two stage lateral approach maxillary sinus lift in the severely resorbed maxilla with bone high ranging from 1 to 3 mm. The posterior areas of the maxilla may present limitations to the anatomical placement of dental implants and should require bone augmentation. Traditionally the sinus bone grafts are classified in two step or one step lateral approach and osteotome crestal approach. The sinus bone graft is a predictable technique to compensate for the part of atrophy due to pneumatization of the maxillary sinus, and should be considered a compromise solution for increasing available bone in case of bone loss on crestal side of the alveolar ridge. Various techniques of crestal approach to the maxillary sinus have been described. However the ability to ensure high primary implant stability in a severely atrophied ridge is of primary concern. The crestal approach should be considered a viable technique for use in patients with residual bone height of  $\leq 4$  mm and it is accepted that it strictly depends on the reach of acceptable primary stability. We report a novel technique designed to treat severely resorbed posterior maxillae (residual ridge high from 1 to 3 mm) usually treated through one step or two step lateral antrostomy, performing a crestal antrostomy of the same diameter of the implant.

**Materials and methods.** We treated 107 patients with a one stage technique for simultaneous crestal sinus lift and short implant insertion. Patients with edentulous areas of only one tooth in the posterior maxilla and residual bone high under 3mm have been chosen. Maxillary sinus septa, smoking and systemic contraindications were exclusion criteria. Bone healing was allowed for 6 months.

**Results.** We obtained success in 98,13% of the cases with a mean follow-up of 22,33 months  $\pm$  10,20 months. We recorded two failures (1,87% of the cases): the first during osteointegration and the second 1 month after loading. We have never recorded any tear of maxillary sinus membrane during surgery, neither sinusal complication or other significative complications after surgery.

**Conclusions.** Short implants help to avoid bone grafting in most situation lessening the bone required to their insertion. Combining short implants (with a plateau design wich allows a direct osteogenesis) with crestal sinus lift we were able to treat complex cases easier and with less morbidity. This technique is feasible with success according with our preliminary results on 107 cases.



### **PRESERVATION OF POST-EXTRACTION SITE USING CALCIUM SULFATE HEMIHYDRATE: AN IN VIVO STUDY**

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**Aim.** Many clinical studies have evidenced that resorption of post extractive socket is a physiological reaction due to loss of "bundle bone", the one responsible for periodontal fiber attachment. Bone resorption occurs mainly during the first three months after tooth extraction. Reducing this physiological process is of most importance nowadays for an implant retained rehabilitation outlook, in order to have better aesthetics and bone support. The aim of the study is to value the level of bone resorption in two contralateral post-extraction sites after one and after three months treating them respectively with calcium sulfate hemihydrate and Absorbable Haemostatic Gelatin Sponge. The null hypothesis is that sites treated with calcium sulfate hemihydrate are going to have a lower resorption than the gelatin sponge treated one.

**Materials and methods.** 30 patients who needed contralateral teeth extractions have been selected in oral surgery department in University of Torino, Italy. A resin template was previously fabricated on the study model and five reference points (mesial, distal, buccal, oral and central) were drilled through it in order to obtain a reproducible probing of the sites during the study. Surgical protocol included atraumatic extraction of both teeth and curettage of the sockets to eliminate granulation tissue. After teeth extractions each site was casually assigned to treatment with calcium sulfate hemihydrate or Absorbable Haemostatic gelatin sponge. Sutures were applied on both sites using a introflecting horizontal mattress suture, and were removed after seven/ten days. A bone probing of the sites was measured after extraction and at one and three months using the previously prepared template and an anesthetic needle with an endodontic rubber stop to reduce the traumatism of second and third probing.

**Results.** A statistically evidenced difference has been shown in the different level of central probing of the sites in favour of calcium-sulfate-hemihydrate treated sites. The other probing sites did not show any statistically evidenced difference.

**Conclusions.** The use of calcium sulfate hemihydrate as post extraction filling, in order to reduce physiological bone resorption after tooth extraction, results to be effective in central (and deepest) probing point of the socket at one and three months distance. No differences were found in the other sites. So the use of this filling can be suggested in order to reduce crest resorption and to arrange a better site for implant surgery.



## PROFESSIONAL CARCINOGENESIS AND ORAL SQUAMOUS CELL CARCINOMA: A SYSTEMATIC LITERATURE REVIEW

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**Aim.** The objective of this systematic review was to highlight the possible association between occupational exposure to carcinogenic substances and risk of oral squamous cell carcinoma (OSCC).

**Materials and methods.** A literature electronic search was carried out in most important databases (Medline, Embase, CancerLit e Cochrane Central Register of Controlled Trials e Cochrane Database of Systematic Reviews), choosing all articles regarding the work-related oral carcinogenesis, published from January 1990 to May 2013. Moreover, a manual search was conducted in five journal (International Journal of Cancer, Head and Neck Cancer, American journal of industrial medicine, Journal of Clinical Oncology, Oral Disease e Oral Oncology) from January 2003 to December 2013. Articles were selected by two independent investigators, according to PRISMA statement (Preferred Reporting Items for Systematic reviews and Meta-Analyses). The selected outcome variable was the risk of carcinogenesis (RR, SIR, OR, SMR, PMR). The only eligibility criterion was referring to the presence of aforementioned variable associated with a particular work and/or professional exposure.

**Results.** One-hundred and twenty-seven articles were examined in full-text. Forty-seven study met the inclusion criteria and were selected for the analysis. The carcinogenic agents analyzed by the included studies were: chemicals (perchloroethylene, stiren butadiene copolymer, chromium hexavalent, phenoxy acids, acid mists, organic solvents and paints, nitrosamines and polycyclic aromatic hydrocarbons, creosote, formaldehyde, gasoline vapors and diesel exhausts), dusts (leather dust, wood dust, concrete-cement dust, rock wool, metal dust, nickel, asbestos, textile fibers, flour) and physical agents (solar radiations). No significant associations were found between the examined substances and OSCC, excepted for polycyclic aromatic hydrocarbons, phenoxy acids, leather dust, concrete-cement dust and UV radiation. Chronic exposure to UV solar radiation, observed in outdoor activities, seemed to be the only true risk factor for oral professional carcinogenesis, especially for lip cancer, although a co-carcinogenic effect mediated by other chemical exposures (phenoxy acids, fumes, dusts) is reasonable. Outdoor works (farm, fishing and construction job) and chemicals-related works (e.g. petrochemical, pharmaceutical industry) were found to be at risk for developing lip cancer. An increased risk of mouth cancer was also found in rubber industry workers. The great heterogeneity of tasks employment and carcinogenic agents, as well as the discrepancies among the measuring methods of the exposure dose, didn't allow to perform a meta-analysis.

**Conclusions.** There were no statistically significant evidence that indicate a key role of specific chemical agents in the carcinogenesis of oral cavity. A slightly evidence was been found about the possible carcinogenic effect mediated by leather dust, organic solvents and fumes arising from rubber vulcanization. Further research will be needed to elucidate the possible co-carcinogenic effect arising from UV rays and chemicals.



### THE ATROPHIC IMPLANT SITE REHABILITATION BY TISSUE ENGINEERING TECHNIQUES: A NEW CLINICAL APPROACH

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**Aim.** The regeneration of hard tissues is one of the topics in greater evolution in the execution of implant-prosthetic rehabilitation. In recent years the introduction of the principles of tissue engineering have varied biological limits in guided bone regeneration leading to new scientific reflections and different clinical approaches.

**Materials and methods.** The study has foreseen the execution by the operator himself of twenty cases of guided bone regeneration through the use of an allograft soaked in growth factor PDGF-BB associated with contextual or delayed insertion of Nobel Biocare implants with TiUnite surface.

The cases were subdivided into 4 groups according to the type of defect treated and analyzed depending on the roofing membrane used.

After 18 weeks was performed the second surgical stage which was followed by histological analysis.

**Results and conclusions.** Although the clinical results may not reflect in all cases the histological observation, it was possible to deduce how this new operative approach is accompanied by significant advantages and further research would refine and deepen the understanding of cellular dynamics.



### REMOVAL OF A LARGE MUCOSAL CYST OF THE MAXILLARY SINUS (MMC) IN ASSOCIATION WITH A LATERAL ACCESS SINUS FLOOR ELEVATION: A CASE REPORT

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**Aim.** The mucosal cysts of the maxillary sinus (MMC) are a group of benign mucosal lesions most commonly located in the maxillary sinus floor, with an average prevalence of 7% in the adult population. When a maxillary sinus elevation is planned, the presence of a MMC may increase the risk of intra-operative and post-operative complications. In particular, the MMC may increase the risk of membrane perforation during the sinus floor mobilization and impair the osteo-meatal complex (OMC) patency after sinus grafting.

The aim of this paper is to present a new surgical technique that allows complete removal of the cyst from the maxillary sinus with an intra-oral approach at the same time of sinus floor elevation. The integrity of the schneiderian periosteum is preserved throughout the entire procedure.

**Materials and methods.** A systemically healthy patient affected by partial edentulism of the right posterior maxilla was referred to restore the missing dentition with an implant-supported fixed prosthesis. The preoperative cone beam computed tomography (CBCT) revealed a significant expansion of the maxillary sinus with relevant reduction of the available alveolar bone in the edentulous area. In addition, a large MMC involving more than 1/3 of the right maxillary sinus was detected.

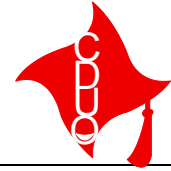
Treatment consisted in a sinus lift procedure via a lateral approach and simultaneous removal of the maxillary cyst through a small accessory bony access, located approximately 10 mm above the upper border of the bony window performed for sinus floor elevation. Initial suction of the cystic liquid was followed by the cyst enucleation through the accessory bony window, preserving the integrity of the schneiderian periosteum over the maxillary sinus floor.

A conventional sinus lift procedure was then performed. Dental implants were inserted at the same time of sinus floor elevation. Prosthetic restoration was started six months after surgery.

**Results.** No intra-operative or post-operative complications were found.

The clinical and radiological evaluation revealed a successful removal of the maxillary cyst and an excellent integration of both the grafting material and implants placed in the grafted area. The most recent recall (96 months after the start of prosthetic loading) showed no signs and symptoms of implant failure nor any relapse of the maxillary cyst.

**Conclusions.** Results of this clinical case suggest that this new technique may represent an easy and effective procedure to achieve the enucleation of MMC in patients scheduled for sinus floor elevation.



### SINUS FLOOR AUGMENTATION WITH SIMULTANEOUS IMPLANT PLACEMENT USING HETEROLOGOUS BONE AS THE SOLE GRAFTING MATERIAL: CLINICAL AND RADIOLOGICAL EVALUATION

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**Aim.** Despite the overall progress in dental implantology, the placement of implants in the posterior atrophic maxilla is already considered to be a challenging procedure due to great levels of reduced bone volumes in many cases. In addition to excellent dimensional stability the heterologous bone allows perimplant tissue loss very reduced in time; the objective of this study is to evaluate the dimensional stability of bio-oss grafted into the maxillary sinus during the procedure of sinus lift and implant placement.

**Materials and methods.** Inclusion criteria were severe atrophy (<8 mm) of the alveolar process in the sinus area unilaterally. The subantral vertical bone high had to be at least 3 mm to allow implant placements at the same time of the sinus grafting procedure. In 9 patients, maxillary sinus lift procedure with simultaneous implant placement using heterologous bone and resorbable membrane was performed. Immediately after surgery an ortopantomography (opt) was done; at 6 months from implant placement another opt was required. A radiographic bone evaluation was made using a digital measurement program, the measurements were taken, using as reference the implant placed in order to minimize dimensional distortions. For the rise is used heterologous bone material that proved to be the best material from the point of view of dimensional stability. Results. Nine patients were analyzed. Implants placed into regenerated bone exhibited success and survival rates of 100% after an average follow-up of 12 months. Six month after the sinus lift an opt showed an average vertical height gained was 7,7 mm; individually evaluated the first quadrant gain 9,47 mm and second quadrant 8 mm.

**Conclusions.** The use of heterologous bone alone during maxillary sinus floor elevation with immediate implant placement is a predictable surgical method to gain vertical bone height and to replace missing tooth in posterior maxilla.





### STAGE 3 BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE POSTERIOR MAXILLA: SURGICAL TREATMENT USING THE PEDICLED BUCCAL FAT PAD FLAP

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**Aim.** To present our experience using a pedicled buccal fat pad flap (PBFPF) in the treatment of stage 3 posterior maxillary bisphosphonate-related osteonecrosis of the jaw (BRONJ).

**Materials and methods.** Four patients, three female and one male, affected by breast or prostate cancer and treated with zoledronate e.v. for metastasis, were referred to our department presenting stage 3 posterior maxillary BRONJ. Intraoral examination revealed swelling, mucosal ulceration, infection and bone exposure in all of the cases. After clinical examination, maxillo-facial CT scan, medical and oncologic assessment, the patients were programmed for extensive sequestrectomy, bone debridement and immediate reconstruction using a PBFPF. In three of the four patients, the CT scan demonstrated homolateral sinus opacity related to sinus reaction to the infection. All four patients were treated under general anesthesia. A trapezoidal flap was made in all cases. In three cases, the maxillary sinus was drained under endoscopic control, gently cleaned and washed with antibiotic solution, paying particular attention not to leave exposed bone in the maxillary sinus. The fat pad was delivered into the mouth after blunt dissection and transferred onto the maxillary defect; on the lateral sinus wall, 2 or 3 holes were made to secure the flap in the correct position without tension using a resorbable 3/0 suture. A trans-mucosal suture was performed to fix the flap on the palatal aspect. A mucosal flap was finally prepared according to Rehrmann, and was sutured over the PBFPF without tension.

**Results.** All patients were surgically managed with sequestrectomy, piezoelectric bone debridement, pedicled buccal fat pad flap and mucosal flap according to Rehrmann. The posterior maxillary bone defect ranged from 2.4 cm to 4 cm in maximum diameter with an average of 3.2 cm. The extent of the flap was always sufficient to perfectly close the defect without tension. There were no post-operative complications and the average postoperative hospital stay was  $3\pm 1$  days. After  $10\pm 2$  days, the sutures were removed and good healing was noted without complications in all cases. The patients have been controlled monthly and after  $12\pm 4$  months of follow-up, no problems have been noted in the treated area.

**Conclusions.** The use of a PBFPF for closure of intraoral defects is a well-established procedure, especially for treatment of oro-antral communication. Oro-antral communication may be common after sequestrectomy and bone debridement in posterior maxillary BRONJ. We posit that in stage 3 bisphosphonate-related osteonecrosis of the posterior maxilla, managing the site with a PBFPF and primary closure may guarantee adequate bone protection with sufficient blood supply for an effective bone healing process.



### STUDYING THE ETIOLOGY AND POSSIBLE RELATIONSHIP BETWEEN SYSTEMIC PATHOLOGIES AND TOOTH EXTRACTIONS

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**Aim.** Prospective clinical study of 1600 cases in investigating the etiology currently leading to tooth extraction, along with a comparison of the results with related studies so as to investigate if there have been changes in the last 15-20 years. Moreover, the study also aims to identify correlations with major systemic diseases by comparing them with other patient characteristics, such as age, sex, health, smoker / non-dental elements mono / multi-rooted. The null hypothesis is that the etiology leading to tooth extraction has varied between years and that there are systematic pathologies which significantly correlate with tooth extraction.

**Materials and methods.** 1520 patients in need of tooth extractions were selected by the department of Oral Surgery of the University of Torino. Patients requesting an extraction without any actual indication were excluded from the study and were instead suggested to opt for a therapy of extraction following any pain. All patients were informed of the study being conducted and were asked to sign an informed consent for all cures they would be receiving. Patient data was collected by filling out a data sheet, carried out by the dentist who performed the extraction, indicating full name, date when the operation was executed, patient age, smoker/non-smoker, remote/recent anamnesis, aetiology of the extraction, patient compliance, and lastly whether a suture had been performed and an antibiotic therapy prescribed.

**Results.** From the results obtained it follows that, so far, the main cause leading to tooth extraction is by decay from destructive caries (about 55%), followed by periodontal disease (about 30%). The other causes of extraction (root fractures, orthodontic reasons, reasons of prosthetic eruptive problems, trauma, occlusal problems, endodontic failures) represent the remaining 18% in a fairly equivalent manner. It should be noted that the pathologies like heart disease, diabetes and hypertension are most probably a consequence of the age difference.

**Conclusions.** In the past 20 years, causes leading to tooth extraction have not varied in a significant manner in patients older than 50 years of age; they have instead varied in younger patients, possibly due to an increase in prevention programmes and motivation towards proper oral hygiene. The incidence of certain systemic diseases (cardiovascular diseases, diabetes, hypertension) is significantly higher in patients that undergo extraction, taking into account that these are pathologies occurring mostly in late age.



### **SURGICAL AND ORTHODONTIC RAPID PALATAL EXPANSION IN ADULTS USING A MODIFIED PALATAL PARTIAL OSTEOTOMY TECHNIQUE (PPOT)**

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**Aim.** Transverse maxillary hypoplasia, in adolescents and adults, is frequently seen in nonsyndromal and syndromal patients including cleft patients. In skeletally matured patients, the uni- or bilateral transverse hypoplasia can be corrected by means of a surgically assisted rapid maxillary expansion. A combined surgical and orthodontic technique for management of transverse maxillary deficiencies in mature patients is described and discussed.

**Materials and methods.** A rigid expansion appliance is usually cemented to the first premolars and first molars on each side. In the operating room, the patient is placed under general anaesthesia and an incision made in the depth of the maxillary vestibule. Osteotomies are done through the use of piezosurgery. As the anterior portion of the osteotomy is being performed, a periosteal elevator is maintained in the piriform rim, lifting the nasal mucoperiosteum to protect it. The lateral wall osteotomy is extended posteriorly to the pterygo-maxillary fissure. The third osteotomy is performed at the median level between the two central incisors. After a arciforme paramedian palatal incision (from the region of 1.4 to 2.4) and an initial scoring with a piezosurgery bur, a midpalatal osteotomy is then accomplished by malletting an osteotome posteriorly, parallel to the palatal plane, into the intermaxillary suture and directed to the posterior nasal spine. Before the soft tissue incisions are closed, the expansion screw is turned four to six times, so that the maxilla is expanded 1 to 1,5 mm. This amount of immediate expansion would normally cause blanching of the incisal gingival tissues. The wounds are closed as for a total maxillary osteotomy, taking care to re-approximate the musculature with deep periosteal sutures. Following the surgical procedure and a latency period, the appliance is activated by the patient, two quarter turn each day, until the desired expansion has been achieved. Within the week following the last activating-turn, orthodontic brackets are placed on the labial surfaces of at least the eight upper anterior teeth.

**Results.** The maxillary arch can be expanded orthopaedically, either unilaterally or bilaterally, in a mature patient with minimal morbidity. In orthognathic cases, this technique allows the orthodontist to create an ideal maxillary arch-form which, in turn, simplifies the subsequent orthognathic surgery, even if the maxilla still needs to be moved in either or both the vertical or the horizontal planes. The technique minimizes the risks of avascular necrosis and difficulties in positioning and stabilizing segments, both of which may be associated with segmented maxillary osteotomies.

**Conclusions.** This technique, as well as give due importance to the median palatine suture as a center of resistance. This modification involves a better visibility and access to the median palatine suture that can be sectioned without the danger of impairing the fibromucosa inside. The risk of a possible oro-nasal fistula is avoided by careful design of incision of the flap. This particular flap does not create problems of vascularisation because being a paramarginal flap, the osteotomy site is then covered and protected by the flap itself.



#### **SURGICAL TECHNIQUES OF TEMPORARY ANCHORAGE DEVICES (TADS)**

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**Aim.** The purpose of this study is to demonstrate the validity of the new ANOTEK miniscrew systematic (TAD). A temporary anchorage device (TAD) is a device that is temporarily fixed to bone for the purpose of enhancing orthodontic anchorage. They can be located: transosteally, subperiosteally, endosteally. They can be fixed to bone either mechanically (cortically stabilized) or biochemically (osseointegrated). The incorporation of dental implants and TADs into orthodontic treatment made possible infinite anchorage, which has been defined in terms of implants as showing no movement (zero anchorage loss) as a consequence of reaction forces.

**Materials and methods.** Inclusion criteria for this study were patients requiring uprighting, after extraction. The uprighting purpose is to create space for place implants. Patients with mixed dentition or any systemic illness were excluded from the study. The screws used in this study were custom made by Tekka, Brignais (France). The screw implants were made up of grade 5 Titanium 95%. They measured 1.5 mm in diameter and 9 mm in length. The screws were placed in the mandible and maxillary bone. Anesthesia was achieved by infiltration of 2% mepivacaine with 1 in 80,000 adrenaline. Pilot hole was drilled at an angulation of 30°–40° under copious irrigation with cold normal saline on the side which was selected for insertion of the screw. Keeping the angulations same as of drill bit, the screw was inserted. Post operative IOPAs were taken to confirm the position of screw. All patients were prescribed a course of routine antibiotics and analgesics and were instructed regarding maintenance of oral hygiene. All screws were immediately loaded with 150–200 gm of retraction force using a Ni–Ti coil spring or an elastic chain. Patients were recalled after 1 week of insertion of screws and subsequently after every month for a period of 6 months. Stability of all the screws was checked on the basis of mobility with tweezers at every follow up visit of the patient. If the screws became loose during the course of the study, they were considered to be a failure. In the absence of any mobility, the screws were considered successful. Redness or swelling around the neck of the screws was a sign of inflammation and thus failure of the screw.

**Results.** The results will be analyzed statistically by the Chi-square test with respect to Success/Failure for the two positions of screws (mandible and maxillary). The test of proportion will be used to analyze the significance of reasons of the screws. Other materials used: Phosforic acid 35% by Ultradent, 3M ESPE Adper Single Bond 2 Adhesive, 3M ESPE COMPOSITE + Filtek Supreme Ultra Flowable.

**Conclusions.** In one year we have collected only 11 cases of uprighting, 6 in the mandible and 5 in the jaw. The number of cases is too low to draw conclusions, therefore, partial results are not available. No screw were lost before the end of the treatment. The research was carried out in 1 year in the Department of "Scienze Odontostomatologiche", U.O.C. Clinica Odontostomatologica, Director Prof. Massimo De Luca, Rome, Italy.



### **SURGICAL TREATMENT OF A LARGE RESIDUAL ODONTOGENIC CYST OF THE MANDIBLE IN AN ELDERLY WOMAN**

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**Aim.** To describe the surgical planning and treatment of a wide residual cyst of the mandible in an 86-year-old patient to try to avoid major peri-operative complications.

**Materials and methods.** An 86-year-old woman was referred to our department by the emergency room for the presence of a swelling in the masseter region. Her medical history reported diabetes mellitus and hypertension controlled by medication; drug history did not report the use of bisphosphonates. Intraoral examination revealed total edentulism, swelling in the right posterior mandible with positive Dupuytren's sign and without mucosal ulceration, no infection or bone exposure and no referred pain. Orthopantomography showed a 5x3 cm unilocular osteolytic radiolucent lesion, to net margins, in the right posterior mandible, localized from the nervus mentalis to the mandibular angle. Considering all the possible differential diagnoses a needle biopsy was performed and the outcome was citrine liquid mixed with blood revealing the probable nature of radicular cyst. The 3D reconstruction CT scans showed the extent of the lesion (5.5x3.4x2.8cm), and partial bone absorption of the lingual and inferior limbus of the mandible. Having regard to the patient's age, edentulism, pathologies, and the lesion's dimensions, the site, the likely nature, and after examination of the clinical and maxillofacial CT scan, enucleation surgical treatment was programmed under general anesthesia. An oblique, antero-posterior and linguo-vestibular incision was made from the alveolar process in front of the lesion towards the cheek mucosa; a blunt dissection through the mucosa to identify the bone margins, isolation of the lesion, and removal using swabs mounted in Klemmer forceps paying close attention to the inferior alveolar nerve, that was gently detached from the lesion, and enucleation. The residual cavity, which was more preserved than that shown by the maxillofacial CT, was gently cleaned, washed with antibiotic solution and then filled with fibrin sponge. The surgical access was sutured with 3/0 silk. There were no complications and the postoperative hospital stay was 2 days.

**Results.** The design of the incision ensured a good intra-operative view and complete enucleation of the cystic lesion. A closure by primary intention and edentulism prevented fracture of the mandible. Thanks to the type of surgical approach and despite not presenting total integrity of its walls, the bone defect maintained a periosteal integrity so as to ensure good ossification. There were no postoperative complications. After 9 days, the sutures were removed, and good healing was noted without complications. There were no sensory abnormalities of the inferior alveolar nerve which maintained normal function. Histological examination confirmed the suspected diagnosis of a residual radicular cyst. The patient was controlled monthly and after 6 months of follow-up, an X-ray image of the jaw and maxillofacial CT showed no problems in the area treated with good signs of re-ossification.

**Conclusions.** When collecting data for preoperative evaluation of the surgical technique to be adopted, it has been shown that CT images do not always correspond to the clinical condition and the surgical field, probably because of the small thickness of the cortex. Additionally, the use of this surgical technique has resulted in minimum periosteal elevation and permitted a suture on bone tissue thus ensuring a closure by first intention and formation of a good primary clot. Although only one case has been reported here, we can assert that, in the treatment of large cystic lesions in elderly patients, this technique has shown effective healing and none of the most worrying complications.



### TECHNIQUES TO REMOVE FAILED IMPLANTS: LITERATURE REVIEW

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**Aim.** This literature review identifies and evaluates the various techniques to remove Non-Mobile failed implants. This study also discusses the indications of the various techniques and delineates the limits and complications that may arise with the various methods of implant removal.

**Materials and methods.** We used the following Bibliographic Databases for our research: PubMed, Cochrane and MDLinx. The combination of the following Keywords "dental implant", "oral implant", with "removal", "retrieval", "extraction", "explantation" and "technique" has been used to find related articles. A further selection among these articles has been performed which allowed us to identify articles inherent the topic of the literature review.

**Results.** Our research has produced 195 articles. We considered a total of 31 pertinent articles among all. These articles have allowed us to classify the various techniques described and to discuss the related indications and contraindications. Five Removal Techniques have been identified: Counter-Torque Ratchet Technique (CTRT), Reverse Screw Technique (RST), Piezo Tips Technique, High-Speed Burs Technique, Trepine Burs Technique. CTRT and RST involve rotation of the failed implant in the reverse direction to the direction of insertion of the same. These techniques are considered minimally invasive with no damage to the surrounding structures. The Counter-Torque Ratchet Technique (CTRT) makes use of a ratchet for its execution. The use of CTRT depends upon several factors: implant connection; implant diameter; implant geometry; implant location (bone quality); amount of residual osseointegration.

The RST technique is indicated to remove a fractured implant, an implant with damaged connection, an implant with external connection when the ratchet may not be engaged. In addition to the Reverse Torque Techniques exist surgical techniques that involve the removal of bone tissue surrounding the implant. Those techniques are defined bone removal techniques (BRT) and include: the Piezo Tips Technique, the High-Speed Burs Technique and the Trepine Burs Technique. Piezo tips technique: Piezo Tips allow you to gain better intraoperative control compared to high speed burs during the osteotomy. The bone healing after piezoelectric surgery seems to be more favorable than the healing of the osteotomies performed with high speed burs. High speed burs technique: The use of high speed burs under copious irrigation is an efficient method to remove a failed implant. Trepine Burs Technique: This technique is one of most invasive and well-known options for the implant removal. There are different sizes of Trepine burs, which correspond to the different implant diameters. Combined Techniques: To ensure the removal of an implant without fracture it is recommended to use initially CTRT: afterwards, if there is any movement Piezo Tips, High-Speed Burs or Trepine Burs may be used. Further CTRT, RST should be performed to remove the fixture. The goal is to preserve as much as possible the remaining bone.

**Conclusions.** On the basis of specific clinical factors: anatomical conditions, implant design, implant connection conditions, bone quality, bone quantity remaining integrated at the implant body is proposed a "decision algorithm" to help clinicians to determine the most appropriate and less invasive technique for removal of the implant. The goal is to preserve as much as possible the surrounding bone for following implant-prosthetic rehabilitations.



### THE USE OF PEDICLED BUCCAL FAT PAD FOR CLOSURE OF OROANTRAL COMMUNICATIONS: A CASE SERIES

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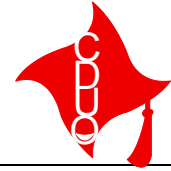
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**Aim.** To present a case series of closure of oroantral communications (OAC) with the utilization of pedicled buccal fat pad (BFP) to cover the posterior maxillary bone defects.

**Materials and methods.** the Egyedi's surgical technique was applied. Egyedi recommended the use of BFP as a pedicled flap to repair oral defects and, subsequently, this has been successfully used by many other surgeon. In some cases this flap is used in sinus lift procedure in combination with graft material to cover sinus wall and protect the perforated membrane, as substitute of collagenous membrane. In this case, the use of BFP provides immediate blood supply to the recipient site and promotes rapid neovascularization of grafted material. BFP separates a fast-growing fibrous tissue and the defect itself in order to allow slow-growing osseo-progenitor cells to migrate into the bone defect and lead to the reossification of this area. In the treated patients, once the BFP is exposed, blunt dissection of the surrounding tissue was necessary. BFP was then gently pulled out from its bed with a vascular clamp and sutured over the bone defect. Finally, the mucosal flap is repositioned to cover entirely the BFP.

**Results.** This procedure was successful in our cases without post-operative complication or recurrence. The localization of this anatomical structure, the easy mobilisation and availability for oral surgeon makes it an ideal flap. Its application is a well-established surgical technique in oral and maxillofacial surgery.

**Conclusions.** BFP is an autogenous graft material that is useful to close small to medium OAC defects, preventing wound dehiscence or fistula. The benefits of this procedure are more than disadvantaged: easy localization and mobilization, rich vascularization, abundance of tissue and maintenance of vestibular fornix depth. In comparison with other classical surgical technique for closure of OAC, this has a very high success rate in literature, close to 98%. The only complications reported in literature are: haematoma, infection, partial necrosis, limitation mouth opening, haemorrhage, facial nerve injury, but most of these are single cases attributed to low experience or invasive surgery. Recent studies have focused on the histological composition of BFP, because it is a substantial and easily accessible source of adipose stem cells, which have multidifferentiative ability. The presence of this kind of cell population may be one of the crucial factor explaining the high success rate of this procedure.



### UPRIGHTING OF THE IMPACTED SECOND MANDIBULAR MOLAR WITH SKELETAL ANCHORAGE: A CASE SERIES

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**Aim.** To present a consecutive case series of uprighting of impacted second mandibular molar using a screw as an absolute skeletal anchorage.

**Materials and methods.** A multidisciplinary technique involving oral surgeons and orthodontics is presented. 12 patients (average age 16.6 years at time of surgery; 6 females and 6 males) with an impacted and angulated mandibular second molar (8 teeth 47 and 6 teeth 37) were consecutively treated. The method consisted in a single surgical phase where the third molar was extracted, the crown of the second molar exposed, a titanium screw with a specific orthodontic head morphology was inserted distally to the the extracted third molar. One or more orthodontic bracket were placed in position on the second molar crown, and it was subsequently connected to the screw by means of two metal ligatures with eyelets for attaching the intermediate traction module or a NiTi closed coil-spring. The orthodontic force was therefore immediately applied. The flap was repositioned and sutured. Follow-up was carried out with clinical controls every 3 weeks and radiographic every 5-6 weeks (periapical x-ray or digital ortopantomography). Intermediate gingivectomies were done when necessary, until the tooth has been uprighted. A further orthodontic step was necessary in some cases to complete the process and finalize occlusion.

**Results.** In all 12 cases, the uprighting of the second molar was achieved. Average therapy duration was 10.6 months. Some minor complications were encountered: gingivitis and gingival hypertrophy were the most common. The screws and the uprighting orthodontic appliances were always in place until they were removed. Screw removal was always done without complains. Orthodontic finalization by the use of a segmental appliance was done in 5 cases.

**Conclusions.** Eruption disorder of the mandibular second permanent molars is quite rare, and it has to be treated early. In terms of occlusion, the patient is assured of the proper arch length, with obvious functional and masticatory advantages, and extrusion of the opposite tooth can be prevented. Surgical methods vary from simply uncovering the tooth to third molar extraction and surgical second molar repositioning. Surgical uprighting and repositioning of the mandibular second molar, with or without extraction of the third molar, is a possible option. When a molar tooth is severely impacted, surgical uprighting may provide a quick and easy solution, particularly when comprehensive orthodontic treatment is contraindicated. Once the molar has been uprighted, any occlusion should be carefully checked for interferences which may lead to occlusal trauma. The uprighted tooth should be also positioned in a manner that allows healthy soft tissue attachment and ease of access for appropriate hygiene. Careful handling and positioning of the keratinized gingiva during the procedure are critical for the long-term periodontal health of uprighted molars. If these criteria are met, surgical second molar uprighting, by means of a distal screw as a skeletal anchorage, has been shown to be a predictable procedure and a viable option when other types of treatment are not possible. The described method is minimally invasive, as the surgery needed to expose the impacted tooth and to place the screw is quite simple and can be completed in a single session, together with the extraction of the third molar, which is necessary in most cases.





#### USE OF PLATELET-RICH PLASMA IN IMPLANTOLOGY

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**Aim.** Platelet-rich plasma (PRP) is blood plasma whose rationale is that platelets release different substances promoting tissue repair and affect the behavior of other cells and modulate inflammation and angiogenesis. Platelets play a fundamental role in mediating the healing of damaged tissue thanks to their ability to release growth factors, such as PDGF, TGF- $\beta$ , VEGF, IGF-1, FGF, and EGF. Therefore, PRP can be used in those surgical areas where a faster tissue regeneration is required. The aim of this work is to stimulate the physiological mechanisms of tissue regeneration, bone regeneration in particular, increasing their concentration in the implant sites.

**Materials and methods.** Nine male and two females patients aged between 28 and 55 years were treated. They presented with several problems: three of them with radicular cystic lesions, unscrewed prosthesis, destruction of the bone saddle due to a periodontal disease and severe atrophy of the jaw. After objective structured clinical examination and radiological and periodontal examinations, PRP in combination with small amounts of autologous bone was used to solve these problems. It was obtained with a double-centrifugation technique, characterized by the decrease of platelet stressors according to the shortness of centrifugation time and the level of revolutions applied. After adding PRP in the implant site, an acceleration of the mechanisms of tissue regeneration was obtained; then, the implant was placed.

**Results.** In the 11 cases who had received grafting of deantigenated, demineralized bovine bone called Geistlich Bio-Oss<sup>®</sup> (mixed with 50% of cortical and medullary grafts and 50% of pure-phase beta-tricalcium phosphate) and Sint Oss made by "Industrie Biomediche e Farmaceutiche" with the addition of growth factors of PRP, we noticed a rapid regeneration and bone maturation and, consequently, a better quality at 6 months (phase II or lamellar bone), with a greater amount of bone trabeculae and greater density of the regenerated bone tissue. The resulting data were analyzed through various methods:

- Histological and histomorphometric examination of specimens at 6 months showed an extension of bone trabeculae of  $7.4 \pm 11\%$  for the grafted bone enriched with PRP, compared with  $55.1 \pm 8\%$  of specimens with bone grafts (the extent of the native bone was  $38.9 \pm 6\%$ );
- Immunocytochemistry with monoclonal antibodies targeting growth factors PDGF and TGF- $\beta$  confirmed their presence in platelets of PRP and in several cells of bone tissue taken for grafting;

**Conclusions.** we can say that the action facilitating the neo-osteogenesis of PRP is achieved through the increased concentration, during surgery, of platelet-derived growth factors and other blood proteins, thanks to the increase of chemotaxis of competent cells involved in the processes of angiogenesis, stimulation of mesenchymal cells, proliferation of preosteoblasts and their differentiation into osteoblasts, i.e. the whole physiological mechanism of tissue regeneration. The faster maturation and the increased quantity of regenerated bone tissue, as well as the improved re-epithelialization of the wound, are the key points of techniques using PRP. PRP gel, has no characteristics of toxicity and immunogenicity even when alloplastic materials with osteoconductive properties are added because one is running out of autologous bone.

The protocol allows to quickly obtain valid results both in minor and advanced oral surgery, with a small sampling of peripheral venous blood under sterile conditions appropriate to the dental operating room, with simple and inexpensive equipment, without loss of time and without additional discomfort for the patient.



### VERTICAL RIDGE AUGMENTATION OF ATROPHIC POSTERIOR MANDIBLE USING AN INLAY TECHNIQUE WITH A XENOGRAFT WITHOUT MINISCREWS AND MINIPLATES: CASE SERIES

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**Aim.** Rehabilitation of partially or totally edentulous posterior mandible with implant-supported prosthesis has become a common practice in the last few decades, with reliable long-term results. The use of miniscrews and miniplates have been reported to increase the risk of fracture of the osteotomy segments. The purpose of this case series was to use an inlay technique, without the use of miniscrews and miniplates for stabilization of the transported bone fragments.

**Materials and methods.** Nine consecutive patients (six men and three women) aged between 26 and 51 years (mean 44 years) were enrolled in this study. A horizontal osteotomy was performed 2-3 mm above the mandibular canal, and two oblique cuts were made using a piezosurgery device. The final phase of the osteotomy was performed with chisels. The osteotomized segment was then raised in the coronal direction, sparing the lingual periosteum. Two miniblocks of xenograft without miniscrews and miniplates were inserted mesially and distally between the cranial osteotomized segment and the mandibular basal bone. The residual space was filled by particles of cortico-cancellous porcine bone. Four months after surgery, a panoramic X-ray was taken before implant insertion. A bone trephine with an internal diameter of 2 mm was used as the second dental drill to take a bone core biopsy during preparation of the #35 and #37 or #45 and #47 implant sites.

**Results and conclusions.** The postoperative course was uneventful in seven of the nine patients. No dehiscence of the mucosa was observed at the marginal ridge of the mobilized fragment. Newly formed bone was present near the osteotomized segments, and was observed in the bottom half of the specimens and was identified by its higher affinity for the staining. Newly formed bone was seen in close contact with the particles of biomaterials. No gaps or connective tissue were present at the bone-biomaterial interface. Histomorphometry demonstrated that  $44 \pm 2.1\%$  of the specimens was composed by newly formed bone,  $18 \pm 0.8\%$  by marrow spaces, and  $33 \pm 2.4\%$  by the residual grafted biomaterial.



### A RARE CASE OF OSSEOUS CHORISTOMA OF THE CHEEK: CLINICAL AND HISTOPATHOLOGICAL FINDINGS

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**Aim.** A "choristoma" is a tumor-like mass of normal tissue in an "abnormal" location. Several different tissue types may occur in the mouth as choristomas; these include bone, cartilage, gastric mucosa, glial tissue, and tumor-like masses of sebaceous glands. Osseous choristomas are uncommon lesions of maxillofacial region which usually occur on the tongue. It appears as a tumorous mass of normal bony structure with mature cells in an ectopic position. Some lesions represent developmental malformations, whereas others may be reactive lesions after trauma or chronic irritation. The aim of the present study was to show a rare case of oral choristoma located on the left cheek.

**Materials and methods.** A 50-years-old man was referred to our Department for consultation regarding an asymptomatic, slowly enlarging swelling of the left cheek. The lesion had been present for 1 year and the patient referred a significant growing over the last 2 months, which caused masticatory interferences. He was in good health and had no history of previous facial trauma or any other medical disorder. Palpation revealed a hard, mobile, well-circumscribed, rounded mass measuring 20 mm covered by normal skin and mucosa. An echographic examination and a magnetic resonance were taken, and they revealed a solid spherical enlargement in the soft tissues, not attached to the mandible or maxilla. The mass was surgical excised under local anaesthesia through an intraoral approach, and the specimen was fixed in 10% formalin. It was subsequently sent to the Oral Pathology Service for microscopic examination.

**Results.** The preoperative clinical impression was that the lesion represented a benign osseous process, possible teratomas, osteomas, calcified lymph nodes, or calcified hematoma. Histological stainings demonstrated lamellar bone with benign-appearing osteocytes within lacunae in a fibroadipose tissue. The diagnosis was "osseous choristoma"; the patient had periodic follow-up and has remained free of disease for the past 18 months.

**Conclusions.** Upon reviewing the English literature, no previous case of osseous choristoma located in the cheek region has been found. The pathogenesis of osseous choristomas remains obscure, and a variety of theories have been proposed to explain its etiology. These theories can be divided into two main categories: the developmental malformation theory, and the reactive or post-traumatic theory. The manifestation on the oral cavity is rare, with the exception of the location on the tongue. Though this is a benign lesion, a prolonged clinical and radiographic follow-up is necessary after surgical excision.



### A RETROSPECTICAL ANALYSIS OF COMPLICATIONS IN 68 CASES OF MAXILLARY SINUS LIFT

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**Aim.** The graft of maxillary sinus is a safe therapeutical option to rehabilitate the edentulous maxilla. This surgical technique leads more risks and complications than simple implant therapy. The aim of our study was to do a retrospectical analysis of the complications after sinus surgery. We put our attention on how these complications were solved.

**Materials and methods.** For the retrospectical analysis 48 patients were included for a total of 68 maxillary sinus grafts. The interventions were do from june 2008 to may 2013. Ten cases developed complications. We evaluated if some variables like different biomaterials represent risks factor.

**Results.** We report 3 cases of perforation of the membrane of the sinus, 2 cases of dehiscence of the flap, 4 cases developed an oroantral communication, one case a sinusitis and one case an hyperplasia of the mucosa. In 63 of 68 cases were possible to rehabilitate the patients with a fixed prosthesis.

**Conclusions.** The patient that undergo to maxillary sinus graft has to be carefully evaluated to reduce the rate of complications. Biomaterials can affect the prognosis and the quality and quantity of regenerated tissue. The compliance of the patient and the follow-up in post-surgical phase are fundamental.



### ACCURACY IN IMPLANT PLACEMENT USING A COMPUTER-GUIDED SURGERY FOR THE PROSTHETIC REHABILITATION OF AN EDENTULOUS MANDIBLE. A COMPUTER TOMOGRAPHY EVALUATION

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**Aim.** Several published papers have described pre-treatment planning software based on radiologic images, showing the advantages of such procedure and promising clinical results. However, the accuracy to reproduce the planned implant position is nowadays widely debated in the scientific literature. The aim of this case report was to evaluate the match between the virtually planned implant position and the placed implant, in a totally edentulous patient treated with the All-on-4 TM concept.

**Materials and methods.** A healthy non-smoking 55 years old male patient was referred to the Department of Oral and Maxillofacial Sciences, Sapienza University of Rome. Comprehensive clinical examination revealed partial edentulism and a failing dentition with class 3 mobility as a result of advanced periodontal disease both in the maxilla and in the mandible. All the teeth were extracted and immediate upper and lower complete dentures were applied. After 8 weeks, when tissue healing was complete, a Computer Tomography scan with a radiographic template was acquired in the mandible. Based on the acquired image data and following transfer into DICOM format, implant planning and simulation was completed using the software program implant (3Dlemme). A surgical template was then obtained and the surgical phase was performed with a flapless approach. A total of 4 implants (4.2mm in diameter, 13mm in length, ISOMED) were placed: 2 in the intraforaminal area, and 2 in the premolar area. The implants were immediately loaded with a temporary fixed-prosthesis. Six months after the implant insertion, the temporary prosthesis was removed and a new CBCT scan was performed with the same settings as the preoperative examination. The pre- and postoperative data sets were fused by means of the software (3Dlemme) to compare the position and axes of planned and placed implants. Three deviation parameters were measured: the angular deviation, implant neck lateral deviation and implant apex lateral deviation.

**Results.** The mean variation of the implant apex was 0,77 mm (range 0.43-1.04 mm); while the mean variation of the implant neck was 0,69 mm (range 0.54-1.10 mm). The overall angular deviation between the planned and the final implant position was 1,11° (range 0.28°- 2.84°).

**Conclusions.** The present case report suggests that the computer-guided surgery has a high reliability to reproduce planned implant position and that it seems to be a very suitable procedure for the All-on-4 TM treatment concept. Further studies with a larger sample size are needed to confirm the accuracy of this procedure.



### BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAW (BRONJ) AS EFFECT OF A LONG-TERM ORAL THERAPY

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**Aim.** Bisphosphonates, pyrophosphate analogs which inhibit osteoclastic bone resorption, represent nowadays the first-line therapy for degenerative diseases of the bones and joints. Considering that a large number of women in post-menopausal undergoes metabolic bone diseases, such as osteoporosis, it is easy to understand how these drugs are used on a large scale. The common adverse effects as a consequence of the assumption of aminobisphosphonates drugs in an ongoing chronic therapy are esophagitis, gastro-intestinal disorders, irritation and local pain, rash, uveitis, dizziness, headache. However, although rarer, a more serious complication can be represented by Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ). We designed the present study to describe the necrotic lesions of maxillary bone diagnosed and treated at the Department of Oral Surgery of Second University of Naples (SUN).

**Materials and methods.** A group of 85 patients who had taken or were taking bisphosphonates drugs, 82 females (71.8%) and 3 men (3.5%), referred to our Department from January 2013 to January 2014. 61 patients (71.8%) were treated for non-neoplastic bone and joint diseases using oral bisphosphonates, and 24 patients (28.2%) were taking bisphosphonates by intramuscular or intravenous injection for neoplastic or non-neoplastic diseases. The 4.7% developed BRONJ. All BRONJ+ patients were females (mean age 73.25 years), which had taken or were taking bisphosphonates drugs per os as chronic therapy for non-neoplastic bone and joint diseases (from 2 to 7 years). They showed single osteolytic areas affected by necrotic processes localized to the jaw bone, of variable extension, spontaneously painful. In X-ray examinations, these lesions appeared as bone sequestrations. The patients were asked to discontinue bisphosphonates therapy in agreement with their specialists. After surgery, which consisted of sequestrectomy interventions, the whole lesions were collected and sent to our Department of Pathological Anatomy for microscopic examination, and patients were prescribed a drug therapy that included home NSAIDs and broad-spectrum antibiotics.

**Results.** The histological report confirmed that lesions were bone necrosis in all cases and one of them was accompanied by moderate degree of dysplasia. In subsequent follow-up visits, it was possible to observe the clinical healing of the areas subjected to intervention. Signs of the healing process were also detectable in X-ray examination carried out during the subsequent months. We therefore made the diagnosis of BRONJ.

**Conclusions.** BRONJ is reported to be caused by bisphosphonates, inhibitors bone resorption drugs. It is an uncommon, serious emergent adverse effect. This report intends to improve awareness amongst clinicians to facilitate early diagnosis and intervention. Further studies are needed to determine the possible causes that lead some individuals to BRONJ. Medical practitioners should also consider the use of alternative dosing strategies for drugs or drug holiday periods when possible. This will promise not only better and safer treatments for patients, but also potentially lowering overall healthcare costs.



### BONE REGENERATION IN PATIENTS WITH SEVERE MANDIBULAR ATROPHY USING DFDBA

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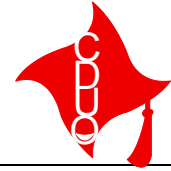
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**Aim.** The success of implant therapy depends on the availability of an adequate volume of the bone in the edentulous site. The increase of the alveolar ridge is a prerequisite for the optimal placement of endosseous implants. Over the years, different regenerative techniques and filling materials have been studied to restore an adequate bone volume: autologous, allogeneic, xenogeneic or synthetic bone grafts with resorbable or non-resorbable barrier membranes. This paper presents a case of advanced implant surgery in a 25-year-old patient with an atrophic mandibular crest (Misch IV class), extended from 4.3 to 3.4. We used, for bone regeneration, a combination of demineralized freeze-dried bone allografts (DFDBA), human bone granules and a resorbable membrane. The aim of this paper is to show the validity of allogeneic bone, in patient with a severe mandibular atrophy and no sampling site.

**Materials and methods.** the patient has reached our observation after maxillofacial surgical intervention (Le Fort I osteotomy and bilateral sagittal mandibular split osteotomy). As confirmed by TC Dentascan, the clinical examination showed a partial mandibular edentulism and an important vestibular bone depression (absence of 3.1 – 3.2 – 3.4 and 4.3). The first surgery was carried out in order to regenerate the residue using allogeneic materials. After exposition and preparation of the patient bone surface, three blocks of pre-cut DFDBA bone were fixed to the recipient site through tenting screws. Then human bone granules were added and a resorbable membrane was placed to wholly cover the site. Six months afterwards a second surgery was performed in order to insert four implants. After further six months, the implants were uncovered and the provisional implant-supported restoration was placed.

**Results.** One year after the surgery the TC Dentascan showed bone development in regeneration sites. The objective of obtaining both an aesthetic and functional result that would satisfy the patient had thus been achieved, thanks to an appropriate diagnosis and a well-thought treatment plan.

**Conclusions.** Major limits in the use of autologous bone grafts are the lack of adequate intra-oral donation sites and the presence of a severe atrophy. Extra-oral grafts require the hospitalization of the patient and use of more resources. In conclusion, the DFDBA represents an excellent alternative for the achievement of adequate bone regeneration and a further implant-retained prosthetic rehabilitation.



## BRONJ ONSET AND DENTAL IMPLANT THERAPY IN BIPHOSPHONATES USERS: A LITERATURE REVIEW

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**Aim.** The aim of the work is to investigate the scientific literature regarding failed osteointegration of dental implants in BP users and the possible simultaneous Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ) onset through an online search performed on MEDLINE-PUBMED.

**Materials and methods.** The bibliographic search was carried out using MEDLINE/Pub-Med database ending in December, 2013. The following MeSH terms were used: "dental implant[Title/Abstract] AND bisphosphonates[Title/Abstract]", "oral implant[Title/Abstract] AND bisphosphonates[Title/Abstract]", "dental implant[Title/Abstract] AND osteonecrosis [Title/Abstract]", "oral implant[Title/Abstract] AND osteonecrosis[Title/Abstract]", "dental implant[Title/Abstract] AND BRONJ[Title/Abstract]" and a simplified search with the terms implant AND bisphosphonates. The relevant publications were identified and full texts of these articles were obtained. The success rate of implant therapy in BP users, and the incidence of BRONJ related to dental implant placement, were evaluated in patients undergoing treatment with oral or intravenous bisphosphonates.

**Results.** A total of 463 articles were found out through the key words used. The subsequent search at the title level yielded 258 titles, and further research at the abstract level identified 187 abstracts. The abstract investigation revealed 89 articles for full-text reading. Out of the 89 studies selected for full-text reading, 45 were excluded. The exclusion criteria for those studies were: the use of machined implant surface, the missing of a detailed report on success criteria used for assessment and the presence of multiple results of the same publications yielded from the keywords. The electronic and manual search provided 20 case reports, 9 prospective studies, 12 randomized clinical trials and 3 reviews that satisfied the inclusion criteria and were analyzed. Subsequently, the data obtained from the collected publication, were divided between oral or intravenous bisphosphonates therapy. Case reports studies, whom 50% described complete failure of implants with ONJ, whereas they represent the lowest level of evidence, were discarded. From the analysis of the remaining part of the scientific publications, a total of 2382 patients, undergoing implant therapy, could be recorded. The percentage of implant survival rate was not statistically significant different between users and not users, while the incidence of BRONJ seems to be higher in subjects taking BF intravenously and from long time.

**Conclusions.** Administering bisphosphonate for the treatment of osteoporosis or for preventing bone metastasis is fairly frequent nowadays. Nevertheless, the literature includes only a small number of cases of maxillary osteonecrosis following surgery in the buccal cavity of patients taking bisphosphonates. Within the limitations of this review, it can be concluded that short term bisphosphonate therapy does not increase or decrease the survival rate of dental implants in bisphosphonate users as compared to non-users. As a matter of fact, risk factors for BRONJ incidence are the type of bisphosphonate and the length of exposure, most commonly identified in the endovenous Bisphosphonate. The American Association of Oral and Maxillofacial Surgeons do not contraindicate dental implant placement in patients who have been taking bisphosphonates orally for under three years prior to surgery providing they do not present other risk factors such as medication with corticosteroids or advanced age. In the case of dental implants, a minimum of three months after surgery is recommended before the medication can be administered again.





### CLINICAL AND HISTOLOGICAL EVALUATION OF NEWLY FORMED BONE IN A SOCKET PRESERVATION TECHNIQUE

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**Aim.** An adequate alveolar ridge volume represents an essential prerequisite for a successful implant placement. After dental extraction an amount of alveolar bone is resorbed. Different SP techniques have been described in literature to limit post-operative bone resorption. The aim of the present study was to investigate bone regeneration under an exposed high density polytetrafluoroethylene (d-PTFE) membrane in post-extraction sockets filled with nano-crystalline graft material.

**Materials and methods.** A total of 10 maxillary and mandibular premolar extraction sockets were evaluated in 10 subjects. After tooth extraction, the socket was grafted and a sub-periosteal pocket was created to insert the membrane. No releasing incisions were made and the membrane was intentionally left exposed. The membrane was removed 28 days after surgery. Six months later, the sites were prepared for implant placement. A trephine drill has been used in the osteotomy preparation for histological analysis of the regenerated bone. Horizontal and vertical dimensions were recorded at baseline and at the time of implant placement. The specimens were processed for histological, histochemical and immunohistochemical analysis.

**Results.** At 6 months the sites showed a limited reabsorption of the bucco-lingual ( $0,21 \pm 0,23$  mm) and mesial-distal ( $0,22 \pm 0,19$  mm) dimension of the alveolar socket. The mean vertical socket height reduction was  $0,42 \pm 1,09$  mm at the buccal site;  $0,50 \pm 1,04$  mm at the lingual sites;  $0,42 \pm 0,60$  mm at the mesial site and  $0,35 \pm 0,37$  mm at the distal site. All the histological specimens showed the presence of trabecular and lamellar bone. The residual graft particles were embedded in newly formed bone. A great presence of connectival tissue was also observed. Furthermore, immunoreactivity indicated newly formed blood vessels and active bone remodeling.

**Conclusions.** Socket preservation using nano-crystalline material and d-PTFE membrane can limit the amount of horizontal and vertical bone resorption. This may represent an advantage in particular when aesthetic concerns are of primary interest. SP technique should be taken into account when an implant restorative planning includes extractions, as an alternative to post-extractive implants.



### CORONECTOMY OF THE LOWER THIRD MOLARS: A SYSTEMATIC REVIEW

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**Aim.** The aim of this systematic review was to evaluate the clinical effectiveness and reliability of the surgical technique of coronectomy for third molars extraction in close proximity with the inferior alveolar nerve (IAN).

**Materials and methods.** A literature survey was performed using the PubMed and SCOPUS databases and Cochrane Library, with the last access in September 30, 2013. "(Coronectomy) OR (Odontectomy)" was used as search algorithm. No language restrictions were used. Finally, a manual search was also performed by scoring the references within the studies examined. After selection, 10 articles have satisfied inclusion and exclusion criteria and qualified for the final analysis. The following variables were evaluated: study design, sample size, age and sex distribution of the sample, adjunct pharmacological treatments, surgical success or failure, inferior alveolar nerve injury (IANI), lingual nerve injury (LNI), postoperative adverse effects such as pain assessment, swelling assessment, dry socket infection, infection rate, pulp disease, root migration, follow-up and rate of reoperation. An assessment of study quality and risk of bias in published studies was also conducted to evaluate the strength of evidence provided. The following characteristics in the quality evaluation method were analysed: study design, prior estimation of sample size, adequacy in sample selection description, adequacy in preoperative radiographic evaluation, adequacy in treatment description, adequacy in development of an accurate follow-up, adequacy in description of clinical outcomes, adequacy of statistical analysis.

**Results.** Many studies considered the coronectomy a safe surgical procedure. This technique appears to be associated with a low incidence of complications in terms of IANI, LNI, postoperative pain and swelling, dry socket infection, and pulp disease. Adverse effects were found to be lower when a pharmacological therapy was assumed postoperatively. Postoperative migration of the retained roots seems to be a frequent occurrence and almost all studies suggested that most migratory component would be present in the first 6 months postoperatively, with an average migration of 2-3 mm. With regard to the quality analysis only one study was judged to be of high quality, three were of medium/high quality, two were of medium quality, and the rest of low quality.

**Conclusions.** Coronectomy seems to be a safe procedure at least in the short term, with a reduced incidence of postoperative complications and risk of IANI. The success requires both adequate case selection and operator technique. Therefore, this surgical technique can be indicated for teeth that are very close to the IAN. If a second operation is needed for the remnant roots after a coronectomy, the roots can be removed with a low risk of paresthesia, because the roots would have receded from the IAN.



### DENTAL PULP STEM CELLS: ISOLATION, CHARACTERIZATION AND OTHER BIOLOGICAL ASPECTS

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**Aim.** It is now accepted that progenitor/stem cells reside within the post-natal dental pulp. Several niches of multipotent mesenchymal progenitor cells with high proliferative potential for self-renewal have been identified. These progenitor stem cells are now recognized as being vital to the dentine regeneration process following injury. Characterization of these cells, and determination of their potentialities in terms of specificity of regenerative response, may help new clinical treatment modalities. Stem cells have been isolated from many tissues and organs and five type of dental stem cells have been established: dental pulp stem cells, stem cells from exfoliated deciduous teeth, stem cells from apical papilla, periodontal ligament stem cells, and dental follicle progenitor cells. All of these type of stem cells can differentiate into odontoblasts, adipocytes, neuronal-like cells, glial cells, osteoblasts, chondrocytes, melanocytes, myotubes, and endothelial cells. Possible application of these cells in various fields of medicine makes them good candidates for future research as a new, powerful tool for therapy. The efforts made in the research of dental stem cells have clarified many mechanisms underlying the biological processes in which these cells are involved. Moreover, recent attention has been focused on tissue engineering and on the properties of these cells: several scaffolds and implant surfaces have been used to promote 3-D tissue formation and studies have demonstrated that DPSCs show good adherence and bone formation on microconcavity surface textures. In addition, adult bone tissue with good vascularization has been obtained in grafts. **Aim.** This study aimed to review the body of knowledge relating to stem cells and to consider the possibility of these cell populations, and related technology, in future clinical applications.

**Materials and methods.** The study is based on a review of items found on the major research sites such as PubMed and Medline. Parameters which we focused on are the most important biological aspects in which their manipulation is involved such as isolation, characterization, cryopreservation and their possible uses in tissue engineering. In the same study we also add a personal in vitro trial which has been conducted to obtain dental pulp stem cells for culturing on titanium surfaces. Dental Pulp Stem Cells have been extracted, digested and then immersed into a colture medium and placed in 75 ml flasks with filtered valves. Flasks were incubated at 37 °C and 5% CO<sub>2</sub> and the medium changed twice a week. From 16 to 20 passages were performed. Stem cells were sorted only when their number was at least 1,000,000 cells per flask. This number was achieved around day 22, when they were still undifferentiated.

**Results.** We have classified and elaborated data obtained from scientific literature and then we used them in our personal experience observing that their manipulation requires some important steps and precautions in particular when DPSCs are challenged with surfaces or scaffolds.

**Conclusions.** Regeneration of the dental tissues provides an attractive alternative to more traditional restorative approaches because the diseased tissue is replaced by natural tissue, which forms an integral part of the tooth. Novel methods based on progenitor cell recruitment and subsequent stimulation offer considerable potential to significantly impact on dental disease treatment. We are still some distance from fully understanding the potentiality and behaviour of dental pulp progenitor cells, and subsequent clinical treatment modalities. Nonetheless, the opportunities for their exploitation in dental tissue regeneration are becoming clearer and will lead to significant benefits in the management of the effects of dental disease.



### EXCISIONAL BIOPSY OF LINGUAL LEUKOPLAKIA: A CASE REPORT

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**Aim.** Leukoplakia is a clinical term which should be used to define white plaques of uncertain origin after other known diseases or disorders are excluded. The lesion has no specific histology: it may show epithelial hypo or hyperplasia and it may or may not present epithelial dysplasia. Leukoplakia has a variable behavioural pattern with a tendency to malignant transformation and strict clinical checks or surgical excision are the unique treatment options.

**Materials and methods.** A 58-year-old woman was referred in June 2010 for a white plaque of 0.9x1.5 cm with finely irregular surface located on right border of tongue. The treatment approach was the surgical excisional biopsy of the entire lesion. A tissue lozenge, with the long axis parallel to the tongue border, was removed with a 3 mm peripheral margin of clinically healthy tissue, without involvement of the deep muscular plane. Before the suture, the peripheral residual superficial tissues were undermined in order to allow a primary wound healing with the best morpho-functional results. The microscopic examination of the excised tissues found acanthosis and hyperkeratosis with mild dysplasia. The patient was therefore put in a strict clinical follow-up program. No recurrences occurred during the following 4 years.

**Discussion and conclusions.** When a leukoplakia is clinically diagnosed, a biopsy is mandatory. The definitive diagnosis is made when any other aetiological causes have been excluded and the microscopic examination does not confirm any other specific disorders. In the presence of any possible etiological factors, including tobacco habits, an observation period of not more of 2-4 weeks seems acceptable to verify the possible complete or almost complete regression after such factors are eliminated or avoided. The reasons to remove a leukoplakia may be the presence of symptoms and an attempt to prevent its malignant transformation. The reasons not to remove the lesion may consist of its large extent or diffuse pattern. Although the present lesion was in an important functional area, the benign appearance of the lesion, which indicated only 2-3 mm of peripheral margin of healthy tissue, and its size, lower than 2 cm, recommended an excisional approach. The reason is that a negative report of a previous incisional biopsy does not mean that malignancy or epithelial dysplasia are not present in a different site of the entire lesion or will not occur in the future. On the other side, there is no scientific evidence that the removal of the leukoplakia really prevents the possible future development of a squamous cell carcinoma. It seems a safe practice to remove all leukoplakias, irrespectively of the absence or presence of epithelial dysplasia, so a preliminary incisional biopsy may be unnecessary. The surgical or laser excision are the most commonly used treatment modalities. The width of the peripheral tissue margin that should be involved has never been discussed in detail, although it is currently demonstrated that epithelium nuclear changes are present well beyond the clinically visible leukoplakia and this most likely explains local recurrences. There are no scientific data available about the possible value of follow-up, although it is widely accepted the need for close clinical checks.



### EXPLOITATION OF FTIR MICROSPECTROSCOPY FOR THE STUDY OF BONE TISSUES AFFECTED BY PERI-IMPLANTITIS

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**Aim.** This work demonstrates the possibility to analyse samples of implants with bone affected by peri-implantitis using Fourier Transform InfraRed (FTIR) microspectroscopy. Up to now in the literature are reported only studies with FTIR spectroscopy of healthy bone tissues (human or animal) or pathological bones, during the progression of diseases such as osteoporosis, osteogenesis imperfecta and osteopetrosis.

**Materials and methods.** Six samples of peri-implant bone affected by peri-implantitis were analysed. These samples were taken from patients between 50 and 80 years, four implants from the mandibular bone and two from maxilla. Healthy bone of the mandible and maxilla was also analysed. Samples were first included in resin and then cut into sections with the microtome. The analysis of the samples was then performed using FTIR-ATR, at the beamline SISSI at Elettra – Sincrotrone Trieste. FTIR spectroscopy probes the vibrational properties of both organic and mineral components of the bone, which are all sensitive to compositional and structural changes under pathological conditions.

**Results.** We compare the results obtained on healthy bone and bone affected by peri-implantitis. In the samples of implants with pathological bone, we revealed a greater spectral variability compared to healthy samples. These differences were particularly relevant in four samples and mainly related to three spectral regions: the bands of phosphates, carbonates and proteins (amide I). The peaks of the bands of carbonates and phosphates, present in the region between 1100 and 800  $\text{cm}^{-1}$ , are reduced in intensity, almost absent, in the tissue affected by peri-implantitis. Moreover, the components of the Amide I band centred at  $\sim 1696 \sim 1660 \sim 1634 \text{ cm}^{-1}$ , typical of collagen and characteristic of healthy bones, are not more recognizable in pathological tissues, that instead has an Amide I band centred at  $\sim 1637 \text{ cm}^{-1}$ . The aforementioned spectral evidences are similar in all pathological samples. We have tried to summarize the data obtained by calculating two kinds of indexes: the "degree of mineralization of bone", expressed as the fraction of the organic component on the mineral one (known as "mineral to matrix ratio"  $M / M$ ) and the phosphate to carbonate ratio ( $F / C$ ).

**Conclusions.** In this work, we demonstrated that it is possible to analyse the bone affected by peri-implantitis by Fourier transform infrared microspectroscopy (FTIR). The advantages of this technique, in combination with ATR sampling, are manifold: the possibility to investigate both the inorganic component and the organic tissue under investigation, the possibility to investigate these two components without causing changes in chemical or physical properties of the sample, to allow a fast sampling, a significant reproducibility of the measurements, an easy sample preparation and to provide us with excellent data quality. The data reported in this study allowed us to establish a methodology for a larger study that can analyse and investigate the phenomena undergone by the organic matrix during the peri-implantitis.



### GUIDED BONE REGENERATION FOR THE PLACEMENT OF ANTERIOR DENTAL IMPLANTS: A CASE REPORT

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**Aim.** In the anterior zone, special aesthetic concerns require not only a stably anchored implant for long-term success, but also the presence of adequate bone tissue. Anterior tooth loss is often accompanied by significant loss of alveolar bone, so increasing hard tissue before or in combination with implant placement becomes a critical part of the therapy. The aim of this case report was to describe the treatment of a patient for whom a guided bone regeneration approach was used for hard tissue implant site development following the extraction of a failing maxillary central incisors.

**Materials and methods.** A 34-years-old patient needed the extraction of elements 1.1-2.1 for recurrent abscesses secondary to multiple failing apicectomies. The buccal plate loss required a delayed protocol: teeth extraction, pre-implantation guided bone regeneration, implants placement with ridge expansion. Eight-weeks after extraction, a guided bone regeneration was performed with autogenous bone chips, a reasorbable membrane and platelet-rich plasma. After 4- months a second surgical step was made in order to improve the bone morphology of the implant sites: a ridge expansion with a split-crest technique and simultaneous implants placement were carried out. A partial-thickness flap was dissected and the periosteum was preserved to provide blood supply to the splitted ridge. A sagittal osteotomy was outlined in the bone and vertical bone-releasing osteotomies were also carried out mesially and distally 2 mm from the adjacent teeth. A bone chisel was progressively driven in the crestal osteotomy to achieve expansion of the pre-osteotomized buccal plate. The implant site was prepared to the final depth using sequential sized osteotomes and two implants, 10 mm long and 4.3 mm in diameter, were placed. The remaining bone gap was grafted with particulate bone and covered with a resorbable collagen membrane. The flap was reapproximated and stabilized with sutures on the surgical site. Four months following surgery a provisional restoration was performed using the dynamic compression technique with the aim of conditioning soft tissues around implants. Four month later the definitive restoration with two cemented porcelain-fused-to-metal single-unit crowns was performed.

**Results.** The 3-years follow-up revealed that the implants were stable, and the buccal depression of the surgical area was reconstructed. An harmonious soft tissue margin was achieved in the esthetic zone. Radiographs demonstrated a normal vertical osseous height and excellent osseointegration of the implants.

**Conclusions.** Immediate and delayed treatment approaches appear to be appropriate following tooth extraction in the aesthetic zone. However, in order to ensure the success of immediate implants are necessary several factors like the presence of adequate bone tissue (at least 4 mm beyond the root apex) to ensure the implant primary stability, the presence of keratinized tissue  $\geq 2$ mm and the integrity of the buccal bone plate. When the specific conditions are not fulfilled, delayed implant placement is the only feasible option for implant restoration in order to achieve a functional and aesthetic rehabilitation.



### IMMEDIATE POST-EXTRACTION IMPLANTS; OPPORTUNITIES AND LIMITS

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**Aim.** Some of the original surgical protocols for implant surgery have been reassessed to satisfy the patient's continuously increasing expectation for shorter rehabilitation time, improved esthetics, and increased comfort. The aim of this study was to evaluate clinical success of 37 single-tooth implants inserted immediately after tooth extraction. Implants were followed for 12-36 months with a mean follow-up of 24,3 months after the load with the final restoration.

**Materials and methods.** A total of 35 patients (22 women and 15 men), 28 to 69 years old, were enrolled in this study. Thirty-seven single implants were inserted in fresh extraction sockets. All experimental sites showed an absence of fenestrations or dehiscences of the bone walls and a residual gap between implant surfaces and surrounding bone walls  $\leq 2$  mm. The clinical success was evaluated through the analysis of some parameters: implant survival, mobility, symptoms, implant probing depth (PD), implant bone resorption and papillary index (SCALE Jemt) mesial and distal.

**Results.** During the 24,3 months follow-up period, none fixture was removed and all implants healed uneventfully with no complications and were assessed as stable and successful at the 24,3 months checkup. No technical complications such as screwloosening, resin fracture, or pain during chewing were registered during this period. In the mean follow-up, 24.3 months, survival of the 37 implants placed in 35 patients was 100%, in addition, on the totality of the cases, there is lack of mobility, and symptoms. Even the peri-implant probing depth remained below 3 mm in cases carried out, while the parameters that have presented some differences were the last two considered. In two cases there was a peri-implant bone resorption greater than the average. The first, on an upper premolar, where the parameter reaches a value of around 2 mm in the first 12 months; the second, on a lower molar, where there was a bone resorption of about 2.5 mm in the first year. The index papillary showed some differences in the cases treated. In 23 cases the value was 3 in 7 cases was 2, in 4 cases was 1, and in 3 cases it was 0.

**Conclusions.** The clinical results of this study show that the immediate post-extraction implant method is effective, safe and predictable, even when applied to infected sites with teeth showing periapical lesions or periodontal diseases. The results in short and medium term, although in a small number of cases, show how the success rates of the immediate post-extraction implants are comparable to those delayed, but with the advantage of rehabilitating the patient in less time, thus bringing it to restore aesthetics and function with fewer interventions and therefore also with a reduced discomfort. However, randomized controlled trials will be needed in the long term in order to give a complete scientific validation for this type of surgical technique.



### IN VITRO EVALUATION OF HUMAN PRIMARY OSTEOBLASTS ON MICROROUGH TITANIUM SURFACES

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**Aim.** The aim of the study is to evaluate cell proliferation, Collagen type I, PGE<sub>2</sub>, and IL-6 secretion of Human Primary Osteoblasts (Hos) cultured onto different microrough titanium surfaces.

**Materials and methods.** A total of 40 experimental discs (5mm diameter; 2mm width) were used for this study and divided into: CONTROL GROUP) 20 titanium discs whose surface was sandblasted with microparticles of titanium oxide (TiO) followed by a chemical treatment by maleic acid; TEST GROUP) 20 titanium discs whose surface was sandblasted and acid etched followed by a treatment with inorganic ions. HOs were obtained from fragments of femoral head (of patients undergoing total hip replacement surgery for osteoarthritis age range 75-85 years). Once isolated and expanded, HOs were seeded onto experimental discs and cultured for a total of 21 days. At established times (8, 14, 21 days), discs were processed for SEM analysis, MTT, LDH and ELISA assays for Type 1 Collagen, PGE<sub>2</sub> and IL-6 secretion.

**Results.** SEM analysis evidences at 8 and 14 days of culture no significant differences in terms of cell adhesion and spreading between the two experimental surfaces, whereas at 21 days of culture a little increase of cell spreading could be recognizable on test surfaces respect to control one. After 21 days of culture MTT assay shows higher values in test surfaces than in control surfaces. The levels of LDH released into the medium show that the test surface toxicity is lower at all time points compared with experimental discs toxicity of the control group. Type 1 Collagen secretion results almost similar between the two groups after 8 and 14 days, while it significantly decreases at day 21 on the test surfaces. IL-6 and PGE<sub>2</sub> secretion appears to be after 8 days lower on the test surfaces compared to control, at day 14 the expression levels appear to be greater on test ones, while at day 21 there are not significant secretion differences between the two experimental surfaces.

**Conclusions.** Our results show that the metabolic activity of HOs in vitro on a surface sandblasted and acid etched followed by a treatment inorganic ions is higher after 8, 14 and 21 days of culture. Moreover, this surface is found to be more biocompatible and well tolerated by HOs both after a short and a medium experimental time, as showed by the lower toxicity and by the reduced secretion of inflammatory cytokines as PGE<sub>2</sub> and IL6. Even if further in vitro and in vivo studies should be conducted, a sandblasted and acid etched surface followed by a inorganic ions treatment seems to be a suitable surface for supporting osteoblasts growth and differentiation and for a future possible clinical use.





### INOS AN BAX EXPRESSION IN PIEZOELECTRIC VS CONVENTIONAL IMPLANT SITE PREPARATION: IN VIVO STUDY ON ANIMAL MODEL

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**Aim.** The aim of the work is to evaluate, in vivo in an animal model, differences occurring between dental implant sites preparation through the use of a piezoelectric instrument or conventional bone-cutting techniques with rotary instruments.

**Materials and methods.** A total of 24 dental implants were inserted bilaterally in the tibiae of 6 adult sheep. Each animal underwent two different surgical intervention, 15 days from each other, in order to have at animal sacrifice, two different experimental points: T1 (15 days post intervention) and T2 (30 days post intervention). In each tibia, two dental implants were inserted: one after site preparation through a piezoelectric instrument (test group) and another after site preparation through conventional bone-cutting techniques with rotary instruments (control group). After the animals were euthanized, bone samples comprising the implant sites and a sample from native bone tissue (T0), were withdrawn and processed for histological analysis and immunohistochemical evaluation of iNOS and Bax expression.

**Results.** Histological aspect after hematoxylin-eosin staining of T1 samples shows the presence of a moderate inflammatory infiltrate and the presence of active remodeling phenomena in both test and control groups. Differences become less evident in T2 samples, where the overall organization of the bone tissue resemble more and more the native bone tissue, even if remodeling phenomena are still evident, especially in the control group. Immunohistochemical evaluation reveals a statistically significant increase in both iNOS and Bax expression in T1 samples compared T0 and T2 ones. However, no significant differences are observed between samples obtained after 30 days of healing (T2) compared to T0 ones. By comparing the different insertion protocols, a higher iNOS and Bax expression is recorded in samples from the control group compared to the test group samples at both healing times (T1 and T2), but these differences result to be not statistically significant.

**Conclusions.** By comparing the two different insertion protocols, a more rapid healing could be noticed in sites treated with piezoelectric instrument, with the presence of a more organized newly formed bone tissue recorded by histological analysis. However, most of the differences seem to disappear after a longer healing period, denoting that most of the advantages of piezoelectric surgery, as precision cutting, soft tissues preservation, and prevention of mechanical or thermal injury, are limited during surgery, but the insertion protocol itself seems not to significantly interact with the long-term healing process.



### PLATELET RICH PLASMA (PRP) TO IMPROVE LESIONS HEALING IN ANTIRESORPTIVE-RELATED OSTEONECROSIS OF THE JAW (ARONJ)

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**Aim.** Bisphosphonates (BP) are a class of drugs used in the treatment of bone metastasis of solid tumors. One of their complications is osteonecrosis of the jaw (BRONJ), which is characterised by a zone of bone necrosis in the maxillofacial region. Recently, as ONJs caused by new chemotherapeutic non belonging to BP class have been reported, it has been proposed to re-name BRONJ in anti-resorptive agents related ONJ (ARONJ). As proposed by the American Association of Oral and Maxillofacial Surgeons (AAOMS), ARONJs/BRONJs are usually classified in 4 stages: – stage zero shows no exposed bone, but pain or radiologic markers; first stage includes asymptomatic bone exposure; second and third stage include patients with exposed bone of various extent with other concomitant symptoms. Treating these lesions is still controversial. Most authors suggests non-surgical treatment for low grade lesions and surgical treatment (curettage and excision of necrotic bone) for advanced lesions. Some also suggested using healing promoter materials such as, among the others, autologous platelet rich plasma (PRP). PRP showed good results in improving surgical treatment healing of ARONJ. In this preliminary data, we refer our experience of treating ARONJ with non-surgical treatment, surgical treatment alone, and surgical treatment with autologous PRP.

**Materials and methods.** Seventy-two patient with BP-related ARONJ observed at the Division of Maxillofacial & ENT Surgery, of "Istituto Nazionale Tumori, Fondazione G. Pascale"- IRCCS, Naples, Italy, from may 2006 to august 2013 were included in this study. All patients had undergone chemotherapy with bisphosphonates (alendronate, pamidronate or zoledronic acid) and developed ONJ, diagnosed by clinical examination and panoramic X-Rays and CT scan. Lesions were classified as Stage 0 in five cases, Stage 1 in eleven, Stage 2 in forty-one and Stage 3 in fifteen. Patients with grade 3 lesions directly underwent to surgical treatment (curettage or curettage + excision of necrotic bone) or surgical treatment with PRP (curettage or curettage + excision of necrotic bone, placement of autologous PRP in the residual wound, suture of the wound). Patients with grade 0, 1 or 2 lesions underwent to a two weeks per os ciprofloxacin and clorexidine 0,20 mouth rinse treatment (non surgical treatment); thus, the status of the lesion(s) were updated. If the lesion had healed they underwent a regular follow-up; if the lesion had improved, they continued therapy for other two weeks; if the lesion had not improved or worsened they underwent surgery or surgery with PRP.

**Results.** Of 72 patients, 23 had complete response with non surgical treatment only, 15 underwent surgical treatment without PRP (8 with complete response, 7 with partial response), 34 underwent surgical treatment with PRP (32 with complete response, 2 with partial response).

**Conclusions.** ARONJ/BRONJ management is still controversial. As a matter of fact, there is no definitive standard of care for these diseases. Our preliminary data show good results of our ARONJ/BRONJ treatment protocol, and the effectiveness PRP usage in improving healing of bisphosphonate-related ARONJ surgical treatment, especially when surgical margins could be properly logged.



### PRE-SURGICAL EVALUATION OF THE RELATIONSHIP BETWEEN LOWER THIRD MOLARS AND INFERIOR ALVEOLAR NERVE: A CBCT STUDY

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**Aim.** For an optimal planning of the surgical approach, the radiological investigation represents the first mandatory step in assessing the risk of a possible postoperative injury to the inferior alveolar nerve. The aim of the study was to perform a pre-surgical evaluation of the relationship between lower third molars and the mandibular canal and to introduce a novel radiological classification that could be routinely used in clinical practice to assess this relationship on cone beam CT (CBCT) images.

**Materials and methods.** The sample consisted of 80 patients consecutively treated at the Unit of Oral Surgery (Dental Sciences School, University of Trieste) that needed the extraction of the impacted lower wisdom teeth. The pre-surgical CBCT images were independently studied by the members of the surgical team to draft a classification that could describe all the possible relationships between third molar and the inferior alveolar nerve on the cross-sectional images. Then, the study population was subdivided according to the classification and a statistical analysis was performed.

**Results.** Eight different classes have been proposed and six of them have been subdivided in two subtypes. The distribution of classes showed a prevalence of buccal or apical course of the mandibular canal followed by lingual position and interradicular one. The incidence of a real contact between third molar and the inferior alveolar nerve was much more frequent in the third decade of life. Younger patients showed an increased rate of direct contact with a reduced calibre of the canal and/or without corticalization. No differences existed in terms of anatomic relationships between males and females apart for a major risk of real contact without corticalization of the canal when the mandibular canal had a lingual course for women group. This result demonstrates that in women, the lingual course of the inferior alveolar nerve is more associated to an intimate relationship with molar roots than in men. When the data were matched with the presence or absence of contact between mandibular canal and third molar, irrespective of corticalization of the canal or not, a significant difference was observed for the lingual course.

**Conclusions.** If taken as preliminary findings, it could be concluded that patient at high risk of developing a damage of the inferior alveolar nerve is represented by young woman belonging to the third decade with a lingual course of the mandibular canal. The application of the classification could represent a valid support in the clinical practice to obtain a common language among operators in defining the possible relationships between an impacted third molar and the mandibular canal on CBCT images.



## QUANTITATIVE AND QUALITATIVE EVALUATION OF SCIENTIFIC RESEARCH IN ITALIAN ORAL SURGERY THROUGH THE ANALYSIS OF BIBLIOMETRIC INDICES

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**Aim.** The aim of the study was to evaluate the scientific production of Active Members of three Italian Associations of Oral Surgeons (Società Italiana di Chirurgia Orale - SIdCO, Società Italiana di Osteointegrazione- SIO and Società Italiana di Chirurgia Orale ed Implantologia - SICOI), to evaluate how it differs between Members with an Academic position at the University and private practitioners members, and if a correlation between scientific production and authors' career length could be established.

**Materials and methods.** The overall population of active members was divided into Academics and Not Academics according to the fact they have or not an academic position. The Scientific production of the Active Members of the selected associations, was analyzed through the evaluation of bibliometric indices, as the total number of publications, the total number of citations, and h-index. In addition, in order to make a more objective assessment of individual scientific production all parameters were related to the researchers' career length.

**Results.** Our analysis showed a significant increase in the total publications number both in Academics and Not Academics Group, which is more evident in recent years. Moreover, a significant difference between Academics and Not Academics Group was recorded for all the evaluated parameters. In relation to the different career length, it was shown that significant the highest values were related to Academics with a longer research activities.

**Conclusions.** The choice to use bibliometric indices in our study was performed in order to execute an analysis of the scientific research in the field of oral surgery that was as objective as possible, fast and cheap. However, this methodology carries a simplification of a reality that is inevitably much more complex. The analysis of only bibliometric indices can not be considered as an absolute parameter of evaluation, but it should always be contextualized to other parameters, such as the size of the database, the multidisciplinary variety, as well as the field of study and the period of scientific activity of each individual author. Therefore, this kind of analysis does not describe an absolute scientific output of a single researcher, but it may be useful for a comparative assessment of different authors or research groups.



### **RADICAL SINUS SURGERY APPROACH FOR RETRIEVAL OF DISPLACED ROOT: A CASE REPORT**

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**Aim.** The aim of this case report is to describe the retrieval of displaced root from the maxillary sinus using radical sinus surgery approach without inferior meatal antrostomy.

**Materials and methods.** A 56 years old man in good general health condition was referred to our department because of a root fragment displaced into the sinus during extraction of upper right second molar. Patient reported facial pain, nasal obstruction, nasal discharge. Orthopantomography revealed the presence of a root fragment displaced in the maxillary sinus involved in inflammatory tissue. Computer tomography confirmed the presence of an oral-antral communication, the displacement of the root and simultaneous chronic sinusitis. After loco-regional anesthesia a vestibular full-thickness triangular incision was made from upper right lateral incisor to upper right third molar. The bone defect was exposed and widened. The displaced root was removed and the sinus membrane was enucleated and stripped down. At the end of the procedure, sinus cavity was packed with vaseline petrolatum gauze to avoid postoperative bleeding. The flap was repositioned and stabilized with sutures. A linear incision was performed in the vestibular fold to carry one of the end of the gauze in the oral cavity. After 5 days the packing was pulled out gently from the maxillary sinus through the intraoral route and wound was sutured. All suture materials were removed on the twelfth day after surgery.

**Results.** The patient was successfully treated with minimal post-operative complaints. The postoperative course was uneventful with wound dehiscence. At the 6-month follow-up orthopantomography demonstrated a complete clinical healing and recovery of the normal sinus ventilation and drainage.

**Conclusions.** Radical sinus surgery approach without inferior meatal antrostomy could provide easier postoperative care and fewer complications. The Authors suggest that it is not necessary to create the inferior meatal antrostomy in the Caldwell-Luc operation for odontogenic sinus disease.



### REIMPLANTING A TRAUMATIC AVULSED TOOTH: CASE REPORT

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**Aim.** The main aim of this work is to describe a case of a traumatic avulsion of permanent tooth and dental reimplanting.

**Materials and methods.** A 13 years old male had a traumatic avulsion of the lateral incisor (22), during a volley ball match. The avulsed tooth was stored in milk after 70 min from the injury. On radiological examination of the avulsed tooth revealed that the root had closed apex and tooth crown was intact. As this case was of delayed reimplantation, endodontic treatment was started before reimplantation. Cleaning of the tooth surface was carried out with saline and betadine. Root canal enlargement and cleaning was performed. The root canal was then dried with sterile paper points and filled with guttapercha point and zinc oxide eugenol (ZOE). Under local anaesthesia, the socket was gently curetted to remove any coagulum, granulation tissue and pathologic tissue and irrigated with physiologic saline solution. Tooth was then soaked in 2.4% sodium fluoride solution, was reimplanted into its socket and was splinted to the adjacent teeth with 0.018 × 0.025 inch stainless steel rectangular wire and composite. Another maxillary occlusal radiograph was obtained to confirm proper positioning of the replanted incisor, and the splint was left in place for 6 weeks.

**Results.** In the case presented here, the avulsed incisor had a closed apex and had been air-dried for a prolonged period, before to be stored in milk. As a result, the management of this case differed from the accepted replantation protocol. The treatment objective was to retain the avulsed incisor to maintain esthetic appearance and occlusal function, to prevent inflammatory root resorption and to achieve periodontal healing with replacement root resorption. Therefore, the avulsed incisor was splinted to the adjacent teeth with rigid wire for 6 weeks to facilitate rapid, solid ankylosis.

**Conclusions.** In conclusion, in cases of avulsed permanent teeth with prolonged non-physiological storage, replantation should be performed if the patient and his or her parents are aware of the outcomes and request such treatment, although the risk of progressive replacement resorption and subsequent tooth loss is high.



### ROLE OF NITRIC OXIDE IN THE *IN VITRO* RESPONSE OF HGFS TREATED WITH ZOLEDRONIC ACID

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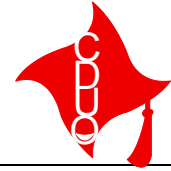
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**Aim.** The aim of our study was to evaluate the role of Nitric Oxide (NO), a molecule that acts as a reactive differentiable and intracellular messenger, in the *in vitro* response of Human Gingival Fibroblasts (HGFs) exposed to zoledronic acid 100µM for a total of 72h.

**Materials and methods.** HGFs were obtained from gingival tissue fragments removed for flap regularization before suturing in healthy patients subjected to third molar extraction. The tissue fragments were placed in DMEM with 10% foetal bovine serum (FBS), 10% penicillin and streptomycin, 1% fungizone at 37°C in a humidified atmosphere with 5% (v/v) of CO<sub>2</sub>. Once obtained, HGFs were cultured until they reach the confluence and then treated with ZA 100µM for a total of 72 h. The morphology of HGFs was assessed by phase contrast microscope analysis and live /dead staining; the MTT assay was used to assess cell viability. Reactive Oxygen Species (ROS) production was analyzed by flow cytometry, the NO production was evaluated by spectrophotometry, eNOS and nNOS expression were measured by immunofluorescence analysis.

**Results.** An initial screening of HGFs viability, with ZA concentration doses ranging from 5 to 200 µM, was performed allowing to choose 100µM ZA dose for this experimental study, as it induces a cell death in less than 50% of HGFs population. Microscope analysis of control samples showed viable fibroblasts and adherent to the substrate, while in the samples treated with 100µM ZA, floating dead cells were recognizable. In addition, in the samples treated with ZA, an increased production of ROS and NO could be identified in comparison to control samples. In particular, the over expression of NO was due more probably to nNOS activity than to eNOS activity, as shown by its increased expression in test sample after 72h ZA treatment.

**Conclusions.** Our results, suggesting ROS involvement in NO overproduction, due to nNOS recruitment, which in turn trigger the inflammatory response, confirm the zoledronic acid cytotoxic effect on HGFs, and lead us to hypothesize a possible role for NO in the mechanisms of mucosal dehiscence recorded in the areas surrounding the bifosphonates-related osteonecrosis of the jaw. This study was partly funded by FIRB 2010 ACCORDI DI PROGRAMMA RBAP1095CR



### SOFT TISSUE MANAGEMENT FOR PROSTHETIC REHABILITATION USING A MODIFIED CLARK'S VESTIBULOPLASTY TECHNIQUE

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**Aim.** Traditionally, Clark's vestibuloplasty was used to overcome the problems of flat alveolar ridge in lower maxilla, allowing the realization of a removable prosthesis. Nowadays, with the great improvement in the field of biomaterials, the volumetric increase of the edentulous atrophic ridge represents a new clinical strategy; however, surgical procedures that involve grafting of biomaterials can be a failure in elderly, medically compromised, patients. To prevent these complications is possible to use vestibuloplasty. We used a modified Clark's technique applied to the upper jaw, which allowed an adequate depth increase of the upper oral vestibule that would make the edentulous ridge more adapted to receive a successive prosthetic rehabilitation.

**Materials and methods.** An edentulous 60 years old female patient with insufficient vestibular depth was referred to our department for prosthetic rehabilitation. Bone height and mucosal quality and quantity were assessed using radiographic and clinical methods and the operative team proposed the surgical correction of her anatomical deficiency. An acrylic splint was carried out from a preoperative impression, on which cast was arbitrarily scraped till the necessary depth as per the clinical requirements. The modified Clark's technique of vestibuloplasty was executed in the upper maxilla, in order to obtain an adequate vestibular depth for prosthetic rehabilitation. An horizontal incision of the mucosa was performed on the alveolar ridge crest from 16 to 26. A supraperiosteal dissection was used to create a mucosal-muscular flap. The flap was fixed to the periosteum at the calibrated vestibular depth with single silk sutures. Subsequently, the customized acrylic splint was applied to maintain the desiderated flap height for three months post-operatively, favoring a secondary soft tissue healing. The patient was instructed to maintain a correct daily oral hygiene and how to wear the splint.

**Results.** There was a clinically significant increase in vestibular depth. We compared the preoperative and postoperative status measuring the height of the ridge before surgery and three months later, after the complete secondary soft tissue healing. Preoperative and postoperative vestibular depth were about 2,5 mm and greater than 10 mm, respectively.

**Conclusion.** In cases with insufficient vestibular depth the modified Clark's vestibuloplasty allows a deepening of the fornix of the upper maxilla and an increase of the height of the edentulous atrophic ridge. Although this technique can not be completely devoid of possible adverse effects on the daily oral hygiene maneuvers and the condition of soft tissue healing, it may be a valid alternative to grafting biomaterials in patients who can not be subjected to this treatment. Anyhow, although so far in the case of our patient there have been no complications after surgery, it is necessary an extended follow-up to evaluate the long term maintenance and management of the health conditions of the interested area.





### TEMPERATURE RISE DURING ULTRASONIC IMPLANT SITE PREPARATION: IN VITRO STUDY

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**Aim.** Over the last decade a great deal of research investigated biological, physical and clinical aspects of piezoelectric devices providing a growing scientific evidence of clinical reliability. Several studies have demonstrated promising results including smoother cutting surfaces, more precise cutting geometries and faster osseous regeneration compared to rotating techniques. In the last years, the use of ultrasound-based devices has been also proposed as an alternative method for implant site preparation. As a wave of ultrasound passes through tissues its energy is reduced and dissipated as heat, leading to an elevation of tissue temperature. Thermal effects due to high ultrasound absorption in bone pose an ongoing safety issue. More than in any other piezoelectric application, heat generation represents a critical aspect in implant site preparation, although few studies focused on it. In the present study a dedicated mechanical device was used to control the most important parameters that affect temperature data during piezoelectric implant site preparation. Temperatures obtained using different tips of a dedicated sequence have been then collected and critically analyzed.

**Materials and methods.** An originally designed Mechanical Positioning Device was used to control the two main factors affecting heat generation: pressure and handpiece kinetic. Temperatures were recorded by means of a fluoroptic thermometer. Different thermal parameters have been taken into account for the tips IM1s, IM2, IP2-3 and IM3 (Mectron Medical Technologies, Carasco, Italy).

**Results.** All tests have been performed by one operator. Ten tests for each insert have been selected to analyze data. IM1s presented the highest temperatures in all the tests. The higher temperature variations of this tip are referable to factors such as the diamond surface, external irrigation and the fact that IM1s is the first tip of the sequence and works on an intact cortical bone.

**Conclusions.** Collected data suggest a gentle use of the IM1s while the other tips are less critical from a thermal point of view. However, in all our tests, the threshold level of 47 degrees for one minute has been never exceeded. Our study confirms piezoelectric devices as biologically safe. However, big care must be taken by operators to control as much as possible the kinetic movements of the handpiece in order to avoid overloads and consequent overheating.



### THE ADVANTAGE OF AN ULTRASONIC IMPLANT SITE PREPARATION FOR A POST EXTRACTION IMPLANT: A CASE REPORT

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**Aim.** The aim of this study is to describe and evaluate the success of an implant in a fresh extraction socket in a mandibular molar site, with a conservative surgical approach.

**Materials and methods.** A 52 year-old non smoking female presented a crown decay and a root fracture in tooth number 36, previously endodontically treated and considered hopeless. The first clinical intraoral examination showed an adequate keratinized mucosa with no signs of infection. After a periapical radiographic control no lesions were detected. A sufficient amount of basal bone, the presence of a well represented interradicular septum allowed to plan a restoration by an immediate implant, instead of a fixed bridge prosthesis. On the day of surgery, the patient received 2 g of amoxicillin 1 hour before the surgical procedure; local anaesthesia was performed with articaine hydrochloride 4% + epinephrine 1/100000 (2 vials). An intrasulcular incision was outlined around the tooth without flap elevation, an odontotomy was carried out by OT7S piezoelectric insert to minimize surgical trauma. After the atraumatic tooth extraction, the implant site was prepared following piezosurgery Ò protocol IM1-IM2-IM2.3-IM3-IM3.4 that allows the insertion of a Straumann Ò Bone Level 4.1-10 mm implant into the interradicular septum to reach primary stability. Finally, the circumferential gap >2 mm was filled with deproteinized bovine mineral bone (Bio - Oss Ò). Closure was accomplished with 5/0 Nylon sutures (Ethilon Ò).

**Results.** After 2 months the implant showed satisfying ridge preservation both clinically and at x-rays. After 3 months of provisional crown the definitive crown was delivered. At 12 and 18 months the bone ridge height and the perimplant soft tissues were stable.

**Conclusions.** This clinical case shows that an immediate implant placement in a post-extraction site can constitute a safe and successful procedure. Post extraction implants are believed to reduce treatment time, surgical exposure of patients, and aesthetic restoration time. Piezosurgery Ò device enhances operator sensitivity and control, and reduces even more surgical trauma. As indicated by several Authors, the survival rate of immediate implants ranges between 94,5-100% at 5 years follow-up. According to international guidelines, the use of regenerative techniques is mandatory to reduce physiological post-extraction resorption. In presence of a circumferential gap >2 mm Bio-Oss Ò filling is aimed to limit the buccal bone loss and prevent alveolar ridge change.



### THE INFLUENCE OF PRE-SURGICAL, SURGICAL AND POST-SURGICAL VARIABLES ON THE EVOLUTION OF PERIODONTAL DEFECT AT DISTAL SITE OF SECOND MOLAR AFTER THE EXTRACTION OF LOWER THIRD MOLAR

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**Aim.** The aim of this work is to do a narrative description of literature to identified the variables involved into the development, progression and treatment of periodontal complications associated to third molars surgery.

**Materials and methods.** Using a Pub Med literature search, review papers and publications have been identified using the key words: third molars AND periodontal disease. Only Systematic Reviews and RCT in English have been reviewed. Variables were identified as pre-surgical, surgical and post-surgical

**Results.** The results showed that pre-surgical risk indicators for residual dental pockets have been identified such as age, inclination of third molar, large contact area, visible plaque distal to second molar and pathologically widened follicle of third molar. For surgical variables different incision, flap and suture techniques have been compared but there are still conflicting results. Recently Authors evaluated different regenerative approaches to prevent periodontal complications but data reported are frequently conflicting and difficult to compare.

**Conclusions.** More investigation are still required to confirm the influence of variables involved in the pathology and to define the prevention strategy and the best surgical technique to avoid periodontal complications.



## VERY EARLY INTERVENTION THROUGH GERMECTOMY WITH PIEZOSURGERY AND RESULTING ISOLATION AND OSTEOGENIC DIFFERENTIATION OF DENTAL FOLLICLE STEM CELLS

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**Aim.** Stem cells are defined as clonogenic cells capable of self-renewal and multi-lineage differentiation. A population of these cells has been identified in human Dental Follicle (DF). Dental Follicle Stem Cells (DFSCs) were found in pediatric unerupted wisdom teeth and have been shown to differentiate, under particular conditions, into various cell types of the mesenchymal tissues. The aim of this study was to investigate if cells, isolated from DF, can differentiate into osteoblastic phenotype and express osteoblastic markers.

**Materials and methods.** Bone remodeling is the process maintaining bone mass and occurs during the whole life; it is regulated by osteoblast differentiation and activity and it is influenced by many pathological events that could determine bone loss. Osteoblast differentiation has been studied starting from mesenchymal stem cells of the bone marrow or periosteum. Stem cells are defined as clonogenic cells and they are capable of self-renewal and multi-lineage differentiation. To date, in human postnatal dental tissues, five different sources of MSCs have been already identified: dental pulp, periodontal ligament, exfoliated deciduous teeth, dental follicle and root apical papilla. Dental Follicle Stem Cells (DFSCs) were found in young patients wisdom teeth and they have been shown their capability to differentiate, under particular conditions, into various cell types of the mesenchymal tissues. All early germectomies were performed with Piezoelectric Bone Surgery technique, in that this technique compared to the traditional instruments, has the advantage to be less invasive, thus reducing post-operative complications and improving a positive biological response to healing. That's why, whether it is performed in the right timing, can be more effective. We have studied the immunophenotype of DFSCs through flow cytometric analysis, the osteoblastic markers of differentiated DFSCs were assayed by histochemical methods and real-time PCR.

**Results.** We have proved that DFSCs are easily obtained from wisdom teeth, a source of easier access than bone marrow and periosteum and succeed in differentiating into osteoblast-like cells, producing mineralized matrix nodules and expressing the typical osteoblastic markers, Alkaline Phosphatase (ALP) and Collagen I (Coll I).

**Conclusions.** We have demonstrated with our work that DFSCs in accordance with established criteria can be defined MSCs and have a remarkable osteogenic potential. Therefore, the ability of these stem cells to differentiate into osteoblasts is certain: firstly, they are cultured in an osteogenic induction medium so that several clusters of cells adhere, assume an osteoblast-like morphology and express the typical osteoblastic marker such as ALP and Coll I. Secondly, DFSCs formed mineralized matrix nodules showing a mature osteoblast exclusive characteristic. DFSCs have a similar, if not identical, potential of BMSCs, but, by contrast, they come from a dental bug that could generate a problematic wisdom tooth and proliferate at a higher rate. Therefore, DFSCs could be used for stomatognathic bone regeneration and other systems, and represent an excellent cell source for tissue engineering therapy. In addition, DFSCs can differentiate into the other cells of the connective tissues, thus, more diversified clinical applications should be investigated. As a potential stem cell source, dental stem cell banking may be a necessary step and further progresses on establishing individualized induced pluripotent stem cells for dental tissue regeneration should be imminent.



### WHEN THE DECISION TO TREAT OR NOT TO TREAT IS A DILEMMA! A CASE OF A TOOTH INVOLVED BY A LARGE HEMANGIOMA

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**Aim.** Hemangiomas are common vascular lesions comprised among soft tissue tumors of the head and neck; they are relatively rare in the oral cavity. Lymphatic channels may be evident in hemangiomas, they will be categorized according the predominant component, e.g. hemangiolympangiomas or lymphangiohemangiomas. Maxillo-facial hemangiomas may be cutaneous, mucosal, intramuscular, involving masticator and perioral muscles and also intra-osseous, involving both the mandible and/or the maxilla. Most hemangiomas slowly and spontaneously reduce with time, but 10-20% of them required treatment. There are some therapeutic alternatives (radiotherapy, cryotherapy, embolization and steroid administration), although wide surgical excision is the gold standard treatment. Nevertheless surgical ablation of the benign tumor, is only partially effective and more than 18% of patients suffered local recurrence; a malignant transformation has also been referred.

**Case report.** A 39-years-old woman was referred by a general dental practitioner to the Oral Surgery Unit of the Department of Odontostomatological and Maxillo Facial Sciences for evaluation and treatment of a swelling, located in the right mandible and involving the second mandibular molar, whose mobility produced pain during mastication. The intraoral examination showed a red-bluish swelling all around the tooth; the mass had soft consistency and the tooth was mobile and painful to palpation. Patient's medical history and systemic conditions were not significant. A previous tongue biopsy (2008) diagnosed a lymphangioma. From the already performed diagnostic exams (Orthopantomography and Magnetic Nuclear Resonance with and without contrast medium) the lesion appeared located in the right masticator space, involving the lateral and medial right pterygoid muscle, the ramus and the posterior part of the body of the mandible, and extending to the right sub-mandibular lodge, the infratemporal, the lateropharyngeal and the parapharyngeal spaces. The extraction of the involved tooth was programmed. After a simple topical anesthesia with lidocaine and prilocaine (EMLA gel 2.5% + 2.5%) and under magnification (Zeiss, 4x), the tooth was extracted by means of a blunt and careful dissection from the pathological tissue. The presence of granulation tissue surrounding the tooth helped the surgeon to separate the tooth from the pathological mass. The tooth and two surgical specimens of periodontal tissue were put in formalin (10%) and sent for histo-pathologic examination. Microscopically, a reactive hyperplastic fibrous tissue and a chronic granulation tissue were found, in which some colonies of bacteria with the histological feature of actinomycetes were present.

**Discussion and conclusions.** In the present case, the extraction was necessary because of tooth mobility, which interfered with the masticatory function. Since the surgical emergency due to the bleeding arising from hemangiomas is a well-documented complication following a simple tooth extraction and other surgical procedures, the pre-operative question was if the risk of a surgical hemorrhage was lower than the risk of a spontaneous hemorrhage caused by traumatic avulsion. The use of a microscopically controlled blunt dissection, certainly avoided that an hemorrhagic accident happened during the extraction and also guaranteed that it was controllable in the case it anyhow happened. On the contrary, a spontaneous traumatic avulsion, occurring during mastication or sleeping, could have exposed to a sudden and unmanageable bleeding. No biopsy of the pathological tissue was performed because it should be really considered an high risk procedure.



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### **TREATMENT OF LATERAL RADICULAR RESORPTION IN REIMPLANTED TEETH**

A.P. Cazzolla, GF. Favia, S. Miccoli, S. Franco, F. Pettini, VA. Lacarbonara, M.G. Lacaifa





## ADULT OR NOT? ACCURACY OF CAMERIERE'S CUT-OFF VALUE FOR THIRD MOLAR IN ASSESSING 18 YEARS OF AGE FOR LEGAL QUESTIONS

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**Aim.** The discovery of reliable means to determine the age of an individual is a fundamental objective in forensic medicine, given the constant increase of illegal immigration within the European community. Research in this area has provided over the years various methods useful for this purpose, including some that consider third molars as a parameter to determine the 18 years of age of a person, which is the threshold of adulthood in many countries including Italy. In 2008 Cameriere et al. developed a method based on the relationship between age and the third molar index ( $I_{3M}$ ) which evaluates the degree of maturation of third molar. The aim of this paper is to test the accuracy of Cameriere's cut-off value of  $I_{3M}$  as method to assess 18 years of age, on a new sample of living subjects.

**Materials and methods.** Orthopantomographic radiographs of 287 (150 female and 137 male) healthy living Italian subjects, whose age was between 13 and 23 years and with no obvious developmental abnormalities, were randomly selected among the patients at the Department of Odontostomatological and Maxillofacial Science, Sapienza University of Rome and at the Macerata Hospital (Italy). Patients' identification number, gender, date of birth and date of X-rays were recorded in a Microsoft Excel® file. Radiographs were converted in computer files and processed by a computer-aided drafting program (Adobe® Photo-shop1 CS4). Dental age estimation was performed according to the method of Cameriere et al. and, according to Bayes' theorem, a cut-off value of 0.08 was established for  $I_{3M}$  as a threshold to discriminate between individuals who are or are not 18 years of age or older.

**Results.** The results show that the sensitivity of the test was 84.1%, with a 95% confidence interval of (76.7%,89.9%), and its specificity was 92.5%, with a 95% confidence interval of (87.0%, 96.2%). The proportion of correctly classified individuals was 88.5%. Estimated post-test probability,  $p$  was 90.1%, with a 95% confidence interval of (83.6%, 95.2%). Hence, the probability that a subject positive on the test (i.e.,  $I_{3M} < 0.08$ ) was 18 years of age or older was 90.1%.

**Conclusions.** This work provides a preliminary analysis of new data emerging from the collaboration of the University of Macerata (AgEstimation Project, Institute of Forensic Medicine, University of Macerata) and the Department of Odontostomatological and Maxillofacial Science, Sapienza University of Rome. The obtained results, although derived from a case series lower than the previous articles, highlight the useful contribution of Cameriere's cut-off value for the  $I_{3M}$  in the assessment of 18 years of age, always remembering that the simultaneous employment of previously introduced complementary methods is essential for the purpose.



## BURNING MOUTH SYNDROME AND DRUGS: A CHICKEN-AND-EGG UNDISCLOSED ENIGMA

L. Azzi<sup>1</sup>, D. Costantino<sup>2</sup>, L. Pasina<sup>3</sup>, A. Nobili<sup>3</sup>, D. Karang<sup>1</sup>, L. Tettamanti<sup>1</sup>, F. Spadari<sup>2</sup>

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**Aim.** Burning Mouth Syndrome still remains a puzzling condition whose aetiopathogenesis is unknown. Several authors proposed different treatment protocols with anxiolytics, antidepressants and even antipsychotics in order to improve the quality of life in BMS patients, but it is commonly found that burning sensations and their correlate symptoms raise up in patients with an already positive pharmacopeian anamnesis for these drugs. Whether the chronic use of some drugs, such as the antihypertensive and the psychiatric ones, could provide a rationale to explain the pathogenesis of the syndrome is discussed among researchers. Afterwards, it becomes very difficult to manage a pharmacological treatment plan with drugs often already used and, sometimes, even abused by patients.

**Materials and methods.** This retrospective analysis focused on the pharmacopeian anamnesis of about 130 BMS patients referred to our hospital due to their burning complaints. Drugs, which were having been assumed for at least two years before the time of the first visit, were considered positive among the collected data. The drugs were also subdivided into different classes following FDA recommendations and classification.

**Results.** About one-third of BMS patients were associated with the chronic use of antihypertensive and heart-protecting drugs: ACE-inhibitors and sartans (22,7%), ASA (22%), diuretics (18,2%), hypocoesterolemic (15,2%) with various combination. These patients were associated with the presence of a predominantly neuropathic clinical appearance of the syndrome and answered well to topical therapies such as capsaicin and salivary substitutes. On the contrary, about another third of BMS patients were found to be assuming psychiatric drugs for a long period before the insurgence of the syndrome: anxiolytics (37,8%), SSRI anti-depressants (12,9%), non SSRI anti-depressants (1,5%), neuroleptics (6,1%) with various combination. It is commonly seen a strong association with a psychogenic pattern of the syndrome in these patients and they usually do not answer positively to topical therapies. At the end, one should consider a very high percentage of patients protecting their stomach with the use of proton pump inhibitors (34,8%)

**Conclusions.** This retrospective study paves the way to new researching protocols in the study of BMS pathogenesis: the role of drugs is still discussed and requires target controlled trials in order to verify which ones could be related to the insurgence of burning symptoms after their chronic use.



## CLASSIFICATION OF NON CARIOUS LESIONS AND ITS UTILITY IN CLINICAL PRACTICE

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**Aim.** The 80% of adult patients present non carious lesions like erosion, abrasion and abfraction in teeth. Nowadays the etiopathological aspect of these clinical manifestations is not well defined yet, even if we know that their manifestation is due to multifactorial causes in which the lesion occurs when there is a non-balance between protective factors of the patient and destroying various causes. In defining these lesions we use the term "tooth wear" making confusion between the clinical typologies of lesion and making diagnosis difficult. So clinicians feels the need to have a classification which represents them to be able to make a correct valuation, to set the right treatment, to follow the lesion by the time and recognise them in terms of prevention.

**Materials and methods.** A research in scientific Literature of the classifications actually in use has been made to establish which of them is more correct for clinical aims to permit the envelope of preventive and therapeutic protocols for the management of these lesions.

**Results.** Many indices has been proposed for the valuation of tooth wear in clinical practice. The most popular classification has been created by Smith *et al.* and it is called "Tooth Wear Index". It can be used in all types of lesion and provides tables which make a classification of the various levels of dental loss in a particular surface (occlusal, cervical, etc..). Hooper *et al.* have recently proposed an index for the measurement of tooth wear loss in marginal or cuspidal areas using gypsum models considering incisors, canines, premolars and molars classing them in a numeric scale before defined. Gordon *et al.* made a classification in a numeric scale making difference between anterior or posterior teeth. Ollo *et al.* gave a score to each tooth wear depending on the characteristics of the lesion and defined it acceptable or not. Johanson *et al.* gave a numeric value to the lesion from 0 to 5 depending on the dental loss. –

**Conclusions.** In the epidemiological field it is necessary to have an universally known index to avoid incomprehension in clinical practice. This index may be achieved by objective, repeatable and precise valuations, so we consider Smith's index the more suitable. It is desirable to be carried out other scientific studies which could give us the opportunity to have effective operative protocols to treat such an important and frequent subject like non carious lesions.



## CLINICAL EVOLUTION OF A LICHENOID LESION INTO A PROLIFERATIVE VERRUCOUS LEUKOPLAKIA

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**Aim.** Proliferative verrucous leukoplakia (PVL) is a rare condition described for the first time in 1985 by Hansen, who presented 30 patients with this particular form of white lesion affecting the oral mucosa. PVL begins as a simple, slow-growing, persistent hyperkeratosis; it tends to spread getting multifocal and, as time passes, the affected tissue can become exophytic, wart-like, or erythroplakic and the lesion can even evolve into carcinomas. PVL appears to resist all attempts of therapy and often recurs. The WHO also described the PVL as having a high rate of malignant transformation to either squamous cell carcinoma or verrucous carcinoma and it is defined by its progressive clinical course, changing clinical and histopathologic features, and potential of developing into cancer. The buccal mucosa, gingiva, and alveolar ridges are the most common affected areas. PVL can exhibit a wide range of histologic features: from mild hyperkeratosis without dysplasia, to more lichenoid features with a band-like lymphocytic infiltrate, or even to dysplasia, verrucous carcinoma or conventional type squamous cell carcinoma. The purpose of this paper is to describe and evaluate the clinical aspects and histologic features of a case of PVL, its effects on the tissues and quick progression to a dysplastic lesion.

**Materials and methods.** We describe a case-report of a 65-years-old female patient who was sent to our hospital due to the presence of a hyperkeratotic, white-patching lesion localized bilaterally upon her buccal mucosa. The left side of the lesion degenerated over time, pointing out its verrucous clinical appearance. Consecutive histopathological analysis were performed after bioptic samples were taken from the same area.

**Results.** The histologic evolution showed an initial pattern of chronic inflammatory lichenoid infiltration which displayed a lichenoid dysplasia after 6 months and finally developed into a clinically recognizable proliferative verrucous leukoplakia, even after a radical excision of the first dysplastic lesion. So the overall clinical and consequential histopathological findings were considered diagnostic for PVL.

**Conclusions.** PVL represents a true life-threatening pathology which requires special awareness from the clinician and strict collaboration between the clinician himself and the pathologist, in order to detect early manifestation of OSCC and to establish a thorough therapeutic protocol of surgical excision. The earliest protocols reported in the international literature, which focused their attention on a strict follow-up programme, appeared to be completely inadequate due to the high percentage of degeneration of PVL, so that radical surgical excision becomes the preferred approach with best prognosis over time.



## COCAINE-INDUCED PALATAL PERFORATION

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**Aim.** Cocaine is an alkaloid stimulating the nervous system, obtained from the leaves of the South American coca plant (*Erythroxylum coca*). Using cocaine involves clinical and social issues but above all it may damage the organs of the upper airways and cause devastating esthetical and functional injuries with destruction and corrosion of the facial structure. The use of cocaine causes several lesions according to the way it is administered: inhalation alters the mucosa causing vasoconstriction and, with the passing of time, it causes ulcerations and perforations to the mucosa of the hard palate and to the nasal septum of the palatine bone. The patient is anesthetized because of the cocaine's crystals; one hour after intake, apoptosis is active and the healing process is blocked. At the same time, the cocaine effect disappears and the patients want to take a new dose; in this way, the micro-necrosis becomes macro-necrosis with a consequent perforation. The aim of this study is to report three cases of cocaine-induced palatal perforation: the patients were aged between 27 and 39 years and presented with a long history of cocaine use.

**Materials and methods.** The first two patients presented with common symptoms: they complained food and drinks coming up from the stomach into the esophagus during the meals; nasal voice to phonation; severe hemorrhages and palatal perforation with exposure of the palatal bone; malodorous crusts and frequent infections associated to rhinitis and sinusitis. The third patient presented with mobility of tooth 2.6 with an erosive area of the oral mucosa and bone absorption in the same area after transbuccal cocaine administration. Instrumental examinations like CT scan allowed to identify the bone erosion while NMR allowed for a better evaluation of the soft tissue involvement. First, the infection was treated in order to encourage the removal of crusts and lubricate the nasal mucosa. Due to the poor patient awareness, in two patients a valve was placed to avoid the passage of food into the upper airways while eating; the aim was to schedule a reconstructive surgery at least one year after interruption of cocaine consumption. The compromised mobile element was extracted in the third patient, who also received surgical curettage of necrotic bone.

**Results.** In the treated cases, the initial symptoms have improved, phonation in particular; it is necessary to establish a follow-up program of at least two months in order to examine the interruption of cocaine consumption and the evolution of the healing process and finally establish if it is recommended to proceed with reconstructive surgery.

**Conclusions.** Cocaine use, as well as the use of any psychotropic drug, is a problem of social importance: the main aim in this case is to treat these patients with minimally invasive techniques, because of their poorly cooperating lifestyle.



## DENTAL MANAGEMENT OF PATIENTS UNDERGOING HEMATOPOIETIC STEM CELL TRANSPLANT: A NEW APPROACH

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**Aim.** In the last years bone marrow transplant is the election therapy for oncohematologic pathologies, which do not respond to other treatments. The hematopoietic stem cell transplant (HSCT) has to be preceded by chemotherapy and radiotherapy at supramaximal doses (conditioning regimen). The following neutropenia and thrombocytopenia could be the post transplant complication's cause. It is necessary to prepare as well as possible the patient before the HSCT with an effective eradication of any possible infectious focus, although conditioning regimen protocols are always less myeloablative, so the consequent aplasia is becoming less severe. Therefore, preparation time has to considerate for healing after tooth extraction and the availability of a compatible donor, so that the patient can face the transplant without infection risks. The remaining time before the hospitalization could influence the therapy planning, also for dental care planning. It is known that the oral cavity is a reservoir of millions of microorganisms, which can cause fever and septicemia in patients undergoing immunosuppressive therapy. As the prevalence of oral infection is high, it is now common practice in transplant centers, the identification and treatment of potential foci. However, until now, literature does not give any precise directions to establish a correct identification of infectious foci and consequently what might be the correct dental protocol before HSCT.

**Materials and methods.** 77 patients have been included in this study: they have been examined in the Department of Oral Surgery, to be evaluated for their suitability to undergo the HSCT in the Hematology Department. Patients were evaluated on their medical history, an interview with the hematologist about transplantation timing, type and severity of the disease, an accurate intra and extra oral exam with radiographic evaluation, to decide the dental management planning, following the new protocol to eliminate oral infectious foci, with conservative, endodontic, periodontal, extractive and oral surgery treatments. Patients were monitored in the period after HSCT and all systemic complications occurred in the first 30 and 100 days were recorded: fever, mucositis, Graft Versus host disease, relapse, death. After 100 days a control visit was made.

**Results.** In three years, of the 77 patients seen for suitability for HSCT, only 55 have been transplanted, the remaining have continued with other systemic treatments; they were affected by 18 different hematopoietic pathologies. Timing for dental therapy is very short. On average, the first dental visit takes place 47 days before HSCT, while disease diagnosis occurs 30 months average prior the transplant. Patients are hospitalized on average for 38 days. Only 37% of patients were able to perform all dental treatment planned. There are no statistically significant differences in post-transplant complications among patients who have completed the entire dental therapy and those who had not had the time.

**Conclusions.** Since the protocols for hematological transplant are becoming less myeloablative, dental management protocols revision is required, because infectious complication risk by oral lesions seems to be less likely. Also, HSCT is a procedure that is adopted more and more for certain types of diseases, that can also regress with other types of treatment which makes not necessary the transplant. Performing extractive radical protocols in these patients that are already systemically debilitated does not seem to be very beneficial and can be a social care problem even after the treatment period, when patients go back to their lives and have to face a long and costly oral rehabilitation.



## EATING DISORDERS: ASSESSMENT OF KNOWLEDGE ON A DENTIST'S SAMPLE

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**Aim.** To analyze the knowledge and experiences of dentists with private practice in Sassari district concerning eating disorders and clinical stomatology manifestations.

**Materials and methods.** A questioner to investigate dentist's knowledge and experiences was created and submitted to a random sample of dentists. The data were collected, into a Microsoft Excel® spreadsheet for personal computers Macintosh G4 (Ireland), data were analysed using an analysis program (Stata SE 10®).

**Results.** 150 dentists have been enrolled (representative sample). After questionnaires evaluation the following results were obtained: 80.7% (121) of the participants have a degree in Dentistry and 19.3% (29) have a degree in Medicine and a Dentistry Master in Science Diploma, 46% (69) were males and, 51% (81) were females, age range was (25, 62 years with a mean age of, 36.1 yrs), average work experience was 11.5 years (range 1 to 36 years). More than 90% of participants was able to define as eating disorders only bulimia and anorexia. 77.3% (116) correctly identified as the western population the most affected while only 52.7% identified whites as most affected people. 80% of the dentists recognised dental erosion and abrasion as typical oral manifestations. Only 62% affirm that the saliva PH decreases and 63% don't recognise parotid gland tumefaction as a clinical sign. Operator experience: 60.7% (91 dentists) had clinical experience of patients with eating disorders. 43, 9% of them made diagnosis from oral manifestations. 51.3% (77) were not able to treat these patients and 69.3% (104) were not able to refer patients to specialized centres for treatment. 119 (79.3%), think that the dental hygienist is a valid collaborator for the treatment of oral cavity manifestations. *Measures of prophylaxis:* 16.7% (25) suggests the fluoride prophylaxis, 21.3% (32) oral hygiene education. Only 1, 3% indicates the use of bicarbonate to change the saliva pH value, suggested conservative or prosthetic restorations, suggested to use salivary substitutes or to seal permanent teeth. The difficulty to clinical treat these patients was related to lack of knowledge for 72% (108) of participants, 36.7% (55) have studied the clinical aspects of this pathology attending the School of Dentistry; only 24.7% (37) after the degree. 94.7% (142) express the need for further information and only 2% (3) had sufficient clinical knowledge.

**Conclusions.** It is evident a lack of knowledge of the problem and seems to be urgent to provide more training programs to establish guidelines for the diagnosis and treatment of eating disorders among dentists. In our opinion the acquisition of such knowledge will better change the approach to these pathology improving clinical skills and subsequently diagnosis and treatment.



#### EEC SYNDROME. CASE REPORT

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**Aim.** Case report. EEC syndrome is a genetic developmental disorder characterized by ectrodactyly, ectodermal dysplasia, and orofacial clefts (cleft lip/palate). The three cardinal signs of the syndrome are ectrodactyly and syndactyly of the hands and feet, cleft lip with or without cleft palate, and abnormalities in several ectodermal structures including skin (i.e. hypopigmented and dry skin, hyperkeratosis, skin atrophy), hair (i.e. fine and sparse hair and eyebrows), teeth (small, absent or dysplastic teeth), nails (nail dystrophy) and exocrine glands (reduction/absence of sweat, sebaceous and salivary glands). Other associated clinical features include abnormalities of the genitourinary system, conductive or sensorineural hearing loss, choanal atresia, mammary gland/nipple hypoplasia, ophthalmological findings (i.e. lacrimal duct defects, corneal ulcerations, keratitis, blepharitis). Patients do not have intellectual deficit.

**Materials and methods.** The exact prevalence is not known. More than 300 cases have been described in the literature. In more than 90% of cases, EEC is due to missense mutations in the sequence of the *TP63* gene (3q27) encoding the TP63 transcription factor that is essential for ectoderm and limb development. These cases correspond to the classical EEC syndrome (EEC type 3) and seem to present some degree of genotype-phenotype correlation. The other cases correspond to EEC syndrome type 1, which shows associated clinical features such as malformed auricles and middle and inner ear malformations, and was mapped to 7q21. EEC type 2 does not exist anymore. EEC syndrome is an autosomal dominant disorder with incomplete penetrance (between 93 and 98%) and variable expression. The diagnosis is based on clinical examination, X-rays of the limbs and jaw, and, according to the associated features, kidney ultrasound, ophthalmologic examinations, and skin biopsy.

**Results and conclusions.** Management is multidisciplinary and requires evaluation by orthopedic, plastic and dental surgeons, ophthalmologists, dermatologists, and speech therapists. Surgery allows correction of orofacial and dental abnormalities.





## EFFECTS OF RADIOTHERAPY ON SALIVAR FUNCTION

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**Aim.** The radiation therapy, often associated with the chemo one, is commonly used in the treatment for cancers of head-neck district. One of the delayed collateral effect is the reduction of the salivary flow, defined Xerostomia. Hiposalivation is responsible for: alteration of the taste, difficulty in deglutition and/or mastication, alterations to the oral cavity flora, addicted to the risk of caries and infections, and an increasing maxillary osteonecrosis risk. The aim of the study is the comparison of Xerostomia between the patients treated with the radiotherapy and the patients treated with an association of radiation and chemotherapy, based on Cisplatino.

**Materials and methods.** We examined 150 patients with a cancer in the head-neck district treated in the period from 2006 to 2011; in the study were excluded cases of previously hiposalivation or Xerostomia. Subjects have been divided into 2 groups: the first one (A), composed by 93 patients were treated with radiations only; the second group (B), consisting of 57 patients with a combined therapy. Furthermore both of the groups were divided into 2 categories, referring to the location of the cancer: upper- or lower-glottal. In Group A we had 35 subjects with upper-glottal and 58 with lower-glottal cancer; in Group B 36 with upper-glottal cancer and 21 with lower-glottal. Beforehand the beginning of the therapy, patients have been submitted to treatments of oral hygiene, conservative therapies and, in case, extractions. Both of the groups have been checked in the following 24 months.

**Results.** In Group A patients with upper-glottal location (35) 27 of them were affected by Xerostomia, 6 by hiposalivation and 2 had not any salivary problem. Regarding 58 lower-glottal cases, only 5 were afflicted by Xerostomia, 10 by hiposalivation and 43 had normal salivary parameters. In the second group (36 upper-glottal tumors), 34 cases showed Xerostomia and 2 without any alteration in salivary flow. Finally concerning lower-glottal cancers (symbolized by 21 patients) 15 of them were affected by Xerostomia, 6 by hiposalivation.

**Conclusions.** Concerning damages assigned to Radiotherapy we had no cases of osteoradionecrosis, due to preventative dental measures. Salivary glands are generally susceptible to radiotherapy, showing functional alterations even with low doses of radiations. Quantification of functional damages is not easy; in this case we adopted a subjective method rather than an objective one. Members of the B group, treated with combined therapy, showed an increasing rate of Xerostomia, probably caused by the sensitizing action of Cisplatino, confirming literature data. After all, patients treated with an association of radiation and chemotherapy are commonly affected by more serious diseases: so they have cancer (with increasing invasive activity and aggressiveness), worst general conditions and, in addition, they underwent more destroying surgical operations. As we can see in these subjects we observe damages in salivary glands also in lower-glottal cases.



## FUNCTIONAL FOODS AND ORAL HEALTH

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**Aim.** According to the British Journal of Nutrition (1999) "A food can be regarded as 'functional' if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either an improved state of health and well-being and/ or reduction of risk of disease. Functional foods must remain foods and they must demonstrate their effects in amounts that can normally be expected to be consumed in the diet: they are not pills or capsules, but part of a normal food pattern." Purpose of this study is to verify, through the Literature analysis, the beneficial properties of foods such as cocoa, yogurt, grapes and green tea, focusing, thanks to the greatest number of studies, on the anticariogenic, anti-inflammatory, antioxidant, antiviral and anti-tumor effects of green tea.

**Materials and methods.** The Literature review of the last five years has been carried out through the full text deepening made using the Pubmed search engine.

**Results.** Green tea is polyphenols rich tea. The main polyphenols are catechins: epigallocatechin-3-gallate (EGCG), epigallocatechin (EGC), epicatechin-3-gallate (ECG) and epicatechin (EC). It also contains additional antioxidants such as carotenoids, vitamin C and E, which in synergy with polyphenols, tend to reduce the oxidations level: binding of metal ions such as iron and preventing their participation in oxidation reactions (leading to the formation of hydroxyl radical); preventing the redox sensitive transcription factors activation that amongst others things serve as mediators of inflammatory reactions; suppressing the oxidation stimulants such as induced nitric oxide synthase (iNOS), cyclooxygenase 2 (COX-2), lipoxygenase 2 (LOX-2); inducing the antioxidant enzymes such as super oxide dismutase. It has been found that mouth rinsing with green tea extracts (0.61%) protect from erosion and abrasion of the tooth dentine, resulting in a reduction of the levels of virulent cariogenic pathogens (Streptococcus Mutans and Lactobacilli) in saliva. Furthermore, it has been demonstrated that EGCG tends to reduce alpha-amylase activity leading to less maltose release that causes mineral depletion from tooth enamel. It has also been studied that the intake of green tea powder can abate the creation of sulphur compounds that cause halitosis. Moreover, catechins can inhibit collagenase activity and prevent bone resorption, inhibiting the cysteine proteases of Porphyromonas Gingivalis and protein tyrosine phosphatase in Prevotella Intermedia, considered potent virulence factors in the development of periodontal disease. It seems that EGCG prevents the binding and penetration of viruses to cells, interfering with the mechanism of HIV -1, HSV -1, Epstein Barr virus and influenza viruses by attaching the viral hemagglutinin and preventing their adhesion to cellular target receptors. EGCG can scavenge nitric oxide (NO) and free radicals (ROS), reduce DNA damage caused by exposure to nicotine and acrolin metabolites, resulting in a decreased smoking related chronic inflammation. Finally, EGCG activity has been shown in oral squamous cell carcinoma (OSCC), inducing apoptosis and cell cycle delay and in reducing metastasis, by the suppression of the HGF signalling pathway (hepatocyte growth factor) and probably through down regulation of matrix-metalloproteinases (MMPs) and urokinase-plasminogen activator (u -PA) expression.

**Conclusions.** Several in vitro studies showed the role of green tea in the maintenance of oral health. Therefore, it could be necessary to carry out in vivo studies to assess its real validity.



## GOLDBLATT SYNDROME: ODONTOSTOMATOLOGIC MANIFESTATIONS

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**Aim.** Spondylometaphyseal Dysplasia (SMD) or Goldblatt syndrome is a dominantly inherited dysplasia and general involvement. Spondylometaphyseal Dysplasia includes special clinical and radiological features such as pectus carinatum, joint hyperextension, coxa and genu valgum, asymmetry of upper and lower limbs due to metaphyseal irregularity, platyspondyly. The association of these clinical signs with dentinogenesis imperfecta was first analyzed by Goldblatt in 1991, from which the syndrome took its name. The clinical signs seem to be confined to skeleton, ligaments and teeth with greater involvement of permanent teeth. Intellectual development is normal and eyes and ears are not involved. The aim of this work is to study a patient suffering from Goldblatt syndrome and identify dental and orofacial alterations typical of this disease, in order to establish diagnostic criteria providing a more efficient diagnosis and therapeutic management of patients affected by this syndrome.

**Materials and methods.** We used several radiographic examinations such as: X-ray of chest, hand, spine in the two projections, lower limbs with pelvis in one projection, NMR of the temporomandibular joint (TMJ) without contrast, latero-lateral and posterior-anterior skull x-ray, OPT X-ray of the dental arches. Also, tooth impression was taken to make the study models. Genetic tests were also performed, in order to search for alterations of genes COL10A1 and SHOX, which are responsible for the synthesis of proteins involved in the development of cartilage and bone. For the evaluation of diseases related to oral breathing, front and back rhinomanometry was used together with some clinical maneuvers that confirmed the clinical diagnosis; these maneuvers were Glatzel mirror and Gudín test. We also carried out quality and quantity laboratory tests on the salivary flow.

**Results.** The patient recruited in our study showed the typical signs of SMD on extraoral physical examination: pronounced orbits, downward palpebral fissures, short and flattened nose, midface hypoplasia and prognathism. The intraoral examination showed diffuse malposition of teeth with crowding of 13-23 and 33-43, lingualization of 32 and 42 with respect to the lower central incisors and extrusion of teeth 33 and 43; necrotic roots of 36 and destructive decay of 46. Frequent dysodontiasis and destructive decay are ascribable to dentinogenesis imperfecta, acidity and reduced salivary flow. Orthodontic diagnosis indicates that the patient had a Class II division II with hyperdivergence, mandibular retrognathia and transversal hypoplasia of the palate. The latter was responsible of atypical swallowing and mouth breathing. NMR of TMJ performed with the mouth closed and then fully open showed signs of ligamentous laxity. The analysis of genes COL10A1 and SHOX did not present any anomaly.

**Conclusions.** Our study allows to state that there is a correlation between Goldblatt syndrome and craniofacial and dental problems. A reduced development of the mandible and maxilla associated with the alteration of ossification centers leads to mandibular retrognathia and transversal hypoplasia of the palate. This is why cephalometric tracing is essential in the treatment of these patients. It was shown that all dental problems (dysodontiasis, tooth decay) were related to dentinogenesis imperfecta. The above-mentioned procedure helps the operator in the diagnosis and immediate identification of the treatment plan to be carried out in these cases.



## IDENTIFICATION OF BACTERIAL SPECIES IN SUBGINGIVAL PLAQUE AS A RISK FACTOR FOR PERIODONTAL DISEASES IN PERIMENOPAUSAL AND POSTMENOPAUSAL WOMEN UNDERGOING HORMONE REPLACEMENT THERAPY

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**Aim.** The aim of this study was to investigate about the implications of the menopause in patients treated with Hormone Replacement Therapy (HRT) on their oral health, with particular reference to quantitative changes of the major periodontal pathogens, which may lead to homeostatic alterations in the microbiota in favour of some species most frequently involved in the etiopathogenesis of periodontal diseases. There are only a few studies about HRT and oral microbiota. In order to assess this, the effects of HRT on oral biofilms has been taken into account, using as a comparison the oral microbiota of postmenopausal women, who did not undergo HRT.

**Materials and methods.** The total population of the study (64) were divided into two groups and invited to a 2-year clinical follow-up study. One group received HRT (23) and the other group (41) did not receive this therapy. Samples, collected from the subgingival plaque from the four deepest periodontal sites using sterile paper points, were taken for PCR analyses. A complete periodontal examination (all teeth except third molar), with a graduated periodontal probe, was performed.

**Results.** Data indicated that despite all the prevention programs, an improved dental hygiene and the fact that chronic periodontitis seemed to be kept under control, over the past few years the frequency of patients suffering from this disease is increasing. Most importantly, in the female subjects in menopause, this period is characterized by significant physiological changes related mainly to a reduced production of oestrogens. 50% of patients, under and not under HRT, apart from circulatory disorders related to menopause, referred also symptoms associated with mouth inflammations, altered taste perceptions, and xerostomia. The main organisms detected in first and the second sampling were *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, *Prevotella intermedia*, and *Prevotella melaninogenica*. Regarding the analysed periodontal clinical parameters, significant data were represented by the increase of PI, PPD and then REC and MOB.

**Conclusions.** Preliminary results indicated that long-term HRT was not associated with relevant effects on periodontal status and clinical measures of periodontal disease, thus suggesting that HRT may not confer protection against periodontitis in postmenopausal women. The exact evaluation of the composition of subgingival plaque should be considered by the clinician, in order to propose a correct diagnosis, especially for the therapeutic decisions to be taken, and, last but not least, for a prediction of the disease progression. Clinical relevance of the results needs to be assessed in future studies with longer observation time, however.



## IS BURNING SENSATION NEUROPATHIC IN BMS? A PILOT STUDY USING THE "DOULEUR NEUROPATHIQUE EN 4" TEST

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**Aim.** Burning Mouth Syndrome is an idiopathic pathology; various authors hypothesized a psychogenic or a neuropathic origin. DN4 (Douleur Neuropathique en 4) is a screening tool for neuropathic pain already used for Burning mouth syndrome in a pilot study. DN4 consists of interview questions (DN4-interview) and some physical test and showed the ability to discriminate neuropathic pain from nociceptive and psychogenic pain. We assessed the characteristic of pain with the DN4 in 10 Burning mouth syndrome patients to check if the scores obtained reinforce the hypothesis of oral burning idiopathic sensation as a manifestation of a neuropathic form of pain.

**Materials and methods.** We randomly selected 10 patients (1man, 9 women) affected by Burning Mouth Syndrome from a database of 318 patients already in treatment at our unit of oral medicine and pathology (University dental Hospital-University of Milan). We performed the DN4 test for every patient selected and recorded the data. These results were entered into a Microsoft Excel database and analyzed.

**Results.** DN4 main scores showed a range from 2 to 6 with a mean value of  $3.6 \pm 0.5$ . Only 4 patients (40%) showed a score major or equal than 4, the cut-off that indicate the presence of a neuropathic pain. For what concern the interview questions (DN4-interview) burning sensation was obviously found in every patients 100% followed by electric sensation (10%), no one experienced cold pain. For what concern question number 2 numbness was found in 3 patients (30%) followed by tingling (20%) and pricking pain (10). In the physical test hypoesthesia appeared in 3 patients (30%) and allodynia in 4 patients (40%).

**Conclusions.** Data from this study show that idiopathic oral burning sensation could be, in some patients, a consequence of a neuropathic alteration. Despite the low number of patients included in our study, the Douleur Neuropathique en 4 test could help to better understand the nature of the pain in patients affected by Burning mouth syndrome. Performing DN 4, in association with a neurological and a psychological assessment could be a valid approach in the development of a therapeutic way that fits the single case.



## MINI INVASIVE SURGICAL REMOVAL OF A COMPOUND ODONTOMA IN A YOUNG MALE PATIENT: A CASE REPORT

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**Aim.** Odontoma is an odontogenic benign tumor of the jaws, more frequent in the young age and composed by enamel, dentine, cementum and dental pulp. Two distinct types of odontoma are acknowledged: a complex form, in which all dental tissues are developed occurring in disorganized distribution, and a compound form, in which all dental tissues are arranged in tooth-like structures named denticles. Odontomas are usually asymptomatic but they are often associated with eruption disorders of contiguous permanent teeth. Swelling, pain, suppuration bony expansion and displacement of teeth have also been reported as rare complications. Surgical excision represents the best choice of treatment. The current study shows the various stages of the surgical removal of a compound odontoma of the anterior maxilla which caused the impactation of the permanent canine and delayed the exfoliation of the primary canine, involving the simultaneous extraction of both teeth.

**Materials and methods.** A 20 years old male patient was admitted to the Unit of Odontostomatological Clinic – Department of Odontostomatological and Maxillofacial Sciences (Sapienza University of Rome, Italy) referred from the Unit of Orthognatodontics of the same Department. At clinical examination the patient showed the persistence of a primary right canine over its physiological age of exfoliation. The accurate study of the orthopantomography and the computed tomography with Dentalscan program revealed the presence of a multiple radio-opaque structure in the right premaxillary area, in central standing, referable to suspect compound odontoma; the unerupted permanent right canine was positioned mesially to the lesion, in palatal version. The surgical removal of the odontoma was performed under local infiltrative anesthesia. A mucoperiosteal flap was raised and the bone was removed by a low speed dental hand-drill and a tungsten carbide bur on both vestibular and palatal sides in order to grant a double access to the area. The impacted tooth and its follicular sac were extracted after odontotomy between the crown and the root using a high speed dental hand-drill and a diamond bur. Then the single tooth-like structures forming the lesion were removed. The wound was irrigated with sterile physiological solution and cleaned with sterile dressing. The flap was correctly repositioned and sutured with 3.0 absorbable suture (Ethicon Vicryl®). After surgery anti-inflammatory, antibiotic systemic therapy and digluconate chlorhexidine 0,20% spray were prescribed to the patient. Periodic post-operative follow up program was performed.

**Results.** The postoperative period was uneventful. Surgical site was totally healed after one week, in spite of patient's poor oral hygiene. The postoperative histological examination confirmed the clinical and radiographic diagnosis of compound odontoma.

**Conclusions.** Odontoma is the most frequent odontogenic benign tumor in patients younger than 20 years of age. The presence of a compound odontoma associated with an impacted permanent tooth involves surgical treatment which has to be accurately planned through the evaluation of clinical and radiological data. The surgical removal of the lesion represents the best therapeutic choice, always followed by histological analysis in order to obtain the final diagnosis. In the reported case a double access to the surgical area was performed in order to extract the multiples components from two different small sites, instead of a single large one, granting a more conservative surgical approach to the pathology.



## OCCURRENCE OF BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAWS FROM A MEDICO-LEGAL POINT OF VIEW

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**Aim.** Bisphosphonates (BP) are frequently used for skeletal diseases; they are particularly effective in reducing malignancies related skeletal events. Patients administered with BP, in particular cancer patients receiving intravenous amino-bisphosphonates, as well as patients taking oral BP for prevention/treatment of diseases of altered bone turnover, may be affected by a significant adverse reaction: the bisphosphonate-related osteonecrosis of the jaws (BRONJ). Scientific literature has deserved a special attention to this disorder due to its growing evidence and the wide and effective use of these drugs as both therapeutic and preventive agents. Nonetheless, the level of evidence related to this relatively recent recognized condition is quite low, its pathogenesis is still poorly understood, its management is very challenging and results are often unsatisfactory. In fact, the condition and its treatment may end up with a marked detriment of the quality of life. For this reasons BRONJ may become a source of litigation and may expose clinicians involved in patients' management to malpractice claims. Legal actions pursuant to BRONJ have already been reported in literature. The aim of this paper is to provide a comprehensive consideration of a number of aspects (facts, events, acting figures), which are required to be addressed in order attribute liability, if any.

**Materials and methods.** A revision of the current literature dealing with BRONJ and its medico-legal issues has been performed together with an overview of medico-legal methodology applicable to this topic.

**Results and conclusions.** Although most BRONJ cases seem to be triggered by invasive dental procedures and oral health care providers are much exposed to legal actions pursuant to BRONJ, the attribution of liability is not straight-forward. In fact, from a chronological point of view, dental professionals are the most closely related to BRONJ occurrence, but this does not imply that causation and all legal obligations should be implicitly attributed to them. Thus, in assessing legal liability, a robust and pragmatic approach to facts (i.e. actions and their timing from bisphosphonates prescription to BRONJ occurrence) and persons involved is required in order to determine if a breach of the duty of care (information to the patient, proper diagnosis, adequate management and referral) occurred, as well as if patient was compliant in attending prescriptions and follow-up programs.



#### ORAL ULCER BY SFINGOMONAS PAUCIMOBILIS: A CASE REPORT

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**Aim.** *Sphingomonas paucimobilis* is an aerobic Gram-negative, oxidase-positive, non-fermentative bacillus, and is considered as minor clinical significance; however, is emerging as an opportunistic pathogen. The purpose of this work is to present the first reported case of infection of the oral mucosa conducted by *Sphingomonas paucimobilis*.

**Materials and methods.** A 73 years-old man was admitted to the Department of Specialistic and Odontostomatological Sciences, Polytechnic University of Marche, Ancona, in May 2013, for evaluation of oral mucosal ulcer at the attached gingiva, appeared during the previous week. The patient reported pain during chewing in the maxillary right canine-premolar region, and fever during the past 3 days. His medical history showed that he was diagnosed to have chronic obstructive pulmonary disease. Oral examination showed an ulcer with necrotic tissue, affecting attached gingiva in maxillary anterior region (teeth 12-14). The bone was exposed, but appeared healthy. Radiographic examination showed periapical radiolucency at the apexes of lateral incisive teeth and canine teeth. Any communication between the periapical lesion and the ulcerated mucosa was absent. Sterile swab was used to collect microorganisms from the ulcer. Subsequently, removal of necrotic tissues by debridement was performed. Amoxicillin therapy was initiated, waiting for the laboratory test results.

**Results.** The laboratory analysis revealed injury sustained by infection with *Sphingomonas paucimobilis*. In agreement with the physician, was prescribed an antibiotic therapy with piperacillin and tazobactam for 7 days. After healing of the ulcer, which occurred after 2 weeks, elements 12 and 13 were subjected to extraction.

**Conclusions.** To the best of our knowledge, this is the first reported case in literature of infection of the oral mucosa conducted by *Sphingomonas paucimobilis*. Therefore, it is possible that other non-classical pathogens of the oral cavity may be responsible for infectious lesions of this district. This may be challenging in diagnoses and therapy.





## **pH SALIVAR VALUE IN PATIENTS WITH HEAD AND NECK CANCER**

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**Aim.** It is well known that the development of the oral cancer risk is mainly due to tobacco use and/or alcohol consumption. In addition to this, many other factors are recently acquiring more and more importance: infectious agents, environmental carcinogens (sun exposure), unhealthy diets (high animal fat content, nutrient deficiency), way of living (sedentary lifestyles), can be mentioned as examples. Furthermore, the consume of hot drinks and foods, typical of some cultures, is probably responsible for an increased incidence of cancer. Consequently, a low pH level of saliva has been supposed to influence the risk of developing cancer in the oral cavity and the pharynx.

**Materials and methods.** In order to verify this hypothesis we compare some salivary features (amount, viscosity, pH and buffer capacity), in two groups of patients: the first one consisting of people who made therapy in the head-neck district (Study group, mean age 64,17 y.), was composed by 30 patients (20 patients had a surgery operation, in 10 cases the therapy was enhanced with radiation; the second group, (Control group, mean age 61,23 y.), was composed by 30 healthy people. The patients have been recruited from the Oral pathology Department and Ear-Nose-Throat Clinic. The object of the study has been explicated, and people in agreement with the final aim has been asked to sign a consent form. Every patient had an oral hygiene session and has been taught for a correct hygiene maintenance. After the following two weeks, patients have been recalled in order to permit the saliva collection; moreover, they were asked not to eat, drink, smoke or brush teeth in the previous 90 minutes from the examination. In order to avoid the circadian pattern of the saliva secretion, it has been collected between 9,00 and 11,00 a.m., using the "spitting method". The different assessment on the samples has been performed with GC Saliva Check Buffer kit®; pH value has been assessed on unstimulated saliva, whereas amount of secretion and buffer capacity has been performed on stimulated saliva.

**Results.** It has been proved that the pH value of saliva in basal condition, the amount and buffer capacity of secreted saliva had a fewer value into the Study group, rather than in Healthy one: pH 6,37 (SG) - 6,80 (CG); amount 5,55 (SG) - 6,86 (CG); buffer capacity 8,88 (SG)-9,80 (CG) as showed by the results, the mean salivary pH level in the Healthy group was 6,80. In the other group, thus, it reached 6,37 with a p-value of 0,0017 (<0,05), highly relevant. Measurement of salivary amount denote a value of 6,86 ml in the Control group related to 5,85 ml measured in the Study group with a p-value = 0,1189 (> 0,05) with a not statistic significance. Although buffer capacity didn't reach a statistically significant value [p-value = 0,0994, > 0,05], it is possible to notice a reduction of this property.

**Conclusions.** Only pH value reached a statistically significant difference; in spite of the reduced samples showed, these first results confirm that a low pH value and a reduced buffer capacity may influence the action of carcinogenic products.



## PRADER-WILLI SYNDROME (PWS) MOLECULAR ANALYSIS OF SALIVA SAMPLES

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**Aim.** Prader-Willi syndrome (PWS) is a rare disorder caused either by the absence of paternally inherited genes on chromosome 15q11-q13 or by the lack of expression of these genes. In approximately 70-75% of affected individuals there is a microdeletion of the paternal chromosome 15q11-q13 (del15); in about 30% of cases there is maternal uniparental disomy (UPD15) in the same region; and in a small percentage of cases (1-2%) PWS results from a mutation in the imprinting center or from a translocation or other chromosomal rearrangements in chromosome 15. Severe neonatal hypotonia and feeding problems, childhood-onset hyperphagia and obesity, short stature, facial dysmorphism, hypogonadism, learning and behavioural difficulties, and oral abnormalities characterize this syndrome. Viscous saliva has been reported to be a diagnostic indicator of PWS in neonates and is a consistent finding in PWS. Decreased salivary flow rate and increased amounts of salivary ions and proteins have been reported in individuals with that syndrome.

**Materials and methods.** In collaboration with the Italian PWS Association, we evaluated a cohort of 15 patients with a genetical confirmed diagnosis of PWS whose average age was 22 confronted with a healthy control group. Anamnestic and clinical data were obtained by administration of Nordic Orofacial Test – Screening (NOT-S). Informed consent was signed by parents of all patients. Whole unstimulated saliva samples were collected in a collection tube. Total collection time was about 10 minutes (depending on patients cooperation). Calcium, phosphate, phosphorus, chloride, total protein, albumin, lactoferrin, lysozyme, cystatin, amylase, immunoglobulin, transaminases, alkaline phosphatase and lactate dehydrogenase concentration were measured in collaboration with the Department of Microbiology of the Second University of Naples.

**Results.** Results showed that patients with PWS had a different qualitative and quantitative saliva secretion than considered normal for a standard population.

**Conclusions.** The aims of the present study were to quantify the salivary flow rates of major salivary glands and to quantify calcium, phosphate, phosphorus, chloride, total protein, albumin, lactoferrin, lysozyme, cystatin, amylase, immunoglobulin, transaminases, alkaline phosphatase and lactate dehydrogenase concentration in whole saliva in individuals with PWS and to compare findings with a healthy control group.



## REFLECTANCE CONFOCAL MICROSCOPY IMAGING OF ORAL LICHEN PLANUS: A REAL-TIME, NON-INVASIVE AID FOR CLINICAL DIAGNOSIS

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**Aim..** Oral Lichen Planus is a common disease of unknown aetiology affecting oral mucosae by T-cell mediated chronic inflammation. Oral Lichen Planus diagnosis is made by evaluating both clinical and histological criteria. Pharmacological treatment is useful in symptomatic cases. Life-long clinical follow-up is essential, due to low-risk of malignant transformation. In vivo reflectance confocal microscopy offers a real-time virtual biopsy of the being tissues and does not require surgical excision nor histopathological processing. Aim of the present work is to image oral lichen planus by reflectance confocal microscopy to preliminarily define its confocal features.

**Materials and methods.** A 62 years old male smoker referred at the Oral Pathology Unit, Second University of Naples, affected by a plaque oral lichen planus involving buccal mucosae of the cheeks, underwent reflectance confocal microscopy imaging after informed and written consent. The oral lichen planus lesions were imaged in vivo by a commercially available handheld reflectance confocal microscope (Vivascope3000®, first version, Lucid, Rochester, NY). The laser power, varying in the range of 5-10 mW, does not cause tissue injuries and allows to evaluate subsequent 500 µm x 500 µm horizontal virtual stacks from surface to basal layers.

**Results.** In vivo reflectance confocal microscopy imaging of the plaque oral lichen planus correlated the clinically visible epithelial thickening with ortho- and parakeratosis of the upper layers; stratum spinosum keratinocytes showed strongly bright cellular boundaries and quite regular architecture. The epithelial-connective tissue disruption appeared as junctional dark areas corresponding to necrosis of basal keratinocytes and inflammatory infiltrate made up also by inflammatory cells carpet appearing as multiple small dotted bright cells in the connective tissues below the basal layers.

**Conclusions.** The preliminary imaging of oral lichen planus by reflectance confocal microscopy assessed the feasibility to image and define oral lesions with aetiologies similar to interface dermatitis previously described in skin. Further extended studies are needed in order to better define oral lichen planus confocal criteria for diagnosing this pathology by virtual biopsy.



#### TREATMENT OF LATERAL RADICULAR RESORPTION IN REIMPLANTED TEETH

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**Aim.** The internal root resorption is a pathological process associated with chronic inflammation of the pulp tissue followed by partial necrosis. The aetiology is not entirely clear but may be associated to many factors such as tooth decay, pulpotomy, dressings pulp with calcium hydroxide, extreme heat, dental fractures, and post-traumatic reimplantation. The post-traumatic reimplantation causes chemical changes within the soft and hard tissues, such as inflammation and differentiation of pulp cells in osteoclasts, macrophages, and multi-nucleated giant cells causing dentin resorption. These cells cause a complex series of biological events and molecular reactions with production of cytokines, enzymes, and hormones responsible of the progression of the lesion. Generally, root resorption is asymptomatic and occasionally identified during intraoral radiography. Different materials have been used for their treatment, such as gutta-percha, zinc oxide and eugenol, amalgam, and MTA (Mineral Trioxide Aggregates). The aim of this report is to describe two cases of internal root resorption occurred in reimplanted teeth not promptly treated with endodontic therapy, using a biocompatible ionomer resin for the reconstruction of root tissues (Geristore).

**Materials and methods.** A 40-years-old female and a 12-years-old male presented lateral root inflammatory resorption of two upper incisors, previously reimplanted. The female patient underwent to the reimplantation of the central upper incisor after 12 hours from the traumatic avulsion, whereas the male patient after almost 10 hours. In both patients the endodontic treatment was performed in the first two weeks, and the root resorption was diagnosed during the radiological follow-up at 5 and 6 months. We proceeded with the surgical exposure of the lesion through flap incision and elevation, removal of granulation tissue, and radicular wall reconstruction with dual ionomer resin (Geristore). The radicular wall reconstruction was preceded by the insertion of a fiberglass pin into the root canal.

**Results.** The clinical and radiographic follow-up after two years showed optimal recovery of hard tissues without areas of bone loss and with periodontal tissue support.

**Conclusions.** The treatment of lateral root resorption was carried out with the use of an ionomer resin (Geristore) with low coefficient thermal expansion, low polymerization shrinkage, highly biocompatible with characteristics of good adhesion to dentin and cement despite the presence of body fluids giving good cosmetic results.



### A MULTIDISCIPLINARY CLINICAL RESOLUTION THROUGH CONSERVATIVE TECHNIQUE OF A SEVERLY DISCOLORED UPPER INCISOR: THE COMPONEER COMPOSITE DIRECT VENEER

E. A. Sofan, A. A. Sofan, S. Staffoli, G. Migliau

### AESTHETIC-FUNCTIONAL REHABILITATION WITH VIRTUAL PLANNING PROTOCOL

F. Pettini, D. Di Venere, M. Savino, N. Gatti, D.M. Madeo, A. Mininno, G. Sibio, M. Corsalini

### ASSESSING DIODE LASER EFFICACY IN THE TREATMENT OF DENTINAL HYPERSENSITIVITY

F. Pettini, M. Corsalini, M. Savino, G. Sibio, M. Pellegrino, G. Roselli, A. Mininno, D. Di Venere

### COMPARISON OF RE-ATTACHMENT METHODS OF ANTERIOR FRACTURED TEETH ENDODONTICALLY TREATED: AN IN-VITRO STUDY

E. Salomon, E. Gumirato, A. Simoneffi, A. Zuccon, S. Mazzoleni, E. Stellini

### EFFECTIVENESS OF A DIGITAL IMAGING FIBER-OPTIC TRANSILLUMINATION DEVICE IN THE ASSESSMENT OF DENTAL CARIES VERSUS RADIOGRAPHIC AND CLINICAL EXAMINATION

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### PROFILOMETRIC ANALYSIS OF COMPOSITE MATERIALS (MICROFILLED, NANOFILLED AND SILORANE) AFTER DIFFERENT FINISHING AND POLISHING PROCEDURES

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F. Pettini, M. Corsalini, V. Lacarbonara, M. Savino, A. Mininno, M. Pellegrino, D.M. Madeo, D. Di Venere

### RESIN MONOMERS TEGDMA, HEMA AND SELF-ETCHING ADHESIVE

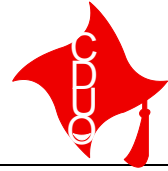
#### DON'T REGULATE IL6 GENE EXPRESSION IN HPCS

F. Riccitiello, M. Simeone, A. Valletta, G. Castiello, V. Riviaccio, A. Procino

# XXI CONGRESSO NAZIONALE

*Odontoiatria Traslazionale*

*(Roma, 10-12 Aprile 2014)*



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## CONSERVATIVA

SESSIONI >>>

### **RESTORATION OF FIRST AND SECOND BLACKS CLASSES CAVITY WITH THE USE OF A VACUUM-FORMED TEMPLATE AND A PERSONALIZED RETAINING RING. A CASE REPORT AND TECHNIQUE PRESENTATION**

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### **THE PERIPHERAL SEAL CONCEPT IN ADHESIVE DENTISTRY: A CLINICAL APPLICATION**

L. Giannetti, A. Bassoli, L. Generali, E. Spinass, C. Bertoldi, A. Murri Dello Diago



### A MULTIDISCIPLINARY CLINICAL RESOLUTION THROUGH CONSERVATIVE TECHNIQUE OF A SEVERLY DISCOLORED UPPER INCISOR: THE COMPONEER COMPOSITE DIRECT VENEER

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**Aim.** Re-establishing a patient's lost dental aesthetic appearance is one of the most important topics for contemporary dentistry. New treatment materials and methods have been coming on the scene, day by day, in order to achieve such an aim. Most dentists prefer more conservative and aesthetic approaches, such as direct or indirect veneer restorations, instead of full-ceramic crowns for anteriors where aesthetics is really important. The aim of the study is to evaluate clinically the effectiveness of a direct composite veneering system in resolving aesthetic problem of an upper incisor with a multidisciplinary treatment approach.

**Materials and methods.** Patient with a severe discolored upper incisor came to our attention; at the x-ray exam there was an evidence of a past not good root canal treatment and also old and incongruent composite obturation. After removing all the material inside the root canal was performed a new correct endodontic filling, then authors tried to bleach the tooth through "walking-bleach" technique with a Hydrogen peroxide (30 volumes) and Sodium perborate solution without excellent results. So it was decided to insert a glass-fiber post and then to perform a direct composite veneer with Composeer System (Coltene). Composeer system is a system of prefabricated composite veneers that are able to be applied directly in the first appointment: after a conservative preparation of the tooth, it must be used an adhesive agent (for example a "three steps") and then with composite stratification it's possible to apply the composeer veneer (choosing the right measure, modified as necessary) as the last covering aesthetic layer.

**Results.** The evaluation of result of this multidisciplinary treatment was essentially clinical and radiological; in fact it's possible to observe, from a clinical point of view, the good aesthetic aspect of the direct composite restoration with composeer veneer that offer also some advantages: conservative preparation with minimal lost of tooth tissue, easy standardized technique, low cost and immediate restoration of the tooth (without provisional passage). From a radiological point of view it's possible to check the good quality of endodontic retreatment on the post-operative periapical x-ray. To verify the long-term result authors consider follow up at six months and one year.

**Conclusions.** A multidisciplinary approach is always necessary to program a treatment plan in dentistry; in the case reported authors decide to perform an endo-conservative treatment with different steps:

- root canal therapy to resolve endodontical problem
- glass fiber post to reinforce the conservative restoration
- direct composite veneer restoration (after bleaching) to obtain the resolution of anterior aesthetic problems.



#### AESTHETIC-FUNCTIONAL REHABILITATION WITH VIRTUAL PLANNING PROTOCOL

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**Aim.** In complex or simple conservative rehabilitations, we can use image processing to create real virtual simulations (Virtual Planning). The processed images become an indispensable tool in the therapeutic phase as a support to prosthetic, periodontal and orthodontic treatments. The aim of the present study is to assess the effectiveness of a Virtual Planning digital protocol (Digital Smile Design) in a complex aesthetic-functional rehabilitation.

**Materials and methods.** A 54-year-old patient, ill at ease with her smile, with consequent timidity and scarce social integration. The initial clinical examination revealed a diastema, microdontia and gummy smile. A multidisciplinary treatment was advised as to restore both functions and aesthetics. For this purpose a Virtual Planning digital protocol (Digital Smile Design) was adopted which reinforcing the diagnostic view, improving the communication with the patient and increasing the predictability of the entire treatment. Lines and shapes were drawn on intraoral and extraoral digital photos avoiding any risk of asymmetry, disharmony and violation of the aesthetic principles. The measures were then transferred onto the model by means of calipers. The following guided diagnostic wax-up will be an important reference for any orthodontic, surgical and restorative procedure. At the end of the orthodontic treatment the patient underwent resective surgery aiming at reshaping the gum levels and dental lengths. After about 8 months after surgery alginate impressions of both arches were collected for the making of the temporary prostheses. Tooth preparation should be minimally invasive and the performing of the definitive restorations should be a process subject to minimal final modifications. Once verified the tissue stability on dental-gum reference points, it is possible to perform the definitive preparations and to the rebasing of the temporary prostheses. Together with the definitive impressions the occlusive adjustments will be measured as protrusive wax and facial arch in the same vertical dimension of the acrylic product. In occasion of the last examination, the definitive lithium disilicate prostheses were finally cemented. The choice of the mentioned material is due to its remarkable naturalness and translucency.

**Results.** The aesthetic success was ensured by the strict observation of both objective and subjective aesthetic parameters. The adoption of Virtual Planning (Digital Smile Design) enabled an accurate analysis of the patient's facial and dental features, together with all the critical factors which may have been neglected in the clinic, photographic or diagnostic procedures on the model, considerably simplifying the achievement of the excellent final result.

**Conclusions.** Virtual Planning (Digital Smile Design) is a multiuse digital tool which can support the restoration team during the entire treatment, improving the comprehension of the aesthetic elements and increasing the patient's acceptance of the final result. The positioning of the reference lines and other shapes on intraoral and extraoral digital photos widens the diagnostic view of the dental team and helps the assessment of the limits, risk factors and aesthetic principles of the specific case. The present fundamental data will lead to better results in all the treatment phases. Every prosthetic treatment should be adapted to the patient's individuality and personality, with the aim of achieving the desired harmony within the general context.





### ASSESSING DIODE LASER EFFICACY IN THE TREATMENT OF DENTINAL HYPERSENSITIVITY

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**Aim.** Dentinal hypersensitivity is one of the most frequent issues affecting dental elements. It is responsible for brief and acute pain originated by stimuli of different kind: thermal, physical and chemical. Pain onset is fast, its duration is concomitant with the application of the stimulus even though it can persist as dull and excruciating pain for variable periods. The aim of the present study is the assessment of the efficacy of diode laser, which produces a selective and mildly aggressive thermal effect with a superficial action avoiding carbonizing effects in periodontal tissues. Its action is connected to the obliteration of dentinal tubules, achieved through a coagulation of dentinal fluids and a crystallization of inorganic components of the dentine.

**Materials and methods.** 12 patients were selected. They reported an algic symptomatology related to dentinal hypersensitivity at the time of the anamnesis. The selected patients were administered a questionnaire concerning their oral hygiene and eating habits, the characteristics, duration and onset modality of the algic symptomatology before undergoing treatment. The area affected by dentinal hypersensitivity was treated with diode laser, set to a very low power, 0.6 W, for 60 seconds, using a 400mm diameter fiber. The laser beam was directed to the affected zones, performing a very slow movement from part to part, trying to keep the tip in a perpendicular position to the longitudinal axis of the tooth. Later, we passed to the clinic phase of pain assessment by means of two main scales, VRS (Verbal Rating Scale) and GSE (Global Subjective Scale). After the first registration, patients were re-assessed after a week (first treatment) and finally, after a month.

**Results.** After the laser treatment, pain was significantly less, and in most patients it completely disappeared. Initially, 75% of patients reported pain during compressed air application, and 25% reported pain before and after compressed air was applied. After diode laser treatment, 90% of patients no longer reported any pain and only 10% complained a minimal ailment. Treatments performed by means of laser are well-tolerated by patients and no adverse reactions were referred.

**Conclusions.** Diode laser is extremely effective in treating dentinal hypersensitivity. The potential persistence of dentinal hypersensitivity despite the obliteration of dentinal tubules may indicate the presence of other mechanisms responsible for the nerve activation, whether added to hydrodynamic theory or not, as the release of neuropeptides from nerve endings and consequently the manifestation of a neurogenic inflammation.



### COMPARISON OF RE-ATTACHMENT METHODS OF ANTERIOR FRACTURED TEETH ENDODONTICALLY TREATED: AN IN-VITRO STUDY

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**Aim.** The aim of this study is to evaluate if the use of fiber post in anterior devitalized teeth is advisable in case of re-attachment of the fragment after a complicated coronal fracture. Thirty bovine incisors were randomly assigned to 3 groups: a control group (A) and two experimental ones (B-C).

**Materials and methods.** A coronal fragment was sectioned for every tooth and teeth belonged to experimental groups were endodontically treated. Fiber posts were cemented only in C group teeth and then we proceeded with coronal fragment re-attachment using the same material and the same adhesive technique for both groups. Performed bevel preparation, samples were set on an Universal Instron Machine to evaluate the shear bond strength. At the end, every single fractured was analyzed using the electronic microscope.

**Results.** Samples belonging to experimental groups showed lower resistance than control group; the mean fracture resistances registered were 42.7% in group B (no posts), 47, 8% in group C.. Statistical analysis was conducted with ANOVA test showing no statistically significant difference between B and C groups ( $P=0.34$ ). The quality of fractures were visually estimated; in C sample they were always favourable, in B samples only in half cases. We mean favourable when no dental substance under the adhesion interface was involved. Any root fracture occurred in unfavourable ones.

**Conclusions.** Load test showed reattachment of the fragment does not return the tooth's intact fracture strength. In restored teeth the post does not provide a higher statistically significant resistance but a higher percentage of favorable re-fracture. In half cases, both re-attachment with or without post, the re-fracture was caused by the failure of adhesion.



## EFFECTIVENESS OF A DIGITAL IMAGING FIBER-OPTIC TRANSILLUMINATION DEVICE IN THE ASSESSMENT OF DENTAL CARIES VERSUS RADIOGRAPHIC AND CLINICAL EXAMINATION

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**Aim.** To evaluate the reliability of a DIFOTI device (DIAGNOcam KaVo) in the detection of dental caries versus the conventional clinical examination and radiographic analysis.

**Materials and methods.** Fifty-three dental students from University of Sassari were recruited. In a cross-sectional study, a DIFOTI technology device, DIAGNOcam KaVo, designed to support the identification of open or incipient carious lesion above the gingival margin, was used for the detection of occlusal and proximal caries, initial or secondary in posterior teeth excluding third molars. A clinical examination was performed using a mirror No. 5 and a Wilken's explorer. The radiographic examination was consisted in two intraoral bite-wings radiography (Kodak UltraSpeed DF42). The clinical chart included both the DMFS index and the ICDAS criteria. The presence of caries was classified as: 1 absent, 2 in enamel (ICDAS: 1,2,3) or 3 in dentine (ICDAS: 4,5,6) for proximal lesion whereas for the occlusal lesion the index was: 0 absent, 1 enamel or dentin (ICDAS 1,2,3,4,5,6). Two Dental PhD students were calibrated and performed separately the DIAGNOcam evaluation (Examiner No. 1) and the clinical and radiographic examination (Examiner No. 2). Both the DIAGNOcam device evaluation (CAM) and the clinical and radiographic evaluation were analyzed using SPSS software (SPSS 16.0, SPSS Inc., Chicago Ill, USA)

**Results.** Each student was codified with a number, one subject dropout (N=52). Sixteen teeth were evaluated: 1<sup>st</sup> and 2<sup>nd</sup> molar and premolar, covering 3 surfaces: occlusal (O), mesial (M) and distal (D). A total of 2496 surfaces were analyzed with the DIAGNOcam (CAM) device and with the clinical and x-ray evaluation (CBW). According to both CAM and CBW, the most frequently decay tooth was No. 46 (16.03% and 12.90% respectively). The most frequently decay surface was the occlusal of No. 37 (CAM 38.46% and CBW 34.62%). The least frequently decay tooth was No. 44 (CAM 1.92% and CBW 1.28%). The mean caries prevalence was 4.52±5.80 (CAM) and 3.17±4.69% (CBW). Occlusal caries was similar for CAM (N=149) and CBW (N=145). Mean caries in-enamel was 3.92 (CAM) and 3.03 (CBW). The prevalence of proximal caries was 36.60% for CAM while 12.12% for CBW. No statistical difference was found.

**Conclusions.** DIAGNOcam can identify initial caries in interproximal surfaces of posterior teeth. When evaluating occlusal areas, it was not possible to identify if the lesions involved dentine or only enamel.



#### FRAGMENT TOOTH REATTACHMENT: DIFFERENT TECHNIQUES

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**Aim.** Coronal fractures are frequent in patients in pediatric age and mainly interest front upper incisors. An immediate treatment option consists in re-gluing, which enables the reintegration of the well-kept fragment in a fast, decisive way in just one session. This procedure ensures a good patient compliance and a good endurance to wear. It should be added that the keeping of the anatomical fragment enables the tooth color continuity without resorting to composite restoration. The present study compares three different techniques re-glue the fractured coronal fragment: total-etch-three-steps, total-etch-two-steps, self-etch. The aim of this work is to analyze the different techniques and highlight their long-term relative results.

**Materials and methods.** 21 dental elements were taken into consideration, they showed non-complex coronal fracture. The patients underwent an anamnestic investigation of the type of trauma, the accident dynamics, time elapsed between the trauma and the examination and potential symptomatology burdening the fractured element. A brief clinical examination was carried out by means of the inspection of the adjacent soft tissues, the assessment of dental mobility and pulp vitality test. Only one patient reported contusion-related pain, 2 patients reported hypersensitivity, 1 patient reported percussion-related pain. Pulp vitality test resulted to be positive in all cases. A radiological investigation of the case was performed with endoral x-ray and/or OPT. For each provided coronal fragment, the keeping modality (11 physiological solution, 10 milk) and hydration status were taken into consideration in the examination. All the examined fragments showed a good hydration status. In only two cases it was not possible to recover the fractured fragment and a composite restoration was therefore necessary. The congruity of the fragment provided by the patient was also assessed (20 congruous, 1 non-congruous). In all cases a desensitizing treatment was performed with a diode laser. In none of the cases endodontic therapy was resorted to. In the case where the fragment revealed to be non-congruous a direct restoration was carried out. After isolating the surgical field by means of a rubber dam, 20 elements were treated with total-etch technique, performing the mordanting of the enamel and the conditioning of the dentine with 37% orthophosphoric acid both on the fragment and on the dental element. For 8 of the these the 3-step technique was adopted, for the remaining 12 we resorted to the 2-step technique. For only one case the self-etch technique was used. The fitting of the fragment and its positioning was performed by means of a flow composite resin. After polymerization the final operations of finishing and polishing were performed and the restoration of a correct occlusion was assessed.

**Results.** All the patients underwent periodical clinical and radiological follow-up. The long-term controls show optimal results in both functional and cosmetic terms. The mechanical endurance of the re-glued fragment, the degree of chromatic variation and wear index were assessed.

**Conclusions.** In those cases where the patient provides the fractured fragment, the re-gluing technique seems to ensure good long-term results from both a cosmetic and functional point of view. This approach can be therefore considered as ultra-conservative, also offering the chance to work on the patient's tissues and avoiding the preparation of the dental element with a further loss of material. This technique also ensures an optimal psychological response of the patient allowing to obtain the integrity of the element in relatively short time, rather moderate costs and by means of simple and fast operative procedures.



### IN VITRO EVALUATION OF THE EFFECT OF REPEATED CYCLES OF PRE-HEATING ON MECHANICAL PROPERTIES OF COMPOSITE RESINS

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**Aim.** Chairside warming resin-based restorative materials, prior to placement and contouring, is one of the recent trends in composite application. Preheating reduces viscosity and increases flowability, which facilitates better adaptation to cavity walls. This may result in superior marginal adaptation, may reduce microleakage and, thus, enhance the durability of restorations. The increase in temperature of a composite enhances both radical and monomer mobility, resulting in a high degree of monomer conversion as well as an improvement of polymerization rate. As a result, more highly crosslinked polymer networking and improved mechanical and physical properties may be anticipated. Preheating may be achieved by placing compules or syringes of the resin composite material into commercially available preheating devices that operate at a temperature range of 39°C-68°C. Some *in vitro* studies using commercially available resin composites indicate superior surface hardness and greater depth of cure for preheated composites. The aim of this study was to assess the flexural strength, flexural elastic modulus and Vickers micro-hardness of three resin composites prepared at RT or cured after 1 or repeated preheating cycles to a temperature of 39 °C.

**Materials and methods.** Three resin composites were evaluated: Enamel Plus HFO (Micerium) (HFO), Opallis + (FGM) (OPA), Ceram X Duo + (Dentsply DeTrey) (CER). For each trial, one group of specimens of each material was fabricated under ambient laboratory conditions, whereas in the other groups the composites were cured after 1, 5, 10, 20, 30 or 40 preheating cycles to a temperature of 39°C in a preheating device. Ten specimens were prepared for each group and for each trial. A three-point bending test was performed using a universal testing machine at a crosshead speed of 0.5 mm/min. Three Vickers hardness (VH) indentations were carried out on each specimen for VH measurements. Two-Way-ANOVA tests were performed to analyze the influence of the two factors (Number of Heating Cycles AND Restorative Material) on the mean values of the three dependent variables under investigation (Flexural Strength, Flexural Modulus and the Vickers Hardness). Multiple comparisons were carried out according to the Tukey method. Values of p lower than 0.05 were considered statistically significant in all tests.

**Results.** Data was statistically analyzed. The Two-Way-ANOVA tests showed that, regardless of the material, the number of heating cycles was not a significant factor and it was unable to influence the three mechanical properties tested. However, a significant main effect of the employed material on the marginal means of the three dependent variables was detected.

**Conclusions.** In conclusion, the preheating procedure tested did not negatively influence the mechanical properties of the resin composites even when highly repeated. Dental clinicians can steadily adopt this pre-heating procedure without compromising the mechanical strengths of the heated composites.



## IN VIVO MEASUREMENT OF COLOUR CHANGES IN NATURAL TEETH: THE EFFECTS OF DEHYDRATION ON TEETH COLOUR AND CHARACTERIZATIONS. PILOT STUDY

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**Aim.** Accurate shade matching and color communication are really important in esthetic dental therapy, especially for anterior smile area. How to use color to reproduce dental macro and micro morphology is a fundamental skill for clinicians and technicians. Today for shade matching it's possible to use both spectrophotometers, colorimeters and digital imaging systems. Instrumental color measurement gives objective data. This study was designed in order to investigate any change in tooth color resulting from dehydration and any change in macro and micro characterization of tooth texture. "Color is a visual sensation that enables us to distinguish otherwise identical objects". In 1905 Munsell described the three parts of color as hue, value and chroma. In 1931 The Commission Internationale de l'Eclairage (CIE) defined a standard light source, and a standard observer and enabled the calculation of tri-stimulus x, y, z values, which represent how the human visual system responds to a given color and allows us to transform spectral energy data into meaningful color data. The L\* value (y axis) is a measure of the lightness of an object on a scale ranging from 0 (black) to 100 (white). The a\* value is a measure of redness (positive a\*) or greenness (negative a\*). The b\* value is a measure of yellowness (positive b\*) or blueness (negative b\*). The a\* and b\* coordinates approach zero for neutral colors (white, greys) and increase in magnitude for more saturated or intense color.

**Materials and methods.** 20 subjects were recruited. Spectroshade measurement of the 6 anterior teeth was assessed before rubber dam positioning. One canine was randomly assigned as test tooth and the other acting as a control tooth. Spectrophotometric shade of the test teeth was assessed before dehydration and 60 minutes after rubber dam isolation. Data was collected in CIE L\*a\*b\* color coordinates. A panel of 10 examiners among dental specialists (prosthodontists, dental students, technicians, restorative dentists) assessed before and after dehydration digital images of the control and test teeth. The panel judged whether canines were or not of different shade and which tooth was lighter if a difference was detected. The panel also judged when other different changes occurs to dental texture, like horizontal perikimata or vertical lines.

**Results.** All color coordinates showed significant differences between baseline versus 60 min of dehydration. The panel found test and control teeth to be of same shade before and of different shade after dehydration. The examiners showed 89% reproducibility before and 93% reproducibility after dehydration for same/different decision between test and control tooth. Test teeth were significantly lighter after dehydration.

**Conclusions.** Most dental procedures cause dehydration of teeth, for exemple polyvinylsiloxane impressions, after which 30 minutes occurs to return to baseline tooth shade. Shade matching procedures should be carried out before the teeth are exposed to dehydration.



#### **OPEN AND CLOSED SANDWICH TECHNIQUE IN CLASS II RESTORATIONS. EVALUATION OF MARGINAL INTEGRITY BY SEM ANALYSIS**

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**Aim.** The purpose of this study was to evaluate in Class II restorations, with cervical margins placed below the Cementum-Enamel Junction (CEJ), whether the new composite Smart Dentin Replacement (SDR, Dentsply) has to be placed prior to (open sandwich technique) or after (closed sandwich technique) construction of the interproximal wall in the centripetal build-up technique using a universal composite (Ceram X -mono, Dentsply) in order to improve the outer of marginal seal. A qualitative SEM analysis of the marginal integrity was evaluated to observe the interface between tooth structure and restoration in term of presence or gap-free adaptation.

**Materials and methods.** Thirteen non-carious molars and premolars were selected and for each one of them two II Class cavities were made: mesial-occlusal (MO) and distal-occlusal with the cervical margin 1 mm below the cementum-enamel junction. Teeth were randomly restored through two different techniques: the mesial or the distal surface by the closed sandwich technique (group A) and the other surface by the open sandwich technique (group B). In Group B, SDR was applied as a first increment, remaining exposed at the cervical margin. In Group A, the nanofilled resin composite Ceram-X mono was applied to the interproximal wall, followed by a layer of flowable composite (SDR) on the occlusal floor, away from the margins. Adaptation at the cervical margin was evaluated by SEM qualitative analysis and data were statistically analyzed by non-parametric Chi Square test ( $p < 0.05$ ).

**Results.** For each replica, 5 points were observed during the SEM evaluation: left and right axial margins; left, middle and right cervical margins. Opening margins and irregularities were observed at the tooth/restoration interface in the Group A and B, but the open sandwich technique showed better marginal adaptation than the closed sandwich technique. The data analysis on the cervical margins showed significant better results for Group B.

**Conclusions.** The use of SDR in the open sandwich technique showed a good performance and may improve the marginal adaptation of Class II restorations, compared to the traditional centripetal build-up technique. SDR material has a self-leveling feature that allows intimate adaptation to the prepared cavity walls. Adopted as a liner on the marginal seal, it could decrease voids on the tooth/restorations interface.



#### ORAL HEALTH COMPROMISSION IN PATIENTS WITH EATING DISORDERS

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**Aim.** The aim of the present study is to assess the oral health level in patients with Eating Disorders, a group of psychiatric pathologies characterized by an anomalous relationship with food.

**Materials and methods.** The study was performed on 20 individuals of female gender, age comprised between 23.3 +/- 6.2; In accordance with DSM IV criteria, 10 bulimic, 8 anorexic and 2 anorexic patients were identified with elimination conducts; the two anorexic patients were assigned to the bulimic group because of the vomiting episode they had in common. The diagnostic protocol provided for the drafting of an eating journal investigating the typology of food consumption, the tooth brushing technique adopted after a vomiting episode and the consumption of medicines interfering with the saliva flux. During the examination, DMFT was measured together with the presence of erosions and dentinal hypersensitivity; intraoral photos were taken, x-ray of the arches were performed, the buffering power of saliva was measured with CRT Buffer kit (Ivoclar Vivadent) and the counting of saliva Lactobacilli and of Streptococcus Mutans with CRT Bacteria test (Ivoclar Vivadent) was carried out. Saliva was collected from the fasting patient in the middle of the morning; patients had to avoid using fluoride toothpaste in the 12 hours before saliva collection. Stimulation was performed making the patients chew a low melting point paraffin tablet, then saliva was collected for 5 minutes and, diluted in buffer solution, the slide was well inoculated, vertically located as to form a culture medium, incubated in a thermostat at a temperature of 37° for 48 hours. Finally, the density of the the grown colonies was assessed. For what concerns the assessment of Streptococcus Mutans, the culture medium used in the dip-slide (CRT Caries Risk Test Vivacare – Vivadent) was MS agar, to which bacitracin was added as a selective agent. The risk of caries is measured through the comparison of the obtained data with a chart dividing the values into 5 classes ( $10^3$ ,  $10^4$ ,  $10^5$ ,  $10^6$ ,  $<10^4$  CFU/ml). The caries risk threshold is 100,000 CFU/ml, i.e.  $10^5$  units forming colonies for 1 ml of saliva. The saliva counting of Lactobacilli was performed with an analogue modality but using as selective medium Rogosa SI agar (CRT Caries Risk Test Vivacare – Vivadent). The risk threshold is set in 100,000 CFU/ml of saliva.

**Results.** The present study shows that patients report several dental erosions, rather severe on the palatal surface of superior incisors and on the occlusal surfaces of inferior molars only in the patient who had been bulimic for 8 years, with 7/8 vomiting episodes a day. The severity of the lesions therefore depends on the duration of the pathology, on the frequency of the vomit episodes and on the flux and buffering power of saliva. 100% of bulimic patients and 50% of anorexic ones report dentinal hypersensitivity.

**Conclusions.** In the light of the obtained data it advisable for patients, after self-induced vomiting, to avoid vigorous tooth-brushing and to perform mouth rinses with sodium bicarbonate, sucralfate or water or milk. Fruit juices should be avoided. During the day patients should regularly perform oral hygiene manoeuvres with desensitizing toothpastes and gels and use sodium fluoride mouthwashes. It is of fundamental value an early dental examination which can ensure the prevention and control of the oral situation until the improvement of the psycho-pathological case is achieved.





### PROFILOMETRIC ANALYSIS OF COMPOSITE MATERIALS (MICROFILLED, NANOFILLED AND SILORANE) AFTER DIFFERENT FINISHING AND POLISHING PROCEDURES

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**Aim.** More in detail, in the market of restorative materials, the finishing and polishing phases are compulsory steps in conservative dentistry not only in terms of beauty of the restoration but also in terms of oral health keeping. In the last years, following to the development of nanotechnology, restorative materials have seen a fast and constant evolution in the quantitative and qualitative composition of the filler, the resin mold and in the physical-chemical properties of the composite. The creation of new, better composites, like microfilled and then nanofilled and siloranes, has led a large number of odontists to opt for these materials. The presence of a smooth and polished surface, obtainable through suitable finishing and polishing, is an essential requirement for the periodontal integrity of teeth, for the marginal integrity of the restoration and its longevity. The aim of the present study is to assess the influence which the material and finishing and polishing procedures exert on superficial roughness, using a superficial roughmeter.

**Materials and methods.** We realized composite samples using a microhybrid composite, a nanofilled and a silorane. All samples were finished and polished with: Multi-blade tungsten carbide milling cutters; Diamond milling cutters; Abrasive discs; Silicon rubber tip; Polishing paste. Later, we measured the superficial roughness of the samples by means of a profilometer.

**Results.** Basically, the lowest roughness values were given by nanofilled composite samples. In all samples, the procedure providing the finishing with medium discs and the polishing with thin and extra-thin discs, is the one ensuring the most smoothed surface.

**Conclusions.** The less roughness of the nanofilled composite samples is due to a more stable and smaller dimension of the particles. The efficiency of a finishing and polishing system as compared to another is still affected by the material used. From the assessed procedures it cannot therefore be claimed with absolute precision that a procedure is better than another one, only that a technique is more suitable to a material than another. As long as universal finishing and polishing procedures are not available, the choice of the most suitable approach is left to the clinician whose decision will be based on the assessment of different factors.



#### REATTACHMENT OF FRAGMENT IN COMPLICATED TOOTH FRACTURE: A CASE REPORT

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**Aim.** The coronal fractures of front teeth, particularly superior incisors, are among the most common forms of dental trauma and have a high incidence, especially in pediatric age. One of the options for the treatment of coronal fractures, when the dental fragment is available, and the deterioration of pulp vitality is minimal or absent, is re-gluing of the coronal fragment. The re-gluing of the fractured fragment to the portion of tooth still present in the arch is a fast, long-lasting solution usually ensuring good cosmetic results since the original anatomical features, color, transparency and structure are kept. This technique also restores functional characteristics, ensures a optimal result from a psychological point of view and it is relatively simple. The present case report describes the treatment of a complex coronal fracture with a laser pulpotomy and the re-gluing of the coronal fragment.

**Materials and methods.** A 12-year-old patient, male gender, presented himself to our observation. The reason of the dental consultation is a trauma of the two central superior incisors following to a sport accident. The patient reports a complex coronal fracture of 11 and a simple coronal fracture of 21. The collection of anamnestic data locates the traumatic event to the previous day and shows a high hypersensitivity and spontaneous pain burdening the dental element affected by the trauma. The clinical examination reveals the contusion of soft perioral tissues, absence of dental mobility and negative response to pulp vitality test. A x-ray assessment of the case is performed with endoral x-ray and OPT excluding root involvement. The fractured fragment of element 11, kept by the patient in a container with physiological solution, shows a good hydration status. The verifying of the fragment congruity and the color matching produce positive outcomes. A pulpotomy of element 11 is performed by means of a diode laser set to 3.5 W, super-pulsed mode on. The fragment is etched with 37% orthophosphoric acid. An engineered ionometric resin is then applied on the dental element. The fitting of the fragment and its re-positioning was performed by means of a flow composite resin. After polymerization, the final finishing and polishing procedures were performed and the restoration of a correct occlusion is finally checked.

**Results.** The patient then underwent a clinic and radiologic follow-up after 18 months. The assessment of the mechanical endurance of the re-glued fragment, its chromatic variation and the wearing index shows optimal results. The pulp vitality test confirmed a positive response. The laser pulpotomy was successfully performed and the endoral control x-ray highlights the absence of periapical lesions.

**Conclusions.** In this medical case the patient provided the congruous fractured fragment in a good hydration state. The re-gluing technique therefore is a successful therapeutic choice. This procedure is in fact more convenient as compared to composite restoration, ensuring the restoration of the original dental morphology, a better endurance to wearing and a suitable chromatic stability in time. The performing of the laser pulpotomy with direct hooding enables the keeping of pulp vitality. The re-gluing of the fragment therefore ensure optimal results in psychological, functional and cosmetic terms.



## RESIN MONOMERS TEGDMA, HEMA AND SELF-ETCHING ADHESIVE DON'T REGULATE IL6 GENE EXPRESSION IN HPCS

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**Aim.** The evolution of dental materials used in clinical practice, is a research area of considerable involvement. The resin monomers are the most commonly utilized materials in restorative dentistry; one of the outstanding problems, in the employment of dental polymer resins, is represented by micro-leakage that occur at the interface between the sealer and the tooth surface, causing bacterial invasion and secondary caries. The diffusion of monomers through dentin residual influence the viability of odontoblasts and the physiological activity of dental pulp. TEGDMA and HEMA can reach the pulp tissue and penetrate into the cytosol, induce cytotoxicity, genetic damage, oxidative stress in several cell phenotypes and stimulate interleukin -6 (IL-6) production. Currently it is not clear whether TEGDMA, HEMA regulate the IL6 gene transcription but the target of our research is to evaluate the activation or inhibition of IL6 caused by different resin dental materials (monomers and dentin adhesive systems XT primer and bond) in primary human pulp cells.

**Materials and methods.** Human pulp fibroblasts (HPCs), were isolated from the pulp of the eighths extracts from different patients. HPCs were stimulated with the monomers TEGDMA, HEMA and three dental adhesives (primer, bound and xt) at different concentrations and after incubation for 24h we carried out the MTT cytotoxicity test and then the quantitative analysis (QRT-PCR) of IL6 gene expression.

**Results.** The MTT assay did not show cytotoxicity with tested materials (HEMA, TEGDMA and primer, bond, xt) at the concentrations indicated in the user manual of the three products. The QRT-PCR assay did not reveal a change in the activity of IL-6 in HPCs stimulated vs. control.

**Conclusions.** IL 6 is an inflammatory cytokine involved in several disorders of the oral cavity; a polymorphism of this cytokine is associated with chronic periodontitis. It was shown that HEMA monomer, is able to reduce the growth of dental pulp mesenchymal stem cells (DP-MSC) and stimulates the IL6 production. Our results show that TEGDMA, HEMA and dental adhesives, does not alter the IL6 gene expression in HPCs stimulated with the materials at the indicated concentrations. Our group is presently committed to confirm the results and also to extend the research to the IL-6 receptor. Our target is demonstrated that resin monomers and dentin adhesives tested, do not trigger an inflammatory process in the dental pulp.



### RESTORATION OF FIRST AND SECOND BLACKS CLASSES CAVITY WITH THE USE OF A VACUUM-FORMED TEMPLATE AND A PERSONALIZED RETAINING RING. A CASE REPORT AND TECHNIQUE PRESENTATION

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**Aim.** The aim of this work is the presentation of a case of cavity caries restoration maintaining occlusal anatomy unchanged. A vacuum-formed template and a personalized nickel-titanium retaining ring were used.

**Materials and methods.** A twenty-one years old male patient, came to our attention with incongruous amalgam fillings on elements 4.5 and 4.6 and with an occlusal caries on element 4.7. At the first visit, a clinical and radiographical evaluation was made in order to assess pulp vitality, presence of periapical lesions, fractures and occlusal relationships. The treatment plan decided was to remove the amalgam fillings to have composite reconstructions on teeth 4.5, 4.6 and 4.7. Firstly, the occlusal side of the amalgam fillings was covered with a thin layer of metacrilate liquid dam, in order to remodelled the occlusal surface. This was made to obtain a more correct intercuspidal relation with the antagonist tooth. Then a precision impression with silicon materials was taken. Finally the model plaster obtained was used to produce the vacuum formed template. This template acts as a guide for the direct occlusal reconstruction. An additional personalized nickel-titanium retaining ring was created with methacrylate liquid dam. It was used to correctly reconstruct the interproximal surface. Radio opaque, nano hybrid composite were used. The stratification was guided by the vacuum formed template. In particular supercolors were added in the teeth's depressions before the positioning of the last composite layer and the last layer of composite was impressed.

**Results.** The isolation of the operative field with a rubber dam allows a better control of the composite stratification. The choose of nano-hybrid composite offered a more haesthetic results.

**Conclusions.** using this technique the correct occlusal and interproximal anatomy is obtained. An excessive finishing of the reconstruction and the exposition of the sublayers and supercolors used was then avoided. Supercolors need a complete coverage.



## SPECTROPHOTOMETER TECHNIQUE EVALUATION IN TOOTH BLEACHING WITH LASER APPLICATION

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**Aim.** The aim of the research is to evaluate, with spectrophotometer technique, the effectiveness of tooth bleaching performed with 35% hydrogen peroxide and 10% carbamide peroxide laser activated

**Materials and methods.** 17 patients were treated with tooth bleaching composed by 35% hydrogen peroxide and 10% carbamide peroxide (Opalescence® boost, Ultradent). All patients were subjected to the same combination of bleaching agents but only in 10 of these, laser (G 8 diode laser, Galbiati) was used. Teeth colours were evaluated before and immediately after the treatment, and, one day and one week after, during the follow-up. During every treatment session and follow-up session the colour was studied both with a chromatic scale (Vita Lumin™) and an electronic analyzer of tooth-colour (Spectro shade™). The spectrophotometer was useful for an objective evaluation of L-lightness (brightness or value), C-chroma (saturation or chroma), H-hue (hue, or tint) and the comparison of the colorimetric data obtained with the chromatic scale used. Three measurements were made for each tooth to standardize the readings and to prevent changes in instrument reading. Then the average was calculated by converting the alphanumeric codes of the colors in numbers, according to the conversion table proposed by Brenna. The difference in Colour  $\Delta E = \sqrt{\Delta L^2 + \Delta C^2 + \Delta H^2}$  was calculated. We considered that for  $\Delta E > 3$  the differences are significant and are easily distinguished by the untrained eye. For  $2 < \Delta E < 3$  differences exist but are not well visible. For  $\Delta E < 2$ , the human eye is unable to make any distinction

**Results.** The data analysis results shows that the changes of hue, lightness and chroma are significantly influenced by the interaction between the bleaching agent and the early teeth colour. The photoactivation has significantly improved the effectiveness of the bleaching agent. All patients treated with laser complained about an increase of teeth sensitivity. This clinical finding can be linked to an increased internal temperature of the pulp chamber compatible with the state of pulp health.

**Conclusions.** The results of this study indicate a statistically effectiveness of the use of photo-activating systems associated with bleaching agents in the treatment of tooth bleaching.



## THE EFFECTS OF PRE-ETCHING IN CLASS V CAVITIES RESTORED WITH SILORANE AND METHACRYLATE

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**Aim.** The achievement of an optimal marginal seal is a main challenge in restorative dentistry. The aim of this research was to investigate the presence of marginal leakage in V class restoration, using both a methacrylate and a silorane composite resin, and evaluate if the selective enamel pre-etching improves the quality of the seal.

**Materials and methods.** Two commercially available composites were used in this study: a siloranic resin (Filtek Silorane 3M) and a Bis-GMA nano-composite (Filtek Supreme XTE 3M). We collected 48 sound premolars and molars extracted for periodontal reasons, stored in a 1% chloramine solution at room temperature (20°) for max 72 h. Subsequently we created, in the buccal surface of the samples, class V cavities with dimensions of 4x3x2 mm. Variation of +/- 1 mm was considered acceptable. The samples were randomly divided in two groups according to the restorative material used (A: Silorane + Silorane System 3M ESPE, Seefeld, Germany; B: Methacrylate + Scotchbond™ universal adhesive) Each group was divided in two subgroups of twelve teeth (1 and 2). In the samples of subgroups 1 the etching was carried out only from the adhesive action. In the subgroups 2 was performed selective enamel pre-etching (15") with orthophosphoric acid 37% (Scotchbond™ universal Etch). After 1 week, the teeth were submitted to a thermo-cycling (1,800 cycles at 5°C and 55°C with 60 s dwell time and 10 s transfer time). Subsequently the radicular apices of the samples were sealed with epoxy resin and the outer surface was isolated with varnish. Around the restoration was placed 1 mm not isolated area. After being stored in a dry environment for 24h, teeth were submerged by the methylene blue 7% solution at room temperature for 3 days. Then the samples were water rinsed and sectioned longitudinally at the centre of the restoration. Two different operators carried out this evaluation of infiltration depth, using the optical microscope (OPMI PRO ERGO S7B ZEISS) with 12.5 X magnification. In case of disagreement for the assignment of the score has been assigned the highest for statistical analysis. The analysis of infiltration followed the scheme proposed by Fabianelli et al. that assign to each sample a progressive score in according to the infiltrating level.

**Results.** Statistical means analysis showed that acid pre-etching had clinical and statistical significant effect (P= 0.011) in nano-filled composite restored group. The B1 group showed a mean of 1.5, while the B2 group a mean of 0.41. The comparison between the two silorane subgroups (A1, A2) showed that the use of pre-etching technique decrease the average infiltration value from 1.25 (A1 mean) to 0.58 (A2 mean), however this clinical outcome was not statistically significant (P= 0.1308). Evaluating the pre-etching action in two different experimental groups (Silorane vs Methacrylate) we observed similar performance of the materials (0,48 vs 0,51). When the pre-etching technique was not applied, in the silorane composite was observed an average grade of infiltration, lower than in the BIS-Gma composite (1,25 vs 1,5).

**Conclusions.** Pre-etching with phosphoric acid reduced significantly the degree of V class marginal leakage, restored with Bis-GMA composites and a self-etch adhesive system. Also low-shrinking silorane composite showed a reduction of clinical marginal infiltration in V class cavities restored with a preliminary etching step.



## THE INFLUENCE OF MOUTHWASHES ON THE COLOR CHANGE OF COMPOSITE RESTORATIONS: EXPERIMENTAL EVALUATION

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**AIM.** Since mouthwashes are being used more and more frequently in daily dental hygiene practice today, special analyses are needed as to their effects on both dental structures and the materials used to restore them. The aim of this study was the evaluation of any colour change undergone by composite aesthetic fillings run on extracted molars after immersion in three different mouthwash and whether colour change may be associated with the presence of alcohol in the mouthwash.

**Materials and methods.** Sixty-three recently extracted human molars were examined. A calibrated hole was drilled in each of them and filled with composite according to standard procedures. They were divided into three groups (G1: 20 teeth; G2: 20 teeth; G3: 23 teeth) and immersed in three mouthwashes, characterized by a blue colour and different active ingredients G1 – Meridol Halitosis, G2 – Colgate Plax, G3 – Oral B Fluorinse; unlike the third one, the others were alcohol-based. The immersion stage lasted 12 hours, as much time as needed for a two-minute daily mouthwash use in the period of a year. Before and after mouthwash immersion colour was detected by MTH spectroshade spectrophotometer, an instrument whose technology is strictly based on internationally recognized colour detection standards. Three different points in the filling area were examined each time, namely the centre, the edge and the unfilled tooth surface. The evaluation of colour change (DE) was carried out according to the CIE L\*a\*b\*. The collected data were then analysed according to the position agreed upon by several authors, holding that two colours are indistinguishable when  $DE \leq 1.00$  n and that colour change is clinically unacceptable when  $DE \geq 3.30$ .

**Results and conclusions.** Results showed that the tested mouthwashes were differently responsible for colour change in fillings, namely: Meridol Halitosis® seems to be the mouthwash with the highest pigmenting action, as its readings were above the threshold of inacceptability in all examined areas; Colgate Plax® seems to be the mouthwash with the lowest pigmenting action, as its readings were the best as to acceptability both in the centre and on the edge of the filling, while close to threshold value on the tooth; Oral-B Fluorinse® was in-between the other two mouthwashes, as it showed acceptable readings in the centre and on the edge of the filling, but unacceptable ones on the tooth. Among the three examined points in the filling area, tooth surface seems to be the most subject to colour change due to mouthwash action. Moreover, the presence of alcohol in the mouthwash does not seem to be a decisive factor in colour change, as Oral-B, the only alcohol-based mouthwash among the three, is not the one associated with the highest colour change.



#### THE PERIPHERAL SEAL CONCEPT IN ADHESIVE DENTISTRY: A CLINICAL APPLICATION

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**Aim.** The main objective that we must achieve treating deep carious lesions today is to avoid iatrogenic pulp tissue exposure. For this reason several partial caries removal techniques have been improved, although they might have several defects. In literature a further partial caries removal technique was recently presented, which relies on the aid of a peripheral adhesive seal around the residual carious tissue. This aims to exclude bacteria which are left under the restoration of nutrients that could come from the oral cavity. The aim of this study is to examine the above-mentioned partial caries removal technique and to verify its success in time in terms of vitality and pulpal changes in radiopacity beneath the restoration. The results are then compared with those of partial caries removal techniques available in the literature.

**Materials and methods.** The study is carried out on 45 primary caries of Black Class I and II in permanent posterior teeth. At zero time elements are vital and show no clinical or radiographic signs of irreversible pulpal inflammation. During the excavation of the carious tissue, a caries detector dye is used in order to distinguish between infected (outer) and not-infected dentin in a better way. A peripheral seal zone of sound enamel, sound dentin-enamel junction (DEJ) and not infected dentin is created around the remaining carious dentin. In fact small areas of circumpulpal outer carious dentin are left to prevent exposure. A three step (total etch) dentinal bonding system is used afterwards to obtain a peripheral seal, and the dental reconstruction is directly performed at last using composite resin. Several elements are eventually evaluated: ? The incidence of pulpal exposure at zero time. ? Signs of pulpal disease during the follow-up period. ? Possible radiopacity increase below the restoration during the follow-up period.

**Results.** The iatrogenic pulp exposure has occurred in 15.56% of cases, and the cumulative success of those elements which have not suffered this complication after the 6 months follow-up is a 92,11%. In 63.89% of cases after the 6 months follow-up, signs of increased radiopacity have been observed below the restoration.

**Conclusions.** The occurred pulp exposure percentage seems to be in line with other studies of partial caries removal, as well as the success after the 6 months follow up. The result in terms of increased radiopacity below the restoration after the 6 months follow-up appears to be positive. The clinical application of the new methodology, outlined by Alleman and Magne, seems to give positive results.





### EXPERIMENTATION AND COMPARISON BETWEEN TWO CLINICAL METHODS FOR POST-SPACE MAKING IN PACKED CARRIER-BASED ROOT CANALS

S. Gaffuri, H. Galvani, R. Tonini, F. Mazzoleni, S. Salgarello

### EVALUATION OF ELECTRIC POWER CONSUMPTION AFTER GLIDE PATH WITH PATHFILES AND PROGLIDER

P. Franco, L. Ciaccio, A. De Sanctis, M. Alovisi, D. Pasqualini, E. Berutti

### A CONFOCAL MICROSCOPIC EVALUATION OF DENTINAL TUBULE PENETRATION AND PERCENTAGE OF ROOT CANAL SEALER USING THREE DIFFERENT INSTRUMENTATION TECHNIQUES

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# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## ENDODONZIA

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### EXPERIMENTATION AND COMPARISON BETWEEN TWO CLINICAL METHODS FOR POST-SPACE MAKING IN PACKED CARRIER-BASED ROOT CANALS

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**Aim.** The aim of this study is the analysis of the materials filling the area between glass-fiber post and root canal dentin at increasing distance from the apex, in root canals of human teeth endodontically treated after extraction and obtured with carrier-based technique and restored using fiber post, comparing two different methods for post-space making.

**Materials and methods.** 60 single-rooted teeth, extracted for orthodontic and periodontal reasons, are sectioned at level of CEJ in order to obtain radicular length from 12 to 15 mm. All teeth are shaped using Ni-Ti rotary file Protaper Universal (Dentsply-Maillefer) until F2 or F3 according to the width of the canal and obtured using Protaper Obturators F2 or F3 according to the last shaping file. The first coronal 8 mm of the filling material are removed from the canal of each teeth in order to prepare the post-space, attending in leaving apically not less than 4 mm of filling material in root canal. Roots are randomly divided into two groups (A,B) with n=30 and each of this group is divided in two subgroups (1,2) with n=15 according to the method of preparation of the post-space:

- Group A1: preparation of post-space using Largo burs only;
- Group A2: preparation of post-space using Largo burs and dedicated to the fiber post used burs;
- Group B1: preparation of post-space using Preppi burs (Dentsply-Maillefer) only;
- Group B2: preparation of post-space using Preppi burs (Dentsply-Maillefer) and dedicated to the fiber post used burs.

The fiber post diameters selected are 1 mm and 1,2 mm; a self and photo curing cement is used for the cementation. Teeth are later placed in vertical position and mechanically abraded according to the longitudinal axis using abrasive bur. The sections analyzed for each root are 4: at 3 mm, at 5 mm, at 7 mm, at 9 mm from the CEJ. Each section is photographed using Nikon digital reflex (D90) positioned on clinical microscope ( Moller Wedel V900) at magnification of 20 X. Each photo is analyzed using a specific software (JMicrovision) which determines extension of the area occupied by radicular dentin, fiber post, cement composite, plastic carrier, gutta-percha and vacancy.

#### Results.

- Group A1: plastic carrier and/or gutta-percha at 3 mm 9%; at 5 mm 15,9%; at 7 mm 18,1%; at 9 mm 100%;
- Group A2: plastic carrier and/or gutta-percha at 3 mm 8,8%; at 5 mm 9%; at 7 mm 13,4%; at 9 mm 100%;
- Group B1: plastic carrier and/or gutta-percha at 3 mm 11%; at 5 mm 10,7%; at 7 mm 10,1%; at 9 mm 100%;
- Group B2: plastic carrier and/or gutta-percha at 3 mm 10,3%; at 5 mm 6,9%; at 7 mm 5,3%; at 9 mm 100%;

**Conclusions.** According to the results obtained, traces of the material used for canalar obturation (plastic carrier and/or gutta-percha) are present in the 75% of the teeth of the specimen. They occupy an area (that should be occupied by post and cement composite) of 10,2% on average.



### EVALUATION OF ELECTRIC POWER CONSUMPTION AFTER GLIDE PATH WITH PATHFILES AND PROGLIDER

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**Aim.** Instrument failure due to excessive torsional stresses can be controlled by creating a manual or mechanical glide path. Recently, the ProGlider single-file system has been introduced to perform mechanical glide path. The present study evaluated the influence of glide-path performed with PathFiles and ProGlider on torque, time and pecking motion required for ProTaper Next X1 to reach the full working length in simulated root canals. The required torque for root canal instrumentation was calculated through the evaluation of the endodontic engine electrical power consumption.

**Materials and methods.** Fortyfive Endo Training Blocks (Dentsply Maillefer, Switzerland) were utilized. Fifteen of them (PathFile group B) were prepared with a mechanical glide path obtained with PathFile (Dentsply Maillefer, Switzerland) 1 and 2. Other fifteen (ProGlider group C) were prepared with a mechanical glide path obtained by using a single ProGlider (Dentsply Maillefer, Switzerland) file. On the remaining third of the Training Blocks no glide-path was made (group A). All samples in all groups were shaped with ProTaper Next X1 driven by an endodontic motor (Tecnika digital motor - setting: 300 rpm, torque 5.2 Ncm; ATR, Muggio', Italy) connected to a digital wattmeter (WT 2030 Digital Power Meter, Yokogawa, Japan). Electric power consumption (MEPs), elapsed time (s) and number of pecking motions requested for reaching the full working length with ProTaper Next X1 were calculated. Differences among groups were analyzed with one-way ANOVA e Bonferroni's post hoc test ( $p=0.05$ ).

**Results.** A lower electric power consumption resulted in the ProGlider and PathFile group (B e C). The C group has shown minimum values (MEPs = 0,87 mWh). No statistically significant difference were observed between the group ( $p=0,65$ ). No fracture or canal aberration have been reports.

**Conclusions.** The lower values of MEPs observed in the C could be connected to the increased tapering shape of the ProGlider. Results confirmed the ability of ProGlider to reduce the stresses in ProTaper Next X1 during shaping through glide path and preliminary middle and coronal preflaring. There is still need of future research to find a valid quantitative indicator of instrument life, useful in clinical practice, which could register and record the stress stored by each instrument during shaping suggesting the appropriate moment to discard it.



## A CONFOCAL MICROSCOPIC EVALUATION OF DENTINAL TUBULE PENETRATION AND PERCENTAGE OF ROOT CANAL SEALER USING THREE DIFFERENT INSTRUMENTATION TECHNIQUES

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**Aim.** Penetration of endodontic sealer may be in relationship with the type of instruments to shape root canal and with the amount of smear layer and debris produced during shaping procedures. The aim of this study was to evaluate the dentinal tubules penetration by endodontic sealer TopSeal (Dentsply Maillefer, Baillagues, Switzerland) after root canal preparation with nickel-titanium rotary instruments, ProTaper Universal and WaveOne (Dentsply Maillefer) and Self-Adjusting File system (ReDent-Nova, Ra'anana, Israel).

**Materials and methods.** 24 single rooted teeth were selected from a random collection. The teeth had a single round root canals with a long-short cross-section diameter ratio of  $\leq 2.5$  at 8 mm from the apex and similar root canal anatomy. The crowns were sectioned at the cemento-enamel junction to standardize the root length to 13mm from the anatomic apex. The coronal third of all roots canals was enlarged with size 1, 2, 3 and 4 Gates-Glidden drill (Dentsply Maillefer,). The working length (WL) was established by the insertion of a 21-mm #10 K-File (Dentsply Maillefer) until its tip appeared at the apical foramen under microscopic vision at 10x. A glide path was performed using size 13, 16 and 19/.02 PathFile (Dentsply Maillefer) at 300 rpm. Three experimental groups were formed of 8 teeth each that had a comparable canal width. The groups resulted homogeneous according to canal width. The same operator performed all experimental procedures. In the group 1 the canals was instrumented using the ProTaper Universal technique to a size of the F2 instrument at the WL and irrigated with 1 ml 5% NaOCl and 0,5 ml of 17% EDTA. In the group 2, the canals were shaped by WaveOne Primary (size 25 and 8% taper) and irrigated with 1 ml 5% NaOCl and 0,5 ml of 17% EDTA. In each group a final rinse was performed with 2 ml 5% NaOCl for three minutes. In the group 3, the 1,5-mm-diameter SAF was operated for four minutes and continuous irrigation with 5,25% NaOCl was performed by a VATEA peristaltic pump (ReDent-Nova) at a rate of 4 mL/min. The canals was dried with paper points; each canal was filled with GuttaCore Obturators #25 and TopSeal sealer (Dentsply Maillefer). Rhodamin B, a fluorescent dye, was added to the sealer (approx. 0.1 wt%) during the mixing procedure. The samples were embedded in methacrylate resin and then were horizontally sectioned at 2, 5 and 7 mm from apical foramen by using microtome (Leica SP 1600, Nussloch, Germany). The specimens were examined with a inverted confocal microscope (Leica TCS SP2 AOBS, Mannheim, Germany). Percentage of circumferential dye penetration and maximum depth of sealer penetration were measured using ImageJ software (National Institutes of Health, USA).

**Results.** The ANOVA analysis and Turkey test results showed no significant difference in the mean of percentage and maximum depth of sealer penetration among three instrumentation techniques. The coronal sections in each group showed a significantly higher percentage and maximum depth of sealer penetration, followed by middle sections and least at the apical sections.

**Conclusions.** Under the parameters of this study, sealer penetration is not affected by instruments used.



### A NEW DEVICE TO TEST CUTTING EFFICIENCY OF ENDODONTIC MECHANICAL INSTRUMENTS

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**Aim.** Although extensive studies have been conducted on the cutting efficiency of hand and rotary endodontic instruments, clear standards for testing cutting effectiveness or sharpness of endodontic instruments have not yet been defined, and there is a need for a standardisation in testing the cutting efficiency of endodontic mechanical files. Therefore, the aim of the present study was to evaluate a new device specifically designed to evaluate the cutting efficiency of mechanically driven endodontic instruments,

**Materials and methods.** A new testing device was built to evaluate the cutting efficiency of endodontic mechanical instrument in terms of capability to penetrate in a plastic block in function of time. The device consist on a main frame to which a mobile plastic support for the hand-piece is connected and a static support for substrate (Plexiglas block ) against which the cutting efficiency of the instruments can be tested. Thanks to a sliding track the mobile support for the hand-piece can move horizontally, put in traction by a weight throughout a pulley system. The plastic support for the hand-piece allowed for precise and simple three-dimensional alignment and positioning of the instrument, as soon as it came perpendicularly into contact with plexiglas block. So once everything was set the weight can drove the horizontal instrument against the Plexiglas block in a precise and reproducible way. To eliminate due to possible different mechanical characteristics of dentine specimens, special Plexiglas plates (30 X 30 X 1 mm) created from the same original raw material were used. The same 512 grams weight has been used to test all instruments. The cutting efficiency was tested 12 mm from the tip of the instruments to avoid excessive deflection of the instrument when the weight was applied. Once everything was fixed, the motor of the testing device was switched on and the rotary instrument removed material and penetrated actively. To permit removal of plastic debris created by the instrument during the test, an air compressor was attached and used during all the experiment. A total 20 new TF ml3 files, divided in two groups were to be investigated in the new device. Each instrument was tested in linear cutting unidirectional lateral motion. As the criteria to evaluate cutting efficiency of instruments, for group 1 (n=10) was measured maximum penetration depth of the instruments in one minute, while for group 2 (n=10) was recorded the time taken by the instrument to penetrate for 10 mm in the plexiglass block. Mean and standard deviations have been calculated for each group.

**Results.** For Group 1 mean length of cut obtained in 1 min was 7,8 mm and standard deviation was 2,04. For group 2 mean time taken to cut 10mm in length was 76,9 sec and standard deviation was 15,7

**Conclusions.** The cutting testing device described in the present study has demonstrated reliable and easy to use, and may be effectively used to test cutting efficiency of mechanical endodontic instruments in standardized condition.



### ANALYSIS OF THE ANTIBACTERIAL EFFICACY OF DIFFERENT MIXTURES OF ANTIBIOTICS IN PULP REVASCULARIZATION THERAPY BY CONFOCAL LASER SCANNING MICROSCOPY

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**Aim.** Many studies have been performed in order to propose a protocol for dental pulp regeneration. Currently for the disinfection of the endodontic space is used this mixture of antibiotics: metronidazole, ciprofloxacin and minocycline (TRIMIX), the latter responsible for discoloration. An ex-vivo study on human extracted permanent teeth is carried out to evaluate the antibacterial efficacy of a combination of antibiotics alternative to the use of minocycline. In previous studies the antibacterial efficacy of certain mixtures of antibiotics on bacteria taken from infected root canals and the incidence of discoloration have been evaluated. The aim of this ex-vivo study is to evaluate by confocal laser scanning microscopy the antibacterial efficacy of clarithromycin in place of minocycline in the disinfection of the root canal system.

**Materials and methods.** 34 extracted single rooted teeth were selected and decoronated at CEJ level, shaped with PathFile (Dentsply Maillefer), Protaper (Dentsply Maillefer) and Largo burs (Dentsply Maillefer) until reaching an apical diameter of 1.1 mm. The roots were embedded in transparent resin, sterilized in ethylene oxide and then infected in laboratory with *E. Faecalis* ATCC 29212 for 3 weeks. The infected samples were divided into 3 groups: one treated with TRIMIX (minocycline, ciprofloxacin, metronidazole), one with TRICLARITRO (clarithromycin, metronidazole, ciprofloxacin) and one with BIMIX (ciprofloxacin, metronidazole), all for 3 weeks, plus 2 positive and 2 negative controls. The samples were stained with DEAD / LIVE BacLight stain (Invitrogen, Eugene, OR, USA) and sectioned by microtome to obtain discs of 2 mm thickness, analyzed by confocal laser scanning microscopy (SP5, Leica, Germany). The images obtained for each sample were reconstructed to 3D model and the volume ratio of red fluorescence to green-and-red fluorescence, which indicates the portion of dead cells for each combination of antibiotics, was evaluated. Univariate analysis of variance was applied to analyze the differences between the proportions of dead cell volume in the 3 test groups by using SPSS 16.0 software (SPSS Inc, Chicago, IL). Post hoc multiple comparisons were then used to compare the results at a significance level of  $P < 0,05$ .

**Results.** The bacterial load reduction was 87.07% for TRIMIX; 88,69% for TRICLARITRO and 76.28% for BIMIX. The difference between groups was statistically significant ( $P < 0.001$ ).

**Conclusions.** The antibacterial efficacy of TRIMIX and the pigmentation caused by minocycline is already known in literature. The mixture of antibiotics with clarithromycin showed the greatest antibacterial efficacy and does not cause pigmentation. More studies are needed to confirm in vivo the ability of the new antibiotic mixture to penetrate the complex system of the dentinal tubules and eliminate bacterial infection.



## BIOLOGICAL AND CHEMICAL-PHYSICAL PROPERTIES OF DIRECT PULP CAPPING MATERIALS: A COMPARATIVE STUDY

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**Aim.** Direct pulp capping involves the application of a dental material to the exposed pulp in an attempt to act as a barrier, protect the dental pulp complex and preserve its vitality. Materials used in the vital pulp treatment must be placed in contact with the pulp tissue, so they should be non toxic, biocompatible and bactericidal; they should also provide good sealing ability and low solubility. The objective of the present study was to evaluate and compare biocompatibility effects, antimicrobial activity, solubility and pH of six direct pulp capping materials: Dycal (Dentsply), Calcicur (Voco), Calcimol LC (Voco), TheraCal LC (Bisco), MTA Angelus (Angelus), Biodentine (Septodont).

**Materials and methods.** Cytotoxicity of the assayed materials towards murine odontoblasts cells (MDPC-23) was evaluated at three different times (24, 48 and 72 h) using the Transwell insert methodology by Alamar blue test. The mouse odontoblast cells, cultured in DMEM medium (Biowhittaker, Italy) with 10% FBS and additives at 37 °C in 5% CO<sub>2</sub> atmosphere, were routinely detached using a trypsin-EDTA solution for 2 minutes at 37°C. The percentage of vitality of cells was also assessed with the MTT assay at 72 hours. *Streptococcus salivarius*, *Streptococcus sanguis* and *Streptococcus mutans* strains were selected to evaluate the antimicrobial activity by the agar disc diffusion test of pulp capping materials. Paper disks with each pulp capping material were placed onto culture agar-plates and incubated for 24 h at 37°C. The growth inhibition zones around each pulp capping material were recorded by the same operator and compared for each bacterial strain after 24 h and 48 h. To evaluate solubility new samples for each material were prepared according with ISO 6876 method and with American Dental Association specification #30. The specimens of each material were weighted three times, placed in tarred bottles containing 5 ml of distilled water and transferred to an oven at 37°C for 24 hours. Then they were removed from the oven and rinsed with distilled water, which was collected in the same bottle and evaporated. Bottles and residues were weighted. The differences between this weight and the original bottle weight were divided by the initial dry weight of the specimens and multiplied by 100. The result was recorded as solubility and repeated at two months. Meanwhile pH measurement was performed after incubation of 3 and 24 hours. The pH value was measured by a digital pH meter (HI 2210 pH Meter, Hanna Instruments, USA), previously calibrated (Leouvakul Dental Materials). Data collected (i.e. number of vital cells, growth inhibition, solubility and pH values) were assessed to be normal by means of Kolmogorov-Smirnov test and ANOVA was carried out. Tukey test was performed as *post hoc* ( $P < 0.05$ ).

**Results.** Biodentine and MTA-based products showed lower cytotoxicity, varying from calcium hydroxide-based materials. When testing antibacterial properties, Tukey test showed that MTA-based materials induced lower growth inhibition zones. No differences in solubility were registered among the materials, except for Biodentine which showed higher values. PH values of the tested materials had not a significant increase/reduction after 24 hours.

**Conclusions.** The differences showed by the materials do not cover completely the clinical requests for direct pulp capping technique. All the materials tested could not be considered as the ideal material due to the fact that they should present at once biocompatibility, antibacterial properties and low solubility.





## COMPARISON OF 2D AND 3D IMAGING TECHNIQUES USED TO EVALUATE THE SHAPES OF SIMULATED ROOT CANALS

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**Aim.** Two-dimensional (2D) techniques for evaluating geometric variations of simulated root canals related to shaping are widely described in literature. This study evaluated statistical differences between 2D and three-dimensional (3D) measurements of resin blocks simulating curved root canals before and after canal shaping with Nickel-Titanium (Ni-Ti) rotary instruments.

**Materials and methods.** Three groups of resin blocks characterized by different preparation methods were prepared: 15 unprepared resin blocks (Group A), 15 resin blocks with the root canal shaped with WaveOne Primary reciprocating instrument after mechanical glide path with PathFiles (Group B) and 15 resin blocks with the root canal shaped with WaveOne Primary reciprocating files without preliminary glide path (Group C). Resin blocks simulating curved root canals were digitally photographed in bucco-lingual (BL) and mesio-distal (MD) directions (Canon EOS 350D, 8 Mpx resolution, ISO 100, f 18, 1/60s). Moreover each block was scanned with X-ray computed micro-tomography (micro-CT) (TOMOLAB Station at ELETTRA synchrotron Light Laboratory in Trieste) in order to obtain high-resolution 3D models. 2D photographic digital images of each physical block were compared with BL and MD cross-sections extracted from the corresponding tomographic 3D models. Image matching was carried out by using a digital imaging software (Adobe Photoshop CS4; Adobe Systems Inc, San Jose, CA) and canal profiles were extracted with an automated procedure implemented in Matlab r2010b software (The MathWorks Inc, Natick, MA). Geometric differences between the canal profiles were collected and statistically analyzed. The 95% confidence intervals were estimated.

**Results.** The empirical cumulative distribution function expressed in pixels (1 pixel = 0,01 mm) of the geometric differences between the canal profiles obtained from the 2D digital images and the corresponding cross-sections extracted from the 3D models showed that the profiles were indistinguishable with a 95% confidence level.

**Conclusions.** This study demonstrated no statistical difference between 2D photographic digital images and the corresponding images obtained from micro-CT models. Both 2D digital images and micro-CT 3D models can be effectively used for the evaluation of root canal dimensions when using simulated root canals in resin blocks; thus validating traditional 2D techniques for evaluating geometric variations of simulated root canals after shaping. It is worth noting that such difference would be possible if real root canals are considered, due to the non-planar 3D path followed by the canal axis.



## CUTTING EFFICIENCY OF RECIPROC AND WAVEONE RECIPROCATING INSTRUMENTS

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**Aim.** The aim of the present study was to evaluate the cutting efficiency of two new reciprocating instruments, Reciproc and WaveOne, using a new testing device specifically designed for purpose.

**Materials and methods.** 24 new Reciproc R25 (VDW, Munich, Germany) and 24 new WaveOne Primary (Dentsply-Maillefer, Ballaigues, Switzerland) files were activated by using a torque-controlled motor (Silver Reciproc; VDW, Munich, Germany) and divided in 4 groups (n=12): Group 1, Reciproc activated by Reciproc ALL program; Group 2 Reciproc activated by WaveOne ALL program; Group 3 WaveOne activated by Reciproc ALL program; Group 4 WaveOne activated by WaveOne ALL program. Cutting efficiency of all instruments was determined by means of a specially designed testing device manufactured for this study. It consisted on a main frame to which was connected a mobile plastic support for the hand-piece pulled by a weight and a stainless-steel block containing the Plexiglas plates against which the cutting efficiency of the instruments has been tested. The dental hand-piece was mounted upon a mobile device connected to a fixed weight that for gravity drove the horizontal instrument against the Plexiglas block in a precise and reproducible way. The same 150 grams weight has been used to test all instruments. To prevent the instruments from slipping out the smooth surface of the plastic, a notch 1mm in depth and width was created on the lateral wall of the Plexiglas plate that measured 1 mm in thickness. The plastic support for the hand-piece allowed for precise and simple three-dimensional alignment and positioning of the instrument, as soon as it came perpendicularly into contact with the notch created on the wall of the Plexiglas specimen without bending. The cutting efficiency was tested 14 mm from the tip of the instruments to avoid deflection of the instrument when the weight was applied nearer to the tip as reported in a pilot study. The length of the block cut in 1 minute was measured in a computerized program with a precision of 0.1mm. Mean and standard deviations of each group have been calculated and data were statistically analysed with a One-way ANOVA and Bonferroni test ( $P < 0.05$ ).

**Results.** Reciproc R25 displayed greater cutting efficiency than WaveOne Primary for both the movements used ( $P < 0.05$ ); in particular, Reciproc instruments used with their proper reciprocating motion and (Group 1) presented a statistically significant higher cutting efficiency than WaveOne instruments used with their proper reciprocating motion (Group 4) ( $P < 0.05$ ). There was no statistically significant difference between the two movements for both instruments ( $P > 0.05$ ).

**Conclusions.** Study shows that the testing device used allows a simple and reproducible measurement of the cutting efficiency of endodontic mechanical instrument. Within the limits of this study Reciproc instruments demonstrated statistically higher cutting efficiency than WaveOne instruments. Since the use of different reciprocating movements do not affect significantly the cutting efficiency of the instruments, Cross-sectional design seems to be a more decisive parameter concerning the cutting ability of NiTi instruments.



### CYCLIC FATIGUE RESISTANCE OF NICKEL-TITANIUM INSTRUMENTS AFTER IMMERSION IN IRRIGANT SOLUTIONS WITH OR WITHOUT SURFACTANTS

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**Aim.** To assess cyclic fatigue resistance of reciprocating (Reciproc and WaveOne) and continuous rotating (ProTaper) nickel-titanium (NiTi) files after immersion in different irrigation solutions with or without surfactants over several short time periods.

**Materials and methods.** A total of 270 new Reciproc R25, WaveOne Primary and ProTaper F2 were tested. Instruments of each brand were divided in one control group (n=10) formed by new files and four test groups (n=20) formed by instruments dynamically immersed at 37 °C for 16 mm in: 5.25% sodium hypochlorite (NaOCl); Hypoclean (5.25% NaOCl with surfactant); 17% Ethylenediaminetetraacetic acid (EDTA); EDTA Plus (17% EDTA with surfactant). Each test group was subdivided into 2 subgroups (n=10) on the basis of the time of dynamic immersion in the endodontic irrigant solution (45 seconds or 3 minutes). Resistance to cyclic fatigue was determined by recording time to fracture (TF) in a stainless steel artificial canal with a 60° angle of curvature and 5-mm radius of curvature. The fracture surface was examined by using scanning electron microscopy.

**Results.** Immersion in NaOCl did not reduce the cyclic fatigue of reciprocating or continuous NiTi files. 17% EDTA reduced the fatigue resistance of all instruments after 3 minutes. The immersion in irrigants with surfactants did not influence the cyclic fatigue of instruments except for Reciproc immersed in Hypoclean solution.

**Conclusions.** EDTA immersion reduced the cyclic fatigue resistance of all instruments after 3 minutes. Addition of surfactants did not influence the cyclic fatigue of files except when added to sodium hypochlorite when it contacts Reciproc instruments.



### CYCLIC FATIGUE RESISTANCE OF NICKEL-TITANIUM INSTRUMENTS: A COMPARATIVE STUDY

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**Aim.** To investigate the cyclic fatigue resistance of four different nickel – titanium rotary (NTR) instruments produced by new methods or traditional grinding processes.

**Materials and methods.** In the present study four different NTR instruments from different brands, of identical sizes (.06 taper and 0.25 tip diameter) were selected and evaluated: group 1. Mtwo (Sweden-Martina, Padova, Italy) produced by traditional grinding processes; group 2 Twisted File (SybronEndo, Orange, CA, USA) produced by "R-Phase"; group 3. (ProTaper Next, Maillefer, Besancon, France) produced by "M-wire" and group 4 HyFlex (Coltene, Padova, Germany) produced by "CM-wire". Twenty NTR file from each manufacturer were tested for cyclic fatigue resistance, resulting in a total of 80 instruments. Tests were performed by a cyclic fatigue device that evaluated cycles to failure of rotary instruments inside curved artificial canals with 60 degree angle of curvature and 5 mm radius of curvature. The instruments were rotated at a constant speed of 300 rpm. All instruments were rotated until fracture occurred. Numbers of cycles to failure (NCF) from the start of the test until the moment of file breakage and the length of the fractured tip for each instrument were recorded. Data were subjected to one-way analysis of variance (ANOVA).

**Results.** Group 4 (HyFlex) showed the highest value of NCF means. Cyclic fatigue resistance of HyFlex was significantly higher than group 1 and 3 (Mtwo and ProTaper Next) ( $P < 0.05$ ), while no significant differences were founded between group 1 (Mtwo) vs 2 (Twisted File) or group 2 (Twisted File) vs 4 (HyFlex) ( $P > 0.05$ ). ProTaper Next showed the lowest NCF significantly lower than Mtwo and Twisted File ( $P < 0.05$ ).

**Conclusions.** HyFlex 25.06 had the best NCF values. The cyclic fatigue resistance of HyFlex was significantly more than those files produced with the traditional grinding process or M-wire (Mtwo or ProTaper Next). However no differences were found between HyFlex (CM-wire) and Twisted File (R-Phase) or Mtwo (traditional NiTi) and Twisted File.



### CYCLIC FATIGUE RESISTANCE OF TWO NICKEL-TITANIUM INSTRUMENTS IN INTERRUPTED ROTATION

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**Aim.** To investigate the influence of interrupted rotation on cyclic fatigue of two different nickel-titanium rotary instruments.

**Materials and methods.** Three hundred new ProTaper Next size X1; X2 and Mtwo size #10/0.04; #15/0.05; #20/0.06 and #25/0.06 were tested for cyclic fatigue resistance using rotation continuous or stopped. Fifty files of the same brand and size were randomly assigned to five different groups (n=10). Files of group 1 were tested in continuous rotation; group 2 and 3 in interrupted rotation for 1 second every 10 or 20 seconds respectively; group 4 and group 5 interrupted rotation for 5 seconds every 10 or 20 seconds respectively. Cyclic fatigue was determined by the numbers of cycles to failure (NCF) obtained from the effective seconds of continuous rotation in an artificial canal with 60° angle and a 5-mm of radius of curve. A two-way analysis of variance were used to evaluate the data.

**Results.** Cyclic fatigue of the group 2 and 4 of ProTaper Next X2 and Mtwo #25/0.06 was lower than group 1 of the same instruments (P<0.01). ProTaper Next X2 showed a reduced cyclic fatigue also in group 3 and 5 (P<0.05). No differences were found interrupting the rotation for 1 or 5 seconds in any instruments tested (P>0.05). All other instruments fatigue were not affected by interrupted rotation (P>0.05).

**Conclusions.** The interrupted rotation reduced cyclic fatigue resistance of instruments with a greater size especially when a great number of interruptions were performed.



### DECALCIFYING EFFICACY OF DIFFERENT IRRIGATING SOLUTIONS

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**Aim.** The aim of the study was to evaluate and compare the decalcifying capability of different irrigating solutions. In particular the measure of the concentration of calcium extracted from root canal dentin, at three immersions time periods (5, 10 and 15 minutes respectively) was performed by inductively coupled plasma-atomic emission spectrometry (ICP-AES Perkin Elmer, Monza, Italy). The null hypothesis of the study was that there is no significant difference in concentration of calcium extracted among the various groups and among the successive 5-min immersion times.

**Materials and methods.** Fifteen maxillary central incisor, recently extracted for periodontal reasons were used. Root canals were instrumented with Peeso burn n° 4 to 6 under abundant irrigation (Dentsply Maillefer, Ballaigues, Switzerland) using a contra-angle handpiece. After each instrument, the root canal was irrigated with 5 ml of distilled water. Two transversal sections of 2-mm thickness were obtained from the cervical third of each root using a pre-programmed automatic Accutom-50 diamond cutter (Accutom Hard Tissue Microtome, Struers, Ballerup, Denmark). Each slice was then sectioned in four equal sections, obtaining a total of four (s1, s2, s3, s4) samples from each root. The specimens were assigned to one of 3 groups (n = 20) for treatment with different irrigating solutions. Group 1: EDTA 15%, group 2: EDTA 17%, group 3: citric acid 10.5%. The solutions were prepared in laboratory using analytical pure grade reagents. The pH of each solution was determined by using a PHM 84 Research pH meter (Radiometer, Copenhagen, Denmark) and a combined ORION glass electrode (Thermo Electron Corp, Waltham, MA, USA). Each specimen was immersed in 20 ml of the irrigant solution and kept under constant stirring. At three successive 5-min immersion times ( $t_1=5$  min;  $t_2=10$  min;  $t_3=15$  min), without renewing the solution, 5 ml of irrigant was separated with a graduated pipette, and then placed in hermetically sealed and labelled tubes. An inductively coupled plasma atomic emission spectrometer (ICP-AES Perkin Elmer, Monza, Italy) was used for calcium determination in each solution. The amount of calcium extracted (mg/l  $Ca^{2+}$ ) by different irrigating solutions and in different immersion times was analyzed using Kruskal–Wallis test and Mann–Whitney tests. The level of statistical significance was predetermined at  $P<0.05$ .

**Results.** For each irrigating solution tested lowest amount of  $Ca^{2+}$  released were detected after 5 minutes of application ( $P<0.05$ ). No significant difference in amount of  $Ca^{2+}$  released was reported when comparing 10 and 15 minutes of application of each irrigating solution ( $P>0.05$ ). Moreover no significant differences were reported among groups 1 and 2 ( $P>0.05$ ), that all showed significantly lower ( $P<0.001$ ) amount of calcium extracted than group 3 ( $P>0.05$ ).

**Conclusions.** The null hypothesis of the study has been rejected. For all irrigating solutions, the amount of  $Ca^{2+}$  extracted from root dentin samples at 10 minutes did not show significant differences when compared to the values reported at 15 minutes ( $P>0.05$ ). Therefore an application of 10 minutes is sufficient to reach the maximum release of  $Ca^{2+}$  for all irrigants tested. A significantly higher release of  $Ca^{2+}$  was observed in samples submitted to citric acid based agents.



### EFFECTIVENESS OF TWO NITI ROTARY SYSTEMS FOR THE TREATMENT OF TEETH AFFECTED BY PERIAPICAL PATHOSIS: A COMPARATIVE CLINICAL TRIAL

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**Aim.** The relationship between the cutting efficiency of NiTi rotary files and the outcome of their clinical application has not been clearly identified yet. Mtwo files (Sweden&Martina) have been available on the market since several years and are known for their cutting ability. As well as Mtwo, the instruments of the Alphakite system (Komet) are used in a full-length technique but they are characterized by negative rake angles. Because of the more recent introduction of Alphakite files, their performance has been tested by fewer studies. The aim of the present clinical trial is to assess the outcome of the endodontic treatment of teeth affected by periapical periodontitis using Mtwo or Alphakite rotary files.

**Materials and methods.** Patients (mean age 42.5±14.4 years) presenting a tooth with periapical pathosis that had not been previously treated were included in the experimentation and randomly assigned to two treatment groups: G1 (n=55), Mtwo and G2 (n=39), Alphakite. The instruments were used according to the instructions of the manufacturer. The irrigation protocol was the same for both groups and consisted of rinses with 5.25% sodium hypochlorite (2,5 ml after each instrument). In both groups, canals were filled with the continuous wave of condensation technique. Clinical examination (pain assessment, sensitivity to percussion) and a periapical radiograph were performed at baseline and after six months. Periapical healing was scored according to the scale described by Katebzadeh et al. (2000): 1=healed, 2=improved, 3=failed (increase or no change in the lesion size), 4=unreadable radiograph. Clinical data and radiographic scores were analyzed statistically by non-parametric methods making use of dedicated software ( $p<0.05$ ).

**Results.** The statistical analysis revealed that the baseline characteristics of the two experimental groups (age, type of tooth, number of canals per tooth, sensitivity to percussion and pain) were similar and thus comparable. Complete radiographic healing occurred in 54.5% of recalled patients in G1 and in 51.3% in G2. In the other cases the periapical lesion was found to be diminished in size but still present, with the exception of two patients in G1 with score 3. The symptoms almost disappeared in both groups, with only one patient of G1 still reporting pain at the six-month recall. No statistical significant difference between the tested file systems emerged. The type of tooth was not a determining factor for both clinical and radiographic healing.

**Conclusions.** Under the conditions of the present study, the two tested systems were similarly effective for the treatment of periapical lesions. After only six months, relatively high success rate was obtained; the follow-up of ongoing healing processes must be extended to exclude the possibility of late failure. The issue regarding the influence of the cross section design of endodontic rotary files on the clinical outcome remains unsolved and deserves further investigation.



### EXPERIMENTAL BIPHASIC CALCIUM SILICATE/CALCIUM PHOSPHATE CEMENTS FOR DIRECT PULP CAPPING

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**Aim.** MTA cements are hydraulic calcium silicate cements currently used to preserve the vitality of the pulp tissue in direct pulp capping as able to set in the presence of blood and other biological fluids. The study was aimed to develop innovative biphasic calcium silicate/calcium phosphate (MTA-like) cements with hydraulic biointeractive and bioactive properties. The cements were tested for their chemical-physical properties, ability to induce the formation of calcium phosphate minerals and their effects on odontoblastic differentiation of human dental pulp cells (HDPCs).

**Materials and methods.** Two biphasic calcium silicate/calcium phosphate hydraulic cements (CaSi-alphaTCP and CaSi-DCDP) were designed and prepared. The materials were tested for their ion-releasing ability (Ca, P, OH), solubility, water sorption and porosity and for the ability to form calcium phosphate minerals (Gandolfi et al. Dental Materials 2011;27:e134-e157; Gandolfi et al. J Biomed Mater Res B 2013;101B:1107-23). Primary human pulp cells (HPC) were cultured with the extracts of the cements. The upregulation of alkaline phosphatase (ALP) and osteocalcin (OCN) was examined after 24-h culture by quantitative real-time PCR and results expressed as fold change (D'Antò et al. J Endod 2010;36: 1839-43; Tammaro et al. J Dent 2014; 42: 60-7; Muzzarelli et al. J Bioact Compat Pol 1997;12: 321-9).

**Results.** The chemical-physical data showed high release of Ca and OH ions, high open pore volume and apparent porosity. ESEM-EDX results demonstrated a pronounced ability to nucleate calcium phosphates on their surface. Pulp cells treated with CaSi-alphaTCP cement showed a strong upregulation of ALP and OCN genes, namely ten-fold increase for OCN and three-fold increase for ALP compared to the control cells. Differently, no variations in gene regulation were induced by CaSi-DCDP cement.

**Conclusions.** Biphasic calcium silicate/calcium phosphate cements showed high biointeractivity (release of Ca and OH ions) in correlation with their marked ability to nucleate calcium phosphates. Cells data suggest the CaSi-alphaTCP cement is a potent inducer of genes such as ALP and OCN as characteristic markers of the mineralization processes normally little expressed in the HPC. These innovative cements may provide epigenetic signals to promote human dental pulp cells differentiation and to induce the formation of the dentine bridge, and appear attractive materials for pulp-capping applications.





## FILLING ABILITY OF CARRIER-BASED OBTURATION SYSTEM IN OVAL-SHAPED CANALS PREPARED WITH RECIPROCATING AND ADAPTATIVE INSTRUMENTS

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**Aim.** The aim of study was to compare the filling ability of carrier-based thermoplasticized gutta-percha obturation system in oval-shaped canals prepared using reciprocating WaveOne files (Dentsply Maillefer, Baillagues, Switzerland) or Self-Adjusting File System (ReDent-Nova, Ra'anana, Israel).

**Materials and methods.** Nine pairs of single rooted teeth were selected from a random collection. The teeth in each pair had a single oval-shaped root canal with a long-short cross-section diameter ratio of <sup>3</sup> 2.5 at 5 mm from the apex. The coronal portion of each tooth was removed at the cemento-enamel junction and sectioned to standardize the root length to 15 mm from the anatomic apex. The coronal third of all root canals was enlarged with size 1, 2, 3 and 4 Gates Glidden drill (Dentsply Maillefer). The working length was established by the insertion of a 21-mm #10K-File (Dentsply Maillefer) until its tip appeared at the apical foramen under microscopic vision at 10x. A mechanical glide path was performed using size 13, 16 and 19/.02 PathFile (Dentsply Maillefer) at 300 rpm. Two experimental groups were formed of 9 teeth each that had a comparable canal width. The groups resulted homogeneous according to canal width. The same operator performed all experimental procedures. The group 1 was instrumented using SAF system (1,5-mm diameter) and continuous irrigation with 5,25% NaOCl (Ogna, Muggiò, Italy) was performed by a VATEA peristaltic pump (ReDent-Nova) at a rate of 4 mL/min followed by 3 mL of 17% EDTA (Ogna, Muggiò, Italy). In the group 2, the canals were shaped by WaveOne Primary (size 25 and 8% taper) and irrigated with 1 ml 5% NaOCl and 0,5 ml of 17% EDTA. After preparation, all canals were dried with paper points and filled by Thermafil Obturators #25 with TopSeal sealer (Dentsply, Maillefer). The teeth were stored in simulated body fluid (Hank's Balanced Salt Solution, HBSS) at 37°C for 7 days to allow for complete setting of the sealer. The whole roots were embedded in cold curing methacrylate resin (Technovit 3040, Heraeus Kulzer, Wehrheim, Germany) and sectioned at 2, 5 and 7 mm from the apex using a saw microtome (Leica SP 1600, Wetzlar, Germany) under continuous water irrigation. The 200 microns thick transverse sections were examined using optical microscopy (Axiophot, Carl Zeiss, Oberkochen, Germany) with a magnification of 20x. For each specimen the Percentage of Gutta-Percha Filled Area (PGFA), the Percentage of Filled Sealer Area (PSFA), the presence of voids, the Percentage of Filled Perimeter (PFP) and the Percentage of Unfilled Perimeter (PUP) were calculated with ImageJ software (National Institutes of Health, USA). Statistical analysis was performed with the Fisher exact test, chi-squared test and the nonparametric Mann-Whitney U test.

**Results.** The mean PGFA in the WaveOne-instrumented group was 93.2, whereas was 95.8 in the SAF-instrumented group ( $P < .05$ ). The 22,2% of the specimens of the SAF group shows the presence of voids, compared with 47,2% in the WaveOne group ( $P < 0.5$ ). The mean PUP was more than double in WaveOne-instrumented group ( $P < 0.5$ ).

**Conclusions.** Under the conditions of this study, instrumentation of flat-oval canals with SAF system led to a significantly superior filling ability of carrier-based thermoplasticized gutta-percha compared with WaveOne instrumentation.



### IN VITRO IRRIGANT PENETRATION INTO THE APICAL PORTION OF ROOT CANALS WHEN USING FOUR DIFFERENT IRRIGATION TECHNIQUES

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**Aim.** The vapor lock phenomenon is known as one of the most important factor that limit the penetration of irrigating solution in the apical portion of the root canal system. An adequate irrigation complete the cleaning process of root canal system and decrease microbial load. The purpose of this study was to evaluate the penetration depth of a final rinse with a radiopaque irrigating solution in the apical third of extracted roots using different irrigation.

**Materials and methods.** sixty extracted single rooted human maxillary lateral and central incisors that had not undergone prior endodontic treatment were used in this study. All the specimens were decoronated to standardized length of 16 mm, they were shaped to ProTaper F3 and irrigated with 5% sodium hypochlorite. The Pro-Train (Simit Dental, Mantova, Italy) was used during the experimental protocol to standardize the procedures for tooth preparation. To simulate clinical conditions, the root canals were submerge in silicon, to prevent the penetration into the root canals a gutta-percha point was inserted to temporary seal the apex. Teeth were divided into 4 experimental groups according to the final irrigate delivering technique: positive pressure irrigation with and without gutta-percha point at the working length (30-G proRinse needle); passive ultrasonic irrigation; and negative pressure irrigation (EndoVac System). To examine irrigating solution penetration a final rinse was performed with 2 ml of a solution prepared with a radiopaque contrast medium and 5.25% sodium hypochlorite. Digital radiograph image were taken before and after the final rinse. Two calibrated readers determined the presence or absence of the contrast irrigating solution in the apical 2 mm of the root canals. The Mann-Whitney U test was used to analyzed and compare irrigant penetration to the working length.

**Results.** There were significantly more canals with irrigant in the apical 2 mm when positive pressure irrigation combined with gutta-percha point was used. The remaining systems did no guarantee the penetration of irrigating solution at the apical level of the specimens.

**Conclusions.** Positive pressure irrigation in association to gutta-percha point as a final rinse increased the penetration of irrigant solution into the apical portion of root canals.



### MICROTOMOGRAPHIC STUDY OF CANAL FILLING QUALITY AFTER POST CEMENTATION IN CURVED ROOTS OBTURATED WITH TWO DIFFERENT TECHNIQUES

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**Aim.** Clinicians appreciate simplified endodontic techniques since a lower number of instruments allows to spare operative time. For this reason, single-file reciprocating systems are gaining popularity. Furthermore, the filling procedure can be simplified by using gutta-percha points that match the shape of the last finishing instrument used. There is some evidence supporting the effectiveness of single point filling technique in mostly round canals, but it is still undemonstrated whether the post cementation can influence the filling quality in curved roots. The purpose of the present study was to assess the filling quality in curved roots obturated with the single point technique and restored with a fiber post; the continuous wave of condensation technique was used as reference.

**Materials and methods.** Sample size was calculated based on previously published data ( $\alpha=0.05$ ;  $\beta=0.20$ ;  $\delta=3.0$ ;  $\sigma=2.6$ ). Consequently, a total of 26 roots was obtained by cross-sectioning single-rooted extracted teeth at the cervical level. Canal curvature was assessed according to the method of Pruett et al. (1997). Root canals were instrumented with Reciproc (VDW) up to size 40/.06, irrigated with 5.25% sodium hypochlorite and randomly assigned to two filling groups (n=13): G1, single point; G2, continuous wave of condensation technique. All canals were immediately prepared with a post drill and received a No. 2 DT Light Post Illusion X-RO (RTD) cemented with a self-adhesive cement (RelyX Unicem, 3M ESPE). Specimens underwent microtomographic scanning and volumetric data were analyzed for the calculation of filling volume, internal, external and combined voids. Data were statistically analyzed with a Student's t-test. Three-dimensional reconstructions were created for qualitative assessment by means of dedicated software.

**Results.** The mean filling percentage was  $97.12 \pm 1.78\%$  in G1 and  $96.20 \pm 3.00\%$  in G2. Very limited (<0.5%) amounts of internal and external voids were found, whereas greater amounts of combined voids were detected ( $2.46 \pm 1.90\%$  in G1 and  $3.55 \pm 3.00\%$  in G2). There was no statistical difference between the two groups in relation to any volumetric parameter. Qualitative analysis showed almost absence of voids in the volume occupied by the cemented post, with the filling defects concentrating in the apical third where only gutta-percha and sealer were present.

**Conclusions.** The combination of the two filling techniques with DT Light Post Illusion X-RO cementation allowed for effective filling of the canals, in accordance with the findings of previous studies on straight roots. Nevertheless, formation of a limited amount of voids was unavoidable, with an average of less than 5% of the whole canal remaining unfilled. Further studies are needed to assess the clinical relevance of the findings of the present study.



### QUALITY OF THE ENDODONTIC OBTURATION OBTAINED BY A NEW CARRIER-BASED SYSTEM

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**Aim.** The aim of this in vitro study was to assess the quality of the endodontic seal obtained by Guttafusion® obturators (VDW, Munich, Germany) through the analysis of serial cross-sections.

**Materials and methods.** Fifteen Real T-Endo resin teeth (Acadental, Kansas City, USA), all first upper molars, with endodontic access and four canals were used. Each canal was prepared using Reciproc R25 except for the palatal ones (R40) and then obturated with the respective Guttafusion obturators and a resin-based sealer (2 seal, VDW, Munich, Germany). The time required to complete the obturation of each canal was calculated from drying of the canal to the removal of obturator handle. Hence, the resin teeth have been cross-sectioned perpendicularly to the canal, resulting in eight cross-sections for each canal from 1mm to 8mm from the apex. A photograph of each section was taken under 10X magnification and then analysed with Photoshop CS5 Extended. Area and perimeter of gutta-percha, carrier, sealer and voids were calculated for each cross-section in each root canal. Mean percentage and standard deviation were then calculated. Voids were also classified as inner and outer and number of cross-sections in which the carrier contacted the root canal were also registered.

**Results.** According to the results, gutta-percha resulted to be the main filling material with an average value over 50%. The percentage of gutta-percha area reached peaks close to 80% in the last apical 2mm. High percentage values were also found regarding the perimeter of the canal touched by gutta-percha (mostly close to 80%). The carrier resulted to be the second main filler for both area and perimeter analysis (respectively 42% and 12%). The carrier touched the root canal walls in the 57% of the sections analysed and most of the time in the middle third of the root (from 5 mm to 8 mm). When analysing the total mean percentages of canal filled by Guttafusion obturators, represented by the coating gutta-percha and the carrier, they were close to 98% in terms of area filled and 92% in terms of perimeter touched. The sealer represented a very low percentages of the area analysed (<5%). The highest values were detected in the apical sections. The mean values of perimetrical presence of sealer in contact with the canal walls was low (<8%) with some higher peaks in few cases (around 20%). Although there were no voids-free canals, the sections presenting voids were only the 12%. The outer voids touching the canal walls prevailed on the inner ones included in the filling material. Mean values of area and perimeter of the voids were respectively lower than 1% and 2%. The mean time required to complete the obturation of a single canal was around 1 minute and 50 seconds.

**Conclusions.** Guttafusions obturators used in the present study provided a three-dimensional and homogeneous obturation and consequently a proper and predictable apical seal. The very low time required to complete the obturation of a single canal underlined a clinical advantage for the operator and for the patient reducing the dentist-related stress. More studies are required to evaluate the quality of the obturation with Guttafusion in terms of short- and long-term leakage results and with non-invasive methods, such as micro-computed tomography.



### RETREATMENT OF ENDODONTIC FAILURES IN CLINICAL ANATOMICAL COMPLEX CASES

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**Aim.** Anatomical abnormalities of the root canal system are frequently seen in specialist endodontic practice, and represent a challenge to be faced with skill and thoroughness. When the anatomy of endodontic space is underestimated, endodontic therapy may bring to a clinical failure. The aim of this work is to point out the importance of an accurate diagnostic phase, above all in endodontic retreatment where priority hedge is to understand how and why the previous therapy failed. Fortunately, much progress has been made in endodontic research thanks to technological advances and the evolution of higher performance instruments, which now consent even very complex cases to be resolved with relative ease.

**Materials and methods.** Authors present some clinical cases of endodontic retreatment in which the operator has encountered numerous difficulties due to peculiar tooth morphology, overcome successfully thanks to the application of modern tools and consolidated clinical experience in the field. In the first case a lower left canine with a previous endodontic therapy and a ceramic-fused-to-gold crown but with pain while chewing and at percussion. At x-ray exam (done with different and inclined direction) operator find a further oral root that had previously escaped notice and had therefore not been treated. After removing the crown and the composite in the access cavity operator treat the root canal with NiTi instruments preparation and warm gutta-percha obturation (thermafil system): clinical symptoms disappear in few days. A second clinical case was that of an upper premolar that presented three roots, two buccal and one palatal, a tooth that had previously been treated and restored with a single crown. Also in this case, close examination of the x-rays brought to light the unexpected anatomical variant: endodontic retreatment, performed with NiTi instruments preparation and warm gutta-percha obturation (thermafil system) resolved the pain. In the last case a first lower left molar with a previous endodontic therapy, a metal post (in the distal root) and a ceramic-fused-to-gold crown but with pain while chewing and at percussion. At x ray exam the previous therapy resulted short and not correct: so operator remove crown and metal post with ultrasound device; then, using also endodontic solvent (bio-orange to dissolve previous cement obturation), treat the root canal with NiTi instruments preparation and warm gutta-percha obturation (thermafil system). The 6 months x-ray show the heal of periapical lesion and the evidence of a lateral canal in the mesial root.

**Results.** The evaluation of the cases was performed through clinical and radiological follow-ups at 6 months, 1 and 2 years: all the follow-ups showed no clinical symptoms and good healing of peri-apical tissues at x-ray exams.

**Conclusions.** Root canal retreatment is an extremely important branch of Endodontics whose aim is the recovery of severely compromised teeth. This can be accomplished with varying degrees of difficulty, depending on the complexity of the clinical case in question. As we have seen, particularly complex cases need to be managed with particular care in both the diagnostic and intervention phases, both of which can be greatly aided by the advanced technologies, instruments and innovative materials at our disposal. These not only serve to simplify techniques, but also confer results with greater outcome predictability and long-term success rates with respect to the past, even in extremely difficult cases.



### ROOT CANAL ANATOMY: A CBCT STUDY

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**Aim.** The aim of the present study was to investigate root canal morphology in a sample of caucasian population by using CBCT.

**Materials and methods.** Two hundred patients aged between 19 and 70 years were selected and divided into three groups (Group 1: aged between 19 -36 years; Group 2: aged between 37-54 years; Group 3: aged between 55 -70 years ). The patients were exposed to investigation with CBCT (New Tom VGI vertical ConeBeam Verona). For each tooth were analyzed the number and morphology of the roots, the number of root canals for the root and the configuration of each canal according to the classification of Vertucci. Root canal shape was evaluated at the coronal, apical and medium level and the canals were divided in round, oval and very oval, according to the classification proposed by Wu et al. For each group of teeth a statistical analysis was performed using the multivariate linear regression backward elimination procedure described by Hosmer & Lemeshow and SPSS 11.0 software.

**Results.** In the upper central and lateral incisors the ovality is reduced and the canals tend to be round. In the central incisors and lower lateral canals tend to have a more circular shape at the apical and more oval or ribbon at the crown. In canines and premolars with a single canal the predominant shape is oval in the coronal and middle and circular in apical part, it's also shown a fair amount of long oval canals especially in the group 1. In the upper first premolars buccal and palatal canals tend to have a circular shape in the three groups with a minimum of ovals canals. In the lower molars mesial-buccal and mesial-lingual canals of the mesial root are predominantly circular in the three groups analyzed. In the distal root the oval shape prevails in the coronal portion and the average of groups 1 and 2, while the circular shape prevails in the middle portion of group 2 and apical of the three groups. The presence of long oval is meaningful. In the lower molars the ovality is in buccal lingual direction and grows coronally. In the upper molars in the mesial-buccal root in the presence of either one or two canals, the most prevalent form appears to be circular in all groups analyzed as well as in the distal-buccal root. In the palatal root was found a canal shape predominantly circular in three portions with a lower presence of oval canals instead of the mesial-buccal roots. In the upper molars the taper in buccal-lingual and mesial-distal direction are similar and this is indicative of a more rounded shape of the canals.

**Conclusions.** Within the limits of this study, the results of the analysis conducted by CBCT show that the root canals become more oval apical-coronal. The presence of oval canals decreases with advancing age. In this study, the prevalence of oval canals in the apical third was higher than that reported in other anatomical and morphometrical studies. Since the variability in root canal anatomy is one of the major concern in endodontics, the new imaging systems such as CBCT could be a valid diagnostical help for clinicians.



## ROOT CANAL OBTURATION: A COMPARATIVE STUDY, IN VITRO, ABOUT OPERATOR VARIABILITY BETWEEN TWO TECHNIQUES: CONTINUOUS WAVE OF CONDENSATION AND GUTTA FUSION

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**Aim.** The aim of this study is to judge whether the operator's experience can influence the quality of root canal fillings carried out using two different techniques: continuous wave of condensation and Guttafusion.

**Materials and methods.** An expert operator prepared 60 endo-training-blocs in resin, using a reciprocating file R25. The 60 blocks have been numbered and divided randomly in 3 groups of 20 each. At each of the 3 groups a chosen operator has been assigned basing on the clinical experience: inexperienced (student), master student (<3 years of clinical experience), expert (>5 years of clinical experience). The 20 blocks have been further divided into two other groups of 10 each to apply one of two techniques. Finally the 60 filled blocks have been x-rayed and analyzed using a support of silicone to standardize the position. The evaluation was carried out by two blinded clinicians, which considered the following standards: apical extension, homogeneity, taper. The two blinded clinicians attributed the "ideal" or "altered" value at each one of the aforementioned standards, following a procedure suggested by Cunha Santos SM et al. Achieving for each root canal filling one of the following results: "perfect" in the case of ideal conditions in the three standards, "satisfactory" in the case of ideal conditions for at least two standards, "insufficient" in the case of ideal conditions for a standard, or none.

**Results.** From the statistic examination carried out using Dunn's test, statistically significant differences ( $p < 0,05$ ) between the expert operator group/Guttafusion and the groups of inexperienced operator/continuous wave of condensation and inexperienced operator/Guttafusion could be detected. The root canal fillings carried out by the expert operator with Guttafusion showed better quality than the ones carried out by the inexperienced operator with the continuous wave of condensation technique and Guttafusion. Moreover, from the Fisher's test ( $p < 0,05$ ) applied to the standards used for the x-ray quality estimate of the canal obturations, a statistically significant difference can be seen about the apical extension ( $p = 0,02$ ) in case of root canal fillings carried out by the inexperienced operator with the two different techniques, in particular it can be noted that the aforementioned operator has shown a better control when using the continuous wave of condensation technique.

**Conclusions.** Within the limits of this study, it is possible to claim that the control of apical extension is the standard which defines a better x-ray quality of the root canal fillings, when carried out by the expert operator rather than the inexperienced ones. When the inexperienced operator uses the technique of the continuous wave of condensation, this guarantees better results in terms of apical extension when compared to Guttafusion.



### SEALING ABILITY OF TWO DIFFERENT ENDODONTIC TECHNIQUES IN WIDE APICES

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**Aim.** To compare the sealing ability of Guttaflow2, a new polydimethylsiloxane self-curing filling system, and Thermafil, in presence of open apices.

**Materials and methods.** The coronal sections of 20 single-rooted teeth were removed at the cemento-enamel junction at 12 mm ( $\pm$  1 mm) and then roots were instrumented up to #50 apical size with Mtwo NiTi instruments (Sweden & Martina, Padova, Italy) and K-files under continuous irrigation of 5ml of 5% NaOCl and 3ml of 10% EDTA. Specimens were divided into 2 groups (n=10) according to the obturation manufacturer-specified system:

- A. GuttaFlow2 + single master cone (Hygenic, Coltène/Whaledent, Langenau, Germany);
- B. Thermafil (Dentsply Maillefer, Ballaigues, Switzerland) + AH Plus (Dentsply Maillefer, Ballaigues, Switzerland).

Filled roots were then immersed at 37°C in Hanks Balanced Salt Solution (HBSS) and the sealing ability was tested. The microinfiltration was measured after 48 hours, after 1 and 3 months using a digital fluid flow-meter working at 70 cm H<sub>2</sub>O. Multivariate double ANOVA for repeated measures was used. F-test was used to compare the variabilities. Trend analysis was carried out by using a linear model.

**Results.** No significant differences were found between the techniques after 1 and 3 months. After 48 hours Guttaflow2 showed significantly higher ( $p=0.047$ ) values of microinfiltration. Comparing the variability of the fluid flow rates, Guttaflow2 demonstrated a lower variability at 1 month ( $p=0.001$ ) and a greater variability at 48 hours ( $p=0.09$ ). Permeability of both groups linearly increased from 48 hours to 3 months ( $p=0.001$ ), indicating a reduction in their sealing ability. This reduction appeared lower for Thermafil, hypothesizing a greater stability.

**Conclusions.** The study demonstrated that the tested endodontic obturation techniques were unable to keep their sealing ability stable during the first 3 months in presence of wide apices. Thermafil technique showed slighter degree of microinfiltration than Guttaflow2 after 48 hours, but after 3 months not significant differences were observed.





### THE IMPACT OF POSTOPERATIVE PAIN ON QUALITY OF LIFE. ROTARY VS RECIPROCATING MOTION. A RANDOMIZED CLINICAL TRIAL

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**Aim.** Endodontic pathology is often associated with pre-and post-operative pain. This can affect the quality of life (QoL) of an individual. The extrusion of debris during instrumentation seems to be a major cause of post-operative pain. In literature there are no data about the impact on QoL of instrumentation with rotary or reciprocating motion, although it is suspected that the latter may be associated with extrusion of debris. The aim of this study is to evaluate the impact of this two different movements on QoL.

**Materials and methods.** We have selected all patients with irreversible pulpitis, symptomatic or asymptomatic, or necrosis, with or without apical periodontitis (acute or chronic). The subjects were divided into two groups, Wave One (W1) or Protaper (PT), randomly. In both groups the Glide Path was achieved with PathFile, shaping instead was performed to WL with Wave One for the W1 group and with Protaper for the PT group. The irrigation was performed with 5% NaOCl and EDTA 10%. The operator could choose between the obturation technique: classical Schilder, continuous wave, Thermafil or mixed, and could choose to finish the treatment in a single or in multiple sessions. The patient has to fill out a form on QoL, expressed through specific indicators, pre-and post-treatment in the next 7 days. For the statistical analysis we used Fisher's exact test and Student's t test ( $p < 0.05$ )

**Results.** For this study, 103 patients were selected (between 15-60 years old, 50,5% men and 49,5% women).

- PT group: 51 subjects (mean pain value at T0 3.18) 21,6% with asymptomatic pulpitis, 49% with symptomatic pulpitis and 29,4% with necrosis (31,4 of which having LEO).
- W1 group: 52 subjects (mean pain value at T0 2.40) 25% with asymptomatic pulpitis, 42,3% with symptomatic pulpitis and 32,7% with necrosis (including 25% with LEO).

The two groups have proved to be homogeneous in preoperative conditions and there were no statistically significant differences between the indicators of QoL ( $p > 0.05$ ).

**Conclusions.** In this study the impact of root canal therapy on QoL is obvious. More than 90% of patients had reported an improvement in QoL, although there is no statistically significant difference between the two groups. The type of movement during instrumentation, reciprocating or rotary, does not seem to have a significant influence on QoL.



### USE OF A DENTIN SUBSTRATE TO TEST THE CUTTING EFFICIENCY OF ENDODONTIC INSTRUMENTS

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**Aim.** We realized a device to assess the cutting efficiency of endodontic instruments that until now tested the cut only on plastic plates. The aim of present study was to evaluate whether the parameters used in previous studies, held good for the dentin.

**Materials and methods.** The study was done under standardized conditions using a device specifically designed, to assess cutting efficiency of endodontic instruments on dentin. 4 single canal inferior premolars, extracted for orthodontic reasons, were selected for the study. Teeth were soaked in sodium hypochlorite for one hour to be disinfected. Then the root cement was removed through a root planing and each tooth was sectioned longitudinally in vestibular-oral direction, resulting in 8 specimens. A composite base was built on the coronal part of each section, to allow the fixing of the specimens into the specific place of testing device. Finally each sample was reduced to a 1 mm thickness using a belt sander. The testing device used for the study consist of main frame on which a mobile support for the hand-piece is connected and a static support for the substrates. The mobile support is driven horizontal trough pulley with a weight of 512 g, allowing instrument mounted on hand-piece to work against the dentin substrates with a constant pressure. Both support are adjustable in gap and angle, to permits a precise and simple three-dimensional alignment and positioning of the instrument, as soon as it came perpendicularly into contact with the substrate. So a section of tooth was inserted in the specific place of the testing device, and the hand-piece in the other one and both was blocked with a screw system. In the hand-piece was mounted a TF ml3 (50.04) in order to have a 90 degrees angle with the sample and hitting it at 12 mm from the tip. Once everything was fixed, the hand-piece was put in traction dropping the weight of 512 g and the motor of the testing device (Promark aseptico) was switched on for 5 minutes, so that the instrument removed material and penetrated actively into dentin substrate. For the tests was used a 8:1 reduction hand piece and a speed of at 300 gpm with 520 g/cm<sup>2</sup>. Instrument was tested in linear cutting unidirectional lateral motion for eight time consecutively and the maximum penetration depth of the instruments was the criterion for cutting efficiency evaluation. The precise length of the dentin block cut in 5 minute was measured in mm using a computerized program (AutoCAD) with a precision of 0.01 mm.

**Results.** The mean length of cut was 0,77 mm (d.s. 0,1).

**Conclusions.** We can conclude that the substratum of dentin is valid for the implementation of the tests, since tests can be realized in reasonable time and the results can be easily calculated and compared. Further studies are needed to evaluate other instruments.



### USE OF TRIPLE ANTIBIOTIC PASTE TO TREAT PERSISTENT APICAL PERIODONTITIS FOLLOWING BIPHOSPHONATE TREATMENT

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**Aim.** To report the case of a persistent apical periodontitis following endodontic treatment associated with the use of biphosphonates.

**Materials and methods.** A 75 years old female patient was referred to the endodontic department of University of Cagliari for persistent apical periodontitis on tooth 3.3. She reported a medical history of mild hypertension and hip replacement surgery which was carried out 3 years beforehand; followed by administration of i.v. biphosphonates (Nerixia once a month i.m. for 3 months; Bonviva a tablet a month for a year; Diphosphonal i.m for a year). Tooth n 3.3 received endodontic treatment because of the development of symptoms following a restoration. Five months after undergoing treatment, the patient experienced an episode of acute apical abscess in the buccal mucosa corresponding to tooth n 3.3 (which was treated with amoxicillin 2000 mg per day for 8 days) followed by the formation of sinus tract. The tooth was retreated. The tooth was re-opened and medicated with calcium hydroxide and filled with gutta-percha, however the lesion did not heal. Therefore, after 3 months, the patient was subjected to surgical removal of the lesion and a new treatment again. The sinus tract persisted. The diagnosis was of "persistent AP following root canal retreatment and the use of biphosphonates". The patient was prescribed antibiotic prophylaxis for ONJ during all the phases of the treatment. The patient refused another surgical therapy. After 2 months the tooth was re-opened and the Hoshino paste, a mix of three antibiotic (metronidazole, ciprofloxacina, minociclina) was used as intermediate medication. One month later the sinus tract had closed, and after another month the tooth was filled with gutta-percha and a Grossman cement.

**Results.** The root canal retreatment was completed and the patient feels well. There was an improvement of symptoms and the fistula disappeared. At the 18 months follow-up the patient was symptom free and the lesion had completely healed.

**Conclusions.** The gold standard for the treatment of the ONJ is intermittent or continuous antibiotic therapy (amoxicilla + acidoclavulanico 1000 mg every 12 h and metronidazolo 250 mg every 8 h per 14 days) with surgical debridement. The antibiotic therapy must continue until complete mucosal healing. In very severe stage, the treatment showed by literature is surgical debridement of necrotic areas. Montebugnoli et al (2007) showed that surgical therapy is important in the treatment of ONJ but sometimes does not give significant improvement like only medical therapy. Even if in literature the use of laser therapy sessions and ozonotherapy are proposed but there is no evidence that these principals can be effective to heal the osteonecrotic site, replacing the surgical and pharmacological therapy. The use of poliantibiotic paste could be very useful to solve osteonecrosis cases refractory to the conventional antibiotic and surgical therapy, overall because is documented that previous root canal treatments with evidence of failure counted for 10,9% of the ONJ cases, so it is more than you could think.





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# **XXI CONGRESSO NAZIONALE**

**Odontoiatria Traslazionale**

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## **GNATOLOGIA**

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### A POSSIBLE CORRELATION BETWEEN CRANIOMANDIBULAR DISORDERS AND FIBROMYALGIA: A CASE SERIES STUDY

M. Corsalini<sup>1</sup>, D. Di Venere<sup>1</sup>, G. Stefanachi<sup>1</sup>, F. Cervinara<sup>1</sup>, A. Re<sup>1</sup>, A. Cervo<sup>1</sup>, A. De Giacomo<sup>2</sup>, S. Tafuri<sup>3</sup>, A.M. Ingrosso<sup>1</sup>, F. Pettini<sup>1</sup>

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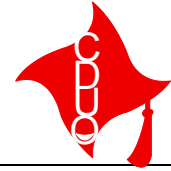
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**Aim..** The aim of the present study is to highlight a potential correlation between Fibromyalgia and Craniomandibular Disorders (CMD) also noticing the eventual presence of CDM in fibromyalgic patients and assessing its prevalence.

**Materials and methods.** The study was performed between November 2012 and November 2013, hiring a sample of fibromyalgic patients at the Neurophysiology/pathology of Pain clinic of Bari Hospital. Among the 150 examined patients reporting chronic pain not related to any pathology, 60 patients were diagnosed fibromyalgia and 27 among them accepted to undergo a gnatologic examination.

**Results.** 27 patients were hired of whom 24 (88.9%) were female and 3 (11.1%) were male, their age being comprised between 26 and 66 (average age 39). 14 patients (51.9%) were affected by primary fibromyalgia, the remaining 13 (48.1%) by secondary fibromyalgia, mainly associated to hypothyroidism (29.6%). The average VAS was  $8\pm 1.85$  as far as pain frequency is concerned, 15 patients (55.6%) reported pain every day, 10 patient (37.03%) once a week and 2 patients (7.4%) only a few times a month. 11 patients out of 27 (40.7%) ascribe the fibromyalgia onset to a specific triggering event; from the gnatologic anamnesis it results that 10 patients (37%) reported a painful symptomatology at neck-head, especially in the front zone, neck, masseter and ATM. Average VAS was  $3.4\pm 2.8$ , considerably lower than the one about fibromyalgic pain. The objective gnatologic examination revealed CMD symptoms and signs in 18 patients out of 27 (66.7%). For what concerns CMD prevalence in the two fibromyalgia subgroups, in type 1 fibromyalgia myofascial pain was more frequent (5 patients), whereas in type 2 fibromyalgia, the dislocation of the disc with reduction was more frequent (3 patients).

**Conclusions.** Even if the neck-head zone is not included in the ACR criteria for fibromyalgia diagnosis, it is reasonable to believe that it can be affected by diffused pain also involving the rest of the body, in the same way, according to clinic experience, it can be claimed that some patients with CMD report pain in other districts. It is still difficult to distinguish the different forms of CMD fibromyalgic pathology-related from those engendered by parafunctional activities. On the other hand, among patients already treated with occlusal plate, it was not reported any symptomatological improvement, which therefore highlights the need for a solution of the fibromyalgic syndrome by means of a multidisciplinary approach.



### A PROSPECTIVE SIX MONTHS STUDY ON TEMPOROMANDIBULAR DISORDERS AFTER WHIPLASH INJURY

**M. Corsalini, F. Pettini, G. Stefanachi, F. Cervinara, A. Re, S. D'Aria, A. Cervo, M.C. Belfiore, D. Di Venere**

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**Aim.** Whiplash injuries are traumatic events usually determining a sudden and violent excursion of the head on different space planes. A hyper-extension followed by a hyper-flexion happens, but we can also have lateral hyper-flexions, i.e. movements on the vertical plane which may amplify the lesion effects. The causes of the whiplash lesions can be related to strains and sprains of ligaments and muscles of the vertebral column in the cervical region. Temporomandibular disorders are a group of dysfunctions, signs and symptoms, often painful, affecting one or more components of the masticatory apparatus of which a multi-factor etiology can be recognized. The role of an indirect mandibular trauma, like the whiplash, is controversial. The goal of the present study is to verify the short and long-term effects on ATM of whiplashes due to a car accident with a 6-month follow up.

**Materials and methods.** In the Department of Dentistry and Surgery of Bari State University (Italy), were hired 20 patients with a cervical symptoms following to a car accident whiplash. Each patient was visited 2, 30, 60 and 180 days after the traumatic event. In each control the European Academy of Craniomandibular Disorders (EACD) file was used, the V.A.S. was assessed according to the Research Diagnostic Criteria (RDC). X-rays (Dynamic TMJ, cervical and orthopantomography) were executed and a myorelaxing therapy was administered. Zimmer collar was prescribed when neurosurgeons believed it to be necessary. Some patients were prescribed a Michigan plate after 6 months.

**Results.** The VAS relative to cervical rachis and masticatory muscles tends to gradually decrease in the first 30 days after the traumatic event. 15 patients (75%), after the last control, do not report any pain, reaching a complete healing. 25% of the patients shows symptoms of temporomandibular disorders 6 months after the trauma. In elderly patients a more intense and prolonged therapy is necessary together with the use of an occlusal bite.

**Conclusions.** The results show that the acute phase can improve or be completely solved in a few days for most patients. Only a small percentage of patients shows, 6 months after the trauma, a residual symptomatology, mainly affecting masticatory muscles, due to old age (often in presence of pathologies preceding the trauma) or to an abuse of Zimmer collar.





### AMBULATORY POLYSOMNOGRAPHIC ASSESSMENT OF SLEEP BRUXISM AND RELATED RISK FACTORS

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**Aim.** Sleep bruxism (SB) is a common sleep-related movement disorder and oral parafunction characterized by tooth grinding or clenching during sleep, which is associated with intense sleep arousal activity. Sleep bruxism is considered to have multifactorial aetiology, it has been associated with peripheral factors such as tooth interference in dental occlusion (weak evidence supports their role as a causal factor for SB), psychosocial influences such as stress or anxiety, and brain neurotransmitters involving the central nervous system and basal ganglia. A number of substances, including medications (e.g. amphetamines, selective serotonin reuptake inhibitors), recreational drugs (e.g. ecstasy), alcohol, caffeine and smoking have also been linked to sleep bruxism and are recognized as risks factor for SB. The activity of tooth grinding can have a high variability (around 25%) during the night and over time. Bruxism can present with periods of intense grinding during sleep, alternating with periods of quiescence and this makes it difficult to diagnose with only questionnaires or clinical signs such as tooth wear. Polysomnographic (PSG) recordings evaluate sleep bruxism activity based on EMG (Electromyography) of the masticatory muscles (the masseter and/or temporalis) with specific criteria to recognize the SB-related pattern. The aim of the study was to evaluate the spontaneous variability of sleep bruxism and other sleep disorders in a population of healthy individuals during two nights: the former during the week and the latter in the weekend. These two nights were chosen specifically in order to assess whether behavioral and lifestyle changes can affect SB motor activity.

**Materials and methods.** 11 healthy subjects (5M; 6F) aged between 19-24 years (who had not been diagnosed with mental or neurological disorders and did not take medications) were recorded with a portable system (Somté PSG Compumedics) during a working day and a holiday. All subjects also filled out questionnaires to investigate sleep quality and possible related diseases (bruxism and sleep apnea).

**Results.** No significant differences were found comparing the 2 recordings neither for bruxism (total ( $P=0.85$ ), phasic ( $P=0.92$ ), tonic ( $P=0.85$ ), mixed ( $P=0.31$ ) contractions), nor in the other movements masticatory recorded ( $P=0.28$ ) nor in the index of apneas and hypopneas ( $P=1$ ). When lifestyle habits were considered a tendency to significance was found for the number of smoked cigarettes ( $P=0.06$ ).

**Conclusions.** In conclusion this study seems to confirm the unreliability of self-report and clinical characteristics such as wear for the diagnosis of SB. It is therefore confirmed the role of polysomnography as the gold standard investigation for the diagnosis of bruxism during sleep, which does not seem to be affected by the possible intra-night variation of motor activity of the masticatory muscles for moderate or severe bruxism.



## AN EVALUATION OF CRANIOMANDIBULAR DISORDERS DURING PREGNANCY. A CASE SERIES STUDY

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**Aim.** Temporomandibular dysfunctions (TMJ) can occur in subjects of all ages and both genders, even though with a different prevalence. Predisposition seems to be related with an higher perception, a minor tolerance and a low threshold for pain; in addition there are some psychological factors like anxiety, temper and depression. Furthermore, an exceptionally high incidence of craniomandibular dysfunction can be observed in females, especially for the direct hormonal influence on the temporomandibular joint. Accordingly, the aim of this study was to investigate the differences between the prevalence of dysfunctional signs and symptoms affecting pregnant women, and compare findings to those from patients of the same gender.

**Materials and methods.** The study was carried out on a group of 23 women four months pregnant, aged between 19-35 years, not affected by serious oral diseases and craniofacial dismorfosis. The screening of craniomandibular dysfunction was carried out according to Helkimo's index. The clinical dysfunction Helkimo's index is based on five symptoms: impaired range of jaw movement, impaired TMJ function, pain on jaw movement, muscle pain, and TMJ pain. Each symptom is graded by using a three-grade severity scale 0, 1, or 5 for none, mild, and severe, respectively. The scores for the five symptoms are added and the dysfunction score varies from 0 to 25 points. The higher the score is, the more severe is the disorder. In addition, the patients filled out a chart containing personal information (name, age, job) and 8 questions about symptoms relative to TMD (the anamnestic questionnaire). The patients, after filling it, were visited by two doctors who made an estimation of: mandibular range of motion; joint sounds; pain associated with palpation of masticatory muscles and temporomandibular joint and mandibular excursions.

**Results.** Results obtained from our investigation indicate that the 52% of young women belongs to the group of D 1 (lightly dysfunctional subjects) according to Helkimo's index; the 4,5% is fairly dysfunctional (D2) and the 43,5% doesn't show any dysfunctional signs (D 0). However the striking finding was the detection of joint sounds (clicking) in 56% of the pregnant women, which is a very high value when compared to non-pregnant subjects.

**Conclusions.** In conclusion, according to our findings it would seem that pregnancy affects more the TMJ tissues than mandibular muscles and mandibular range of motion. Our results could be explained for the presence of hormonal receptor in TMJ disc, capsule and ligaments. Therefore, prevention of TMJ derangements is desirable during pregnancy, in order to avoid more serious TMJ pathologies.



### COMPARISON BETWEEN TWO DIFFERENT MINIMALLY INVASIVE SURGICAL TECHNIQUES IN TEMPOROMANDIBULAR JOINT DISORDERS MANAGEMENT

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**Aim.** Temporomandibular joint (TMJ) surgery developed in recent years an important role in multidisciplinary treatment of TMJ disorders. The aim of this work was to compare, through a literature review, two minimally invasive surgical techniques: arthrocentesis and arthroscopy.

**Materials and methods.** articles were collected searching an electronic database (Pubmed) using the combination of these key words: "TMJ disorders", "internal derangement", "TMJ arthrocentesis", "TMJ arthroscopy", "TMJ surgical treatment". The inclusion criteria were: clinical trials, humans subjects, patients with TMJ internal derangement. Studies on patients with systemic arthritis, animal studies and reviews were excluded. Both prospective and retrospective clinical studies were considered.

**Results.** The search up to January 2014 provided 520 abstracts. By screening these abstracts, 120 articles were identified. After the exclusion criteria were applied, 57 articles were selected. Analyzing the clinical trials, a comparison between the two techniques was done. Some similar aspects were highlighted: both techniques are used when pain and TMJ dysfunction persist in patients after unsuccessful conservative treatments; patients with early stages of disorders have better outcomes patients with advanced pathology; the success rates of these two techniques are very similar (from 70% to 90%); these procedures are very well tolerated by patients. The main differences consist in technical procedures. Arthrocentesis is a joint lavage fulfilled under local anesthesia: the upper joint space is washed out and after that some drugs can be injected into the joint space. Arthroscopy is performed under general anesthesia and allows to see the upper joint space, so that a diagnostic evaluation can confirm the previous diagnosis and precede the operative procedure.

**Conclusions.** This review shows that both arthrocentesis and arthroscopy improve mouth opening and decrease pain levels in patients where conservative treatments failed. Selection of appropriate patients is important to decide which procedure has to be carried out in order to obtain the best result and avoid morbidity. Especially, minimally invasive surgery should be considered early in the management of patients with TMJ pathology because these techniques are more effective when patient is not in a severe stage of disease. A further evolution of these techniques is possible with the help of new technical instruments: a very thin optical fiber (1 mm diameter) can be used while performing arthrocentesis and allows to visualize the articular pathology; otherwise the insertion of the instruments in the upper joint space can be image guided by Cone Beam CT or MRI to avoid complications.



### EARLY DIAGNOSIS OF TEMPORAL MANDIBULAR JOINT INVOLVEMENT IN A PATIENT WITH JUVENILE IDIOPATHIC ARTHRITIS

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**Aim.** "Juvenile Idiopathic Arthritis" (JIA) is a chronic inflammatory auto-immune disease with an onset before the age of 16 yrs. It predominantly affects diarthrodial joints with synovial membranes. In 63-87% of cases the temporal mandibular joint (TMJ) is asymmetrically affected in systemic or polyarticular disease and girls have the higher prevalence than boys (3:1). This disorder includes: class II malocclusion, open bite, reduced posterior and increased anterior facial height, joint and/or muscle pain, joint noise (clicking or crepitus), limitation of mouth opening, headache, muscular fatigue, cartilaginous and condylar alterations, flattening of the articular eminence and thinning of the articular disc. The aim of this study was to show the importance of imaging studies in the early diagnosis of TMJ disease by describing a patient with JIA.

**Materials and methods.** A 10-year-old girl with JIA was referred to the Orthodontic Ward at the Second University of Naples. Anamnestic data, dental casts, intra and extraoral photos were collected and a detailed clinical examination of occlusion, masticatory muscles and TMJ was performed. Instrumental examinations included electromyography (EMG) and kinesiography (KMG). Then, orthopantomography (OPT), latero-lateral and postero-anterior radiographs, stratigraphy and magnetic resonance imaging (MRI) were required.

**Results.** The clinical examination showed a dental class 2 malocclusion, division 1, subdivision, associated with a maxillary arch contraction, crossbite at 5.5-8.5 and upper and lower crowding. Cephalometric analysis indicated a skeletal class II malocclusion by positional mandibular retrusion in a normodivergent subject. Masticatory muscle examination revealed tenderness at palpation, score 6 on the visual analogue scale (VAS), without articular involvement. EMG showed a dystonia of the left masseter, with an inverse temporal-masseteric relation ipsilaterally, whereas the KMG relieved bradykinesia in the intermediate-final phase of rapid mouth opening with normokinesia in rapid closing (sign of articular clicking). The OPT showed a short and irregular left condyle; the stratigraphy and the MRI confirmed an anterior condylar flattening, and an altered morphology, also with a pannus, of the homolateral TMJ.

**Conclusions.** In the evaluation of patients with JIA, instrumental and radiographic examinations play an important role in TMJ disorder diagnosis, because condyle or joint alterations can often occur even in absence of other clinical symptoms and signs. Especially, MRI could represent the gold standard for the early diagnosis of TMJ involvement in pediatric patients with JIA. This examination is less invasive in absence of radiation and provides information on bone-cartilaginous morphology of the joint, soft tissues, and eventual edema and inflammation of the synovial membrane.



### EPIDEMIOLOGICAL LONGITUDINAL STUDY OF DIFFERENT POPULATIONS OF TMD PATIENTS

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**Aim.** This research is a epidemiologic longitudinal study of three different populations of dysfunctional patients (DP). The aims of this study are to highlight the features of people affected by Temporomandibular Disorders (TMD) in order to evaluate the general trends and the evolution over the time.

**Materials and methods.** A population of 387 DP was selected from the medical records of the Service of "Clinical Gnathology" of the Head and Neck Department of Umberto I Hospital of "Sapienza" University of Rome. The patients belonging to three different decades; they were selected and divided in three homogeneous study groups: Group 1 (G1) formed by 129 patients belonging to 1990-1993 years; Group 2 (G2) 129 patients belonging to 2000-2003 years; Group 3 (G3) formed by 129 patients belonging 2010-2013 years. Anamnestic and semeiological aspects were considered and evaluated through statistical analysis, that was divided into a "descriptive analysis" (tables of frequency distribution, standard deviation, mean, median, minimum and maximum) and an "epidemiological analysis" (contingency tables, Pearson's Chi-Squared Test, Maximum Likelihood Estimation).

**Results.** The female gender was confirmed as the prevalent in all three decades (G1: 85,16%; G2: 84,5%; G3: 79,84%), although it was an increasing trend in the incidence of the male gender from G1 to G3 (G1: 14,84%; G2: 15,5%; G3: 20,16%). In all groups the age most affected is between 16 and 40 years, but in G2 and G3 resulted an increase of the average age (G1: 29,64; G2:34,98; G3: 41,49) and median age (G1: 26,00; G2:31,00; G3:41,00) compared to G1. The most frequent dysfunctions in all three groups were TMJ pathologies defined IIa (G1: 44,89%; G2: 40,31%; G3: 34,11%), IIb (G1: 40,15%; G2: 13,96%; G3: 17,06%) and IIIa (G1: 74,42%; G2: 79,07%; G3: 69,77%) according to the RDC/TMD criteria. There has been a progressive increase in G2 and G3 of muscular pain disorders: myalgia (G1: 7,88%; G2: 16,28%; G3: 24,03%) and myofascial pain (G1: 2,36%; G2: 19,39%; G3: 13,18%). In all study groups the parafunctions (bruxism and clenching) showed a significant impact especially in G3: bruxism (G1: 14,96%; G2: 11,63%; G3: 35,66%), clenching (G1: 14,96%; G2: 11,63%; G3: 35,66%). Comorbidities (neck pain and headache) were reported by a significant number of patients of all the groups analyzed, especially in G3: neck pain(G1: 0%; G2: 41,87%; G3: 61,24%), headache (G1: 45,74%; G2: 57,36%; G3: 66,67%). An interesting result was the significant increase of affluence noticed in both G2 and G3 (810,85% - 940,31%) than G1.

**Conclusions.** The results show that, in recent decades, the male seems to be more interested than in the past by TMD, and that seem increasingly interested medium-high aged patients. Another important finding was the marked increase in demand for visits and treatments from the users, in particular in the last decade. The increased opportunities for the patient to received information on these topics, has made them more aware that some issues could be related to a TMJ dysfunction (increased demand for visits to even mild pain). The authors believe that these findings are related in part to a real change in the patient population, in part by improved diagnostic technique. The authors emphasize the importance of planning preventive interventions against TMD and Orofacial pain.



### GENERAL PRACTITIONER AND GNATHOLOGY: FACT-FINDING SURVEY ON CRANIO-CERVICO-MANDIBULAR DISORDERS

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**Aim.** As the number of patients who achieve a late diagnosis of gnathological disease (TMD) is continuously increasing, we think that a study about the real diffusion of cranio-cervico-mandibular disorders and their approach by general practitioner can be useful.

**Materials and methods.** A questionnaire, made up of 7 questions to multiple answers, was mailed to all 517 general practitioners of Modena's country. The first and second questions are about the percentage of patients, reporting cranio-cervico-mandibular disorders, examined in their own clinical practice in the last two or five years respectively. The third question asks to choose among 11 symptoms what are more frequent in their patients. The fourth asks what are the symptoms with more frequent unsuccessful treatment. The fifth asks about signs and symptoms they research or value in the examination of this kind of patients. The aim of sixth and seventh question is to detect the diagnostic and therapeutic iter for these patients in the first instance and in unsuccessful cases. Our study is based on the review of the remailed filled up anonymous questionnaires.

**Results.** 517 general practitioners were involved in the study, but only 30 remailed the filled up questionnaire. The percentage of patients with cranio-cervico-mandibular disorders examined is the same (between 5 and 10%) in the last 2 and 5 years. The more frequent symptom is neck pain (reported by 100%), followed by dizziness (76,67%), tinnitus (66,67%), headache (60%), back pain and fibromyalgia (40%). The more unsuccessful treatment is reported for tinnitus (80%), followed by dizziness (53,33%), fibromyalgia (36,67%), neck pain (26,67%) and back pain (16,67%). 26 of the 30 general practitioners refer to general dentist, we suppose the confidential dentist of the patient, and give him the decision if a gnathologic evaluation is necessary. 33,33% refer to maxillo-facial surgeon directly, 26,67% to otolaryngologist, 23,33% to orthodontist, 16,67% to physiatrist, 13,33% to orthopedic and only 1 of 30 to neurologist and gnathologist. From this analysis, a discouraging fact comes out: general practitioners seem to ignore the figure of gnathologist (TMD specialist). As they are the first medical figure whom patients refer to, this could explain the reason of their late and difficult setting.

**Conclusions.** This preliminary investigation, which needs an increase of the sample, shows the poor knowledge of the figure, role and competence of gnathologist, and the confusion among orthodontist, gnathologist and maxillo-facial surgeon. A stronger relation and integration among the different medical figures involved in diagnosis and therapy of this kind of patients is necessary, in order to create shared programs and reduced times and costs, and to respond more effectively to patient's expectations.



### MULTIDISCIPLINARY APPROACHES TO TREAT CHRONIC MYOFASCIAL PAIN: INITIAL PROTOCOL STUDY

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**Aim.** TMD is a multifactorial disorder which includes pathological conditions regarding temporomandibular joint and masticatory muscle. In particular myofascial pain, one of TMD's, is characterized by trigger points, localized and hypersensitive spots in one or more palpable taut bands of skeletal muscle fiber. There are several treatments proposed for myofascial disorders but, relating outcomes and mechanisms, the therapeutic approach is still uncertain. The muscle pain that characterize these pathologies are often related to psychosomatic components.

Our aim is to conduct a randomized control group study on a sample of patients affected by myofascial pain treated with gnathologic methods (occlusal plates), medication (amitriptyline) and acupuncture (abdominal technique). The sperimental study is currently at the stage T0, sample selection, and it commits by two institutions, Oral and Maxillo Facial Sciences Department of Sapienza University and the Paracelsus Institute of of Rome. The research is assessed to compare the results obtained with the different methods above mentioned in treating symptoms associated to myofascial pain.

**Materials and methods.** The current protocol considers a consecutive series of patients ( more than 100 patients) aged >17 years with myofascial pain for at least 6 months, diagnosed by a RDC/TMD criteria. The average of weekly pain has a mean score of  $\geq 4$  (between Visit 2 and Visit 3 before randomization), when assessed by 24-hour average pain severity on the 11-point Likert scale from the patient diary. Exclusion criteria are the following: pregnant or breastfeeding, Axis I diagnosis of MDD, dysthymia, generalized anxiety disorder, alcohol or eating disorders, concomitant medications. The clinical methods used to assess the patients are: a- CRANIOMANDIBULAR INDEX, TENDERNESS TOTAL SCORE, CERVICAL SPINE TENDERNESS EVALUATION which integrate the RDC/TMD system; b- Migraine Disability Assessment Scale (MIDAS) and Headache Impact Test – 6 items (HIT-6) to integrate the NEUROLOGICAL EXAMINATION- c. The specialist of acupuncture had selected and coded the abdominal areas to treat (abdominal map), the evaluation of treatment will use the above-mentioned indexes

**Results.** The study is at the stage of sample selection, therefore we have to wait before getting the results.

**Conclusions.** This research aims to follow the current guidelines regarding the type of treatment of temporomandibular disorders, which provides a conservative and multidisciplinary approaches. The combination of therapeutic appliances and the comparison of their relative effectiveness in the treatment of chronic pain allows to expand the cultural background of the dentist when faced with this type of pathology.



### PSYCHOMETRIC CHARACTERISTICS IN PATIENTS AFFECTED BY MYOGENIC FACIAL PAIN: COPARISON WITH PATIENTS AFFECTED BY PERIODONTAL DISEASE

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**Aim.** The etiology of the Myogenic Pain (MP) is multifactorial and include predisposing factors (structural, metabolic and psychological conditions), precipitating factors (factors that lead to the onset symptoms and are primarily related to trauma or repetitive adverse loading of masticatory system) and perpetuating factors (parafunctions, hormonal factors or psychosocial factors). The beginning and progression of Periodontal Diseases depends on microbial factors and many others factors (genetic polymorphism, age, genre, compliance, stress, smoke, diabetes) that affect the susceptibility of the patients. It has been proved that tissue reactions to a compressive force are represented by vascular alterations, connective tissue modifications and bone resorption. The extent of these changes is directly related to the intensity of the forces applied to the tooth. Therefore the higher the functional and/or parafunctional load is and the higher is the increase of tissue degeneration and bone resorption. The present study aims to analyze the psychometric profile of patients affected by myogenic facial pain and patients affected by chronic periodontitis.

**Materials and methods.** The sample selected for the study consists of 72 subjects (28 males and 44 females, 49.54±49.74 years) recruited consecutively among patients attending at the C.I.R. Dental School of Turin in the period June 2012-February 2014. We analyzed two different groups: the first group included 47 subjects (18 males and 29 males, 50.09±14.82 years) attending at the Departement of Periodontology and the second group consisted of 25 subjects (10 males and 15 females, 49.04±14.24 years) attending at the Departement of Gnathology. Both groups were checked with a gnatological visit concerning mandibular movements and muscular palpation and with a periodontal visit including periodontal probing . In order to evaluate the psychological profile of patients, both groups received the following psychometric tests: Beck Depression Inventory (BDI), Hospital Anxiety and Depression Scale (HADS), State Trait Anxiety Inventory (STAI-Y I e II), State Trait Anger Expression Inventory (STAXI 2).

**Results.** We analyzed media and standard deviation of all values of the psychometric tests: BDI, HADS, STAI-Y I e II and STAXI. Results of this study show that there are no statistically significant differences between the two groups.

**Conclusions.** From our results it seems that the psychological profile of the muscular and the periodontal groups is similar. In particular both groups revealed mild level of depression and anxiety from the BDI and STAI-Y suggesting that these factors are involved in the multifactorial etiology of both the pathologies.





### RELATIONSHIP BETWEEN CRANIO-MANDIBULAR DISORDERS AND BURNING MOUTH SYNDROME IN REMOVABLE DENTURE WEARERS: A PRELIMINARY STUDY

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**Aim.** Burning Mouth Syndrome (BMS) is a chronic pain syndrome that mainly affects middle-aged / old women with hormonal changes or psychological disorders. This condition is probably of multifactorial origin, often idiopathic, and its etiopathogenesis remains largely obscure. The frequent finding of craniomandibular disorders (CMD) in these patients has led the scientific community to hypothesize that the two diseases have common aspects that require further examination. Some authors have evaluated the presence of symptoms of CMD in patients with BMS. No studies have limited the investigation to denture patients affected by burning mouth syndrome. The aim of the study is to point out a possible relationship between CMD and BMS in removable denture wearers.

**Materials and methods.** Between February 2013 and January 2014 sixteen consecutive patients afferent to Department of Odontostomatology and Surgery, University of Bari (Italy), were enrolled. Age and sex were recorded for each component of the sample and the clinical types of BMS was established according to Lamey's classification. A clinical-gnathological evaluation and a prosthodontic examination were performed and the results compared with a control group. The data were analyzed using a chi-square test.

**Results.** 68,75% of the sample showed disorders classified as primary signs and symptoms of CMD on the basis of RDC / TMD criteria, compared with 50% of the control group. However, the concern about the primary disease (BMS) makes these patients miss or ignore signs and symptoms of CMD. The most common disorders were muscle pain and disc displacement. The data revealed that dysgeusia was a very common symptom. The chi-square test was statistically significant ( $p < .05$ ) for 6 of the 10 relationships studied. The prosthetic devices, especially if incongruous, can significantly increase the functional stress level of the entire stomatognathic system, thereby promoting the main causes of CMD, namely the onset of parafunctional habits. Occlusal errors and the increase of OVD cause masticatory stress and support soft tissue overload. Flanges structural defects may reduce tongue space and violate cheeks and lips muscles, thereby accentuating the patient's discomfort.

**Conclusions.** Treatment of primary disease and periodic controls of the prosthesis can significantly contribute to weaken craniomandibular disorders in patients with burning mouth syndrome.



### REVIEW OF THE LITERATURE ON TEMPOROMANDIBULAR DISORDERS AND NECK PAIN

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**Aim.** The purpose of this research is to examine possible relationships between temporomandibular disorders (TMD) and neck pain. It is considered appropriate to examine these aspects as in the population of dysfunctional Gnatology service DAI Head-neck Policlinico Umberto I, Sapienza University of Rome, the incidence of cervical exceed 40%, and the literature is not clear on the reasons for this comorbidity.

**Materials and methods.** The research was performed using the database Med-line, considering the period from 1990 to 2013. Systematic reviews, randomized controlled trials, controlled clinical trials, clinical trials, observational studies that evaluated the signs, symptoms and dysfunction in adult subjects with TMD and contemporary neck pain were included. Two reviewers extracted the data independently, assigning the level of quality of the studies.

**Results.** The search strategy yielded 104 articles, of which only 33 met the criteria for inclusion. In the general population the importance of neck pain appears to be between 30-50%, with a higher prevalence for the female gender. The incidence found in our work is about 40%, in agreement therefore with the other authors. These are unanimous in concluding that between the two entities there is a possible physio-pathological relationship. The assumptions in support of this thesis are different. The interconnection between the two co-morbidities could be due to neural phenomena of convergence and local interactions. Furthermore, the results of clinical trials of EMG recording of the masticatory muscles indicate an increase in the activity of the cervical muscles during clenching.

**Conclusions.** This review shows a coherence in the results of studies regarding the possible relationship between the two patho-physiological conditions considered. Some authors considered a basic role for TMD in the onset of neck pain, while others wonder about the possible primary role of cervical dysfunction in determining the TMD. The study suggests the need for mutual supervision and rationalization of diagnostic methods which currently do not include in a unified way the two entities. In terms of treatment, emphasizes the need to treat the TMD patients with multidisciplinary therapies that can be targeted to the cervical spine, such as physiotherapy and other manual therapies. More scientific studies are needed to investigate aspects still not clarified by the current literature.



### SLEEP AND TDM: PRELIMINARY STUDY CONTROL ON A SAMPLE OF DYSFUNCTIONAL PATIENTS

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**Aim.** The aim of this study is to evaluate the prevalence of sleep-disordered breathing in patients with temporomandibular disorders (TMD) in order to investigate the possible correlations between the two conditions.

**Materials and methods.** A sample of 150 patients affected by TMD was selected from patients seen, from October to December 2013 on their first visit or follow-up to the Service of Gnathology in the Head and Neck Department of Umberto I Hospital of Sapienza University of Rome. All were subjected to a diagnostic procedure in accordance with the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). The sample was then divided into two homogeneous groups of 75 patients each, a Study Group (GS – 13 males, 62 females, age between 16 and 75 years) and a Control Group (GC – 15 males, 60 females, age between 15 and 77 years). The GS patients answered STOP-BANG questionnaires (for the risk of OSAS) and the EPWORTH SCALE (for the degree of daytime sleepiness and poor quality of sleep). The GC did not undergo special screening for sleep-disordered breathing in order to assess the emergence of spontaneous anamnestic disorder data and therefore to make a comparison with the data obtained in the GS. The data were analyzed with statistic descriptive investigation.

**Results.** In the GS, 40% of patients had unilateral reducible disc dislocation either mono-lateral or bilateral, 28% myalgia, 12% non-reducible disc dislocation, 4% jaw thrust, 4% arthrosis, 4% tinnitus without objective evidence of joint diseases, 2.6% had structural alterations with loss of posterior vertical dimension (PDVP), 5.33% had a joint affected by non reducible disc dislocation and the other, affected by reducible disc dislocation. 36% of these patients reported clenching and/or bruxism (clenching 20%, 6.66% clenching and bruxism, bruxism 9.33%). In the risk assessment, OSAS showed a prevalence of 16%, therefore 12 of 75 patients had a high risk, of these 75% had a comorbid clenching-bruxism. In the GC, 48% had reduced dislocation of the unilateral or bilateral disc, 20% myalgia, 14.6% non-reducible disc dislocation, 5.3% jaw thrust, 4% post traumatic structural alteration, 2.6% arthrosis, 2.6% had a joint affected by non reducible disc dislocation and the other affected by reducible disc dislocation, 2.6% reported tinnitus without objective evidence of joint diseases. 57.33% of the patients reported clenching and/or bruxism (clenching 36%, clenching and bruxism 17.33%, bruxism 4%). Only 2 on 75 patients reported OSAS under CPAP treatment.

**Conclusions.** The association between obstructive sleep apnea syndrome OSAS and para-functional habits of the stomatognathic system such as sleep bruxism, was very narrow. The study showed an association between the two diseases of 75% in GS, conversely this data was not found in the GC, although homologous to GS. Even within the limits of the preliminary study, data resulting from this work highlight the need to use simple screening questionnaires for respiratory sleep disorders such as the OSAS in the diagnostic protocol for TMD patients, because respiratory sleep disorders in comorbidity with sleep bruxism can worsen the quality of life. Concluding, in the light of this high co-morbidities, be able to bring out in dysfunctional patients the frequent and often submerged symptoms of dysfunctional forms of sleep has proved desirable, and the routine screening in parallel of these two conditions is highly needed and recommended.



### SLEEP BRUXISM DIAGNOSIS: CLINICAL VS INSTRUMENTAL EVALUATION. A PILOT STUDY

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**Aim.** The current widely accepted bruxism definition is a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible, having two possible circadian manifestation, during sleep (sleeping bruxism, SB) and wakefulness (awake bruxism, AB). Sleep bruxism is a centrally mediated disorder, having a multifactorial etiology. Sleep bruxism (SB) is related with sleep arousals and has a combination of different motor activities, also including tooth grinding. A recent review reported a mean prevalence of 12.8% in the adult population, with no gender differences and a tendency to decline with increasing age. However a true estimate of SB prevalence is complicated by the low diagnostic specificity of most reviewed papers, thus suggesting that an improvement in SB diagnostic accuracy is a fundamental requisite. Considering that bruxism can seriously affect life quality through dental and oro-facial problems, an early diagnosis is essential. Clinical diagnosis of SB is based upon the diagnostic criteria proposed by American Academy of Sleep Medicine (AASM), even if the validation of these diagnostic criteria is still lacking and great part of clinicians makes bruxism's diagnosis only by using these criteria.

**Materials and methods.** Ten subjects (5 "probable" bruxers and 5 non-bruxers) were selected for the study on the basis of the diagnostic clinical criteria for SB proposed by the American Academy of Sleep Medicine among patients referring to the Gnathology Unit of the Lingotto Dental School of the University of Torino. Furthermore, each subject underwent a Bruxoff recording for one night acquiring sEMG bilaterally from the masseters, and the heart frequency (HF). A logistic regression has been performed in order to evaluate an eventual correlation among clinical variables and the instrumental evaluation.

**Results.** A significant difference has been demonstrated between the clinical and the instrumental diagnosis of SB ( $p$

**Conclusions.** The clinical diagnosis of SB is not sufficient itself in the clinical setting. However some limitation might be due to the scarce knowledge of the SB pathophysiology.



### SOMATOSENSORY TINNITUS TREATED BY STRETCH & SPRAY TECHNIQUE: A CASE REPORT

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**Aim.** Tinnitus is a non specific otological symptom. In fact, it can be determined by various causes affecting different parts of the hearing system. Somatosensory tinnitus is a specific subgroup that can be produced and modulated by inputs from somatosensory system such as myofascial trigger point (MTP). This article presents a case report about the effects of stretch & spray technique for MTP deactivation on somatosensory tinnitus.

**Materials and methods.** A 45-year-old woman was referred to our department by her otolaryngologist for a bilateral tinnitus related to TMD. The patient presented a II class/division 2 malocclusion, clicking sound on the right TMJ with deviation on the right side during opening of the mouth and without limitations during opening and lateral movements, wear facets on the upper and lower canines and incisors. She complained about otological symptoms enduring 10 years: bilateral tinnitus especially on left ear, otalgia and dizziness related to neck and shoulder pain. Since she wore occlusal splint for bruxism, dizziness and otalgia have disappeared. Trunk, cervical and orofacial pain were evaluated using VAS. She reported that pain was localized on the neck and shoulder, was scored 5 and interfered 20% with everyday life. Muscle palpation revealed presence of MTPs on left and right deep masseter and on left temporalis tendon and, especially, on the left SCM (sternal head) which evoked increase of tinnitus on the left ear. Thereafter the patient was examined by an otolaryngologist. Anamnesis questionnaire was positive to somatosensory tinnitus. Audiometry test showed bilateral normal hearing and tinnitus presented 10 dB loudness level at frequency test of 2 kHz. Total THI (Tinnitus Handicap Inventory) score determined presence of slight tinnitus handicap (grade 1). Treatment consisted in three sessions of Stretch & Spray technique so as to deactivate MTP on cervical and shoulder muscles. Stretch and spray technique was accomplished with the patient seated and anchored by arms to the seat, then by stretching passively SCM muscle and spraying a ethyl chloride vapocoolant (Liotonice Spray, Sanofi-Aventis) on skin around affected muscle and bottom up to unilateral digastric, masseter and temporalis muscles. After spray application, an isometric contraction of SCM muscle is induced by tilting head to the same side of coolant appliance against operator resistance for 25 seconds and after that the SCM-TP was once again manipulated. Each session was performed weekly in association with daily hot packs application.

**Results.** After stretch and spray sessions, the patient reported that pain disappeared. Absence of MTP and decrease of muscle pain score was found by muscle palpation. Total THI score decreased and tinnitus presented 20 dB loudness level at frequency test of 8 kHz. Patient follow-up lasted one year and revealed a progressive reduction of tinnitus level as far as disappearance of tinnitus associated to absence of myofascial pain syndrome.

**Conclusions.** MTP deactivation induces a reduction of tinnitus. So Stretch & spray technique may be a valid therapy for somatosensory tinnitus.



### STABILOMETRIC AND ELECTROMYOGRAPHIC EVALUATION BEFORE AND AFTER COMPLETE DENTURES REHABILITATION

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**Aim.** The goal of static stabilometric analysis is the evaluation of postural control of a subject in a standing position, through the quantification of postural sway and the relative contribution made by various components of the postural system. The objective of this work is to evaluate the changes in body posture and masticatory muscles before and after complete dentures rehabilitation in a selected sample of Italian and immigrant poor patients with social disability.

**Materials and methods.** The sample consisted of 60 patients, 34 males and 26 females, aged between 56 and 85 years and an average of 68.8; inclusion criteria: fully edentulous; exclusion criteria: presence of oto-neurological diseases with impaired balance or neuromuscular apparatus. The stabilometric examination was performed with a baropodometric footboard (Zebris-Sx, Zebris Medical GmbH, Isny - Germany). The patient was in Romberg position without shoes and each test lasted 30 seconds. The body posture was analysed with opened and closed mouth and during clenching on cotton rolls between the edentulous arches; these tests were performed both with closed and opened eyes. The following parameters were assessed: the area of the ellipse, the track length and the average speed. We evaluated also the interference stomatognathic index relative to the surface and to the length. The electromyographic analysis was performed with a Bio EMG III (BioResearch Inc., Milwaukee, WI - USA). The average power of the masseter and anterior temporal muscles was recorded with the mandible at rest, during clenching, tapping and swallowing. All these measurements were made before (T0) and 3 months after (T1) the prosthesis rehabilitation.

**Results.** The data analysis collected during our study shows that any muscle imbalances in edentulous patients be considerably reduced after prosthetic restoration and there was a normalization of stomatognathic interference indices and in cases where these indices have remained significant, there was also an improvement of the indices and in however, from a clinical point of view, an absence of balance symptoms.

**Conclusions.** Prosthetic rehabilitation with complete dentures has changed the stabilometric and electromyographic parameters showing a marked improvement in the indices evaluated and chewing ability of rehabilitated patients.



#### TEMPOROMANDIBULAR DISORDERS IN L'AQUILA BEFORE THE EARTHQUAKE

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**Aim.** The present work is an epidemiological analysis with the objective to assess the frequency of symptoms of temporomandibular disorders (TMD) and their association with the psychological status and disability related to dysfunctional pain patients, on a large sample of the population in L'Aquila, Italy.

**Materials and methods.** The study was conducted using a telephone survey, in the year 2008. 500 subjects were telephonically interviewed and were selected randomly from a population of 25262 Telecom customers of the city of L'Aquila. The Research Diagnostic Criteria (RDC) for temporomandibular disorders (TMD) developed by Dworkin, were used to assess the levels of TMD. The element that characterizes the RDC is the dual-axis system used to classify and quantify both the physical and psychological components of the DTM. More precisely, the valuation of the RDC allows to the dentist a diagnosis of Axis I according to the physical characteristics of the disorder to distinguish the DTM into three groups: muscle disorders, dislocations joint disc position and other conditions. There is also a second diagnosis, called Axis II, which refers to the intensity of the pain, its inability to chronic pain and resulting limitations, depression and non specific physical symptoms that suggest a tendency to somatization. It was therefore not possible to make an objective clinical examination on the same subjects interviewed, no data are available regarding the objective signs of the TMD, so the results of our study relate only to the symptoms reported of TMD.

**Results.** Based on what has emerged from the assessment of Axis I, 333 (66.6%) subjects reported at least one symptom TMD. In addition, 148 (29.6%) of these subjects reported the simultaneous presence of more symptoms. Among subjects without joint disorders, Axis II in the evaluation, 28/352 patients (8%) were depressed, while among the depressed subjects with TMD were 58/148 (39.2%). The statistics evaluations, for the depression, show a significant difference ( $p < 0.001$ ) between symptomatic and non-symptomatic subjects. So, in symptomatic subjects for TMD is higher the probability of finding the depression. Furthermore, in subjects with these disorders there is a greater tendency to somatization ( $p < 0.001$ ).

**Conclusions.** In the population of L'Aquila, 33% of the subjects have at least one sign of TMD, the age group most affected is between 25 and 44 years and women are more affected. Finally, another important finding is the significant association between TMD and somatization / depression. This is important in order to establish a multidisciplinary approach in the treatment of temporomandibular joint disorders.



### THE USE OF STABILOMETRIC PLATFORM IN THE ASSESSMENT AND IN THE FOLLOW UP OF DYSFUNCTIONAL PATIENTS

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**Aim.** The aim of the research is to evaluate the possibility to use the stabilometric platform in the assessment and in the follow up of dysfunctional patients. The study takes into account patients who suffer TMD and who are under a therapeutic treatment and also suffer of posture troubles. The analysis is carried out by an electronic platform.

**Materials and methods.** A selected sample of 30 patients affected by TMJ dysfunctions, diagnosed according to the RDC/TMD criteria, was subjected to a stabilometric platform exam before (T0) and a year after the conservative treatment (T1). The parametric variables considered and compared were Romberg, occlusal and cervical indexes. The purpose of data collection followed two focuses: assess the validity of the electronic equipment in the diagnostic phase and verified the responses of the indices after the treatment comparing them with clinical data using the Numeric Visual Scale for pain in Temporomandibular joint, for the headache and neck pain. A descriptive statistical basis analysis and the parametric Pearson index were used.

**Results.** The results showed that the mean and median of all the indices tend to roll away from the range of significance and the trend is better in the second control, so after one year of treatments. Statistically the Pearson's coefficient is valid if between -1 and +1, 0 represents the absence of correlation: it was 0,47 for Romberg, 0,21 for cervical index, and 0,46 for the stomatognathic. The significance indices of the sample went from 67% to 37% for Romberg, from 77% to 27% for cervical, and from 60% to 3% for stomatognathic. The NVS noted a decrease in the average algic values: from 76 to 38 for TMJ pain, from 74 to 42 for headache and from 86 to 51 for neck pain.

**Conclusions.** The comparison between statistical and clinical data indicate a significant correlation between the two evaluations. The results seems to support the use of stabilometric platform as complementary instrumental examination in the diagnostic phase of the dysfunctional patients so that it has proved a valuable aid to clearly quantify the treatment outcomes. Further research is needed to validate the results of this study.





### VARIATION OF DYNAMIC FORCE IN A GROUP OF ATHLETES BY USING OF A BITE

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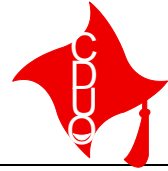
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**Aim.** Nowadays for an athlete it is important not only the physical training but also the use of medical devices in order to support the prevention of sport injuries and to improve sports performance for a better psycho-physical management of the sport activity itself. For this reason the aim of this study was to evaluate the variation of the dynamic force of the upper and lower limbs in athletes engaged in weight lifting during exercises performed with overload, with and without the use of a bite.

**Materials and methods.** Twenty-four athletes practicing weightlifting at least from five years and with a training frequency of three times a week were selected for the study and followed for a period of eight weeks during exercises performed with overloads with and without the use of a bite. They were divided into two groups: the group that used the bite (GW: 13 male athletes, mean±SD: 27±5 years of age, 78±7 kg in weight, 176±4 cm in height ) and a control group that did not use the bite (GC: 11 male athletes, mean±SD: 28±6 years of age, 78±11 kg in weight, 175±6 cm in height). For each GW group athlete has been realized a personal bite after evaluation of condylar movements through axiographic registration with Cadiax Dyagnostic (Gamma Dental, Austria) and subsequent installation of model casts in articulator in centric relation (natural rest position of the mandible) in order to provide to each athlete the most comfortable occlusion during the physical effort. The dental contacts on the bite were verified both in the articulator and directly in the patient's mouth by means of the T-Scan III, which allows a sophisticated computerized occlusal analysis both in maximum intercuspitation, both in the gradual achievement of this. The strength tests were carried out with strength machines, benches and rockers for both upper and lower limbs. For the statistical analysis was used a non-parametric statistics and the significance was set to  $p \leq 0.05$ .

**Results.** and conclusions No change in acute was found at the beginning of the study (T1) between GW and GC (Mann-Whitney U-test for independent samples) and between GW and GWO (study group without bite) (Wilcoxon test for dependent groups). In contrast, eight weeks after (T2), the increase of the strength was significant especially for GW, which showed the greatest variation of the performance (44%  $p < 0.001$ ). The other average percentage increases were 37% in the GWO ( $p < 0.001$ ) and 31% in the GC ( $p < 0.001$ ). These results allow us to conclude that wearing a bite during sport activities does not introduce changes in strength in acute, but results in an improvement in performance in a long-term use.





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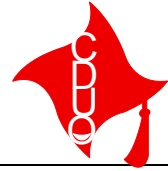
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**DIGITAL PLANNING AND SURGERY THE ULTIMATE IMAGE BASED PROCEDURE FOR A SUCCESSFULL IMMEDIATE LOADING REHABILITATION**

Sh. Ehsani, M. Manacorda, P. Capparè, R. Vinci, G. Gastaldi



### 3D-CAD PLANNING FOR THE TREATMENT OF EDENTULOUS JAWS: AN AID FOR A PROSTHETICALLY DRIVEN REHABILITATION

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**Aim.** The first aim of the study is to compare a 3D virtual planning with the real position of the implants inserted with a free-hand flapped technique. The second aim is to evaluate the 3D planning, made by the surgeon, as a prosthetically driven rehabilitation.

**Materials and methods.** Two patients treated in the Dental School Prosthesis Department of Turin, asking for a full-arch fixed rehabilitation of both upper and lower jaw, were selected. A double scanning TC was made (one with a radiologic template inside the mouth and the other without). The surgeon planned the position of the implants with a 3D software (NobelClinician™) and then inserted four implants (All-on-Four™ technique) with a free-hand method. The comparison between the planning and the real position of the implants was made with the Amira™ software: the model obtained from the surgical template is compared with the one obtained from the post-surgical impression.

**Results.** On the axial plane there is a mean difference of 2.5mm ( $\sigma=2.11$ ), on the sagittal plane of 15.0° ( $\sigma=11.09$ ), on the frontal plane of 7.6° ( $\sigma=5.46$ ). The measurements can be divided between anterior and posterior zones: for the anterior implants the mean difference on the axial plane is 1.1mm ( $\sigma=1.04$ ), on the sagittal plane is 14.6° ( $\sigma=9.85$ ) and on frontal plane is 5.9° ( $\sigma=4.78$ ); for the posterior implants the mean difference on the axial plane is 3.9mm ( $\sigma=1.57$ ), on the sagittal plane is 15.5° ( $\sigma=14.48$ ), on the frontal plane is 12.1° ( $\sigma=6.93$ ).

**Conclusions.** As expected, with a free-hand flapped technique it is impossible to respect perfectly the implants position planned by a 3D software. In order to insert the implants as perfectly planned, it is necessary to use the guided surgery. However, the 3D-CAD analysis is very useful for the surgeon to planning the surgery.





### A CLINICAL AND RADIOGRAPHIC CROSS SECTIONAL STUDY ON SHORT IMPLANT WITH A FOLLOW-UP OF 11 YEARS

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**Aim.** The aim of this retrospective clinical and radiological study was to investigate our success rate with short implants (7 and 8.5 mm, machined-surface 3i® and Osseotite®, Biomet 3i Implant Innovations, Palm Beach Gardens, FL, USA), implanted from 1992 to 2003 in partially and totally edentulous patients with jaw bone atrophy.

**Materials and methods.** This clinical and radiological retrospective study was conducted at the Dentistry Clinic of the University of Padova (Italy) and involved 119 patients, 26 men and 93 women, with 290 3i® implants, implanted between May 1992 and September 2003. The implants were 7 or 8.5 mm in length and 3.75 or 4 mm in diameter. Patients were invited to attend a radiographic and clinical follow-up and their previous clinical files and x-rays were assessed. Radiographic measurements were taken on standardized periapical radiographs obtained by an experienced radiologist using the long-cone technique and the Rynn system (XCP Instruments, Rinn Corporation Elgin, IL, USA). A digital radiological system was used (Vario DG, Sirona Dental System, Bensheim, Germany). The landmarks were established twice, 1 week apart, by two examiners reaching a consensus. Linear distances between landmarks were measured in millimeters. The following linear measurements between landmarks were taken (1) anatomical crown length (perpendicular distance from the implant shoulder to the most coronal aspect of the crown); (2) anatomical implant length (perpendicular distance from the implant shoulder to the most apical aspect of the implant); and (3) crestal bone level (perpendicular distance from the implant shoulder to the first visible apical bone-to-implant contact in the mesial and distal aspects of the implant). Real measurements were calculated with the rule of three using the real implant length or the distance between threads as the reference values. The precision of the radiographic measurements was calculated by comparing the values of the first and second radiographic readings.

**Results.** The mean time from stage-one surgery to latest follow-up was 11 years (range 4.5-16.33 years). 151 of the implants were 7 mm long and 139 were 8.5 mm long, and the survival rate was 98% in both cases (1 implant was lost for both sizes). The cumulative survival rate was therefore 98%. We used 77 implants with a smooth surface (machined-surface 3i®), 69 of which were 7 mm long and 7 were 8.5 mm long (survival rate 99%) and 61 implants with a roughened surface (Osseotite® implants, 4 of which were 7 mm long and 57 were 8.5 mm long (survival rate 98%). The mean bone resorption for the 7 mm implants was 1.46 mm mesially (SD 0.5) and 1.42 mm distally (SD 0.5); for the 8.5 mm implants it was 1.48 mm mesially (SD 0.5) and 1.43 mm distally (SD 0.5). There was no statistically significant difference in terms of bone resorption between the two different implant lengths (7 vs 8.5 mm; p-value=0.7450) or diameters (3.75 vs 4 mm; p-value=0.8331), or the smooth and rough implant surfaces (p-value=0.2485).

**Conclusions.** The cumulative survival rate for the 7 and 8.5 mm implants in our series was 98%, a result comparable with other reports in the literature. The different implant lengths and types of surface finish on the implant do not appear to influence implant survival. Short implants appear to be a valid option for patients with severe atrophy.



### ADVANTAGES AND LIMITS OF COMPUTER-GUIDED IMPLANT SURGERY

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**Aim.** Aim of this work is to evaluate and present clinical advantages and limits of using computer-guided flapless implant surgery to rehabilitate edentulous arches with immediate prosthesis. We scrutinized the current scientific literature and we have also reported our clinical experience on the subject.

**Materials and methods.** We evaluate different parameters to analyze clinical advantages and limits of using computer-guided flapless implant surgery: implant and prosthesis survival rates, technical and biological complications, duration of treatment, immediate function, simplification of the treatment by optimal implant positioning, surgical trauma and post-operative pain, post-operative complications, economic sustainability.

**Results.** In literature there are only three systematic reviews on this subject. Most of the studies in literature takes into consideration only the accuracy of implant placement, without focusing on other aspects of this technique. In our clinical protocol we treated 13 patients, for a total of 66 implants inserted: (46 in the maxilla, 20 in the mandible). Both the scientific evidence and our clinical experience suggest that guided implant placement shows at least as good implant survival as conventional protocols. The reported implant failure rate is comparable to conventional surgery. The computer-guided implant concept in combination with immediate loading is marketed as easy, safe, and predictable. However, several complications or unexpected events at guided implant and prosthesis placement were reported. In agreement with the literature, we also noticed a significant reduction in immediate postoperative pain, use of analgesics, swelling, edema, hematoma, hemorrhage, and trismus when flapless guided surgery was performed, compared to traditional techniques with the elevation of a flap. Even if the duration of the surgical intervention may be shorter with flapless guided surgery compared to conventional techniques, it seems that much more time has to be invested in the preoperative planning. This, together with the uncertainty regarding the total cost of the treatment, makes it difficult to estimate the cost-effectiveness of different guided surgery protocols. No information regarding cost-effectiveness measurements are available in the scientific literature.

**Conclusions.** The limited scientific evidence available suggests that guided placement has at least as good implant survival as conventional protocols. However, as in literature as in our daily practice we noted that the possibility of unexpected adverse events during guided implant placement indicates that the clinical demands on the surgeon were no less than those during conventional placement. The most evident advantage with flapless guided implant surgery is that the technique is likely to decrease pain and discomfort in the immediate postoperative period. Further investigations are needed with a longer follow-up and analyzing the application of the technique even in cases of severe atrophy.



### **ANATOMICAL REMODELING OF BUCCAL BONE PLATE IN 35 PREMAXILLARY POST-EXTRACTION IMMEDIATELY LOADED SINGLE TPS IMPLANTS: A 10 YEARS RETROSPECTIVE RADIOGRAPHIC INVESTIGATION.**

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**Aim.** Dental implants represent the ideal option to restore an anterior tooth, particularly when immediate placement can be used. A surgical approach, known as anatomical remodeling technique (ART), was proposed to avoid the use of biomaterials to fill the residual gaps between the post-extraction socket and the implant. The purpose of the present study was to clinically and radiographically evaluate immediately loaded post-extractive single implants placed with the ART, after a 10-year follow up.

**Materials and methods.** Thirty-five patients, with an hopeless tooth in the anterior maxilla, were included in the study, and 35 implants were inserted according to the ART. Clinical and radiographic evaluations were performed at baseline (T0), after 6 months (T1), after 14 months (T2), 4 years after surgery (T3) and every other year up to the 10-year follow-up (T4, T5 and T6). Implant success, survival, and failure rates were evaluated according to the International Congress of Oral Implantologists (ICOI) Pisa Consensus Conference criteria.

**Results.** Twenty-nine patients and 29 implants were available for the 10-year data analysis, because 6 patients dropped out. After 10 years, the accumulated mean marginal bone loss was  $3.63 \pm 0.42$  mm. The cumulative survival rate of the implants was 100%.

**Conclusions.** Immediately loaded post-extractive implants, placed according to the ART, have been proved to be a predictable method to rehabilitate single tooth in the anterior maxilla. This technique allowed the placement of immediately loaded post-extractive implants without the use of bone substitutes, and lead to good clinical and aesthetic outcomes after a 10-year follow up.



### BONE BEHAVIOR IN RELATION TO THE DEPTH OF THE LINE OF MARGINAL CEMENTATION OF PROSTHESES ON CONE MORSE IMPLANTS: RADIOGRAPHIC EVALUATION IN A DOG MODEL

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**Aim.** Due to the controversies regarding cemented crowns, considered by clinicians a worse biologic option compared to screw retained prosthetic devices, the aim of this study was to evaluate, through radiographic analysis, the effect of three different depths of the cementation line of prosthetic crowns on the bone response around Cone Morse implants.

**Materials and methods.** Five mixed-breed dogs underwent extractions of all of their lower premolars, and after 3 months placement of 30 implants and abutments was performed. The implants were installed 3 mm apical to the bone level. Each animal received 6 implants equally divided in their right and left sides. The distance between the implants was 4.5mm and they were inserted at middle distance between the buccal and lingual bone crests. Abutments with three different transmucosal dimensions were installed and the cementation line was positioned respectively 1.5mm apically, and 0.5 and 2.5mm coronally to the bone level. In the control group, implants and abutments were placed without crowns, and therefore no cementation line existed. In the test group, cylinders of alumina were immediately cemented to the abutments with Zinc Oxide-Eugenol cement. The radiographic evaluations were performed at implants placement and 10 weeks after their insertion. Standardized Periapical radiographs were taken and analyzed with the AutoCAD® software. The differences between the different cementation line positions were statistically compared.

**Results.** All implants remained stable, with no complications observed throughout the experimental period. The results showed no statistically significant differences between the control and the test group at different depths in relation to bone tissue, both at the mesial ( $P=0.18$ ) and the distal portion ( $P=0.50$ ) of the implants.

**Conclusions.** Within the limits of the study, in dog mandibles, different depths of cementation did not affect the behavior of marginal bone, indicating that crowns can be cemented at any distance or even at the bone level without disturbing the bone healing around Cone Morse implants.



### BONE DEFICIENCY IN A CHALLENGING IMPLANT CASE

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**Aim.** This case wants to show step by step the single tooth restoration by immediate implant placement, trying to explain the importance of proper management of bone and gingival tissue for a long term success and how the predictability of immediate implant placement with minimum invasion can lead to evolution of bone peak and zenith level of surrounding gingiva.

**Materials and methods.** A 43 years old man has a deciduous tooth in position 26 with mobility grade 1 and pain. The tooth shows a root resorption with loss of mesial bone peak and lack of the mesial contact point. Also, it isn't respected the distance between the bone peak and the optimal prosthetic contact point for a proper maturation of soft tissues. After atraumatic tooth extraction, removal of granulation tissue and assessment of surrounding bone, an immediate implant is inserted in the site with grafting material. The prosthetic component is cut at the correct height and then positioned over the implant. The provisional is relined with acrylic resin, paying attention to apply the provisional only when resin shows opacity at the surface. The internal screw is protected by some cotton. Blue wax is used to seal the prosthetic component against resin infiltration. The crown is relined under occlusion and the blue wax is visible through the resin. This tip helps to find the path towards the internal screw for removal and refining. The provisional was relined with acrylic resin paying attention to apply the provisional only when resin show opacity at the surface. This means that the resin is more dense and don't penetrate too much the extraction site. The screwed provisional is shaper in order to obtain an s-line contour of the emergency profile. After the final positioning of the provisional a couple of single suture are performed in order to gain adherence of the surrounding tissue to the provisional. The temporary crown is lowered to a 1mm away occlusion and the final restoration is delivered 6 months after implant placement.

**Results.** The Predictability of good profile about soft tissues is achieved by a simplified implant prosthetic protocol and an adequate prothesis design, progressing from healing abutment to definitive crown. After 3 years, soft tissue around implant doesn't show recession in comparison to soft tissue around adjacent molar that suffered recession.

**Conclusions.** An implant placement in the right position accompanied by a proper emergency profile prosthetic restoration gives a long predictability and ideal aesthetics of gingival line. Zenith level can be controlled with a proper emergency profile shaping.



### **BONE FORMATION IN SINUS AUGMENTATION PROCEDURES USING AUTOLOGOUS BONE, PORCINE BONE AND 50:50 MIXTURE: A HUMAN CLINICAL AND HISTOLOGICAL EVALUTATION AT 2 MONTHS**

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**Aim.** The aim of the present study was to perform a 2 months clinical and histological comparison of autologous bone, porcine bone and a 50:50 mixture in maxillary sinus augmentation procedures.

**Materials and methods.** A total of 10 consecutive patients, undergoing two-stage sinus augmentation procedures using 100% autologous bone (Group A), 100% porcine bone (Group B) and a 50:50 mixture of autologous and porcine bone (Group C) were included in the present study. After a 2-month- healing period, at the time of implant insertion, clinical evaluation was performed and bone core biopsies were harvested and processed for histological analysis.

**Results.** The postoperative healing was uneventful regardless of the materials used for the sinus augmentation procedures. The histomorphometrical analysis revealed comparable percentages of newly formed bone, marrow spaces and residual grafted material in the three groups.

**Conclusions.** The clinical and histological results of the present study indicated that porcine bone alone or in combination with autologous bone are biocompatible and osteoconductive materials and can be successfully used in sinus augmentation procedures.



### BUCCAL BONE DEFICIENCY IN FRESH EXTRACTION SOCKETS: A PROSPECTIVE SINGLE COHORT STUDY

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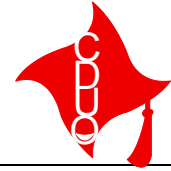
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**Aim.** The initial thickness of the buccal bone overlying maxillary anterior teeth has a significant impact on the responding level of facial soft and hard tissues after extraction. A facial alveolar bone thickness, amounting to less than 2 mm, put its integrity at risk of fenestration, dehiscence and soft tissue recession. As a consequence, aesthetical damage and alteration in the osteointegration of the immediate implant might occur. The purpose of this prospective single cohort study was a clinical evaluation of the use of xenograft and collagen membranes in treating full or partial buccal bone defects of fresh extraction sockets in the aesthetic zone. The implant placement was delayed and the follow up was planned at least for five years.

**Materials and methods.** Thirty-three patients requiring tooth extraction in the anterior maxillary area and showing a complete or partial buccal bone plate deficiency (more than 2 mm) were consecutively enrolled and treated. Corticocancellous porcine bone and platelet-rich fibrin (PRF) with a collagen membrane were used to graft the extraction sockets and the membranes were left exposed to the oral cavity with a secondary soft tissue healing. The outcome variables were as follows: width of keratinized mucosa (evaluated at baseline, 5 months after extraction and grafting procedure, and 1 year after implant restoration); facial soft tissue levels (evaluated at baseline, 5 months after tooth extraction and 1 year after implant restoration); clinical vertical bone changes (evaluated at baseline and after 5 months, measured at mesial, distal and lingual/palatale site with a clinical splint); implant (diameter and length) and prosthesis failures; peri-implant marginal bone changes and requirement of further bone contouring procedures.

**Results.** All treated sites allowed the placement of implants; the width of keratinized mucosa at the mid-facial aspect showed an increase of 2.3 mm 5 months after the grafting procedure and its value was  $3.2 \pm 0.6$  mm at 1 year follow-up. The mean values of the facial soft tissue level indicated an increase over time. The bone level showed an improvement of  $0.8 \pm 0.1$  mm and  $0.7 \pm 0.1$  mm at mesial and distal sites, respectively, when compared to the baseline measurements. Finally, in the palatal area no bone changes were observed. No implant failed during the entire observation period.

**Conclusions.** Findings from this study showed that xenograft and PRF, used for ridge preservation of the extraction sockets with buccal bone plate dehiscence in the aesthetic zone, can be considered effective in repairing bone defects before implant placement. The secondary soft tissue healing over the grafted sockets did not compromise bone formation; moreover, the soft tissue level and the width of keratinized gingiva showed a significant improvement over time. The 1-year results are promising but should be confirmed by a longer follow-up study.



### CAD/CAM DESIGNED HYDROXYAPATITE SCAFFOLD IN CRANIOFACIAL DEFECTS: A SYSTEMATIC REVIEW

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**Aim.** The aim of the review is firstly to verify the optimal mechanical and biological properties of HA in vitro and in vivo, comparing to other synthetic materials. Secondly the CAD/CAM technique using porous HA scaffold was evaluated to estimate its real efficacy with clinical and radiological assessments.

**Materials and methods.** A systematic literature search on the electronic database of National Library of Medicine (PubMed- MEDLINE) was conducted using search terms to identify relevant articles regarding the aim of the review. Inclusion criteria selected for the current systematic review are: 1) histological evaluation of the effective biocompatibility and osteoconductivity of porous HA in vivo and in vitro 2) evaluation of the mechanical properties of HA in relation to its porosity 3) compared evaluation of biological and mechanical properties between several biomaterials in order to assess whereas HA is preferable in relationship to different clinical situation 4) clinical and radiological evaluation of the precision of the CAD/CAM technique.

**Results.** Among the synthetic materials, hydroxyapatite has proved excellent osteoconductivity and biocompatibility in vitro and in vivo comparing to other biomaterials. Porous hydroxyapatite (HA) is a more readily resorbable and more osteoconductive material than dense HA, however the strenght decreases exponentially with the increase of the porosity. Mechanical tests showed that fabricated HA scaffolds with pore diameters ranging from 400 to 1200 microns had compressive modulus and strength within the range of human craniofacial trabecular bone; this implies that they can be easily used for bone regenerative rehabilitations.

**Conclusions.** Several studies in vivo have evaluated optimal clinical and radiological results using HA scaffold as grafts before implants position even after several months on both human mandibula and maxilla. In conclusion, using CAD/CAM technique for HA scaffold could increase grafts stability and reduce surgical operative time.





### CELL DIFFERENTIATION ON MICROTEXTURED TITANIUM SURFACES IS ASSOCIATED TO INCREASED CONNEXIN 43 EXPRESSION

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**Aim.** The structure and topography of implant surfaces contribute to regulate osseointegration, by affecting the adhesion, proliferation and gene profile of cells colonizing the device. The aim of the present work was to investigate the differentiation pattern of murine osteoblastic MC3T3 cells growing on control smooth (Machined) or rough titanium samples, namely commercially available Zirti discs, or experimental surfaces obtained through Zirti protocol modifications, and herein labelled as Zirti FM, Zirti F, Zirti M.

**Materials and methods.** Cell viability was measured by MTT assay after plating mouse calvaria MC3T3 cells on Zirti, Zirti FM, Zirti F, Zirti M surfaces, provided as sterile 10 mm discs by Sweden&Martina (Due Carrare, PD, Italy). We then measured gene expression at Real Time PCR and, to better understand how cell-to-cell contacts are modulated by surface topography, we analyzed cell morphology by Scanning Electron Microscopy and immunofluorescence.

**Results.** Cell viability was higher on smoother surfaces, as reported in the literature. The expression of Collagen 1a1, the main component of extracellular matrix, showed striking similarities with the cell proliferation pattern, suggesting that higher proliferating cells also expressed higher levels of collagen. However, this tendency was reversed with differentiation markers, whose levels were increased on rough surfaces: more specifically, the expression of the early differentiation marker Alkaline Phosphatase was higher on Zirti F surfaces whilst the mRNA levels of later osteoblastic markers Osteoprotegerin and Osteocalcin was enhanced on Zirti M, indicating that different treatments may also affect differentiation timing. Noteworthy, the expression of Connexin 43 (Cx43), a component of gap junctions and membrane hemichannels followed a similar pattern to differentiation marker genes, and was lower on smooth surfaces and highest on Zirti-M samples. Microscopy revealed that noteworthy, cells on smooth discs engaged in more numerous cell-to-cell contacts, albeit low Cx43 expression, whereas cells on Zirti-F surfaces were more sparsely scattered on the sample, though presenting with four-fold higher levels of Cx43. This suggests that Cx43 on osteoblastic cells growing on rough titanium surfaces may be mostly acting as hemichannel components, that is membrane-associated channels that allow different paracrine stimuli to be released in the extracellular microenvironment.

**Conclusions.** Taken together, the present findings identify the possible role of a hitherto ignored component of the surface-mediated osteoblastic differentiation process, potentially a novel target to enhance bone implant integration. Further studies will be needed to better investigate Cx43 function in osteoblasts on micropatterned titanium surfaces.



### CHANGES IN SALIVARY ANTIOXIDANT CAPACITY AFTER ORAL SUPPLEMENTATION IN DENTAL IMPLANTS

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**Aim.** Oxidative stress i. e. the unbalance between the production and elimination of reactive oxidant species by antioxidant systems plays a relevant role in the pathophysiology of many oral diseases like periodontitis as well as in tissue regeneration and osteointegration after dent implantation. On the other hand growing evidence suggests the potential usefulness of antioxidant formulas as preventive or adjunctive treatment to improve the success of implantations. The aim of the present study was to evaluate the effects of a combined local (toothpaste) and systemic (oral supplementation) antioxidant treatment on total salivary antioxidant capacity and some clinical outcomes in patients undergoing delayed dental implantations.

**Materials and methods.** In this perspective case-control clinical trial 50 apparently healthy peoples candidates to a conventional delayed implantation were randomised to receive an antioxidant treatment (test group, TG, N=25, 13 F and 12 M, average 52 year old) or nothing (control group, CG, N=25, 10 F and 15 M, average 50 year old). The antioxidant treatment included the combination of a pomegranate-based toothpaste and a liquid oral antioxidant supplement (containing selenium, vitamin C, E and A, b-carotene, red fruits extracts, Zn, L-cysteine, coenzyme Q<sub>10</sub>, and pirydoxin). Salivary total antioxidant capacity to be intended as iron reducing capacity was measured by a photometric assay (optimal value 1,000 to 1,500 mM, using vitamin C as standard), before, after and four times during the follow-up (2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> week). A visual analogical scale was administered to the all recruited subjects in order to evaluate the degree of oral inflammation (as rubor, calor, dolor, and tumor).

**Results.** No statistically significant difference was found at the recruitment time between TG and CG except for the different M:F ratio. All the subjects completed the study and achieved the success of the implant (after 24 Months of treatment). Salivary total antioxidant capacity increased significantly before implantation compared to the first visit, (1530 ± 89 vs. 1270 ± 97 mM, p<0.05) only in the TG while it remained unchanged in the CC and picked in both groups immediately after intervention with the TG showing the highest increase during the follow-up period. Daily measurements up to ten days after implantation showed a faster significant decrease of all inflammation symptoms in the TG compared to the CG (p<0.05). The combined treatment of toothpaste and oral supplement was safe and well tolerated; no unwanted side effect were reported by the subject who completed all the 5-week treatment.

**Conclusions.** The integration of dental implantation protocol with antioxidants as toothpaste and oral formula was associated to a significant increase of salivary total antioxidant capacity after one week of treatment before implantation and immediately after intervention compared to controls. Although preliminarily these findings suggest that the control of oxidative stress and local inflammation by antioxidant supplementation may optimize the efficacy of classical protocol of delayed dental implantations.



## CHRONIC SINUSITIS WITH SEVERELY ATROPHIC JAWS: NEW PERSPECTIVES IN IMPLANT-PROSTHETIC REHABILITATION WITH THE USE OF BIO-OSS®/ SINT OSS AND PRF®

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**Aim.** The aim of the present study is to evaluate if sinus lift surgery can cause further complications or a clear worsening health in patients with clinical or radiological manifestations affecting the sinus. This study aims at verifying if, in cases of diagnosed alterations of normal sinus homeostasis or frankly pathological situations, they go through positive or negative alteration after sinus lift surgery, or if they can be considered as a real negative predictive factor of the prognosis of the rehabilitation.

**Materials and methods.** The sinus lift procedure was carried out to 28 edentulous patients with severe atrophy of the alveolar ridge. The response to surgery was evaluated over time. 28 patients with chronic sinusitis caused by a thickened Schneiderian membrane were selected and 75 fixtures were placed after sinus augmentation according to Tatum's technique. The whole cohort of patients was initially subjected to OPT X-rays and DentaScan CT. 8 patients presented with slight alterations of the sinus membrane, 13 with membrane thickness within 5 mm, 7 with sinus opacity more than one third. Examination of the Ears, Nose, and Throat (ENT) was recommended and an 8-day aerosol therapy (with antibiotic associated to 20 milligrams of cortisone per day) was administered before and after sinus lift surgery. The thickness of the residual basal bone was between 4 and 7 millimeters in 24 patients (one stage), while only in 4 patients it was less than 5 millimeters (two stage). Geistlich Bio-Oss® bovine bone (50% cortical and medullary and 50% with beta-tri-Calcium phosphate, puriss) and Sint Oss by "Industrie Biomediche e Farmaceutiche srl" were used, with the addition of growth factors from PRF®.

**Results.** Control CT scan performed 12 and 24 months after surgery showed total regression of the thickened Schneiderian membrane in 8 patients; 13 cases appeared with approximately 5 millimeters of thickness with a 50% reduction; in the 7 cases with the most compromised maxillary sinuses, the results varied according to the disease the patient had from the beginning: 2 of the cases of almost total sinus opacity showed an important improvement of the clinical picture; the radiopacity was reduced by one third in one patient, while the pathology completely disappeared in three patients. Only in one case there was no evident improvement. 100% of patients immediately perceived an improved nasal respiration; even in these 7 cases which were less suitable to undergo surgery, there was a success of the regenerative therapy and no worsening of the clinical picture, with a complete implant prosthetic success.

**Conclusions.** The examined sample is limited to draw definitive conclusions. Radiographic and clinical results confirm the beneficial effects in the immediate postoperative period, opening up encouraging prospects in the management of patients affected by chronic (non-pathological) sinusitis who can be subjected to implant rehabilitation of the atrophic jaw. The hyperplastic and edematous membrane reduces the risk of perforation during surgical maneuvers and sinus lifting contributes to improve secretion drainage. The association of resorbable biomaterials and growth factors from PRF® have certainly fostered a quicker transformation of the neo-apposed bone into mature bone (confirming implant stability) and a rapid reduction of the chronic inflammation affecting the hypertrophic Schneiderian membrane.



### CLINICAL BENEFITS BY USING INTERNAL TAPER CONNECTION IN SHORT DENTAL IMPLANTS. A 2-YEARS FOLLOW-UP RETROSPECTIVE STUDY

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**Aim.** The objective of the present study was to evaluate the clinical and radiological outcomes deriving from the use of short dental titanium implants (6 mm) with internal taper connection in single implant supported crown.

**Materials and methods.** Eight cases of monoedentulism were rehabilitated using Universal In-kone dental titanium implants (Tekka, Brignais, France) 6 mm in length, supporting a single crown. The implants had an internal taper connection (8°) with a length of 2 mm. It was also present an internal hexagon (1 mm in height) to prevent any possible abutment rotation. In all cases, the healing abutments were immediately placed and, after 3 months from the surgery, dental impressions were taken. The prosthetic protocol included a platform switched design of the abutment. Clinical and radiological exams including plaque index (PI), peri-implant probing depth (PPD), bleeding on probing (BOP), suppuration on probing (SUPP), marginal bone loss (RX) and mechanical complications (MC) were performed 6, 12 and 24 months after the final restoration delivery.

**Results.** No implant failure happened. No marginal bone loss was recorded during the follow-up period. Under no circumstances mechanical complications (connection screw loosening or fracture, abutment fracture, fixture fracture) occurred.

**Conclusions.** The taper implant connections aimed to obtain a hermetic seal between fixture and abutment. The direct friction between the two titanium surfaces seems to prevent the bacterial infiltration into the gap (Dibart et al. 2005). Many studies have focused, instead, that the classic screw-retained implant systems (with internal or external hexagon) are characterized by considerable discrepancies (about of 20-30 microns) in the interface between the abutment and the fixture (Persson et al. 1996). The lock-taper connection allows to reduce this gap up to a value lesser than 3 microns and this is guarantee of a good coefficient of friction which ensures a stable seal against bacterial penetration. The bacterial cell size is variable from 1 to 6 microns and it is immediately evident that a gap of 1-2 microns is able to prevent the bacterial infiltration much better than classical internal or external implant connections. Such small tolerance between the two titanium surface in contact (abutment and fixture) assures an excellent degree of mechanical stability which is a key factor involved in the peri-implant bone level maintenance. The use of smaller abutment diameter than the fixture platform (platform switching) allow to create a peri implant biological width horizontal developed with a decreased risk rate of bone loss (Lazzara et al. 2006). Results from the present study show that a short implant supported single crown is a predictable treatment option in case of severe bone atrophy (Lai et al. 2013; Mangano et al. 2013; Mezzomo et al. 2014). Short implants, presenting a taper connection coupled with an internal hexagon, seemed to have many biological and mechanical advantages compared with internal or external connections. Future studies, with a larger number of implants, are needed which compare short implant with different connections to confirm the results of the present paper.



### COMPUTER-GUIDED SURGERY: THE "ANALOGIC APPROACH"

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**Aim.** The aim of this work is to show the most recent innovations in the field of computer-guided implantology that regards the acquisition and coupling of digital X-ray and optical data, virtual waxing and virtual operation planning

**Materials and methods.** we did a research of scientific articles published on international and national journals, using the following words: oral guided surgery, dental implants, 3D surgery and then we studied 20 patients rehabilitated with implant insertion guided by surgical mask, flapless surgery and immediate loading. The virtual data of patients and plaster models were obtained using the same fork with a landmark both in the X-ray scan of the maxilla and in the optical model. The data obtained are then reprocessed using software that combine the results of the two scans.

**Discussion and results.** The technique used, as well as having clear advantages such as greater comfort for the patient both intra and postoperative and reduced risk due to possible complications; has many advantages to the oral surgeon arising by the direct link between anatomical interpretation, treatment plan and execution surgery. Through towards multiplanar reconstructions and virtual approach is possible to interact with the 3D model of patient and simulate the outcome of oral surgery to asses different surgical orientation before starting concrete surgery. 3D Guided Surgery offers us several advantages: the oral surgeon can study the surgical case before the patient sits on the dental chair, so can have a reduction of risks surgery just because the anatomic variations can be visualized in advance, and the implantar overcome is between 91-100%, with an acceptable ISQ (Implant Stability Quotient - acceptable range 55-85); from the point of view of the patient, all the surgical path translates into a less invasive approach, in a reduced operative time and in a better post-surgery healing. Then we must not overlook the most important vantage (and at the same time the most neglected), the prosthetic one: the planning computer-assisted allows us to place the implants optimizing the healing of the patient and the prosthetic rehabilitation. Furthermore, the sovrapposition of optic scansion (analogic technique) between plaster model and the 3D-maxilla data, after we simulate the placement of implants, let us previously analyse the finished work with crown or dental-bridge placed.

**Conclusions.** oral guided surgery is indicated for complete and partially edentulous patient, when they have a satisfactory bone quantity. This alternative approach shows several advantages such as the preservation of the vital anatomic structures, minimal invasive surgery, faster and simple technique that can be obtained with the excellent team-work among radiologist, bioengineer, oral surgeon and dental technician. The real innovation of this analogic technique concerns the higher precision obtained especially gave by the better scanning and interpretation of the soft tissues due to the presence of the model related data. Moreover it is observed the possibility of using this surgery method for the rehabilitation of osteoporotic patients or with hematic diseases.



## **CONNECTION BETWEEN PROSTHETIC OVERIMPLANT MESOSTRUCTURES AND ABUTMENTS, PRECISION PERFORMANCE USING DIFFERENT REALISATION TECHNIQUES –A PRELIMINARY STUDY**

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The improved reliability of techniques for taking dental impressions allows for a much higher quality in the detail and precision of models obtained, allowing us to achieve excellent prosthetic superstructures, even in extended ones. Increased precision standards are fundamental in cases of post-implant immediate load of full dental arches. The success of implant therapy is indeed dependent on the efficacy of prosthetic structure. The introduction and wider use of intra-oral capture equipment or models have radically changed the production process of dental prostheses. Today, waxing and metal casting are supported by CAD constructions of the prosthetic structure which transfer the scanned model directly onto a 3D file, and it is achieved by using computerized milling equipment and laser syntherization. It is clear that, in becoming operator-independent, the production process reaches very high levels of precision and repeatability. In the clinical case presented, two implant operations were performed according to the All-on-Four method, one per arch, on the same patient. The planned immediate load was done on a fixed prosthesis to the implants, screwing into the pre-shaped abutments. In both cases, the realization of the supporting prosthetic mesostructure to the prosthesis elements was carried out by CAD/CAM techniques. Two models were produced for both arches: one virtual model that was obtained by intra-oral capture and the second from a traditional dental impression using plaster cast from implant transfers. In this second case, the CAD mesostructure construction required a further step: an optical scan of the traditional dental impression in plaster cast. The programmed mesostructures were milled from solid titanium thanks via a specific program for digital modeling, and they were then tested. Both of them showed good/adequate fitting, even though there was a differing degree of friction on the abutments. In order to evaluate the differences and quantify the discrepancy between the two structures that had been modeled on the same software by two different dental impressions, the two CAD files were converted into STL format using the Geo Magic program. The automatic software allows for an overlapping of the two models and the dimensions are measured digitally. Results are reported with a mean calculation of the linear differences on three levels. The dimensional difference shows how the model taken from the plaster cast dental impression differs from that of the digital optical dental impression.



### CRESTAL BONE EVALUATION IN CONE MORSE AND EXTERNAL HEX IMPLANTS: A COMPARATIVE HISTOLOGICAL AND HISTOMORPHOMETRIC STUDY IN DOGS

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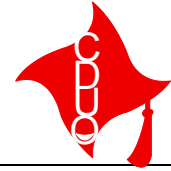
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**Aim.** The aim of the present study was to evaluate the histological and histomorphometrical differences, observed at the marginal bone level, with the use of two different implant-abutment assembly designs (the traditional External Hexagon implant connection and the Cone-Morse tapered connection) in a dog model.

**Materials and methods.** In the first surgical phase, all inferior premolars were extracted in six male mongrel dogs. After 3 months, in the second surgical phase, they received nine 3.5 x 8 mm Cone Morse implants (CM Cortical Titamax – Neodent, Curitiba, Brazil) 2 mm under the bone crest level and nine 3.75 X 8.5 mm External Hexagon Ice Implants (3i, Implants Innovations, Palm Beach, FL, USA) equicrestally. Each dog randomly received 3 implants in the right mandibular side with 4.5 mm interimplant distance, in the middle of the bone crest. An immediate loading protocol was applied and, as prosthetic abutment, a Mini-Pilar (Neodent, Curitiba, Brasil) with a prosthetic diameter of 4.1 mm was used. A protection cap was inserted upon each abutment. After 8 weeks the dogs were sacrificed and samples were retrieved for histological analysis. Mean distance between the original level of the coronal bone level to the top of the implant and the mean distance between the top of the implant and first bone to implant contact were recorded for histomorphometric evaluation from both buccal and lingual side.

**Results.** No implants failed, no inflammatory infiltrate was observed and all implants were osseointegrated. The histological analysis showed bone loss in the External Hex group, while in the Cone Morse group bone growing on the implant shoulder was detected. No significant differences ( $P > 0.05$ ) were found when the mean distance between the original level of the coronal bone level to the top of the implant were compared in External Hex and Cone Morse groups. Significant differences were found when compared the first bone to implant contact between the two groups, with an higher value both on the buccal ( $0.03 \pm 0.08$ ) and lingual sides ( $0 \pm 0$ ) for the Cone Morse group versus External Hex group buccal ( $1.69 \pm 0.44$ ) and lingual sides ( $1.40 \pm 0.63$ ).

**Conclusions.** In Cone Morse group a lower level of bone resorption was recorded when compared with External Hex group after 8 weeks of healing. In some cases bone was relived growing in direct contact with the abutment in the Cone Morse group. The undercrestal placement of implants with Cone Morse tapered connection seemed to reduce the crestal bone remodeling.



### DENTAL IMPLANTS AND IRRADIATED JAWS

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**Aim.** The success of the implant-supported restoration is associated with the effective osseointegration of the dental implants and the health of the peri-implant tissues. Among the risk factors potentially related with the implant failure there are the subjects treated with radiation therapy for the care of the head and neck cancer. Decreased of saliva production, alteration of local vascularization, chronic and recurrent infections and reduction of cellular production, induce an increased risk for osteoradionecrosis and mucositis. The aim of this study is to highlight the precautions to be taken in case of dental implants placed in previous irradiated jaws.

**Materials and methods.** Inclusion criteria: PubMed, Embase and Scopus were the databases searched for articles published before November 1, 2013. MeSH terms, key words and free terms have included: location and site of implants in jaws, radiation dose, timing of implant placement, implant material, number of implants, type of prosthesis and effect of Hyperbaric Oxygen therapy (HBO). Exclusion criteria: Studies that reported data on implants placed only in grafted areas of the jaw.

**Results.** The search strategy yielded 17 papers. Of these studies, 15 were considered eligible for inclusion. A total of 2812 fixtures were assessed in the included studies of which 66% were placed in irradiated jaws. The overall estimates of the review revealed: a) Most studies reported greater implant loss rate in irradiated maxilla. b) One year time interval between radiotherapy and implant placement seems ideal c) There is no significant difference in survival when dental implants are placed in native or grafted bone. d) Advanced dental implant surfaces like TPS, SLA, Ti-Unite and different implant materials like zirconia are not yet tested in irradiated bones. e) It is preferable a multiple insertion of fixtures for an implant-supported over denture. f) The use of HBO therapy is still controversial. g) The success rate is higher in subjects exposed to a radiation less than 50 Gy than subjects exposed to a radiation greater than 50 Gy and no failures were observed in association with a radiation dose lower than 45 Gy.

**Conclusions.** Radiotherapy in the jaw area is associated with higher rates of implant loss, especially for implants inserted in the maxilla. At present, there are insufficient data regarding the timing of the implant placement after radiation therapy and the toxicity of chemotherapy. A widest number of prospective studies by also analyzing the difference of the type of implant are needed to confirm the findings arose from these reviews.





### EARLY BONE RESPONSE TO A NEW HIERARCHICAL 3-FUNCTIONAL IMPLANT SURFACE: CLINICAL EVIDENCES AND HISTOLOGICAL FINDINGS

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**Aim.** The reduced healing time in implant dentistry should be a goal pursued for both biological and clinical reasons. As far as the healing of the implant sites, the advent of the hierarchical implant surface has improved the results. Moreover, the presence of a switching platform connection offers undeniable advantages in terms of increased organization and tropism of the peri-implant soft tissue. The present study has the intent to evaluate clinically and histologically the performance of T3 dental implants.

**Materials and methods.** All the subjects involved in this study given a signed informed consent before to be treated. All treatments were performed by a single operator (TT) in a private dental practice. The clinical evaluation was performed on seven patients (five female and two males) receiving a total of ten T3 3i implants with integrated switching platform of 4/3 x 10 mm and final restorations in gold/ceramic. Mostly of the implants were placed in post-extractive sites with alveolar socket bone spontaneously regenerated. The insertion torque of the implants was in mean  $50 \pm 20$  Ncm. The final position of the implants was crestal. The healing of the sites took place without complications and after four weeks from implant insertion healing screws were placed. After about 12 weeks from implant placement final restorations in gold-ceramic were cemented. After radiographic examination, the clinical performance was evaluated. Histological analysis was made on two implants, one retrieved after four weeks and the other retrieved after eight weeks. The specimens were fixed in 10% buffered formalin, dehydrated in an ascending series of alcohol rinsed and embedded in a glycolmethacrylate resin (Techonovit 7200 VLC, Kulzer, Wehrheim, Germany). After polymerization, the specimens were sectioned, along their longitudinal axis, with a high-precision diamond disc at about 150  $\mu$ m, and ground down to about 30  $\mu$ m with a custom built grinding apparatus (TT System, TMA2, Grottammare, Italy). The evaluation was performed under brightfield light microscope a confocal scanning laser microscope (CSLM), and a scanning electron microscope (SEM).

**Results.** After 6 months of function, all implants appeared osseointegrated successfully without any complication. The peri-implant soft tissue appeared to be free of inflammation process, while the crestal bone resorption was less of  $0.03 \pm 0.02$  mm (measured on Rx). Histological findings showed after 4 weeks a high level of cellular activity around the implant surface with area of newly formed bone. SEM evaluation showed some area of osteoid directly laid-down over the implant surface (mainly along the nano-scale portion). After 8 weeks the level of osseointegration was almost completed all around the implant surface as showed by both SEM and CSLM images.

**Conclusions.** The clinical results were well supported by the hierarchical surface, of 3i T3 implants that promotes bone healing after only four weeks. Moreover, the platform switching design demonstrated a beneficial effect on peri-implant mucosa.



### EFFECT OF PLAQUE ACCUMULATION AND OCCLUSAL OVERLOAD ON PERI-IMPLANT BONE LOSS. A CASE REPORT

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**Aim.** The present case report describes the effect of plaque accumulation and occlusal overload on peri-implant bone loss and implant failure.

**Materials and methods.** A 43-year-old male patient came for consultation because of crown loss on one implant (Winsix 3,8 x 11 mm) at the level of the left first molar in the mandible. The clinical and radiographic examination revealed severe peri-implant bone loss and gingival inflammation associated with poor oral hygiene. The patient had an Angle class type II and no history of clenching. Although the implant was considered failed, it was stable so the decision was taken not to remove it. The patient was followed-up for 2 years and bone level was evaluated over time. Periapical x-rays, plaque index (PI), bleeding on probing (BOP) and probing depth (PD) were recorded at baseline (T0), after 6 (T6) and 12 months (T12). After 12 months, the extractions of teeth 45, 46, 47 were performed due to destructive caries and a provisional screw-retained composite crown was realized on the implant (site 36) in order to improve mastication. Six months after loading, the patient came at the Dental Department because of implant mobility, pain and suppuration at the implant level. The implant was removed. During the 2-years follow-up, professional oral hygiene sessions were performed every 6 months and the patient received instructions for home dental care, but his compliance was very low.

**Results.** During the entire follow-up period, the patient presented a PI and BOP of 100% at the level of the implant site. Mean PD and mean peri-implant bone level next to the implant were 7 mm and 6 mm at T0 and T12 respectively, and 8.6 mm and 7 mm at T18 respectively. At T24 suppuration, pain and implant mobility appeared.

**Conclusions.** In the present case report the dental implant remained stable as long as the implant was not loaded, although a 100% PI was present. In contrast, as soon as an occlusal load was applied peri-implant bone loss and implant failure occurred. Clinical trials based on a greater number of patients are needed to validate the present outcomes.



### FIXED RESTORATIONS SUPPORTED BY CONE-MORSE CONNECTION IMPLANTS: A RETROSPECTIVE CLINICAL STUDY WITH 10 TO 20 YEARS OF FOLLOW-UP

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**Aim.** Rehabilitation with implant-supported fixed prostheses is a predictable modality to restore lost function and esthetics with satisfactory survival rates; however, fixed restorations are subject to biological and prosthetic complications, which may represent a problem over the long-term. The aim of the present study was to evaluate the long-term survival and complication rates of fixed restorations supported by Morse-taper connection implants.

**Materials and methods.** Forty-nine patients (age range 22-70 years) treated with fixed rehabilitations (fabricated between January 1992 and December 2002) and supported by Morse-taper connection implants were included in this study. The restorations involved 58 fixed reconstructions (15 single crowns, 29 fixed partial prostheses, 14 fixed full-arches), supported by 178 Morse-taper connection implants with a follow-up ranging from 10 to 20 years. Clinical and radiographical evaluation were performed in order to assess peri-implant conditions, presence/absence of continuous peri-implant radiolucencies and the distance between the implant shoulder and the first visible bone contact (DIB) as index of marginal bone loss. The Kaplan-Meier survival estimator was used to calculate the 20-year cumulative implant survival and the "complication-free" survival of restorations. "Complication-free" survival rates among different patient-related and restoration-related variables were compared using the Tarone-Ware test.

**Results.** The mean observation period for all restorations was 15.2 years ( $\pm 3.1$ ). Only 2.8% implant failures had occurred in five different patients, respectively 3 and 4 months after surgery, due to lack of osseointegration. The 20-year overall cumulative implant survival was 97.2%. No implant-supported reconstruction failures were reported during the 10- to 20- year follow-up for the 49 patients enrolled in the study. The radiographic evaluation of the implants revealed a mean DIB of  $1.6 \pm 0.6$  mm and  $1.8 \pm 0.6$  mm at the 10 and 20 year follow-up evaluation, respectively. A few biological (3.4%) and prosthetic (10.3%) complications were observed. The "complication-free" survival rate of restorations was 85.5%. No statistically significant differences were observed among patients' gender, age, smoking or parafunctional habits, prosthesis site and type.

**Conclusions.** Satisfactory "complication-free" survival rates can be achieved for fixed restorations supported by Morse-taper connection implants, with minimal marginal bone loss and complications over a 20 years observation period.



### GUIDED BONE REGENERATION PROCEDURE WITH PLATELET RICH FIBRIN (PRF) MEMBRANES IN THE RESOLUTION OF A SEVERE MANDIBULAR BONE DEFECT: REPORT OF AN EXPLICATIVE CASE

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**Aim.** Platelet-Rich Fibrin (PRF) is a new generation platelet concentrate, invented by Choukroun in 2000, consisting of an autologous fibrin matrix which releases growth factors and cytokines in a slow and sustained way, and promoting physiologic healing processes. PRF is a very versatile biomaterial which can be used as an adjuvant tool for regenerative surgery of both hard and soft tissues in the form of membrane, cylinder, or fragments, according to occurrences. The aim of this work is to report an explanatory clinical case of the use of PRF membranes as graft material cover in order to enhance tissue healing in a pre-implant guided bone regeneration (GBR) procedure of a horizontal bone defect in the mandibular posterior area.

**Materials and methods.** A 58 years old apparently healthy female subject presented to our observation requiring a fixed prosthetic rehabilitation on implants of the lower arch's rear portions. The clinical examination and the computed tomography with Dentascan program revealed the presence of a severe horizontal bone defect in the posterior region of the mandible, on both sides. We planned a pre-implant GBR of the bone lacking areas in which the fixtures would have been required to support the prosthesis, in order to create appropriate bone sites for their proper insertion. On the right mandibular side the reconstructive procedure was performed using PRF membranes as a support to the traditional GBR technique. The surgery was performed under local infiltrative anesthesia. A linear mucoperiosteal flap was raised and the bone defect area was exposed. In order to ensure a better vascularization of the graft, the cortical bone was pierced in several points by a low speed dental hand-drill and a tungsten carbide bur, under abundant irrigation with sterile saline solution. An homologous thermoplastic bone graft material was modeled on the area and then PRF membranes were positioned to cover the regenerating site. The flap was correctly repositioned and sutured with 4.0 non absorbable monofilament suture. The patient was subjected to antibiotic, pain-relieving and anti-edema therapy for 7 days. Digluconate chlorhexidine (0,20%) spray was also prescribed to the patient for the post-operative period. At 6 months after surgery 3 implants were positioned in the regenerated site and a bone specimen was concurrently taken using a 2 mm inner diameter steel trephine bur.

**Results.** Clinical examination at 7, 13 and 18 days after surgery showed no inflammation and good progression of the soft tissues' healing process in the area involved by the surgery. Cone beam computed tomography performed to assess implants' osteointegration showed no inflammatory complications and good graft integration. Histological examination by optical microscopy of the hard tissue sample, with hematoxylin and eosin staining, attested the success of the healing process, showing: lamellar bone being formed, deposited in the vicinity of young trabeculae; presence of osteoclasts and osteoblasts highlighting the active process of bone remodeling; visible resorption signs on the graft material particles.

**Conclusions.** PRF membranes represent an interesting supporting tool in GBR procedure. Their biological, immunomodulatory and mechanical actions positively contribute to the healing of hard and soft tissues involved in the surgical intervention.



### HISTOLOGICAL EVALUATION BETWEEN B.I.C. OF IMPLANTS PLACED WITH PIEZO SURGERY AND BONE CUTTERS

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**Aim.** purpose of this study was to evaluate the different B.I.C. between submerged implants inserted through the use of drills and piezo surgery.

**Materials and methods.** To this end, on four rams of about 60 kg each of two years of age and at the end of skeletal growth, the same experienced operators, have positioned twentyfour implants from the diameter of 3.8 mm and length 11mm with surface Sla through the aid of rotary cutters or piezo surgery. Each animal received six implants on the iliac crest, three with the use of cutters and three with the use of piezoelectric surgery. The surgical protocol provided the decontamination of the skin with betadine, the sedation of the animals by Xylazine Hydrochloride, infiltrative local anesthesia with lidocaine hydrochloride 2%, incision at the level of the iliac crest, implant site preparation using inserts piezo-surgery, or rotary burs under copious irrigation with saline solution, of the below 800 rpm, at the end of the intervention was applied a suture of the muscle planes with absorbable polyglycolic acid thread, soft tissues with non-absorbable silk thread, and applied a local and systemic antibiotic therapy for five days.

**Results.** At fifteen and thirty days after surgery were sacrificed rams with an intravenous injection, have developed the samples, which were obtained from seventy slides. Microscope examination revealed a BIC to 15 days of the two samples respectively 32% and 35% at 30 days by 50% and 52%.

**Conclusions.** statistical analysis of the data showed no significant differences



### IMMEDIATE LOADING IN AESTHETIC/ANTERIOR SECTORS: STANDARD VS SWITCH PLATFORM AND TWO YEARS FOLLOW UP

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**Aim.** To date, many papers have been published during the last decades regarding immediate loading in Implantology. A major comfort for patients and many biological advantages (e.g. BIC increase) – compared to the traditional delayed loading – have been widely reported. In addition, the choice of placing an implant immediately after tooth extraction is one of the most common in the field, since it reduces surgery and wound healing. Indeed, this technique proved itself very successful in the immediate loading rehabilitation, particularly in the anterior (aesthetic) sector. Briefly, we want to demonstrate and report the use of implants with “switch platform” prosthetic profilometry built in order to ensure a distance between the connection and bone tissue equal to the biological width. In this way we presume to avoid the bacterial migration towards the implant neck and the bone contact point. Our aim is to preserve and keep intact bone and connectival architecture.

**Materials and methods.** Ten implants have been used for implantoprosthesis rehabilitation of four patients (two male aged 48 and 56, two female of 54 and 60) from two different manufacturers: six IntraLock® CT 3.75x11.5 (four) and 4.0x11.5 (two), and four Tekka In-Kone® Universal switch platform 3.5x10.0 (two) and 3.5x11.5 (two). We used the “Flat-One-Bridge” screwed technique for IntraLock® implants and the switch platform one for Tekka In-Kone®, in both cases according to the protocol provided from manufacturers. Patients have been monitored every ten days in the first two months, then every four months until two years.

**Results.** We achieved bone and connectival stability during control period; in the “standard platform” implants we reported a physiological adherent gingival loss after the first 18 months: we put down the structure and we relined it to balance the attachment loss. In the case of “switch platform” implants we obtained a good peri-implant and adherent gingiva trophism without any relinement in our 2-years follow-up. The switch-platform connection and profilometry, as indicated in the protocol, oblige the surgeon to insert the implant 2 mm under the cortical bone, ensuring in this way a biological protection of the fixture with over-implant bone growth. The implant neck remains completely under the bone and connectival tissue, guaranteeing a physiological protection for the implant. The prosthetic work is made exclusively across the prosthetic foramen without compressing the peri-implant mucosa which can undergo transmucosal ischemia. We confirmed a short-term augmentation of the aesthetic, with a physiological maintenance of the interdental papilla and a good peri-implant trophism, monitoring everything with regular probing and radiographical (always same machine) collection data. The implant choice and moreover of the connection between abutment and implant represents the fundamental entity of periodontal and peri-implant stability in the follow-up (2 years). The switch platform technique allows a good connectival trophism and a more predictable (in the long-term) peri-implant mucosal closure; in addition, bone/connectival biology is augmented in the spaces with this type of profilometry, ensuring a stable mucosal support over the peri-implant bone, managing the prosthetic closures directly on the abutment and not on the implant neck.

**Conclusions.** Nowadays the immediate loading technique in aesthetic/anterior sectors favours the anatomical/periodontal relation maintenance (e.g. connectival height, residual bone thickness) and allows a fast and safe surgery execution, in full compliance with the immediate loading protocols already widely described in literature.



### IMMEDIATE LOADING OF IMPLANTS PLACED INTO FRESH AND HEALED EXTRACTION SITES TO SUPPORT A FULL-ARCH FIXED PROSTHESIS PLACED WITH A MODIFIED "TORONTO TECHNIQUE": 1-YEAR RESULTS FROM A PILOT CLINICAL TRIAL

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**Aim.** Over the last decade, newer immediate provisionalization/loading protocols have demonstrated to reduce the treatment time resulting in high implant success rates. The present pilot clinical trial evaluates the outcome of a modified "Toronto prosthesis technique" placed in fully edentulous mandibles and immediately restored with metal-resin screw-retained cross-arch prosthesis.

**Materials and methods.** 7 patients completely edentulous or presenting natural teeth with a hopeless prognosis seeking implant-supported prosthesis at the Istituto Stomatologico Toscano, Dentistry Department of Versilia Hospital, Italy (University of Pisa) were recruited. Eligible patients had to have sufficient bone volume allowing placement of six implants, which should be used for a full-arch implant-supported rehabilitation. A complete examination of hard and soft oral tissues was conducted for each patient to assess the bone volume of the scheduled implant sites. Each case was accurately evaluated examining diagnostic casts for the intraarch relationship, periapical and panoramic radiographs, and computed tomography if necessary. Six dental implants 3.8 mm diameter (Khono, Sweden and Martina, Italy) were placed on each patient in healed and fresh extraction sites following a one-stage surgical protocol. Implants were inserted with a minimal torque of 45 Ncm. All prosthetic procedures were performed by the same prosthodontist and the same dental technician. Implant positions were registered intraoperatively. Provisional abutments were screwed onto the implants and then splinted to the impression template. This information was transferred to the patient's diagnostic cast and used to make an acrylic resin provisional full-arch screw-retained metal-reinforced prosthesis with no distal cantilever, which was placed within 72 hours postsurgery. Patients were assessed by a calibrated investigator at 2, 6, and 12 months following completion of treatment. The occlusion was adjusted to provide a balanced distribution of forces. Implant success was determined according to the clinical and radiographic criteria defined as follows: (1) absence of clinically detectable implant mobility, (2) absence of pain or any subjective sensation, (3) absence of recurrent peri-implant infection, and (4) absence of ongoing radiolucency around the implant after 6 and 12 months of loading.

**Results.** Two patients failed to attend the scheduled recall visits and were excluded from the study. The final patient sample consisted of 5 patients (2 women and 3 men) with a mean age of  $51.4 \pm 9.8$  years (range, 38 to 69 years). The 5 patients included in the study received a total of 30 implants, all the implants fulfilled the success criteria. The implant survival rate was 100%, whereas the average marginal bone loss was of 0.42 mm of peri-implant bone (range 0.1 to 0.8 mm, standard deviation [SD] 0.23 mm) after 1 year.

**Conclusions.** The present study, with a short follow-up period and a small sample, showed implant success and minimal peri-implant marginal bone loss after immediate loading of fixed full-arch prostheses with a modified "Toronto technique". All provisional immediately loaded fixed prostheses functioned successfully. Additional studies with longer follow-up times and larger samples are required to better evaluate the influence of loading protocols on the alveolar bone response and the outcome of dental implant therapy.



#### IMMEDIATE LOADING OF POST-EXTRACTIVE MONOPHASIC AND BIPHASIC IMPLANTS

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**Aim.** The aim of the present study is to verify the early stage of peri-implant tissue healing, in patients exhibiting complete and partial edentulism treated with immediate loading of post-extractive monophasic and biphasic implants. The present study is based on the response of tissues and of the implant-bone interface, while comparing implants with different morphologies, both wide and narrow spiral implants according to the surgical technique.

**Materials and methods.** This study is based on the predictability of results achieved on a group of 21 patients, 11 males and 10 females aged between 34 and 78 years, whose medical history was taken before surgery and whose bone quality and quantity were assessed through instrumental investigations. Each patient was rehabilitated with a variable number of implants according to his/her needs, by means of wide or narrow spiral implants for a total of 60 implants placed in the upper jaw and 48 in the lower jaw in variable areas. In 71% of cases, implants were immediately loaded on latero-posterior areas. Healing of peri-implant tissues and osseointegration of each implant was monitored on each patient with a follow-up protocol at 15 days, 1 month, 3 months, 6 months and 1 year.

**Results.** Long-term controls showed proper and sufficient osseointegration of immediately loaded implants both in patients exhibiting complete and partial edentulism, irrespective of the surgical technique and implant morphology. This was achieved following the protocols of implant bed preparation, primary retention, oral hygiene and follow-up. 96% of cases showed implant success, while 4% of cases failed because of a fracture to the provisional implant, due to splinting and welding defects.

**Conclusions.** In the light of the results achieved in the present study, the Authors observed that it is possible to proceed with immediate loading in any area of the jaws in patients exhibiting complete edentulism, partial edentulism or monoedentulism, regardless of the shape of the implant body. The principle of soldering the dental prostheses has to be followed in order to avoid those micro-movements which could lead to implant failure.





### IMMEDIATE TRANSMUCOSAL IMPLANTS TREATED WITH UNCOVERED RESORBABLE MEMBRANES: ONE YEAR PROSPECTIVE STUDY

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**Aim.** To evaluate the soft tissue healing around immediate transmucosal implants when the membrane was left exposed in oral cavity.

**Materials and methods.** Twenty four non-smoker patients with the presence of a upper first molar to be removed for any reason except for periodontal disease were selected according to the following inclusion criteria: 1) Age 21 years or older; Sex M/F; 2) Non smokers; 3) Absence of systemic pathologies; 4) Indication for a first upper molar extraction due to any reason except for periodontitis; 4) its replacement with an immediately placed implant; 5) Absence of dehiscence in the extraction site; 6) Presence of a vestibular keratinized gingiva  $\geq$  2 mm. Gingivitis were treated with scaling in order to obtain one week before surgery Full Mouth Plaque Scores (FMPS) and Full Mouth Bleeding Scores (FMBS)  $\leq$  20%. Between February 2011 and January 2012 surgery was performed by unique expert surgeon at the Department of Neuroscience and Reproductive Sciences and Dentistry, University of Naples "Federico II", Italy. After tooth extraction, twenty four implants (6.5 mm diameter/12 mm length) Tapered-effect (TE) implants of the Straumann® Dental Implant System (Straumann AG, Basel, Switzerland) with a sandblasted and acid-etched (SLA) rough surface were inserted in the alveolar sockets according to manufacturer's. Alveolar gaps were filled by the use of DBBM (cancellous deproteinized bovine bone mineral) and a resorbable collagen barrier was adapted to the neck of the implant in order to cover the scaffolding material. The flaps were replaced by the use of 4/0 monofilament suture not attempting primary closure but leaving the membranes partially uncovered. The area of the exposed membranes were measured by the use of a periodontal probe (Hu-Fridy®): the maximum exposure recorded was of 4 mm. Amoxicillin (1g./ 2 times/day) and ibuprofen (100mg/ 2 times/day) were prescribed for 10 days post-surgery. Starting on the 2<sup>nd</sup> day till to 14<sup>th</sup> day after surgery, patients were suggested to apply twice daily on the treated area 0,2% chlorhexidine gel.

**Results.** In the totality of the patients (24) soft tissue healing proceeded uneventful: nor infection of the membranes neither exposure or degranulation of the grafted particle of DBBM was reported. The stability of the grafted material into the alveolar sockets was confirmed by x-rays analysis. Probing pocket depth around implants at six months follow up was considered as compatible with optimal healing.

**Conclusions.** In conclusion the present study showed that the collagen barrier had the potential to guide the soft tissue healing even when the membrane was uncovered till a maximum of 4 mm.



### IMMEDIATE VERSUS DELAYED RESTORATIONS FOR IMPLANTS PLACED IN FRESH EXTRACTION SOCKETS: A 1-YEAR COMPARATIVE COHORT STUDY

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**Aim.** The placement of dental implants for replacing missing teeth is a widely used therapy, also in esthetic areas. In the conventional protocol, implants are placed after the bone healing, providing a highly predictable outcome. The actual demand for reduced treatment time and simpler protocol led to the immediate placement protocols, where implants are put into fresh extraction sockets. Even if it is a technically demanding procedure, the immediate implant procedure shows to be effective in reducing surgical steps, overall treatment time and morbidity. The objective of this study was to compare the clinical outcomes of immediate and delayed restoration of implants with a specific design placed into fresh extraction sockets after 1 year from the implant placement.

**Materials and methods.** Thirty implants (Blossom, Intralock International, Boca-Raton FL, USA) were placed in fresh extraction sockets and divided in two groups. The restorations were applied immediately or after 4 months, on the basis of the implant insertion torque. In this prospective cohort study, marginal bone level at mesial (mMBL) and distal (dMBL) aspect, facial soft tissue (FST), width of keratinized gingiva (WKG) and papilla index (IP) were compared in both groups; correlations with pristine buccal bone thickness were also investigated. The data were collected at baseline (T0), 4 months (T1) and 1 year (T2) after the implant placement. The comparisons were made between T1 and T0 ( $\Delta 1$ ) and between T2 and T0 ( $\Delta 2$ ).

**Results.** The two groups were homogeneous, showing similar parameters at baseline. The overall implant success rate was 100% and favorable soft and hard tissues integration was reached in both group. The mesial and distal marginal bone level in the delayed restoration group registered a statistically significant decrease between the 4 months and the 1-year control. The mesial aspect (mMBL) was  $0.5 \pm 0.9$  mm at 4 months and  $0.1 \pm 0.8$  mm at 1 year, the distal aspect (dMBL) was  $0.7 \pm 0.7$  at 4 months and  $0.1 \pm 0.7$  at 1 year. These findings pointed out that the marginal bone loss started at the same time with the delayed restoration. On the other hand, in the immediate restoration group, the bone loss followed a gradual progression, thus resulting in a final value similar to the delayed group. No significant differences were registered in facial soft tissue and keratinized gingiva width. In the delayed group, a loss and reassessment of the papillary tissue was recorded at the time of restoration, but the Papilla Indexes of the two groups were comparable after 1 year. The baseline facial soft tissue level was positively correlated to the buccal bone thickness, at least in the delayed group, even if a slight recession was observed in both groups and final results were similar. The immediate restoration group seemed to show better results in terms of healing time and soft tissues response.

**Conclusions.** The immediate restoration protocol of immediately placed implant seemed to have the same efficiency as the delayed restoration, besides offering other clinical advantages such as better healing time, soft tissues management and patient's compliance.



### IMPACT OF FRAMEWORK MATERIAL ON IMPLANT-SUPPORTED FIXED DENTURES: A THREE-DIMENSIONAL FINITE ELEMENT ANALYSIS

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**Aim.** The aim of this study was to analyse through a three-dimensional Finite Element Analysis (3D-FEA) stress distribution on four implants supporting a full-arch fixed denture (FFD) using different prosthesis framework material. In particular a carbon fiber framework has been evaluated, which might be an interesting alternative to traditional metal framework, due to its lower weight and cost.

**Materials and methods.** A 3-D edentulous maxillary model was created using a customized computer software (FEMAP 8.3). Four implants (length: 15 mm) were virtually placed into the maxilla and splinted with a FFD of 12 masticatory units. The implant necks were placed at the level of the canine and the molar area; prosthetic cantilevers were avoided in the simulation; the distal implants were mesio-distally tilted with a 45 degrees inclination placing them parallel to the mesial wall of the maxillary sinus. Keeping constant all other parameters, 3 different configurations were evaluated: (1) full acrylic resin prosthesis without framework, (2) acrylic resin veneering material with cast metal framework, (3) acrylic resin veneering material with a carbon fibre framework. The only difference between the three simulations was the presence or not of framework and the material of which it was made. An occlusal load of 150 N was applied on the most distal portion of the bridge and stresses transmitted into peri-implant bone and prosthodontic components were recorded.

**Results.** 3D-FEA revealed higher stresses both on the implants (up to +55,16%) and on peri-implant bone (up to +56,93%) when the full-acrylic denture was simulated. The value of stresses registered in the model with the metal framework and the carbon fiber framework were highly decreased. In fact, forces were more spread and were distributed also to the structures on the side opposite to load application. The difference was even more evident when cancellous bone was simulated compared to cortical bone.

**Conclusions.** Finite element analysis simulating a maxillary rehabilitation revealed that FFDs endowed with a metal or carbon fiber framework decrease stresses on implants and on the peri-implant bone. This could be particularly important in immediate loading protocols, when reducing the risk of overloading is mandatory to achieve a predictable osseointegration. Carbon fiber might be a viable alternative to traditional metal framework, providing similar stiffness and rigidity to the framework and significantly reducing its weight and cost.



### IMPLANT SURFACES STRUMENTATION: REVIEW OF THE LITERATURE

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**Aim.** The aim of this work was to highlight as an implant cleaning treatment is diversified from another as for the success in cleaning the site as for the level of aggressiveness of its action.

**Materials and methods.** A review of the literature was conducted from April 2013 entering the studies concerning the possibilities for the treatment of implant surfaces in the last 23 years.

We identified 240 articles whose screening led to the identification of 18 publications that were within our inclusion criteria. All this was done by entering the keywords: dental implant and surface alterations that allowed us to identify 92 articles; hygiene instruments and dental implant to get 131 articles; effects of ultrasonic scaler and titanium surfaces for 6 articles, and finally ultrasonic tips on implant surfaces for 11 articles. So in total 240 articles were identified. The inclusion and exclusion criteria, were used for the selection of the articles, leading to the identification of 15 publications. 3 other relevant articles were identified through the bibliographies of the articles already included in the first. The instrumentation can be of two types:

- *manual*: performed with curette, standard tools for removing tartar above and subgingival. Those dedicated to the implant surfaces are very similar in design to the traditional scalers and curettes;
- *mechanical*: made with many different types of inserts to be applied to sonic and ultrasonic handpieces.

Each instrument taken into consideration has been tested by the authors on a surface then compared to the SEM with an untreated surface. The instrumented surface could then be ruined, smooth, or comparable than the control.

**Results.** Based on the findings from this review, seems clear what are the tools of choice to preserve the integrity of the implant surfaces.

*Manual instrumentation.* The instrument most tested and that is less damaging to the implant surfaces is the PLASTIC CURETTE or PLASTEEL, however their flexibility prevents a safe positioning which leads, consequently, to a removal of plaque that is not optimal. Finally, the shape, designed for use on natural teeth, prevents the achievement of the innermost portions of the coils. NOT to use: steel curette, titanium curette.

*Mechanical instrumentation:* the tool that lets comparable results to the control surfaces is the TIP SILVER PLATED COPPER ALLOY, which is highly recommended for the maintenance of the fixtures. In fact it had the advantage last longer in terms of wear and fracture. NOT to use: steel tip. Mixed results for: carbon tip.

*Other methodologies:* the instrument that leaves unchanged the surfaces is the RUBBER BOWL. Regarding the addition of prophylaxis paste results are diversified as in each study was used a different paste.

**Conclusions.** We have a variety of tools for the treatment of implant surfaces that support the integrity. Recalling that this remains the primary goal.



### IMPLANT-PROSTHETIC REHABILITATION OF A CLINICAL CASE OF MULTIPLE TOOTH AGENESIS

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**Aim.** In the present work we describe a clinical case of multiple tooth agenesis treated and solved with a multidisciplinary approach made of several therapeutic stages and implant-prosthetic rehabilitation.

**Materials and methods.** An 18-year-old patient presented with agenesis of 6 teeth (15-25-34-35-44-45). The therapeutic approach consisted of two phases: the first was orthodontic and second was implant-prosthetic. The orthodontic treatment involved a ceramic fixed appliance on both arches to provide a fair distribution of the spaces among agenesis teeth, leaving unaltered the unexfoliated deciduous teeth (65-73-75-83-85) which acted as space maintainers, and to avoid the physiological bone resorption that would certainly affect the edentulous area. The above-mentioned deciduous teeth were subsequently extracted during the surgical stage and replaced by post-extraction implants. Therefore, the aim of pre-prosthetic orthodontics was to obtain a correct placement and inclination not only of clinical crowns, but also of tooth roots adjacent to the implant sites. To compensate the congenital absence of teeth, in the second therapeutic phase we decided to place six implants. It was a more conservative solution than fixed prosthesis, also in the light of the good health of teeth and of the patient's age, who had almost finished growth. With the technique of immediate loading, under local anesthesia, after flap detachment and preparation of the implant bed by means of osteotomes, implants were placed at the level of tooth 15 (in the space orthodontically created with the use of a spring compressed between teeth 14 and 16). Post-extraction implants were placed at the level of teeth 25, 35, 33, 45, 43; after screwing the abutments, resin crowns were cemented on them acting as space maintainers and esthetical provisional implants. After periodic examinations and after osseointegration occurred, implants were prosthetised with fixed metal-ceramic crowns.

**Results.** thanks to an accurate case analysis and planning, we could achieve both functional and aesthetic objectives, without interfering in any way with the structural integrity of the adjacent teeth.

**Conclusions.** The solution of this clinical case highlights that a multidisciplinary approach is crucial to solve a similar situation in everyday dental practice, since it requires the aid of the orthodontist, surgeon and prosthodontist, who work in the patient's interest and chose the therapy having more advantages for the health of the patient.



### IMPLANT-PROSTHETIC REHABILITATION WITH HIGH AESTHETIC VALUE USING POST EXTRACTIVE MINIMALLY INVASIVE SURGERY AND DELAYED LOADING

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**Aim.** In this case we demonstrate how we could get a high value aesthetic rehabilitation with the use of post-extractive implants with delayed loading.

**Materials and methods.** We report the case of a patient of 40 years old, thin gingival biotype, non-smoker, healthy. The patient had been previously subjected to an endodontic therapy for necrosis of the elements 11 and 21 after direct trauma on the elements themselves. The endodontically treated elements showed a wide rizalisi, grade II mobility and considerable discoloration. Radiographic studies show a state of advanced rizalisi. As the patient was dissatisfied with the cosmetic result and continuous therapies that appeared to be not predictable in time and given the poor prognosis in the long term of the involved elements, we decide the extraction of the maxillary central incisors and the simultaneous insertion of 2 Implant BT LOCK BT-Tite CV1 Line diameter of 5.50 mm and a length of 10. The implants were placed at a distance between the implant and the buccal bone gap of 3 mm. Providing a bone resorption by approximately 50%, we had used a scaffold of biomaterial substitute bone to slow resorption of bovine origin Geistlich BioOss to fill the gap between the bundle vestibular bone and the implant itself. The insertion torque determined manually with the torque wrench in the final phase of insertion is 35 N/cm. Radiographs obtained with intraoral radiographs and with use of Rinn sensor holder show correct positioning of the fixture and a good fit between implant and alveolus. We had carefully evaluated the protrusive guide that it's hard to download without excessive alteration of the aesthetics and we opted for a temporary rehabilitation with the use of a Maryland bridge metal resin adhesively cemented to the teeth adjacent to not upset the delicate process of osseointegration. After 4 months since the surgical phase, we proceed to the inclusion of two resin provisional crowns and screwed together for the conditioning of the soft tissues for another 6 months. At the end of this period, obtained an optimum aesthetic result, we proceed to the definitive stage taking a Polyether Impression with open tray technique and transfert individualized resin, in order to detect the performance of the conditioned soft tissues. We produce two zirconia abutments glued on titanium connectors and two zirconium - ceramic crowns cemented. It was made the check of the abutments in zirconia, the zirconia copings structure check, the ceramic check and delivery after the final glaze. The crowns are cemented with a resin cement type.

**Results.** The pictures performed at baseline and at a distance of time show an aesthetically satisfying result. The radiographic tests performed at 1 and 2 years show good health implant without appreciable loss of bone and maintenance of the mucogingival parables.

**Conclusions.** The use of post-extractive implants in anterior aesthetic areas could be a great alternative to delayed implant placement on healed bone, with excellent aesthetic results.



### INTERNAL HEXAGON VS EXTERNAL HEXAGON CONNECTION DESIGN ON SINGLE IMPLANT REHABILITATION: A REVIEW OF THE LITERATURE

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**Aim.** The object of this study is to evaluate through a review of the literature which is the best implant connection design in single tooth implant rehabilitation.

**Materials and methods.** All the studies included in this research were obtained by using the keywords: external hexagon, internal hexagon, single implant fixed prosthodontics, screwed crown on implant and cemented crown on implant, which were all verified through MeSH (US National Library of Medicine, National Institute of Health); all the keywords and combination of them were inserted in PubMed/Medline database (US National Library of Medicine, National Institute of Health).

Inclusion criterias of the research were: retrospective studies and prospective studies on humans and in vitro; instead, all the experimental on animal studies were excluded from the research.

**Results.** Using these keywords, 90 studies were obtained and then examined; 81 of these were excluded from the final analysis because of:

- Absence of data regarding implant connection design.
- Absence of data on single implant fixed prosthodontics.
- Among the 9 selected studies were extracted data regarding:
  - type of the study
  - number of patients, in case of clinical studies
  - follow up years of dental implants in case of clinical studies
  - materials and methods used in the study
  - result of the study
  - conclusion of the study

From this review of the literature neither prospective nor retrospective study emerged. The absence of random trial control prevent to realise a metanalysis study on this topic. Nonetheless, from the selected articles emerge that in single implant fixed prosthodontics, internal hexagon shows better resistance on masticatory loads with both assial and transversal forces than external hexagon; as a consequence of the stress operating on them, external hexagon connections show higher mechanical wear than internal hexagon connections. Regarding screwed or cemented crowns on implants, there is still no common consensus on which is the best connection between internal and external hexagon design.

**Conclusions.** At the present time on this topic there are only in vitro studies in literature; it is to be hoped the development of random clinical trial and retrospective studies in order to evaluate and analyze the behaviour in different clinical situations of both hexternal connections and internal connections design for a better understanding of all the virtues and vices of the different implant connection design.



### LEARNING CURVE OF THE SMART LIFT TECHNIQUE FOR TRANSCRESTAL SINUS FLOOR ELEVATION

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**Aim.** The Smart Lift technique is a minimally-invasive procedure for maxillary sinus floor elevation with a transcrestal approach (tSFE). The present study was performed to assess the learning curve of the Smart Lift technique in a prospective cohort of consecutively treated patients. Also, we evaluated the influence of the clinician's experience in implant surgery on the outcomes of the Smart Lift technique.

**Materials and methods.** The study was designed as a prospective case series. Treatments were performed by three clinicians at three clinical centers. Patient allocation to one of the three clinical centers was dependent on which center he/she attended for professional dental care. At the beginning of the study, clinicians were characterized by different levels of experience in implant surgery (expert, moderately experienced and low experienced, as assessed in terms of years of clinical activity, number of implants placed prior to their participation in the trial, and previous experience in tSFE procedures), and were all inexperienced with respect to the Smart Lift technique. The initial (n= 13) and final (n= 13) groups treated by the expert operator were compared for tSFE outcomes. Additionally, the last 20 patients treated by the expert clinician, the first 20 patients treated by the moderately experienced clinician, and the first 20 patients treated by the low experienced clinician (identified as the high, moderate, and low group, respectively), respectively, were also compared.

**Results.** (i) No significant differences in clinical and radiographic outcomes were observed between initial and final groups; (ii) high, moderate and low groups showed substantial extent of sinus lift in a limited operation time, with the outcomes of the procedure being influenced by the operator level of experience in implant surgery; (iii) minimal incidence of membrane perforation and postoperative assumption of anti-inflammatory drugs were recorded for all groups.

**Conclusions.** The results of the present study indicate that the Smart Lift technique may be considered as a user-friendly option for tSFE, since it allows for a substantial extent of sinus lift at limited operation times along with minimal morbidity when used by different clinicians. The effectiveness of the procedure in terms of SL appears to be influenced by the clinician's level of experience in implant dentistry.





### MULTIDISCIPLINARY MANAGEMENT OF THE UPPER LATERAL INCISORS AGENESIS IN ADULT PATIENT

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**Aim.** The aim of this case report is to evidence the importance of a correct diagnosis for a good multidisciplinary approach – orthodontics, implantology, prosthetic and aesthetic restorative - in a case of upper lateral incisors agenesis in adult patient.

**Materials and methods.** In this case was very important the good management of the biological space in the dental arch, the precision of implants insertions made by guided-surgery, the good management of peri-implant soft tissues means by temporary screwed teeth and also an aesthetic restorations of the other upper incisors. The patient, female, 40 years old, presents upper lateral incisors agenesis with central diastema between 1.1 and 2.1 and an incongruous non aesthetic maryland bridge in the 1.2 and 2.2 elements very small. After a short orthodontic treatment to obtain the correct roots spaces for the future implants and to close the central diastema, we started the surgical stage with the creation of a surgical template CT guided with the software NobelClinician so we used a CT conebeam to guide the fixtures insertions in the respect of near roots. We used two implants Nobel Biocare™ NobelActive of 3.00 mm diameters and 11.5 mm long to replace the lateral incisors. We used a surgical two-step technique with submerged implants. During the osteo-integration time the patient used a clear plastic vacuum-mask with the 1.2 and 2.2 resin elements inside with temporary teeth and orthodontic retainer functions. At the connection of implants, in the prosthetic stage, we fixed two temporary screwed crowns for conditioning the peri-implants mucosa to achieve a natural gingival architecture. We added composite in the cervical portion of temporary crowns until we reached the correct morphology. It was important to respect the timing of soft tissues maturation. Finally, we did the cosmetics stage, restoring the upper central incisors and the canines with composite, after teeth whitening with peroxide carbamide 10% gel.

**Conclusions.** The correct formulation of multidisciplinary treatment and the CT guided surgery permitted the correct implants placement in extreme condition. The software of guided surgery is the most advanced tools for the diagnosis and the treatment planning, in the respect of near teeth and delicate structures. A correct management of tissues and different techniques allows natural and good aesthetic smiles and happy patients.



## PERIIMPLANT MUCOSA ZENITH EVOLUTION AND CORRELATION WITH BUCCAL BONE THICKNESS.

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**Aim.** The objective of this perspective study is to evaluate the soft-tissue maturation around titanium implants and the influence of the residual facial bone thickness at implant placement time on the gingival zenith.

**Materials and methods.** The study includes 170 consecutive enrolled implants. The mean follow-up time for this sample of patients is of 5 years. All implants were clinically and radiologically monitored at each year follow-up and data regarding facial mucosa height (the distance between the gingival zenith and the incisal edge of the prosthetic restoration), buccal, mesial, distal and lingual/palatal probing depth and inter-proximal bone peak were collected. Buccal bone width (BBW) value was evaluated during surgery and was recorded after implant placement. Inter-proximal bone resorption was investigated by the use of individualized intra-oral RX tray, such to have always the same projection and measurements were acquired after setting 1:1 the images using the implant measures as a reference. All data were then inserted in a statistical software and processed. Afterwards the results were compared to those provided by the literature (an in-depth research was made through the PubMed and Google Scholar databases)

**Results.** At five years follow up, it is observed that for buccal bone width  $\geq 1,5$  mm the buccal zenith of the corresponding implant grows by an average +0,71 mm. For a buccal bone width  $< 1,5$  mm the gingival zenith average value is stable at -0,3 and when only horizontal GBR (guided bone regeneration) techniques (Deproteinized Bovine Bone + Collagen Membrane) are required, due to the lack of the buccal bone wall, the zenith recedes by an average - 1,3 mm. Results were observed to be statistically significant.

**Conclusions.** Whenever a correct surgery is made, patient's domiciliar maintenance is observed and good prosthetic design is reached, buccal bone width plays a cutting edge role on gum parable stability during time. In the 170 considered cases the relation is confirmed and a wider buccal bone width is favorable whenever is possible. Wherever guided bone regeneration techniques are not mandatory, it is suggested that no surgical overcorrection is to be performed.



### PLATFORM SWITCHING AND A MICROSTRUCTURED BIOACTIVE SURFACE FOR OSSEOINTEGRATED IMPLANTS: A KEY SUCCESS FACTOR

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**Aim.** The aim of this work is to evaluate the importance of the platform switching and of new implant surfaces to decrease marginal bone resorption and to avoid complications.

**Materials and methods.** The use of available prosthetic components led to a mismatch between the diameters of the implants and the prosthetic abutments. This mismatch was termed platform switching. This study has focused on radiographic observation of the crestal bone level around implants restored with platform switching (481 implants in 160 patients) comparing them to rehabilitation with implant/abutment switched diameters (400 implants in 150 patients). Different titanium surface preparations have been compared too.

**Results.** Also the behavior of dental implants is significantly influenced by the surface characteristics of the implants. Microstructured and bioactive surfaces show higher bone contact values and therefore lead to an improved osseointegration, reducing healing time too ( $p < 0.01$ ).

**Conclusions.** Implants with platform switching could avoid complications and enhance osseointegration success rate limiting alveolar crestal bone remodeling and resorption at the abutment/implant interface.



### PRELIMINARY STUDY OF MARGINAL BONE LOSS OF 156 TITANIUM IMPLANTS PLACED WITH ULTRASONIC IMPLANT SITE PREPARATION WITH PIEZOSURGERY® (UISP): FOUR YEARS FOLLOW-UP

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**Aim.** Marginal bone level is considered a criterion for implant success. The use of titanium implants may incur in a peri-implant infection and in a marked marginal bone loss. The aim of the present study was to evaluate implant survival and radiographic marginal bone loss around titanium dental implants placed with Ultrasonic Implant Site Preparation (UISP) after 4 years of function.

**Materials and methods.** A total of 28 totally and partially edentulous patients were rehabilitated with 156 titanium implants (100 Speedy TiUnite™, Nobel Biocare AB, Agrate Brianza (MI) Italy and 56 Osseotite®, Biomet 3i, Vicenza, Italy) and fixed prosthetic rehabilitations. All implants were placed with Ultrasonic Implant Site Preparation (UISP) with Piezosurgery® using two-stage procedure in native bone. A total of 17 single, 38 partial and 6 full arch rehabilitations were delivered. Marginal bone loss at mesial and distal aspects was measured on intra-oral paralleling digital radiographies, taken to the impression phase and after 4 years of function, as the difference between baseline (distance from implant/transfert junction [IT] to the first bone contact [T0]) and bone level after 4 years of function (distance from implant/abutment junction [IA] to the bone contact [T1]). The formula used was: Peri-implant Bone Loss (T0/T1) = (IA/T1 – IT/T0). Marginal bone loss was related to different variables: gender, jaws, bone quality, implant surface, connection, and diameter and type of rehabilitation. Statistical analysis was carried out using SAS 9.0 (a P-value less than 0,05 was considered the threshold for statistical significance).

**Results.** No operative complications were reported. Three implants (1,92%) were removed at the second surgery stage, with a overall Survival Rate (SR) of 98,08% after 4 years of function. The mean marginal bone loss was  $0,52 \pm 0,33$  mm, ( $0,51 \pm 0,35$  mm at mesial aspect and  $0,53 \pm 0,35$  mm at distal aspect). Maxilla ( $0,52 \pm 0,32$  mm) and mandible ( $0,52 \pm 0,35$  mm) was almost the same. Statistical analysis showed a significantly greater bone loss in male as compared with female both in maxilla and in mandible, in mandible full arch than maxilla and in maxilla Osseotite® surface than mandible.

**Conclusions.** Ultrasonic Implant Site Preparation with Piezosurgery® (UISP) can be considered a valid technique for implant placement, showing a Survival Rate (SR) and a mean marginal bone loss comparable to drilling surgery technique.



### QUANTITATIVE EVALUATION OF THE FIBRIN CLOT EXTENSION ON DIFFERENT IMPLANT SURFACES: AN IN VITRO STUDY

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**Aim.** The chemical and physical surface properties of dental implants have an important influence on blood clot organization. The aim of the present study was a quantitative evaluation of the in vitro fibrin clot extension on different implant surfaces.

**Materials and methods.** Thirty commercially pure Grade IV titanium discs with three different surface topographies (machined, sandblasted, and laser treated) were used in the present study. For the preliminary quantitative evaluation of the fibrin clot, 15 specimens were used (5 per group) where human whole blood was employed. Venous blood was drawn from a healthy adult volunteer, and 0.2 mL were immediately dropped onto the surface of each specimen. Contact time was 5 min at room temperature; then the samples were rinsed with saline solution and fixed in a buffered solution of glutaraldehyde and paraformaldehyde. Samples were washed again with a buffer solution and dehydrated in an ascending alcohol series. Specimens belonging to all groups were observed under SEM at a magnification of 3000X. From each sample, 50 random micrographs were collected in.tif format with an N X M 2048 X 1536 grid of pixels.

**Results.** Quantitative analysis of fibrin clot extension showed the following results: in machined samples fibrin clot extension was 71,5  $\pm$  5,8% (Median  $\pm$  SD), in sandblasted samples fibrin clot extension was 65,8%  $\pm$  6,5 (median  $\pm$  SD), and in laser treated samples, it was 83%  $\pm$  7,8 (median  $\pm$  SD). With Kruskal Wallis One Way ANOVA it was possible to find that there were significant differences among the groups  $p < 0.001$ . The Tukey test revealed that the extension of the fibrin clot of laser treated samples was statistically higher ( $p < 0.05$ ) compared to both machined and sandblasted samples. On the SEM evaluation the fibrin clot appeared directly attached on the machined specimen surfaces without any particular three dimensional organisation, meanwhile, in either sandblasted and laser treated groups the fibrin network shown a three dimensional distribution. Particularly, on the laser treated surfaces fibrin clot network appeared to be 3- dimensional organized among the laser pores, and at the same time tightly adherent to the internal wall of the them showing also a two dimensional organization.

**Conclusions.** The results of this in vitro study indicate that, there is a correlation between implants surface morphology and fibrin clot extension. Improvement in surface micro texture complexity seems to determine the formation of a more extensive and three dimensionally complex fibrin scaffold. Further investigations are necessary to explain in more detail the mechanisms that regulate the fibrin clot formation on different implant surfaces.



### REASONED EVOLUTION IN SINUS-LIFT: FIT-LOCK TECHNIQUE

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**Aim.** The pneumatization of the sinus is a frequently occurring phenomenon in absence of dental elements, causing a vertical reduction of bone availability and limiting the implant placement for prosthetic rehabilitation. The authors have proposed the fit lock technique, which allows the implants to be placed simultaneously with residual bone thickness less than 4 mm, while harvesting intraoral autologous bone. Given the long term results, a longitudinal study has been conducted on 11 patients treated with this technique while using a new implant design to guarantee better stability of the graft also in cases of insufficient bone density. The aim of the study, retrospective and longitudinal, is to evaluate by resonance frequency across the follow-up periods the degree of the stability of the implants applied with the fit lock technique in the upper sinus with bone availability lower than 4 mm. The stability measurement has been carried out by resonance frequency analysis with Osstell Mentor (Osstell instrument, Integration Diagnostics AB, Gothenburg, Sweden). The Tekka implants underwent measures of resonance frequency at the time of the initial placement, six months, and 12 months after progressive load to evaluate the degree of osteointegration; moreover, radiographic TC dentalscan and Orthopantomaxillary RX were carried out both at the diagnosis time and following treatment.

**Materials and methods.** About 50 patients were visited between January 2011 and January 2012 for implant-supported rehabilitation of the posterior-superior sectors at the Municipal Japanese University Hospital of Santa Cruz de la Sierra, Bolivia and at the Department of Odontostomatologic Sciences, Sapienza University of Rome. All patients were studied following our clinical-implantologic protocol for prosthetic rehabilitation. During this period 11 patients were selected according to the following exclusion and inclusion criteria. From the initial 50 patients 15 were excluded, 20 did not give consent, 4 did not undergo the follow-up. The remaining sample consisted of 11 patients. All patients were treated with Tekka grade 5 titanium implants, with a half-conical full screw shape, double progressive condensing thread, SA2 surface (sandblasted and double acid etch) that consists in sandblasting trough corundum micro beads of 260 micron diameter, followed by a double chemical treatment with acid tipping. The Tekka implants were evaluated with measures of resonance frequency during the follow-up periods using Osstell Mentor (Osstell instrument, Integration Diagnostics AB, Gothenburg, Sweden) at time 0 (T0) of implant placement, after 6 months (T1), and after 12 months (T2), upon progressive load.

*Statistical analysis:*

- Normality test on the distribution of the stability values
- Descriptive statistics of the stability values: mean, median, mode, variance, standard deviation standard error, quartiles)
- Non parametric analysis of variance

Aim to verify if the implant stability, measured by "implant stability quotient" increases progressively, and in a statistically significant manner, from the moment of the placement up to six months and one year.

**Results.** The overall results reported show the loss of only two implants in position 24 and 27 on the same patient, due to a post-surgical infection occurring 15 days after placement.

No complications occurred for the remaining 18 implants across the study period. The evaluation of the data across the three follow-up periods showed a distribution that significantly deviated from normality.

**Conclusions.** In literature the implant survival in posterior lateral areas (type SA4) - ranges between 90 and 97%. These data are influenced by several factors. Some surgical protocols suggest that, if the bone available is thinner than 4 mm, as in Misch IV classification, first is necessary a reconstructive-regenerative phase and then a second surgical phase of implant insertion. These protocols are justified by the fact that, as reported by the authors, the survival of the implant is also influenced by the quality and density of the bone which is reduced in these areas (Nedir et al, in 2009), proposed one-stage surgery with simultaneous insertion of implants in patients with atrophic maxilla without grafting, provided that primary stability was guaranteed. Later other authors have proposed, in a wider caseload, the contextual placement of the implant without filling or with PRF (platelet-rich fibrin), reporting a 100% of success also in cases of lower bone availability. The described technique seems to ensure a good success rate in cases of Misch IV class with contextual implant placement, with a success percentage of 93.4% one year after placement. The technique allows an immediate stabilization of the implants also due to the new design that improves performance in those cases with reduced bone density. Compared to similar techniques it appears simpler and reproducible, it does not depend on the operator and allows a lower biological and economic effort for the patient, considerably reducing the time of prosthetic rehabilitation.



### REDUCED INVASIVE EFFECTS IN LASER DENTAL IMPLANTSURGERY SEDRAN

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**Aim.** New implant surfaces are being evaluated by current dental scientific research. Various implant related surgical procedures once entirely performed through scalpel and drilling surgery or piezoelectric insert tips are now supported by the erbium laser.

**Materials and methods.** Er, Cr: YSGG laser energy is in the infrared wave spectrum with a photon emission at a 2780 nm wavelength and a pulse duration of 140 microseconds in the repetition rate ranging from 10 Hz to 50 Hz. During surgical procedures, the power output for alveolar bone is 3.5 W 30 Hz yielding an energy density of 8.6 J/cm<sup>2</sup>, and the power output for gingival tissue is 1.25 W 30 Hz, yielding an energy density of 24 J/cm<sup>2</sup>. During surgical procedures, the tip is approximately 2 mm from the target tissue, contactless and under the control of magnifying systems.

**Results.** The hydrophotonic energy performs an under-sized osteotomy of the surgical site. Tapered implants are inserted through bone expansion and high torque for an early or immediate loading.

**Conclusions.** The erbium laser allows a precision of 10-15  $\mu$  per spot removing a fixed bone amount per single pulse with an excellent cutting control, holes with fitting diametres, trauma reduction to biological tissues, better integration of prosthetic implant structures and reduced post-operative course.



### REHABILITATION OF ATROPHIC MAXILLA WITH A MINIMALLY INVASIVE TECHNIQUE

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**Aim.** Minimally-invasive dental treatments have nowadays become more and more requested in the everyday clinical practice. The main challenge for the clinician is to aim at being as less invasive as possible in the more complex surgical and prosthetic rehabilitations. The new Cad-Cam technology and the digital impression technique can help us develop faster and easier protocols.

**Case report.** Patient D.M. presents to the clinic for a functional and esthetic full mouth rehabilitation. Her periodontal and prosthetic conditions are severely compromised with hopeless prognosis for all the remaining teeth. Full mouth extractions are planned under local anesthesia and IV sedation as well as the immediate placement of 8 implants (4 implants per arch) (the so called Just on Four technique)

**Materials and methods.** After collecting the preoperative data and information, two surgeries consisting on the placement of 4 implants per arch (15 days between the two surgical procedures), are performed under IV sedation. After the extraction of the remaining teeth and the placement of the dental implants, a precise digital impression is taken with the help of the Trios 3shape scanner, after positioning the Scann Body devices on each of the implants heads, which are necessary for a correct record of the implant positions. The obtained file is then sent to the milling center which will eventually deliver an anatomical bar within 12-18 hours. The bar is then tried in and finalized with a composite layering 48 hours after the surgery is performed.

**Discussion.** The idea and the possibility to take advantage of the new modern technology for the development of complex full arch rehabilitation is of primary interest. Further studies need to be carried out to evaluate the effectiveness of this clinical protocol.

**Conclusions.** The purpose of this clinical report, which is the development of a quick and less invasive technique to rehabilitate the patient, has been successfully achieved within 48 hours from the surgery.





### REHABILITATION WITH ULTRA-SHORT IMPLANTS: PRELIMINARY RESULTS OF A MULTICENTRIC STUDY

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**Aim.** In the implant-prosthetic rehabilitation of edentulous jaws are frequently encountered problems related to bone atrophy. Unfavorable conditions of the alveolar ridge are treated with horizontal and vertical bone augmentation, sinus floor elevation and "tilted" implants. By the evidence of scientific literature we know that although there are many techniques, it is still unclear what's the most efficient and the results are not always predictable. The use of short implants seem to be a good alternative, providing a simple and minimally invasive surgery, with a reduction of morbidity, complications, and with a more rapid postoperative period. The predictability of this technique, however, is dependent on an implant design valid from the biomechanical point of view: plateau design, sloping shoulder, locking taper (subcrestally placed). In this study are being rehabilitated edentulous patients with severe atrophy using four implants Ultra Short 4x5 and finalized with a particular type of fixed prosthesis "metal-free" Trinia® (fiber resin fixed prosthetics). The aim of the study is the evaluation of the success of the implant rehabilitation and the life quality of the patients.

**Materials and methods.** A prospective, randomized and multi centric study is performed. The centers involved are: Implant Dentistry Centre Boston USA, University "Sapienza" Rome, University of Cartagena Colombia, University of Leuven Belgium, University of Vienna Austria, University of Minnesota USA. We treated in our department 10 patients. Each patient was rehabilitated with four ultra short implants; four months after implant placement, the fixtures were uncovered and the fixed prosthetics were made. The follow-up of patients is based on radiological controls (orthopantomography) on predetermined intervals: Implant placement (T0); Implant exposure; 1 and 6 month, 1 to 5 year after load.

**Results.** Six month after prosthetic rehabilitation no implant failure was observed. At clinical controls no one of the forty implants with prostheses showed sign of inflammation. The radiographic evaluations showed no significant variations of bone level between the two checks to one and six months after prosthetic loading.

**Conclusions.** These preliminary results seemed rather promising allowing us to record the entire implant success. This data demonstrates the effectiveness of minimally invasive surgical technique that is opposed to techniques well-articulated and more burdened by expenses of time and result. The excellent osseointegration obtained by merging the characteristics of the implant design and fixture-abutment connection allows implants to support the prosthesis. The chewing load is also dissipated thanks to the innovative prosthetic structure Trinia®. The prosthetic rehabilitation with "short" implants seems to be a viable alternative to advanced surgical procedures. However, 5 years of post-loading data are necessary before making reliable recommendations.



## RELIABILITY OF A PROJECT OF SOFTWARE-ASSISTED IMPLANT SURGERY. A COMPARATIVE ANALYSIS

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**Aim.** The purpose of this paper is to illustrate the advantages of software-assisted guided surgery and its predictability, showing the possibility of obtaining a correspondence between system design and surgical outcome through their comparison. The computer - assisted guided surgery requires the clinician to careful diagnosis, followed by an implant project that regards the anatomical factors and also the prosthetic rehabilitation visible in the bone volume. The advantages of this method are essentially that the clinician is forced to be programmed in a precise and reasoned way, what will be the three-dimensional positioning system, and that such accuracy is then honored during the intervention phase. In addition the diagnostic phase, the clinical diagnosis of three-dimensional software enables you to make an assessment of bone density HNS (Hard-Soft-Normal) obtaining data correlated with the density defined in histology, in micro-CT and in clinical assessment. core of the rehabilitation prosthetic immediate loading. Depending on the clinical condition, the method makes possible the use of flapless surgery, resulting in less invasivity and post-operative discomfort for the patient; with appropriate indications defined already in project, is possible the realization of a pre-built implantoprosthesis immediate loading, allowing also a reduction of the times of intervention.

**Materials and methods.** We report the clinical case of a patient rehabilitated with two implants placed in the upper right with flapless technique and two placed in the left; in this second case with the lifting of a micro flap combined with bone regeneration techniques, using guided implantology software assisted bnx3D guides and the surgical guide realized digitally with 3D printer. Moreover, in this specific case was possible to build the surgical template directly by CAM on the CAD model using digitized and aligned to the volume radiology. The patient, at a later time and for other reasons, repeated the CTCB for the rehabilitation of the dental arch below, giving us the ability to control the position of the actual post-surgical implants and to evaluate the actual correspondence with what was planned, by means of a software measurement used in micromechanics

**Results.** The evaluation showed high accuracy and mismatches between implant and clinical outcome. The implant design performed with the software takes into account in the final of the bone anatomy and its density measured with the software, the project prosthetic achieved through the diagnostic wax analogue or digital and evaluation of the thickness of the gingiva important for choosing prosthetic abutment. At this stage it is also possible to measure the ability to perform the rehabilitation of the patient in immediate loading with a pre-established Implant Prosthesis (PIP).

**Conclusions.** In clinical cases with a need for inclusion of a limited number of implants, this method appears to be highly predictable, as well as easy to manage even by operators with medium level of expertise in computer-assisted implant surgery.



### RESORBABLE POLY-D-L-LACTIC ACID MEMBRANES FOR BONE REGENERATION: A HISTOMORPHOMETRIC STUDY

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**Aim.** To histologically and histomorphometrically evaluate the biocompatibility and the biological properties of poly-d-l-lactic acid (PDLLA) resorbable membranes, using a model of calvarial monocortical bone defects in domestic pigs.

**Materials and methods.** Six 10x10x10 mm circular calvarial bone defects were prepared in three adult female Large White domestic pigs and treated as follows: left empty (control), covered by a non porous membrane (PDLLA), covered by a porous membrane (pPDLLA), filled with bone (bone), filled with bone and covered by a non porous membrane (bone + PDLLA), filled with bone and covered by a porous membrane (bone + pPDLLA). PDLLA pins were used to fix membranes by means of an ultrasonic device. After 40 days, bone blocks were harvested and histologically processed.

**Results.** No traces of inflammatory tissue or signs of infection around PDLLA membranes and pins was found. A centripetal pattern of bone formation from the bone walls into the defect was evident. An incomplete bone filling in the empty defects was found, whereas all sites filled with bone chips showed a complete bone formation, irrespectively of the presence and the type of membrane used.

**Conclusions.** PDLLA membranes and pins showed to be highly biocompatible toward bone tissue and they did not interfere with the bone healing process of monocortical calvaria defects in domestic pigs. No adjunctive effect of PDLLA membranes, irrespectively of their porous / non porous structure, could be evidenced in terms of bone regeneration under the present experimental conditions. Further studies are needed to test such devices in other clinically relevant experimental models.



### RETROSPECTIVE ANALYSIS ON PRECISION OF FREEHAND AND COMPUTER GUIDED IMPLANT SURGERY. PRELIMINARY RESULTS

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**Aim.** The precision of implant placement is the key for success in the prosthetic rehabilitation. Not only anatomical conditions limit the placement of implants, but also the position of the prosthetic emergence profile can affect the esthetic results and maintenance of the rehabilitation. The present study analyzed the precision of the position of implant placed both in guided and non guided implant surgery.

**Materials and methods.** Patients that were already treated with implant surgery were selected and divided in two groups. Group Control was treated with 2-3 implants in a free hand standard procedure. Implants were placed using a standard surgical guide based upon a wax up and an open flap approach. The patient in Test Group were those treated with 2-3 implants using a guided implant surgery approach, with flawless or an open flap approach. All guides were Teeth supported. The CT scan of the patient of the freehand group was loaded on the Co-Diagnostic software. Ideal implant placement was planned and recorded. All patients were rehabilitated by means of a digital impression. The STL of the impression with the scan abutments was matched on top of the planned implant position for both groups. The difference between the implant placed and the implant planned was calculated automatically by the software. All data was recorded and was statistically analyzed (test T student).

**Results.** The mean angle deviation was 3.10° (SD 1.85°) for Test group and 12.73 (SD 2.94) for control group. The base and tip of the implant was measured by four parameters: mesio-distal, vestibular-lingual, apico-coronal and a 3D value of discrepancy. The base results were: the mean MD deviation was -0.22 mm (SD 0.58 mm) for test group and -0.50 mm (SD 1.59 mm) for control group. The mean VL deviation was 0.62 mm (SD 0.28 mm) for test group and 0.14 mm (SD 2.50 mm) for control group. The mean AC deviation was -0.54 mm (SD 0.24 mm) for test group and -1.30 mm (SD 0.57 mm) for control group. The mean 3D deviation was 0.99 mm (SD 0.32 mm) for test group and 2.84 mm (SD 0.98 mm) for control group. The tip results were: the mean MD deviation was -0.10 mm (SD 0.74 mm) for test group and -1.38 mm (SD 2.75mm) for control group. The mean VL deviation was 1.16 mm (SD 0.39 mm) for test group and -0.15 mm (SD 2.47 mm) for control group. The mean AC deviation was -0.51 mm (SD 0.22 mm) for test group and -1.05 mm (SD 0.60 mm) for control group. The mean 3D deviation was 1.41 mm (SD 0.52 mm) for test group and 3.50 mm (SD 1.32 mm) for control group. The results were statistically different.

**Conclusions.** Although a retrospective analysis, the present study shows that the use of a guided surgical guide allows the position of implants with a deviation lower than when a freehand surgery is used.



### SEVEN-YEARS RETROSPECTIVE ANALYSIS OF IMPLANT-PROSTHETIC TREATMENT WITH WINSIX® IMPLANT SYSTEM

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**Aim.** To assess a retrospective analysis on the health of implant sites in implant-prosthetic rehabilitations with an implant system performed between March 2006 and March 2013 at the Department of Dentistry IRCCS San Raffaele Hospital in Milan, which are submitted, at the end of the rehabilitative procedures, to an implant maintenance program at the Center for Oral Hygiene and Prevention (COHP) of the same Operative Unit.

**Materials and methods.** Through the analysis of records of the Dental Surgery Section, the patient data stored in the digital databases used in the Unit, 2761 implants placed in 1172 patients, of whom 942 have joined the implant maintenance program, allowing the monitoring of 2201 implants were retrospectively evaluated. For each implant were taken into consideration clinical parameters identified in the scientific literature as effective for determining the health of the implant site and radiological parameters. Among analyzed data we included Plaque Index (PI), Bleeding on Probing (BoP), Probing Depth (PD, probing in 6 sites), patient history data. Tilted implants were excluded from the study. The collected data were then analyzed according to a statistical observational methodology.

**Results.** Overall data collected has shown a survival rate of implants of 97.8%, compared with a failure rate of 2.2% of cases. The rate of periimplantitis was 6.2% and the rate of mucositis was 33%. Mean BoP values were 25.2% in patient with survived implants, and 61.9% in patients that underwent implant failure. Mean PI values were 15.6% in patient with survived implants and 53.3% in patients that underwent implant failure. For the PD, the 77% of the probing sites, were less than 4 mm, and the 33% are more or equal to 4 mm.

**Conclusions.** The adoption of an implant maintenance program is confirmed to be an effective tool to ensure the long-term implant survival. It is also necessary to educate and motivate the patient to most appropriate home care techniques to control bacterial biofilm, make information about the risk factors for implant failure and assess the patient's exposure to the same. On the basis of these data and clinical parameters measured would be appropriate to establish an individualized maintenance program not only to prevent and detect possible problems with the implant, but also to ensure the highest level of implants health.



### SOFT AND HARD TISSUES CHANGES OF IMMEDIATE TRANSMUCOSAL IMPLANTS PLACED IN END ABUTMENT MOLAR SITES: A 12-MONTHS PROSPECTIVE CONTROLLED STUDY

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**Aim.** To verify the distal bone resorption of immediate transmucosal implants placed in fresh molar site associated with distal healed edentulous zone after 12-months follow-up period.

**Materials and methods.** A total of 40 tapered implants were installed in 40 patients. Twenty test implants were immediately placed in fresh alveolar sockets of first lower molars associated at distal healed edentulous zone while control implants were installed in lower first molar sites associated at distal healed edentulous zone following tooth extraction and a 6-month healing period. The marginal defects of test implants were treated using the principles of guided bone regeneration (GBR). Clinical parameters (PPD; probing pocket depth and REC; recession), and radiographic measurements (IS-BD; vertical distance from the implant shoulder to the most apical extension of the bone defect and AC-BD; vertical distance from the alveolar crest to the bottom of defect) were compared between test and control group.

**Results.** After 12-months follow-up period statistically significant differences ( $P < 0.05$ ) related to clinical parameters were observed between test and control implants. Statistical significant changes ( $P < 0.01$ ) related to radiographic measurements between test and control implants, at baseline and after 12-months follow-up period, were recorded.

**Conclusions.** The outcomes of this study demonstrated that the vertical bone resorption on distal aspects is more pronounced in test implants respect to control and the presence of periodontal structures of adjacent teeth is needed to preserve the vertical bone height.



### SOFT AND HARD TISSUES MODIFICATIONS AT IMMEDIATE TRANSMUCOSAL IMPLANTS (LASER-LOK® MICROTTEXTURED COLLAR) PLACED INTO FRESH EXTRACTION SITES. A SIX-MONTHS PROSPECTIVE STUDY WITH SURGICAL RE-ENTRY

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**Aim.** This prospective study aimed at assessing the alveolar dimensional changes after immediate transmucosal implants placement (Laser-Lok® microtextured collar) associated with bone regenerative procedures.

**Materials and methods.** Sixteen implants were placed immediately into single-rooted extraction sockets. Peri-implant defects were treated with bovine-derived xenograft and resorbable collagen membranes. After 6-months follow-up period a surgical re-entry was performed. The following intra-surgical parameters were recorded at baseline and during surgical re-entry: IS-BD: vertical distance from the implant shoulder (IS) to the bottom of the bony defect (BD), IS-CREST: vertical distance from the implant shoulder (IS) to the most coronal extension of the alveolar crest (CREST), CREST-BD: vertical distance from the most coronal extension of the alveolar crest (CREST) to the bottom of the bony defects (BD), EC-I: horizontal width from the external aspect of the socket wall at the level of the alveolar crest (EC) to the implant surface (I), IC-I: horizontal width from the internal aspect of the socket wall at the level of the alveolar crest (IC) to the implant surface (I).

**Results.** At 6 months, all implants were successfully osseointegrated, yielding a survival rate of 100%. The vertical bone resorption was  $0.38 \pm 0.65$  mm ( $7.51 \pm 14.51\%$ ) at the mesial,  $0.46 \pm 0.66$  mm ( $9.43 \pm 16.54\%$ ) at the buccal,  $0.15 \pm 0.90$  mm ( $1.15 \pm 19.21\%$ ) at the distal,  $0.31 \pm 0.85$  mm ( $6.68 \pm 17.76\%$ ) at the oral site respectively. The horizontal defect fill was  $0.62 \pm 0.87$  mm ( $76.92 \pm 43.85\%$ ) at the mesial,  $2.38 \pm 1.19$  mm ( $96.15 \pm 9.39\%$ ) at the buccal,  $0.62 \pm 0.87$  mm ( $80.77 \pm 38.40\%$ ) at the distal,  $1.31 \pm 0.85$  mm ( $96.15 \pm 13.87\%$ ) at the oral site respectively. The horizontal bone resorption at the mesial and distal aspect was not present, while at the buccal and oral aspects the horizontal bone resorption was  $1.38 \pm 1.12$  mm ( $32.18 \pm 22.66\%$ ) and  $0.62 \pm 0.65$  mm ( $20.51 \pm 21.41\%$ ) respectively.

**Conclusions.** At 6-months surgical re-entry, Laser-Lok® microtextured collar provides more favorable conditions for the attachment of hard and soft tissues, and reduces the alveolar bone loss.



### SURFACE NANO-TOPOGRAPHY AND COMPOSITIONAL CHARACTERISTICS AND SURFACE REACTIVITY TOWARDS CALCIUM PHOSPHATES NUCLEATION OF CONE MORSE DENTAL IMPLANTS

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**Aim.** Titanium and its alloys have no ability to bond to living bone directly and the achievement of reactive surfaces possessing biostimulating activity represented a challenge for the implantology. The creation of micro-textured surfaces (Ballo et al. *Implant Dentistry - A rapid evolving practice* 2011) and the formation of a biologically active calcium-phosphate thin layer on surface allow the direct bond of the implant to the alveolar bone without interfacial fibrous tissue formation. It is clinically important to know whether a titanium surface of endosseous implants can be spontaneously coated by a film of calcium phosphates through a biomimetic process when in contact with biofluids, owing to its intrinsic chemical-physical properties interlinked with its chemical composition and surface treatments. Cone Morse endosseous dental implants characterized by an innovative taper/conical internal connexion have been recently marketed. The manufacturer states that the implant surfaces have been activated with Ca and Mg containing nanoparticles, sandblasted and treated with hydrofluoric acid. The aim was the surface study at macroscopic level (screws design and pitch, and thread shape) and microscopic level (texture, micro-topography and compositional characteristics) and the surface reactivity towards calcium phosphates (CaP) nucleation of cone Morse titanium implants.

**Materials and methods.** Sandblasted acid-etched Universal II cone Morse implants (Implacil De Bortoli, São Paulo, Brazil) were analyzed by ESEM-EDS (Environmental Scanning Electron Microscope with Energy Dispersive X-ray System) to study the micro-morphology of titanium surface and perform elemental X-ray microanalysis (microchemical analyses) and element mapping. ESEM/EDS analyses were performed at  $t=0$  and after 28-day soaking in a simulated body fluid Hank's balanced salt solution (HBSS). The ability of titanium surface to form a layer rich in Ca and P (apatite or apatite precursors) when soaked in HBSS was tested following ISO specifications (ISO 23317:2012: Implants for surgery - In vitro evaluation for apatite-forming ability of implant materials). Microchemical EDX analyses (weight% and atomic%) and element mapping were carried out to evaluate the relative element content, the element distribution and the Ca/P atomic ratio (Gandolfi et al. *J Biomed Mater Res B* 2013;101:1107-23).

**Results.** Micro-morphological analyses showed a micro-textured highly rough surface with microgrooves. Microchemical analyses showed compositional differences among apical (tip) middle (body) and distal (apex) thirds of the screw. A uniform calcium phosphates layer formed after soaking in HBSS. EDS data provided Ca/P ratios of 1.13-1.27, values consistent with amorphous calcium phosphates, dicalcium phosphate and octacalcium phosphate.

**Conclusions.** Implacil implant showed a macro-design feature of the screw and a nano-texture of the surface variable among the different portions and demonstrated the ability to nucleate calcium phosphates when immersed in serum-like environment through the defined biomimetic coating process in simulated body fluid. Titanol Ti-OH groups formed on the hydrated titanium oxide are responsible for the surface reactivity and are involved in the nucleation of calcium phosphates. These properties may favour bone anchorage and healing by biostimulation of mineralizing cells.





### SURGICAL REGENERATIVE THERAPY OF PERI-IMPLANTITIS: A CASE SERIES

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**Aim.** The aim of the present case series is to evaluate retrospectively the effectiveness of regenerative procedures in the management of peri-implantitis.

**Materials and methods.** A case series of 7 patients, having a minimum of one osseointegrated implant diagnosed for peri-implantitis and treated with regenerative procedure between 2009 and 2012, is presented. The peri-implantitis-affected implants demonstrated: probing pocket depth (PPD) 35 mm; presence of bleeding on probing (BOP) and/or suppuration (Sup); radiographic bone loss (RBL) 33 mm; absence of implant mobility. Prior to the surgical approach all patients received full-mouth debridement. Systemic antibiotics were administered peri- and post-operatively. The regenerative procedure consisted of: reflection of a full-thickness flap; granulation tissue removal from the defect area with plastic curettes and debridement with ultrasonic instruments; decontamination of exposed implant surface using an air-abrasive device with glycine powder; application of citric acid pH=1 for 30 seconds or photothermal therapy with diode laser (810-nm) and EmunDo® (Sweden & Martina); topical antibiotic delivery with tetracycline soaked cotton pellets; filling of the intra-bony defect with hydrated mineralized bone allograft (Puros®, Zimmer); graft coverage with a collagen barrier membrane; tension-free closure of the flap. The supra-structures were removed before surgery and remounted after treatment. At 2 years of follow-up PPD, BOP and RBL were evaluated.

**Results.** Ten implants in 7 patients (1 male, 6 female) were consecutively treated with a regenerative approach and followed up between 2 and 4,4 years. The age of the patients ranged from 32 to 63 years. Seven implants were in the maxilla and 3 in the mandible. The initial PPD ranged from 10 mm to 5 mm (mean  $6,5 \pm 1,8$  mm). Five implants were positive for BOP and two for Sup. The RBL prior to surgery was on average of  $4,7 \pm 1,2$  mm on the mesial aspect of the implants and  $4,5 \pm 2,2$  mm on the distal aspect. Two years after the intervention PPD was reduced to less than 5 mm, no BOP or Sup were present and the average RBL became  $2,2 \pm 0,7$  mm (mean reduction  $2,5 \pm 0,9$  mm) and  $2,3 \pm 1$  mm (mean reduction  $2,3 \pm 1,4$  mm) respectively on the mesial on the distal aspect of the implants.

**Conclusions.** Within the limits of this case series, the regenerative approach for the treatment of peri-implantitis seems to be favorable in the short term.



### THE EFFECT OF AGE, GENDER AND INSERTION SITE ON MARGINAL BONE LOSS AROUND ENDOSSEOUS IMPLANTS 3 YEARS AFTER INSERTION

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**Aim.** The goal of the present study was to evaluate bone changes around endosseous implants. Additionally, the overall clinical performance was assessed.

**Materials and methods.** 617 two-stage Premium® implants were placed in 226 consecutive partially edentulous patients. All the implants had straight emergence profile and Zirti surface, diameter ranging from 3.30 to 5 mm and length from 8.5 to 13 mm. All surgeries were performed by the same surgeon. At 3 to 4 months, fixed prosthetic rehabilitation was performed employing titanium abutments with the same diameter as the implant. Marginal bone levels were assessed on orthopantomography immediately after surgery and at follow-up visit at 6 and 36 months. Marginal bone loss (MBL) was calculated from the difference between the initial and final measurements. Clinical parameters, including the peri-implant soft tissue characteristics, were evaluated at each follow up visit.

**Results.** The cumulative survival rate was 98.6% at 3 years. Eight implants failed and they were all replaced by another implant. Mean overall MBL was 0.81 mm (range 0.2 to 2 mm).

Regardless of patient gender and age, higher MBL was observed around implants in the maxilla than in the mandible ( $p < 0.007$ ), which reached statistical significance for the 4.5 platform ( $p < 0.0001$ ). Moreover, a relation between implant diameter and MBL ( $p < 0.0001$ ) was observed in male (both in maxilla and in mandible) and female patients only in the maxilla. Three age groups were identified based on the age distribution in the study population: <50 year old, 50-60 year old and >60 year old. Older patients had higher MBL in the upper maxilla but this did not occur in the mandible ( $p < 0.03$ ). When gender effect was considered, MBL appeared to progressively increase with age in male patients, but appeared to reach a peak already in the 50-60 years age group in the female population subset ( $p < 0.001$ ).

**Conclusions.** The overall performance and MBL values at 36 months were good. Older age, female gender, and maxilla (vs mandible), appear to significantly worsen MBL, therefore representing important factors to consider when planning implant supported fixed rehabilitation.



### THE IMPACT OF SUBCRESTAL IMPLANT PLACEMENT ON PERI-IMPLANT HARD AND SOFT TISSUES HEALTH: RESULTS AT 2 YEARS

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**Aim.** To assess the influence of the placement level of short implants with a locking-taper connection design on the outcomes of crestal bone level and soft tissue health.

**Materials and methods.** Records of 58 consecutive partially or totally edentulous patients restored with still surviving short locking-taper implants (Bicon LLC, Boston, MA, USA) were reviewed. For each implant, radiographs from the surgical appointment ( $t_0$ ) were compared to those from the loading time ( $t_1$ ) and from last follow-up visit ( $t_2$ ). A radiographic evaluation of the degree of subcrestal positioning was conducted to identify two implant groups: Group 1 was composed of implants placed less than 2 mm under the crestal bone; Group 2 was composed of implants placed 2 mm or more under the crest. The primary outcome variables were the crestal bone levels and the peri-implant bone loss between prosthetic loading and last control visit ( $t_1$  to  $t_2$ ). Clinical parameters including the keratinized gingival (KG) width, modified bleeding index (mBI), modified plaque index (mPI), and probing depth (PD) were assessed at the last follow-up visit. T tests were conducted to identify statistically significant differences implant groups. Linear regression models were developed to test the dependence of the crestal bone heights by the degree of subcrestal surgical implant placement. Significance level was set at  $p < .05$ .

**Results.** One hundred and thirty-seven implants were followed for an average period of 31 months. At the surgery, the implants were placed, on average, 2.04 mm (mesial) and 1.86 mm (distal) subcrestally. Eighty implants were placed less than 2 mm under the crest (average: 1.28 mm), while fifty-seven implants were placed more than 2 mm under the crestal bone (average: 2.97 mm). At the prosthetic loading ( $t_1$ ), the average crestal bone level was 1.11 mm, 0.79 mm in Group 1 and 1.86 mm in Group 2, with statistically significant differences between implant groups ( $p < .05$ ). At the follow-up visit ( $t_2$ ) the mean crestal bone levels were respectively 0.51 mm and 1.35 mm, with statistically significant differences between implant groups ( $p < .05$ ). The average peri-implant bone loss between prosthetic loading and control visit ( $t_1$  to  $t_2$ ) was 0.04 mm in the Group 1 and 0.33 mm in Group 2. The average keratinized mucosa width was 2.16 mm, the average mBI was 0.24, the average mPI was 0.17 and the average PD was 2.34 mm. Significant difference between groups was observed regarding to keratinized gingival width (Group 1: 1.97 mm; Group 2: 2.41 mm;  $p < .05$ ) but not for other clinical soft tissues parameters. Linear regression models confirmed the dependence of crestal bone levels by the degree of subcrestal placement ( $p < .05$ ).

**Conclusions.** After two years of observation, the implants of this study have shown minimal peri-implant bone resorption. The greater subcrestal implant placement has resulted in a higher level of the peri-implant crestal bone, both after the osseointegration period and after the loading period. Both the study implants groups have shown good health of peri-implant soft tissues.



#### THE PAPILLA INFLUENCING VARIABLES - PERSPECTIVE CLINICAL TRIAL 4Y F-UP

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**Aim.** The presence or absence of interdental papilla around implants plays a fundamental role in the esthetic outcome and the satisfaction of patients; in this study the relationship between the Papilla Index (PI) and the contact point bone peak (CPBP), the buccal bone width (BBW) after implant placement and presence of an adjacent implant or natural tooth (MS) was analyzed with a clinical perspective trial having the purpose of assessing the pattern of maturation of the peri-implant papillae after 4 years.

**Materials and methods.** The study group included 63 consecutive enrolled implants at mean follow-up 4 years. The distance between the prosthetic contact point and the bone peak was measured by the use of standardized intra-oral radiograph made by individual trays for each site and after setting 1:1 the image on the base of implant dimensions. Papilla Index (PI) was recorded according to Jemt such to know if papilla was complete or not between tooth. Papilla in diastema site or without two adjacent tooth with a valid contact point were excluded from the study.

**Results.** From the 4th years f-up study (Graf.1) is highlighted that papilla between implant and natural tooth is more predictable than when considering papilla between two implants at  $p=0,02$  (confidence interval increase between implants), it is furthermore emphasized that, having CPBP = 4 mm, complete papilla values are nearly the same in both Tooth-to-Implant ad Implant-to-Implant scenarios. It is also noticeable that a lower degree of papilla loss is experienced for CPBP increments in Implant-to-Implant cases (papilla presence is unexpected but possible even with CPBP=7, possibly due to surgery technique), than in Tooth-to-Implant scenarios (papilla is likely to be present only for CPBP values  $\leq 6$  mm). Furthermore, considering (BBW) with 4th years f-up (Graph 2) as an additional variable ( $p>0,05$ ), is observed by mean that with a thicker BBW (BBW=2) is easier to get a complete papilla (PI=3) when a tooth as a mesial element is present (3 mm BBW) instead of an implant (2 mm BBW); also the papilla loss is more persistent if a tooth represent the mesial element (no papilla is obtained with 9mm BBW) instead of an implant (for which the critical point is 5 mm). With a thinner bone (BBW = 1 e between 0.6/1.4 mm) the PI trend is less predictable (particularly in mesial implant cases) and seems to be unconnected to this variable. Unlikely these data don't reach a sufficient number to gain a statistical significance. Eventually for thin or absent buccal bone (BBW = 0 e 0/0,5 mm) we have complete papilla for CPBP value  $\leq 5$  mm for tooth as a mesial element, while for implant-to-implant cases 3 or less CPBP mm are required to form a complete papilla.

**Conclusions.** Papilla is more easily reached between implant and tooth than between two implants ( $p=0,02$ ) and a lower distance between the prosthetic contact point and the bone peak sustain more extended papillas ( $p<0,05$ ).



### TISSUE EQUATION CONCEPTS

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**Aim.** Tissue management during or after implant placement is a challenge for clinician. Literature underline that tissues around implant affect the 50% of the aesthetic outcome of the rehabilitation. Potential causes of esthetic implant failures deal with anatomic and iatrogenic factors such as improper implant or prosthesis design and fixture malpositioning. This case series presents prosthetic considerations as indications for implant therapy. Aspects of the tissue contouring by use of different emergence profile is described in detail to guide tissues at the correct tridimensional positioning.

**Materials and methods.** All implants were placed following manufacturer recommendations. The following positioning criteria were respected:

- presence of at least 2 mm of Keratinized Mucosa (KM);
- Contact Point-Bone Peak (CPBP) distance of at least 5 mm;
- more than 3 mm of inter-implant distance and more than 1,5 mm from adjacent teeth;
- the prosthesis has been manufactured so that the peri-implant soft tissues were not compressed. (no more than 2 minutes of ischemia any time prosthetic profile was changed).

After implant placement, either in a two step or in immediate implant prosthetic procedures were performed. Tissue contouring timing and method highly affects the final result and it's stability upon time. Many variables are reviewed to gain a predictable result in the peri-implant tissue stability along time. After implant placement, either in a two step or in immediate implant prosthetic procedures, the tissue contouring timing and method highly affects the final result and it's stability upon time. In detail zenith and papilla positioning were analyzed.

**Results.** The emergence profile angulation is the instrument we can use to manage tissue in order to achieve the wanted shape inside a tolerance range of values depending on biotype, keratinized mucosa width, site characteristics and compliance of the patient. This case series shows how by increasing the emergence profile angulation is possible to increase soft tissue thickness and loose tooth coverage. On the contrary, if an extended papilla anchorage is present, the decrease of the emergence profile, leads to a major tooth coverage and a thinner tissue.

**Conclusions.** Within the limit of this restricted study, a tissue non linear equation can be drawn to describe how to carve and guide tissues to the wanted shape and tridimensional position. To gain a desired aspect of the periimplant soft tissues, in order to gain a high value of Pink Esthetic Score the prosthesis emergence profile represent a crucial aspect of the rehabilitation.



## TRANSCRESTAL GUIDED SINUS LIFT WITHOUT GRAFT MATERIAL. CLINICAL AND RADIOGRAPHICAL OUTCOMES OF EARLY LOADING

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**Aim.** The aim of the present study was to investigate a technique, transcresal-guided sinus lift, for bone augmentation of the maxillary sinus floor without additional grafting material using a surgical templates in combination with expander-condensing osteotomes, for immediate implant placement.

**Materials and methods.** The patient (53 years old male) came to our attention with the request for a fixed prosthetic rehabilitation in the first quadrant where the first and second molars were absent for several years. Radiographically it showed a marked atrophy of alveolar bone associated with pneumatization of the maxillary sinus. As per protocol fingerprints were taken of the jaw and proceeded with the installation of the models in the articulator and the diagnostic wax to define an ideal location and volume of missing teeth, of fundamental importance in the final stages of planning to implant computer. The dental laboratory realized this fact from the diagnostic wax-up scan template resin (complete with the necessary pin radiopaque necessary for the protocol of the double CT scan) completely covering the sides of the buccal, occlusal and palatal extension of the remaining teeth and palatal total in order to ensure greater stability prior to the template after the template for surgical radiological and that from this practically ensues. Only at this point they proceeded with the double CT scan in accordance with the protocol Nobel Guide (Nobel Biocare), which allows the clinician, the acquired data in DICOM format, starting the virtual implant planning stage by means of a dedicated software (Procera® Software Planning Program Clinician - Nobel, Nobel Biocare AB). The images from the CT scan of the patient may in fact be meticulously analyzed three-dimensionally. In this way every detail can be inspected. In the case of mini - upward by crestal as in the present clinical case, the working depth of the bur approach breast could be exactly calculated cross working image of the area to be rehabilitated while minimizing the risk of perforation of the membrane schneideriana. The exact distance between the alveolar margin and the floor of the maxillary sinus was calculated by analyzing the cross-section corresponding to the center of the system chosen. Once the treatment plan was approved by the team implant-prosthetic, was sent via modem to the workstation Procera® (Nobel Biocare AB) for future manufacture of surgical guide with stereolitografic technique. The following specific drill stops were applied to bring Clinically the length of the planned work. Only at this point the working length was increased to 0.5 mm in order to fracture the sinus floor and so begin to gently detach the membrane schneideriana. In this critical phase were preferred expander-condensing osteotomes, which guaranteed the best possible control while minimizing the risk of iatrogenic perforation of the membrane which we controlled the integrity progressively through the Valsalva maneuver. Once you reach the desired elevation of the membrane were placed implants (Nobel Speedy Groovy wp 5 to 11.5 mm, Nobel Biocare). The postoperative X-ray control confirmed the accuracy of the computerized planning.

**Results.** Computer-driven implant dentistry in this clinical case report improved surgical treatment by increasing accuracy, controlling risk, and minimizing tissue damage.

**Conclusions.** The modern computer-aided technologies available can assist the surgeon during all stages of the process, from initial visualization to the treatment decisions simplifying the surgery procedures.



### TREATMENT OPTIONS IN CASES OF MISPLACEMENT IMPLANT

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Implants are placed in the wrong position for various reasons. The presence of a sufficient thickness of alveolar bone and keratinized gingiva is an essential requirement to obtain an ideal implant-prosthetic rehabilitation. There are many methods to place implants that allow for adequate osseointegration. However, these traditional techniques do not guarantee accurate implant positioning. Factors such as the surgeon's hand stability, variation in bone quality, visual obstacles and improper surgical guides will compromise the implant surgery. The misplacement of implants leads to non-axial implant loading, complicated restorative process, increased expense, compromised esthetics as well as biologic and prosthetic complications. The use of surgical computer guided planning changes the surgeon's approach: whereas before the use of conventional guides permitted a certain degree of offset from what was planned, the use of computer guides allows the implant to be inserted in a far more precise way. It is obvious that careful planning is the key factors to avoid implant misplacement. To correct the misplacement of implants, surgical management or removal of the implants is necessary. In this study describes procedures to minimizing damage to the osseointegration and surrounding tissues of the implants.



### ULTRASHORT IMPLANT-SUPPORTED CANTILEVER FIXED DENTAL PROSTHESES (ICFDPS): OUR CLINICAL EXPERIENCE.

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**Aim.** In this study, posterior mandibular edentulous spaces with severe bone loss within three patients have been rehabilitated using ultrashort implant-supported cantilever fixed dental prostheses (ICFDPs) (one 5.0 x 5.0 mm, three 4.5 x 6 mm, two 4.0 x 5.0 mm for a total of six implants, Bicon Dental Implants, Boston, MA, USA) and two years survival rate since prosthetic rehabilitation (T2) has been evaluated in order to assess implants' osseointegration and stability.

**Materials and methods.** Implants' osseointegration has been evaluated at T0 (prostheses insertion), T1 (12 months after prostheses insertion), and T2 (24 months after prostheses insertion) using Periapical x-rays performed accordingly to the long cone paralleling technique and using a Rinn positioning system; a Computer Graphic Generated grid added to the radiographs and scaled accordingly has been used in order to calculate and compensate radiographs' possible distortion and thus evaluate in millimetres the amount of bone loss.

**Results.** Comparing the radiographs between T0 and T1 we could observe an average mesio distal bone loss of 0,5 mm at T1 within all the three patients, while there has not been any visible modification between T1 and T2, so as in accordance with other literature works.

**Conclusions.** In this work we have shown how short and ultrashort implants rehabilitation has proven to be a valuable alternative therapy when compared to surgical vertical bone ridge augmentation procedures, the former being more inexpensive, more rapid and presenting less morbidity than the latter; yet, within some patients with a severe bone loss it could still be impossible to insert an implant on the edentulous ridge, regardless of its size. Implant-supported cantilever fixed dental prosthesis is a good option in order to provide such cases. The choice of short implants instead of traditional ones as prosthesis' support has proven to give similar results in terms of osseointegration and stress analysis (7). There are few studies in the existing literature about usage of ultrashort implants supporting cantilever fixed prosthesis, in this work, despite the limited number of patients, it has been possible to show that ultrashort implant-supported cantilever fixed dental prosthesis (ICFDPs) is a valuable therapeutic option for patients with reduced amount of bone left.





### VIABILITY AND INTEGRITY OF CELL PRESENT IN PARTICULATE BONE COLLECTED DURING THE PREPARATION OF THE IMPLANT SITE: A PRELIMINARY STUDY

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**Aim.** The aim of this study was to evaluate viability and integrity of cells (Osteoblasts and Osteocytes) present in the particulate bone (bone chips), obtained during the preparation of the implant site.

**Materials and methods.** Four patients aged between the IV and the VI decade presenting edentulous areas class III of Cawood and Howell were selected. All patients suffering from systemic and oral diseases and smoking were excluded. The surgeries were performed with the conventional technique, full-thickness flap, and the implant sites were prepared with large coils calibrated burs mounted on surgical micromotor at a speed of 600 rpm and external irrigation of saline solution previously cooled. The particulate bone collected from each implant site was processed with the technique of decalcification and divided into 10 sections to be analyzed by optical microscope at 40X, and each section is further divided into 10 fields of view. The hematoxylin and eosin staining system was performed. The areas containing vital cellular structures, intact cytoplasm or cytoplasmic membrane, well preserved and visible nucleus, were considered viable cells; instead the areas presenting gaps, isolated nuclei, damaged osteocytes or with pyknotic nucleus and necrotic surface were considered non-viable. In each sample the relative frequency of viable cells identified in 10 sections with relative confidence interval of 95% was calculated. The significance of differences between the samples was analyzed with the chi-square test ( $p < 0,05$ ).

**Results.** Some minute fragments of lamellar bone tissue (bone chips) and flattened osteocytes were visible with optical microscope in all sections of the specimens. The mean of the viable cells in each sample was 32.8% (Range: 30,6-34,1; D.St: 1,53). The difference between the samples was not significant ( $p = 0,541$ ).

**Conclusions.** The bone particles, obtained from the preparation of the implant site, containing a sufficient intact and vital cellular component, have osteogenic, osteoinductive, osteoconductive and neoangiogenetic properties. Therefore, it is very important to collect these particles and, if it is necessary, to mix them with other biomaterials. This is a great method for the immediate correction of small peri-implant defects, occurring sometimes after placement of the fixture, and for regeneration of localized bony defects.



### DIGITAL PLANNING AND SURGERY THE ULTIMATE IMAGE BASED PROCEDURE FOR A SUCCESSFUL IMMEDIATE LOADING REHABILITATION

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Images guided surgery procedures and digital implant planning and are becoming very popular and most of the clinicians are interested to this innovative method. More than 20 programs offers today alternative methods for virtual implant planning and guided surgery on CBTC images. Computer-assisted implanto-prosthetic planning allows the morphological, functional and aesthetic study of teeth and maxillofacial bones, with the aim of planning an implant-supported dentoalveolar prosthesis. Most of the techniques anyway are based on high level technologies that are generally owned by the Industry, giving the surgeons and laboratories just a partial control over the full process. The scope of this article is to illustrate a procedure that uses the most advanced technologies, both for planning and manufacturing, but differently from the others it can be fully managed in a seamless workflow between the doctor and the laboratory. The procedure can be summarized according to the following steps:

- *PATIENT DIAGNOSIS AND PROSTHETIC PLANNING.*
- *RADIOLOGIC GUIDE SET-UP:* a functional diagnostic prosthesis is duplicated in a radiologic guide, used during the CBTC exam.
- *OPTICAL SCANNING:* a "double optical scan" of the model and the prosthesis is performed in the laboratory with a standard optical scanner.
- *CBCT EXAM:* the Patient is scanned wearing the radiologic guide with a single scan protocol, taking care to include a radiopaque marker in the acquisition volume.
- *DATA FUSION:* the DICOM dataset obtained from the CBTC exam represent the anatomy, STL files resulting from lab optical scan shows the real anatomy without distortion, both files are imported in the medical imaging software.
- *IMPLANT PLANNING:* after importing the anatomy STL file it is possible to use the same mathematical transformation to bring inside the software all the files connected, such as the virtual wax-up and the antagonist arch scan, both exported from the dental technician software: the "virtual patient" is finally set up and it is possible to plan implant position from the library for a "prosthetic-driven" surgery.
- *PROSTHESIS MODELLING:* the implants and abutments virtual files exported from the planning software can be imported into a laboratory prosthesis modelling software in order to convert the virtual wax-up into a provisional prosthesis file to manufacture the immediate loading temporary prosthesis.
- *MANUFACTURING:* all the objects modelled in the previous steps are manufactured with the same rapid prototyping machine.
- *SURGERY:* protocol depends on the structure of the guide (teeth, gums or bone supported) and the surgical instruments used. The procedure is very similar anyway and starts with the guide fixing in the patient mouth, implant site preparation with calibrated drills and the implant insertion through the guide using a dedicated implant mount.

Immediate loading is possible using the temporary prosthesis obtained with CAD/CAM procedure, and projected together with the implant planning. A case report describes finally the procedure with a mininvasive flapless surgery in a full arch maxillary rehabilitation.



### ANTIMICROBIAL PHOTODYNAMIC THERAPY (APDT) HELBO IN BACTERIAL DECONTAMINATION OF THE SITE PRE-IMPLANT AND POST-EXTRACTION IN THE TREATMENT OF PERI-IMPLANTITIS

B. Rapone, G.M. Nardi, F. Scarano Catanzaro, F.R. Grassi

### IN VITRO EVALUATION OF DIODO LASER ( $\lambda$ 80 NM) IRRADIATION EFFECT ON TITANIUM IMPLANT SURFACE

C. Cafiero, D. Riccitelli, V. Iorio Siciliano, A. Blasi, U. Romeo, S. Matarasso

### DIODE LASER-ASSISTED SUBEPITHELIAL CONNECTIVE TISSUE GRAFT

F.M. Ghielmi, A. Passalacqua, S. Friuli, F. Angiero, R. Crippa

### EFFICACY AND EFFECT OF LOW LASER THERAPY IN THE MANAGEMENT OF LATERAL PERIODONTAL CYST

A. Crupi, G. Isola, F. Briguglio, F. Fabiano, G. Matarese

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### KTP LASER EXCISION OF A PYOGENIC GRANULOMA ON THE TONGUE

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### ND:YAG LASER, QUANTIC MOLECULAR RESONANCE SCALPEL AND COLD BLADE IN ORAL SOFT TISSUE SURGERY: A COMPARATIVE PROSPECTIVE STUDY OF POST-OPERATIVE DISCOMFORT

I. Giovannacci, G. Mergoni, M. Meleti, E. Merigo, C. Fornaini, P. Vescovi

### POST OPERATIVE DISCOMFORT AFTER SURGICAL REMOVAL OF ORAL BENIGN LESIONS USING ND:YAG LASER AND TOPICAL APPLICATIONS OF HYALURONIC ACID AND AMINOACIDS VS HYALURONIC ACID VS PLACEBO, A DOUBLE BLIND RCT

A. Sarraj, M. Meleti, E. Merigo, G. Mergoni, P. Vescovi, M. Manfredi

### PYOGENIC GRANULOMA ASSOCIATED WITH DENTAL IMPLANT: CO AND DIODE LASER EXCISION

R. Lo Giudice, E. Brauner, G. Pompa, G. Palaia, V. Valentini, U. Romeo



## ANTIMICROBIAL PHOTODYNAMIC THERAPY (aPDT) HELBO IN BACTERIAL DECONTAMINATION OF THE SITE PRE-IMPLANT AND POST-EXTRACTION IN THE TREATMENT OF PERI-IMPLANTITIS

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**Aim.** For several years we have known the therapeutic successes of antimicrobial photodynamic therapy (aPDT) Helbo as adjunctive therapy minimally invasive. Thanks to this therapy is possible to obtain an effective reduction of bacteria normally 2-4 decimal powers in the areas reached by a special dye and then exposed to a laser light of low intensity. The aim of our study was to evaluate the efficacy of antimicrobial photodynamic therapy (aPDT) Helbo in bacterial decontamination of the site pre-implant and post-extraction in the treatment of peri-implantitis.

**Materials and methods.** As demonstrated in many studies, photodynamic therapy helps efficiently the long-term maintenance of teeth, favors a reduction in pain, a rapid remission of inflammation and tissue regeneration interested. In our study we want to demonstrate how Helbo photodynamic therapy in patients with periodontal disease overt and in case of peri-implantitis can be effective for disinfection of the contaminated site. For all patients the diagnosis was made of chronic persistent or aggressive periodontitis (40 patients) or peri-implantitis (35 patients). All patients were treated with antimicrobial photodynamic therapy (aPDT) Helbo. Clinical signs of peri-implantitis were observed: increased probing depth with a marginal bone resorption >1.5 mm 1 year after loading and 0.2 mm for year (>5 mm) associated to defects with craters formed, bleeding and/or suppuration in the survey; therefore disagree with the criteria for implant success established by Albrektsson et al. Photodynamic therapy acts through the inactivation of cells, microorganisms or molecules, induced by light and not by heat reducing bacteria of 99%. This therapy involves the application of the chromophore Helbo Blue photosensitize (Bredent) which is left to act for at least one minute at each site by trattatare, increasing the time of permanence into the deepest pockets. Then proceed to rinse the excess liquid and exposure of the laser. The exhibition is made within 6 points of the tooth (buccal: mesial, central and distal; oral: mesial, central, distal) in a circular motion around the implant, never out of the rut, with dwell time of 10 seconds site. Were carried out periodic follow-up up to 3 years from the treatments.

**Results.** After Photodynamic Therapy (aPDT) Helbo we found no cases of implant failure in cases of post-extraction implants, in addition, it was found to maintain the level of attack peri-implant bone in cases of peri-implantitis and in some cases there was a restitutio ad integrum with bone regeneration around the implant.

**Conclusions:** Our study has demonstrated that the antimicrobial photodynamic therapy Helbo is able to determine a bacterial decontamination significant, then it can be regarded as an adjuvant in the therapy of peri-implantitis and bacterial decontamination of post-extraction sites preimplantari. Antimicrobial photodynamic therapy (aPDT) Helbo allows a reduction of the bacterial load without administration of local anesthesia and can be repeated without side effects. This method allows a minimally invasive way to treat the peri-implantitis, achieving reduction or abatement of the clinical indices of bleeding and pocket depth.



## IN VITRO EVALUATION OF DIODO LASER ( $\lambda$ 810 NM) IRRADIATION EFFECT ON TITANIUM IMPLANT SURFACE

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**Aim.** The aim of this in-vitro study was to analyze the increase of temperature in dental implants induced by irradiation with a 810 nm GaAlAs continuous diode laser. Irradiation was conducted in dry conditions, to evaluate the results in the worst condition mode to use a laser. Data were recorded by the use of a Medium Wavelength Infrared thermo-camera.

**Materials and methods.** A Diodo GaAlAs laser (Smarty A800; DEKA, Firenze) with a wave length 810 nm and a power output from 0,5 to 10 W, a frequency up to 150 Hz was used. The laser was equipped with a optic fiber with a diameter of  $\varnothing$  300  $\mu$ m placed at 1mm from implant surface. It was used in continue mode with power output of 0,6W - 3W- 6W at various exposure time. Both smooth and rough surface were treated. Five Titanium Plasma Sprayed (TPS) dental implants ( $\varnothing$  4,1mm, h 14mm) were exposed to a 810 nm GaAlAs continuous wave laser diode light. Temperature increase on implant surface was collected during irradiation by means a MWIR thermo-camera (FLIR Merlin™ Mid-Wavelength Infrared thermo-camera) to determine the parameters of irradiation over which the critical threshold for bone necrosis of 47 °C was exceeded. Temperature values obtained were considered like temperature increase ( $\Delta$ T) starting to ambient temperature (27 °C).

**Results.** Collected computer data were analyzed by means of a customly developed MATLAB code. The temperature increase over ambient ( $\Delta$ T) was recorded in three different points of implant surface for each irradiation condition tested: "point A" (laser spot), "point B" (3 mm apically to the laser spot) and "point C" (2 mm horizontally to the laser spot, implant edge). Five measurements were collected for each irradiation condition. Laser GaAlAs 810 nm when used with 0,6 W power output showed a little temperature increase: in point "A" it was recorded a  $\Delta$ T of 0,4C after 5 second of irradiation, a  $\Delta$ T of 0,45C after 10 seconds and a  $\Delta$ T of 0,5C after 20 seconds. Temperature increase for 3,0 W power output, after 5 sec. of irradiation, showed a immediate and big increase of temperature in "point A" (temperature increase >30 °C) meanwhile a gradually increase was recorded in "point B" (range 0 °C - 14 °C) and "point C" (range 0.1 °C - 7 °C). Recorded value respect to temperature increase for the 3.0 W power output showed in "point A" an impressive  $\Delta$ T increase was immediately recorded ( ranged over 30 °C). In "point B" was recorded a slight  $\Delta$ T after 2 sec. irradiation (range 0,1 °C to 5 °C), a moderate  $\Delta$ T after 4 sec. irradiation (14°C) and a consistent  $\Delta$ T after 8-10 sec. irradiation ( range 20 °C- 24 °C). In "point C"  $\Delta$ T values were very similar to those collected in "point B". In tested conditions, this laser when used with power output 6.0 W induced a temperature increase so high that termo-camera receptors were immediately saturated. Results of Optical stereo microscopy examination (32x) did not show any surface alteration or damage after which ever laser irradiation independently from irradiation time and power output.

**Conclusions.** Laser GaAlAs 810 nm can be used safety with power output value less or equal 1 W for an exposure time not exceeding of 10 sec. Higher power output values analyzed (3 W, 6 W) cause increases in temperature too high on implant surface for 10 sec of irradiation that exceed the critical threshold. Reducing exposure time to 5 sec., for power of 3W temperature rises of 14 °C at point B and 8 °C in point C. Laser GaAlAs 810 nm used with power of 3W and 6W at point A induced temperature increase not compatible with bone health both on the smooth than on rough part of the implant. Optical stereomicroscopy examination (32x) did not show any surface alteration or damage after whichever laser irradiation independently from irradiation time and power output.



### DIODE LASER-ASSISTED SUBEPITHELIAL CONNECTIVE TISSUE GRAFT

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**Aim.** This study evaluates thermal damage and wound surgical healing of mucogingival mucosa treated with Diode laser 810-980 nm used for functional and aesthetic regeneration of Miller class I and II gingival recessions.

**Materials and methods.** Forty-six patients (thirty-eight women and eight men, with mean age of 40±2 years) were selected for root coverage procedures with Subepithelial Connective Tissue Grafts (SCTG) from 2004 to 2013. All the recessions (Miller class I and II) were treated with Diode laser 810-980 nm. Parameters used for donor site preparation (palate) were: 320 µm fiber, 2.0 W power average in continuous wave (CW) mode. Parameters used for graft disepithelization were: 320 µm fiber, 1.0-1.2 W power average in pulsed mode (PM), 50 ms/on, 10 ms/off. So, a good hemostasis was obtained and no suture was applied in donor site in all cases. The recipient sites were prepared with traditional surgical technique with a blade scalpel (n° 15) performing a full-thickness flap in 14 cases and full-partial thickness flap in 32 cases. In the case of full-thickness flap a tunnel technique for the graft placement was performed without sutures. In the case of full-partial thickness flap the graft placement was performed with "envelope" and "modified envelope" techniques.

**Results.** The mean Vertical Recession Depth (VRD) statistically significantly decreased from 3±1.2 to 0.5±0.5 in Miller II gingival recessions and we obtained a complete root recovery in Miller I gingival recessions after 6 months and 1 year follow-up. At 1 year follow-up aesthetic and functional outcomes were maintained. Patients did not report the post-operative disorders typical of conventional graft procedures. The absence of surgical sutures in the donor site reduced the post-operative discomfort and allowed the patient to receive soft diet on the second since day after surgery. Any post-operative pain was reported in the palate region as compared to the conventional harvesting technique and the threshold was never greater than 4, according to NVS score.

**Conclusions.** The results of the laser assisted CSTG suggest some considerations:

1. A good healing of the donor site was facilitated by the tissue biostimulation.
2. The absence of sutures in donor site reports a low pain and the ability to regular heat from the patient on the second day.
3. The thermal damage of donor site and graft borders is not significant for the attachment in the recipient site.
4. The intra and post-operative bleeding was minimal despite of the suture absence.
5. The volumetric increase and aesthetic/morphofunctional gingival restoration showed the excellent results obtained by means of this technique.



### EFFICACY AND EFFECT OF LOW LASER THERAPY IN THE MANAGEMENT OF LATERAL PERIODONTAL CYST

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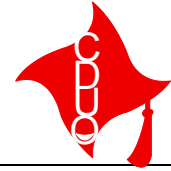
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**Aim.** Laser is one of the most captivating technologies in dental practice. Laser therapy has bactericidal and detoxification effects, and it can remove epithelial lining, granulation tissue, plaque and calculus within the periodontal pocket with low mechanical stress and without leaving a smear layer on root surfaces and these effects may potentially improve periodontal healing. Lateral periodontal cyst (LPC) is a rare, but well recognized type of epithelial developmental odontogenic cyst. Until now, the effects of low power laser irradiation (LPLI) in the treatment of lateral periodontal cyst have not been well known, though some studies have shown that LPLI can promote the proliferation and differentiation of several cell types in vitro

**Materials and methods.** Eighteen patients, 10 men and 8 women, aged 25–65 (mean age 46.7), who were diagnosed LPC were enrolled for this study. For each patient, the values of Probing Depth, Clinical Attachment Level and Bleeding on Probing were recorded. The histological diagnostic criteria for LPC were the presence of rests of Serres, a squamous non-keratinized or cubic epithelium composed of 1-3 cell layers, and epithelial plaques composed of fusiform clear cells. Orthopantomography and periapical radiograph of the site in each patient was taken. Local anaesthesia was used and full-thickness flap was elevated. The cyst capsule was detached from the adjacent bone by a treatment with a diode laser. The laser used it was a Diode laser 980 nm (Wiserlaser Doctor Smile, Lambda SPA - Italy).

**Results.** All of the enrolled patients complete positively the study. The histological findings supported in all of the treated cases the diagnosis of LPC. The patients were evaluated at six and twelve months during the routine follow-ups and were registered the postoperative complications such as pain and persistent inflammation, swelling, edema, ecchymosis, alveolitis, temporary paresthesia, periodontal recessions, pulp vitality, worsening of periodontal pocket depth (PPD) parameters, gingival necrosis and root resorptions.

**Conclusions.** The post-treatment course was uneventful in all our cases and no complications arose throughout the follow-up. This study demonstrates the clinical efficacy of a comprehensive periodontal treatment protocol for Lateral Periodontal Cyst, based on diode lasers used in combination with conventional surgical treatment. In comparison with a conventional surgery alone by means of hand instruments, the laser treatment led to a significant reduction of the postoperative complications and an improvement of all the clinical parameters assayed after a 12-month follow-up. In periodontal therapy, the use of low-level diode lasers has recently been considered to improve wound healing of the gingival tissue. With the LPLI treatments, the patients consistently showed a rapid and persistent abatement of the timing of the wound healing.



## HUMAN ORAL MUCOSA BIOPSIES PERFORMED THROUGH ND:YAG LASER, QUANTIC MOLECULAR RESONANCE (QMR) AND TRADITIONAL SCALPEL. A COMPARATIVE HISTOMORPHOMETRIC ANALYSIS

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**Aim.** Histological and cytological changes induced by lasers may limit the histopathological diagnosis. The aim of the present study is to report a comparative histomorphometric analysis of oral mucosa specimens obtained through Neodymium (Nd): yttrium, aluminum and garnet (YAG) laser and quantic molecular resonance (QMR) scalpel and to evaluate if thermal artifacts may limit the histopathological diagnosis.

**Materials and methods.** Forty-one benign fibro-epithelial lesions were excised at the Center of Oral Laser Surgery and Oral Pathology of Parma, Italy. All the lesions were localized on the cheek mucosa. Surgical specimens were subclassified according to the instrument used for excision: group 1 - QMR scalpel (15 specimens); group 2 - Nd:Yag laser (output power: 3.5 W; frequency: 60 Hz; fiber diameter: 320 µm; power density 488,281 W/cm<sup>2</sup>) (15 specimens); group 3: Bard-Parker n° 15c scalpel blade (11 specimens). Histopathological diagnosis included benign epithelial and fibrous lesions such as denture-induced fibrous hyperplasias, fibromas, and fibropapillomas. The specimens were fixed in a 10% buffered formalin solution, cut into slices and embedded in paraffin blocks, according to conventional methods. Sections 5 µm thick were obtained for hematoxylin and eosin staining. The histopathological sections were evaluated by a pathologist unaware of the excision method. Histomorphometric features evaluated for assessing the entity of tissue modifications were: 1) epithelial changes; 2) connective tissue modifications; 3) vascular modifications; 4) incision morphology and 5) width of tissue modifications.

1. Epithelial changes included nuclear changes, (presence of picnotic, spindle-shaped and hyperchromic nuclei), cytoplasmatic and cell membrane changes (hyperchromic cytoplasm, cell fusion and/or loss of normal cell adhesion)
2. Connective tissue modifications included carbonization (thermal necrosis), desiccation (presence of dense eosinophilic layer underlying the possible carbonization area and mainly consisting of collagen denaturation and tissue hyalinization).
3. Vascular modifications included the presence of thrombosed or collapsed blood and lymphatic vessels.
4. Incision morphology, subclassified into regular (presence of a linear, smooth edge for more than 90% of the whole resection margin) and irregular (presence of a rough, uneven edge for more than 90% of the whole resection margin).
5. Overall width of tissue modifications was defined as the width of tissue injuries (expressed in micrometers and separately evaluated for the epithelium, fibrous tissue and vascular structures).

Statistical analysis was performed using non-parametric statistical tests (Chi-square test and Fisher's exact test). A p value < 0.05 was considered significant.

**Results.** QMR scalpel induced less changes in the epithelium when compared to Nd:YAG laser (P = 0,0025). Specimens removed with QMR scalpel and Nd:YAG laser were not significantly different with regard to stromal changes (P = 0,4828) and vascular stasis (P = 0,2104). Analysis of regularity and quality of incision revealed that QMR scalpel produced a sharp surgical cut. The width of overall tissue injuries was higher in the specimens obtained with Nd:YAG.

**Conclusions.** The present study demonstrates that the presence of artifacts induced by QMR scalpel and Nd:YAG laser does not limit the histopathological diagnosis of oral benign fibro-epithelial lesions.





#### KTP LASER EXCISION OF A PYOGENIC GRANULOMA ON THE TONGUE

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**Aim.** Pyogenic Granuloma (PG) is a reactive hyperplasia of connective tissue in response to local irritants, chronic irritation and hormonal changes. It is a tumor-like growth of the oral cavity or skin. It usually arises in response to various stimuli, such as low-grade local irritation, traumatic injury, hormonal factors, certain kinds of drugs, vascular malformations or chronic inflammation. Clinically, the lesion appears as a smooth, lobulated, exophytic mass, exhibiting pink to reddish-purple color which can bleed on slight manipulation. It is painless and soft in consistency; although older lesions tend to become more collagenized and firm. Histologically, the surface epithelium may be intact and may show foci of ulcerations or exhibit hyperkeratosis. Marginal gingiva is the most common site affected followed by buccal mucosa, tongue and lips. The size of lesion varies from millimeters to several centimeters; rarely exceeding 2-2.5 cm. Excisional surgery is the treatment of choice for PG. Aim of this paper is to report the case of a PG on the tongue treated by KTP laser (DEKA, Florence, Italy, 532 nm).

**Materials and methods.** A 63 years old man with no history of systemic diseases, in drug therapy for hypertension, which was referred to our observation, since the presence of swelling one month ago, located on the anterior portion of tongue. The patient reported bleeding episode but no pain. Clinical examination showed a soft, mobile and rilevate mass, of about 2 x 1,5 cm, covered with ulcerated and lobulated mucosa. After local anesthesia without adrenaline, because the wavelength of the KTP laser is absorbed by oxyhaemoglobin, that provokes a photothermolysis with erythrocytes microagglutination and vessels obliteration, reducing hemorrhage risks, the lesion was immobilized and pulled by suture. Then, it was performed an elliptical incision by laser with optical fiber of 300 micron with parameters of 3 Watt in continuous wave and a fluence of 2830 J/cm<sup>2</sup> and the lesion was lifted and removed. Resorbable suture point was applied on the surgical wound, haemostasis was good and healing was obtained for primary intention. The surgical specimen was placed and preserved in a container with 10% neutral buffered formalin solution and sent for histopathologic examination.

**Results.** Surgery was performed with no intra- nor post-operative complications. Follow-up at 7, 15, 21 days and 2 months showed an optimal wound healing. Histopathologic examination confirmed the clinical diagnosis of pyogenic granuloma.

**Conclusions.** The advantages of the employment of the KTP laser in oral soft tissue surgery are its high cutting ability, the bloodless operative field, its relative ease and rapidity of use, and the reduced use of infiltrative anaesthesia. It can be very useful in these cases, as it offers many intraoperative advantages (minimally invasive, minimal intra-operative bleeding, haemostasis, reduced times of healing) and reduces postoperative complications, also increasing patient's compliance. The wavelength of this laser is more strongly absorbed by oxyhaemoglobin than any other wavelength, so lower levels of energy and fluence can be used to cut vascularized tissues. For this reason, as well as in light of literature studies, it may be considered as the gold standard.



#### LASER AND SELF LIGATING: IT'S POSSIBLE TO REDUCE ORTHODONTIC TREATMENT TIME?

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**Aim.** The reduction of orthodontic treatment time is an interest both patients and orthodontists and the use of the laser related to orthodontic treatment offers several advantages when compared with conventional methods. In literature it has been seen that the low level laser therapy (LLLT) in orthodontics permits to control the pain of the first period after bonding and reduces treatment time. On the other hand, self-ligating appliances, by reducing frictional forces, permit to achieve orthodontic alignment more quickly. Aim of this in-vivo study is to evaluate for the first time the effect on treatment time of the orthodontic alignment when laser bio-stimulation and self-ligating appliances are used together.

**Materials and methods.** 24 patients were assigned randomly in 2 groups. Group A was treated with active self-ligating brackets, Group B was treated with active self-ligating brackets associated with laser biostimulation. Patients were reviewed every 4 weeks and, every time, patients of group B were irradiated. The laser used was a Diode laser 980 nm (Wiser-Doctor Smile). The beam was delivered by a plane wave optical fiber at 1 watt, continuous wave. The subjects which satisfied the following inclusion criteria were included in one of the 2 treatment groups: under 35 years of age at the start of treatment;

- permanent dentition;
- First class malocclusion;
- non-extraction treatment in the mandibular or maxillary arches;
- mandibular Little irregularity index ranging between 3mm and 6 mm;
- no therapeutic intervention planned with any extra-oral or intraoral mandibular appliances, including elastics and lip bumpers;
- no permanent tooth lost;
- no previous orthodontic treatment.

The laser used was a Diode laser 980 nm (Wiser-Doctor Smile). Irradiation was performed for 50 seconds on each point × 3 times, (a total of 150 seconds) once a month on months 0-6 (a total of seven times). We utilized 1 Watt, with a plane wave optical fiber, as indicated by the producer (Doctor Smile-ManipoloOndaPiana) The energy density corresponding to an exposure time of 150 seconds was 150J/cm<sup>2</sup>, (every second the fluence is 1J/cm<sup>2</sup>).

**Results.** The treatment period average for the irradiate group was 8,25 appointment, 28,75% less than the non-irradiated group. The daily alignment rate mean is of 0,02 mm for the irradiated group. The effect of laser bio-stimulation was clinically evident from the first month.

**Conclusions.** The time reduction could be possible because low friction helps to achieve the tooth movement with low forces and LLLT enhances the stimulation of bone remodeling, facilitating the tooth movement



## **ND:YAG LASER, QUANTIC MOLECULAR RESONANCE SCALPEL AND COLD BLADE IN ORAL SOFT TISSUE SURGERY: A COMPARATIVE PROSPECTIVE STUDY OF POST-OPERATIVE DISCOMFORT**

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**Aim.** To evaluate and compare the differences in the post-operative course (post-operative pain, health-related quality of life (HRQoL) and need for painkillers) associated to the use of new technologies (Nd:YAG laser and quantic molecular resonance (QMR) scalpel) and to cold blade after oral soft tissue surgery.

**Materials and methods.** One-hundred and sixty-three comparable surgical interventions on oral soft tissues, performed at the Center of Oral Laser Surgery and Oral Pathology of Parma, from December 2011 to August 2013 were evaluated. Group 1 (G1) included 77 interventions performed with Nd:YAG laser, group 2 (G2) 45, performed with QMR scalpel and group 3 (G3) 41, performed with cold blade. Intra-operative bleeding was present in 29.9% of the surgical interventions in G1, 97.8% in G2 and 97.6% in G3. The number of stitches needed in G1 ( $0.10 \pm 0.55$ ) were statistically lower ( $p < 0.0001$ ) than in G2 ( $2.07 \pm 1.62$ ) and G3 ( $2.29 \pm 1.49$ ). The acute post-operative pain was evaluated with three different pain scales: the visual analogue scale (VAS), the numeric rating scale (NRS) and the verbal rating scale-6 (VRS-6). Each patient filled in a questionnaire the same day of surgery (day 0), and at 1, 3 and 7 days after surgery. The HRQoL was evaluated on day 7 using a questionnaire with a 0 - 45 score range. On day 7, painkillers taken and their dosage were recorded. Data were analyzed using the software STATA 12 (StataCorp LP, College Station, Texas, USA). Statistical tests used were the ANOVA test (significance for  $p < 0.05$ ), the Pearson chi-square test, the Fischer's exact test and the Mann-Whitney U test (significance for  $p < 0.05$ ).

**Results.** No statistically significant differences could be highlighted in the VAS and NRS scores between the three groups at day 1 (VAS -  $p = 0.0814$ ; NRS -  $p = 0.0823$ ), 3 (VAS -  $p = 0.1493$ ; NRS -  $p = 0.1706$ ) and 7 (VAS -  $p = 0.2966$ ; NRS -  $p = 0.5607$ ). A trend toward significance in the VAS at day 0 ( $p = 0.0597$ ) was evident, with a VAS and NRS average score lower in G1 (VAS:  $1.79 \pm 2.40$ ; NRS:  $2.36 \pm 2.65$ ) than G2 (VAS:  $2.73 \pm 2.67$ ; NRS:  $3.08 \pm 2.64$ ) and G3 (VAS:  $2.59 \pm 1.86$ ; NRS:  $3.50 \pm 1.98$ ). With regard to the VRS-6 scores, the comparison between the 3 groups resulted statistically significant at day 1 ( $p < 0.005$ ) and day 3 ( $p = 0.001$ ), close to significance at day 0 ( $p = 0.0510$ ) and not statistically significant at day 7. In particular at day 1 after surgery 47.14% of patients in G1, 37.14% of patients in G2 and 13.16% of patients in G3 had no pain; at day 3 after surgery 62.86% of patients in G1, 40% in G2 and 21.05% in G3 had no pain. The HRQoL in G1 ( $3.51 \pm 5.03$ ) was statistically lower than HRQoL in G3 ( $6.45 \pm 6.39$  -  $p = 0.0044$ ). Difference in the use of painkillers did not result statistically significant ( $p = 0.204$ ) in the 3 groups; 42.85% of patients in G3 took painkillers, 42.22% in G2 and only 27.27% in G1.

**Conclusions.** Our study confirms that the use of new technologies (Nd:YAG laser and QMR scalpel) in oral soft tissue surgery is associated to a reduction of patient's post-operative discomfort in terms of post-operative pain, health-related quality of life (HRQoL) and need for painkillers. The high HRQoL and low post-operative pain after surgery with Nd:YAG laser may be associated to the possible analgesic and bio-stimulating effects of the laser.



### POST OPERATIVE DISCOMFORT AFTER SURGICAL REMOVAL OF ORAL BENIGN LESIONS USING ND:YAG LASER AND TOPICAL APPLICATIONS OF HYALURONIC ACID AND AMINOACIDS VS HYALURONIC ACID VS PLACEBO, A DOUBLE BLIND RCT

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**Aim.** The aim of this study was to evaluate if there is difference in the post-operative discomfort after surgical removal of benign lesions with Nd:YAG laser in patients treated with topical applications of hyaluronic acid and aminoacids gel (HA+A) compared to hyaluronic acid (HA) alone and to placebo gel. A randomized controlled trial with 3 double-blind parallel arms was so planned. The primary endpoint of the RCT was the reduction of the postoperative discomfort in the group of patients treated with HA + A compared to the group treated with HA alone and placebo.

**Materials and methods.** The study sample was selected from patients who had been referred to the Unità di Odontostomatologia, Dipartimento di Scienze Biomediche Biotecnologiche e Traslazionali (SBiBIT), University of Parma, between January 2009 and September 2012 for a surgical removal of benign lesions of the oral cavity. One hundred fifty six adult patients were consecutively enrolled and divided into 3 groups. To be included in the study patients should have an asymptomatic benign lesion of buccal mucosa ranging in size between 1 to 2 cm. For randomised treatment allocation a randomising table was created by an External Department. The post-operative topical applications of the 3 different gels (HA+A, HA or placebo) were randomly assigned to each patient using the above mentioned randomising table (created before the recruitment of the first patient). All the surgical removal of the lesions were performed under regional anesthesia using a Nd: YAG laser (1064 nm, Fidelis Plus® Fotona - Slovenia) with the following parameters: 3.5 W, 70 Hz, 320µm fiber, PD 4355 W/cm<sup>2</sup>. No stitches were applied to obtain a healing of the wound by secondary intention process. All the interventions were performed by the same operator using the same laser device and with the same parameters. Each patient received the same post-operative instructions. Follow-up examinations were conducted at 3 and 10 days after surgical treatments by a different operator from who performed the surgical procedures. Inflammation scores (0-4), adverse effect, use of painkillers as well as the degree of post operative pain/discomfort (measured using a visual analogue scale-VAS) were recorded.

**Results.** In the group of patients treated with the placebo gel, higher level of discomfort (mean VAS 9.2) were observed in comparison to the other two products used (HA+A mean VAS 5.1, HA mean VAS 8.6). It is interesting to observe that the VAS scores recorded in the 3 groups of patients treated with Nd:YAG laser surgery are mainly concentrate between 0 and 15, indicating very low level of post-operative pain.

**Conclusions.** The data of this study confirm that post-surgical discomfort of Nd:YAG surgery is minimal, even if the area treated is wide, and does not affect patients' quality of life. The use of a topical and not aggressive preparation, to be applied 3 times per day on the treated area with a light massage, has favored the healing process, enhancing the effect of laser surgery, containing wound contraction and avoiding the scar formation.



### **PYOGENIC GRANULOMA ASSOCIATED WITH DENTAL IMPLANT: CO<sub>2</sub> AND DIODE LASER EXCISION**

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**Aim.** Pyogenic granuloma is a common inflammatory hyperplasia of the oral cavity that usually occurs as a response to different stimulating factors, such as local trauma or irritation, iatrogenic and hormonal factors. Gingival reactive lesion like pyogenic granuloma are common lesions in the natural dentition while such lesions in association with dental implants are uncommon.

**Materials and methods.** A 64 year old male in good general health condition referred to our clinic for a diffuse soft tissue mass around implants from the first and second incisors to first and second bicuspid in the right mandible. His dental history showed a right mandible resection for an ameloblastoma affecting premolar-molar region and its immediate reconstruction with iliac bone graft. Seven months after the reconstructive procedure 5 titanium oral implants (3i Dental Implant System, BIOMET, Inc. Warsaw, IN, USA) were inserted in the reconstructed areas. Prosthetic rehabilitation was started 4 months after implant placement. Clinical examination revealed a diffuse exophytic sessile lesion with a smooth, shiny surface located on the vestibular and lingual marginal gingiva around implant supported fixed prosthesis. Lesion was excised under local anesthesia with a CO<sub>2</sub> laser (4W, CW) in the vestibular area, and with a diode laser (5W, CW) in the lingual area to perform a better haemostatic effect. The lesion was then submitted for histologic examination.

**Results.** Histopatologic analysis revealed an intense vascular proliferation with extensive areas of ulceration, mixed inflammatory infiltrate and abundant macrophages. The histopathologic diagnosis was pyogenic granuloma.

**Conclusions.** Laser excision of pyogenic granulomas is a safe effective and reasonable alternative to conventional therapy, with no postoperative complications or persistent pigmentary changes or scarring. Careful management of the lesion helps to prevent its recurrence, when all causative factors have been removed. Nevertheless, extended follow up is needed because recurrence rate for treated pyogenic granuloma is 16%.



# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
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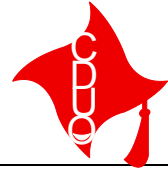
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## MATERIALI DENTARI

SESSIONI >>>

### PMMA RESIN BLOCKS FOR LONG-TERM PROVISIONAL RESTORATIONS FOR CEREC CAD-CAM SYSTEM. A FLEXURAL STRENGTH TEST.

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### CROSS-LINKER INACTIVATION OF MMPS WITHIN THE HYBRID LAYER AND EFFECT ON BOND STABILITY

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### IN VITRO BIOCOMPATIBILITY ASSESSMENT OF FOUR CERAMIC DENTAL IMPLANT SURFACES

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### ASSESSMENT OF DIFFERENT TECHNIQUES AND MATERIALS FOR DENTAL IMPRESSION ON IMPLANTS BY OPTICAL MICROSCOPE

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**Aim.** The aim of this in vitro study was to evaluate by an optical microscope the accuracy of dental impressions made with 8 different techniques in full-arch dental implant rehabilitations.

**Materials and methods.** A cast metal framework was realized using a master cast representing a lower jaw in which 4 implants were inserted at the level of the canines and of the first molars. Then implant analogues were screwed to the metal framework and a simplified master cast was realized. This master cast was used for all the tests subsequently described. Impressions of the master cast have been taken using different materials and techniques:

- Impregum (polyether) + open tray technique (OTI);
- Impregum (polyether) + closed tray technique (CTI);
- Impregum (polyether) + open tray splinted technique (OTIS);
- Ramitec (polyether) + open tray technique (OTR);
- Ramitec (polyether) + closed tray technique (CTR);
- Ramitec (polyether) + open tray splinted technique (OTSR);
- BF plaster (plaster for dental impression) + open tray technique (PLASTER).

For each of these techniques 5 impressions of the master cast have been taken (n=35). Standard plastic impression trays provided with rimming were used. A special device was used to standardize the force exerted during the impression and the direction of the impression tray. Casts have been realized connecting abutment analogues into the impressions. The accuracy of the frameworks was evaluated by the "one screw test" or Sheffield's test, screwing the metal framework previously realized on the 35 casts. An optical microscope (SmartScope MVP) with a 120x magnification was used to measure the accuracy of the interface between the abutment analogues incorporated in the casts and the metal framework. For each cast 8 measurements were taken: 4 screwing the framework at the level of the implant 26 and 4 screwing the framework at the level of the implant 16. For each of the 35 models average values of deviation compared to the master cast were obtained when screwing the stiff framework. This information was subsequently compared with the respective average values of the master model using a T-test to a sample (one sample T-test).

**Results.** The casts made with the techniques PLASTER ( $0.077 \pm 0.033$ ,  $p=0.221$ ), OTI ( $0.095 \pm 0.042$ ,  $p=0.111$ ) and OTSR ( $0.140 \pm 0.080$ ,  $p=0.078$ ) did not show a significant difference compared to the master model ( $0.056 \pm 0.047$ ). Considering both the mean values compared to the master cast and the standard deviation for these three techniques, respectively  $V=0.43$ ,  $V=0.44$ ,  $V=0.57$  the models obtained with plaster resulted the most similar to the master cast.

#### Conclusions

1. The closed tray techniques were the least reliable. 2. The splinting of impression copings with acrylic resin did not improve accuracy. 3. The open tray technique with a stiff material (plaster) exhibited the best accuracy.



#### BONDING EFFECTIVENESS OF FOUR SELF-ETCH ADHESIVE SYSTEMS

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<sup>2</sup>University of Bologna, Bologna, Italy

**Aim.** The purpose of this study was to investigate the bonding effectiveness to dentin of different one-step self-etch adhesive systems assayed with microtensile bond strength test (mTBS) and interfacial nanoleakage expression analysis.

**Materials and methods.** Four all-in-one self-etch commercial adhesives were selected: AdheSE One F experimental self-etch mode (Ivoclar Vivadent), Scotchbond Universal (3M ESPE), iBOND self-etch (Heraeus Kulzer) and EE-Bond (Tokuyama). Flat occlusal dentin was exposed in 20 extracted human molars, equally and randomly assigned to 4 groups (N=5), one for each bonding system. Adhesives were applied in accordance with manufactures' instructions. After adhesive application a resin composite build-up (Filtek Z250, 3M ESPE) was created over the bonded surface and polymerized with a LED curing unit (Valo, Ultradent Product Inc. South Jordan, UT, USA). Specimens were processed for mTBS in accordance with the non-trimming technique and were stressed to failure under tension after 24-h of storage in artificial saliva at 37°C. Additional specimens were processed to investigate the interfacial nanoleakage expression under light microscopy and electron scanning microscope (SEM). As values did not present a normal distribution, the statistical analysis was performed with the non-parametric Kruskal-Wallis test for multiple comparisons and Mann-Whitney U-test ( $p=0.05$ ) for both mTBS and nanoleakage analysis.

**Results.** Means (MPa) and standard deviations of microtensile bond strength test of the four tested adhesives are shown in the table below:

Adhesive systems	Storage Time (24-h)
AdheSE One F experimental self-etch mode	34.4 (9.6) <sup>a</sup>
Scotchbond Universal	33.7 (9.9) <sup>a</sup>
iBOND self-etch	23.4 (9.9) <sup>b</sup>
EE-Bond	13.4 (7.4) <sup>c</sup>

Different superscript letters indicate statistical differences at  $p=0.05$ .

Nanoleakage analysis showed that: EE-Bond=AdheSE One F > Scotchbond Universal > iBond.

**Conclusions.** After 24 hours AdheSE One F and Scotchbond Universal showed higher bond strength than iBond self-etch and EE-Bond. EE-Bond showed the lowest mTBS values and the highest nanoleakage expression among the tested adhesives.. Future in vitro studies are needed to verify the effectiveness of all tested adhesives over time.



## **BONE CELLS ON HYPERHYDROPHILIC SURFACES ARE MORE SENSITIVE TO OXIDATIVE STRESS AND CAN BE RESCUED BY INCREASE IN FREE B-CATENIN**

**C. Galli, S. Lumetti, A. Smerieri, G. Ghiacci, M. Bonanini, E. Manfredi, A. Toffoli, G.M. Macaluso**

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**Aim.** Little is known about how the surface characteristics of implants modulate the responses of bone cells to oxygen-related stress that occur with age, or during the early phases of wound healing or inflammation. The present study aims at investigating cell viability and apoptosis on rough titanium surfaces with normal wettability or hyperhydrophilicity.

**Materials and methods.** Acid-etched, sand-blasted (SLA) or hyperhydrophilic SLA (modSLA) commercially pure titanium samples were kindly provided by Straumann Institut AG (Basel, Switzerland), as sterile discs of 1 mm thickness, 16 mm diameter. The murine calvaria MC3T3-E1 cell line was grown in Dulbecco modified MEM (Life Technologies), 10% Fetal Bovine Serum, 1% Penicillin and Streptomycin and 1% Glutamine (Sigma-Aldrich). For viability assay, 100000 MC3T3 cells were plated on SLA or modSLA discs in 24 well plates and were treated with vehicle or 0.1 mM H<sub>2</sub>O<sub>2</sub> after cell attachment and assayed 24 hours after plating. For cell viability and 3/7 caspase activity, bioluminescent assays (Promega) were used. The samples were read with a Glomax 20/20 Luminometer (Promega) with double injectors. To increase cytosolic levels of beta-catenin 1 mM LiCl was added to the culture and viability was then measured by chemiluminescence. Two-way ANOVA statistical test was performed to analyze the data.

**Results.** No difference in cell viability between the two experimental groups was observed under basal conditions, though cells on modSLA surfaces had higher levels of activated Caspases. Addition of 0.1 mM H<sub>2</sub>O<sub>2</sub> significantly decreased cell viability on modSLA surfaces ( $p < 0.01$ ), while not affecting cell viability on SLA. Consistently with this finding, H<sub>2</sub>O<sub>2</sub> treatment increased the activity levels of Caspase 3/7 on modSLA surfaces ( $p < 0.05$ ) but not on SLA discs. Addition of 1 mM LiCl rescued cell viability in the presence of ROS.

**Conclusions:** Based on the present study, it can be concluded that oxidative stress significantly increases the activation of pro-apoptotic caspases and reduces cell viability on hyperhydrophilic surfaces to a greater extent than on equally rough surfaces with lower wettability, and this can be reversed by addition of LiCl.



## DEGREE OF CONVERSION OF A ZNO-DOPED AND ZNCL<sub>2</sub>-DOPED 2-STEP ETCH-AND-RINSE ADHESIVE

C.O. Navarra<sup>1</sup>, L. Breschi<sup>2</sup>, M. Toledano<sup>3</sup>, R. Osorio<sup>3</sup>, R. Di Lenarda<sup>1</sup>, M. Cadenaro<sup>1</sup>

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**Aim.** Unprotected collagen may become the target of hydrolytic host-derived matrix metalloproteinases (MMPs). It has been hypothesized that zinc might reduce MMPs-mediated collagen degradation in dentin (Toledano et al., J Dent 2012;40:756-65). Thus, including zinc compounds in the formulation of dental adhesives may be a strategy to increase the longevity of adhesive restorations. The aim of this study was to assess if the addition of ZnO or ZnCl<sub>2</sub> to a two-step etch-and-rinse adhesive affected its polymerization.

**Materials and methods.** The mixtures selected for this study were: 1) ZnO-doped Adper Scotchbond 1XT; 2) ZnCl<sub>2</sub>-doped Adper Scotchbond 1XT; 3) Adper Scotchbond 1XT (control). 1 mL of each mixture covered with a polyester film was analyzed with a FTIR-spectrophotometer (Thermo Fisher Scientific, Italy). IR-spectra were obtained between 4000 and 400 cm<sup>-1</sup> at 8 cm<sup>-1</sup> resolution at a rate of 5/s with 8 accumulations per spectrum. Spectral acquisition was initiated immediately to obtain the IR spectra in the uncured state and continued up to 60s of irradiation with a LED-curing unit (VALO, USA; 1000 mW/cm<sup>2</sup>-irradiance). Spectra were characterized by identifying the typical bands of methacrylate-based adhesives: 1610 cm<sup>-1</sup> (phenyl), and 1640 cm<sup>-1</sup> (C=C group). The phenyl peak was selected as a reference peak (which remained stable during polymerization), and the 1640 cm<sup>-1</sup> as a reaction peak. Degree of conversion, expressed as DC%, was calculated at 20, 40 and 60s using the ratio between the reaction (A<sub>rxn</sub>) and internal reference (A<sub>ref</sub>) peak areas as follows:

$$\% \text{conversion} = \{1 - [A_{\text{rxn}}(\text{p})/A_{\text{ref}}(\text{p})] / [A_{\text{rxn}}(\text{u})/A_{\text{ref}}(\text{u})]\} \times 100$$

where "u" refers to uncured and "p" to cured system. Additional spectra of neat ZnO and ZnCl<sub>2</sub> were collected. Absorption values on either side of the peak of interest were baseline-corrected to zero and the peak area was determined using the baseline connecting absorbance tails on both side of the peak with a data-analysis software (Ominc, Thermo Fisher Scientific, Italy). Because the ZnCl<sub>2</sub> salt signal overlapped the C=C region, the ZnCl<sub>2</sub> spectrum was subtracted in order to better visualize the peaks of interest. Data were statistically analyzed with Two-way Anova (factors: adhesive and curing time) at a significant level of  $\alpha=0.05$ .

**Results.** Means of degree of conversion (DC%) with standard deviations (SD) of the tested mixtures, expressed in percentage, are shown in the table below:

Group	Time(s)	DC%	SD
Adper Scotchbond 1XT+ ZnO	20	45 <sup>a,b</sup>	11
	40	56 <sup>b,c,e</sup>	2
	60	62 <sup>d,e</sup>	4
Adper Scotchbond 1XT +ZnCl <sub>2</sub>	20	39 <sup>a</sup>	2
	40	53 <sup>b,c,d</sup>	2
	60	65 <sup>e</sup>	5
Adper Scotchbond 1XT	20	47 <sup>a,b,c</sup>	3
	40	62 <sup>d,e</sup>	6
	60	66 <sup>e</sup>	4

The DC of the experimental adhesives was not significantly different compared to the control at all curing times. Increasing the curing time from 20 s to 40 s significantly increased the DC of all the tested mixtures ( $p<0.05$ ).

**Conclusions.** Addition of zinc compounds to Adper Scotchbond 1XT did not affect its degree of conversion. Further studies are needed to assess the compatibility of zinc particles to other adhesive systems and their capability to promote the longevity of the bond over the time.

This study was supported by FIRB RBAP1095CR of MIUR.



## DENTIN BOND STRENGTH OF SELF-ADHESIVE RESTORATIVE MATERIALS: MICRO-SHEAR BOND STRENGTH TEST AND SCANNING ELECTRON MICROSCOPIC ANALYSIS

D. Scaminaci Russo<sup>1</sup>, E. Rossi Campani<sup>1</sup>, M. Ugoni<sup>1</sup>, R. Gori<sup>1</sup>, L. Giachetti<sup>1</sup>

<sup>1</sup>Department of Surgery and Translational Medicine, University of Florence, Florence, Italy

**Aim.** To the best of our knowledge, no investigation has simultaneously compared the bond strength of etch-and-rinse adhesive, self-etch adhesive, self-adhesive resin composites and glass-ionomer cement to dentin. Therefore, using the micro-shear bond strength test ( $\mu$ SBS) and scanning electron microscopic (SEM) observation, the aim of this in-vitro study was to compare the bond strength to human dentin for a variety of adhesive materials, including self-adhesive resin composites, self-etch and etch-and-rinse adhesive systems and glass-ionomer cement. The tested null hypothesis was that there is no difference in bond strength between the adhesive materials tested.

**Materials and methods.** Thirty-two human molars were sectioned to obtain a 2 mm-thick slab of mid-coronal dentin, randomly divided into four groups (n=8). Nine conical frustum-shaped build-ups were constructed on the occlusal surface of each dentin slab using bonding agent (OptiBond FL, Kerr Group 1; OptiBond XTR, Kerr Group 2) combined with resin composite (Premise Flow, Kerr), self-adhesive resin composites (SpeedCEM, Ivoclar Vivadent Group 3) and a glass-ionomer cement (Ketac-Fil, 3M ESPE Group 4). Specimens were subjected to  $\mu$ SBS test and observed at SEM. Data were statistically analyzed.

**Results.** Measured bond strengths were (mean  $\pm$  standard deviation): 21.5  $\pm$  7.1 MPa for Group 1, 24.6  $\pm$  12.1 MPa for Group 2, 11.1  $\pm$  5.3 MPa for Group 3 and 5.4  $\pm$  2.8 MPa for Group 4. The bond strengths measured in Groups 3 was significantly lower than those recorded in Groups 1 and 2 but was significantly higher than that recorded in group 4. There were no significant differences in bond strengths between Group 1 and Group 2. The bond strengths measured in Groups 4 was significantly lower than those recorded in the groups 1, 2, and 3. Microscope observation showed different fracture patterns among the groups. Failures were mainly adhesive in all Groups. However, the differences in failure mode distribution were statistically significant (p<.001). In particular, Group 2 exhibited a considerable amount of cohesive in dentin failure (8.6% of the total) and mixed failure (adhesive/cohesive in dentin) (20.7% of the total) than the others Groups. Group 4 exhibited a considerable amount of cohesive in build-up failure (6.7% of the total) and mixed failure (adhesive/cohesive in build-up) (17.8% of the total) than the others Groups.

**Conclusions.** Self-adhesive resin composites appear to offer a promising new approach in restorative dentistry. However, the bond strength of these materials is not comparable to that of conventional bonding agents.



#### EFFECT OF ACROLEIN-BASED PRIMER ON BONDED INTERFACE

V. Angeloni<sup>1</sup>, A. Mazzoni<sup>1</sup>, R. Di Lenarda<sup>1</sup>, M. Cadenaro<sup>1</sup>, L. Breschi<sup>2</sup>

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**Aim.** Previous studies supported the use of collagen cross-linkers to improve mechanical strength of the collagen network and resistance to enzymatic degradation due to matrix metalloproteinases (MMPs) inhibition. In this study we investigated the effectiveness of acrolein, used as a collagen cross-linker, in the preservation of collagen degradation to improve bond stability over time. The hypothesis tested in this study was that pretreatment with acrolein-based primer before bonding application can improve the stability of the bonded interface over time and strengthen the hybrid layer created by a two step etch-and-rinse adhesive system.

**Materials and methods.** Twenty-four middle/deep dentin surfaces were etched with 35% phosphoric acid for 15 s, rinsed and blot dried. Specimens were then assigned to the following treatments. Group 1: dentin was pretreated with 0.01% acrolein water solution as conditioner for 1 min, then bonded with Scotchbond 1XT (SB1 XT; 3M ESPE); Group 2: SB1 XT was applied on untreated etched dentin (control group). In both groups SB1 XT was generously applied with a microbrush for 20 s, according to manufacturer's instructions, and light-cured for 20 s after solvent evaporation. Composite buildups were made using Filtek Z250 (3M ESPE). The bonded teeth were serially cut for microtensile bond strength test ( $\mu$ TBS) in accordance with the non-trimming technique and stressed to failure at a crosshead speed of 1 mm/min after 24 h and 6 months of storage in artificial saliva at 37°C. The  $\mu$ TBS data were analyzed using two-way ANOVA and Tukey's multiple comparison tests. Additionally, to investigate endogenous dentin matrix MMPs activity a zymographic assay was performed on protein extracts obtained from phosphoric-acid-etched dentin powder with or without 0.01% acrolein pre-treatment.

**Results.** The results of  $\mu$ TBS after 24 hours of storage didn't present a significant difference: Group 1:  $43.3 \pm 10.2^a$  MPa; Group 2:  $42.6 \pm 9.3^a$  MPa. Otherwise after 6 months of storage the results of  $\mu$ TBS showed a statistically significant difference between two groups tested:

- Group 1:  $41.7 \pm 8.9^a$  MPa;
- Group 2:  $34.2 \pm 7.4^b$  MPa [different superscript letters indicate statistical differences ( $p < 0.05$ )].

Zymographic analyses revealed that 0.01% acrolein pre-treatment significantly inhibits dentinal MMP-2 and -9 activities.

**Conclusions.** The results of the study showed that the use of 0.01% acrolein-containing conditioner on etched dentin surfaces before the application of SB1 XT contributes to stabilize the adhesive interface over time. In fact, the use of an acrolein-based primer significantly improve the mechanical properties and stability of the hybrid layer after 6 months of storage in artificial saliva. Furthermore acrolein pre-treatment inactivated dentinal gelatinases as assayed with the zymographic analyses. Future studies are needed to further clarify the ability of 0.01% acrolein to stabilize the bonded interface over time.



### EFFECT OF ONE-STEP AND TWO-STEP DIAMOND PASTE POLISHING PROTOCOLS ON THE SURFACE ROUGHNESS OF TWO NANOHYBRID COMPOSITE RESINS

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**Aim.** Nanotechnology applied to fabrication of sub-micron filled composite resin is a fairly recent and promising innovation in dental restorative materials. The actual advantages that nano-sized fillers can provide to the surface smoothness and luster have not been supported yet by sufficient evidence. Effective polishing protocols presenting the fewest number of steps are demanded by clinicians in order to avoid waste of operative time. Polishing pastes have a better ability to reach irregular areas of restorations in comparison to semi-rigid rotating instruments. The aim of the present study was to assess the effectiveness of two simplified polishing systems with diamond abrasive pastes applied onto the surface of two nanohybrid composites.

**Materials and methods.** Two nanohybrid resins were selected for the present experimentation, namely Filtek Supreme XT (3M ESPE) and Herculite XRV Ultra (Kerr). Thirty discs per material were fabricated by pouring the resin into silicon molds with a height of 2 mm and a diameter of 4 mm, covering it with a Mylar strip and applying 60 s light cure with a halogen lamp at 600 mW/cm<sup>2</sup>. For each material, the specimens were randomly allocated to a control unpolished group (n=10) and two experimental groups (n=10), which underwent finishing with 1200P sandpaper. The experimental groups were subjected to further polishing with either one-step (Unigloss paste) or two-step (Diamond Polish Mint, Ultradent) diamond polishing pastes. Three linear roughness measurements (R<sub>a</sub>) were performed on the surface of each specimen. Statistical analysis was carried out by non-parametric tests. The surface of polished specimens was assessed by means of scanning electron microscopy.

**Results.** Under all experimental conditions, the surface roughness of the tested resins never exceeded the threshold to inhibit bacterial adhesion (0.20 μm) and polished specimens exhibited surface smoothness that was similar to controls. The one-step system polished more efficiently the composite Herculite XRV Ultra than Filtek Supreme XT (p<0.05) and was more effective than the two-step system only when applied to Herculite XRV Ultra (p<0.001). No other significant differences were pointed out. Microphotographs showed mostly polished surfaces with sporadic isolated grooves left by the finishing procedure and not removed by the polishing pastes.

**Conclusions.** Both one-step and two-step simplified protocols considered were effective for polishing the two nanohybrid composites being tested. Different association between material and polishing protocol can lead to slight but significant variation of performance.



### EFFECT OF THREE DIFFERENT POST SPACE PREPARATION INSTRUMENTS ON FIBER POST RETENTION

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**Aim.** The present study assessed the effect of three different drills used for post space preparation on fiber post retention.

**Materials and methods.** Thirty human upper incisors were endodontically treated using Reciproc (VDW, Munich, Germany) and warm vertical gutta-percha compaction. Teeth were sealed coronally using Fuji VII (GC, Tokyo, Japan), then stored in 0.5% T chloramine solution at 4°C. After one week, teeth were randomly assigned to 3 groups (n=10) that differed for the drill type used for post space preparation: group 1: Calibrated drill (RTD, St. Egreve, France); group 2: Largo drill (Dentsply, Maillefer, Ballaguess, Switzerland); group 3: M two drill (Sweden&Martina, Due Carrare, Padova, Italy). Illusion posts (RTD, St. Egreve, France) were luted into the root canals using Gradia Core (GC, Tokyo, Japan). After 24 hours, posted roots were transversally cut into 1 mm-thick slices for thin-slice post push-out testing. Two slices per apical, middle, and coronal thirds were obtained, resulting in a total of 6 slices per tooth. Thin-slice push-out test was conducted using a universal testing machine (Triax Digital 50, Controls, Milan, Italy). Post push-out strength was measured in MPa. For the failure mode analysis, the specimens were observed using a stereomicroscope (Nikon SMZ645, Tokyo, Japan) at 40 × magnification and classified as adhesive between post-cement (P-C) or dentin-cement (D-C) interface, cohesive (within the post or adhesive cement), and mixed (adhesive and cohesive fractures occurred simultaneously). Between-group differences in post retentive strength were statistically analyzed (Kruskal-Wallis Analysis of Variance, Dunn's Multiple Range test,  $p > 0.05$ ). Differences in push-out strength among root levels within each group (One-Way Analysis of Variance or Kruskal-Wallis Analysis of Variance, depending on the normality of data distribution,  $p > 0.05$ ) and in failure mode distribution (Fisher's Exact Test,  $p > 0.05$ ) were also statistically evaluated.

**Results.** For each group the mean of MPa values was: 1.  $10.41 \pm 3.56$ , 2.  $10.98 \pm 3.96$ , 3.  $12.11 \pm 1.65$ . Failure mode distribution was as follows: Adhesive: 1. P-C - 23.3%, D-C - 21.7%; 2. P-C - 20%, D-C - 10%; 3. P-C - 46.7%, D-C - 13.3 %; Cohesive: 1. 0.0%, 2. 3.3%; 3. 0.0%; Mixed: 1. 55.0 %; 2. 66.7 %; 3. 40.0 %. The statistical analysis revealed the existence of significant between-group differences in push-out strengths ( $p = 0.002$ ). Group 3 measured significantly higher push-out strengths than groups 1 and 2, which were comparable. Statistically significant between-group differences emerged also in failure mode distribution ( $p = 0.004$ ). In Group 3 post-cement adhesive failures were significantly more frequent and mixed failures were significantly less frequent than in Group 2. No statistically significant differences emerged among the different root levels of the tested groups ( $p > 0.05$ ).

**Conclusions.** When M two drills were used for post space preparation, significantly greater post retention was achieved than when utilizing Largo and Calibrated drills.





## FLEXURAL RESISTANCE OF EIGHT POLYAMIDIC THERMOPLASTIC DENTURE BASE MATERIALS

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**Aim.** Polyamide-based thermoplastic materials are currently used for the fabrication of partial and full removable prostheses. When compared to traditional PMMA-based resins, these products have the advantage of higher elasticity, giving the chance to fabricate sub-equatorial clasps and rests for partial dentures, without the need of metal, allowing improved esthetics. Aim of this study was to evaluate the flexural strength of different polyamide-based materials available on the market.

**Materials and methods.** Eight thermoplastic polyamide-based materials were selected for the study (Tab. 1). In order to fabricate a suitable mould, aluminum specimens were invested in a denture flask, with dimension of 2.2 mm height, 2.2 mm wide, and 15 mm length. Then, the aluminum specimens were removed and the material was injected into the flask following manufacturer indications for temperature, pressure, and time. The obtained specimens were then polished using silicon-carbide paper with 600 and 1200 grit. A three-point bending test (3PBT) apparatus was used for the test, consisting in a steel AISI type 316 block, having diameters of tip and supports of 2 mm. The span was set at 13 mm and the crosshead speed was 5 mm/min. On the basis of the graphical outcome of the instrument, the maximum load at the elastic point was recorded as the top of the straight part of the curve. Flexural strength was then calculated. Data were subject to Kolmogorov-Smirnov Test to verify normality of the data distribution. Then, a One-Way ANOVA was performed. Tukey Test post-hoc was then used. In all the statistical analyses the significance level was set at  $\alpha=0.05$ .

**Results.** Results are reported in Tab. 1. A significant difference was found among tested materials ( $p < 0.001$ ). The post-hoc test revealed that M10 (Deflex) obtained a significantly higher flexural resistance than other tested materials ( $96.77 \pm 3.66$  MPa), followed by Bre.Flex 2 (Bredent) with  $86.26 \pm 6.30$  MPa and Deflex (Deflex) with  $84.70 \pm 2.72$  MPa. Materials Asako (Techim Group -  $81.78 \pm 12.05$  MPa), F.J.P. (Pressing Dental -  $74.36 \pm 5.73$  MPa), and FlexiUltra (Sabilex -  $64.98 \pm 6.58$  MPa) obtained intermediate results. Valplast (Valplast Int. Corp.) and Duraflex (Myerson) obtained worst results with  $60.21 \pm 3.93$  and  $40.61 \pm 4.10$  MPa, respectively.

Material, Manufacturer	Flexural strength (MPa)		
	Mean	St. Dev.	Sig.
M10, Deflex	96.77	3.66	a
Bre.Flex 2, Bredent	86.26	6.30	b
Deflex, Deflex	84.70	2.72	b
Asako, Techim Group	81.78	12.05	b,c
F.J.P., Pressing Dental	74.36	5.73	c,d
FlexiUltra, Sabilex	64.98	6.58	d,e
Valplast, Valplast Int. Corp.	60.21	3.93	e
Duraflex, Myerson	40.61	4.10	f

**Conclusions.** The polyamide-based thermoplastic material for partial or full removable prostheses tested in the present study showed statistically significant differences in terms of flexural resistance. Thus, in the fabrication of such a prostheses, the selection of the product is crucial in the final resistance of the restoration.



## FRACTURE TOUGHNESS OF A NEW GENERATION OF HYBRID GLASS CERAMIC. THE ZIRCONIA REINFORCED LITHIUM SILICATE CERAMIC (ZLS)

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**Aim.** The purpose of this study was to investigate and analyse the vickers hardness (HV) and fracture toughness (Ft) of new hybrid glass ceramic ZLS. Since the new material is currently intended for CAD/CAM use, we compared HV and Ft before and after crystallization treatment.

**Materials and methods.** One single block (lot 36021) of Vita Suprinity (developed by VITA Zahnfabrik, DeguDent GmbH and Fraunhofer-Institut for Silicate Research ISC, Germany) was used. Forty indentations were made on each sample, twenty immediately after milling and twenty after crystallization treatment at 840°C (as reported in Vita Suprinity guideline n° 1951). The indentations were made with a diamond Vickers pyramid (angle 136°) fixed together with the load cell at a universal testing machine (Lloyd 30K, Lloyd Instruments Ltd. Segensworth, UK) in a controlled displacement mode at 0.5 mm/s until to a maximum load of 50 N that was applied for 5 seconds. The stress intensity at the crack tip, was determined using a scanning microscope (SEM) Zeiss EVO 50 XVP with LaB6 (Carl Zeiss SMY Ltd., Cambridge, United Kingdom). The length of radial cracks emanated from each of the four-indented corner sources were evaluated using Image-Pro Plus vers. 6.0 (Media Cybernetics Inc, Bethesda, USA). HV was determined using test ISO 6507-1:2005 applying the following equation:  $HV = a (F/d^2)$  (GPa) while the material's resistance to fracture (or Ft) was evaluated computing the stress intensity factor using the equation by Evans and Charles:  $K_{Ic} = 0.16 (c/a)^{-1.5} (HV a^{1/2}) \text{ MPa m}^{-1/2}$ .

**Results.** The HV<sub>50</sub> values were  $7.6 \pm 0.7$  for crystallized group and  $6.8 \pm 0.5$  for pre-sintered group. The K<sub>Ic</sub> values were  $4.7 \pm 0.8$  for crystallized group and  $2.8 \pm 0.9$  for pre-sintered group. The differences were statistically significant for both comparisons (P<0.001). SEM images confirm the difference between the Ft and HV. In fact, the crack propagation in the crystallized material follows a relatively linear pattern, while crack irregular lines and multiple cracks characterize propagation in the pre-sintered material.

**Conclusions.** The new glass ceramic ZLS showed very good results for both HV and Ft after the crystallization process, while in the pre-sintered form it was noted a tendency of the material to be brittle. This aspect should be taken in account during the marginal adaptation process of the crowns in pre-sintered state.



### JETKIT, UNIFAST AND DURALAY RESINS, REGULATE THE BEHAVIOR OF HGFs CELLS THROUGH LONG NON-CODING RNA HOTAIR TRANSCRIPTION AND THE MMP2, MMP9, IL6 GENES EXPRESSION

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**Aim.** The polyacrylic acid-based resins, used in the practice of dental restoration or prosthesis, are designed for the release of toxic compounds that stimulate the production of molecules such as interleukin-6 (IL-6) and metalloproteinases (MMPs) are involved in the pathogenesis of gingival diseases. Long non-coding RNAs (lncRNAs) are small RNAs that interact with the nuclear architecture, regulate the histone code, activate and / or repress gene activity and cell proliferation; HOTAIR, is a lncRNA can promote tumors and metastatic processes, operates by recruiting the polycomb repressive complex-2 (PRC2) epigenetic regulator of cell phenotype. The aim of this work is to study the involvement of polyacrylic resins (JetKit, Unifast and Duralay) in gingival disease, through the regulation of MMP2, MMP9 and IL-6 genes mediated by HOTAIR.

**Materials and methods.** *Cell cultures:* Human gingival fibroblasts (HGFs) were isolated from fragments of gum, taken from patients suffering from inflammatory diseases premises. The resins were prepared by direct leakage in the plates, we subsequently immersed the materials in the HGFs specific culture medium for 24h. The conditioned medium was used to stimulate the HGFs in the subsequent 24h. We have used the MTT assay to determine the potential degree of cytotoxicity of the materials and the quantitative analysis (QRT-PCR) for IL6 gene, MMP2, MMP9 and HOTAIR genes expression expression.

**Results.** The MTT assay does not show cytotoxicity for Jetkit, Unifast and Duralay resins, at the concentrations indicated in the user manual. QRT-PCR: The IL-6, MMP2, MMP9 and trend and is a function of the resin. The IL-6 does not seem to be correlated with HOTAIR. HOTAIR genes, are overexpressed in HGFs stimulated with the materials. The HOTAIR gene expression appears correlated to MMP2 and varies with the resins used. The MMP9 and HOTAIR expression shows an opposite.

**Conclusions.** The resins Jetkit, Unifast and Duralay, activate the response of MMP-2 and MMP-9 genes by HOTAIR, with the risk of alteration of the extracellular matrix (ECM) and cell function damage; these resins also activate the IL6 gene expression, epigenetic regulator of DNA and determining of gingival disease. Further research is in progress to demonstrate the role of polyacrylic acid-based resins, in the regulation of gene systems, able to control cell behavior and to determine alterations in the phenotype with the onset of the gingival tissue diseases.



## MATCHING THE SHADE FOR Y-TZP RESTORATIONS: A SPECTROPHOTOMETRIC ANALYSIS OF COLOR AND TRANSLUCENCY

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**Aim.** The increase demand for aesthetic monolithic zirconia restorations took the attention on the problem of coloring Y-TZP restorations with stains and/or coloring liquids. Recently a new staining system (VITA Akzent Plus, Vita Zahnfabrik, Bad Säckingen, Germany) was introduced into the market with the aim of easily change the base shade and characterize ceramic restorations regardless of the coefficient of thermal expansion. For the present study, measurements of translucency and color were performed in order to analyze the influence of coloring and staining procedures on the main optical proprieties of Y-TZP restorations.

**Materials and methods.** Pre-sintered blocks of Y-TZP (VITA YZ, Vita Zahnfabrik, Bad Säckingen, Germany) were cut by a slow speed diamond saw (Isomet, Buehler, Lake Bluff, IL, USA) in order to obtain 50 flat specimens. The cutting thickness was set in order to compensate the sintering shrinkage and to obtain the desired final thickness of  $1,00 \pm 0,05$  mm. Specimens were randomly divided into 10 groups (n=5). The VITA Akzent Plus Body-Stain Spray (Vita Zahnfabrik, Bad Säckingen, Germany) in BS1 to BS5 shade and the VITA Coloring Liquids Neutral, Light-Pale, Medium and Intense (Vita Zahnfabrik, Bad Säckingen, Germany) were tested. A non-colored groups was used as a control. Coloring Liquids were applied following manufacturer instructions and then sintering firings were performed for all the specimens in a sintering furnace (ZYrcomat® T, Vita Zahnfabrik, Bad Säckingen, Germany) according to manufacturer's guidelines. Then, Vita Akzent Glaze Spray was applied and fired (VITA Vacumat 4000, Vita Zahnfabrik, Bad Säckingen, Germany) two times, following manufacturer instructions. For the Body-Stain groups, the stains were applied and fired two times. A benchtop spectrophotometer (PSD1000, OceanOptics, FL, USA), equipped with an integrating sphere (ISP-REF, OceanOptics, FL, USA) was used in PC running a color measurement software (OOILab 1.0, Ocean Optics, FL, USA). D65 illuminant and 10° standard observer were selected. Measurements for translucency were carried on using as a background white and black calibrated field tiles in CIExyz color system, and the Contrast Ratio was calculated with the formula  $CR = Y_b/Y_w$ . For color measurements, color coordinates were recorded against a calibrated neutral gray field tiles and according to CIELab\* color space. The  $\Delta E$  value ( $\Delta E = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$ ), was calculated for evaluating color differences. CR and  $\Delta E$  were statistically analyzed by the One Way ANOVA followed by the Tukey test for post-hoc comparison.

**Results.** Results and statistical significance were reported by the following table.

Table 1. Differences between groups with \* were not significant as reported by the Tukey test ( $p < 0.05$ ).

Groups	Translucency (CR)		CIELab	
	Mean	SD	Mean $\Delta E$	SD
Control	0,740	0,007	0,00	0,00
Neutral	0,784*	0,004	5,21	0,95
Light-Pale	0,849	0,005	19,28	1,53
Medium	0,866	0,003	35,87	0,55
Intense	0,918	0,002	53,62	0,60
BS 1	0,794**	0,005	22,31	0,41
BS 2	0,808	0,005	43,03	1,42
BS 3	0,828	0,007	57,59	0,76
BS 4	0,758	0,004	15,60	0,63
BS 5	0,788***	0,006	32,66	0,82

**Conclusions.** Within the limitations of this in vitro study it is possible to affirm that the color of Zirconia restoration can be effectively influenced by both superficial stain and coloring liquids in all the dimensions of color. The translucency of the restorations (CR) was directly correlated to the changing in shade ( $\Delta E$ ) and was negatively influenced by the use of coloring systems. The influence for coloring liquids on translucency was higher than that of the superficial stains. This factor should be considered for correctly evaluate the aesthetic clinical performance of monolithic Y-TZP restorations.



### MICROTENSILE BOND STRENGTH AND OF A NEW UNIVERSAL SIMPLIFIED ADHESIVE

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**Aim.** Recently, a new type of one-step self-etch adhesive has been introduced. This type of self-etch adhesive is classified as "universal" or "multi-mode" as they can be applied either with the etch-and-rinse or the self-etch technique. The aim of this study was to investigate the bond strength and the interfacial nanoleakage expression created by a new multi-mode one-step adhesive system using different application modes: etch-and-rinse (on wet or dry dentin) or self-etch on human coronal dentin. The null hypotheses were that the microtensile bond strength ( $\mu$ TBS) and interfacial nanoleakage expression (following the use of etch-and-rinse on dry or wet dentin or self-etch technique) are not affected by aging after 24 h or 6-months storage in artificial saliva.

**Materials and methods.** Forty extracted non-carious human third molars were selected for the study. The teeth were cut to expose middle/deep dentin and assigned to one of the following bonding systems: (1) Scotchbond Universal, 3M ESPE) self-etch mode, (2) Scotchbond Universal etch-and-rinse technique on wet dentine, (3) Scotchbond Universal etch-and-rinse technique on dry dentin, and (4) Prime&Bond NT (Dentsply De Trey) etch-and-rinse technique on wet dentin (control). Specimens were processed for  $\mu$ TBS test in accordance with the non-trimming technique and  $\mu$ TBS was performed after 24h or 6-months of storage in artificial saliva at 37°C. Additional specimens were processed and examined to assay interfacial nanoleakage expression.

**Results.** Storage in artificial saliva for 6 months significantly reduced the bond strength of the adhesive compared to immediate bond strength ( $p < 0.05$ ), irrespective of the application technique. Conversely, no reduction was found for Prime&Bond NT ( $p > 0.05$ ). Interfacial nanoleakage showed the following results at T0: Group 1 < Group 3 < Group 2 < Group 4 ( $p < 0.05$ ). Storage increased in artificial saliva for 6 months increased interfacial nanoleakage expression in all tested adhesive systems ( $p < 0.05$ ).

**Conclusions.** The null hypotheses were rejected because of the reductions of  $\mu$ TBS and nanoleakage interfacial expression after storage. Further studies on different substrates, such as carious dentin in association with in vivo tests are needed to assess the long-term clinical behavior of new "multimode" simplified adhesives.

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## PMMA RESIN BLOCKS FOR LONG-TERM PROVISIONAL RESTORATIONS FOR CEREC CAD-CAM SYSTEM. A FLEXURAL STRENGTH TEST.

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**Aim.** CAD-CAM-fabricated provisional restoration made by highly cross-linked PMMA acrylic resin allows clinicians to evaluate the treatment objective over a certain period of time and therefore generates a high predictability of the definitive rehabilitation in terms of esthetics, masticatory function and phonetic. Many companies offer high-density polymers for CAD/CAM manufacturing methods. The computer aided design performed for long-term provisional from PMMA blocks with CEREC software can be easily switched into the final design of the definitive restoration, these useful tools simplify the use of long-term provisional as diagnostic support. Therefore, the aim of this study was to compare the flexural strength ( $\sigma$ ), Weibull characteristic strength ( $\sigma_0$ ), Weibull modulus ( $m$ ) and the Young's modulus ( $E$ ) of three commercial blocks for CEREC System.

**Materials and methods.** Three resin blocks were selected (Group 1=VITA CAD-Temp, Group 2=Merz Artbloc Temp, Group 3=Ivoclar TelioCAD). Specimens ( $n=15/gp$ ) were perpendicularly cut out from CEREC blocks with a slow speed water cooled diamond saw. The specimens were polished and refined in a finishing-polishing machine with silica carbide paper of 600, 1200, 2400 grit until the desired dimension of  $4,0 \pm 0,2$  mm in width,  $1,2 \pm 0,2$  mm in thickness and  $16,0 \pm 0,2$  mm in length was reached. Specimens were then tested until fracture (three-point bending test: span=13 mm, cross-head speed=1 mm/min) in a universal testing machine (Triax 50, Controls, Milano, Italy). The fracture load was recorded in N and the time of load in Seconds; the flexural strength ( $\sigma$  in MPa), Weibull characteristic strength ( $\sigma_0$  in MPa), Weibull modulus ( $m$ ) and the Young's modulus ( $E$  in Gpa) were calculated. Data were statistically analyzed with a Kruskal-Wallis One Way Analysis of Variance on Ranks followed by the Dunn's Test for post-hoc comparison.

**Results.** Results are summarized in the following table.

Group	Materials	$\sigma$ (Mpa)	SD	$m$	$\sigma_0$ (Mpa)	sig.	$E$ (Gpa)	SD	sig.
1	Vita CAD Temp	87,46	2,34	43,68	88,57	C	4,38	0,10	a
2	Merz Artblock Temp	119,17	9,56	15,01	123,32	B	2,23	0,17	b
3	Ivoclar Telio CAD	131,98	3,75	39,79	133,80	A	1,40	0,28	c

**Conclusions.** PMMA resin Blocks proposed for provisional restoration show different characteristic strength in terms of flexural resistance and Young's modulus. An inverse proportional relationship has been observed for flexural strength and Young's modulus. Further studies should be carried out to understand how both properties could influence provisional resin restoration's long-term success by wear test and aging test.



## POLISHING OF A NANOFILLED FLOWABLE RESIN: EFFECTIVENESS OF FOUR PROTOCOLS WITH ABRASIVE PASTES

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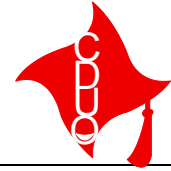
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**Aim.** Flowable composite resins are generally characterized by lower physical and mechanical properties than universal packable composites. Nevertheless, the viscosity, consistency, handling characteristics, and delivery system of flowable resins make them a very attractive choice in selected cases, such as those needing minimally invasive conservative treatment. Interestingly, the filler technology has evolved in order to improve the performance of resin composites, so that nanofilled and nanohybrid composites have been developed. Small occlusal cavities located in pits and fissures that can be restored with a flowable resin are not easily polished with rigid and semi-rigid rotating instruments; on the contrary, these areas are effortlessly reached by abrasive pastes. The aim of our work is to assess the effectiveness of four abrasive paste protocols for polishing a nanofilled flowable resin.

**Materials and methods.** One hundred and fifty discs of a nanofilled composite resin (Filtek Supreme XT Flow, 3M ESPE) were obtained making use of 2 mm high and 4 mm wide silicon molds. Before light cure with a halogen lamp (600 mW/cm<sup>2</sup> for 60 s), the exposed surface of the resin was covered and compressed with a Mylar strip. Thirty unpolished specimens served as controls, the other ones were subjected to finishing with 1200P sandpaper and divided into four experimental groups (n=30): G1, one-step aluminum oxide paste (Nupro Shimmer, Dentsply Caulk); G2, two-step aluminum oxide paste (Prisma Gloss, Dentsply Caulk); G3, one-step diamond paste (Unigloss, Intensive); G4, two-step diamond paste (Diamond Polishing Mint, Ultradent Products). A linear rugosimetric parameter (R<sub>a</sub>) was registered thrice on randomly selected areas of the top surface of the specimens; the arithmetic mean of the readings was regarded as statistical unit. Data were statistically analyzed with one-way analysis of variance and Scheffé post hoc test (p<0.05). Additionally, qualitative scanning electron microscopy observation of representative polished specimens was performed.

**Results.** The mean surface smoothness registered in both control and experimental groups was always below the 0.20- $\mu$ m R<sub>a</sub> threshold that can inhibit bacterial adhesion. The mean surface roughness of controls was 0.031 $\pm$ 0.013  $\mu$ m and similarly low values were registered in G2 (0.039 $\pm$ 0.009  $\mu$ m) (p>0.05). Group 1 exhibited the greatest roughness (0.072 $\pm$ 0.013  $\mu$ m) (p<0.05). Groups making use of diamond pastes obtained intermediate and similar values (G3, 0.050 $\pm$ 0.012  $\mu$ m; G4, 0.049 $\pm$ 0.005  $\mu$ m) (p>0.05). Microphotographs did not highlight relevant surface irregularities, with the groups presenting similarly polished surfaces.

**Conclusions.** All the tested protocols proved to be effective for polishing Filtek Supreme XT Flow nanofilled resin and appear thus suitable for clinical use. In the comparison among experimental groups, the two-step aluminum oxide paste system led to the smoothest surface and the single-step system to the roughest. When choosing between diamond-based polishing paste systems, it is possible to spare operative time with the one-step protocol because its effectiveness was similar to the two-step protocol.



## ROLE OF OCCLUSAL LOADING ON DENTIN COLLAGEN DEGRADATION

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**Aim.** Despite numerous studies suggested that host-derived matrix metalloproteinases (MMPs) and cysteine cathepsins can degrade the dentin collagen network, no information is available on the role of occlusal forces on their enzymatic activity. The aim of this study was to determine the effect of chewing simulation (CS) on MMPs and cysteine cathepsins activity quantifying the release of ICTP and CTX collagen fragments. The tested hypotheses were that CS had no influence on dentin MMPs activity (1) and on dentin cysteine cathepsins activity (2).

**Materials and methods.** Dentin slabs  $1.0 \pm 0.1$  mm-thick were obtained from human sound teeth and completely demineralized in 10 wt% phosphoric acid, (pH=1) for 24h at 25°C. After demineralization, the dentin slabs were cut in circular disks of  $6.0 \pm 0.2$  mm in diameter using a surgical biopsy punch. Demineralized specimens were then equally and randomly assigned to the following aging treatments: CS (37°C in 0.5mL artificial saliva, submitted to 50N occlusal load, 30s occlusal time plus 30s with no load, 1Hz up to 30 days) or static (control; 37°C in 0.5mL artificial saliva for the same time intervals). Total MMPs and cathepsins activity were assayed by quantifying ICTP and CTX collagen fragments respectively, using an ELISA kit at 1, 2, 3, 4, 5, 6, 7, 10, 14, 21 and 30 days. Statistical differences between data were investigated using t-test for independent data.

**Results.** Results are shown in Figure 1 and 2.

Figure 1: ICTP release as function of the tested evaluation points after aging in static or dynamic (CS) conditions. Comparison between the two aging conditions, at the same interval, is significantly different when labeled with an asterisk (\*= $p < 0.05$ ; n.s.=not significant; t-test).

Figure 2: CTX release as function of the tested evaluation points after aging in static or dynamic (CS) conditions. Comparison between the two aging conditions, at the same interval, is significantly different when labeled with an asterisk (\*= $p < 0.05$ ; n.s.=not significant; t-test).

**Conclusions.** The first tested hypothesis (1) was partially rejected since a statistically significant difference in ICTP release in relation to the aging procedure was observed only at certain time intervals. The second tested hypothesis (2) was rejected since significant differences were observed in the CTX release in relation to the CS procedure compared to controls. Demineralized dentin stored in static conditions showed higher endogenous telopeptidase activity, as indirect evidence of cathepsins K activity, compared to CS specimens. Future studies will investigate dentin endogenous MMPs and cathepsins activities when submitted to chewing simulation at shorter time intervals.

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## THE EFFECT OF A NEW ZIRCONIA PRIMER ON THE ADHESIVE POTENTIAL OF SELF-ADHESIVE RESIN CEMENT TO THE ZIRCONIA SUBSTRATE

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**Aim.** The aim of the study was to evaluate the influence of an experimental zirconia primer on shear bond strength (SBS) of an experimental self-adhesive resin composite cement to zirconia substrate .

**Materials and methods.** A sample of 40 zirconia blocks was selected for the study. The blocks were embedded in acrylic resin and fixed in an aluminum split mold. Then, the zirconia substrates were wet ground with 320; 800 and 1000-grit paper to create a flat surface and sandblasted with 110- $\mu$ m alumina particles. The sample was divided randomly in two groups (n=20) as follows: group 1. Without any treatment; group 2. With primer application. In Group 2, an experimental primer (GC, Tokyo, Japan) was applied to zirconia substrates using microbrushes, left undisturbed for 60 seconds and air-dried. An experimental self-adhesive dual-cure resin cement (GC, Tokyo, Japan) was applied onto the treated substrate using a cylinder-shaped silicone mold of 3 mm in diameter, and light-cured. All the specimens were stored in water for 24 hours, in 100 % humidity at 37°C and then subjected to the shear bond strength test. Using a universal testing machine (Triax Digital 50, Controls, Milan, Italy), a shear load was applied in a direction parallel to the bonded interface and at a crosshead speed of 0.5 mm/min until failure occurred. The diameter of the bonded interface was measured with a digital caliper (Orteam s.r.l, Milan, Italy).The load at failure was recorded in Newtons and bond strength was calculated in MegaPascals. Data were statistically analyzed using Mann-Whitney U test.

**Results.** The following bond strength values were recorded (mean  $\pm$  standard deviation): group 1) 2.75  $\pm$  2.17; group 2) 12.44  $\pm$  5.4. The Mann-Whitney U test revealed that following primer application a significantly higher bond strength was achieved (p<0.001).

**Conclusions:** The use of the zirconia primer significantly increased the adhesion of the resin cement to the zirconia substrate.



## THE INFLUENCE OF ALUMINA PARTICLES IN THE PRODUCTION OF BIOMIMETIC COMPOSITES

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**Aim.** The aim of the work is to evaluate the influence of the filler size and shape in the final architecture of biomimetic composite produced through the freeze casting technique.

**Materials and methods.** Different samples of ceramic infiltrated with resin, composed by a different ration between RonaFlair White Sapphire aluminium oxide powder - EMD Chemicals/Rona Gibbstown, USA (platelet-like morphology and average particle size <16 µm) and Almitis alumina filler - CT3000SG, Almitis, USA (average particle size of 0.5µm) have been produced. The samples have been then characterized through thermal analysis and calorimetry (Model TG/DT A 6300, Seiko Instruments USA Inc. Torrance, CA, USA), scanning electron microscopy (Phenom-World BV, Eindhoven-The Netherlands), and optical microscope (Nikon Eclipse E600 microscope). Moreover the percentage of shrinkage after the ceramic syntherization have been measured through a digital caliper (Mitutoyo USA, Aurora, IL 60502). Four different groups have been considered: Group 1 (10R): 10% Ronaflair- 90% Almitas; Group 2 (20R): 20% Ronaflair- 80% Almitas; Group 3 (40R): 40% Ronaflair- 60% Almitas; Group 4 (60R): 60% Ronaflair- 40% Almitas.

**Results.** Thermal analysis and SEM observations have confirmed that all samples were characterized by a biomimetic hierarchic structure. For what concerning the average thickness of lamellae measured at 4 and 8 mm from the cooling plate, samples 10R were characterized by higher thickness at both levels. The measured parameter indeed decreases with the increment of the percentage of Ronaflair in the slurry composition. On the contrary the distance between lamellae, was characterized by an opposite trend. The measurement of the diameters of the samples after the process of syntherization through a digital caliper confirmed that 10R and 20R samples were characterized by a constant shrinkage in all the samples. On the contrary, groups 40R and 60R were distorted and were characterized by an higher diameters at the bottom respect the upper portion of the samples. These samples were characterized in the bottom by a greater amount of particles, both Almitis than Ronaflair ones. We have supposed that gravity force, during the freeze casting process, tended to push down in the lower layers all heaviest particles and then the lightest ones have occupied the spaces they have left. Consequently in upper layers there are only few particles and during the syntherization were characterized by the higher shrinkage. This phenomenon was limited in samples 10R and 20R because the percentage of smallest particle is so much greater that their position was random and constant.

**Conclusions.** the present study has shown that samples composed by an higher percentage of Ronaflair, were characterized by an higher distortion after syntherization; the cause of this phenomenon could be the different sedimentation process that characterizes particles of different weight and size.



## CROSS-LINKER INACTIVATION OF MMPs WITHIN THE HYBRID LAYER AND EFFECT ON BOND STABILITY

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<sup>2</sup>Georgia Regents University, Georgia, USA; <sup>3</sup>DIBINEM, University of Bologna, Italy

**Aim.** Protein cross-linking agents employed during bonding procedures have been recently proposed to improve bond durability. The present study aimed to evaluate the ability of 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) cross-linker to improve the bond stability of an etch-and-rinse adhesive system over time. Furthermore, since the activity of dentinal matrix metalloproteinases (MMPs) has been implicated in the degradation of resin-dentin bonds, the effect of EDC on the activity of dentinal MMPs was also investigated.

**Materials and methods.** Middle/deep dentin exposed from 20 human molars was etched with 35% phosphoric acid for 15s. Specimens were then assigned to: Group 1 (N=10): dentin was pretreated with 0.3M EDC water solution for 1min then bonded with Optibond FL (OFL; Kerr); Group 2 (N=10): OFL was applied on untreated etched dentin (control group). Composite buildups were made using Filtek Z250 (3M ESPE). The bonded teeth were then sectioned for microtensile bond strength test ( $\mu$ TBS) in accordance with the non-trimming technique in order to evaluate the bond strength stability over time. Specimens were subjected to  $\mu$ TBS test and pulled to failure after 24h or 1 year of storage in artificial saliva at 37°C. In addition, to evaluate the effect of EDC cross-linker on dentinal MMPs activity standard zymography and in situ zymography analyses were performed. Briefly, the zymographic assay was performed on protein extracts obtained from dentin powder treated with the tested adhesive with or without 0.3M EDC pre-treatment, while for the in situ zymography analysis, adhesive/dentin interfaces were created with the same adhesives applied to acid-etched dentin slabs pre-treated or not with 0.3M EDC primer.

**Results.** Results of  $\mu$ TBS revealed that the use of the 0.3M EDC-containing primer did not affect immediate bond strength to dentin but significantly contributed to preserve the bond strength of the tested adhesive after 1 year of storage ( $p < 0.05$ ). Zymographic analysis showed an increased expression of dentin endogenous MMP-2 and -9 after adhesive application, while the use of EDC as a primer inactivated dentin gelatinases. Results of in situ zymography showed that hybrid layers created with OFL exhibited intense collagenolytic activity, while almost no fluorescence signal was detected when specimens were pre-treated with 0.3M EDC.

**Conclusions.** In conclusion, the results of this study showed that 0.3 M EDC pre-treatment was found to be effective as an additional primer for the tested etch-and-rinse adhesive to improve its stability over time. Additionally, the correlative zymographic analysis employed demonstrated that EDC pre-treatment could contribute to inactivate endogenous dentin MMPs. Future studies are needed to further support the efficacy of EDC pre-treatment and promote its potential application in adhesive dentistry.



## IN VITRO BIOCOMPATIBILITY ASSESSMENT OF FOUR CERAMIC DENTAL IMPLANT SURFACES

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<sup>3</sup>CNR, Torino, Italy

**Aim.** In order to investigate the biocompatibility of four different ceramic dental implant surfaces, cell morphology, adhesion and proliferation of murine pre-osteoblasts were studied in-vitro.

**Materials and methods.** *Sample preparation.* High purity powders were used to produce respectively planar ZTA and ATZ samples: Taimic Al<sub>2</sub>O<sub>3</sub>-16 wt%ZrO<sub>2</sub> (Taimicron) and Tosoh ZrO<sub>2</sub>-20 wt%Al<sub>2</sub>O<sub>3</sub> (TZ-3Y20AB), in form of ready to press powders. Green samples were obtained by linear pressing at 80 MPa followed by Cold Isostatic Pressing under 200 MPa. The optimized sintering conditions were: heating 50° C/h up to 700° C, dwell for 2 h at 700° C; heating of 100° C/h up to temperature sintering of 1500° C and dwell for 2 h at this temperature. All the specimens were mirror polished and ultrasonically washed in acetone, ethanol and deionized water. Then half of ATZ and ZTA samples underwent a patented hydrothermal treatment. Thus four types of surfaces were obtained: treated ATZ, untreated ATZ, treated ZTA, untreated ZTA. *Biological assays.* A mouse pre-osteoblastic cell line, MC3T3-E1, was purchased from ECACC (ECACC number: 99072810). Cells were kept in Alpha Minimum Essential Medium supplemented with 10% FBS (Sigma), 50 µg/mL gentamicin (Cambrex). To examine cellular adhesion and morphology, MC3T3-E1 cells were seeded on the samples and stained with Rodamine-Phalloidin/Dapi, at different time points (3;5;24h). Pictures were acquired with Nikon Eclipse Ti-E microscope using a Nikon Plan 10X/0,10; Nikon Plan Fluor 40X/0,75; Nikon Plan Apo VC 60X/1,40. Quantification of the cell spreading was performed by Image J software. Cell viability and proliferation were studied using the colorimetric MTS assay, at 24, 48 and 72 hours. Data were analysed by Kaleidagraph (Synergy Software). Each experiment was repeated at least three times. Statistical analysis was performed using the nonparametric unpaired Wilcoxon-Mann-Whitney test. A p value of <0.05 was considered statistically significant.

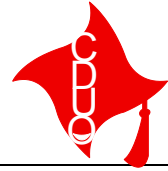
**Results.** As visualized by fluorescence microscopy, MC3T3-E1 cells were able to properly spread without any significant difference among the four experimental conditions. Also, after 3 hours from seeding, no statistically significant difference could be observed in cell spreading among the cells on the different surfaces. Finally, the increment of the proliferation rate from 24 to 72 h detected was similar in the four conditions considered and consistent with the trend of biocompatible materials.

**Conclusions.** The ceramic materials, either treated or not with orto-phosphoric acid, properly sustained cell growth and proliferation showing high biocompatibility. We report for the first time the behavior of osteoblasts cultured on ATZ and ZTA that underwent a patented hydrothermal treatment.

# XXI CONGRESSO NAZIONALE

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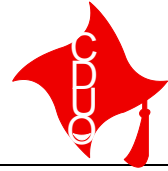
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## ODONTOIATRIA PEDIATRICA

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A.B. Sonmez, D. Cervantes, F. Petrillo, G. Consoli, G. Ierardo, V. Luzzi, A. Polimeni

### **USE OF DENTAL SEALANTS WITH AND WITHOUT FILLER: EXPERIMENTAL EVALUATION OF FOUR MONTHS**

E.A. Gobbato, M. Caburlotto, E. Mattiuzzo, A. Fioretti, A. Zuccon, E. Stellini

### **USE OF VIDEO EYEWEAR DURING PEDIATRIC DENTISTRY PROCEDURES**

A. Carlucci, S. Montefrancesco, L. Lombardo



### A NEW ENDODONTIC TECHNOLOGY: PILOT STUDY

I. Fiore, M. Bossù, A. Salucci, F. Pepe, C. Introini, G. Salsedo, A. Polimeni

D.A.I. Testa collo UOC Odontoiatria Pediatrica Sapienza Università di Roma Italia (Dir. A. Polimeni)

**Aim:** the success of endodontic treatment depends on cleaning and shaping of canals. In primary teeth is more important the cleaning of debris than the shaping, but we need the knowledge of the anatomy. We studied the endodontic anatomy of primary teeth by micro-ct and we used in the second mandibular primary molar of a child 7 years old a new endodontic system, SAF system.

**Materials and methods.** we studied the anatomy of root canals by micro-ct and we selected, as instrumentation the SAF system, which is a cleaning-shaping-irrigation system. The file is used with a particular handpiece head, which turns the rotation into in and out vibration and is used with irrigation provided by a pump. The SAF file is the first endodontic file that doesn't have a central metallic core. The walls of the cylinder are made of a ni-ti lattice and the tip is asymmetrical. The metallic surface is rough and, when it is compressed into a root canal, it adapts itself to the cross section of the canal with light pressure. It operates at 5000 rpm and is linked to a peristaltic pump and its flow rate can be adjusted from 1 ml/min to 10 ml/min. At the beginning the file uses rotation and when it is adapted to the shape of canal it changes its movement in vibration. Before the use of SAF file we prepared the tooth opening the pulpal chamber and identifying the working length, so made the glide path with a 20 k-file.

**Results.** Primary teeth are characterized by narrow and ribbon canals. Maxillary molars have 3 canals, one in each root and the distal is more narrow than the others and it, in its first third, is always joined to the palatal by an isthmus. Mandibular molars have generally 3 canals, two mesials and one distal; but the distal canal is narrow and in 50% of cases it has 2 entrances joined by a long isthmus. SAF instrumentation can adapt the file to the root canal. It doesn't impose its shape, but adapts itself to the walls of canals removing a thin and uniform layer of dentine. So the canal will maintain the same shape, but with larger dimension. In particular when there is an isthmus which is the link between two canals, it will be the area where dentine chips will be packed. So using SAF file, which adapts itself to the canal, also this area can be shaped and our idea is confirmed by literature. In fact, unaffected walls by the procedures is greatly reduced. In SAF system is 24% compared to 45% for Profile, 48% for ProTaper or 53% for GT.

**Conclusions.** The SAF system is a new technology, which can change the concept of shaping. With this file is cleaned a portion of dentin which was ignored by other files with rotary or reciproc movement. Another advantage of this new file is the property of maintain the same shape, but with larger dimension. In particular, the file is minimally invasive and preserve dentine in the thinnest layer where there is the permanent germ. This is a preliminary study, which will be study in deep using micro-ct and 3D image to compare the endodontic system before and after the treatment.





### ACUTE ORAL GRAFT-VERSUS-HOST-DISEASE IN PAEDIATRIC PATIENTS SUBJECTED TO ALLOGENIC HEMATOPOIETIC STEM CELLS TRANSPLANTATION: A SCREENING STUDY

P. Defabianis, R. Guagnano, G. Caserta, A. Cimma, L. Bello

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**Aim.** In this study, 58 paediatric patients were prospectively evaluated with a number of screening studies performed between 0 to 180 days after allogenic hematopoietic stem cells transplantation (HSTC) to detect any risk factors for developing oral manifestations of acute-Graft-versus-Host-Disease (a-GvHD).

**Materials and methods.** A total of 58 paediatric allogenic HSTC patients (37 males aged 1 to 15 and 21 females aged 4 to 18), entered the study and were observed by a trained dental team for a period of 6 months following transplantation, while assuming cyclosporine, an immunosuppressive agent with a GVHD prophylactic activity. Median age at transplantation was 7,2 years old. Screening studies included physical examination, complete blood counts and liver function tests. A complete extra-oral and intra-oral clinical examination was performed for all patients to detect oral lesions. Furthermore, some variables (sex, number of HSTC performed in the same patient, degree of HLA disparity and the positive/negative result to cytomegalovirus (CMV) antigenemia test during the three months after engraftment) were investigated in the attempt to evaluate their predictive and/or diagnostic value in paediatric HSTC recipients. The resulting data were analysed with the Fisher's Exact Test.

**Results.** 22% of the patient patients included in the study developed oral manifestations of a-GVHD. Oral symptoms frequently constitute the major complaints of the patients during the follow-up period. The oral changes included mucositis, erosions and/or ulcerations; xerostomia, pain and bleeding were also referred. The variables investigated to evaluate their predictive and/or diagnostic value in paediatric HSTC recipients included sex (relative risk 0.494, 95% confidence interval 0.119-2.052, P=0.1242), number of HSTC performed in the same patient (relative risk 5.4, 95% confidence interval 0.759-3.843, P=0.0714), degree of HLA disparity (relative risk 0.24, 95% confidence interval 0.058-0.987, P=0.0428), and the positive/negative result to cytomegalovirus (CMV) antigenemia test during the three months after engraftment (relative risk 0.86, 95% confidence interval 0.273-2.712, P=1).

**Discussion.** The incidence of oral a-GVHD seems to be prevalent in males.

Furthermore, patients who underwent just one HSTC showed an increased risk compared to those who underwent a double one. In patients undergoing HSTC from matched unrelated donor (MUD), the probability to develop a-GVHD has been reported with a probability rate 4 times higher than that found in patients undergoing transplantation from a matched related donors. The correlation with Cytomegalovirus antigenemia positivity and a-GVHD occurrence, has been examined but with no statistically significant results, which is not confirmed by the data reported in literature. The point is that most of the investigations are based on an adult patients sample while our study is dealing with growing patients, which could represent a confusing factor.

**Conclusions.** Patients presenting two or more risk factors should be closely monitored for development of clinical oral a-GVHD. As oral complications are a significant cause of morbidity and potential mortality for children undergoing HSTC and can interfere significantly with transplant recovery.



### ADULT SYNDROME: THE DENTAL FEATURES OF A VERY RARE CONDITION

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**Aim.** The ADULT syndrome is one of the rarest ectodermal dysplasias and it is associated with several malformations involving especially the limbs. Only a few cases are known all over the world. The most clinical features are the presence of ectrodactyly, syndactyly, hypermelanosis or multiple lentiginos, onychodysplasia, abnormalities in the lacrimal duct, recurrent conjunctivitis, photophobia, mammarian hypoplasia, hypotrichosis and frontal alopecia, hypohydrosis, cutaneous photosensitivity, nasal bridge prominence, exfoliative dermatitis and xerosis. All the reported clinical features are referred to an abnormal development of the ectodermal tissues due to a specific missense mutation involving the p63 gene. It is an autosomal dominant disorder involving a family group, but several ex-novo mutations could also occur. Among the craniofacial deformities, one distinguishing characteristic is the total absence of labiopalatal clefts, being this a useful feature to distinguish the ADULT syndrome from the other ectodermal dysplasias. The ectodermal dysfunction expresses itself with conoid teeth, enamel hypoplasia, dentinal dysplasia and especially hypodontia, with following functional and aesthetic defects. The developmental defect of the dentition contributes to render an hypoplastic third medium of the face. The absence of the permanent teeth determines an alteration of the physiologic bite augmentation with a consequent loss in the vertical dimension of the third medium of the face. The ADULT syndrome can be diagnosed by observing the clinical features, but the final diagnosis is made by genetics. The prognosis of the syndrome is good. No systemic involvement or mental retard have been reported. Patients show a normal IQ. The only complications are of aesthetic nature, with the exception of ectrodactyly and syndactyly which require a surgical intervention.

**Materials and methods.** We report the case of a 11-years-old Caucasian girl affected by ADULT syndrome. The radiographic examination revealed the presence of a skeletal deep-bite, a brachicephalic subtype, a missed vertical development due to the absence of the permanent molars and a collapse of the premaxilla following the absence of permanent incisors. A prosthetic plan was performed in order to re-establish a correct vertical dimension. Posterior composite inlays and an anterior fixed prosthesis were applied.

**Results.** By performing prosthetic treatment it was possible to restore the vertical dimension and the anterior guide in order to help the physiologic maxillo-mandibular growth.

**Conclusions.** The ADULT syndrome is a rare condition which affects the normal development of most of the ectoderm-derived structures, such as hands, nails, lacrimal ducts, hair, melanocytes and cranio-facial bones. No labiopalatal clefts have been reported in the international literature, and this feature is useful to distinguish the ADULT syndrome from the other ectodermal dysplasias. In the ADULT syndrome it is possible to detect a high-graded hypodontia often involving the permanent molars which are responsible for a correct bite augmentation and vertical dimension of the third medium of the face. During the changing dentition the use of inlays or fixed prosthesis could provide a general improvement to re-establish a correct maxillo-mandibular growth. At the end of the growth, once sex maturity has been reached, it becomes possible to effectuate a definitive prosthetic intervention through the use of dental implants and the application of single or multiple crowns, following the distinctive clinical situation of every patient.



### ADVERSE LATE ORAL EFFECTS IN A BONE MARROW TRANSPLANTED CHILD: A CASE REPORT

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**Aim.** The most common types of cancer in childhood are leukemias, central nervous system (CNS) tumors and lymphomas. Leukemia is a common malignancy seen in young children and acute lymphoblastic leukemia (ALL) accounts for 75% of all leukemias. The disease is characterized by a high incidence of oral complications at diagnosis and during subsequent treatment. Oral complications can be divided in three groups. Primary lesions are induced by the infiltration of the oral structures by malignant cells: gingival infiltration and infiltration of bony oral structures. Secondary lesions are the result of the myelophthitic character of the disease. This group contains symptoms of anemia, bleeding tendency and increased susceptibility to infections. Tertiary lesions are induced by the antileukemic treatment patients receive. Direct and indirect cytotoxic effects can be distinguished. Adverse late oral effects – such as disorders of mineralization, caries, microdontia, agenesia, altered root development and changes in mandibular condyle shape - are also reported in literature. The aim of this presentation is to describe the oral conditions in a bone marrow transplanted child.

**Case report.** P.C., a 5 yrs and 3 months old girl, was sent to the section of Paediatric Dentistry by the department of Oncology of the Regina Margherita Children Hospital for dental evaluation. The child had been diagnosed acute lymphoblastic leukemia (ALL) at the age of 14 months and underwent allogeneic bone marrow transplantation six months later. The preparatory regimen before the infusion consisted in a chemotherapy regimen. Seven months later, the patient underwent a second procedure of bone marrow transplantation due to the failure of the first one. This time the preparatory regimen before the infusion consisted in a total body irradiation (TBI). At the moment of dental evaluation the patient was in remission for cancer since the age of 3. A complete extra-oral and intra-oral clinical examination was performed to detect oral lesions. Caries and restorations of the deciduous molars were evident while the oral mucosa was absolutely normal. A tendency to develop a Class III malocclusion was observed. The orthopantomography showed the agenesia of 1.5, 2.5, 3.5, 4.5, 1.7, 3.7 and 4.7 with a microdontia of 3.4 and 4.4. All teeth evidenced a marked alteration in root development with a short length. The girl underwent dental restoration and newly erupted teeth were sealed. She has now entered a program of regular follow-up including oral hygiene session and regular fluoride treatment.

**Discussion and conclusion.** Leukemia and its treatment are likely to cause to children more oral complications than all other types of cancer. Both the leukemic condition itself and the therapy cause oral signs and symptoms with significant morbidity. Luckily, the mean survival rate of children with malignant disease is increasing ; for the Acute Lymphoblastic Leukemia the cumulative survival at 5 years from diagnosis for cases diagnosed in Italy (1998-2002) was 86.2%. Since life expectancy for a patient with leukemia has been greatly improved, the adverse late oral effects of the disease are becoming more and more important. Dentists must be aware of these problems as they have an increasing role to play before, during and after a treatment against leukemia.



#### CEPHALOMETRIC ASSESSMENT AND DENTAL ARCH MORPHOLOGY IN YOUNG CHILDREN WITH SLEEP DISORDERED BREATHING

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**Aim.** The aim of this work was to study the association between sleep disordered breathing (SDB) and occlusal and cephalometric parameters in a group of pediatric age. Sleep disordered breathing forms a severity continuum from snoring to obstructive sleep apnea and several studies have underlined a close relationship between SDB and facial and dental anomalies.

**Materials and methods.** A group of 30 snoring children, aged between 5 and 8 years, was selected from the Paediatric Allergology and Immunology Center of "Sapienza" University. All subjects underwent an orthodontic examination at the UOC of Paediatric Dentistry, through cephalometric study and model analysis. The collected data were analyzed through descriptive analysis. Moreover, associations between SDB and the presence of malocclusion were investigated. The Pearson test with a significance level of 5% was used.

**Results.** The study showed there were more subjects with Class III malocclusion (53%) than Class II (44%), while only 3% had a Class I malocclusion. Most of Class III malocclusions were characterized by maxillary retrusion (87.5 %); Class II malocclusions consisted mostly of mandibular retrusion (84,6%). The children exhibited a more posteriorly inclined mandible with increased vertical facial growth and reduced airway space (S-Pas and N-Pas). The hyoid bone was located lower from mandibular plane and more retrusive compared to the third cervical vertebra. Analysis of the dental arches demonstrated a significantly smaller distance between deciduous canines.

**Conclusions.** Pediatric sleep-disordered breathing symptoms reported in this study were primarily associated with morphologic characteristics of a long face, with a tendency toward Class III skeletal, nasal breathing resistance (allergic rhinitis 32%) and mouth breathing. An orthodontic diagnosis and therapy should be encouraged in pediatric SDB, and an early approach may permanently modify nasal breathing, thereby preventing obstruction of the upper airway.



#### CO<sub>2</sub> LASER TREATMENT IN PEDIATRIC ORAL SURGERY

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**Aim.** A CO<sub>2</sub> laser emits a radiation in the infrared portion of the electromagnetic spectrum, which when directed on biological tissues results in a pure thermic effect – this means that when a tissue is exposed to a CO<sub>2</sub> laser radiation, 90-95% of the energy is absorbed by a thin layer of the tissue and transformed in heat: the tissue is subjected to a rapid evaporation of its intra and extra-cellular fluids, followed by a mass destruction of the cells and their architecture. The heating effect of the CO<sub>2</sub> laser has the capacity to seal the blood and lymph vessels of small resulting in an excellent coagulation. The advantages are the following: total absence of any form of contact with the tissues, resulting in a more secure working environment for both the patient and the operator, especially vis à vis possible cross infections; high level of coagulation (bloodless field), extremely precise incision, sterilizing effect for the high temperature, no need for stitches, better wound healing, edema and post-operative pains reduction, rapidity in the execution. The disadvantages are related to the possibility of damage to underlying structures if and when not using the correct parameters, to its ineffectiveness in the presence of pathophysiologic liquid on the surgical field and, to the cost of the equipment.

**Materials and methods.** The use of the laser technology in paediatric dentistry is proposed as an alternative, sometimes complementary and sometimes as a replacement of traditional techniques. In paediatric oral surgery this is mainly used for the removal of pathological labial and lingual frenula. The intervention of frenectomy or labial frenulotomy consists in the complete excision of the frenulum from the apex of its insertion to its base, also including any deep periosteal insertions. The intervention of lingual frenulotomy, instead, is a surgical procedure indicated in cases of tongue-tie with functional impairment (e.g. difficulty in breast-feeding, atypical swallowing, impaired fonesi, orthodontic and postural problems). To reduce the scarring process of the frenulum, the tongue must be exercised early, already in the day of the intervention and for the following days, prescribing and explaining to the patient the simple mobilization and stretching exercises to be performed several times during the day.

**Discussion.** Together with the assimilation of the parameters reported in the literature corroborating the proposed treatment, it should be emphasized that, clinically, a critical factor in the laser therapy is the operator. The minimally invasive result of the laser therapy is conditioned both by his/her knowledge of the technology - i.e. the application of the correct energy and power (the minimum effective) - and by his/her skilfulness: the operator must in fact learn how to act precisely on the tissues using a tool that is not working in contact. This requires learning the proper operative technique with substantial hands-on training, characterised by a steady but more or less long learning curve. Also of considerable importance is to observe the basic rules of safety and, in particular, the use of specific goggles according to the wavelength used.

**Conclusions.** The laser therapy is becoming increasingly common as a valid and effective instrument in paediatric dentistry. Both therapies on soft tissue and those on hard tissues benefit of the clinical and operational advantages brought about by the laser technology. Besides, a proper psychological approach to the patient contributes, as always, in a decisive manner to the full success of therapy.



### COMPARISON BETWEEN WHITE PRO-ROOT MTA AND A NEW MINERAL TIROXIDE AGGREGATE IN PULPOTOMIES OF PRIMARY MOLARS. A CLINICAL STUDY

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**Aim.** The purpose of this study was to conduct a clinical and radiographic evaluation of pulpotomy in temporary molars performed with White ProRoot MTA (Tulsa Dental Products, Tulsa, OK, USA) and Tech Biosealer Capping (Isasan, Rovello Porro, Como) and compare the results in a sample of 38 primary molars with a maximum follow-up of 12 months.

**Materials and methods.** Calcium silicate cements, conventionally defined MTA cements, are hydraulic materials able to set in the presence of blood and other biological fluids. MTA form calcium hydroxide during their hydration, release calcium and hydroxyl ions and induce the formation of calcium phosphate deposits (apatite). Calcium silicate MTA materials may provide epigenetic signals to induce the formation of reparative dentin and dentinal bridge by pulp stem cells. Twenty-eight patients were treated at the Department of Pediatric Dentistry, "Sapienza" University of Rome, Italy. This prospective study was designed to include first and second primary molars that had been treated by pulpotomy, in patients 5 to 9 year old patients, with White ProRoot MTA (Tulsa Dental Products, Tulsa, OK, USA) as control group and a new MTA material Tech Biosealer Capping (Isasan, Rovello Porro, Como) as test group. The authors had been previously involved in several pulpotomy studies and used a standardized technique. The inclusion criteria included subjects with no systemic pathology or allergies; primary molars which needed a pulpotomy treatment due to caries, that revealed no clinical or radiographic signs of radicular pulp degeneration and undergo vitality test. Primary molars which had not been previously treated and that presented, at treatment time, at least half of the root length. All primary molars pulpotomy were selected and randomly assigned to Pro-Root (n=17) or Tc-Capping (n=21) groups. After coronal pulp removal, the remaining radicular pulp was covered with two MTA material; then the teeth were permanently restored with a glass ionomer cement Equia (GC Europe N.V., Leuven, BEL) following the pharmaceutical instructions. Clinical and radiographic success or failures were evaluate at 1, 6 and 12 month.

**Results.** The sample consisted of 38 primary molars. Seven molars were not included in the study: three molars belonged to two patients who did not show up to follow-up visits and four molars were not included as three patients underwent a repeated antibiotic therapy after the pulpotomy because of systemic pathology. Therefore, our final sample included 31 primary molars. The Radiographic and clinical evaluation at 12 months of the 31 molars revealed total success rates in Tc-Capping groups and unfavourable pulp response in 1 molar treated with White Pro-Root MTA. In this case, it was verified the presence of an abscess and internal root resorption. After a second retreatment of the pulp chamber, an incomplete hardening of the material used was detected.

**Conclusions.** White ProRoot MTA (Tulsa Dental Products, Tulsa, OK, USA), Tech Biosealer Capping (Isasan, Rovello Porro, Como) presented high levels of clinical and radiographic success, showing a very good biologic response with this kind of materials. The Tc-Capping proved to be more easily worked by simplifying end speeding up the operative procedures.



### DENTAL ANOMALIES IN PATIENTS AFFECTED BY OSTEOGENESIS IMPERFECTA

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**Aim.** osteogenesis imperfecta (OI) is an inherited disorder of the connective tissue caused by mutations in either the collagen 1a1 gene or the collagen 1a2 gene on chromosome 17 and 7. The disease is usually inherited in an autosomal dominant manner. Patients with OI show signs related to the defective collagen: bone fragility, growth deficiency, blue sclera, hearing loss, joint laxity and dentinogenesis imperfecta. The aim of our study was to delineate dental abnormalities in patient affected by OI.

**Materials and methods.** twenty-seven patients, 4-18 years-old, referred by Dipartimento di Malattie Rare del Policlinico Umberto I were visited and ten of the twenty-seven patients had a parent with OI. The dental examination was performed at the Department of Pediatric Dentistry of Sapienza Rome University and traumatic injuries, caries and disturbances in eruption were registred. Moreover, panoramic radiographs were obtained from nineteen patients. Four patients had only primary teeth, seven patients had only permanent teeth.

**Results.** Only one child had a severe dentinogenesis which involved all primary teeth, four patients had a moderate dentinogenesis and five had a discoloration. Twelve patients were caries free, ten had DMFT  $\leq 5$ , four presented DMFT  $\leq 10$  and one had DMFT  $> 10$ . Twenty patients had a good oral hygiene, but in seven there was gingival bleeding during the examination. Tooth eruption age was appropriate in all but two of the twenty-seven index patients: a female 10 years-old had the second primary molars ankylosed and a boy 14 years old had the upper second molars impacted. In a patient there was a transposition, which involved upper lateral incisor and canine. Twenty-one patients showed malocclusion, which was only clinically observed and can be divided in thirteen third class and eight second class. In six of these there was a crossbite, which involved in four case posterior teeth and in two case the anterior, and two had the midline diverted. Agenesis was found in five patients and the teeth involved were always second premolars.

**Conclusions.** our results are comparable to international data even our group is small. The impaction is less frequent than the results of others study, but only five patients were more than 12 years old, which is the normal age of eruption for canines and second molars. So the prevalence of impaction in an older population could be higher. This prevalence of dental anomalies in patients affected by OI stresses the importance of a clinical and radiological odontoiatric examination during the tests for the diagnosis because in patients with uncertain signs demonstration of dental disturbances can be careful.



### DENTAL MANAGEMENT IN RHABDOMYOSARCOMA PEDIATRIC PATIENT

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**Aim.** Rhabdomyosarcoma (RMS) is a rare, malignant and aggressive soft tissue tumor. It is most common in children aged 1- to 5-years old and often affects head and neck regions. The antineoplastic treatment of this disorder frequently needs a multimodal approach that includes surgery, chemotherapy and radiotherapy. Radiant therapy and chemotherapy can have several impacts on dental development, such as local enamel defects, hypoplasia, root stunting and agenesis. Altered pattern of tooth eruption, susceptibility to carious lesions and mucositis can also be present. The severity of damaging effects depends on the patient's age, the treated anatomic site and the dose administered.

The aim of this case report is to illustrate our experience in management of dental complications in a child with history of RMS.

**Materials and methods.** A 8-years old girl referred to our department in 2012. Difficulty in chewing and severe teeth mobility was reported.

The rx orthopantomogram revealed the absence of root portions of all permanent elements. The intra-oral examination showed diffused gingival reddening, necrotic primary teeth and multiple caries. Poor hygiene and angular cheilitis was also observed. The treatment plan was based on the necessity of reducing dental mobility with the aim of improving masticatory function. The choice of maintaining the permanent teeth as long as possible is justified in order to ensure an acceptable aesthetic to the child and to limit the long term bone resorption.

**Results.** During two years of treatment and periodical follow-up (from 2012 to 2014), the decay teeth has been treated and the patient was submitted to repeated hygiene sessions. Deciduous teeth were maintained until the mobility has not become excessive and to make the mastication more comfortable, an individualized thermoplastic retainer was recommended to use by the patient during daily meals. The mobility of compromised teeth were drastically reduced and the child is able to normally chewing.

**Conclusions.** Antineoplastic therapy of the RMS can have severe effects with remarkable impact on dental aesthetic and function. The management of dental complications includes all dental specialties: prevention, conservative and endodontic therapies, oral hygiene, parodontology and surgery. It is essential a long lasting follow-up, the dental team collaboration, and the comparison with the parents of young patients.





### DENTAL STEM CELLS AS A POSSIBLE THERAPEUTIC TOOL IN REGENERATIVE MEDICINE: A LITERATURE REVIEW

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**Aim.** The study of stem cells in dentistry over the years has shown an exponential increase in literature due to their possible use in tissue engineering applied to regenerative medicine. Stem cells have recently been isolated and harvested from dental tissues as dental pulp stem cells (DPSCs), periodontal ligament stem cells (PDLSCs), exfoliated deciduous teeth stem cells (SHED), dental follicle stem cells (DFSCs) and stem cells from the apical papilla (SCAP). Therefore oral cavity must be considered as a source of stem cells as well as a site of application to regenerate missing or damaged tissues. The aim of this work is to define various dental stem cells types and their possible clinical applications.

**Materials and methods.** In order to perform our search of literature we consulted PUBMED database by entering "STEM CELLS" as main inquiry term, "AND" as default Boolean operator and "IN DENTISTRY" as secondary inquiry term and we added four search filters offered by the same database. We excluded review articles by the results. Then we performed a second exclusion step by reading articles' title and abstract and a third exclusion step by reading original manuscripts, including papers focused on stem cells in tissue engineering.

**Results.** Our primary search resulted in a total number of 547 articles including 129 reviews on the subject. We considered 107 papers by reading title and abstract, finally including 76 papers by analyzing the complete manuscript content.

**Conclusions.** Dental stem cells are a easily obtainable source of multipotent cells. Their employment together with scaffolds and growth factors might represent a rising therapeutic application of oral stem cells in many branches of dentistry. In vivo studies on animal models confirmed the significant outcomes of in vitro studies. DPSCs, SCAP and SHED are good candidates in regenerative endodontics for pulp organ regeneration into necrotic or vital but diseased teeth and for the induction of dentin tissue repair among exposed pulp. DPSCs and SHED are good candidates for improving the existing regenerative procedures of cranio-facial bone defects together with already reliable scaffolds and/or growth factors. PDLSCs and DFSCs can be proposed as adjuvants tools for periodontal regeneration procedures as "Guided Tissue Regeneration" technique. Despite all there are no in vivo studies on humans supporting the reliability for therapeutic use and further evidence is required to demonstrate the possibility of using stem cells as a tool of daily clinical practice.



### ENDODONTIC TREATMENT OF MAXILLARY LATERAL INCISOR TYPE III DENS INVAGINATUS: A CASE REPORT

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**Aim.** Dens invaginatus is a developmental dental anomaly clinically characterized by a palatine furrow that can be limited to the coronal pulp or may extend to the radicular apex. Dens invaginatus Type III is characterized by infolding of the enamel and dentin as far as the root apex. This report describes a case of non-surgical endodontic therapy for a maxillary lateral incisor with type III dens invaginatus, necrotic pulp and with a large periradicular lesion.

**Materials and methods.** Patient 13-year-old male, with spontaneous pain in the anterior upper region and discreet edema in the apical area of tooth 2.2. A pulp vitality cold test with refrigerate gas on tooth 2.2 presented negative response. Periapical X-Ray evidenced Type III dens invaginatus and a radiolucid image at the apex of tooth 2.2. After the absolute isolation with rubber dam, a conventional coronary opening for the principal canal was accomplished. The presence of two canals with communication between the main and invaginated canals was detected. A vestibular opening for the accessory canal was accomplished. Biomechanical preparation with Pro-File was accomplished by preparing the cervical and the middle thirds with Gates drills and the surgical diameter was determined with a 40 K-File for the primary canal and 20 K-file for the accessory canal. At each instrument changing, the canals were irrigated with 2 ml of 5.25% sodium hypochlorite. The final irrigation was accomplished with 2 ml of 17% EDTA for 3 minutes, followed by 2 ml of 5.25% sodium hypochlorite. After the root canal was dried with absorbent tips, the intracanal medication composed of calcium hydroxide administered at 30-day intervals for a 3-month period. After clinical signs and symptoms had resolved, the primary root canals and invaginated space were obtured using McSpadden thermoplastizers with zinc oxide and eugenol cement. The first follow-up visit was accomplished one month after case conclusion with a follow-up period of 3, 6 and 12 months.

**Results.** Radiographic and clinical one-year follow-up were responsible for the success in this case, demonstrating that conventional endodontic treatment through orthograde techniques is useful in cases of type III dens invaginatus.

**Conclusions.** Dens invaginatus constitutes a challenge to endodontic treatments, due to its complicated root canal system. In types I and II, the invagination can be removed, thus transforming the tooth into a single canal followed by conventional treatment. The challenge becomes greater in type III cases, where the anatomy is more complex. Extraction is indicated only in those cases, where endodontic therapy and parendodontic surgeries failed or were not possible. The present case shows the occurrence of type III dens invaginatus in tooth 2.2 with periapical lesion, which was properly treated through an orthograde procedure. The method was successfully used to fill complex root canals.



## EPIDEMIOLOGICAL ANALYSIS 2013 OF DMFT INDEX CONCERNING A SAMPLE OF PEDIATRIC PATIENTS OF NORTH-EAST AND COMPARISON WITH OTHER NATIONAL AND INTERNATIONAL REALITIES

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**Aim.** The tooth decay is still the most common illness among children and adolescents in western world. The two main factors which affect the quantity of tooth decay among children are the socioeconomic level and immigration. The aim of this study is to carry out an epidemiological research in order to assess the spreading of this pathology within Pedodontics U.O.C of Padua University situated inside the civil hospital of Castelfranco Veneto. For what concerns the Italian situation, the dental system is prevalently private and onerous, then who frequents the hospital belongs to less privileged classes such as charge-free people because of unemployment or low-income and non-EU citizen, so it is only a part of population. Moreover, this study allows to assess the differences of this pathology among native and immigrant children.

**Materials and methods.** In all, 2000 patients have been examined, from 1 to 16 years old, considering the frequenter of Padua Pedodontics ward. This study has been carried out since October 2011 until August 2013. For each person has been calculated the DMFT index for permanents and the DMFT for deciduous.

**Results.** The deciduous dmft is worth 2,13 while permanents dmft is worth 1,33. Moreover, the DMFT is zero (for caries-free patients) for deciduous in 48.7% of patients and 62.0% for permanents. For what concerns the results considering the ethnic group, the DMFT shows different values according to origin area, whether for deciduous or for the permanents. Immigrants or their relative sons have a larger amount of tooth decay compared to native patients. The patients frequenting Castelfranco Pedodontics ward, have a DMFT medium value larger of a unit than the medium value relative to their origin country, including Italy.

**Conclusions.** We can notice that the hospital reality, which is the background of this study, in a country with a dental reality, prevalently private, affects the results. This is the result of low socioeconomical influence and of the immigrant situation for what concerns the presence of tooth decay: these two classes are more and more present within the hospital reality, which is less expensive than private dentist's surgery. To conclude, the sample shows results in line with literature because, in a way, it represents the less rich part of population, which can be found in epidemiological school researches and in a large part of immigrants. It proves that new prevention programmes have to be taken into consideration in order to reach immediately this percentage of patients where tooth decay is more developed.



### EVALUATION OF ROOT AXES IN INTERCEPTIVE THERAPY WITH ELASTODONTIC DEVICES

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**Aim.** The objective of this study is to evaluate, through panoramic radiographs, the mesiodistal axial inclinations of the maxillary anterior teeth at the end of nonextraction orthodontic treatment, and to compare the results with the mesiodistal axial inclinations of a control sample with normal (acceptable) occlusion. The device used for treat the patients of the experimental group was the elastodontic device Occlus-o-Guide.

**Materials and methods.** The experimental sample consisted of 28 patients in mixed dentition, age range from 8 to 12 years, with Class I malocclusions who were treated exclusively with elastodontic appliance Occluso-oGuide. The mean treatment period was 2 years. In this experiment, panoramic radiographs were taken of the patients of the experimental group at the end of treatment and the mean values of the mesiodistal axial inclination of the anterior superior teeth were compared with the values of the mesiodistal axial inclinations, ever of the anterior superior teeth, of the control sample. The control sample was taken from the study of Almeida-Pedrin in the article "Panoramic evaluation of mesiodistal axial inclinations of maxillary anterior teeth in orthodontically treated subjects"; it comprised 42 white subjects (14 male, 28 female; age range, 12-17 years) with untreated normal (acceptable) occlusion. Cephalometric evaluation of the panoramic radiographs was made by the cephalometric software OrisCeph Rx3. In both experiments this evaluation was made analyzing the internal angle created by the interception of the long axis of the maxillary anterior teeth and a reference plane constituted by a line passing by the lowest point of both orbits.

**Results.** At the end of the therapy most of the values obtained were inside the acceptable range of  $90^{\circ} \pm 5^{\circ}$ , range that give the root parallelism. From the comparison of the data collected between the two groups, all are statistically significant, except the angulation of the right lateral incisor and the left canine. The values obtained with the therapy are similar to the values of the control group in the experiment of Almeida-Pedrin.

**Conclusions.** Occlus-o-guide is a good appliance that give an excellent guide to the eruption of the teeth and a good root parallelism. Use this device in mixed dentition is an effective method to restore normal occlusion in phase of mixed dentition and prevent the need for further orthodontic treatment.



### FLUORIDE VARNISH IN CARIES PREVENTION

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**Aim.** Caries is one of the most important chronic illnesses all over the world, affects all age ranges, children and young adults are the categories more interested of this pathology. The aim of the present study was to evaluate the effects of topical fluoride varnishes in dental caries prevention in children and to examine factors which can modify their effect.

**Materials and methods.** A study was conducted using MEDLINE, covering the years 1989-2011 and using the following terms: fluoride varnish, fluoride varnish for caries prevention, effect of fluoride varnish, topical fluoride, baby bottle caries, childhood caries. We included studies in English and Italian that involved pediatric patients with recurrent caries but not severe concomitant diseases, tested one or more fluoride agents in addition to the instruction of oral hygiene, with or without placebo, the results obtained in a fixed time and highlighted different results depending on the type and frequency of agent application. 600 papers were found, but only 13 were selected and considered. 4 study was selected for use of fluoride varnish in pediatric age, 4 for caries's prevention, 3 for the effect on dental tissue, 2 for the topic fluoride in bacteria metabolism. In this study was consider the diminution of caries's percent in relation with application of fluoride vanish. (The main outcome was caries increment measured by the evolution in decayed, missing and filled tooth surface in both permeant (DMFS) and primary dmfs teeth.)

**Results.** A review of the literature showed that the use of topical fluoride varnishes can be considered a valid defense for the prevention of caries in high-risk patients. The application of fluoride varnish has been shown to have variable efficacy between 20% and 60% and the evaluation includes a frequency of two/four recalls every year. Topical varnishes fluoride stopped the process of teeth demineralization, reduced sensibility of exposed dentin. The facility to apply, and safety use give an important advantage over other types of topical fluoride treatments (such as gels and rinses) or other caries management methods. 14 controll study with placebo dimostred that the application of gel and varnish, in deciduos and permanent teeth, applied for three month every year, was efficacy in carie's control, the protective effect increase if oral hygiene of patients was associated with fluoride toothpaste (900-1450 ppm). Only few informations were found concerning possible adverse effects or the acceptability of the treatment.

**Conclusions.** The review suggests a substantial caries-inhibiting effect of fluoride varnishes in both permanent and deciduous dentitions based largely on trial with no controls treatment. These prevention techniques can be utilized on the territory in systematic mode to prevent in many cases the use of invasive and traumatic technique for infant childhood. Dental hygienists can play an important role complementary to the dentist, promoting to patients's parent preventive therapy and who need it.



### IN VITRO EXPERIMENTAL COMPARISON OF THE DEGREE OF INFILTRATION OF SEALING WITH AND WITHOUT A BONDING AGENT IN PRESENCE OF SALIVARY CONTAMINATION

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**Aim.** Dental caries in pits and fissures of molars is still very common in young people, despite a gradual reduction in their incidence and prevalence. Sealing grooves and fissures, has been repeatedly shown to be an effective tool to prevent the development of carious process in pediatric patient. The aim of the in vitro experimental study is to compare two different sealing techniques, respectively with and without an adhesive layer, in presence of salivary contamination.

**Materials and methods.** A total of forty five caries-free extracted molars were randomized and subdivided in 3 different groups, counting each 15 teeth. In group A (control group) the teeth were sealed with Clinpro Sealant (3M, Saint Paul, Minnesota, United States) without the salivary contamination. Group B and group C, after the prophylaxis and the enamel etching with 35% Phosphoric acid, teeth were contaminated with human saliva for 10 seconds. In group B the sealant Clinpro Sealant (3M, Saint Paul, Minnesota, United States) was applied directly on the contaminated enamel and then light cured; while in group C, after the salivary contamination, a layer of adhesive was applied Scotchbond Universal (3M Saint Paul, Minnesota, United States) before the application of the sealant Clinpro Sealant (3M Saint Paul, Minnesota, United States) then, light cured together. After the execution of the sealings, the samples were left in saline solution for a week. To point out the micro leakages a solution 2% of basic fuchsin were used. The samples were sectioned longitudinally in the mesial-distal direction, and the sections were observed under a stereomicroscope with magnification from 25 to 50x. The one-way analysis of variance (Anova Test) with a post-hoc analysis using Bonferroni's test was used to compare the three groups. The level of statistical significance was set as  $\alpha=0.05$  and statistical power of 80%. All testing was performed by the use of SPSS 16.0 software package (SPSS inc, Chicago, Illinois, USA).

**Results.** In group B, in which the sealant was applied on the contaminated enamel, without an intermediate layer of adhesive, the samples were infiltrated in 93% of cases. While the group C, in which was used the intermediate adhesive layer, presents only 10% of infiltrated samples.

**Conclusions.** In presence of impossible isolation of the field, the use of an intermediate adhesive layer before the sealant application is able to significantly reduce the microleakages.



### INFANT'S SMILE HEALTH FROM 24 MONTHS

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**Aim.** The oral cavity diseases in childhood, especially caries and periodontal disease, are often associated with the poor dental and oral hygiene, early weaning, an improper diet and unhealthy lifestyle (Nardi 2011). The correct primary multidisciplinary prevention as "Infants' Oral Health Care" allows to prevent the onset of severe clinical cases and commitment of significant financial resources for dental therapy. The oral health education aimed to children, involves mostly the parents. The proper oral cavity hygiene in terms of teeth brushing, becomes essential before starting the 24 month. It's main function is mechanical bacterial-biofilm disrupt. It is not important the toothbrushing movement technique (Nardi et al.). The parents need to put more attention to the choice of toothbrushes, specially designed for needs of early childhood, to control the results of the child's home hygiene behaviours and to dental visit. The child's oral hygiene educational technology performed together with the parent allows to engage and empower the young patient and become autonomous.

**Materials and methods.** Alice has grown, she is 2-year-old. From the first months, the mother of Alice uses for her oral hygiene bunny-shaped glove and massaging brush (Oral Care Set - MAM). The deciduous dentition is fully developed. We do not observe a malocclusion. Alice was breast-fed and used the pacifier designed that contributes to harmonious oral cavity growth and supports correct physiological occlusion. We introduced toothbrush realized for early childhood (Learn to Brush Set - MAM) consisting of 2 toothbrushes. The long one (Training Brush - MAM) is used by the parent that guides the child in exploring of the first teeth and in brushing movement. The child is using the small toothbrush (First Brush - MAM) containing the special anti-swallow ring and becomes every day more and more autonomous. The brush has ergonomic non-slip grip, ideal for a better handle. The toothbrush's head is small, round and smooth, not sharp, to protect the mouth of the child. The bristles are very soft and rounded in consistency and form, right for a good adaptation to the morphology of the deciduous dentition stage in growth. The opposite side of the toothbrush is used for the tongue hygiene. Alice presents an important biofilm on the surface of the tongue. It is fundamental to lead Alice in oral hygiene care and support and reinforce her correct oral care habits.

**Conclusions.** The purpose is to provide operating protocols to be recommended to parents and all professionals who deal with childhood and educate them in proper checkup of the child's oral health and hygiene, scientifically defined and customized for different age groups.



## LANGERHANS CELL HISTIOCYTOSIS IN PEDIATRIC AGE: THE ESSENTIAL ROLE OF THE DENTIST IN EARLY DIAGNOSIS OF A RARE PATHOLOGY

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**Aim.** Langerhans Cell Histiocytosis (LCH) constitutes a rare proliferative disorder in which the central cellular element shows histopathologic and immunophenotypic features referable to Langerhans' cell. LCH substitutes the old term Histiocytosis X in the current WHO/Histiocyte classification, and includes the three clinical designations known in the past as Eosinophilic granuloma, Abt-Letterer-Siwe disease, Hand-Schuller-Christian disease. LCH have an incidence of 0.45-0.54 cases out of 100000 children from 0 to 15 years. Lesions localized on the skin, oral mucosa or bones of the head and neck region have been observed in more than 80% of cases. According to the literature, the incidence of oral lesions ranges from 10% to 40% of cases, while in around 13% of patients oral lesions represent the first appearance of the pathology. The aim of this work is to study oral lesions as first clinical appearances in LCH patients.

**Materials and methods.** This multicenter study was carried out by the Department of Pediatric Dentistry and the Department of Pediatric Oncology of Sapienza University of Rome and Interdisciplinary Department of Medicine, Aldo Moro University of Bari. Forty-five (45) patients affected by LCH, whose age was between 0 and 19 years at the time of the diagnosis, were enrolled in our study. Oral LCH manifestations were analyzed as a function of the number of lesions, of their localization, of the affected tissue, and of the examination of their clinical, histological and radiographical features. Evaluation of patients' response was performed via laboratory and radiographic exams every 4 weeks. Patients were not assessed by the same clinician at each follow-up evaluation and therefore inter-examiner or intra-examiner variability had a little chance to significantly alterate the results. Radiographic exams considered in our study were Rx cranium, lateral skull x-ray, panoramic radiography, cranial CT scan, head and neck Nuclear Magnetic Resonance (NMR) and scintigraphy of bone with technetium. Histological evaluation was performed dividing the samples into 2 different groups: A group and B group. In A group the evaluation was performed by optical microscopy on formalin 10 % fixed, paraffin embedded specimens with traditional histological stains (HE, PAS et all.) and immunohistochemical stains. In B group the evaluation was performed by electron microscopy on osmium fixed, plastic embedded semthin sections and toluidine blue stain.

**Results.** Our study considered a 45 patients (26 males and 19 females) sample whose mean age was 4.8 ±3.8 years (median=3.9 years range 0.8-14.1 years). Oral manifestations were the initial symptoms of the pathology in 8 patients, representing 17% of the early lesions seen in all participants. Considering only the cases of oral complications, these early lesion represented 50% of all symptoms. In 81% of cases mandible has been the first localization of lesions, which were observed with higher frequency in the posterior sectors, especially in the molar areas. Outbreak symptoms of LCH were divided according to their localization in: gengival, mucosal, periodontal, bone, lymph nodes, skin and other lesions at first presentation.

**Conclusions.** LCH is a rare disease typically diagnosed in children. Its clinical outbreaks and initial phase may be highly variable and ambiguous, often making early diagnosis difficult. Our clinical observations have shown that in pediatric dentistry it is possible to obtain a tempestive diagnosis of LCH recognizing the initial oral lesions which characteristically appear in two ways: as swelling, with or without pain, located in the posterior areas of the jaws in absence of any teeth infections; as severe parodontal lesions unconnected to the area affected. The early diagnosis is important to increase the efficiency of treatment and to improve the prognosis.





### LASER THERAPY IN TONGUE-TIE TREATMENT: A CASE REPORT

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**Aim.** The lingual fraenum is a fibro-mucosal fold that connect the ventral surface of the tongue and the mucosa of the oral pavement. An erroneous process of cellular death can cause an excessive shortness of this structure; in these cases the tongue adhere at the oral pavement because the cells of the fraenum that join the two embryonic structures don't succumb to the planned death that normally occurs. When this malformation reveals itself, we can talk about short lingual faenum or tongue-tie or ankyloglossia. The aim of this case is to show how, the use of a Diode laser in tongue tie therapy, is safe and effective and how its treatment cause an immediate improvement of the speech and deglutition.

**Materials and methods.** The patient is a 10 y.o. girl in late mixed dentition with a Class IV in Kotlow's classification (Complete ankyloglossia: less than 3 mm) that has phonetics and swallowing problems. We used a Diode Laser (830 nm, 3W) with a little bit of local anesthesia. After using Laser we don't suture the tissues and the patient follow a selective diet and aminogam for the further week.

**Results.** The images shows that the procedure is safe and simple to obtain an immediate result. We saw the patient 2 months later to follow the result and its maintenance. Besides we also analyze the speech and deglutition with specific tests that showed an immediate improvement of the two capacity and their improvement two months later thanks to the help of a logopedic therapy. The patient however had no pain during and after the laser therapy and no bleeding was observed during and after this intervention.

**Conclusions.** Even if surgical technique are yet safe and efficacy to obtain a good result, the use of laser is safe and simple and it allows us to solve faster the problem of tongue tie because there is no or few bleeding. However we can also say that the associated therapy (laser assisted and logopedic) cover a fundamental role in the resolution of the related problems (such as phonetics or deglutition problems). And this results appear to be stable and safe in time.



### LATE APEXIFICATION IN A NECROTIC DENTAL ELEMENT WITH IMMATURE ROOT APEX AND PERIAPICAL LESION: CASE REPORT

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**Aim.** The root apex of teeth ends his development over the three / four years after the eruption. This is due to the presence of pulp tissue and mesenchymal stem cells that reside in the apical papilla. Immature permanent teeth, which met pulp necrosis as a consequence of a trauma occurred during their development, as in the case discussed, they have an incomplete root development and physiological closure of the apical foramen. In these cases, treatment includes a check for infection and the creation of a calcified apical barrier that allows us to make a traditional closure of the root canal. This treatment is defined Apexification and it is obtained through the use of calcium hydroxide or MTA. The aim of this document is to describe a case of Apexification conducted, for a patient 15 years old, on a permanent maxillary central incisor that due to a traumatic sports event occurred 7 years before, without causing any clinical signs or symptoms, has determined necrosis before it was completed root formation.

**Materials and methods.** Male patient, 15 years old, coming at our attention because of a trauma on a permanent maxillary left central incisor. Afterwards clinical and radiographic examinations and vitality tests, patient showed necrosis of the element with slight mobility. At the same time it has been noticed necrosis of a permanent maxillary right central incisor with periapical lesion and immature root apex. From the case, we noticed that patient had an additional trauma without any symptoms he was 8 years old. We proceed to root canal treatment of teeth using Ni-Ti rotary endodontic files PROFILE®, that allow us a non-aggressive shape of thin and fragile walls of the roots, 5,25% sodium hypochlorite such as irrigating solution and dressing with calcium hydroxide paste for a permanent maxillary left central incisor, which in a second session was performed root canal closure for, using thermo-plasticized gutta-percha technique and direct composite coronal reconstruction. The right incisor has been dressed with pure calcium hydroxide powder, which has been then replaced and checked at regular intervals for 18 months

**Results.** Although there has not been a physiological closure of the root apex, treatment with shaping, cleaning and intermediate dressing with calcium hydroxide for that necrotic tooth with immature apex, it led to the formation of a type 3 closure apical, according to the classification of Frank, with total resolution of symptoms, complete healing for the apical lesion and the possibility of three-dimensional obturation of the root canal.

**Conclusions.** The use of calcium hydroxide in the treatment of Apexification allowed us to obtain, moreover the regression of the apical lesion, a calcified apical barrier even in a dental element that exceeded physiological development's timings. Checking results 1 year later, it was confirmed the success of the treatment.



### MULTIDISCIPLINARY APPROACH IN AGENESIS GROWING PATIENT: CASE REPORT

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**Aim.** Multidisciplinary approach is required in hypodontia growing patient treatment, where more than 4 or 5 permanent teeth are missing. The main objectives in the management of any hypodontia case are to preserve all deciduous teeth where permanent teeth are missing, to correct dental and skeletal malocclusion and to improve esthetics and restore masticatory function. Treatment planning depends on: severity of hypodontia, severity of skeletal and dental malocclusion, patient age, dental development stage, patient's compliance to a long duration treatment and socioeconomic status.

**Materials and methods.** The patient, a girl aged 11, presented late mixed dentition. Radiographic examination confirmed that 7 teeth were developmentally missing: teeth 11, 15, 17, 24, 25, 35, 45. The patient shows also an association between hypodontia and microdontia: diastemas were present between central and lateral upper incisors on both sides. Oral hygiene and gingival status were good. A cavity was found on 65 tooth (grade ICDAS IV). Orthodontic diagnosis revealed class I molar relation and class II canine relation, increased OVJ and OVB.

Treatment plan was made of three stages:

1. Orthodontic treatment: a fixed orthodontic appliance was used to correct the dental malocclusion and to align the teeth in preparation for later prosthodontic care. At debonding time both arches were correctly aligned, with coincident midlines. Normal buccal and incisor relations were restored. The OVJ and OVB were normalized.
2. Advanced Restorative treatment: pulpotomy procedure on 65 tooth with MTA medication and definitive composite reconstruction
3. Prosthetic treatment: six lithium disilicate veneers were placed to rehabilitate the esthetic area of the upper dental arch. The prosthetic treatment stage evaluates parameters of dento labial analysis including lip at rest, incisal curve versus lower lip, smile line, smile width, labial corridor, upper incisal line versus midline, and occlusal plane versus commissural plane/horizon.

**Results.** Clinical and radiographic postoperative follow up examination after 1 -3-6 months shows the success of therapy and the no sign of suffering.

**Conclusions.** Multidisciplinary consultation during treatment planning and appropriate timing of subsequent interdisciplinary dental care enables the clinician to provide the optimum care and to improve patient's life quality and self awareness. Orthodontic, restorative and prosthetic management of hypodontia in growing patients permits optimum control of the developing occlusion, in order to plan, whenever necessary, in early adult age, implant prosthetic intervention.



### NATAL AND NEONATAL TEETH: MANAGEMENT AND REPORT OF A CASE

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**Aim.** Teeth may be present at or shortly after birth. Teeth present in newborns have been called natal teeth; those arising within the first 30 days of life are called neonatal teeth. The purpose of this paper is to discuss their clinical features and management. Then, we report here a case of natal teeth in an infant.

**Materials and methods.** An overview of the literature on the current information on this topic and on the treatment modalities available for the management of this condition was carried out. In addition, a case is described in which a 3-months-old female child was referred by her pediatrician to our Unit of Pediatric Dentistry of the "Sapienza", University of Rome, for one natal tooth in the mandibular incisor region and ulcerative lesion on the ventral surface of the tongue.

**Results.** According to the literature, natal and neonatal teeth are rare phenomena. In fact, the incidence of natal and neonatal teeth ranges from 1: 2,000 to 1: 3,500, being natal teeth three times more common than neonatal teeth. The presence of natal teeth is due to several factors, systemic and local, congenital and acquired, which alter the correct chronology of eruption of the teeth. This condition occurs most commonly in the mandibular region of the central incisors, followed in descending order by the maxillary incisors, by the mandibular cuspids or molars, and by the maxillary cuspids or molars. There is no difference in prevalence between males and females. The radiographic examination is essential to differentiate the premature eruption of a primary deciduous tooth from a supernumerary tooth. More than 90% of natal and neonatal teeth are prematurely erupted deciduous teeth, whereas less than 10% are supernumerary. The supernumerary teeth should always be extracted, but the decision to extract a premature primary tooth should be done according to scientific knowledge, mobility of the tooth, local or general complications and parental opinion. A major complication from natal/neonatal teeth is ulceration on the ventral surface of the tongue caused by the tooth's sharp incisal edge. This condition is also known as Riga-Fede disease. Although the aspect of the lesion might be impressive, its nature is relatively benign, and the history and clinical features are generally so typical that there is seldom a need for additional histopathological examination. Other complications from natal/neonatal teeth are linked to the possibility of swallowing/aspiration and injury to mother's breast and inconvenience during suckling.

**Conclusions.** Although their occurrence is rare, it is still possible for dental practitioners to encounter natal and neonatal teeth in their daily practice. It is therefore important for dental practitioners to be able to make a swift and correct decision about the possible extraction of natal/neonatal teeth by developing a proper management of the case. Babies with posterior natal teeth should be investigated for other systemic conditions that may be associated with syndromes or other diseases.



### NEW EXPERIMENTATION OF PREVENTION NOT ONLY TRAUMATIC IN THE USE OF MOUTHGUARD IN YOUNG ATHLETES

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**Aim.** Establish the criteria for the realization of an ideal mouth guard, comfortable and easy to use in any sportive situation for young athletes, whilst trying to improve the performances of these ones. To create a device capable to protect from traumas and able to grant a psychological security to the young athlete without interfering with the performance. This device would be able also to prevent oral pathologies with the help of preventive substances insertable into the mouthpiece.

**Materials and methods.** 14 young athletes practicing different sports as test group and 12 patients as control group, they were selected from patients afferents to the Unit of Pediatric Dentistry, Department of Medical, Oral and Biotechnological Sciences, University of Chieti. Every patient received a self-administered questionnaire to obtain data concerning pathological complete history, a history of oral hard and soft tissues, a family history, oral hygiene practices, snacking habits and fluoride intake and everyone provided an informed consent. A complete clinical analysis were performed on each subject and data regarding oral health, presence or absence of malocclusion and brushing habits were recorded. At the same time sample of saliva and plaque was collected to be analyzed (T0). After this it were registered waxes and fingerprints of every patient to realize the individual mouthguard. The devices were delivered and tested in the patient's mouth and then casein was applied into the mouthguard. Three months after delivery each patient was re-visited and new samples were taken (T1).

**Results.** At T1 the test group showed an increased amount of stimulated saliva and the salivary buffering capacity was improved in a statistically significant way. At the same time the ph baseline has suffered an increase not statistically significant. The other recorded parameters did not change worthy of note. Control group underlined no significant changes in their data. Even in some of them some parameters showed a worsening not statistically significant.

**Conclusions.** The use of casein in individual devices could prevent the the onset of changes in the environment of the oral cavity, improving the salivary buffering capacity and the amount of saliva strengthening the capacity of the patient at the self cleaning of dental surfaces. This substance could prevent the change of the salivary bacterial flora, impeding the progression of demineralization provided by bacterial acids. The appliance of these substances, as casein, could lead the clinician to a realization of a preventive protocol to avoid the onset of dental caries in young athletes using the individual mouthguard. The device used in this way could represent a new approach to the future for the dentist and for his entrance in the world of the sport as active figure.



## ODONTOBLASTIC CELL QUANTIFICATION AND APOPTOSIS WITHIN PULP IN DECIDUOUS TEETH

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**Aim.** The dental pulp not only provides nutritional and sensory properties to dentin but also has its own reparative capacity. This potential has important implications for dental therapy. Dentinogenesis has been extensively studied to comprehend the development and mineralization of this connective tissue. The odontoblast ability to respond to injury and up-regulate its secretory activity leading to deposition of reactionary dentin is well-established. No cell renewal is present and the odontoblasts have to survive the injury. Moreover, surviving odontoblasts secrete reactionary dentin and no other pulp cells are involved. Otherwise, reparative dentinogenesis, the intensity of the injury results in odontoblasts death and cell renewal by a new generation of odontoblast-like cells, that may differentiate from progenitor cells and secrete a reparative dentin matrix. Since reparative dentinogenesis may start after the elimination of damaged odontoblasts, it is noteworthy to understand the death regulation of odontoblasts. Moreover, the number of odontoblasts decline with age and the apoptosis, as programmed cell death, has been implicated in this biological process. There are several findings confirming that apoptotic cell death play a role during tooth development and in repair-related tooth remodelling such as injured pulp, in permanent teeth. However, there is a lack of knowledge in the understanding the apoptotic mechanism in odontoblasts of deciduous teeth and their potential response to pulp injuries. Aim of this study was to compare the odontoblast physiological activity between deciduous teeth (DT) and permanent teeth.

**Materials and methods.** Dental pulp was obtained from forty-two deciduous teeth (DT) and twenty-seven permanent teeth (PT) extracted from sixty-five patients (aged 6-16 yrs). All patients, including the parents of minor children, gave informed consent to the treatment procedure. Histomorphometry was carried out and the quantification of odontoblastic layer was assessed. Dental pulps of deciduous teeth (DT) and permanent teeth (PT) were stained for anti-ssDNA, BCL-2, BCL-x, BAX. Sections only from deciduous were immunostained for activate caspase3.

**Results.** Pulp from deciduous teeth (DT) are characterized by absence of odontoblastic layer and greater occurrence of apoptotic odontoblasts. Pro-apoptotic BAX phenotype expression on odontoblasts correlates with the occurrence of numerous activated caspase3 odontoblasts in deciduous teeth DT.

**Conclusions.** According to these results Authors hypothesize a lower reparative activity in the odontoblasts of deciduous teeth (DT).



### ODONTONGENIC TUMOURS OF CHILDHOOD AND ADOLESCENCE: EPIDEMIOLOGICAL ANALYSIS AND SURGICAL MANAGEMENT OF THIRTY-FOUR PATIENTS

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**Aim.** The odontogenic tumours (OTs) are an unusual group of lesions of the jaws derived from tooth forming apparatus and its remnants. OTs were categorized into three groups based on WHO 2005 classification: group 1 OTs originated from odontogenic epithelium with mature, fibrous stroma without odontogenic ecto-mesenchyme; group 2 OTs derived from odontogenic epithelium with odontogenic ecto-mesenchyme, with or without hard tissue formation; group 3 OTs originated from mesenchyme and/or odontogenic ecto-mesenchyme with or without odontogenic epithelium. More common in pediatric age and adolescence than in adult age, the OTs can be observed casually or after the appearance of non-specific symptoms as painless swelling, so appropriate diagnosis requires radiographic and histopathological analysis. The aim of this study was to report the cases of 34 patients affected by OTs in order to examine the relative frequency of OTs in childhood and adolescence, as well as to describe the surgical management of these patients.

**Materials and methods.** In the period between 2006 and 2014, 34 patients, 14 females and 20 males, with 54 lesions came to our attention to the Odontostomatology Unit of University of Bari. Nine patients, affected by Naevoid basal cells carcinoma syndrome (NBCCS), showed 29 Keratocystic Odontogenic Tumours (KOT); three patients exhibit sporadic KOT; nine OTs were diagnosed as complex odontoma and nine as compound odontoma, two patients were affected by odontogenic fibromyxoma and two by ameloblastic fibroma. Only few cases were associated with non-specific clinical symptoms. Diagnosis had been suggested by conventional radiography and CT, in which each lesion appear as its characteristic radiological features. A certain histological diagnosis was achieved with Fine Needle Aspiration Biopsy (FNAB). KOT, although considered as benign, are locally aggressive lesions, so they were treated with a marginal resection comprehending healthy bony margins and involved teeth. Other OTs, because of their less aggressive behaviour, were treated with local excision and bony curettage. For guarantee the bony regeneration a gel formulation of sodium hyaluronate added to four synthetic amino acids (glycine, leucine, proline, lysine) was used. Surgical samples were sent for histological examination.

**Results.** The mean age of occurrence was 13.5 ( $\pm 5.5$ ) years (range 3-20 years); odontoma with 53% of cases was the most common odontogenic tumour followed by KOT (35%), odontogenic fibromyxoma (6%), and ameloblastic fibroma (6%), no case of malignant odontogenic tumour was seen in this series. After surgical treatment we noticed the healing of all the lesions and an optimal bone regeneration in less than one year; recurrences occurred only in 4 patients affected by NBCCS.

**Conclusions.** Head and neck tumours rarely affect young people, but OTs are relatively frequent. In our study the most frequent one is odontoma, followed by KOT. Early diagnosis achieved with FNAB allows a correct surgical management depending on the tumour behaviour. The use of gel guarantee a fast bony healing and regeneration.



### ORAL HEALTH INEQUALITIES IN ITALIAN SCHOOLCHILDREN: A CROSS-SECTIONAL EVALUATION

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**Aim.** To evaluate which of the following indicators of socio-economic status (SES) has the strongest association with dental caries status in a 6-years-old population: the educational level of each parent (individual-level); the mean price of housing/m<sup>2</sup> in the area where the family resides; or the mean per capita income in the area where the family lives (area-level).

**Materials and methods.** The study was carried out in Sassari and in nine small surrounding towns. Dental caries was recorded in 2,040 schoolchildren (42.5% boys, 57.5% girls) using decayed/missed/filled surface index (dmfs) at d<sub>3</sub> level in primary dentition. Parents filled in a standardized questionnaire regarding nationality, level of education, frequency of dental check-up, child's previous experience to dentist, perception of child's oral health and child's oral hygiene habits. In data analysis, Sassari (mean income €24,373) was considered an urban area, while the mean income of the nine surrounding towns (mean €19,468) was considered typical of a non-urban area. Descriptive statistics and cross-tabs were calculated to investigate the relationship between dental health and different risk factors. Next, a multilevel mixed Poisson regression was performed to determine which SES indicator, at individual- or area-level, fits better with caries disease. Finally, a multinomial logistic regression was performed using caries severity levels as the dependent variable.

**Results.** At the individual-level of SES, mothers' educational level was associated with their children's caries severity ( $\chi^2_{(9)}=147.51$   $p<0.01$ ): as educational level rose, the proportion of children with high numbers of carious lesions fell. Multilevel Poisson regression (mixed effects) has shown that mothers' education was the only indicator significantly associated with the caries level. The two income indicators (area-level SES) were not associated. A multinomial logistic regression model was run for caries risk factors. Caries severity was used as dependent variable and the model was stratified by mothers' educational level. Mothers' perception of child's oral health was the only covariate that was always associated in each caries severity stratum and for all levels of mothers' education. The frequency of child dental check-up, namely the presence of tooth pain, was statistically associated with the highest caries figures in two levels of mothers' education: compulsory and secondary.

**Conclusions.** The present study shows that the individual-level indicator of SES, mother's educational level, is a useful SES measure of caries in children in a low-income population; meanwhile area-level income indicators have not proved useful when economic disparities in the population are quite reduced.





#### ORAL MANAGEMENT OF PEDIATRIC ONCOLOGICAL PATIENTS: A REVIEW OF THE LITERATURE

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**Aim.** Progress in the treatment of children's cancer has led to long-term survival rates of up to 90% for some tumors. Nevertheless, it is a condition that dramatically worsens the quality of life of children and their families. Not only the disease affects the whole organism, but also the treatment administered, such as chemotherapy and radiotherapy, however effective, interferes with its physiological functioning. Aim of this review of the literature is to analyze oral complications of cancer in pediatric patients, and evaluate the guidelines proposed with regard to their oral management.

**Materials and methods.** Pubmed was accessed to search for all relevant articles published between 1991 and 2013, using a combination of controlled vocabulary, and 10 publications were selected for the review following inclusion and exclusion criteria.

**Results.** Literature refers to a higher incidence and severity of acute oral diseases in pediatric oncological patients, such as mucositis, buccal ulcerations, herpetic infections, candidiasis, gingival bleeding and cheilitis, due to the accelerated cell kinetics and the treatment administered. Chemotherapy-related myelosuppression causes infections, prolonged bleeding, mucositis and ulcerations. These conditions are more frequent in situation where caries, gingivitis and poor oral hygiene are already a problem. Bone anomalies, damage to the salivary glands, dental agenesis, microdontics, tooth enamel defects may be present to a greater extent than in a healthy population; this is especially true for dental malformations at root level, crowns and the presence of rudimentary teeth. These manifestations are influenced by the type of treatment (chemotherapy and/or radiotherapy in the maxillo-facial area) and the age of the patient (therapy in the first years of life). A correlation between the time when the treatment is started and the beginning of mineralization in the affected teeth was observed. Xerostomia and/or generalized stomatitis appearing months after an allogenic bone marrow transplant may be the only indicators of chronic Graft-versus-Host Disease. Therefore, it is advisable to use oral prevention protocols, which may serve as a guideline for dentists before, during and after oncological treatment. Before oncological treatment, all children should be evaluated by a pediatric dentist and the necessary care should be performed, when possible, prior to cancer treatment. During oncological care, routine control visits are effective in reducing frequency and gravity of oral sequelae of cancer treatment. After the treatment has been completed, children should be controlled every three months in the first year, and every six months thereafter. Pediatric oncological studies demonstrate the importance of such programs for diminishing the occurrence and severity of oral alterations in children, based on the mechanical control of plaque, a controlled diet and the use of substances such as fluoride, saline bicarbonate solutions or chlorhexidine. The Authors report an emblematic case of a pediatric patient who had a significant necrosis of the maxilla due to a supra-infection caused by immunosuppressive chemotherapy used to treat an acute lymphoid leukemia (ALL) in 1985. No attention, in fact, was given to the patient's oral health during cancer treatment. Over a follow-up of 25 years, the consequences of bone necrosis were several reconstructive surgical interventions, disproportionate growth of the maxilla and mandible and the need for prosthetic rehabilitation.

**Conclusions.** The pediatric cancer patients can greatly benefit from the collaboration of pediatric dentists with the units of pediatric oncology, in terms of improvements and maintenance of oral health, and therefore an improvement in the quality of life.



### ORTHOPEDIC AND ORTHODONTIC MANAGEMENT IN A PATIENT WITH DIGEORGE SYNDROME AND FAMILIAL MEDITERRANEAN FEVER

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**Aim.** The DiGeorge Syndrome (DGS) is a rare disease (incidence 1:4000) which exhibits an expansive phenotype with more than 180 clinical features involving almost every organ and system. The major symptoms include congenital heart disease, particular conotruncal malformation, characteristic face, palatal abnormality, immune deficiency (system T-cell deficiency due to thymic hypoplasia), hypoparathyroidism and cognitive or behavioural disorder. Its minor features involve growth retardation, neonatal hypocalcemia, feeding difficulty, hearing loss, limb deformity, and so on. The penetrance of each clinical feature is different; no single phenotype occurs in all patients and none is mandatory. Only about 5–15% patients inherit the disease from parents, while most of them are sporadic (de novo) due to a heterozygous deletion of the long arm of chromosome 22 at position q.11. Familial Mediterranean Fever (FMF) is an autosomal recessive hereditary disease due to MEFV mutations that most commonly occurs in multiple populations from the eastern Mediterranean basin, particularly Jews, Armenians, Turks, and Arabs. FMF is characterized by short recurrent bouts of fever and localized inflammation usually involving the peritoneum, pleura, joints or skin. The MEFV gene, which is located on the short arm of chromosome 16, encodes a protein termed pyrin or marenostrin. The pyrina / marenostrina is a basic protein of 781 amino acids which seems to be the control (downregulator) of the mediators of inflammation. Therefore, in patients with mutations in the MEFV gene, you would have an altered pyrina not able to perform an adequate inhibition of the synthesis of IL1- $\beta$ , consequently prolonging the half-life and activity of the neutrophil chemotactic factor so as to allow a sufficient influx of neutrophils in the serous tissues and the subsequent release, degranulation and maintenance of the inflammatory process. The aim of our research is to describe a DGS case associated to FMN with facial abnormalities and dental anomalies, which has undergone orthopedic and orthodontic treatment in our Reference Centre for Rare Diseases.

**Materials and methods.** An 8 years-old boy with dysmorphic facial features (flat profile, hypertelorism, narrow palpebral fissures, epicanthus, micrognathia, malformed ears) was brought to our observation and underwent to a complete clinical examination, genetic testing, biochemical and radiological exams. Anamnesis: signs of fetal respiratory distress, previous subdural hematoma surgically removed, recurrent episodes of fever, arthralgia, polyserositis, hepatosplenomegaly, chronic interstitial nephritis with hypertension, microproteinuria, normocytic anemia, hyperparathyroidism and secondary amyloidosis. DNA sequencing identified microdeletions on 22q11.2 and MEFV mutation. The patient has been subjected to different treatments with immunosuppressive agents (corticosteroids, methotrexate), colchicine, antihypertensive therapy, calcitriol, erythropoietin and low-protein diet. Intraoral examination: enamel hypoplasia of teeth, anterior and posterior cross-bite. Panoramic radiograph: unerupted 1.3. Lateral telerradiograph of the skull and cephalometric analysis: III dento-skeletal class, open-bite with an expectation of vertical growth. After cephalometric study, orthopedic treatment with rapid maxillary expansion was carried out. Then Fraenkel III and orthodontic treatment to recover the unerupted 1.3 and subsequent alignment was performed.

**Results.** The orthopedic-orthodontic treatment solved posterior cross-bite, improved the skeletal and dental relationship, and recovered the unerupted 1.3.

**Conclusions.** Literature does not describe cases of patients having DGS associated to FMN undergoing to orthodontic and orthopedic treatment. In this patient the treatment started early with timely management of orthopedic and orthodontic forces to reach positive and stable results also after 5 years follow-up.



### OSTEOGENESIS IMPERFECTA AND RAPID PALATAL EXPANSION: CLINICAL EXPERIENCE IN UOC OF PEDIATRIC DENTISTRY

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**Aim.** In the field of dentistry OI, can be described with direct involvements as, high significance of dentinogenesis imperfecta, high association with cranio-facial deformities (triangle-shaped face, temporal bones protrusions, prominence of the frontal bone) and malocclusions (anterior and/or posterior crossbites and posterior openbite), and non direct involvements, due to the use of bisphosphonates, which represent most common the therapy for this disease. These drugs, that regulate the bone reabsorption through the osteoclasts have been studied regarding the influence of orthodontic treatment. Although Bisphosphonates have been proposed as a possible factor able to influence the rate of orthodontic movement, no report are available in literature regarding their effects on orthopedic appliance therapy. Aim to provide documentary evidence the efficiency of the rapid palatal expansion in patients treated with bisphosphonates.

**Materials and methods.** we describe three of more than ten orthodontic-interceptive treatments took place in UOC of Pediatric Dentistry. The inclusion criteria adopted were: presence of trasversal palatal contraction just in the cases with a necessary use of rapid palatal expander; concomitant presence of malocclusion on the sagittal plane (II-III classes); long term follow up. We did not take into account screening factors for the cross-section choice, neither the age of the patients, nor the type of malocclusion. Patients presented to orthopantomography, lateral cephalogram, superior occlusal radiographies pre and post treatments, extra and intra-oral objective exams.

**Results and conclusions.** all patients show positive responses to treatment and we have encouraging results from the same treatment with patients with different ages. With these patients, we have decided to stop the pharmacological therapy (quarterly infusions of neridronate), agree with referential pediatricians, for the time of the palatal expansion and stabilization. Interceptive orthodontic method we have described can be a valid example for orthodontists, that begin a therapy with growing patients affected by Osteogenesis Imperfecta with dental and/or skeletal problems. It's clear that it's better beginning an orthodontic therapy with a child rather than an adult, so it's necessary operating promptly with a complex therapy during the growth. This study isn't a scientific procedure because of the restricted number of cases, but it's an example for the management of OI patients and in general of all young patients that take bisphosphonates.



### PALLISTER-KILLIAN SYNDROME: A CASE REPORT

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**Aim.** The aim of this study is to report the clinical case of an Italian patient affected by Pallister-Killian Syndrome (PKS), and to point out general and oral-cranio-facial characteristics and oral health's parameters of PKS.

**Materials and methods.** A girl affected by PKS was sent for counseling by Departments of Pediatrics, Policlinico S. Orsola-Malpighi in Bologna to Dentistry for Special Needs Patients Division, Biomedical and Neuromotor Sciences Department, University of Bologna. Family members answered a detailed questionnaire about dietary and oral hygiene habits, general anamnesis and medical and dental history. A complete extra- and intra-oral examination of the patient was performed in order to evaluate and to record facial features, dental formula, index of dental caries (dmft), abrasion and erosion, oral hygiene (plaque index of Silness and L oe.), health of periodontal tissues (community periodontal index), oral habits and malocclusions.

**Results.** The girl was from an Italian ancestry and was 7 years and 3 months old. The questionnaire's results showed that parents considered their daughter oral hygiene level good and that she complained dental pain/discomfort and halitosis occasionally; the frequency of daily tooth brushing was once a day; tooth brushing was performed using manual toothbrush and fluoride toothpaste; fresh fruit and vegetable consumption frequency was once a day; she did not consume habitually sweetened foods or beverages. The medical history revealed that the patient has severe mental retardation, seizure and respiratory disorders (bronchitis, pneumonia, asthma, sinusitis), VII coagulation factor deficiency, muscular hypotonia, hypothyroidism and gastroesophageal reflux. From dental history questionnaire resulted that the patient has been artificially suckled, her first deciduous tooth eruption occurred at 18 months and she has never been affected by dental pathology. Extraoral examination revealed specific facial features: flat profile, fronto-temporal alopecia, high forehead, sparse eyebrows and eyelashes, telecanthus, hypertelorism, hypotonic lips, mandibular prognathism and short neck. Intraoral examination showed that the patient was in primary dentition; dmft =1 (decay), enamel abrasion and erosion lesions, plaque index=2, community periodontal index =1 and gingival hypertrophy. The patient had oral habits such as finger sucking, bruxism and oral breathing. The visit performed by orthodontic specialist showed that the patient had strong prognathism and anterior open bite.

**Conclusions.** The PKS causes significant involvement of the oral-cranio-facial district, with peculiar characteristics. Lack of data in literature about PKS evidence the need to study more in depth this syndrome, its features and to carry out epidemiological studies on representative groups of patients affected by PKS.



#### PREVENTIVE TREATMENT OF POST-TRAUMATIC DENTAL INFRAOCCLUSION: THE DECORONATION TECHNIQUE

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**Aim.** In adolescents replanting teeth after traumatic avulsion can often evolve with the onset of ankylosis of the replanted tooth. The ankylosis is characterized by a gradual resorption of the root surface and a infraocclusion of the dental element involved. The ankylosis is always present in delayed dental replantations (that is made after two hours after the trauma), also younger the traumatized patient is, greater will be the severity of the dental infraocclusion at the end of the dento-alveolar growth, and consequently more complicated will be the replacement of the traumatized tooth with a dental implant. The aim of this paper is to describe what are the therapeutic methods that can prevent or alleviate this event that causes considerable aesthetic and functional deficits of the permanent tooth. For this purpose has been assessed how much the decoronation treatment is known and used by dental clinicians that operate in the pediatric area and what is the acceptance by patients who could benefit from this method.

**Materials and methods.** A large sample of dentists has been interviewed, these were interviewed in courses or master degrees in pediatric Dentistry topic. To these Dentists (100 subjects) were asked if they knew the decoronation treatment procedure. 80 of these didn't know the procedure and its scope of application; 20 subjects declared to know it but 15 of them have not been able to describe the techniques steps; only 5 have been shown to know the procedure and 2 of them declared to have used it in a few cases (5 in total). In our department in the case of diagnosis of dental infraocclusion the decoronation procedure is always proposed; very often, however, the temporary mutilation of the dental crown that this technique provides discourages young patient parents to give a consent to the execution of this method; only 20% of our patients accepts this dental infraocclusion preventive technique that generally gets good clinical results.

**Results and conclusions.** is evident that there is a considerable deficit of knowledge on the use and benefits of the decoronation post-trauma technique. This deficit needs to be filled with appropriate training before and after the degree, also require additional clinical studies that confirm the great potential of this technique in the field of dental trauma treatments in adolescence patients, also needs better information to users about the features and results obtained with this low risk intervention.



### PRIMARY HYPEROXALURIA: MULTIDISCIPLINARY TREATMENT

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**Aim.** Hyperoxaluria (PH) is a rare metabolic disorder characterized by excessive urinary excretion of oxalate and by calcium oxalate deposits (oxalosis) localized predominantly in the kidney, but also in the bones, thyroid, myocardium, blood vessels, and skin. Oxalic acid is an end product of the metabolism of ascorbic and glyoxylic acid. Most of oxalic acid (80-90%) is of endogenous origin but there is also an exogenous share related to food intake (spinach, cocoa, tea, beets, rhubarb, tomatoes). Hyperoxalurias can basically be classified as primary due to genetic enzyme deficiency inherited in an autosomal recessive way and secondary caused by excessive intake of oxalate or its precursors or ascorbic acid, vitamin B6 or pyridoxine deficiency, increased intestinal absorption (Crohn's disease, celiac disease, ileal resection, pancreatic insufficiency), repeated use of oral antibiotics leading to the elimination of oxalate, occupational exposure from both oxalic acid (workers exposed to detergents and bleaches) and ethylene glycol (general anesthetic), and during hemodialysis. Two different types of primary hyperoxaluria are described on the basis of different hepatic enzymes involved in glyoxylate metabolism (PH1, PH2). The accumulation of calcium oxalate can result in recurrent kidney stones and parenchymal and kidney damage at the final stage. Calcium oxalate crystals can be deposited in oral tissues, in the alveolar processes of the jaw bones, in the pulp, and in the dentin, with onset of atypical toothache in periodontal tissues with severe periodontal disease, external root resorption, and rapidly progressive tooth mobility. The aim of our study is to describe a case of a patient with PH1 who underwent liver and kidney transplant with facial dysmorphism and dental anomalies.

**Materials and methods.** A 9 year-old boy with facial dysmorphic features suffering from PH1 was brought to our attention. The patient underwent to a complete clinical examination, biochemical and radiological examinations. Anamnesis: patient dialyzed from age of 3, transplanted (liver and kidney) at 5 and 7 years, and undergone to cochlear implant for occurred iatrogenic deafness by drugs. Patient under immunosuppressive therapy (cyclosporine, mycophenolate mofetil), calcitriol, Sodium Bicarbonate, food supplements based on K and Mg, and monthly antibiotic therapy. Intraoral examination: diffuse hypoplasia of the enamel and dental relationships of class III. Rx-OPT: absence of external root resorption or periodontal and bone lesions. Lateral telerradiograph of the skull and cephalometric analysis: III dento-skeletal class ratio, deep bite with an expectation of horizontal growth. After appropriate assessments, orthopedic treatment with application of mask Delaire and following orthodontic treatment for dental alignment was performed. Due to the presence of gingival hyperplasia because of cyclosporine, laser-assisted gingivectomy was carried out.

**Results.** Orthodontic treatment solved the third class, and the laser-surgery solved the iatrogenic gingival hyperplasia.

**Conclusions.** Literature does not describe cases of patients having PH1, transplanted and undergone to orthodontic treatment. In fact, this requires a careful medical history, early intervention, careful dento-periodontal evaluation, good oral hygiene, and timely management of orthopedic treatment and orthodontic forces to reach positive and stable results.



#### PRIMARY IMPACTION OF PRIMARY TEETH: A LITERATURE REVIEW

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**Aim.** Primary impaction of primary teeth is a rare event. It has been reported in literature with an incidence of 1:10000 cases, affecting almost always second molars. In primary impaction, the primary tooth not only never appeared in the oral cavity, but it is also always covered by a more or less thick layer of bone. This condition should be distinguished from the secondary impaction, the latter is more common and consists in a cessation of eruption of a tooth after initial emergence. The criteria for a correct diagnosis of primary impaction of primary teeth are: a) deep retention into the bone; b) absence of caries or restorations of the crown; c) no resorption of the roots; d) frequent passing of the corresponding permanent tooth; and e) possible retention or malposition of the corresponding adjacent tooth. The aim of this paper is to present a systematic review of the literature that was for evaluating epidemiology, etiology and different treatment procedures of the primary impaction of primary teeth.

**Materials and methods.** Detailed search strategies were developed in order to identify studies considered for this review, using a combination of MeSh Terms and free text terms. The following electronic databases were searched: MEDLINE, SCOPUS Elsevier and ISI-Web of Science. The considered studies met the following criteria: published between 1980 and 2013 and describing a primary impaction of primary molars in the absence of mechanical obstacles or systemic condition.

**Results.** 15 studies were included in the literature review: 12 articles were Case Reports and 3 Narrative Reviews. Moreover, only 7 articles were published in impacted journal. In all the studies, the impacted deciduous tooth was a second molar, with a prevalence of the second right inferior molar. Symptoms were absent in almost all cases (26 out of 27 patients) and only a few Authors suggested possible etiological factors. As regards the treatment, a surgical extraction of the impacted deciduous tooth was preferred by most of the Authors; however, follow-ups to verify the corresponding permanent tooth eruption were not performed in almost all studies.

**Conclusions.** More studies are necessary in order to achieve a diagnosis and treatment protocol for the primary impaction of primary teeth. However, some considerations are clearly defined: the primary failure of eruption of primary teeth may have several effects on the developing dentition which include malformation, impaction or ectopic eruption of the succeeding tooth. A long delay in the eruption time of a primary tooth should alert the dentist for a possible primary impaction. After clinical and radiological examinations essential for a correct diagnosis, parents should be informed about possible effects on the developing dentition.



### RETROSPECTIVE STUDY ON INTRUSIVE LUXATIONS IN DECIDUOUS DENTITION

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**Aim.** Intrusive luxations are the most common dental trauma during early infancy. They amount to about 30% of all dental alveolar trauma of Children with ages ranging from 1 to 4 year-old. In literature there is no uniformity of views in the treatment of these injuries. Our retrospective study aimed to evaluate, among a large number of patients, resolutions obtained with respect to the types of treatment adopted in accordance with the protocols of most common use

**Materials and methods.** The study population consisted of 150 patients aged between 1 and 4 year-old who attended the Dentoalveolar dental trauma study Centre of the University of Cagliari, between 2006 and 2013 because of a traumatic injury of their primary upper anterior teeth. In this group were selected 60 patients (90 teeth) who were involved specifically in intrusive luxations.

**Results.** Spontaneous re-eruption was observed in 20% of cases, while in over 60% of cases the adoption of local domiciliary assisted operations it has determined a partial or complete dental repositioning. About 20% of the total cases had no repositioning of the intruded teeth (spontaneous or induced).

**Conclusions.** In intrusive luxation primary teeth management, the adoption of local domiciliary assisted operations resulted a more successful rate compared to a behavior of "watchful waiting Therapy". These data are coherent with the most recent international literature.





### SEALANT IN PERMANENT FIRST MOLARS IN CHILDREN AT HIGHT RISK OF TOOTH DECAY: EVALUATION OF FISSURE SEALANTS RETENTION FOLLOWING TWO DIFFERENT ISOLATION FOR CARIES PREVENTION: TWO YEARS CLINICAL TRIAL, PRELIMINARY RESULTS

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**Aim.** The specific aim of this study was to evaluate the retention of fissure sealants applied with 2 different kind of isolation, through a prospective study of the health status of the treated teeth.

**Materials and methods.** 20 children, 10 male and 10 female aged from 6 to 9 years, having all four molars fully erupted and caries free, were consecutively treated from June to July 2013 using a chemically initiated tinted fissure sealant. This was placed following 2 different methods in every child, for a total of 80 sealed molars, 40 for each technique:

- Technique for four hands: cotton rolls isolation; cleaning of occlusal surface using a bristle brush and non-fluoridated paste; etching with 35% orthophosphoric acid for 30 seconds.
- Technique for two hands: rubber dam isolation; cleaning of occlusal surface using a bristel brush and non-fluoridated paste; etching with 35% orthophosphoric acid for 30 seconds.

Clinical analysis of the changes of fissure sealants was programmed by controls every 6 months for 2 years. Furthermore, frequency and modality of oral hygiene and eating habits were investigated. Results were statistically analyzed using Chi-square test.

**Results.** All seals are intact at the time of follow-up (6 months). Non significant difference were detected.

**Conclusions.** Pit and fissure sealants are a valide preventive approach, that can be applied with similar results both isolating with rubber dam or cotton rolls.



### SEDATION WITH NITROUS OXIDE AND ITS USE IN PEDIATRIC DENTISTRY

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**Aim.** The aim of this poster is to review the current dental and medical literature related to nitrous oxide use in pediatric dentistry. By mentioning advantages, disadvantages and guideline for nitrous oxide sedation, a clear understanding of the method could be achieved.

**Materials and methods** Various publications that are in favor or against the method are examined, including the guidelines for the procedure and its acceptability. Recommendations provided by researchers and clinicians, and based on expert and/or consensus opinion, represent the supporting factors. Comparisons with other types of sedation methods yield important considerations to the usage of nitrous oxide sedation in pediatric dentistry.

**Results.** Nitrous oxide sedation, compared with other sedation techniques such as oxygen sedation, have many advantages as well as disadvantages. However, correct diagnosis, patient selection and strict protocol are mandatory.

**Conclusions.** The need and safety of nitrous oxide sedation in pediatric dentistry must be correctly evaluated. Once confirmed as the ideal sedation method for a given therapy, specific guidelines need to be followed both for a safe and effective producing analgesia technique, and for a clear pre-op communication between the patient and the health care provider.



#### SUB-GINGIVAL TOOTH FRAGMENT REATTACHMENT IN A COMPLICATED ROOT-FRACTURE: A CASE REPORT

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**Aim.** fracture of anterior teeth is a relatively common outcome of trauma to the teeth. If the fragments are recovered by the patient and brought to the dental office with reasonable time, into an appropriate storage medium, the fragments may be reattached to the remaining tooth structure. When the fracture extended subgingivally, and apical to the alveolar bone crest, invading the biological width, flap surgery may be needed to expose the root surface and reattach the fragment. We describe the case of 16 years old female patient who presented a complex dentoalveolar trauma with a complicated root-crown fracture, a non-complicated crown fracture and lateral luxation of the maxillary central incisors, in addition with a monolateral condylar fracture.

**Materials and methods.** the patients came to our attention few hours after the trauma. After the radiographic examination and urgency treatment with pulpectomy and  $\text{Ca(OH)}_2$  temporary medication, the patient was referred to the maxillofacial surgery unit for the evaluation of the condylar fracture. After obtaining the healing of the TMJ with functional therapy, we proceeded with the final endodontic therapy of the tooth and with the reattachment of the fragment. Since the fragment extended subgingivally and apical to the palatal alveolar bone, a flap was performed to expose the root face and proceed with the fragment reattachment after the isolation with rubber dam of the tooth. Hereafter other necessary conservative treatments were performed to the others fractured teeth.

**Results.** After a one year-follow-up, clinical and radiographic evaluation revealed periodontal health, a satisfactory aesthetic and normal function.

**Conclusions.** The clinician should clearly inform the patient about the limitations and prognosis of this treatment option. It's fundamental the knowledge about complicated root-crown fracture and its guidelines of the International Association of Dental Traumatology that suggests as gold standard treatment the orthodontic extrusion or surgical crown lengthening. However, as thought this case report describes, a more conservative approach is possible through an under-flap fragment reattachment. Trough this periodontal compromise we obtain a positive functional, biological and aesthetic result, saving for the future the orthodontic extrusion that would create an unfavourable crown-root relation of the tooth for its prosthetic rehabilitation.



### THE "ELFIN FACE": CRANIOFACIAL AND DENTAL ASPECT OF WILLIAMS-BEUREN SYNDROME

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**Aim.** The aim of this study is to review the published literature about the dental features of patients with Williams Syndrome, show the case of a 12- year- old male who presented for dental treatment and evaluate the relationship between the data detected during our patient's examination and those in the literature.

**Materials and methods.** An orthopantomogram, a posterior-anterior radiograph of the skull and a lateral cephalogram were carried out to assess the patient. The reference values were taken from IBO cephalometry, the patient's dental casts and extraoral photos of the patient were examined to perform orthodontic evaluation.

**Results.** The main features of Williams-Beuren Syndrome reported in the international literature are the following: small size of the anterior cranial base, deficient bony chin, increased mandibular plane angle, unusual proportion of upper to lower anterior facial height and posterior to anterior facial height. Although such results were statistically significant, authors have regarded these skeletal features as not dominant enough to be the hallmark of facial dysmorphoses. The most outstanding abnormality showed by our patient's orthopantomogram was the multiple agenesis of teeth 1.4, 1.5, 2.5, 3.4 and 3.5 with the corresponding persistence of deciduous teeth. Agenesis of 1.8, 2.8 and 4.8, whose dental buds were not yet visible, was also likely. The patient showed a 1<sup>st</sup> skeletal class with a correct vertical dimension and a predictable eugnathic growth. The posterior-anterior X-ray examination reported a skeletal symmetry within normal range. The analysis of the dental casts showed a bilateral 1<sup>st</sup> class molar and canine with an anterior cross-bite from 1.2 to 2.2. Dental midlines corresponded, overjet was negative (-3 mm) and overbite was reduced (1 mm). There was a general reduction of mesiodistal dimensions of upper and lower incisors with increased embrasure space.

**Conclusions.** From the analysis of these results we can infer that the studies carried out on dental aspects of Williams Syndrome are very few due to the low frequency of incidence. Often these studies were designed by the purpose to suggest a simple and cheap screening method, especially for the diagnosis of those patients who had reduced clinical symptoms. Actually both the cephalometric and the dental analysis do not show particular characteristics that could be used for diagnosis, as it is pointed out by the lack of correlation of some data found out in our patient with those in literature. On the other hand what has been highlighted is the increased frequency of some anomalies, such as multiple agenesis, excessive interdental spaces, abnormal dental shape and size which need a careful follow up of these patients in the early years. Furthermore the main problem which occurs during therapy is the lack of patient compliance which is necessary during any conservative, orthodontic or surgical treatment. Often these patients have severe malocclusions linked to skeletal problems that only a joint surgical -orthodontic treatment could solve, but their severe problems of general health, especially cardiovascular, often make it unfeasible.



### USAGE OF PROBIOTICS IN PEDIATRIC DENTISTRY FOR THE PRESERVATION OF ORAL HEALTH

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**Aim.** The aim of this review is to get to know the probiotics used for oral health preservation, their properties and mechanism in caries prevention, gingival and oral health. A brief description to fully understand the concepts of functional foods fortified with probiotics, prebiotics and synbiotics that are introduced to the biological science and their current uses in pediatric dentistry as well as general health considerations are to be discussed.

**Materials and methods.** Examination of various publications on probiotics, that include long term studies as well as laboratory researches reveal their features to understand their proper usage and indications.

**Results.** Probiotics are living microorganisms, principally bacteria, that are safe for human consumption and when registered in sufficient amounts, have beneficial effects on human health beyond basic nutrition; whilst prebiotics are non-digestible food ingredients that confer benefits on the host by selectively stimulating growth and activity of one bacterium or a group of bacteria to improve host health. They establish a microflora that maintains the normal functions of human body.

**Conclusions.** Probiotics that make a part of our daily nutrients, and can be as well be supplemented with other products are shown to have positive effects on oral health as well as other organs of human body preserving its natural microflora.



### USE OF DENTAL SEALANTS WITH AND WITHOUT FILLER: EXPERIMENTAL EVALUATION OF FOUR MONTHS

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**Aim.** A sealant is an organic polymer that flows in the cavity or in the slot and adheres to the tooth enamel surface, thanks to a mechanical retention. The purpose of the sealant is to provide a physical barrier between the enamel surface and the oral cavity, to prevent the bacteria to be gathered within cavities or dimples allowing the formation of caries. The basic requirements of an ideal sealant include: adhesion to enamel, ease of application, biocompatibility, low viscosity, low solubility in the oral cavity. This study was conducted in order to identify a product to perform sealing of good durability and effective in the prevention of caries lesions. The goal is to provide a valuable tool to make an informed choice in materials.

**Materials and methods.** We have selected 11 children aged between 6 and 12 years, regardless of caries index, plaque index and previous dental procedures performed. 5 patients were performed with the sealing material Clinpro 3M™ ESPE™ (Not filled) for a total of 16 teeth. For the other 6, sealings were performed with sealant UltraSeal XT® plus™ (highly padded) for a total of 16 teeth sealed. All seals were performed by the same operator and the technique has been used to work for four hands. We chose to perform a photographic control that allows to submit images of teeth sealed to multiple experts for the evaluation and to get more objective observational results. It was decided to carry out the photographic control, after 4 months of their application, according to the literature. The tooth examined at time 0 was compared with the tooth at time control without specifying which of the two was the initial photo and which the 4 months one, and also with which the sealing material had been performed.

**Results.** 19.5% of the seals regarded as most worn among those performed with the material Clinpro (unfilled) has been classified as belonging to the level 0 (pictures A and B were judged as the same for retention of the sealant), compared with 57 % of the seals with filler. 39.5% of the seals made with the unfilled material: Clinpro has been rated as "sealing little worn" while only 24% of the seals made with material filled were assessed as belonging to this category. 40% of the seals, whose performance had been used the not filled material, were very worn, with missing parts. While only 11,5% of the seals made with filled material appeared so worn.

**Conclusions.** Sealants filled appear to have a greater adaptability to the grooves, a greater adhesive strength and a greater resistance to abrasion. In contrast, however, have a lower penetration into pits and fissures. The unfilled sealant better resist to the cariogenic infiltration due to their greater penetration. At the conclusion of this study is evident that the sealant Ultraseal XT Plus is widely more present after 4 months. Therefore, it is advisable to use filled sealing materials for longer duration and retention over time. They are therefore more effective in protecting the grooves and fissures of the tooth from decay. It is still desirable that further studies are carried out on prolonging the follow-up to obtain a more complete overview of results and long-term.



#### USE OF VIDEO EYEWEAR DURING PEDIATRIC DENTISTRY PROCEDURES

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**Aim.** Young patients are often subjected to dental procedures that can cause anxiety and pain. Distraction can be useful and effective in reducing children's negative perception during dental practice. Virtual Reality technology (VR) provides a three-dimensional interactive environment with auditory and visual components. The aim of the present study is to assess the efficacy of video eyewear as a distraction tool in reducing anxiety and pain during sealant application in pediatric dentistry.

**Materials and methods.** Sense of anxiety and pain during sealants application are evaluated using different distraction techniques: 2D video and VR with 3D video eyewear. A video glass (Carl Zeiss Cinemizer 3D Oled Display) was used to see a 2D and a 3D videos. The subject of this research consist of thirty-six patients aged 7- to 14 years. Inclusion criteria were: caries free, first molar erupted and higher caries risk. At T<sub>0</sub> all the sample was examined and two molars were randomly selected from each patient (total 72 teeth). At T<sub>1</sub> all the sample was treated: the sealant (3M ESPE Concise Light Cure White Sealant) was applied into occlusal pits and fissures of 36 molars: One teeth for each patient. During these procedures any form of distraction were used. At T<sub>2</sub> the sample was divided in 2 group (group A and group B). The sealant was applied following the same protocol of the remaining 36 molars. Group A was treated wearing the video glasses and seeing a 2D cartoon and group B was treated with VR seeing a 3D video cartoon. At T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> every patient was asked to complete a questionnaire created using the Short State-Trait Anxiety Inventory (short-STAI) The questionnaire was aimed to focus their perception of anxiety and pain. Statistical analysis was performed to clarify the effectiveness of the distraction tools in reducing anxiety and pain. Analysis of variance was used to analyze the data.

**Results.** Statistically significant differences were found among patients treated without forms of distraction and the patients treated with the video eyewear. Statistically significant differences were also found between the groups A and B. The major reduction of anxiety was found in the patients treated with the video eyewear instead of patients treated with any form of distraction ( $F(2,68) = 124.17$ ,  $p < 0.001$ ,  $\eta^2 = 0.78$ ). The anxiety and pain reduction was greater in group B ( $F(2,68) = 5.21$ ,  $p < 0.01$ ,  $\eta^2 = 0.13$ ).

**Conclusions.** The present study supports distraction with 3D video eyewear as an effective strategy for pediatric patients showing a significant reduction of anxiety and pain during sealant application. VR could be a feasible and useful tool in pediatric dentistry.







### ON POSITIONAL VARIATIONS OF HYOID BONE IN DIFFERENT FACIAL TYPES AND MANDIBULAR MORPHOLOGIES

F. Nicoira, C. Conforte, P. Campagna, S. Crimi, R. Leonardi

### PROTOCOL FOR THE USE OF OCCLUSAL MOUTH GUARDS DURING THE PRESURGICAL PHASE OF TREATMENT

S.A. Stabilini, N. Cenzato, G. Rosso, G. Cossellu, L. Kairyte, L. Del Ponte, C. Occhipinti, C. Del Ponte, F. Nolet, M. Farronato

### 3D IMAGING ROLE IN THE DIAGNOSIS AND PLANNING OF THERAPY OF THE VERTICAL MAXILLARY ASYMMETRY IN THE ADULT. CASE REPORT

C. Lettieri, A. Laino, L. Laino

### 3D ORTHODONTIC AND SURGICAL STUDY OF THIRD MOLARS: MRI VS CBCT

U. Garagiola, E. Del Rosso, P. Cressoni, R. Soldo, S. Pozzi Taubert, G. Bassi, F. Farronato

### A NEW DEVICE (FAQ.FIX®) FOR ORTHODONTIC BRACKET PLACEMENT IN STRAIGHT-WIRE TECHNIQUE

E. Marchese, V. Ferrulli, F. d'Apuzzo, S. Palumbo, V. Grassia, L. Perillo

### A RANDOMIZED CLINICAL TRIAL ON ALIGNMENT EFFICIENCY AND DENTO-ALVEOLAR EFFECTS IN THE LOWER ARCH: SELF-LIGATING TIME 3 VS. ALEXANDER BRACKET SYSTEMS

E. Gatto, P. Aceto, R. Nucera, A. Laiola, M. Portelli, C. Crupi, A. M. Bellocchio, L. Perillo, G. Matarese

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G. Bilello, C. Caradonna, V. Aloisio, F. Seidita

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### BINDER SYNDROME CASE REPORT OF ORTHODONTIC TREATMENT

N. Cenzato, M. Farronato, G. Rosso, L. Karitye, P. Pereira, S.A. Stabilini, L. Del Ponte, C. Occhipinti, C. Del Ponte, G. Cossellu

### CASE REPORT: RESPIRATORY SLEEP DISORDERS IN PEDIATRIC AGE. DIAGNOSTIC AND THERAPEUTIC PROTOCOL

G. Rosso, C. Batia, L. Kairyte, S.A. Stabilini, N. Cenzato, L. Del Ponte, P. Pereira, C. Del Ponte, S. Batia, M. Farronato

### CBCT ALGORITHM OF THE CORRELATION BETWEEN VERTICAL AND SAGITTAL DIMENSION

N. Cenzato, M. Farronato, G. Rosso, L. Karitye, P. Pereira, S.A. Stabilini, L. Del Ponte, C. Occhipinti, C. Del Ponte, F. Nolet



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U. Garagiola, P. Cressoni, I. Tubertini\*, E. Del Rosso, S. Pozzi Taubert, G. Bassi, R. Soldo

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L. Kairyte, S.A. Stabellini, N. Cenzato, G. Rosso, S. Speroni, L. Del Ponte, V. Lanteri, C. Del Ponte, F. Nolet, M. Farronato

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### HOW VARIOUS CHIRURGICAL PROTOCOLS OF THE UNILATERAL CLEFT LIP AND PALATE INFLUENCE THE FACIAL GROWTH AND POSSIBLE ORTHODONTIC PROBLEMS. WHICH IS THE BEST TIMING OF LIP, PALATE AND ALVEOLUS REPAIR

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N. Cenzato, M. Farronato, G. Rosso, L. Kairyte, P. Pereira, S.A. Stabilini, L. Del Ponte, C. Occhipinti, C. Del Ponte, F. Nolet



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S.A. Sabilini, N. Cenzato, G. Rosso, G. Cossellu, L. Kairyte, L. Del Ponte, C. Occhipinti, C. Del Ponte, F. Nolet, M. Farronato

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### RELATIONSHIP BETWEEN THE MAXILLARY CANINES IN AN ECTOPIC AND VARIATION OF THE DIAMETER OF THE TEETH

F. Tarantino, G. Bilello, G. Currò

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### TEMPOROMANDIBULAR JOINT DISORDERS IMAGING BY ULTRASONOGRAPHY IN JUVENILE IDIOPATHIC ARTHRITIS

U. Garagiola, P. Cressoni\*, I. Tubertini, R. Soldo, F. Farronato, I. Borzani

### THE ASSESSMENT OF THE PERCEPTION OF SMILE ESTHETICS: LITERATURE REVIEW

L. Kairyte, S.A. Stabilini, N. Cenzato, G. Rosso, S. Speroni, L. Del Ponte, Brotto E, Del Ponte C, Cossellu G,  
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A. D'addetta, D. Aiello, S. Marianetti, N. Calarco, L. Cotticelli, C. Grippaudo

# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## ORTOGNATODONZIA

SESSIONI >>>

### THE IMPORTANCE OF AN ACCURATE DIAGNOSIS IN ORTHODONTIC TREATMENT TO PREVENT FAILURE: A CASE REPORT

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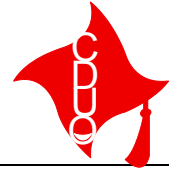
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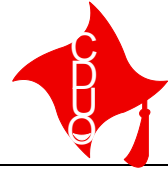
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### ON POSITIONAL VARIATIONS OF HYOID BONE IN DIFFERENT FACIAL TYPES AND MANDIBULAR MORPHOLOGIES

F. Nicotra<sup>1</sup>, C. Conforte<sup>1</sup>, P. Campagna<sup>1</sup>, S. Crimi<sup>2</sup>, R. Leonardi<sup>3</sup>

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<sup>3</sup>Chair of the Department of Orthodontics and Gnathology, University of Catania, Catania, Italy

**Aim.** The aim of this survey is to assess the antero-posterior and vertical spatial position of the hyoid bone in the different facial types in relation to the mandibular morphology. This study took as reference the "hyoid triangle of Bibby" which provides the use of cephalometric plans built on mandibular and cervical vertebrae points, eliminating, in this way, those variations that could be caused by the use of cranial plans.

**Materials and methods.** Sixty-four pretreatment teloradiographs from a group of young growing subjects were evaluated. All teloradiographs have been made using the same device in such a way as to obtain the natural head posture. The following parameters of Ricketts in teloradiographs have been measured: FAX, FD, LF, MA, MP - to quantize the Vert and obtain the vertical types of subjects. To evaluate the mandibular morphology the distance Xi-Pm and Dc-Xi were used. The estimation of the antero-posterior and vertical position of the hyoid has been made on all the teloradiographs employing the "hyoid triangle of Bibby" using instead of the Retrognation point the Menton point. The Bibby's modified triangle thus resulted in:

- C3: antero-inferior point in the body of the 3<sup>rd</sup> cervical vertebra.
- H: highest point in front of the body of hyoid bone.
- Me: lower point of the mandibular symphysis.
- H1: point on the straight line C3-Me, as identified by the perpendicular to the straight line passing through the H point.

Has been used a statistic analysis with variance, standard deviation, standard error, coefficient of variation, minimum and maximum values to obtain the mean values.

**Results.** According to measurements made with this method the following results in average have been obtained:

- C3-Me measurement in mean value were 73.4 mm, in the brachyfacial the distance C3-Me presented the highest average value, while in the dolichofacial subjects the average value was lower;
- C3-H measurement mean value were 32.5 mm, while it was increased in brachyfacial subjects and was almost identical in mean value in meso- and dolichofacial subjects;
- H-Me (such as C3-Me) was bigger in brachyfacial subjects and really smaller in dolichofacial subjects (with a 6 mm gap between the two groups);
- H-H1, index of the vertical position of the hyoid bone, showed a variability among hypodivergent, mesodivergent and hyperdivergent subjects; in dolichofacial subjects on teloradiographs the hyoid bone was higher than other groups of our pattern.

No statistically significant correlations was observed between the parameters of hyoid triangle and distance between DC-Xi and Xi-Pm and angle MA. Instead we detected that characteristic values for each facial types.

**Conclusions.** The mean values of the distance C3-Me, C3-H and H-Me obtained in our subjects are very close to those reported by Bibby, but the values obtained concerning the vertical position of the hyoid show a big discrepancy. Data obtained from our study indicate a high spatial variability of the hyoid bone about the antero-posterior spatial and vertical position in the 3 groups evaluated (meso-, brachy-, and dolichofacial). Hyoid bone position seems to be related to characteristic of each vertical pattern. On the other and any correlation between hyoid bone position and mandibular morphology were detected.



### PROTOCOL FOR THE USE OF OCCLUSAL MOUTH GUARDS DURING THE PRESURGICAL PHASE OF TREATMENT

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**Aim.** The aim of our research is to illustrate the new pre-surgical protocols used by the Dentistry University in Milan.

**Materials and methods.** The diagnostic protocol consisted in.

- Medical history
- Clinical examination
- Clinical intra oral and extra oral pictures
- Radiographic examination (OPT, latero-lateral projection) with cephalometric tracings.
- Study models
- Face bow
- Mounting of the models on the articulator
- Surgical and orthodontic Vto
- Pre-surgical orthodontic set up
- Occlusal mouth guards

This protocol allows to establish the pre-surgical orthodontic aims and develop a specific surgical objective. During the course of the pre-surgical orthodontic phase the clinician must take into consideration the future positions of the bone basis to reposition correctly the teeth for the successive surgical intervention. During the orthodontic treatment, impressions should be taken often to evaluate the reaching of the objectives with consequent prolonging of the treatment time and discomfort of the patient. To optimize such phases, mouth guards can be constructed on the base of the orthodontic set up which allows to evaluate, during the various follow ups, the results obtained. The mouth guards are made on the basis of the final position that the teeth should have before the surgical intervention and hence represent an optimal guide for the orthodontist towards the final result. At each visit the orthodontist should evaluate how the guards fit on the teeth of the patient realizing how these should progressively fit better informing the orthodontist of the positive progression. Once the guards fit perfectly, the clinicians will know when the patient is ready for surgery.

**Results.** The time for each follow up and the actual and total time for the pre surgical orthodontic treatment has been noticeably reduced. This protocol also increases patient compliance eliminating the impression taking phases.

**Conclusions.** Maxillary movements are pre-established in the initial phases of treatment enabling the clinician to evaluate and improve, from the beginning, the biomechanical movements. This clearly increases the quality of the work and results obtained. In addition, after the noticeable precision allowed by such protocol, we can predict that there may also be a noticeable reduction in the time of the post-surgical phase.



### 3D IMAGING ROLE IN THE DIAGNOSIS AND PLANNING OF THERAPY OF THE VERTICAL MAXILLARY ASYMMETRY IN THE ADULT. CASE REPORT

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**Aim.** The aim of this case report is to show the importance of 3D TC imaging in differential diagnosis between surgical and not - surgical vertical maxillary asymmetry in the adult.

**Materials and methods.** Adult female patient with clear facial asymmetry, asked us a second opinion because 5 previous orthodontists after clinical and x - ray evaluation (lateral and posterior - anterior x - ray and of teeth) recommended her to perform a surgical therapy in order to resolve her vertical discrepancy (the diagnosis was: Hemimandibular Hypoplasia). Before to perform our diagnosis, we asked her an additional TC 3D cone beam.

**Results.** The 3D TC showed a normal jaw and a normal maxillary weere we found a vertical tooth - bone asymmetry. So our diagnosis was vertically maxillary asymmetry based on tooth- bone asymmetry.

**Conclusions.** In this case the TC 3D was important to perform the correct diagnosis and correct therapy. So authors recommended to perform always TC 3D in order to confirm the diagnosis in the asymmetric patients.



### 3D ORTHODONTIC AND SURGICAL STUDY OF THIRD MOLARS: MRI VS CBCT

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**Aim.** The aim is to assess 3D volumetric anatomical reconstruction of the third molars and the relationships with the inferior Alveolar nerve canal (IAN) by Magnetic Resonance Imaging (MRI) versus Cone Beam Computed Tomography (CBCT).

**Materials and methods.** The precise localization of third molars and the study of their relationships with the inferior alveolar nerve canal (IAN) is critical for a correct surgical approach. Magnetic Resonance Imaging (MRI) is a technique applied in various branches of medicine, it allows to obtain tissue images using their behavior in a high intensity magnetic field. Twenty patients underwent CBCT and MRI with a new 3D protocol, that provides Dicom data acquisition that can be imported into three-dimensional reconstruction and visualization software. It has been performed a segmentation of jaw bones and dental elements, and has been mapped the location of the inferior alveolar nerve.

**Results.** The volumetric MRI has resulted optimal for the virtual models of anatomical structures, especially the third molars and the IAN. The 3D MRI volumetric reconstruction resulted similar to 3D CBCT volumes ( $p < 0.1$ ). In this way the operator can see in the three planes in space, the structures of interest, with a dimensional ratio of 1:1.

**Conclusions.** The results presented confirm the possibility of using this MRI technique for imaging 3D-volumetric study of dental and maxillo-mandibular structures. The main advantage in the application of MRI is the total absence of ionizing radiation delivered to the patient, however, have a greater execution time of the examination and data review.



### A NEW DEVICE (FAQ.FIX®) FOR ORTHODONTIC BRACKET PLACEMENT IN STRAIGHT-WIRE TECHNIQUE

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**Aim.** The Straight - Wire (SW) appliance was introduced to make orthodontic treatment more efficient and comfortable using a wire without bends and positioning the brackets on the midpoint of the Facial Axis of the Clinical Crown (FACC), defined Facial Axis point (FA). Unfortunately, this is not easy to do for most orthodontists due to the difficulty in placing the bracket properly. For this reason, to detail the occlusion at the end of the treatment, many orthodontists spend considerable time to compensate for bracket-positioning errors. The most common bracket placement errors are horizontal, axial, vertical and base related. The aim of the paper was to describe the FAQ.FIX®, a bracket positioner to FIX the brackets accurately (Q) on FA point in direct or indirect bonding.

**Materials and methods.** After the development of a FAQ.FIX® bracket positioner prototype, a kit with 20 brackets positioners was produced, one for each tooth, reproducing the pre- inserted angulation of the single prescription, identified by the international color coding and by a disto - gingival dot. Two types of positioners were made, the former for flat edge teeth and the latter for cuspidate teeth. Along with FAQ.FIX® kit, a "Bracket Placement Clinical Chart" was developed according to the American Association of Cosmetic Dentistry (AACD) criteria. The FAQ.FIX® bracket positioned could be used both with indirect and direct bonding. However, the chair time was reduced with the indirect bonding compared to "eyeball" or with a gauge direct bonding.

**Results.** The FAQ.FIX® facilitated the accuracy in bracket placement on FA point. Along with the "Bracket Placement Clinical Chart", it allowed us to avoid the most common bracket placement errors regardless of the operator skill, even in case of partially erupted or fractured teeth, or in more difficult orthodontic cases, such as Class II, Division 2 malocclusion.

**Conclusions.** Correct bracket placement is still a challenge for both expert and beginning orthodontist. The failure may compromise the treatment outcome. FAQ.FIX®, along with the indirect bonding, make the bracket placement easier and more accurate. Moreover, the treatment time and the initial placement error are reduced. Thus, the FAQ.FIX® may represent a significant clinical improvement in bracket placement compared to the "eyeball" and the traditional gauges bracket position.



### A RANDOMIZED CLINICAL TRIAL ON ALIGNMENT EFFICIENCY AND DENTO-ALVEOLAR EFFECTS IN THE LOWER ARCH: SELF-LIGATING TIME 3 VS. ALEXANDER BRACKET SYSTEMS

E. Gatto<sup>1</sup>, P. Aceto<sup>2</sup>, R. Nucera<sup>1</sup>, A. Laiola<sup>2</sup>, M. Portelli<sup>1</sup>, C. Crupi<sup>1</sup>, A. M. Bellocchio<sup>1</sup>, L. Perillo<sup>2</sup>, G. Matarese<sup>1</sup>

<sup>1</sup>Department of Scienze Sperimentali Medico-Chirurgiche Specialistiche e Odontostomatologiche, Section of Orthodontics (Chairman and Head: Prof. G. Cordasco), University of Messina, Messina, Italy

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**Aim.** The objective of this study was to perform a randomized clinical trial to evaluate the alignment efficiency and the dento-alveolar effect in the lower arch with two different bracket systems.

**Materials and methods.** Twenty-five patients (14 females and 11 males) were selected in this study. The inclusion criteria were the following: age below 35 years at the start of treatment, permanent dentition, non extraction treatment in the upper and lower arch, irregularity index between 4 and 8 mm, no spaces and dental agenesis in the lower arch, no missing teeth, no previous orthodontic treatment. The subjects were randomly assigned to 2 groups: the first treated with self-ligating Time 3 brackets (MBT prescription-American Orthodontics) and the second with Alexander brackets (American Orthodontics). All the brackets had the same slot dimension.018. The mandibular incisor torque values for these brackets were – 6° for both bracket systems. The alignment efficiency was evaluated measuring the difference of irregularity index between T<sub>0</sub> (at the beginning of treatment) and T<sub>3</sub> (at the insertion of. 017 ×.025 inch stainless steel archwire), divided the time among the two measurement. The dento-alveolar changes after alignment as the intercanine and intermolar widths were measured on dental cast whereas the lower incisor proclination was estimated on cephalometric radiograph. All measurements were made by the same clinician.

**Results.** By comparison of two bracket systems, no significant inter group differences ( $p < 0.05$ ) from T<sub>0</sub> and T<sub>3</sub> was found. The Time 3 group had a slightly higher mean time (7.5 weeks) compared with the Alexander group (6.2 weeks). The Time 3 group showed a greater expansion in the anterior and posterior areas of the lower arch. Intercanine and intermolar width increased respectively of 2.5 and 4.4 mm in the self-ligating group vs. 1.2 and 2.3 mm in the Alexander group. The incisor proclination was lower with Time 3 brackets.

**Conclusions.** The use of self-ligating bracket system produced greater dento-alveolar effects than the Alexander group except for the lower incisor proclination.





### ANALYSIS OF METHODS OF HYGIENE FOR ORTHODONTIC INVISIBLE ALIGNERS

T. Oliverio, L. Lombardo, G. Siciliani

**Aim.** The aim of the study was to evaluate an ideal method to sanitize orthodontic aligners invisible in PET G, which reduces the amount of precipitates and bacterial derivatives salivary and allowing to maintain its physical characteristics and invisibility of the aligner is not used. We analyzed four methods of hygiene aligner easily executable:

- washing with water,
- "sweep" with toothbrush,
- washing with portable ultrasound,
- soaking in a specific detergent for orthodontic devices.
- washing with Ultrasonic professional machine and specific detergent.

At the end of 15 days for each aligner were performed:

- an analysis of the color by the spectrophotometer spectroshade " Micro" MHT,
- analysis of the hardness of the walls by means of measurements with the instrument INSTRON 446,
- Microscopic analysis of the precipitates present and microanalysis by SEM EVO.

By analyzing the data obtained from the measurements with the spectroshade, it looks like the most obvious changes in value as a result of the show only washing with water. The immersion in the detergent showed more stable results, namely that only a sample of 8 has undergone changes in value and hue going from C to D. As regards the analysis of the color of the aligner treated with ultrasound professional and detergent, the sample has not changed nor color nor value. The material's behavior varies greatly depending on the method used to cleaning. According to the data obtained, the washing of the aligner with the water contributes to a hardening of the surface from 62% to 87 % compared to the aligner not used. The method that affects to a lesser extent on the physical changes, appears to be washing with detergent for orthodontic devices. The change of hardness in this case is between 2% and 12%. The evaluation of the organic material and the precipitates on the inner surface of the aligner, a result of its use, it is greatly different depending on the method of hygiene performed.

The conclusions that can be drawn in this regard, with respect to our tests, are:

- Clean the aligners subjecting them the daily washing with water is not an effective method for maintaining invisibility and also for the removal of the organic component that is deposited and which is responsible for a hardening up to ' 87 % of the material of which they are composed;
- Brushing or the use of an ultrasonic instrument portable does not provide optimum results. Whit their use, the presence of the organic component is not reduced significantly and this entails a hardening of the material up to 77%.

The detergent for orthodontic appliances ensures better results with regard to maintaining invisibility and the removal of the organic component with respect to the first three methods analyzed, also the material undergoes a hardening minimum of the walls, between 2 and 12%.

The best result, even if tested on a single sample, derives from the use of professional ultrasound with the aid of a detergent to orthodontic appliances. The synergy between the mechanical and chemical actions guarantees a good elimination of the organic component respecting the physical-chemical characteristics of the aligner.



### ANTERIOR OPEN BITE TREATED WITH E F APPLIANCE: A CASE REPORT

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**Aim.** Current trends in pediatric orthodontics aim to identify incorrect development of occlusion and medium/lower facial third as early as possible. Functional appliances are a popular type of device used for treating malocclusion in patients who are growing. Among the functional orthodontic devices intended for this purpose, "Education Functional" is highlighted. It was developed by Dr. Daniel Rollet. In fact, in the occlusal alterations, early preventive treatment with elastodontic devices resulted in avoiding dysfunctional forces from acting on the skeletal pattern, thus reaching a balance between bone basis and muscular components. This report describes a clinical case of a patient (9-year-old female) with anterior open bite associated to oral dysfunction, treated, in the mixed dentition, with EF-line appliance. Our purpose is to evaluate the effectiveness of this device for the correction of the dysmorphoses.

**Materials and methods.** Case study of a 9 years old female patient. The patient has been selected at the Section of Orthodontics, Department of Surgical, Oncology and Stomatologic Sciences, University of Palermo, Italy. The extraoral examination showed an armonic profile, an increased nasolabial angle, no facial asimmetry. The intraoral examination showed mixed dentition with an Angle's Class I, anterior open bite, proclination of upper incisors, atypical deglutition and speech defects. The cephalometric showed SNA Angle of 79°, SNB Angle of 77° and Wits 3 mm. It was meant to be appropriate the use of a functional appliance, the device EF-Trainer. The patient has been instructed to use the device for 4 hours during the day and all night long. Exercises for neuromuscular reeducation of the tongue muscles were also performed. These exercises, according to the protocol, are considered to be fundamental in the patient's functional rehabilitation. The treatment lasted 9 months and periodic recall has been performed every 3 months, always by the same operator.

**Results.** The results, observed on examination after this period of treatment, showed the efficacy of the therapy with the appliance "EF- trainer" for the correction of the anterior open bite. Also, we were able to show an improvement in atypical swallowing and speech defects, with the help of our speech-therapist.

**Conclusions.** In this case report, the patient showed significant improvements after functional therapy with EF trainer. The child also showed good cooperation to the treatment. The appliance, thanks to the material of which is composed, is comfortable and well tolerated by the patient. Emphasis should be placed on the possibility of using these appliances in early preventive treatments in preschoolers (3-5 years), since it is easy to use and does not require a great patient cooperation. The results obtained suggest it is justified to undertake more rigorous studies to provide a better understanding of the effectiveness of functional therapy with EF devices.



### ASSESSMENT OF CLINICAL AND RADIOLOGICAL DATA OBTAINED BY MRI IN PATIENTS WITH TMD

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**Aim.** The purpose of this study was to assess if there is a correlation between the radiological data obtained by MRI and clinical data in patients with temporomandibular disorder.

**Materials and methods.** The study group included 17 patients (for a total of 34 joints), 14 females and 3 males, aged between 14 and 60 years old (mean age 31 years), who presented symptoms of temporomandibular disorders. In the clinical analysis signs and associated symptoms have been assessed; a preliminary assessment during radiological diagnostic phase was carried out in order to appreciate on the radiological images the entity of structural changes, expression of pain symptoms and dysfunctional. It's been done even after treatment (whether it is gnathologic or orthodontic), to understand what kind of connections exists between the resolution of the symptoms and functional framework and the new disk – condyle relationship. The analysis of the radiological images in a closed mouth was obtained using the technique described by Chintakanon for measurements of condyle axis, angle of eminence and sagittal position of the disc. With image analysis of Chintakanon we appreciated the degree of displacement and the modifications of the structural relations. Chi-squared and paired t test were used to assess the statistical significance of the values obtained.

**Results.** The results from clinical examinations for all patients showed a general improvement of the clinical status.  $\chi^2$  test yielded a statistically significant result ( $p < 0.05$ ). MRI showed in some patients after therapy a correction of the condyle - meniscus relationship; the values of Chintakanon analysis proved a favourable change. Therefore in some asymptomatic patients the permanence of several degrees of condyle – disk incoordination was detected with Chintakanon analysis.

**Conclusions.** The approach to temporomandibular joint disorders appears to be quite complex due to the multifactorial etiology and the variety of symptoms with which the disease manifests itself. No full correspondence between the clinical data and the degree of disk displacement was found. The symptoms recorded during a clinical evaluation can not therefore be the only index of diagnosis. On the other hand the absence of these at the end of therapy does not indicate complete resolution of the anatomical relationships, but rather can only be the adaptive response of tissues to functional stimuli induced by the type of treatment performed. Temporomandibular disorders can be diagnosed without MRI; nevertheless MRI gives us the possibility to obtain objective data of the patients concerned.



### BINDER SYNDROME CASE REPORT OF ORTHODONTIC TREATMENT

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**Aim.** The purpose of this work is to describe the case of a patient affected by Binder syndrome that did not undergo any surgical treatment. Binder Syndrome (Maxillo-Nasal Dysplasia) is a developmental disorder primarily affecting the anterior part of the maxilla and nasal complex (nose and jaw). It is a rare disorder and the causes are unclear. This syndrome causes hypoplasia of cartilaginous nasal septum and premaxilla. In this work we will follow the patient's treatment, and describe the procedure to recreate a certain harmony and the method to have a good diagnostic approach.

**Materials and methods.** To realize this study we followed a Binder syndrome case documenting everything remarkable. After studying it we described revision, case report and follow up. To accomplish those aims we used literature review starting from criteria of the most recent results found in pubmed or books.

**Results.** At the end of the patient's development we obtained the following results: the maxilar hypoplasia was solved without surgery treatment bringing back to a situation of harmonic function and a good aesthetic effect. The evidence was brought by a 5-years follow up which confirmed the stability of the results obtained and the harmony of the treatment.

**Conclusions.** This rare syndrome consists on a development alteration decreasing the growth and correct expansion of the medium facial. Also known as maxilla-nasal dysplasia this condition hits up less then 1 individual out of 10000 but it's probably under diagnosed. Most of the times the most commonly used approaches are including surgery as well as LeFort I or II. But in this case through a good precocious diagnosis it was possible to treat the patient using just orthognathic therapy avoiding the surgical approach which is much more invasive and uncomfortable for the patients undergoing this kind of treatment. But of course a very precocious diagnosis is required as well as a step-by-step follow up.



### CASE REPORT: RESPIRATORY SLEEP DISORDERS IN PEDIATRIC AGE. DIAGNOSTIC AND THERAPEUTIC PROTOCOL

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**Aim.** This study aims to investigate the disease in pediatric age, to validate the treatment with rapid palatal expander and to achieve a volumetric analysis of the airways using CBCT (Cone Beam Computed Tomography).

**Materials and methods.** Patient with the characteristics of inclusion is subjected to complete medical history, clinical examination following dental and nasopharyngeal endoscopy performed by the otolaryngologist, functional tests related to breathing, imaging studies such as polysomnography at home, active front rhinomanometry. It was required the Cone Beam CT to do an orthodontic diagnosis and to evaluate the air volume. It was applied a Rapid Palatal Expander according to the protocol of activation of the School of Orthodontics at the University of Milan. At the end of therapy functional tests and non-invasive imaging studies were repeated.

**Results.** The 9 years old patient showed the signs and symptoms of SDB, functional and instrumental exams and Cone Beam CT, using Mimics® software, showed a reduction in air volume. A change in breathing pattern was evaluated after rapid palatal expansion.

**Conclusions.** Change in nocturnal respiratory patterns in patients subjected to this treatment is estimated through the improvement of symptoms, of nocturnal polysomnographic indices and the degree of nasal stenosis.



#### CBCT ALGORITHM OF THE CORRELATION BETWEEN VERTICAL AND SAGITTAL DIMENSION

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**Aim.** The aim of this work is to analyse and classify a group of about 280 patients to prove the correlation existing between the different cephalometric dimensions. CBCT, in fact, is much more precise and is not affected by errors as well as magnification and distortion. The large scale of cases is very useful to determine these values.

**Materials and methods.** Starting from an archive of 600 Tc Cone Beam, 201 patients scanned with Tc Cone Beam performed with I-Cat Classic® (Imaging Science International) were casually selected. Those patients were taken from the Orthognatodontic clinic of the Università degli Studi di Milano, they are from 4 to 67 years old feminine and masculine. The CBCT of those subjects had been analysed by the tridimensional cephalometry of Milano School using the software Mimics® Materialise.

**Results.** After this study the result was that, correcting the sagittal scale, 40 subjects out of 61 became deepvertibite, 21 instead stayed normovertibite. Those data's confirmed the hypothesis and found correlation with the literature.

**Conclusions.** Dimorphic pathologies are rarely a matter of one dimension of space and finding disgnatic pure forms is rare as well: very often dentofacial anomalies coexist. That's why nowadays more and more we need a tridimensional view of the anatomical structures in order to make a good diagnosis and efficiently treat it and its causes. With the introduction of CBCT and three-dimensional cephalometric data a simple, repeatable, and relatively uninfluenced by human error method has been found, which relies on the use of computers. CT Cone Beam provides an actual representation of reality without distortion, eliminating perspective problems, because it works directly using the three dimension.



## CHANGES IN MOLAR AND CANINE RELATIONSHIPS BETWEEN 3 AND 4 YEARS OF AGE, RELATED TO SUCKING HABITS IN UNTREATED SUBJECTS

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**Aim.** To determine the changes in the molar and canine relationships in untreated pre-school children (between 3 and 4 years of age) and their correlations with prolonged sucking habits.

**Materials and methods.** This study is based on a 1-year follow-up of 91 children (39 girls, 52 boys) at the age of 3 years at the start of the study. It is conducted in the private and public preschools in Chiavari, (Italy). This study was approved by the Ethical Committee of University Hospital "San Martino" (Genoa) and by the Local Health Centre "Asl 4 Chiavarese". A questionnaire for children parents and clinical examinations were carried out. Two WHO-calibrated examiners carried out the clinical examinations and they were blinded to the information collected from the parental questionnaires. The occlusion was assessed in centric occlusion and was classified according to Foster and Hamilton criteria. Radiographic examination was not included. The children were evaluated at T0, and after 1-year. The chi-square test and the T-Student test were used for statistical analysis.

**Results.** The prevalence of non-nutritive sucking habits (dummy-sucking and/or digit-sucking, NNSH  $\geq 36$  months) in the sample at T0 was 43.5%. Molar Class I relationship at T0 was detected in 58.2% of the subjects, class II in 36.3% and Class III in 5.5%; at T1 we found molar class I relationship in 53.2%, Class II in 39.1%, Class III 7.7%. From T0 to T1, 30.3% of the subjects improved their molar relationships from class II to Class I and 39.6% change from Class I to class II. These molar relationship modification were not related to the non-nutritive sucking habits changes. Canine Class I relationships at T0 was detected in 52.7% of the subjects, class II in 42.9% and Class III in 4.4%; at T1 we found canine class I relationships in 60.8%, Class II in 32.6, Class III 6.6%. From T0 to T1, 69.2% of the subjects improved their canine relationships from Class II to Class I and 28.6% change from Class I to class II. The improvement in canine relationships from Class II to class I was correlated ( $\text{Chi}^2 < 0.01$ ) with a shorter duration (lower than 36 months, NNSH  $< 36$  months) of non-nutritive sucking habits, on the opposite, the worsening from Class I to Class II was positively associated ( $\text{Chi}^2 < 0.01$ ) with persisting sucking habits (NNSH  $\geq 36$  months).

**Conclusions.** Based on the present study data's, sucking habits affected premaxilla growth: subject with persisted sucking habits (beyond 36 months) developed a canine Class II relationships from 3 and 4 years-old. Instead subject with Canine class II relationship at 3 years who suspended the bad habits, improved their Canine relationships from Class II to Class I.



### CHARACTERIZATION OF HYBRID ORGANIC-INORGANIC COATING FOR PERMANENT MAGNETS IN ORTHODONTIC APPLICATIONS

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**Aim.** The Nd-Fe-B type permanent magnets possess high magnetic properties achieved for smaller size compared to others permanent magnet and with lower cost. Contrary to traditional force delivery system, magnetic brackets should be able to provide a controlled force released, no friction and no material fatigue. The main reason limiting long-term clinical application of magnets in orthodontic field is their marked corrosion tendency in middle aggressive media containing chloride such as saliva. This is due both to the high porosity of Nd-Fe-B alloys and to the inhomogeneity of the magnets surfaces that lead to uncoated areas. The imperfections in the coating represent the starting point for preferential pitting corrosion. The corrosion implies the mechanical deterioration and the decrease of the magnetic properties nevertheless the release of cytotoxic agents. Thereby it becomes necessary to overcome the corrosion resistance lack of Nd-Fe-B magnets with new wear resistant encapsulating materials and surface coatings.

**Materials and methods.** The coating tested consists in a metal substrates (such as Au, Ni, Zn, etc..) and a coupling agent. In first step the mechanical characterisation was carried out acquiring knowledge about how, at different thicknesses of the coupling agent, the coating affects the magnetic force. The measurements of the magnetic force were performed by using an universal testing machine model Tenso Test TT2, 5-GU, Lonos with a 10 N load-cell and sensibility of 0.001 N. The cross-head speed was 0.05 mm/s. In the second step we investigated the corrosion resistance of the new coating for Nd-Fe-B magnets in corrosive environments by immersing them in a system consisting of Fusayama artificial saliva media at pH 5.5. Electrochemical impedance spectroscopy measurements and potentiodynamic polarization tests during 3 days of immersion were performed.

**Results.** Up to 30 coupling agent layers, the magnetic force is constant with a variation from the central value of less than the 3%. The statistical analysis (ANOVA) of the data of forces measured each 0.1mm shows that the data in the samples with 7, 8, 11, 15, and 30 coupling agent layers, measured at the same distance, are normally distributed, as if they are belonging to the same population. Analyzing the acquired data by EIS is possible to evidence as coupling agent coated samples at 0 hours have higher protective performances ( $10^9 \Omega$ ) then uncoated one ( $10^4 \Omega$ ), similar behaviour was found to high immersion times (72 hours). These results confirm that the addition of coupling agent layer on a magnet surface enhance its durability in biological electrolyte solution. Similar results are obtained for samples with higher dipping layer suggesting that this multi-steps procedure stabilize the electrochemical activity of Nd-Fe-B magnets.

**Conclusions.** First results of this research show that the limiting aspect preventing the use of Nd-Fe-B magnets for orthodontic applications, as rapid corrosion in saliva, can be avoided by using coupling agents as surface coating. In fact, it was evidenced that the coupling agents provides a barrier effect with the formation of stable structure of hybrid organic-inorganic coating.





### CHEWING PATTERN AND MUSCULAR ACTIVATION IN OPEN BITE PATIENTS

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**Aim.** The aim of this study was to evaluate the kinematics parameters of the chewing cycles and the activation of masseters and anterior temporalis muscles of patients with anterior dental open bite malocclusion.

**Materials and methods.** Fifty-two young patients (23 boys and 29 girls; mean age $\pm$ SD 11.5 $\pm$ 1.2 and 10.2 $\pm$ 1.6 years, respectively) with anterior open bite malocclusion and 21 subjects with normal occlusion were selected for the study. Kinematics parameters and surface electromyography (EMG) were simultaneously recorded during chewing a hard bolus with a kinesiograph K7-I Myotronics-Usa.

**Results.** The results showed a statistically significant difference between the open bite patients and the control group, during chewing a hard bolus, on the right and left side, for the following kinematic and EMG values: the cycle width resulted significantly decreased in open bite patient with respect to the control group; the temporal parameters showed a lower total duration of the chewing cycles, being the closing phase duration significantly decreased in the patient group. The EMG peak of left and right anterior temporalis and the EMG peak of the masseter of the bolus side resulted significantly lower in the patient group. The occlusal pause showed a tendency to a shorter duration for all muscles, but especially for the masseter of the bolus side, in the patient group. The neuromuscular aspects of opening and closing tracings, are, of course, very different especially the end of closure, which is characterized by the occlusal pause. It is controlled by reflexes and automatic mechanisms strictly dependent from peripheral inputs (muscles, teeth, tongue, gum etc.), neural network and motor control. The occlusal pause resulted steadily shorter in open bite patients in comparison with the control group. The shorter duration of the chewing cycles seems, consequently, due to the shorter duration of both the closing phase (masseters activity) and the occlusal pause. The results of this study high light the involvement of the neuromuscular system in dentoalveolar anterior open bite patients, characterized by a frequent muscular activation, a lower amplitude of the EMG peaks, a shorter duration of the chewing cycle, especially of the closing pattern, and of the occlusal pause and a narrow chewing pattern. Hence, the clinical consequence is a reduced masticatory efficiency and a reduced capacity of physiologic recovery, that may result in an impaired adaptation to load.

**Conclusions.** In this study, it has been observed that open bite patients, lacking the inputs from the anterior guidance, that are considered important information for establishing the motor scheme of the chewing pattern, show narrower chewing pattern, shorter lasting chewing cycles and lower muscular activation with respect to the control group.



### CHEWING PATTERN EVALUATION IN FIRST MOLAR UNILATERAL POSTERIOR CROSS-BITE PATIENTS

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**Aim.** Cross-bite is a common malocclusion developing at an early stage of growth. It may involve the anterior and/or the posterior regions of the dental arches. The posterior unilateral cross-bite has been defined as: 'a malocclusion in which one or more deciduous or permanent posterior upper teeth occlude in an abnormal buccal-palatal relationship with their corresponding lower teeth' (Daskalogiannakis and Miotti, 2001). It has been classified by Bjork considering different regions of the occlusion and has been defined as 'a malocclusion in the canine, premolar, and molar regions, characterized by the buccal cusps of the maxillary teeth occluding lingually to the buccal cusps of the corresponding mandibular teeth' (Björk et al., 1964). The largest part of studies concerning unilateral posterior cross-bite had taken in consideration patients with more than one tooth in cross-bite. As it is well established, patients with this malocclusion exhibit reverse-sequencing chewing patterns when chewing on the affected side. The aim of this research is to evaluate the prevalence of reverse-sequencing chewing cycles in patients with unilateral posterior cross bite involving first upper and lower molars, during chewing on the cross-bite side and on the non-cross-bite side, in order to evaluate the role that play this type of malocclusion on masticatory function.

**Materials and methods.** Forty one patients (16 boys, 25 girls) were included in the study and subdivided as follows: twenty-three patients (10 boys, 13 girls; age between 8 and 17 years) with right unilateral posterior cross-bite of first upper and lower molars (study group), and eighteen patients (6 boys, 12 girls; age between 8 and 17 years) with normal occlusion (control group). Masticatory cycles were recorded during chewing a soft (chewing-gum) and a hard (winegum) bolus with a Myotronics K7-I kinesiograph. The kinematic signals were analysed using a custom-made software. The chewing cycles were divided in non-reverse and reverse cycles, based on the vectorial direction of closure.

**Results and discussion.** The results showed a high prevalence of reverse-sequencing chewing cycles in patients with posterior unilateral cross-bite involving first upper and lower molars when chewing with both soft and hard bolus on the cross-bite side, with respect to patients with normal occlusion ( $P < 0.001$ ).

**Conclusions.** Patients with unilateral posterior cross-bite involving first upper and lower molars show an asymmetry of mastication as well as patients with more than one tooth in posterior unilateral cross-bite. For this reason, these patients need orthodontic treatment in early stage of development.



### COMPARISON BETWEEN THE SPEECH THERAPY AND FUNCTIONAL THERAPY IN PATIENTS WITH ATYPICAL SWALLOWING

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**Aim.** Compare two groups of patients with atypical swallowing, one group underwent the speech therapy and the other one followed a combined treatment based on speech therapy and orthodontic therapy.

**Materials and methods.** A sample of 30 patients was included in this study (aged between 7 and 13). These patients have been divided in two groups. The first one underwent only speech therapy, the second one followed a treatment based on speech therapy and orthodontics. The whole group suffered from atypical swallowing, dental anterior or lateral open bite, altered ovj and ovb. For each subject the following were collected: extraoral and intraoral pictures, models, X-rays (orthopantomography, lateral cephalogram). We have taken measurements with dynamometer and besides, patients underwent photogrammetric analysis and consecutive superimpositions at  $T_0$  and  $T_1$ .

**Results.** The atypical swallowing was corrected in both groups of patients and the tone of the orbicular muscle was increased except in three cases that underwent only speech therapy, where the compliance from the patients was absent. The measurements with dynamometer (repeated at  $T_0$  and  $T_1$ ), demonstrated in the majority, an increase almost double of the initial value, with an average about 600 gr, except in one case where there was no compliance from the patient and in two cases where the patients were seven years old. The 3D photogrammetry, allowing the comparison between the facial morphology before and after the treatment, highlighted in patients who underwent only speech therapy an increase of the muscle tone associated with an elongation of the lips, an increase of the nasolabial and labiomental sulcus. In patients who underwent the combined therapy (speech and orthodontics), the photogrammetry demonstrated remarkable changes related to soft tissues of the third lower of the face as a consequence of the solved open bite and a considerable change in the position of the anterior teeth, associated with a variation of the position of the upper and lower lip.

**Conclusions.** We can conclude, considering the study done, that a myofunctional therapy, if conducted by motivated and cooperative patients, can have as results the steady correction or a considerable improvement of the anomalies regarding the swallowing. The combined treatment, based on speech therapy and orthodontics, allows to have better results, as highlighted in the photogrammetric analysis superimposed.



### COMPARISON OF THE ORTHOPAEDIC VERSUS SURGICAL EXPANSION OF THE PALATE

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**Aim.** The aim is to assess the results obtained from the study of patients who have had surgery to expand the palate and assess the skeletal modifications, which have occurred. We have then compared the data to the orthopaedic expansion.

**Materials and methods.** Two groups of patients with insufficient transverse upper maxillary development were assessed. The first group included 6 subjects at the end of growth, 2 females and 4 males of ages between 21 and 27. The second group included 18 patients in the dynamic growth phase, 9 females and 9 males of ages between 5 and 17. All patients presented with a posterior crossbite due to an insufficient upper maxillary transverse development. The first group of patients has been treated with pre-surgical orthodontic therapy to de-compensate the dento-alveolar inferior arch after which surgery was carried out. The expander has been activated by two complete turns (2mm) during surgery. During the first day 2/4 turns have been carried out whilst in the successive days the activation has been 2/4 in the morning and 2/4 in the evening for a variable number of days based on the necessity of the programmed expansion. Once this was done, the central screw of the appliance was blocked with a metal ligature for 8 months to act as retainer before removal. The second group of patients has been treated with the expansion of the palate via the use of the RPE. The activation occurred 1/2mm each day with two rotations per day (one in the morning and one in the evening) for 15 days. In such patients the number of mm of expansion has been programmed for each single case to obtain an adequate hypercorrection of the initial transverse discrepancy. The central screw has then been blocked with a metal ligature leaving the appliance in situ for 6 months as retainer. At the end of the retention phase the expander has been removed. All patients have been treated by the same clinician.

**Results.** The results confirm an increment of the transvers diameter. An increase in the width of the nasal fossa, of the upper maxilla and shape of the arch has been highlighted.

**Conclusions.** The rapid expansion of the upper maxilla results to be an optimal therapeutic method for the correction of the transverse upper maxillary discrepancy in Class I, II, III malocclusions, open and deep skeletal bite. The structural changes do not highlight a substantial difference between the subjects treated with the surgical assisted expansion and the subjects treated with an expander during the dynamic growth phase. From a clinical point of view this research allows to confirm the therapeutical validity of the rapid expansion in all cases in which there is a decreased diameter of the transverse upper maxilla.



### CONE BEAM CT FOR ORTHODONTIC TREATMENT PLANNING: LOW-DOSE PROTOCOLS AND COMPARISON WITH CONVENTIONAL IMAGING

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**Aim.** Because of the many advantages and possibilities of cone-beam computed tomography (CBCT), orthodontists are starting to use this method for patient assessment. The aim of our study was to compare low-dose CBCT protocols with conventional panoramic and cephalometric imaging regarding images quality and radiation doses.

**Materials and methods.** Dose measurements of different acquisition protocols were calculated for Pax Zenith 3D Cone Beam (Vatech, Korea) and for OPT Ortophos (Sirona Dental Systems, Bernsheim, Germany). The absorbed organ doses were measured by using an anthropomorphic phantom loaded with thermoluminescent dosimeters at 58 sites related to sensitive organs in order to have a good sampling for all the involved organs at risk (bone marrow, bone surface, brain, salivary glands, thyroid, oral mucosa, extrathoracic airway, esophagus and lymph nodes). Five different CBCT protocols were evaluated for image quality and radiation doses. Measurements were then carried out with orthopantomograph. Equivalent and effective doses were calculated. The calculation of the effective doses was based on the International Commission on Radiological Protection's 2005 recommendations.

**Results.** The reference protocol routinely used is characterized by the following parameters: FOV of 240X190 mm, high resolution quality images, 95 kVp, 5 mA and acquisition time of 24 seconds; this protocol resulted in a DAP value of 1556 mGy.cm<sup>2</sup>. To obtain dose reduction we tested four different protocols: in the first we reduced KVp from 95 to 80, which translated into a value of DAP inferior to 35% (from 1556 to 1013 mGy cm<sup>2</sup>). Going from a high resolution to a normal resolution there is a reduction of the acquisition time which results in a further decrease in the dose of approximately 40%, with a value of 628 mGy cm<sup>2</sup>, equal to 40% of the value obtained with the reference protocol. Finally, the effect of different collimation has been evaluated, considering two scans with a reduced FOV (160 x 140 mm and 120 x 90 mm). The low-dose protocol that we chose for orthodontic treatment planning was that with large FOV, normal resolution quality images, 80 kVp, 5 mA and acquisition time of 15 sec; this protocol resulted in a value of the effective dose of 35 microSievert (mSv). The effective dose of the panoramic and cephalometric images in lateral and antero-posterior projections resulted in a value of the effective dose of approximately 15 microSievert.

**Conclusions.** CBCT performed with low-dose protocols have a low radiation exposure and, therefore, could be proposed as the primary method in orthodontic treatment planning resembling conventional Imaging.



### CORRELATION BETWEEN MAXILLARY SINUSITIS AND JUVENILE IDIOPATHIC ARTHRITIS: CONE BEAM CT STUDY

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**Aim.** To evaluate a possible correlation between Juvenile Idiopathic Arthritis (JIA) and sinusitis of the maxillary sinuses and determine their prevalence.

**Materials and methods.** The Juvenile Idiopathic Arthritis (JIA) is a chronic inflammatory disorder of probable autoimmune origin. The most important manifestation of this disease is chronic synovitis, synovial fluid pressure is produced in it often causes pain. The JIA begins before the age of 16 years of age. Sinusitis of the maxillary sinus is an inflammatory process, acute or chronic, causing a marked thickening of the mucosa, with or without local pain. This study analyzed 200 Cone-Beam CT (CBCT). Of these 100 patients suffering from JIA, 100 were healthy. All patients who fall in this study were aged between 8 and 16 years. All CBCT were observed in the three planes of space, bringing attention to the coronal and transverse sections. Were not considered pathological maxillary sinuses presenting with mucous cysts and those with mild thickening of the membrane of the maxillary sinus (within 2-3 mm). Were considered acute sinusitis showed that, in the above sections, air-fluid level visible and those that showed complete obstruction (empyema) of the maxillary sinus and the complex osteomeatale.

**Results.** The analysis of CT slices showed involvement of the maxillary sinuses in greater proportion in patients with JIA (24%), whereas in healthy subjects are involved in only 11% of cases. The difference between the two study groups was statistically significant ( $p = 0.0156$ ) ( $\chi^2 = 5.85$ ). Of the 24 patients with JIA, 50% showed bilateral sinusitis, 50% unilateral sinusitis. In healthy patients with sinusitis, however, the percentages vary: 36.4% 63.6% unilateral and bilateral sinusitis.

**Conclusions.** Only 1 from 11 healthy patients showing acute sinusitis, the remaining 10 cases had chronic sinusitis. Of the 24 patients with JIA, only 2 have acute sinusitis. In most cases analyzed, therefore, the sinusitis is chronic, especially in patients with JIA. In light of what, it is possible to assume a correlation between Juvenile Rheumatoid Arthritis (JRA) and sinusitis.



### CORRELATION BETWEEN SCHELETIC 2 CLASS AND TEMPOROMANDIBULAR JOINT DISORDERS

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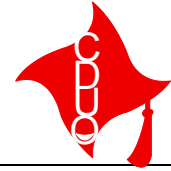
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**Aim.** The temporomandibular joint disorder (temporomandibular disorder tmd) is a series of problems that involves the masticatory muscles, the temporomandibular joint and the structures associated with them. currently is believed that, to define a temporomandibular joint dysfunction, must be present at least one of these symptoms: pain, noise, altered masticatory function. The purpose of this literature review is to evaluate current knowledge about the relationship between angle ii class malocclusion (especially the second division) with temporomandibular dysfunction (tmd).

**Materials and methods.** A survey has been conducted through the electronic databases medline. the keywords used in order to select studies that evaluated the relationship between dysfunction of the temporomandibular joint and the presence of angle ii class malocclusion were: "temporomandibular disorder and ii class malocclusion " using specific inclusion and exclusion criteria. of the 252 articles resulting from research 23 have been selected that met all the inclusion criteria of this review.

**Results.** the ii class malocclusion of angle, in particular the division 2, in the past have been cited as the main occlusal anomaly related to the appearance of the temporomandibular disorders. the prospective, longitudinal and retrospective analysis does not ultimately support a primary role of occlusion, especially ii class malocclusion second division, in the development of joint problems and also support the hypothesis of a multifactorial origin theory of joint problems.

**Conclusions.** a critical review of the most recent international literature does not support the primary etiological role of the occlusal factors, in particular, the ii class in the tmd. it can be said that the actual state of knowledge, occlusion is a factor of secondary importance, relevant but not decisive in the development of the temporomandibular disorders. it is therefore impossible to make any provision of proper development of tmd on the basis of the presence or absence of a malocclusion although in some studies the ii class malocclusion has been associated with a higher prevalence of muscle strains problems. so there is a lack of association with joint disorders (click, locking, dislocations), in the literature ii class malocclusion is related only to the problems of muscular type.



### DENTO-ALVEOLAR TISSUES ON THE FRONTAL PLANE: COMPUTERIZED 2D ANALYSIS METHOD FROM 3D SCANS

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**Aim.** Improving smile aesthetics is one of the primary goals of an orthodontic treatment. Scientific literature presents several difficulties in finding enough objectivity in the evaluation and comparison of the results of the orthodontic treatments. This lack of objectivity is particularly evident in the photographs analysis. Considering the increasing use of 3D virtual cast models, we aimed to analyze the macro-aesthetics of dental and alveolar soft and hard tissues, when visualized on the frontal plane using a dedicated software.

**Materials and methods.** The procedure starts from the cephalometric analysis of the lateral cephalograms, realized in natural head position, performed with the software Nemoceph NX® which allows to evaluate the inclination of the occlusal plane compared to the true vertical line. Using the extra-oral scanner Maestro 3D Dental®, we obtained the 3D scans of the orthodontic plaster casts of the patient, with a resolution of 1.5 million of triangles. Then the ortho file is uploaded on the software Maestro 3D Ortho Studio® and the occlusal plane of the cast is oriented coherently with the cephalometric value. The areas of interest (teeth, mucosa and empty spaces) are selected with an automatic procedure. The view of the casts is changed from the lateral to the frontal one, and a freeze-frame of the image is acquired in order to transfer the evaluation from 3D to 2D. The.jpg file is transferred on the image processing software Adobe Photoshop CS6® and the different areas are automatically calculated, obtaining their pixel number value.

**Results.** The casts analysis allowed a greater precision and reproducibility compared with the photographic one. We verified, using an existing software, that the automatic selection of different tissues and their numerical quantification is already feasible.

**Conclusions.** Aesthetic analysis of the consequences of the orthodontic treatments is important but needs more objectivity. By using a software available on the market, it is already possible to develop an accurate and standardized analysis. It should be useful to carry out these procedures on a single integrated software. Even though limited to the dento-alveolar tissues, our analysis allowed a quantitative intra- and inter-patient evaluation of the areas most involved in the orthodontic treatment. The position of the cast coherent with the natural head position may lead to a more realistic aesthetic evaluation. Our research do not included the extra-oral tissues and therefore it should be accordingly improved.





### DENTO-SKELETAL EFFECTS AFTER TWIN-BLOCK TREATMENT IN GROWING CLASS II PATIENTS: PRELIMINARY RESULTS

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**Aim.** The purpose of this retrospective controlled study was to verify dento-skeletal changes produced by the Twin-Block (TB) appliance during the treatment of growing patients with Class II malocclusions by mandibular retrusion compared with untreated growing Class II subjects.

**Materials and methods.** The data were derived from records obtained from a private practice (PPS). A total of twelve patients (9 girls and 3 boys) treated with the Twin-Block appliance for 1.5 years was compared with twelve untreated controls (5 girls and 7 boys) observed for 1.8 years. The two groups were matched for age (mean age of 11.3 yrs) and type of malocclusion (Class II malocclusion by mandibular retrusion). The TB appliance was used according to the following protocol: full time wear with activations based on the subject's response. The appliances were constructed according to the design recommended by Clark, except for the acrylic structure that was extended to the incisal edge. Patients were instructed to turn maxillary expansion screw once a week, while no mandibular screw was used. Lateral cephalograms at T0 and at T1 were analyzed in both groups. All sets of cephalograms were traced at the same time by a blind investigator, with particular attention to tracing the outlines of the maxilla, the mandible and the upper and lower incisors. A second blind operator checked each tracing for accuracy. Twenty-eight measures for the initial cephalometric values and changes between T0 and T1 were calculated. Stages of skeletal development was identified with the cervical vertebral maturation method (CVM).

**Results.** The stages of skeletal development were CS2 or CS3 at T0 and CS3 or CS4 at T1. The t-tests showed no statistically significant differences between patients and controls before treatment. After treatment, however, the TB appliance appeared to have some effects on the skeletal sagittal intermaxillary relationship. The comparison between groups showed significant average changes of the following measurements: ANB ( $-2.7^\circ$  vs  $-0.4^\circ$ ;  $P<0.001$ ), AOBO ( $-4.5$  mm vs  $-0.4$  mm;  $P=0$ ), SNA ( $-0.5^\circ$  vs  $0.4^\circ$ ;  $P=0.029$ ), A-N perp ( $-0.7$  mm vs  $0.1$  mm;  $P=0.02$ ), SNB ( $2.3^\circ$  vs  $0.8^\circ$ ;  $P<0.001$ ) and Pg-N perp ( $3.1$  mm vs  $1.4$  mm;  $P=0.01$ ). Also the OVJ ( $-5.1$  mm vs  $-0.8$  mm;  $P=0$ ) and the OVB ( $-1.8$  mm vs  $0.4$  mm;  $P=0.005$ ) decreased significantly with a remarkable improvement of incisor relationship, whereas the upper protrusion lip decreased significantly ( $-3.0$  mm vs  $-1.3$  mm;  $P=0.003$ ).

**Conclusions.** The TB in Class II growing patients with mandibular retrusion, treated at prepubertal stage of skeletal development, was associated with an improvement of intermaxillary discrepancy. A significant decrease of the OVJ and a significant increase of mandibular length were reported in treated patients compared to controls. Thus, the ideal timing for TB treatment seemed to be the beginning of the pubertal growth spurt.



### DENTO-SKELETAL EFFECTS OF HYBRID MAXILLARY EXPANSION

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**Aim.** To achieve skeletal changes with only minor dental movements, using an expansion protocol consisting of a rapid activation at the first appointment to separate the maxillary halves, followed by a slow activation at subsequent appointments. Since this protocol used both rapid and slow activations, it was called hybrid maxillary expansion. The aim of this retrospective study was, therefore, to verify this hypothesis comparing the dento-skeletal effects of hybrid maxillary expansion in growing patients with posterior crossbite with those of untreated growing subjects.

**Materials and methods.** A group of 24 patients (18 girls and 6 boys) treated with a Hyrax-type device was compared to an untreated matched control group at T0 (8.6 yrs  $\pm$  2.01) and T1 (10 yrs  $\pm$  2.00) using PA cephalograms. A Hyrax-type expander was bonded to the first upper molars and first deciduous molars or first bicuspid. The activation was performed during the same day with three steps of four, two and one turns, respectively. One turn was equivalent to  $\pm$  0.25 mm. After the first step the tenderness was located on the bonded teeth for 20 to 30 minutes, then it shifted to the palatal incisor area after the second step and to the central sutural area after the third one, for about 10-15 minutes. The decrease in tenderness on the bonded teeth and/or tenderness in the sutural area indicated that maxillary halves were separated. The cephalometric analysis included eight bilateral skeletal and dental landmarks. The groups were compared using independent sample t-test to estimate dento-skeletal effects on PA cephalograms. The method error was evaluated with Dalbergh's formula.

**Results.** The method error ranged between 0.5 mm and 0.2 mm indicating that there was a good reliability of the measurements. The comparison between the expansion and control groups at T0 revealed different transversal dento-skeletal measurements except for the latero-nasal, antegonial and lower molar widths. The control group after the observational period (T1-T0) presented changes (increase) of maxillary ( $P<0.01$ ), latero-nasal ( $P<0.01$ ) medio-orbitale ( $P<0.05$ ) and latero-orbitale ( $P<0.05$ ) widths. The treated group, after the expansion, had increases of all the transverse dento-skeletal measurements, except mastoid and antegonial widths. A comparison of yearly incremental changes revealed that all variables except the mastoid width differed significantly between the groups. At T1, the treated group, compared with the control group showed significant increase of the following measurements: medio-orbitale ( $P<0.01$ ), latero-orbitale ( $P<0.05$ ), mastoid ( $P<0.05$ ) and upper molar width ( $P<0.001$ ).

**Conclusions.** This study showed that in pre-pubertal patients, the hybrid maxillary expansion was an effective treatment option to improve dento-skeletal transverse dimensions and correct posterior crossbite. This outcome was associated with major skeletal and minor dental changes. Thus, the working hypothesis that by separating the two maxillary halves at the first appointment, the expansion forces were completely applied to the maxillary bone, may be confirmed.



### DIAGNOSTIC APPROACH TO DETERMINE THE CLINICAL INDICATION TO THE MANDIBULAR ADVANCEMENT DEVICE IN MODERATE OR SEVERE OSAHS PATIENTS

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**Aim.** Obstructive Sleep Apnoea/Hipopnoea Syndrome (OSAHS) is a sleep disorder that is characterized by recurrent episodes of partial or complete upper airway obstruction during sleep, leading to hypoxaemia and sleep disruption. Some patients can benefit using intraoral appliances, devices that are directed at opening and enlarging the pharyngeal airway by mechanical action. These devices increase airway size or stiffness through direct tissue advancement of the tongue and/or the jaw. Often, the therapeutic approach depends on the opportunity for the dentist to apply the oral appliance and on the simplicity for the patient to solve the clinical problem with a non-invasive solution. There is the lack of a general protocol to deal with the diagnostic aspect. The aim of the work is to define the diagnostic path to establish which patients could solve the OSAHS with Mandibular Advancement Device (MAD)

**Materials and methods.** Patients from the Centers for Sleep-Wake Disorders are recruited in the otolaryngology department of Brescia Spedali Civili. All patients have been already evaluated with Polysomnographic (PSG) recordings and patients with moderate and severe OSAHS; Hipopnoea/Apnoea Index (AHI)>10; AHI>30) are selected. These patients come to the attention of general practitioner because of the rising of sleeping and daily symptoms (snoring, apnea and daily sleepiness). In the otolaryngology department of Brescia Spedali Civili these patients undergo medical examinations during pre-hospitalization and the Epworth Sleepiness Scale is compiled. Then they do Sleep endoscopy Drug Induced (SEDI). A temporary MAD is prepared by the orthodontic department of dental clinic: a dentist uses the George Gauge device with the disposable fork to determine the maximum quantity of jaw protrusion and disclusion, depending on the patients occlusion. In this position, with polyvinylsiloxane putty fast set paste the new occlusion is recorded. When the patient is about to fall asleep for SEDI, the temporary MAD device is positioned into the mouth and the new jaw position is reached. At this point, it is possible to evaluate and visualize the efficacy of MAD and his influence on the pharyngeal anatomic structures. The Vote Classification is written. When the patient is discharged from hospital, therapeutic options are given.

**Results.** We expect that a small number of patients with moderate OSAHS is discharged from hospital with the therapeutic indication of MAD only. Some other patients, especially with severe OSAHS, will be discharged with the indication of combined MAD use and otolaryngology surgery intervention to solve the detected anatomic disorder. The patients with the indication of MAD only, if there are the dental clinical conditions to apply it, come to the dental clinic and the orthopantomography and cephalometric radiography are performed. The MAD applied is TAP (Thornton Adjustable Positioner) or Silensor, random selected. In those patients when the surgery has been decided, the MAD will be applied after surgery. After 6 months of use, the PSG recording is repeated to verify the improvement of AHI.

**Conclusions.** The diagnostic approach to OSAHS applying SEDI with the use of a temporary MAD in moderate or severe OSAHS patients can be more efficient and effective to determine the therapeutic solutions instead of the PSG recordings only.



### DISIMPACTION OF CANINES IN ADULT PATIENTS

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**Aim.** The impacted tooth is a dental element, in complete or in advanced state of maturation, which remains impacted at the level of bone or bone and soft tissue that fails to erupt in normal anatomical position, without tendency to the physiological migration in the vertical direction. The inclusion of the canine, after the third molar, occurs most frequently. Commonly individuals in the growth and development period and sometimes adults are subject to dental inclusions. We have analyzed and described the treatment options and prognosis in adults with inclusions of the canines. Today, the surgical orthodontic disimpaction treatment in adults is the preference choice of treatment, because impacted dental element is important in the morphofunctional balance of the stomatognathic system.

**Materials and methods.** In this study were selected and analyzed adults with impacted upper canines. For disimpaction of the upper canines was performed apically repositioned mucogingival flap procedure to restore proper biological dimension with the formation of an epithelial attachment. Successively using intra-oral traction with light forces with orthopantomography control in order to see through, that has been managed the replacement of the tooth in the arch.

**Results.** In all cases analyzed it was obtained the reposition of the dental element in the arch and orthodontic surgical therapy is considered a viable option even in the adult. It has to be considered the possible risks and complications of this treatment: ankylosis or loss of vitality of the impacted tooth; the root resorption of the impacted tooth or the adjacent teeth, the gingival recession and loss of bone support. In addition, it has to be evaluated the possible collateral effects, secondary complications and excessive duration of orthodontic treatment.

**Conclusions.** The goals of rehabilitation treatment in adult patients are the same like in the young patient and consist in achieving optimal aesthetics and proper function. The contraindication to orthodontic surgical therapy in the adult is represented by a paraorthological position of the impacted dental element, the radicular deformation or poor clinical need to bring the dental element in the arch. The canine is considered the aesthetically irreplaceable tooth and fundamental from the functional point of view. According to our studio, the most effective treatment in cases of impacted canines is orthodontic surgical disimpaction.



### EVALUATION AND REPRODUCIBILITY OF VOLUMETRIC MEASUREMENTS ON MAXILLARY SINUSES

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**Aim.** The aim of our study is to validate the use of Dolphin Imaging software to analyze CBCT images as a tool for volumetric estimation of maxillary sinus volumes and to test the intra- and inter-examiner reproducibility of this technique. In addition, other aim is to demonstrate the absence of correlation between the volumetric dimensions of the paranasal maxillary spaces between male and female subjects and among different skeletal types.

**Materials and methods.** The validation was performed by four different operators measuring the volume of six phantoms, where the real volume was already known. The maxillary sinus volumes of 52 patients (26 males and 26 females) mean age 24.3 were calculated and compared between genders and sagittal skeletal class subdivision. The measurements for patients and phantoms were based on CBCT scans (ILUMATM) processed by Dolphin 3D software.

**Results.** No statistical difference was observed between the real volume and the volume measurements performed by the operators. No statistical difference was found in patient's maxillary sinus volumes between gender and among different skeletal types.

**Conclusions.** This investigation demonstrated that, under defined clinical settings, CBCT imaging could provide accurate and reliable representations of maxillary sinus dimensions.



### EVALUATION OF NASAL OLFACTORY AND BREATHING CAPACITY BEFORE AND AFTER RAPID PALATAL EXPANSION (RPE) IN GROWING PATIENTS

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**Aim.** The purpose of the study was to evaluate Olfactory Capacity of children aged 6 to 12 years before and after RME, which found an improvement in Olfactory Threshold after 20 days of maxillary expansion. Olfactory tests has been done by using Sniffin' Sticks®.

**Materials and methods.** 12 patients aged 6 to 12 years, 4 boys and 8 girls have been selected for this study. These patients had unilateral or bilateral skeletal cross-bite with a discrepancy, of 4 mm or bigger, of transverse diameter between the maxilla and the mandible. The first permanent molars were erupted and were used for anchorage of Rapid Palatal Expander Hyrax-type. The patients have been submitted to respiratory tests (Rhinomanometry RAA, Peak Nasal Inspiratory Flow, PNIF) and olfactory tests (Nez du Vin, Threshold Test with Sniffin' Sticks®) before and after 20 days of expansion. The parents of the patients completed a questionnaire named SNOT22 to exclude symptoms that could distort the tests.

**Results.** Comparing the data of PNIF before and after expansion, an overall improvement trend can be observed, but there isn't any statistical significance ( $p 0,0762$ ). Olfactory Threshold doesn't demonstrate a significant improvement, however patients could pick out the odorant stick more easily. The evaluation of Nasal Inspiratory Resistance, before and after Rapid Maxillary Expansion, was shown in most patients to increase, probably caused by a temporary inflammation of nasal mucosa for the greater airway flow. It has to be remembered that the aim of the research was to also evaluate the patients after 6 months of expansion.

**Conclusions.** After this study it can be registered that there isn't any data that shows a statistically significant improvement of Olfactory Threshold after Rapid Palatal Expansion (T1). These data, however, are preliminary and a sample increase and a 6-months post expansion evaluation are necessary.



### EVALUATION OF PAIN CONTROL OF THE ANTI-INFLAMMATORY DRUGS DURING RAPID PALATAL EXPANSION

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**Aim.** The aim of this study was to investigate the prevalence, duration and intensity of the pain experienced during the active phase of the palatal expansion and assess the efficacy of the anti-inflammatories in association to the pain symptoms. In addition, we assessed whether there were different perceptions of pain and the resolution on the base of age and sex of the patient.

**Materials and methods.** 144 patients have been selected, 61 male and 83 females aged between 6 and 12 undergoing rapid palatal expansion. The protocol of activation of the appliance consisted in two activations per day for 14 days. The intensity of the pain perceived was registered after each activation using the facial expression scale. The patient was requested to inform if he/she was taking painkillers, which type and the doses and number of times.

**Results.** The results obtained demonstrate that 81.95% (118/144) of the patients have declared painful symptoms with respect to the use of the palatal expander which was more intense during the first day of activation of the appliance. In total, 27,97% of the patients who were experiencing painful symptoms (33/118) have taken painkillers. 48.48% (16/33) of patients who have taken painkillers have also taken anti-inflammatories, 42,42% (14/33) have taken drugs with only pain killer activity and 9,09% (3/33) have taken other drugs. Patients who have taken also anti-inflammatories have encountered a resolution of pain for a longer time, which highlighted the decreased number of drugs needed for the resolution of discomfort in respect to drugs without such activity. In addition, 81,25% (13/16) of patients who have taken NSAID have taken only one administration of the drug for the resolution of the symptoms against 28.57% (4/14) of patients who have taken drugs with no anti-inflammatory activity. The difference between reported pain symptoms and use of medication in relation to age and sex have had no statistical significance.

**Conclusions.** The data gathered has highlighted the efficacy of the pharmacological therapy with different drugs during the rapid palatal expansion. The anti-inflammatory therapy associated to pain killers has been more efficient in the control of pain in respect to a drug with no anti-inflammatory action.



### EVALUATION OF THE CONCORDANCE BETWEEN SOFT AND HARD TISSUE CEPHALOMETRIC ANALYSIS

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**Aim.** The cephalometric analysis of the soft tissue, as suggested by Arnett is an important diagnostic tool in orthodontics. The soft tissue analysis is better correlated with the aesthetics of the face compared to the one of the hard tissue, and both can allow the clinicians to achieve a correct diagnosis, that is a needful goal for a proper treatment planning. The aim of this study is to compare the diagnostic differences between the hard and soft tissue cephalometric analysis.

**Materials and methods.** The sample of this retrospective study consisted of the lateral cephalograms of 30 patients treated at the orthodontic clinic of the University of Messina (AOU G. Martino). 10 patients were randomly chosen from the clinical database for each Angle skeletal class and a new cephalometric analysis was made evaluating 3 parameters for the hard tissue (SNA°, SNB°, ANS-Me) and 3 for the soft tissue (A', B', SN'-Me'). Those cephalometric parameters allowed us to do a diagnostic assessment of the following facial features: the lower 1/3 facial height (brachyfacial, mesofacial and dolico-facial) and the anteroposterior position of the upper and lower Jaw (retrusive, normally positioned and protrusive). The diagnostic results obtained for each of those facial features with the hard tissue analysis and the soft tissue one were compared statistically using the T-test to find any statistically significant difference.

**Results.** The comparison between the hard and soft tissue diagnosis for the chosen parameters showed a statistically significant difference between those two cephalometric analyses.

**Conclusions.** Given that the aesthetics of the soft tissue plays a primary role in the social life and consequentially in the approval of the orthodontic treatment of the patients and considering the statistically significant differences between those two techniques it's necessary to complement the hard tissue evaluation with the one of the soft tissue.





### EVALUATION OF THE EFFICIENCY OF ORTHODONTIC TREATMENT COMBINED WITH LOW LEVEL LASER THERAPY IN RESOLVING DENTAL MISALIGNMENT

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**Aim.** To evaluate if Low Level Laser Therapy (LLLT) enhance the efficiency of the orthodontic treatment during the alignment stage.

**Materials and methods.** This clinical trial was carried out at the Department of Surgery and Translational Medicine, Section of Orthodontics, Milano Bicocca University. Inclusion criteria: patients under 35 years of age at the start of treatment who presented first class malocclusion with full permanent dentition, non-extraction treatment plan, mandibular Little irregularity index ranging between 3 mm and 6 mm, no spaces in the mandibular arch and no permanent tooth lost. Exclusion criteria: no previous orthodontic treatment, presence of a craniofacial syndrome and/or general diseases and the willingness of the patient and parent to take part in the study. A total of 24 patients were randomly allocated to receive fixed orthodontic appliance combined with LLLT (GROUP A) or only fixed orthodontic appliance as control group (GROUP B). All patients were bonded with active self-ligating bracket (Empower, AO, Sheboygan, WI, USA) with an 0.022-in slot and same prescription (MBT). Both groups underwent the following arch-wire sequence: 0.014-in thermal Ni-Ti arch-wire (Thermal-Ti Lite, Form I) at T1, 0.017X 0.025-in thermal Ni-Ti (Thermal-Ti Lite, Form I) at T2, and 0.019X 0.025-in thermal Ni-Ti arch-wire (Thermal-T D, Form I) at T3. The rate of alignment for both groups was measured by the differences of the irregularity index of serial casts taken at T0 and T4 divided by the number of days between the 2 measurements (irregularity index correction per day IICPD expressed in mm). All measurements were blindly performed by two expert orthodontists. Statistical analysis of data was performed using the analysis of variance (ANOVA); values that were not statistically significant were defined as  $P > 0.05$ .

**Results.** Basing on the overall treatment period of dental misalignment in this study, patients underwent to fixed orthodontics combined with LLLT (Group A) were found to require circa 8 appointments going from T1 to T3, that is, 28,75% less than Group B (circa 11 appointments). The daily alignment rates mean was double in Group A (0,02 mm) compared with Group B (0,01 mm).

**Conclusions.** LLLT seems to be an effective tool to improve the efficiency of orthodontic treatment.



### EXPERIMENTAL EVALUATION OF THE NEW HERBST MINISCOPE DEVICE IN PATIENTS WITH OSAS: PROTOCOL OF OBSERVATIONAL CLINICAL STUDY

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**Aim.** Aim of our observational clinical study is to evaluate the effectiveness of the new mandibular advancement device, Herbst Miniscope, in the therapy of sleep apnea in patients with OSAS (Obstructive Sleep Apnea Syndrome) in mild cases and/or moderate, in severe OSAS patients who refuse surgical treatment and in patients who do not tolerate the CPAP or are not responding to it or they can't use it occasionally.

**Materials and methods.** The observational clinical study Protocol requires that patients with mild or moderate OSAS, recruited on a voluntary basis, with written informed consent, are chosen according to the inclusion criteria, or are excluded on the basis of the exclusion criteria and contraindications to orthodontic treatment with Herbst Miniscope, defined by the study.

- *Inclusion criteria:* Adult patients with OSAS mild and/or moderate; Mostly obese BMI =  $W/H^2 \geq 28$  kg/m<sup>2</sup>; Neck girth: M  $\geq 43$  cm; F  $\geq 41$  cm; Rear retro-pharyngeal space  $\leq 8-9$  mm; Micrognathia and/or mandibular retrusion; Patients with moderate forms and/or serious that don't respond to CPAP, or they don't tolerate it or occasionally they can't use it; Patients with moderate forms and/or serious who refuse the surgical treatment.
- *Exclusion criteria:* The trouble is due to internistic or neurological diseases, use of drugs (muscle relaxants, sedatives, barbiturates and benzodiazepines) or substances (alcohol, drugs); Patients with periodontal disease, tooth mobility, hypodontia or edentulism. Patients with malocclusion of third class, injury of temporomandibular joints, bruxism.

The clinical course is divided into three stages: diagnosis, treatment and follow up. The diagnostic phase includes: first visit, screening tests, laboratory examinations, Polysomnography, OPT, cephalometric examination, dental visit and compilation of medical record, orthognatologic visit. In patients included in the study after finding imprints of jaw and bite of construction builds the appliance Herbst Miniscope. Patients must then undergo follow-up checks (one week, one month, two months after the start of therapy with Herbst Miniscope) during which will be assessed the effectiveness of the device in the resolution of the syndrome and the eventual appearance of side effects.

**Results.** By the analysis of the scientific Literature has been confirmed the effectiveness of Herbst Changed in the treatment of mild and moderate OSAS. Herbst Miniscope presents considerable advantages compared to other telescopic Herbst, so the implementation of clinical study Protocol demonstrates the effectiveness of Herbst Miniscope, compared to using other Mandibular Advancement devices, both in the resolution of the syndrome, both in reduction of symptoms and Polysomnographic indexes and increased patient comfort.

**Conclusions.** The device allows the mandibular advancement which prevents the adhesion of the tongue to the back wall of the pharynx, allowing oropharyngeal area expansion and thus guaranteeing the passage of air and the proper breathing. The flexibility of the device allows freedom of movement of the mandible in the night and the adjustment of mandibular advancement and improves the effectiveness of the device and patient comfort resulting in improved quality of life. Among the many benefits offered by this device include ease of use, robustness and effectiveness during the night in the resolution of snoring, in the forms of mild and moderate OSAS, in patients who refuse the surgical treatment or they don't tolerate the CPAP, or they don't respond to it or, occasionally, can't use it.



### FUNCTIONAL AND MORPHOLOGICAL CHANGES DUE TO ORAL HABITS: A LITERATURE REVIEW.

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**Aim.** Perform a literature review in order to identify the functional and morphological changes caused by oral habits.

**Materials and methods.** The research of scientific articles was performed on the database of the U.S. National Library of Medicine, by PubMed website. The terms used in the search were: "oral habits AND malocclusion". We found 138 articles and 16 were selected among them.

**Results.** The articles analyzed showed that the oral habits most commonly found in pediatric patients are represented by the sucking of the thumb or other fingers, use of the pacifier or bottle over the normal weaning period (3-4 years), sucking lips or cheeks and parafunctional habits such as mouth breathing and atypical deglutition. These habits can cause the onset of malocclusion in deciduous dentition that in mixed dentition. The damage caused by the oral habits vary depending on many factors: age of onset, duration, intensity and type. Moreover, the results indicate that the early cessation of the habit leads spontaneously to a structural and functional normalization while if the habit persists over 4 years of age are found more adverse effects on occlusion than those that are found if the bad oral habit is interrupted earlier.

**Conclusions.** The review shows that oral habits are closely related to the development of different malocclusion: anterior open-bite in the vertical plane, posterior cross-bite and lateral mandibular deviation in the transverse plane, while in the sagittal plane increased overjet, tendency to second class, mandibular retroposition, lingual inclination of the lower incisors and vestibular inclination of superior teeth are observed. Therefore it's important to investigate and to intercept these oral habits early, also considering that these are part of an evolutionary stage in the child during the first years of life. So parents adequately informed, the pediatrician or primary care physician should therefore pay attention to the possible persistence of these habits over the physiological time so that the dentist can take immediate action. For these reasons, it is recommended an early orthodontic control, around 5-6 years. The key to success in the treatment of oral habits lies precisely in the early interception.



### HOW VARIOUS CHIRURGICAL PROTOCOLS OF THE UNILATERAL CLEFT LIP AND PALATE INFLUENCE THE FACIAL GROWTH AND POSSIBLE ORTHODONTIC PROBLEMS. WHICH IS THE BEST TIMING OF LIP, PALATE AND ALVEOLUS REPAIR

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**Aim.** Cleft lip palate are congenital growth diseases with unknown ethiology, probably linked to both genetical and external causes. The aim of this work consists in presenting the effects of these diseases on cranio facial growth and the surgical protocols described in literature.

**Materials and methods.** The literature review has been conducted on medline and articles ranged from 1998 to 2011 have been selected. The key words of the research were "cleft lip palate", "cleft lip palate facial growth", "cleft lip palate surgery". The inclusion criteria were articles that analyzed surgical protocols and the growth of unilateral lip and palate clefts, the timing repair of lip, palate and alveolus. of the research, 57 articles had the selection criteria.

**Results.** the cleft lip and palate is one of the most common birth defects that needs long rehabilitation between birth and adulthood. surgical protocols described from several authors and timing proposed have been presented. The effects of these diseases on cranio facial growth and the importance of the early intervention have been described.

**Conclusions.** The review speaks about the main chirurgical protocols and treatment strategies of the unilateral lip and palate clefts. is discussed how surgery effects the midfacial skeletal growth. Studies agree that the palate repair is the main cause of the maxilla growth disturbances. it can be concluded about the timing of palate repair in the unilateral clefts that the most studies founded no difference between one or two stage palate repair techniques for the midfacial growth. Also from the research, delayed hard palate repair is abandoned between the centers because of worse speech outcome. despite wide variation in the timing of hard palate repair in current use according to the survey of the eurocleft project, more than 90% of the 201 registered centers complete hard palate closure before 3 years (shaw et al.2000). Which are the best techniques of palate repair is difficult to conclude, because the research results are mixed of the big controversy between the centers. From the studies about the alveolar repair it can be concluded that the primary bone grafting had more negative results on the skeletal growth. gingivoperiosteoplasty and the secondary bone grafting had more positive results for intracranial relationship. The studies agree that the best timing of lip repair is during third-sixth month of life and that lip repair could have the negative influence on the maxillary growth.



### IDIOPATHIC INTERNAL RESORPTION OF AN UNERUPTED THIRD MOLAR CASE REPORT

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**Aim.** To present and discuss a case of idiopathic resorption of the crown of an unerupted third molar.

**Materials and methods.** A pediatric male patient 12-years-old comes up for a visit and two TC are viewed: in the first one the 38 is clearly visible which crown is mineralizing. In the second one, taken one year after the first, it is impossible to evaluate the crown of the same teeth because of its absence.

**Results.** After a normal radiographic control the resorption of the 38's crown is seen even if the follicle and the bone cortex continuity is still clearly visible

**Conclusions.** We can say after a literature research that this case is the only one of this kind described.



### IMPACTED MAXILLARY CANINES ORTHODONTIC TREATMENT DURATION AND DIFFICULTY LEVEL PREDICTION

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**Aim.** The aim of this study was to evaluate the concordance between well known 2D measurements for predicting orthodontic treatment duration and difficulty level of impacted maxillary canines and the KPG index, a new index based on 3D CBCT images.

**Materials and methods.** OPG and CBCT images of 70 impacted canines, randomly extracted from our database, were scored by three orthodontist at  $t_0$  and after 1 month ( $t_1$ ). KPG index was calculated adding together the scores assigned to cusp tip and root tip on x, y, and z planes: Easy and Moderate categories were considered as Easier-Shorter Treatment; Difficult and Very Difficult categories as Difficult-Longer Treatment. 2D scores were calculated as follow: according to Stewart (2001) distance from cusp tip and occlusal plane less than 14mm indicated Shorter Treatment, more than 14mm Longer Treatment; according to Ericson and Kurol (1988) cusp tip distal to the midline of the lateral incisor was considered as Easier Treatment, mesial as Difficult Treatment. Inter- and intra- rater reliability for both 2D and 3D methods were calculated. The qualitative results (shorter/longer or easier/difficult) from these methods were plotted using contingency tables, and Pearson's coefficients were calculated in order to evaluate the degree of agreement. Conversely, the  $\chi^2$  with Yates correction test was used to assess the independence between them.

**Results.** Inter- and intra- rater reliability were higher with KPG compared to 2D methods. Overall, 34 of the 70 canines were classified in the same category in both 2D and 3D classifications; 12 were in the same category only considering 2D distance from the occlusal plane and KPG index; and 20 were in the same category only considering cusp position compared to lateral incisor midline and KPG index; 4 were in the same category only considering 2D measurements. Pearson's coefficients showed a statistically significant association between KPG and the two 2D indexes, while the  $\chi^2$  with Yates correction test resulted in a statistically significant rejection of independency only between KPG index and Ericson and Kurol analysis. KPG results were more frequently in accordance with the 2D canine's cusp position relative to lateral incisor midline, compared to the distance from the occlusal plane results. Considering Ericson and Kurol's analysis and Stewart's measurement, there was no statistically significant association between the results obtained with both analysis, and it was not possible to reject their independence at a statistically significant level.

**Conclusions.** Sometimes 2D indexes for predicting impacted maxillary canines treatment duration are discordant; a 3D index like the KPG index, considering the canine position in all the three dimensions, could be useful in solving these conflicts.



### IN-VITRO EVALUATION AND NUMERICAL DESCRIPTION OF SPEED INFLUENCE ON THE RESISTANCE TO SLIDING: ANALYSIS OF DIFFERENT ARCHWIRES DIAMETERS AND SHAPES IN SELF-LIGATING BRACKETS

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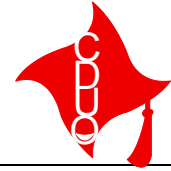
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**Aim.** The use of low-friction mechanics is becoming common in the clinical practice, and several authors tried to clarify which variables contribute to the phenomena, in order to better control their effects. They performed different in-vitro tests, aiming to simulate as accurately as possible the clinical reality, including several factors that can influence friction; some of these factors were not considered individually. The sliding speed was not considered as an independent variable so far, although it is one of the factors which was replicated in-vitro farthest from the clinical values. The purpose of this work was to investigate whether the resistance to sliding is influenced by the speed, especially at values closer to the orthodontic movement. This research aims to assess the proportionality between speed and friction, with a mathematic description of the function, which describes the phenomenon.

**Materials and methods.** A protocol consisting in 25 points was designed at the University of Hong Kong to isolate the speed as the only variable attributable to the changes in the resistance to sliding. Only the contribute of the kinetic friction was considered, by using an Instron® 5848 Micro Tester machine. A self-ligating interactive bracket (Empower, AO) was fixed on a custom made model, using a jig of positioning composed by a 0.021x0.028" straight wire. Several tests were performed to verify the correct axial positioning of the slot, the reliability of the clamps and the dimensional stability of the system. We used four different wires diameters and two types of sections (0.018" and 0.020" round, 0.016x0.022" and 0.017x0.025" rectangular), randomly selected by one blinded operator, coupled with three different speeds (0.1mm/100s, 0.01mm/100s and 0.001mm/100s). Each combination was tested ten times, for a total of 120 tests, detecting corresponding force values (N). Resulting data were tabulated in Microsoft Office Excel®, the mean values were obtained for each sample, and the differences were statistically analyzed with Student's t-tests ( $p < 0.05$ ) and correlation tests.

**Results.** As showed by previous studies, greater diameters are related to higher friction values and rectangular sections are related with friction values higher than round ones. With equal diameters and shapes, in all the analyzed situations, lower speeds are related with lower resistance to sliding. Friction becomes the half (46.42% less) each time that speed is ten times decreased, therefore resistance to sliding has a linear inverse proportionality with the speed.

**Conclusions.** Lower speed values are produced lower values of resistance to sliding. The proportionality of this phenomenon can be numerically characterized. The resulting formula suggests to perform quantitative evaluations on friction with tests carried on at speeds comparable to the clinical reality, otherwise applying a mathematical correction subsequently. It is possible that data provided by the literature so far, if considered in their absolute values, may have higher friction values than the clinical reality.



### LITERATURE REVIEW OF THE DENTAL AGENESIS AND THE THERAPEUTIC GUIDELINES

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**Aim.** The hypodontia is a congenital condition determined by the absence of one or more teeth. oligodontia is the term commonly used in cases of agenesis of at least 6 dental elements, while the anodontia is a serious and rare genetic disorder, characterized by the congenital absence of all primary or permanent teeth. The etiology of the hypodontia is unknown. The majority of cases present a polygenetic inheritance pattern, represented by genetic and environmental factors. The aim of this work is to describe the main treatment choices reported in the literature together with their indications and protocols. The treatment planning of congenitally missing maxillary lateral incisors is often challenging because of the high aesthetic value of their seat.

**Materials and methods.** The research has been conducted through the electronic databases medline (<http://www.ncbi.nlm.nih.gov/sites/entrez/query.fcgi>). The keywords used in order to select studies were: "congenitally missing teeth", "therapeutic guidelines".

**Results.** According to the evaluated articles the prevalence of the teeth agenesis occurs more frequently in permanent teeth comparing with deciduous teeth. It was a significant difference between males and females with the higher incidence in females compared with men. There is a correlation between hypodontia and microdontia; this form is most frequently present in the females. The hypodontia can occur individually or in association with other syndromes. It was associated more than 49 syndromes or systemic conditions, including the ectodermal dysplasia, down syndrome, ellis van crevald and cleft lip and palate. The agenesis most commonly involve the third permanent molars, maxillary lateral incisors and lower second premolar. Treatment planning must consider both patient-related factors (age, compliance, type and severity of malocclusion) and his expectations. Conservative approach is possible with remodelling of deciduous maxillary lateral incisors by composite resin. However, it should be considered a short-term solution. It is possible to perform an orthodontic treatment plan either to move canines in the space of missing teeth or to open the same space in order to allow a prosthodontic restoration. There are currently available prosthodontic options such as traditional or resinbonded fixed partial dentures, removable partial denture and osseointegrated implants. The latter option must be avoided in young patients, until facial growth is complete and permanent teeth are fully erupted. Autotransplantation of available teeth, generally extracted for orthodontic reasons, can also be a suitable choice in young patients.

**Conclusions.** there are several treatment options that should be considered during the treatment plan. a multidisciplinary approach by orthodontist, prosthodontist and oral surgeon is required in the treatment of congenitally missing maxillary lateral incisors.





### MANDIBULAR INCISORS PROCLINATION CONTROL DURING HERBST TREATMENT: WHICH ANCHORAGE AND LIGATION?

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**Aim.** To compare the skeletal and dental effects in patients treated with a traditional acrylic splint herbst (controls), with an acrylic splint miniscrew Herbst ligated with an elastic ligature (EL) and with an acrylic splint miniscrew Herbst ligated with a metallic ligature (ML).

**Materials and methods.** Inclusion criteria were: patients who could benefit from a Herbst treatment, that had a bilateral Angle Class II division 1 malocclusion,  $\geq 1/2$  cusp width, who were in permanent or late mixed dentition and whose parents had signed an informed consent form. Subjects were chosen retrospectively by pairing the data in order to create homogeneous groups for age and sex variables. The control group (11 males and 9 females, mean age  $11,25 \pm 1,74$  years) was treated with a traditional acrylic splint Herbst. The EL group (10 males and 10 females, mean age of  $11,85 \pm 1,66$  years) was treated with an acrylic splint Herbst, miniscrews were placed between mandibular second premolars and first molars in the attached gingiva and were ligated with elastic chains. The ML group (11 males and 9 females, mean age of  $11,75 \pm 2,38$  years) was treated with an acrylic splint Herbst, miniscrews were placed between mandibular first and second premolars in the attached gingiva and were ligated with metallic ligatures. The SO-cephalometric analysis of Pancherz was carried out for each patient before and at the end of Herbst treatment to analyze skeletal and dental changes. Measurements were compared using the ANOVA test and the Bonferroni test for pairwise comparison. The value of a for significance was set at 0.05.

**Results.** Subjects from all groups were successfully treated to a bilateral Class I relationship; fourteen miniscrews had to be replaced because of their mobility during treatment. Some cephalometric variables did not statistically change among the groups, such as maxillary bone base, condyle position and skeletal divergence. Some variables changed similarly in all the groups, such as skeletal class, mandibular incisor position, overjet and molar relationship. The variables that showed a significant difference were mandibular length, mandibular incisor inclination and Pg position. Statistical analysis showed that both the miniscrew groups controlled lower incisor flaring better than the control group ( $p=0.001$ ) with the elastic chain providing an even better control than the metallic ligature. Also, the EL group presented a greater mandibular length increase ( $p=0.033$ ) compared to the other groups. Finally, the EL group showed a better response in pogonion advancement ( $p=0.008$ ).

**Conclusions.** It seems that miniscrew Herbsts ligated with elastic chains provide both a better mandibular incisor flaring control and a mandibular advancement during miniscrew herbst treatment, if compared with metallic ligatures and controls.



### MINI-IMPLANTS IN ORTHODONTIC ANCHORAGE: CLINICAL INDICATIONS

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**Aim.** Mini-implants are becoming a frequent choice in orthodontics. They can represent a helpful anchorage device as a substitute for more traditional techniques requiring patient collaboration. Titanium mini implants are frequently used for their qualities like versatility, small size, low cost and the ease in positioning and removal; with this system osteointegration is not necessary and it can be used for a large range of orthodontical procedures. The use of mini implants is indicated for sagittal movements (retrusion/protraction) and for vertical movements (intrusion/extrusion). The aim of this poster is to demonstrate the clinical usage and show the benefits of mini implants in a 46-year-old female patient with a severely compromised dentature.

**Materials and methods.** 2 titanium mini-implants (2r = 1.8 mm and length =7 mm) were placed between the maxillary second premolar and first molar. The loss of lower premolars and molars often bring about supereruption of the maxillar antagonist teeth causing insufficient space for the prosthetic rehabilitation. In this situation the possible treatments are odonoplasty of the extruded teeth with the necessary endodontic treatment, maxillary impaction surgery or orthodontic treatment. In this case report (T2 at 6 months distance from T0, and T1 represent the mini-implants placement) the situation is shown of an adult patient requiring the intrusion of the first maxillar molar to obtain enough space for a removable prosthesis in the fourth sector. Furthermore, in this case the utility of the mini implant to obtain a reduction of the upper incisor protrusion is demonstrated.

**Results.** The mini implant allows the intrusion and the backward movement of the maxillary anterior teeth. This treatment allows a high preservation of dental structures and a restoration of the mandibular dentition. The patient obtains with this technique a safety and proper solution to her denture serious problems.

**Conclusions.** Mini implants used as temporary devices during orthodontic therapy are a solution in many different clinical situations. Important to be considered is that:

- Immediate loading of these devices with slight force is not a cause of their failure.
- Stability of the mini implants can be obtained through: good bone quality (adequate cortical bone thickness and high trabecular bone density); absence of inflamed perimplant soft tissues; limited distance between the centre of resistance of the mini implants; application point of the force and the correct placement procedure.



### MONITORING THE THERAPY OF TEMPOROMANDIBULAR DISORDER BY USING THE VISUAL ANALOGUE SCALE VAS

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**Aim.** To relate the development and maintenance of gnathological therapy, here we have compared two treatment strategies for temporomandibular disorder (TMD): 1) SVED and GELB splints; 2) Essix thermoformed plate, and myofunctional therapy of the tongue and masticatory muscles, using Visual Analogue Scale (VAS) and diagnostic protocol (myofascial trigger point examination) at University of Chieti.

**Materials and methods.** We studied Ten patients with TMD in the Department of Orthodontics at University of Chieti and in the Department of COI at Miulli Hospital. Following the treatments, we monitored Ten patients with TMD who shows visually the various feature of intensity and quality of pain using Visual Analogue Scale (VAS) and diagnostic protocol. We divided the patients into two groups: two for each treatment strategy, Valuations was made a month before therapy (T0) and one (T1), five (T2), and 15 (T3) months after the therapy start, all patient following Gymnastics and strengthening of the paravertebral muscles.

**Results.** All the patients showed signs of improvement. In patients with intra-capsular problems we used one of protrusive splint creating an improvement in the retrodiscal tissue, and in patients with extracapsular we used thermoformed plate 1mm, that reduced of facial pain. Seven of these patients stated to have their problem solved. And the only Three who still presenting the symptoms of the disease, claimed that was able to live with the problem.

**Conclusions.** For TMD we noticed a group of signs and symptoms, including the temporo-mandibular joint, masticatory muscles and connected ligaments. Differently from other similar syndromes, TMD is apparently one of the most difficult one to treat, both for the complexity of the anatomical structures involved and for the psychological implications that can be seen in the patients after healing the chronic pain. Our diagnostic protocol includes many questions and clinical examination that make it standard and reproducible any therapeutic valuation and it make possible a monitor of the therapy.



### NEUROMUSCULAR AND POSTURAL SYSTEMS: EFFECTS OF GLOBAL PROPRIOCEPTIVE RESONANCE

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**Aim.** The purpose of this study was to investigate the effects of Global Proprioceptive Resonance (GPR) by Multi Focal Vibrations (MFV) on muscle performance and body balance in healthy subjects, above all to find out a correlation between the postural equilibrium and MFV that leads to a muscular release and a redistribution of plantar loads, a correlation between the neuromuscular system (electromyographic, electrognatographic activity) and an MFV that leads to a muscular release.

**Materials and methods.** Sixty volunteers (31 males and 29 females, aged 19-25 years) underwent, in a randomized order, both the electromyography (EMG) and stabilometry exams before the Multi Focal Vibration (MFV) and immediately after it.

**Results.** The effects of GPR on the surface EMG of masseters and anterior temporalis muscles did not induce any statistically significant change, except to masseters muscles ( $p < 0.05$ ). There were effects in body balance tests, too ( $p < 0.05$ ).

**Conclusions.** In this preliminary study it was concluded that the Multi Focal Vibration (MFV) induced changes both in neuromuscular and in postural tests. Further and future studies should focus on evaluating the effects on orthodontic and temporomandibular disease patients, as well as the long term effects.



### ORTHODONTIC INDICATIONS TO FRENECTOMY

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**Aim.** The indications to frenectomy during an orthodontic treatment are still a controversial topic in the scientific literature. The aim of the present study is to review the scientific literature about the orthodontic indications to the superior labial frenum frenectomy.

**Materials and methods.** A detailed MEDLINE database search was carried out using the following key words: orthodontics AND frenum OR frenulum OR frenectomy OR frenulotomy OR frenotomy, diastema AND labial frenum, labial frenum AND periodontal disease. Among the 336 identified articles, 31 met the following inclusion criteria: publications from 1950 until today, orthodontic topic, systematic reviews, controlled and randomized clinical trials. The Authors also consulted the following texts: Contemporary Orthodontics, 5a ed. Proffit et al; Manuale di Chirurgia Orale, 3a ed. Chiapasco et al; Atlante di Chirurgia Parodontale, Erpestein.

**Results.** The first orthodontic indication to the superior labial frenum frenectomy is the presence of maxillary midline diastema. Three articles show that frenum may exert passive resisting mesial pressure during the eruption of lateral incisors and canines but it's not an important etiologic factor in midline diastema. Seven latest articles report that multiple factors contribute to diastema and an enlarged labial frenum has an etiologic role in few cases. There is a spontaneous closure of the midline diastema with the eruption of permanent lateral incisors and canines, therefore the treatment of maxillary midline diastema should be postponed until the eruption of the permanent canines but it may start earlier in case of diastema larger than 4mm. The decision to treat a maxillary midline diastema also depends upon its role in psychological well-being. Two articles found that maxillary anterior spacing is an aesthetic complaint for many people. Two articles explain that the relapse of the midline diastema appears in most of the cases so the use of permanent retention is essential in every case. One study supports the genetic predisposition for the midline diastema and this explains the racial and gender differences that exist for diastema which are stated in three publications. It has also observed a relationship between the frenum and periodontal disease but this relationship is not clear. Two studies reported that when the frenum exhibits a gingival insertion it can complicate the oral hygiene procedures with accumulation of plaque, thus contributing to the initiation or progression of periodontal disease. However one study reported that plaque and bleeding scores decreased when increasing the proximity of the frenum to the gingival margin. Frenectomy can be accomplished by scalpel technique, electrosurgery or laser. Various surgical techniques were employed for frenectomy but the use of lasers is increasingly popular. Five articles have reported laser frenectomy as an effective procedure, because of its simplicity, less bleeding, less pain, minimal swelling and a small or absent scar.

#### Conclusions

- Maxillary midline diastema is the most important indication for the superior labial frenum frenectomy. A maxillary midline diastema is common until the eruption of permanent canines, but it can mildly persist in the permanent dentition. When the diastema persists, many causes can be considered. Only after the exclusion of the other causes the frenum can be considered as a possible cause of diastema.
- There is the need to understand if frenum has a psychological implication for the patient, since frenum surgery often has only aesthetic motivations.
- The correlations between frenum and gingival recession remain unclear.

Additional high evidence based clinical studies with long follow-up are essential to assess the influence of an abnormal frenum on the midline diastema.



### ORTHODONTIC PRE SURGICAL PROTOCOL: IS IT RELIABLE?

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**Aim.** To evaluate the reliability of the virtual pre-surgical orthodontic programming protocol practiced at the School of Orthodontics of Milan comparing it with the non-virtual protocol used by the same School.

**Materials and methods.** The study involved 18 patients: 9 were subjected to pre-surgical orthodontic programming protocol, the other 9 to the standard one. The two methods were compared by evaluating the degree of discrepancy between the situation prospected by the program and the standard treated patients measured at the end of pre-surgical orthodontics in both groups. Also, the values of the maximum positive and negative deviation, medium and standard deviation were taken under control because they characterize the points of overlap.

**Results.** For all patients an overlap >75% was obtained between the planning scan and that related to the pre - surgical situation except for 2 patients strongly asymmetric. The analysis of the variables of the punctual deviation found no statistically significant differences between the two methods.

**Conclusions.** The study shows a high accuracy for both programming protocols whose reliability results very similar. However the virtual protocol entails numerous advantages in terms of quantity of information obtainable, the repeatability of the procedure and execution speed.



### ORTHODONTIC TREATMENT IN DIABETIC PATIENTS: A LITERATURE REVIEW

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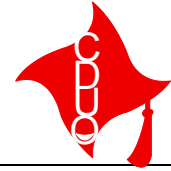
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**Aim.** The aim of this work was to evaluate the relationship between diabetes mellitus and orthodontic treatment, considering the effects that this systemic disease causes in the oral cavity and its implications in orthodontic patients. Diabetes mellitus is a common disease and its prevalence is increasing. Therefore, the dentist will have to deal with the oral health of these patients more and more often.

**Materials and methods.** The literature review was conducted using the Medline database. We found more than 400 articles using the following keywords: "orthodontic treatment and diabetes mellitus", "diabetes and malocclusions", "orthodontic therapy and medical disorders" and "oral manifestations of diabetes mellitus". We selected those that give useful information on the correlation between diabetes and oral diseases, in particular on the need for orthodontic treatment in diabetic patients. Articles considered were published between 1980 and 2013.

**Results.** One of the major complications of diabetes is periodontal disease, which is due to a greater periodontal fragility caused by the damage of proteins involved in the remodeling of periodontal ligament fibers. It follows that the orthodontic treatment in the diabetic patient is closely linked to its periodontal health and to the control of metabolic disease. However, many aspects of biological mechanisms that lead to periodontal damage in diabetic patients have not been cleared up and in next years we expect new research that will promote the development of new therapeutic methods.

**Conclusions.** Before starting an orthodontic therapy, the orthodontist have to ensure that glycemic control is stable and within the physiological range, otherwise he should advice the patient to consult his o her physician. If diabetes is poorly controlled (glycosylated hemoglobin HbA1c >9%) orthodontic treatment should be avoided or exclude since these individuals are particularly susceptible to periodontal breakdown. Otherwise well-controlled diabetes is not a contraindication for orthodontic treatment but during treatment special attention is required with regard to periodontal problems. Patients have to be explained about the greater propensity for gingival inflammation when fixed appliances are planned and the importance of maintaining good level of oral hygiene, including also the possible use of chlorhexidine, to prevent the progression of periodontal breakdown. In this way, satisfactory results can be achieved.



### ORTHODONTIC TREATMENT IN TWO PATIENTS AFFECTED BY HYPER IGE SYNDROME

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**Aim.** The aim of this work was to illustrate the orthodontic treatment carried out on two patients affected by hyper IGE syndrome. This is an autosomal dominant syndrome, which appears to be characterised by locular mutations situated on the arm of the chromosome 4 and has a variable expression. Clinically it is characterised by an increased level of type E immunoglobulin, chronic dermatitis and recurrent infections. Orthodontically it is characterised by 'Job's face' which is particular due to the altered vertical dimension, asymmetry, delay in eruption, prominent front, increase in the width of the nose, pronounced lower lip and increased thickness of the skin on the front, nose and ears as well as alterations to the transverse dimension of the palate.

**Materials and methods.** two patients attending the orthodontic department of the University of Milan affected by Job's syndrome have been assessed. Both patients have undergone the orthodontic diagnostic protocol, which consisted in: medical history, intra and extra-oral examination, radiographic evaluation, cephalometric assessment, study models and pictures. Both patients have been inserted in the hygiene prevention protocol of the University of Milan.

Patient 1: Referred to as V.C. 12 years old male patient in the 3<sup>rd</sup> growth period (according to the carpal assessment). The patient had a II class skeletal discrepancy, normal maxillary transverse diameter. The plaque index was found to be 3,6%, bleeding index was 23,4%, DMFT was 0 which increased to 4. An Andresen functional appliance was placed to guide the growth.

Patient 2: Referred to as J.A. 8 years old male patient. Class I skeletal malocclusion with skeletal deep-bite and transverse contraction with horizontal growth and hence favourable on the vertical plane. The plaque index was 3,9%, bleeding index 11,5%, DMFT 0. It was decided to use the rapid palatal expander with great difficulties due to the little patient collaboration. The teeth 52, 62,72,82 were extracted and after the RPE the Andresen functional appliance was used.

**Results.** Due to the prevention oral protocol that the patient had to follow it was possible to improve the overall oral health of the patient. In patient 1 it has been possible to correct the Class II skeletal malocclusion and guide with the functional appliance the growth of the stomatognathic system. The DMFT remained invariable to 4, the plaque index was 3,5% and the bleeding index was 10,2%. In patient 2 the transverse palatal and vertical relationship improved. The DMFT remained invariable at 0, the plaque index 1,9% and the bleeding index 7,4%.

**Conclusions.** the orthodontic treatment carried out in patients affected with hyper IGE syndrome is possible and leads to an improvement in the skeletal parameters. However, it requires a multidisciplinary approach between the paediatrician, orthodontist and oral hygienist.





### PARTIAL DISPLACEMENT TREATMENT OF THE TOOTH OUT OF ITS ALVEOLAR SOCKET IN AN ORTHODONTIC PATIENT. A 4 YEARS FOLLOW- UP

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**Aim.** Description of a dento-alveolar trauma in a young orthodontic patient. Traumatic dental injuries (TDIs) occur with great frequency in preschool, school age children and young adults comprising 5% of all injuries for which people seek treatment. Extrusion is an injury to the tooth characterized by a partial or total separation of the periodontal ligament resulting in the loosening or displacement of the tooth. TDIs represent a challenge for clinicians worldwide. Consequently, proper diagnosis treatment planning and follow-up can be critical to assure a successful outcome.

**Materials and methods.** A 10-years-old boy presented an orofacial trauma after sustaining 3 hours before at school. The injury regarded the upper right central incisor. The presence of the orthodontic device has prevented the complete extrusion of the tooth. The dental element appear elongated with buccal deviation of the crown and the tooth was suspended only by the fixed appliance to the vestibular gum and the palatal bone. There was bleeding from the periodontal ligament and the percussion sound was dull. Radiographic findings revealed an increased periodontal ligament space apically. The treatment consisted in: cleaning the exposed root surface with saline and antibiotic solution, repositioning the tooth carefully whereby the coagulum formed between the displaced root and socket wall with local anaesthesia. The correct tooth position optimizes the healing of the periodontal ligament and neurovascular supply while maintaining esthetic and functional integrity. After the repositioning procedure the niti arch was replaced with a one more rigid and passive in steel, than the labial and palatal bone plates were compressed to ensure repositioning and facilitate the periodontal healing. In this way, the tooth was splinted in its normal position. At the time of injury, the sensibility test gave no response. Patient instructions consisted in consuming soft food for 3 week, avoid biting and a meticulous oral hygiene with soft brush and chlorexidine rinsing to prevent accumulation of plaque and debris. The patient was discharged with follow-up appointments scheduled every week for two months and than every month. At each appointment the splint was checked, vitality was assessed and professional oral hygiene performed. Over the course of treatment, periodontal healing progressed well and the traumatized tooth survived.

**Results.** After a suitable period of recovery (six months), the steel arch was removed and the orthodontic therapy restarted. The treatment had been completed after one year using very low forces.

**Conclusions.** Very few studies have been performed on the prognosis of extrusive lesion. After a 4 years follow-up, there are no complications such as pulp necrosis, pulp canal obliteration, root resorption and marginal breakdown.



### PLAQUE ACCUMULATION AROUND BRACES: DIRECT VS INDIRECT BONDING TECHNIQUE COMPARISON

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**Aim.** Compared to direct bonding technique, indirect bonding technique allows a reduction in patient chair time, a more accurate braces placement and a reduced composite excess around the braces. The aim of this study was to evaluate whether the use of an indirect braces bonding technique could also help to reduce plaque accumulation around brackets and the formation of demineralization of the surrounding enamel at the end of the orthodontic treatment.

**Materials and methods.** This study involved 30 patients aged between 11.2 and 12.8 years (13 boys and 17 girls) treated with a split-mouth approach, bonding randomly one half-arch with a classic direct technique and the other half-arch with an indirect bonding protocol. Exclusion criteria were: presence of systemic or local (mucosal alterations, caries, periodontal pockets) pathologies, enamel development alterations, need for surgical or extended restorative adjunctive procedures and dietary restrictions or intolerances. The study protocol was approved by our institutional review board. The first step consisted in one or more sessions of professional oral hygiene and oral hygiene instruction and motivation. Then, for the first six months of treatment, we monthly recorded (from  $t_1$  to  $t_6$ ) plaque presence around braces according to a plaque accumulation index (PAI), in order to evaluate the amount of plaque accumulated between the occlusal, mesial, apical, and distal margins of the bracket and the corresponding dental margin. Evaluation criteria were as follows: 0. if plaque was absent; 1. if there was plaque accumulation on the bracket margin that did not cover half of the distance between the bracket and tooth margins; 2. if the accumulated plaque covered at least half of the distance between the bracket and tooth margins; 3. if the plaque reached the dental margin. During the orthodontic treatment, the patients underwent sessions of professional oral hygiene every 6 months. At the end of the treatment ( $t_7$ ), which lasted on average 2 years and 6 months, braces were debonded, final intraoral pictures were analyzed and the presence of white spots was noted. Analysis of variance (ANOVA) was used to identify significant differences between different bracket margins and between test and control sides.

**Results.** Test and control sides differed significantly for PAI measurements from  $t_1$  (1 month after bonding) to  $t_4$  (4 months after bonding), with the highest value of significance ( $P < .001$ ) at  $t_1$  but with no significant differences from  $t_5$  to  $t_7$  (treatment end). Considering whole-mouth results, different bracket margin PAI scores did not differ significantly. At time  $t_0$ , nine white spots were found on the buccal surfaces of the teeth that were successively bonded; at time  $t_7$ , there were 21 new white spots of different sizes on the control sides and 8 new white spots on the test sides. Thus, the test sides had fewer new white spots emerge.

**Conclusions.** these results do not indicate a significant difference in the onset of decay in patients treated with a fixed multibracket orthodontic appliance bonded following a direct or an indirect technique. Our indirect bonding protocol allowed for a significant reduction in plaque accumulation around the braces during the first 4 months after brackets placement and for a reduced onset of white spots during the orthodontic treatment. Considering whole-mouth results, plaque accumulation around different bracket margins did not significantly differ.



### PREVALENCE OF CRANIOMANDIBULAR DISORDERS IN NAVY SCUBA DIVERS AND RAIDERS: DIAGNOSTIC TOOLS

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**Aim.** To determine the prevalence of temporomandibular disorders and the neuromuscular system variations in scuba divers of the Navy and to identify the risk factors for the development of TMD signs and symptoms before and after diving by the use of a questionnaire, electromyography, stabilography, spirometry, and Cone Beam CT.

**Materials and methods.** 20 males individuals participated in the research aged 30 to 42 years. Each diver answered a questionnaire and undergone to neuromuscular tests, muscular and postural exams before and after diving, to CBCT and to spirometry to evaluate respiratory function.

**Results.** The prevalence of TMD symptoms after diving was about 93% versus a 32% before diving, the neuromuscular answers after diving (T3) were highly different from rest situation before immersion (T0): percent overlapping coefficient T0-T3  $p=0,0001$  ( $p<0,001$ ); impact T0-T3  $p=0.0087$  ( $p<0,01$ ); also postural aspect were different after diving ( $p<0.01$ ). Clenching seemed to be the greatest risk factor for pain in the masticatory muscle system while holding the mouth piece and after diving. Limited mouth opening and clenching were responsible for the symptoms in temporomandibular joint after the dive. Exposure to cold water for long periods of time causes the mandible to protrude and, together the tendency to bite harder on one side, can bring to dysfunction.

**Conclusions.** Scuba divers exhibiting TMD-related symptoms have met the greatest risk of developing TMJ dysfunction and neuromuscular changes during and after the dive. But also in asymptomatic divers, before the dive, TMD is a common problem after it.



### PYCNODYSTOSIS: CASE REPORT

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**Aim.** The Aim of the work is to report a case of a patient affected by Pycnodystosis (from Greek: puknos meaning "dense", dys "defective", and ostosis "condition of the bone"), is a lysosomal storage disease of the bone caused by a mutation in the gene that codes the enzyme cathepsin K. This is an autosomal recessive osteochondrodysplasia also named Toulouse-Lautrec syndrome and is related to osteoporosis because there's usually failure in bone's resorption.

**Materials and methods.** We selected a male 11-years-old patient affected by Pycnodystosis whom was sent to our school looking for an orthodontic treatment. He presented the typical craneo-facial anomalies such as maxillary and mandibular hypoplasia, late ossification of the fontanelles and of the skull joints. Bucally he presented severe superposition of the teeth.

**Results.** A Panoramic view showed the elevated grade of superposition caused by the lack of space due to bimaxillar hypoplasia, retentions and many caries. A post-anterior view showed great-generalized sclerosis of the bone, concentrated in the periorbital area and open fontanelles. Cephalometric analysis revealed obtuse mandibular angle and the measuring of the airway revealed a reduced space in the pharynx. Also many teeth have sever malposition and the palate is narrow and grooved.

**Conclusions.** Pycnodysostosis patients have special needs in terms of dental care; they need preventive and interceptive treatments to treat oral hygiene and caries due to dental crowding and the impactation of the dental pieces. The most important is precocious diagnosis. They need frequent visits to control their growth and especially their craniofacial development. Extraction of the deciduous teeth should be considered to consent the correct eruption of the permanent teeth and reduce dental crowding.



### QUANTITATIVE AND QUALITATIVE MICROBIOLOGICAL ANALYSIS AND VSC CONCENTRATION IN PATIENTS TREATED WITH TWO DIFFERENT FIXED ORTHODONTIC TECHNIQUES: A RANDOMIZED CONTROLLED CLINICAL TRIAL

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**Aim.** It was shown that the levels of VSCs in the mouth correlate with the depth of periodontal pockets, and that amount of VSCs in the breath increase with the number, depth, and bleeding tendency of the periodontal pockets. Therefore, good plaque control is an important factor in the maintenance of dental health during fixed appliance therapy in orthodontics. In literature there's only one study about VSC production in orthodontic patients. This study wants to analyze the quantitative and qualitative microbiological changes in subgingival plaque and to evaluate VSC production in patients treated with straight-wire or self-ligating orthodontic technique.

**Materials and methods.** 8 subjects have been selected from patients arrived for orthodontic treatment at the Department of Orthodontics, Umberto I Hospital, Sapienza, University of Rome. They are been divided, using a randomized computered method, in 2 groups [12 subjects treated with straight-wire technique and 12 subjects treated with self-ligating technique], similar for gender and age. The inclusion criteria have been: 1) good general health; 2) no previous orthodontic treatment and no orthognathic surgery required; 3) no prior history of periodontitis or periodontal therapy; 4) no systemic or local use of antibiotics or antinflammatory drugs during the preceding six months; 5) non-smokers. Each subject is instructed to brush their teeth after dinner and to refrain from eating and drinking until coming to the dentistry faculty next morning. They are also requested to avoid spicy foods, onions, and garlic for 48 hours before the appointment. All subjects received professional tooth brushing 1 week before placement orthodontic appliance, but no type of professional prophylaxis will be preformed during the observation periods. The following measures in each group by same periodontist (1) gingival index (GI), (2) gingival margin (GM), (3) bleeding on probing (BOP), (4) plaque index (PI) are recorded. Oral malodor is recorded using organoleptic test (count- to-twenty test and Rosenberg's scale) and gas-cromatografy evaluation with Oral Chroma<sup>TM</sup> software. The subgingival microbiota with PCR (Polymerase Chain Reaction) method is collected in the MV and DV gingival crevice of 1.6 and 2.6 (banded) and in the MV gingival crevice of 3.6 (no banded). Oral malodor tests, infiammatory measurements and PCR are recorded before bonding (T0), 1 week after bonding (T1), 4 weeks after bonding (T2), 3 months after bonding (T3) and 6 months after bonding (T4).

**Results.** Seems to be a correlation between IP e GM and VSC concentration. At T2, T3 and T4 the values of periodontal parameters and VSC cobcentration are higher in SL group. Even if it is too early to make an evaluation of the results, we can see that after a week there seems to be a reduction in the VSC's concentration. This can be explained by more consciousness of oral hygiene by the patients.

**Conclusions.** In according to the litterature we have observed inflammation of gingival tissues and microbiologic changes in subgingival biofilm during fixed orthodontic therapy, expecially in self-ligating techniques, probably because of the bracket design that offers more surface for bacterial colonization. During treatment there's also an increase of VSC concentration, expecially in SL group. We have attempted for microbiological analisys to obtain more predicible results.



## QUANTITATIVE SMILE ANALYSIS AFTER ORTHODONTIC TREATMENT WITH LOW-FRICTION ORTHODONTIC BRACKETS

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**Aim.** The aim of our research was to analyze changes occurring in smile width after orthodontic treatment. Although there is an overall agreement in the choice of the parameters that must be analyzed in the aesthetic evaluation of the smile, there is still some subjectivity in their interpretation. Among the existing quantitative variables objectively measurable on standardized photographs, we selected the most continuous. We did not want to interpret qualitatively the results that we obtained. We estimated if low friction mechanics cause changes in the parameters we considered.

**Materials and methods.** Our sample consisted of 40 subjects (with an average age of 13.5 years) equally distributed between males and females. These subjects did not received any previous orthodontic treatment. Pre- and post- treatment smile photographs were taken with a standardized methodology. These photographs were uploaded on the image processing software Adobe Photoshop CS6®. Then six measurements were performed: three linear (in pixels) and three of surface (in square pixels), for each photograph. We measured the inter-canine distance and the width of the dental arch, comparing them with the length of the inter-labial commissures. We also calculated the areas of the right and left buccal corridors, comparing them with the total area of the smile. The collected data were reported in Microsoft Office Excel® worksheets and statistically analyzed with Student's t-test (significance  $p < 0.05$ ) and correlation index analysis.

**Results.** Comparing pre- and post-treatment values, the ratio between dental arch width and the distance between the labial commissures, showed statistically significant changes. No changes were found considering the inter-canine dimensions. A statistically significant change was also found regarding the relationship between the areas of buccal corridors and the total smile area, comparing pre- and post-treatment. Total dental arch and inter-canine width values showed similar changes between pre- and post-treatment, with an high correlation degree. Measurements variations concerning the areas of the buccal corridors did not showed a significant correlation.

**Conclusions.** The photographic analysis of the smiles of patients treated with low-friction mechanics, showed a significant increase in the width of the dental arch without a corresponding increase of the inter-canine length. This increase corresponds to a reduction in the area of the buccal corridors that could be due to an increase of dental exposition mainly involving molars and premolars regions. Further studies will be useful to investigate the amount of correlation between the therapeutic results achieved and the low-friction mechanics used for the treatment of the patients.



### RELATIONSHIP BETWEEN THE MAXILLARY CANINES IN AN ECTOPIC AND VARIATION OF THE DIAMETER OF THE TEETH

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**Aim.** A tooth is impacted when its apex is formed but does not erupt as expected during the physiological timeframe of eruption. Maxillary canines, after the third molars are the teeth that more frequently show alterations of their eruptive process.. Maxillary canines can be positioned in ectopic palatal or buccal position. In recent years, an extensive search of the literature has shown a correlation between the palatal ectopic eruption of the canine and size of the dental elements reduced. Purpose of the study was to investigate a relationship between ectopic eruption of the canine oral, dental crowding and increased diameter of the teeth.

**Materials and methods.** In this study a sample (49 patients of both sexes), aged between 19 and 80 years was selected. It was carried out in among patients of the Section of Orthodontics, Department of Surgical, Oncology and Stomatologic Sciences, University of Palermo, Italy. The inclusion criteria for the selection of the sample are: aged 12 to 18 years, mean age 14 years old, both sexes, presence in the arch of the maxillary canines, presence of tooth agenesis, presence of dental crowding, ectopic buccal erupted maxillary canines. Exclusion criteria were age under 12 years, partially edentulous, including teeth, delayed eruption, the presence of other teeth in ectopic location. All patients fulfilling the inclusion criteria had one or both maxillary canines in ectopic buccal position. another control group of both sexes with maxillary canines correctly positioned in the arch; measurements were made of the diameters mesial-distal of the teeth of both jaws., on plaster models of the dental arches. Statistical analysis was conducted using test T Student. The significance level was set at  $p < 0.05$ . The acquired data refer to the mean values of the measurements for every –established parameter. The values of the phases of the study with one or both or without maxillary canines in ectopic buccal position were compared.

**Results.** The results show a significant reduction ( $p < 0.05$ ) the diameter of the elements in female patients with both the maxillary canines in ectopic buccal position. In patients of both sexes with one maxillary canine in ectopic buccal position the changes in the mesial-distal diameters of teeth are not statistically significant.

**Conclusions.** The statistical analysis, first, confirmed the presence of a sexual dimorphism, not only among the patient without maxillary canines in ectopic position, which was predictable confirmation of this difference in the size of the teeth between the sexes. Also the patient with canines in ectopic position showed a sexual dimorphism. In female patients with dental crowding is possible to recognized an eruption ectopic because of the increased diameter. If the displacement of the canines is detected early, the clinicians should then focus on the means of preventing a possible impaction.



### ROOT RESORPTION EVALUATION IN ADOLESCENT PATIENTS TREATED WITH A LOW-FRICTION MECHANIC

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**Aim.** Root resorption is an undesirable and unpredictable consequence associated with orthodontic treatment, which leads to shortening of the root length. The primary aim of this investigation was to evaluate the severity of the apical root resorption of upper and lower central and lateral incisors after a low-friction orthodontic treatment; the secondary aim was to investigate the presence of an association between root resorption and treatment duration.

**Materials and methods.** 40 subjects, 22 females and 18 males, with mean age of 11.3years (median value 13.22), were treated with an edgewise low-friction fixed orthodontic appliance. All the patients presented a small amount of frontal crowding and therefore any dental extraction was planned. Treatment duration ranged between 15 and 44 months (mean duration 27.9 months). Pre- and post-treatment root lengths of upper and lower central and lateral incisors (measured from the incisal edge to the root apex, through the midpoint of the CEJ) were taken on OPG previously uploaded on Adobe Photoshop CS6®. The resulting measurements, expressed in pixel, were intra-patient normalized using the mesio-distal diameter of the crown of the lower left first molar as reference. Pre- and post-treatment cephalometric analysis were traced on lateral cephalograms with the computerized software NemocephNX®, in order to evaluate changes occurring in the inclination of upper and lower central and lateral incisors, with regard to the bispal and mandibular planes respectively. All radiological images were taken by the same expert radiologist with a standard protocol and all radiological measurements were made by the same orthodontist. Data were then organized by using a Microsoft Excel spreadsheet. In order to estimate the variation of roots length values on the frontal plane, due to the change of teeth inclination on the sagittal plane, a trigonometric correction, based on lateral cephalograms measurements, was calculated for each patient. After this correction, differences between pre- and post-treatment values were statistically analyzed using the Student's t-test (significance setted at  $p < 0.05$ ), and correlation analysis was used to evaluate a possible association with treatment duration.

**Results.** Using the root length adjusted with the numeric correction, no statistically significant differences were found between the pre- and post-treatment tooth lengths of upper and lower central and lateral incisors. A weak correlation was found between the amount of root resorption and the duration of the treatment.

**Conclusions.** Our results demonstrated that, in presence of slight misalignment, a non-extractive treatment with low-friction mechanics do not lead to root resorption. However, considering the weak correlation found between root resorption and duration of the treatment, we cannot exclude that this adverse event can appear in case of higher amount of frontal teeth misalignment.





### **SURGICAL AND ORTHODONTIC MANAGEMENT OF IMPACTED MAXILLARY CENTRAL INCISORS DUE TO SUPERNUMERARY TOOTH**

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**Aim.** The aim of this clinical case is to demonstrate a surgery and orthodontic technique to solve an impacted maxillary central incisor in mixed dentition.

**Materials and methods.** The clinical case deals with an impacted permanent maxillary incisor. A 7 years old girl shows at the root level of the deciduous incisor a supernumerary element (revealed with a pretreatment panoramic and a 3D Maxiscan) which prevents the growth of the normal eruption of the permanent tooth. The surgical technique was performed for the supernumerary tooth extraction and the contextual impacted incisor anchorage. Afterwards the orthodontic treatment regarded a first light press for the tooth traction (palatal arch with the button of Nance) then a uprighting spring in order to place the incisor in the dental arch.

**Results.** In 1- year the objective has been successfully achieved with the positioning of the tooth in a balanced dental arch, with the good stability showed after a 6-year follow-up.

**Conclusions.** The maxillary central incisor impaction is uncommon, with a prevalence rate of 0.06% to 0.2% and the incidence in the 5–12 years-old age group has been reported as 0.13%. The usual cause of impaction of the maxillary central incisor is the presence of a supernumerary tooth or mesiodens. If the supernumerary tooth is discovered early and extracted, the central incisor may erupt spontaneously. If the root of the impacted incisor forms completely and the mesiodens has not been removed, however, then the central incisor may not erupt spontaneously. The impacted supernumerary tooth which was preventing the eruption of permanent incisor was surgically removed. The objectives of the orthodontic therapy are to establish a good occlusion, enhance the health of the periodontium, and most importantly to improve dental and facial esthetics. Many factors influence an impacted maxillary central incisor, among these the most common is the presence of a supernumerary tooth. This clinical case emphasizes that it's possible to reach a successful result only with an accurate diagnosis and a right treatment plan using a multidisciplinary management approach.



### TEMPOROMANDIBULAR JOINT DISORDERS IMAGING BY ULTRASONOGRAPHY IN JUVENILE IDIOPATHIC ARTHRITIS

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**Aim.** The aim of this study is to show the importance and reliability of ultrasonography (US) in the diagnosis of the temporomandibular disorders in patients affected by Juvenile Idiopathic Arthritis (JIA).

**Materials and methods.** 30 patients with JIA have been assessed by ultrasonographic exams. US was performed with a 11-18 MHz linear transducer. For paediatric patients, US offers specific advantages because it is non-invasive, does not require sedation or general anesthesia (which facilitates examinations for follow-up), is quickly accessible bedside, and is easy to combine with clinical assessment (interactivity). Agitation of the patient is rarely a problem, and hence young children can be seated on a parent's lap or play while being examined, and multiple locations can be assessed during a single session. Furthermore, modern high-frequency US transducers used by experienced US examiners can provide unsurpassed resolution of the superficial musculoskeletal structures in children.

**Results.** Were detected morphological alterations and positions of mandibular condyles in the glenoid fossa, condylar synovitis disc displacement and joint effusion.

**Conclusions.** Ultrasonography is a noninvasive and inexpensive diagnostic procedure that can be suggested for the evaluation of TMJ disorders, with particular accuracy in the detection of disc displacement and joint effusion. Limitations are especially related to the scarce accessibility of the medial part of the TMJ structures, and the need for trained and calibrated operators.



### THE ASSESSMENT OF THE PERCEPTION OF SMILE ESTHETICS: LITERATURE REVIEW

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**Aim.** The smile aesthetics and facial aesthetics is one of the aims of orthodontic treatment. the aesthetics perception is subjective. however, there are mathematical and geometrical concepts that help us to analyze the relationship of the lips and teeth and their compatibility with the general rules of structural beauty and the harmonious integration in the facial complex. the purpose of this study is to compare the perception of smile aesthetics of the general dentist, orthodontist and lay people.

**Materials and methods.** University of Washington in 1999 carried out the research that used a questionnaire with included smiling photographs that were intentionally altered with common anterior esthetic discrepancies in varying degrees of deviation, including variations in crown length, crown width, incisor crown angulation, midline, open gingival embrasure, gingival margin, incisal plane, and gingiva – to- lip distance. forty images were randomized in a questionnaire and rated according to attractiveness by three groups: orthodontist, general dentist, and lay people. The questionnaire was about the level of the perception of the smile esthetics, visual impact of the smile and the facial symmetry.

**Results.** The results demonstrated threshold levels of noticeable difference between the varying levels of discrepancy. A maxillary midline deviation of 4 mm by orthodontist was rated significantly less esthetic than were perceived by the others. However, general dentists and lay people were unable to detect even a 4 mm midline deviation. All three groups were able to distinguish a 2 mm discrepancy in incisor crown angulation. General dentist and lay people were unable to detect symmetric or asymmetric 2 mm narrowing in maxillary lateral incisor crown width. Open gingival embrasure became detectable by the general dentist and lay people at 3 mm, whereas gingiva - to - lip distance was classified by these groups as noticeably unattractive at 4mm.

**Conclusions.** Laypersons, generic dentists and orthodontists had different perceptions of attractiveness when evaluating different modified smiles. The layperson preferred smiles with midline deviation and were not attentive on esthetic parameters and symmetric alteration, that were important for the orthodontist. in all analyzed articles age and gender did not correlate with the judgment of the evaluators.



### THE EFFECT OF THE "SOMNO DENT" APPLIANCE FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS). A PROSPECTIVE LONGITUDINAL STUDY

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**Aim.** A prospective longitudinal study was carried out in order to assess "somno Dent", a mandibular protrusion device, for the treatment of Obstructive Sleep Apnea Syndrome (OSAS). The syndrome is characterized by 5 or more episodes of apnea per hour or a number of apneas and hypopneas more than 10 episodes per hour of sleep. During the apnea, blood oxygen levels are lowered, with increased blood pressure, cardiac arrhythmias and possible awakenings and breathlessness.

**Materials and methods.** A sample of 7 patients affected with Obstructive Sleep Apnea was examined with Dental Panoramic Tomography, Cephalogram X-Ray and polysomnographic examination in order to correlate the malocclusions with the OSAS severity (T0). Two months after the patients were fitted with the device somno Dent, the patients were tested again with polysomnography while they were wearing the device (T1). The following values were analyzed:

- BMI
- AHI (Apnea Hypoapnea Index)
- ODI (Oxygen Desaturation Index)
- LOW SA O2% (minimum saturation during examination)
- MED SA O2% (average saturation during examination)
- T <90% (total time when the saturation was less than 90% and measured in percentage to the total duration of the examination)
- time of snoring
- time in supine position

**Results.** The polysomnographic datas before and after the application of somno Dent device showed an evident improvement of all the parameters considered. The AHI was reduced in all the patients except one.

**Conclusions.** According to literature, the use of oral devices is effective in the treatments of mild or moderate sleep apnea, and allows a significant improvement of patient clinical conditions with no alterations of life quality.



### THE IMPORTANCE OF AN ACCURATE DIAGNOSIS IN ORTHODONTIC TREATMENT TO PREVENT FAILURE: A CASE REPORT

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**Aim.** The aim of this work is to demonstrate how the orthodontic diagnosis is an important step to obtain a successful treatment plan. More specifically, it demands an evaluation of the functional aspects of the dentition in terms of the overall well-being (esthetics), physiologic activity (breathing, swallowing, mastication and speech), health of the teeth (dental caries) and their supporting tissues (gingival and periodontal breakdown). The periodontal health is one of the most important aspect to consider: in fact, an orthodontic treatment managed without caution in a patient with periodontal disease, could certainly contribute to a surplus in disruption of the periodontal tissue. Particularly, a combination of orthodontic strength, occlusal trauma and periodontal disease could bring to a faster disruption of periodontal tissues. Now, we'll show a clinical case which emphasize the importance of a correct diagnosis in order to achieve a correct orthodontic treatment plan: the failure of an orthodontic treatment of an adult-patient with a class I malocclusion and an impacted maxillary canine.

**Methods and materials.** A 40 year-old patient came to our attention on April 2010, after the failure of a previous orthodontic treatment done from June 2002 to March 2008 for a dental alignment and bringing the impacted maxillary canine into the line of occlusion. During this period, clinicians did four surgeries for the impacted canine anchorage followed by uprighting attempts of dental element for its placing in the dental arch and the extraction of 4 premolars. The failure of the approach depends on both a failure of the orthodontic treatment (positioning of the impacted maxillary canine in the dental arch) and loose of teeth (for periodontal compliance and orthodontic press). After an accurate diagnosis using a multidisciplinary management approach (patient age, failure of a previous orthodontic treatment, suspect dental ankylosis, periodontal disease), beyond patient compliance ("no treatment if the patient does not desire it"), it was decided to realize a treatment plan that does not consider a new orthodontic approach.

**Results.** After a complete and multidisciplinary evaluation of the clinical case it has been decided for a 1-year treatment plan that would consider a prosthetic solution with:

- the extraction of the impacted maxillary canine and replacement with Zirconia crowns for the excellent long term natural aesthetics and the biocompatibility
- the replacement of compromised teeth with implanto-prosthetic solution.

Nowadays the patient is satisfied of the result achieved.

**Conclusions.** In the orthodontic diagnosis a thorough evaluation of all the aspects that could influence the goal of the treatment plan is mandatory. Clinicians, indeed, should formulate treatment plans that are in the best interest of the patient and they must be knowledgeable about the variety of treatment options. A good evaluation have to consider the oral cavity by a multidisciplinary point of view (orthodontic, prosthetic, gnathological and periodontal) in order to avoid every difficulties which could represent an impediment to achieve the result.



### THE ORTHOPEDIC TREATMENT OF III CLASS SKELETAL MALOCCLUSION IN THE GROWING PATIENT. CASE REPORT

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**Aim.** To evaluate the efficacy of III class skeletal malocclusion treatment performed to Delaire appliance.

**Materials and methods.** A female patient 8 yrs old with III skeletal Class malocclusion treated by Delaire's appliance. She worn 14 h for day for 18 months this appliance. We used 500 gr. of force for each side. We does'nt performed maxillary expansion. The therapy was in the same time performed with functional rehabilitation.

**Results.** The correct use of this appliance allowed to have an orthopedical forward movement of III middle of maxillary impossible to obtain by surgery in the adult age.

**Conclusions.** The Delaire's appliance today is the only non invasive efficacious treatment for skeletal correction of III class deformities.



### THE TEMPOROMANDIBULAR JOINT DISORDERS IN THE SPECIAL FORCES OF THE ITALIAN NAVY SUBJECTED TO EXTREME MENTAL AND PHYSICAL STRESS: STANDARD VS CUSTOMIZED DEVICES

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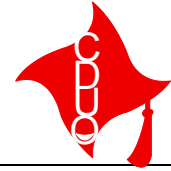
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**Aim.** Scuba divers deal with an extreme psychophysical effort during their activities showing neuromuscular, postural and cranio mandibular disorders. The aim is to determine the prevalence of temporomandibular disorders and the neuromuscular system variations in scuba divers of the Italian Navy with Commercial (CM) and Personalized Mouthpiece (PM), and to identify the risk factors for the development of TMD signs and symptoms before and after diving.

**Materials and methods.** Forty males (23-30 years) undergone to neuromuscular tests, spirometric and postural exams before and after diving, MRI and CBCT exams too.

**Results.** The prevalence of TMD symptoms after diving was about 93% with CM and 38% with PM versus a 32% before diving; with CM use the neuromuscular answers after diving (T3) were highly different from rest situation before immersion (T0) ( $p < 0,001$ ); also postural aspects were different after diving ( $p < 0,01$ ); there were no changes by PM use.

**Conclusions.** Scuba divers exhibiting TMD-related symptoms have met the greatest risk of developing TMJ dysfunction during and after the dive. Also in asymptomatic divers, before the dive, TMD was a common problem after it. Customized mouthpiece have reduced symptoms, significantly.



### THE USE OF DRUGS DURING ORTHODONTIC TREATMENT: A LITERATURE REVIEW

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**Aim.** The purpose of this scientific work was to evaluate the influence that drugs can have on orthodontic tooth movement, to determine which is the best approach to take in orthodontic patients in conjunction with drugs therapies.

**Materials and methods.** It was conducted a Review of the scientific literature of the last twenty years in order to examine what the effects of drugs on orthodontic tooth movement are.

**Results.** By the analysis of the considered articles it was found that the most commonly prescribed medications (antidepressants, anti-ulcer, cholesterol reducing drugs and broad-spectrum antibiotics) do not affect the orthodontic movement with a few exceptions (tricyclic antidepressants, antihistamines, anti-H1 and doxycycline). In particular, drugs that can affect orthodontic tooth movement are those that act on inflammation and bone metabolism (NSAIDs, corticosteroids, bisphosphonates).

**Conclusions.** On the basis of anamnestic data, it is important to inform the patient of the fact that these therapies may interfere with orthodontic treatment, extending the time and changing the results. So, in these cases, you should choose the treatment most appropriate to the situation and compromise more beneficial for the patient and his or her needs.





### THREE-DIMENSIONAL ANALYSIS OF DENTAL MOVEMENT IN PATIENTS SUBJECTED TO MONOCORTICAL TOOTH DISLOCATION AND LIGAMENT DISTRACTION

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**Aim.** Corticotomy-assisted orthodontic treatment is an established and efficient orthodontic technique that has recently been studied in a number of publications. It has gradually gained popularity as an adjunct treatment option for the orthodontic treatment of adults. It involves selective alveolar decortication in the form of decortication lines and dots performed around the teeth that are to be moved. It is done to induce a state of increased tissue turnover and a transient osteopenia, which is followed by a faster rate of orthodontic tooth movement. This technique has several advantages, including faster tooth movement, shorter treatment time, safer expansion of constricted arches, enhanced post-orthodontic treatment stability and extended envelope of tooth movement. Monocortical tooth dislocation and ligament distraction (MTDLD) is a corticotomy procedure conceived by Tommaso Vercellotti; this technique combines two different dental movements that work separately but simultaneously on opposite root surfaces. On the root surface corresponding to the direction of movement, vertical and horizontal microsurgical corticotomies are performed around each tooth root with a piezosurgical microsaw to eliminate cortical bone resistance. The immediate application of strong biomechanical forces produces rapid dislocation of the root and the cortical bone together. On the root surface opposite the direction of movement, the force of dislocation produces rapid distraction of ligament fibers. During the osteogenic process that follows, application of normal orthodontic biomechanics achieves the final tooth movement. The aim of this study is to evaluate the effectiveness of transversal expansion in the bilateral cross-bite treatments which has been obtained with monocortical tooth dislocation and ligament distraction. ( 373)

**Materials and methods.** Three inclusion parameters for the selection of patients have been expected: patient with ultimate growth, bilateral posterior cross-bite and dental crowding ( mild or moderate). Two patients have been selected for the study according to the previous parameters. The research protocol consists of a sequence of phases: MTDLD of the superior bonded arch (demon system) (T0), split mouth trial (stainless steel emiarch 0,17X0,25 for a quadrant and 0,14 CuNiTi emiarch for the other one), periodical controls (20-40-60 days) digital measurements of the three-dimensional dental casts through an appropriate software (T1), substitution at 120 day of the split-mouth arch with a 0,14X0,25 CuNiTi arch, realization of dental casts at 270 day and their conversation in three-dimensional models (T2). The final aim of these phases is to evaluate the clinical results and to compare the results obtained with split-mouth arch to those ones obtained with the continuous arch.

**Results.** During the time interval T0-T1 the anterior and posterior expansion has been greater in the quadrant with SS emiarch than the contralateral quadrant. During T1-T2 an additional transversal expansion has been achieved, especially for the inter-canine width. During the entire period of examination T0-T2 one of the two patients has obtained a greater transversal expansion but this discrepancy can be explained with the different transversal diameters at T0.

**Conclusions.** At T2 the cross-bites of the two patients are not completely resolved. The results are in a partial discordance with the previous literature where the cross-bite resolution has been achieved in the context of the biological window of RAP. The discord may be justified by the use of different orthodontic appliances.



### TMJ AND POSTURAL DISORDERS: IMPROVEMENT AFTER USE OF A MICROCHIP

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**Aim.** Many patients with TMJ problems have made numerous visits from one physician to another; some have even been hospitalized by a neurologist and many patients never get correctly diagnosed. Several studies have identified impairments in postural control in patients with temporomandibular disorders. There are several methods to alleviate TMD, and some studies have suggested that it is possible to control the stomatognathic system and the musculoskeletal system through the "foot support". The aim of the present study was to evaluate the variation produced by microchip in foot plantar in temporomandibular and postural disorders.

**Materials and methods.** A non-randomised clinical crossover study was carried out in among patients of the Section of Orthodontics, Department of Surgical, Oncology and Stomatologic Sciences, University of Palermo, Italy. The group included 42 participants ( 24 male and 18 female ) age range 12- 56 years, with mean age 34. All patients were evaluated for inclusion when the history and examination were being taken. The inclusion criteria for temporomandibular and postural disorders were: 1) a positive history of TMD with crepitus , click , limited functional mandibular movements and pain with VAS score of >5; 2) good general health; 3) no use of drugs, with affecting in TMJ , in the month before and during our trial; 4) no bite treatment; 5) an impaired postural balance. The study was carried out in accordance with the ethical standards set forth in the Helsinki Declaration of 1975 and approved by the Ethics Committee of the Faculty of Medicine. All participants received oral and written information regarding the study purpose and experimental protocols and provided written informed consent before being enrolled in the study. All participants responded to a specific questionnaire in which they reported on TMJ and postural disorders. All patients fulfilling the inclusion criteria had one a microchip ( neurostab ) on foot plantar region. The Neurostab , created by a Team of engineers and clinicians, is a microchip able to generate an elettromagnetic field. We evaluated the effects of neurostab by baropodometric platform. The crossover study was conducted in two phases: first exam was taken by baropodometric platform without microchip, as a baseline. Second exam was taken by baropodometric platform with microchip positionator. This microchip was used for at least two months. Both tests were performed under the eyes-closed and eyes-opened condition with a 5 min interval. The variation of foot support were investigated through the baropodometric platform.

**Results.** The results of barapodometric platform exam show an positive correlation between the application of neurostab and balance. In fact we observed an improvement in foot support , TMJ symptoms and postural balance.

**Conclusions.** In this study, patients with postural and TMJ symptoms show a significantly improvement after giving neurostab in foot plantar region. The technique with neurostab is potentially useful because is relatively non-invasive, is cheap and requires little additional time. Also, it can be applied even in the presence of other diseases. The results suggest it is justified to undertake more rigorous prospective and randomized studies to provide a better understanding of this phenomenon.



### TOOTH TRANSPOSITION BETWEEN UPPER MOLAR AND PREMOLAR: A CASE REPORT

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**Aim.** Tooth transposition is defined as a type of ectopic eruption with a permanent tooth developing and erupting in the position normally occupied by another permanent tooth. Although transpositions can appear in both the maxilla and the mandible, the maxillary canine is the most frequently involved tooth, followed by the first premolar, and less often by the lateral incisor. The aim of this work was to show an unusual tooth transposition between a molar and a premolar.

**Materials and methods.** A 10-year-old girl showed a Class I dental relationship in early mixed dentition: the maxillary arch was slightly constricted with no crossbite. Mild crowding in both arches and a tendency to open bite with tongue thrust were observed. The facial profile was slightly convex. The panoramic radiograph showed a developing ectopic premolar. The treatment had two phases. The first phase, lasting 1 year, was interceptive with a transpalatal bar in the maxillary arch and a lip bumper in the mandibular arch. The second phase of the treatment began with the placement of 0.022 x 0.028 standard edgewise appliances associated with high-pull headgear to supplement the anchorage and achieve vertical control. Initial leveling was accomplished with 0.016 and 0.018 Australian round wires and an open-coil springs to gain the space for the unerupted bicuspid. Then, the left second premolar was surgically exposed from the palatal side and showed an enamel hypoplasia of the crown. During the surgery a button for orthodontic traction was bonded and an elastomeric chain was applied. The tooth erupted palatally close to the distal cusp of the first molar. Once the premolar tooth was in the buccal position, rectangular archwires were used to move the roots progressively buccally and to complete the leveling of the arch. The fixed phase lasted 18 months. After active orthodontic treatment, maxillary and mandibular Hawley retainers were used for retention.

**Results.** The panoramic radiograph during treatment showed that the crown and the root of the maxillary left second premolar were into the correct position. The final occlusion was good, although the ectopic maxillary left second premolars had an ovoid shape and required reshaping with composite materials. However, the gingival height at the buccal side of the left premolar was satisfactory. Facial esthetics was preserved. The total treatment time was 3 years 6 months. Bilateral Class I molar and canine relationships and ideal overjet and overbite were achieved.

**Conclusions.** The tooth transposition is among the most difficult challenges for orthodontists. As shown by the occlusal and esthetic outcome of this clinical case, early diagnosis and treatment are suggested, albeit the complexity and the length of the treatment protocol. Moreover, a cost-benefit evaluation is always to be considered. Light forces and extra care, however, are required to prevent any possible damage to the teeth and the supporting structures. Therefore, early treatment of an unusual tooth transposition, even if carefully, should be considered.



### TREATMENT OF CLASS I MALOCCLUSION WITH FRANKEL APPLIANCE

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**Aim.** The aim of this paper is to evaluate the effect of the Frankel in child with class I malocclusion, maxillary and mandibular contraction, and anterior teeth crowding.

**Materials and methods.** 5 patients with a class I division I malocclusion, maxillary and mandibular contraction and anterior crowding was enrolled in the present study. All patients presented with a stage CS2, CS3 or CS4. Patients with CS5 were not enrolled in the study. Before wearing the Frankel, on each patient head radiographs were taken in lateral plane with the head fixed in a cephalostat with a film-focus distance of 4 m and a midsagittal-to-film distance of 0,1 m. Cephalometric analysis and casts analysis was performed before phase 1 treatment (T1), and immediately following phase 2 treatment (T2). In addition to standard cephalometric evaluation, another analysis, based on the distance of the basion, A and B to the T line, was done. Patients were instructed to wear the Frankel for 16 hours per day, during the night and afternoon, removing it only to eat and brush. Active treatment lasted 24 months for all patients. A statistical analysis of cephalometric and casts values before and after treatment was done.

**Results.** After 24 months of treatment the cephalometric effects observed were: an increase of the anterior facial height (mean 3,8 mm), an increase of the distance of the basion to the T line (mean 3,6 mm), a incisors tip control (upper incisors mean 0°, lower incisors - 3,2°) and a sagittal maxillary growth control (the mean distance of A to T line was 0°, the mean distance of B to T line was of - 2,2 mm). On cast authors observed an expansion of the upper and lower arches (anterior upper arch expansion mean 2 mm, posterior upper arch expansion mean 2,5 mm; lower arch mean 1 mm) with anterior crowding resolution and incisors sagittal control.

**Conclusions.** Authors evaluated that Frankel had a great repeal to control jaw growth, an increase of maxillary and mandibular expansion, an increase of the anterior facial height with a good control of incisors inclination.



### UNUSUAL PERIODONTAL COMPLICATIONS DURING THERAPY WITH ORTHOPEDIC FACE MASK IN TWO YOUNG BOYS WITH DIFFERENT BIOTYPES

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**Aim.** Recent articles have suggested the role of the marginal gingiva in triggering gingival recessions, in case of traumatism. An external compression, a surgical flap or orthodontic treatment, are able to stretch the extracellular matrix of the periodontal ligament. This can induce intracellular events that lead to the activation of osteoblast and osteoclast, as well as local alterations in vascularity. In patients with thin biotype, even when young, the resorption process may be greater than the deposition. A patient, in fact, can have different biotypes in different areas, that is he has different thickness of keratinized tissues and buccal cortical plate that can offer different resistances to external stimuli for recession. Thick biotype, in fact, usually develops pockets and fenestration, while the thin ones have recessions. These case reports describe unusual periodontal circumstances that occurred in two young boys, with different biotypes, during treatment with the Petit-type face mask.

**Materials and methods.** The patients were 8 years old, with a combined class III skeletal malocclusion, and a transverse deficiency. One patient had a thin gingival biotype, while the other a thick one, but both with healthy periodontium. The patients were treated with rapid maxillary expansion appliance to solve arch length discrepancy and a Petit-type face mask after the expansion. An elastic force of 300 g was applied per side, 16 hours a day.

**Results.** After a few months of therapy, in the first case gingival margins of teeth 31 and 41 migrated apically leading to a gingival recession on the labial surface. In the second case the boy had just a 1.5 mm of diameter fenestration, 2 mm apical to the CEJ. After the use of the masks was stopped and a protocol of oral hygiene was prescribed, both the situation improved, up to a restituo ad integrum in the first case. The fenestration was localized at the soft tissues with no attachment loss.

**Conclusions.** The biological mechanism at the basis of recessions is not clear yet, but it is possible that in patients with thin biotype the ability to resist to inflammatory stimuli is very small. This is why thick biotypes are more resistant to attachment loss. It is also credible that a compression at the gingiva may be the triggering a process of resorption at bone and gingival level. The early removal of the irritative stimuli can repair the damages both by a good vascularization and bone deposition extracellular matrix – induced. In case of class III treatments with Petit-type mask, it is recommended to control the position of the mental region of the appliance, in order to avoid compression at the gingival level, and the forces and to create personalized hygien-protocols, particularly in case of thin biotypes.



### USE OF THE TSME APPLIANCE FOR THE CORRECTION OF THE CLASS III MALOCCLUSIONS

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**Aim.** The aim of this study was to assess the results obtained through the use of the transverse sagittal maxillary expander (TSME) appliance in 5 patients affected by sagittal and transverse maxillary hypoplasia.

**Materials and methods.** The TSME is a fixed appliance indicated for the correction of hypoplastic forms secondary to the upper maxilla. Five patients have been assessed, 4 females and 1 male of ages between 8 and 11 years with a transverse and sagittal hypoplastic maxilla. After a thorough evaluation and a clinical examination, impressions have been taken for the development of study models. The relevant radiographic evaluations have been done as well as the cephalometric tracings. All 5 patients have undergone TSME correction. The protocol of activation of the device involves two phases. The first phase consisted in the rapid palatal expansion consisting of two activations of a quarter turn, which resulted in an expansion of 0,2-0,25 mm. These turns should ideally be carried out in the morning and evening so to perceive less pain and discomfort. Once the activation phase was completed, the central screw was fixed with a metal ligature. After 4 weeks the second phase of activation of the TSME was done. Hence a slow expansion of the two sagittal screws was carried out which were activated a quarter of a turn every seven days for a period of 6-8 months. Each quarter turn activation causes an expansion of the appliance similar to 0,2-0,25mm. The activation of such screws have the aim to determine the advancement on the sagittal plane of the anterior superior dento-alveolar sector together with a proclination of the upper incisors with consequent increase of the overjet. These effects allow an increase in the arch perimeter and the correction of the cross bite or the edge to edge occlusal relationships of the anterior sectors.

**Results.** In all patients we have noticed a resolution of the maxillary contraction and the Class III relationships. This is due to the palatal expansion during the first phase and the successive sagittal development of the maxilla carried out during the second phase.

**Conclusions.** In cases of transverse and sagittal maxillary hypoplasia the use of the TSME has resulted to be an opportunity that the orthodontist must keep in mind. In fact, thanks to the use of a single appliance it has been possible to obtain the re-establishment of the normal inter-maxillary relationships both in the sagittal and transverse planes.



### WHITE SPOT LESIONS AFTER FIXED ORTHODONTIC TREATMENT

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**Aim.** This study aim to evaluate the prevalence of White Spot Lesions (WSLs) on the teeth and in the mouth of patients after a fixed orthodontic treatment. The WSLs associated with fixed orthodontic treatment are a common side effect of orthodontic therapy and represent a significant challenge to achieve aesthetic excellence. They consist in some areas of decalcification and demineralization of the enamel which appear as white areas on the surface of the teeth. The formation of these lesions is due to the diffusion of the acids resulting from the metabolism of carbohydrates in the enamel with consequent dissolution of hydroxyapatite crystals. Moreover, the presence of plaque is a barrier which hinders the acids in the removal from the tooth surface.

**Materials and methods.** We considered a group of 40 patients at the end of fixed orthodontic treatment. A total of 1117 teeth were analyzed. First, we carried out a visual inspection on the wet surface of each tooth evaluated for each three surfaces: mesial-vestibular, vestibular and distal-vestibular. Then we repeated the analysis after drying the surfaces of the teeth with a jet of air for five seconds. To classify the characteristics of the WSLs four codes were used:

- Code 0: no change or light change in the enamel translucency after prolonged air drying;
- Code 1: opacity (white color) especially noticeable on the wet surface, but distinctly noticeable on the dry surface;
- Code 2: opacity (white) distinctly visible without drying;
- Code 3: localized enamel cracking or discoloration of enamel and/or gray discoloration of the underlying dentin.

**Results.** the prevalence of the WSLs in the mouth and on the surfaces of the teeth was respectively 90% and 39%. The analysis revealed the presence of WSLs in the 15% of the studied surface. In accordance with the four codes of evaluation, we identified 22% of the lesions with code 1; 74% of lesions with code 2; 3% of the lesions with code 3.

**Conclusions.** At the end of the study it demonstrated a high prevalence of WSLs in patients after a fixed orthodontic treatment. The WSLs are not uniformly distributed on the teeth. About 30% of them have been classified with codes 1 and 2 and most of these WSLs where localized on the surfaces of lower molars and premolars.



### EFFICIENCY OF SELF-LIGATING BRACKETS. A QUANTITATIVE APPROACH ON 3D MODELS: DAMON VS MBT

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**Aim.** The most recent knowledge on the biology of orthodontic tooth movement have highlighted the need to use light and constant forces to optimize orthodontic treatment. To evaluate the effective force agent on the tooth it is necessary to subtract, from the total force applied, the frictional ones. Friction is defined as the resistance to movement when an object moves tangentially against another. The frictional phenomenon is generated by the sliding between arch and slots and it is related to several factors including the type of ligature. It has been shown that the amount of produced friction by the attacks that require metals or elastomers ligatures, compared to self-ligating brackets, is progressively greater. The delivery of light forces must be obtained by reducing levels of friction, so that this can not reduce the force to ineffective levels. To reduce the amount of friction produced by kind of ligatures, self-ligating brackets have been developed; that allow the wire to slide more easily into the slot and consequently a more physiological tooth movement. The purpose of this study was to evaluate the better efficiency between Damon and MBT systematic, by analyzing three-dimensional models on which evaluate the change in arch form during orthodontic treatment.

**Materials and methods.** 12 patients requiring non-extractive orthodontic treatment with fixed appliances have been collected, and then ascribed random 8 to a group treated with systematic Damon 4 to a group treated with MBT. For each group 5 parameters have been evaluated (interincisive distance II, intercanine IC, interpremolar IPM, intermolar IM and arch depth PROF) measured on 3D models obtained by scanning gypsum casts at two time; t0 before orthodontic treatment, t1 after alignment and leveling phase after 20 weeks of therapy.

**Results.** The results obtained were subjected to statistical analysis, to evaluate the significance of the data. The † Student test was used to paired samples. Obtained results showed no significance of the data except for the intrepremolar distance (IPM) parameter, on which the damon sistematic seems to be more effective by changing the arch form.

**Conclusions.** The results obtained should take into account the different prescription of the two systematic, rather than arrogate to Damon bracket a greater efficiency during dental movement.

Further investigations are needed to demonstrate a greater efficiency of self- ligating appliances in dental movement and so in orthodontic treatment.





### 3D COMPUTED TOMOGRAPHY ORBITAL VOLUME AND APERTURE WIDTH EVALUATION. A STUDY IN PATIENTS AFFECTED BY FUNCTIONAL POSTERIOR CROSSBITE

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**Aim.** The purpose of this study was to assess Functional Posterior Crossbite (FPXB) effects on orbital skeletal structures, by using Computed Tomography, to evaluate orbital volume and aperture width in young patients.

**Materials and methods.** The study sample included 30 patients (12 males, 18 females, mean chronologic age was  $9.8 \pm 1.8$  years) affected by FPXB. Low-dose MDCT was performed immediately before orthodontic treatment. OsiriX Medical Imaging (Open-Source, OsiriX Medical Imaging Software, [www.osirix-viewer.com](http://www.osirix-viewer.com)) software was used to take measurements. Orbital volumes and aperture widths of crossbite sides were compared with data of the non crossbite sides that were used as controls.

**Results.** Orbital mean volumes of the control group was  $18.03 \pm 1.23$  cm<sup>3</sup>. In the crossbite side, mean volumes was  $18.54 \pm 1.26$  cm<sup>3</sup>. Differences between orbital volume measurements in the crossbite side and in the non crossbite side were found to be not statistically significant ( $p > 0.05$ ). Orbital aperture width mean in the non crossbite side was  $36.02 \pm 1.24$  mm while in the affected sample it was  $37.11 \pm 1.01$  mm. Differences between orbital aperture width among the two sides were analysed and found to be not statistically significant ( $p > 0.05$ ).

**Conclusions.** In our study, FPXB seems to produce small and not statistically significant differences in orbital dimensions between the crossbite side and the non crossbite side. Further researches should be conducted to assess FPXB influence on orbital district in older patients.



### A NON INVASIVE CEPHALOMETRIC ANALYSIS?

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**Aim.** Cephalometry represents the common base of every orthodontic treatment planning. However the biological cost is well known: cephalometric analysis requires radiographic exposure which may not be compatible with the growing concern over radiation hazards. Every cephalometric analysis employs several anatomical skeletal points, sometimes deep in the skull as S or Ba point, sometimes on the bone's external surface near the skin as N or A. The aim of this study is to identify the position of these bone's surface point without radiographs; furthermore, authors investigate the possibility to accurately measure, by echography, the thickness of the soft tissues covering N, A and B cephalometric points and calculate the amount of ANB angle starting from the echographic thickness evaluation, comparing it with the cephalometric one. The goal is to demonstrate the possibility of a real skeletal measurement of the patient avoiding x-ray exposure.

**Materials and methods.** In this retrospective study a sample of 20 consecutive patients was evaluated. Every patient had a digital lateral telerradiography made no more than 30 days before. Anatomic and cephalometric tracing was made by an expert orthodontist. The thickness of the soft tissues under N, A and B points and ANB angle was measured on the anatomical tracing. Digital photographs and echographic data of every patient were collected maintaining the patient in the same clinical situation as in the radiograph: occlusion in the correct centric relation and natural lip's posture. The statistical analyses about the differences between the measurements of the two echographic operators and the differences between X-Ray and echography results were produced by the statistical package IBM-SPSS v.20. Student's t-test and the non-parametric Wilcoxon's test were used to compare the means and medians for paired data: p values were considered significant when  $p < 0.05$ . Agreement between the methods was evaluated by Pearson correlation coefficient, intra-class correlation coefficient and Lin's concordance correlation coefficient. Tukey-Bland-Altman plots were also compared.

**Results.** Student's t-test didn't show significant statistical difference between the means of the measurements of the thickness of soft tissues that covers points A, B, and N when comparing X-rays to echography ( $p > 0.05$ ). No statistically significant difference was also found in the means of the measurement of ANB angle as obtained by echography and X-Ray ( $p > 0.05$ ). High concordance was found in this latter case between echography and X-Ray (Concordance correlation coefficient  $C_c = 0.98$ ; 95% C.I.: 0.9241 to 0.9958). On the contrary weak correlation was found in the measurements between the two techniques for each of the three points A, B and N.

**Conclusions.** The data from our study seem suggest that echographic measurements might be a reliable and reproducible tool. No significant mean difference and very high concordance correlation coefficient ( $C_c = 0.99$ ) were found between the echographic measurements made by two different operators. No significant difference was also found between the average values of ecographic and X-ray measurements, and no difference was found between the ANB angle calculated from X-ray and from ecography. However, because of the limited sample size, further studies are needed in order to assess if a noninvasive and less expensive tool such as ecography should be used alternatively or in addition to the standard radiological cephalometry.



### ANATOMICAL CHARACTERISTICS OF THE MAXILLARY ARCH IN MOUTH-BREATHING SUBJECTS EVALUATED WITH THREE-DIMENSIONAL ANALYSIS OF DIGITAL DENTAL CASTS – A CONTROLLED STUDY

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**Aim.** The aim was to compare the anatomical characteristics of the maxillary arch, identified as palatal surface area and volume, between mouth breathing and nose breathing subjects using a three-dimensional (3D) analysis of digital dental casts.

**Materials and methods.** 21 Caucasian subjects (14 females and 7 males) with a mean age of 8.4 years (SD 1.6 ys) were selected according to the following criteria: mouth-breathing pattern due to allergic rhinitis, early mixed dentition, skeletal Class I relationship, and pre-puberal stage of cervical vertebral maturation. Exclusion criteria were: sucking habits, previous history of nasal respiratory surgery, previous orthodontic treatment, cleft lip and /or palate, and other genetic diseases. This study group (SG) was compared with a control group (CG) of 17 nose breathing subjects (9 females and 8 males, mean age 8.5 years SD 1.7 years) and the control group matched the study group in terms of dentition stage, skeletal relationships, and skeletal maturation. For each subject initial dental casts were taken and the upper arch was scanned using a 3D laser scanner. On each digital model 3D measurements were performed to analyze maxillary arch morphology. Between-group differences were tested with the independent sample Student's t-test ( $p < .05$ ).

**Results.** No systematic error was found between the repeated digital measurements. The mean random error for the palatal surface area was 26.1 mm<sup>2</sup> while for the palatal volume was 143.8 mm<sup>3</sup>. In mouth breathing subjects changes in physiological function of the upper respiratory tract resulted in skeletal adaptations of the maxillary arch. In the SG both palatal surface area and volume were significantly smaller when compared with values of the CG. In particular, the palatal surface area and palatal volume were respectively 13.5% and 27.1% smaller in the SG when compared to the CG.

**Conclusions.** Subjects with prolonged mouth breathing showed a significant reduction of the palatal surface area and volume leading to a different development of the palatal morphology when compared with subjects with normal breathing pattern. Therefore, it seems advisable to correct the breathing pattern already at early developmental phases in order to prevent adverse maxillary growth.



### RARE CASE OF COMPLETE CONDYLAR RESORPTION IN A PATIENT WITH DOWN SYNDROME

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**Aim.** The condylar resorption is an idiopathic pathological condition and represents a diagnostic and therapeutic challenge especially when associated with syndromes. The condylar remodeling is multifactorial and influenced by mechanical factors and individual abilities to adjustments. The condylar idiopathic resorption is defined by erosion on the condyle and fossa and is often associated with Class II skeletal malocclusion, high FMA angle and open bite. Pain is not always present and most commonly occurs in teenage girls.

**Materials and methods.** A twenty years old female affected with Down syndrome was suffering from bilateral idiopathic condylar resorption, which, untreated in adolescence, severely progressed to the point that the patient was no longer able to chew. No orthodontic therapy was possible to plan because of the poor compliance. Professional hygiene sessions were routinely carried out for the only purpose of dental preservation.

**Discussion and conclusions.** This case demonstrates the importance of early diagnosis and accurate problem list when treating Down syndrome patients. Condylar resorption is a rare pathological condition difficult to diagnose and treat. It is crucial to assess whether it is associated to other pathologies, and when not associated, it is called "idiopathic". When not treated, the condylar resorption can dramatically progress and in special need patients become untreatable and affect quality of life.



### BIOMETRIC ANALYSIS OF MESIO-DISTAL DENTAL DIMENSIONS IN CAUCASIAN SUBJECTS WITH NORMAL OCCLUSION

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**Aim.** To confirm the efficacy of Bolton Index in a group of caucasian patients without normal occlusion. Maxillary and mandibular teeth measures obtained from male and female were analyzed with multivariate cluster analysis to find a new method that allows to localize and quantify the dento-dental discrepancy.

**Materials and methods.** The measurements of teeth dimensions were obtained from a sample of 56 caucasian patients with a normal occlusion (22 males, 34 females, mean age 27.8 years). The selection criteria of these subjects were: canine and molar class I, complete dentition exception for the third molars, normal OJ and OB (between 1 and 3 mm), minimum crowding (less than 1,5 mm whereas the 2 arches), normal Bolton Index, without previous orthodontic and/or prosthetic and/or conservative treatments (absence of Black's class II restorations). Statistical analysis provided for Dahlberg Index to evaluate the random error and t-test for independent samples to evaluate the systematic error. The range of the Dahlberg test varies between a minimum and a maximum 0.03 mm 0.31 mm, and the measurements for  $\alpha = 0.05$  were not affected by the systematic error. Teeth sizes data were analysed separately for males and females, dividing the scores between the maxilla and mandible. When clustering, the partitioning around medoids (PAM) algorithm was performed with the transformed data based on principal component analysis (PCA).

**Results.** Multivariate analysis revealed 3 clusters of dental dimensions (small, medium, large) for maxillary and mandibular, and for males and females. There is a significant proportionality between the clusters of lower and upper arches except for the "large - large" clusters combination. No difference between the genders was found nor with respect to the AR score ( $t_{(37,51)} = -0.82, p = 0.41, d = 0.24$ ) or with regard to the score OR ( $t_{(46,38)} = 0.66, p = 0.51, d = 0.18$ ). Statistically significant differences between the two genders in relation to the average measurements of the teeth were found. No significant differences for  $\alpha = 0.05$  were revealed between the left and right tooth which it may take the overlap between the scores of the left and right emiarcate.

**Conclusions.** Bolton index represents an irreplaceable tool in the determination of dento-dental discrepancy in most patient despite the wide range. Multivariate cluster analysis allows to obtain the exact location of the inter-dental arch discrepancy and represents an important aspect of the diagnostic phase during an orthodontic treatment by providing a standardized set up of "normal" dental dimensions.



### CAMOUFLAGE OF A BORDERLINE CLASS II MALOCCLUSION: CASE REPORT

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**Aim.** Camouflage treatment aims to correct the malocclusion so as to make less evident underlying skeletal problems. Camouflage is suggested in adult patients with a Class II skeletal disharmony, however this orthodontic treatment will hardly lead to success if are present: OVJ >10 mm, short mandible (<70 mm), lower incisors proclination compared to Pogonion, distance between the Pogonion and the perpendicular to the Nasion greater than 18 mm, a long face (facial height > 125 mm). Purposes of this work are the analysis of results of orthodontic treatment of compensation for a borderline skeletal Class II malocclusion and evaluation of diagnostic and therapeutic aspects.

**Materials and methods.** Case report of an adult 25 years old patient with a diagnosis of Class II dento-skeletal malocclusion, hypodivergent mandible, slight lower dental crowding, upper incisors proclination, lower incisors lingual inclination, deep bite (OVJ= 11 mm), increased OVJ (OVJ=14 mm), scissor bite of 2.4 and 2.7, upperpostero-lateral teeth palatal inclination with previous extractions of 3.6 and 4.7. The treatment planning included:

- Distalization of the upper dental arch and mesial movement of the lower dental arch through the combined action of the sequence of the arches and the use of Forsus™ Fatigue Resistant Device (FRD).
- Lower incisors proclination and upper incisors retroclination through the sequence of archwires.
- Deep bite resolution by leveling of dental arches with the combination of fixed therapy and supporting of FRD.
- Closing spaces with maximum anterior anchorage given by FRD.
- Correction of molar and canine Class, through the use of Class II elastics.
- Gear and finishing with elastics.

**Results.** Skeletal Class II has been masked by a dentoalveolar compensation. Dental arches leveling, given by the use of archwires sequence and FRD, helped to solve the deep bite and to increase vertical dimension. Furthermore, scissor bite of 2.4 and 2.7 has been solved and upper postero-lateral teeth proclination was generated, all just by means of archwires sequence. The duration of treatment was approximately 3 years.

**Conclusions.** One of the most difficult decisions that the orthodontist has to take is the opportunity to carry out an orthodontic treatment on a patient, at the end of growth, with a borderline skeletal discrepancy. Clearly, there are postpubertal patients with Class II malocclusions for whom orthognathic surgery combined with orthodontics is the best option, but epidemiologic information suggests they are a relatively small percentage of the potential patient pool. Many of these patients can be treated by an orthodontic camouflage. A careful analysis of cephalometric, dental and aesthetic data has evidenced that the treatment protocol used allowed the dento-skeletal Class II elastics with success and satisfaction for the patient.



### CAPABILITIES AND LIMITS IN THE DAILY USE OF PROFESSIONAL AND EDUCATIONAL ORTHODONTIC SOFTWARES FOR MOBILE DEVICES

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**Aim.** The rapid and continuous evolution of mobile technology is changing our life, conditioning our professional activity too. Portable devices, including tablets, smartphones and phablets allow doctors, dentists and orthodontists to enter patients records easily and everywhere using little softwares called "applications" or simply "apps". At the same time patients may leverage of Orthodontic Apps improving therapy and its results.

**Materials and methods.** We reviewed English, German, Spanish and Italian orthodontic apps on four different systems (Apple, Blackberry, Android, Windows) and scientific literature (PubMed Database) about this topic distinguishing two groups of results, programs for patients and programs for clinicians (Key words: braces, orthodontic, orthodontist). Four independent operators tested them on four different mobile devices (Samsung GalaxyII, Blackberry Z30, Ipad2, Nokia Lumia).

**Results.** Orthodontic Apps have been found only for Android and Apple devices. Two operators were using Blackberry and Windows devices in the early stage of the study continued to test Android and Apple Orthodontic Apps on opportune twin devices. From the 250 initial resulted apps, only the 27.5% are for orthodontists (products, meetings, publications, tooth ratio calculators), the 20% for patients (elastic and aligners reminders, products, therapeutic progresses, orthodontic emergencies). The remaining 52.5% are not OA, but games or advertisement apps-spaces for private dental activities.

**Conclusions.** Caring of problems related to privacy especially with underage patients Orthodontic Apps are catchy programs with an high potential to become useful tools supporting the patient during the therapy and the specialist in his orthodontic practice. Many Orthodontic Apps we selected in our study showed limits probably due to the poor architecture of the software. The repeated use of some Orthodontic Apps revealed the function of data recall and virtual archive isn't ever adequate, we met many errors. Another limit is related to the language. All these softwares are developed for clinicians and patients with a good level of English language knowledge. It can't be a limit for orthodontists, but our patients, or their parents, could find difficult to use apps in a foreign language. In this perspective, even though a successful orthodontic practice and therapy can't renounce to a good relation and communication orthodontist-patient, we are sure these tools can be a benefit for both we are going to develop our ideal orthodontic apps designed for us and our patients.



### ASSESSMENT OF AESTHETIC RESULT AFTER ORTHODONTIC THERAPY FOR THE CORRECTION OF FACIAL ASIMMETRY

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**Aim.** To evaluate the reduction of the facial lower third asymmetry in a patient treated with orthodontic therapy.

**Materials and methods.** A 8.3 years old female patient came to our observation and she has been submitted to clinical, photographic and radiographic examinations. The exams revealed a severe facial lower third asymmetry, class II malocclusion, deep bite, hyperdivergent facial profile, maxillary contraction and severe dental crowding.

**Results.** After an assessment, we decided to proceed with an initial phase of mobile interceptive therapy period of 2 years with monobloc with central expansion screw and masticatory upward to the right in order to maintain the vertical dimension on the right and to expand the maxillary arch. At the end of dental exchange the result obtained with the first phase was refined with fixed metallic multibracket appliance. The second phase of the therapy had a duration of about 24 months and has provided for the use of occlusal rises and asymmetric intermaxillary elastics. Once we got a stable occlusion, correct class relations and an aesthetically acceptable result, the patient came under restraint with periodic checks. The stability of the obtained results was evaluated by means of control after 10 years with examination of clinical photos and dental impressions; 3D-photogrammetric exam has allowed us to assess the possible residual asymmetry without the patient to undergo more radiographies.

**Conclusions.** Looking at the 3D exam it's interesting to note that though the middle third shows an asymmetry of 3 or 4 mm, the orthodontic therapy was able to reduce the negative consequences of this aspect. Indeed we can observe that the lower third asymmetry is at most of 1.5 mm, but the average value is 0.5 mm.





### CHANGES IN NASAL SOFT TISSUES WIDTHS ASSOCIATED WITH RAPID MAXILLARY EXPANSION THERAPY AND COMPARISON WITH A CONTROL GROUP

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**Aim.** The aim of this study was to analyze the changes in nasal soft tissues widths associated with a rapid maxillary expansion (RME) therapy. Data on greater alar cartilage (GAC) and alar base (AB) widths were compared with a control group within the same age.

**Materials and methods.** The study sample consisted of 61 subjects (26 girls and 35 boys, mean age  $10,5 \pm 1,8$  years) with maxillary transverse deficiency. It was treated with a rapid maxillary expansion therapy. The control group of 41 subjects (26 girls and 15 boys, mean age  $10,7 \pm 2,2$  years) had no therapy. Both groups underwent nasal soft tissues width measurements, which were: greater alar cartilage (GAC) and alar base (AB). In the study sample they were obtained at three separate time points:  $T_0$  prior to place rapid maxillary expander,  $T_1$  after completion of active expansion and  $T_2$  after removal of the expander. In the control group the second measurement was taken after 6 months from the first. A Shapiro-Wilk test was applied to evaluate data homogeneity. An analysis of variance (ANOVA) was used to determine statistical significant differences in the study sample and to determine the time range which caused the nasal width increase. In addition, independent sample Student's t-tests were used to compare the study sample versus the untreated normative sample in  $T_0$  and in  $T_2$  to show significant statistical differences in nasal widths.

**Results.** In the study sample the descriptive statistical analysis showed a mean increase within the size of 1 mm in the greater alar cartilage and in the alar base dimensions. Statistical significant differences were found in the  $T_1 - T_0$  increase and in the  $T_2 - T_0$  increase in the GAC width ( $p\text{-value} < 0,01$ ). Comparisons of  $T_2$  and  $T_0$  values between the study and the control group showed statistical differences in the greater alar cartilage width in  $T_2$  ( $p\text{-value} < 0,05$ ).

**Conclusions.** Analysis of the results showed that RME caused statistical significant differences in the GAC widths in the active period of treatment which was confirmed after 6 months of therapy. Statistical significant differences were also found in greater alar cartilage widths between the study sample and the control group at the end of the study period.



### CLINICAL AND EXPERIMENTAL APPROACH OF TADS IN THE INTRUSION OF MAXILLARY FIRST MOLAR

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**Aim.** The objective of this study is to evaluate the characteristics in terms of quantity and type of intrusion concerning maxillary first molar, obtained by the appliance of calibrated NiTi coil springs and TADs such as miniscrews.

**Materials and methods.** In this study, four patients (mean value age of 12.8 years) with maxillary molar extrusion were selected and treated at the Orthognatodontic Department "La Sapienza" University of Rome. The clinical treatment option of the malocclusion using TADs and its consequent dental movements were simulated on Typodont models per each case. After a careful evaluation of the anatomical morphology and site features of the tooth to intrude, four titanium miniscrews with round head, 1.6 mm diameter and 10 mm length, were inserted: both pairs on the buccal and palatal side, between the second premolar and first molar at 5-8 mm from the alveolar crest. Moreover a buccal twin bracket and a palatal button were placed on the clinical dental crown center. The traction was obtained through calibrated NiTi coil springs exerting a light force of 150 g. In order to avoid the possible coronal displacement of the TADs, caused by the traction force exerted by the coil springs, metal ligatures have been positioned at the level of each mini-implant, that, fixed to those of the opposite side, balanced the tensile force simulating a typical human pattern of absolute anchoring system. Digital intraoral periapical radiographs were taken before and after the intrusion.

**Results.** The intrusion of the maxillary first molars obtained was confirmed to be significant and pure both clinically and radiographically - through endoral X-ray observations, before and after the intrusion, comparing the axis of the intruded molar to the contiguous dental element. The use of four miniscrews in those study cases is a biomechanical approach that allows a virtually complete tridimensional control of tooth movement during the therapeutic treatment.

The association of miniscrews with calibrated NiTi springs was found to be a valid alternative solution as compared to other devices such as elastic chains. In fact, calibrated NiTi springs, connected to four miniscrews, develop a constant and known force (150 g) along four different vectors: thus allowing to obtain a controlled and uniform intrusion and, subsequently, a full control of tooth movement.

**Conclusions.** The current study proves that a maxillary molar can be successfully intruded with TADs by applying a slight and constant force on opposite side (bucco-palatal, posterior-anterior) directions exerted by calibrated NiTi springs hence leading to a better stress distribution and uniform intrusion, further confirming the validity of this biomechanical approach. A review of the literature shows that the use of Temporary Anchorage Devices (TADs) represents a safe and reliable procedure with high success rates (between 70 % and 91.6 %). TADs have great potential features close to ideal anchorage devices having an easy insertion and removal, the possibility of immediate loading, minimal patient's cooperation (adaptable to any age up to 12 years-old), reducing the overall treatment duration and have proved to bring clinical results equivalent or even superior to traditional biomechanical anchoring techniques.



### COMPARISON BETWEEN TWO THERAPEUTIC APPROACHES FOR SKELETAL CLASS III MALOCCLUSIONS

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**Aim.** The aim of the present study was to evaluate the effectiveness of an innovative therapeutic approach for skeletal class III malocclusions, using a modified protocol of splints and class III elastics (SEC III), and compare the skeletal and dental effects achieved with the chincup treatment.

**Materials and methods.** A group of 18 patients, 11 males and 7 females, with mean age 8.5 years, were treated for 12 months with modified SEC III, i.e. without using the chincup, to avoid possible mechanical stresses to the TMJ. At the beginning of treatment, all patients presented a skeletal class III malocclusion (ANB<0). Patients were educated to wear SEC III almost 18 hours a day, using correctly class III elastics (128g). Cephalometric tracings were performed on lateral head films taken at the beginning of the treatment (T0) and 12 months later (T1). Measurements were taken from McNamara's analysis, and completed with specific references to Tweed's, Steiner's, Ricketts' and Jacobson's analysis. These results were matched with a control group of 26 patients (11 males, 15 females), treated with light force chincup (125-250 g). The mean age at the beginning of the treatment with the chincup group was 8.5 years.

**Results.** The results of the treatment with modified SEC III, showed a clear improvement of all the variables considered, both dental and skeletal, from T0 to T1. The comparison with the control group, treated solely with chincup, showed few differences in skeletal changes, with a slight decrease in SNB angle and an increase in ANB angle. In the study group there was no dento-alveolar compensation, but a sort of corporeal tooth movement, with no changes in the interincisal angle. In the control group there were significant dento-alveolar changes, particularly retroclining of mandibular incisors, with reduction of IMPA.

**Conclusions.** The comparison of the effects achieved with the SEC III and chincup treatment showed no significant differences of the skeletal variables. There was no significant differences in mandibular body length, an increase in ANB angle, repositioning the mandible backward, and no significant variation of the gonial angle in both groups, with a tendency to the closure of the gonial angle. Significant differences of the dental measurements were found between the two groups, with the chincup group showing relevant dentoalveolar changes, such as retroclining of mandibular incisors.



### DENTAL AND FACIAL FEATURES OF WILLIAMS SYNDROME: A CLINICAL CASE

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**Aim.** William-Beuren syndrome (WBS) is a rare congenital disorder, due to microdeletion on chromosome 7, characterized by cardiovascular system disorders, mental retardation, distinctive facial features, infancy hypercalcemia and tooth anomalies. Aim of this study is to analyze the dentofacial abnormalities of a 12-years-old boy with WBS.

**Materials and methods.** we evaluated orofacial and dental characteristics of a 12-years-old boy with WBS, brought to Unit of Orthodontics of "Sapienza" University, comparing our observations with related data available in papers (PubMed) published from February 1991 to June 2012. Cephalometric analysis has been developed using Viewbox 3<sup>®</sup> Soft and manual measurement.

**Results.** The patient showed symmetric normofacial face, convex profile and typical "elfic facies": swollen eyelid, hypertelorism, wide and depressed nose, thick lips, chubby cheeks, retrognathism (in him not evident) and short chin. Intraoral examination revealed multiples agenesis, dental malpositions, palatal contraction, lower crowding, increased overbite and overjet, caries and gingival hyperplasia.

**Conclusions.** Dentofacial dysmorphologies of our patient are similar to the other cases observed in literature. A multidisciplinary approach is indicated. Healthy counterparts allows an early orthodontic treatment to avoid further dental complications.



### DENTAL AND SKELETAL EFFECTS OF RAPID MAXILLARY EXPANSION (RME): A SYSTEMATIC REVIEW IN THE LAST SEVEN YEARS

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**Aim.** Rapid maxillary expansion (RME) is a common orthopedic-orthodontic treatment used to correct a reduced maxillary width. Transverse maxillary deficiency is generally concomitant with the presence of posterior crossbite, arch form deformation, dental crowding, aesthetic and functional problems such as the narrowing of the nasal cavity and is often found in children with abnormal breathing. From a biological point of view, RME creates great forces at the sutural site in a short period of time and produces immediate mid-palatal suture separation by disruption of the sutural connective tissue. The goal of this treatment is to open the suture and to provide a correct and stable maxillary width. Treatment outcomes were different depending on the appliance used, tooth tissue-borne/tooth-borne expanders, bonded semi/rapid maxillary expansion, or rapid maxillary expansion through mid-palate suture opening. The clinical management of RME is well established and some differences characterize the different protocols of expansion, such as the number of turns of the midline screw (activation rate of the screw), i.e. rapid or slow expansion, appliance design (banded or bonded acrylic expander), and anchorage on deciduous or permanent teeth. The aim of this study is to review the current scientific literature about dental and skeletal effects of rapid maxillary expansion in children in the last seven years.

**Materials and methods.** Authors searched Medline/Pubmed electronic database from 2008 to February 2014 using keywords "rapid\*", "expand\*", "palat\*" and "maxillar\*" in Dental Journals category. Seventy-eight articles fulfilled the inclusion criteria, and the full-texts were assessed.

**Results.** The outcomes of RME appliance have been demonstrated to be skeletal, based on enlargement of the hard palate and maxillary base, reduction of its length, widening of the nasal cavity with reduced nasal airway resistance, increasing of the maxillary sinus volume and dental effects, based on increasing interdental distance, teeth axial inclination and reduction of overjet and overbite.

**Conclusions.** According to scientific literature RME produced a significant expansion in interpremolar and intermolar distances, a significant modification on the morphology of the maxillary dental arch, palatal area and maxillary bone and considerable effects on nasal airway resistance with improvement in nasal respiration after therapy.



### DIAGNOSTIC PERFORMANCE OF 3D EVALUATION OF PALATAL VAULT CHANGES IN ASSESSING SUCCESSFUL TREATMENT OF CONSTRICTED MAXILLA IN GROWING SUBJECTS

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**Aim.** Over the last decade, several three-dimensional (3D) recording methods have become more widely used in dentistry, including invasive (e.g. cone-beam computed tomography) and non-invasive (e.g. laser scanning procedures). In particular, non-invasive 3D recording methods have been used to monitor growth of the palatal vault in subjects with normal or constricted maxilla, or to assess the treatment effects of maxillary expansion. The success of maxillary expansion should not be assessed solely by the elimination of the teeth in crossbite; it should also be defined as the re-establishment of normal maxillary growth. The aim here was to quantify the longitudinal palatal changes in children treated for maxillary constriction associated with functional crossbite (TG) and normal controls (CG)

**Materials and methods.** Study casts of 48 Caucasian subjects (23 TG, 25 CG; mean age, 5.2 ± 0.6 years) were collected at baseline and at 6, 12, 18, 30, 42 and 54 months follow-up. The TG was treated using a cemented acrylic splint expander. Casts were scanned using a laser scanner and palatal surface area and volume, and their increments over time, were calculated. Non-parametric tests were used for the data analysis. The diagnostic performance in assessing successful treatment of palatal constriction was evaluated by the receiver operating characteristic (ROC) curves.

**Results.** Significantly greater increments in palatal surface area and volume were seen for the TG group up to 30 months ( $p < 0.05$ , at least). According to the ROC curves the best overall diagnostic performance in terms of accuracy was for the palatal volume at 18 months reaching up to a value of 0.85, by using a cut-off value of increments of 13.5%.

**Conclusions.** The assessment of successful maxillary expansion should not only be based on the absence of teeth in crossbite, but also on the re-establishment of normal growth. When dealing with subjects treated for maxillary constriction in the primary dentition and using a non-invasive 3D laser scanning procedure, an increase in palatal volume of at least 13.5% after 18 months out of treatment has an accuracy of 0.85 for the assessment of the re-establishment of the normal growth rate.



### DIAGNOSTIC PERFORMANCE OF COMBINED CANINE AND SECOND MOLAR MATURITY FOR IDENTIFICATION OF GROWTH PHASE

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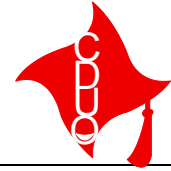
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**Aim.** Analysis of the diagnostic performance of the circumpubertal dental maturation stages of the mandibular canine and second molar, as individual teeth and in combination, for identification of growth phase.

**Materials and methods.** This study enrolled subjects who were seeking orthodontic treatment and who had never been treated before. The following enrolment criteria were observed: (1) age between 7 and 17 years, (2) intermediate or late mixed, or early permanent phases of dentition, and (3) good general health with absence of any nutritional problems. A total of 300 healthy subjects, 192 females and 108 males were enrolled in the study (mean age,  $11.4 \pm 2.4$  years; range, 6.8-17.1 years). Assessment of dental maturity was carried out through the calcification stages, according to the method of Demirjian et al. (stages D to H), from the panoramic radiographs of the left-side mandibular teeth. An experienced orthodontist who was blinded to the skeletal maturation stages assessed the dental maturity of the mandibular canines, the first and second premolars, and the second molars. Determination of growth phase (as pre-pubertal, pubertal and post-pubertal) was according to the cervical vertebra maturation method. An experienced orthodontist who was blinded to the dental maturation stages assessed the skeletal maturity of the subjects. Finally, the subjects were clustered into three groups according to their growth phases, as pre-pubertal (CS1 and CS2), pubertal (CS3 and CS4), and postpubertal (CS5 and CS6). For each canine and second molar, and within each dental maturation stage, the prevalence of the growth phases was calculated. To establish the clinical performance of each dental maturation stage for the diagnosis of each CVM stage, the positive likelihood ratios (LHRs) were calculated, along with the 95% confidence intervals. The diagnostic performances of the dental maturation stages, as both individual teeth and in combination, for identification of the growth phase were evaluated using positive likelihood ratios (LHRs), with a threshold of  $\geq 10$  for satisfactory performance.

**Results.** For the individual dental maturation stages, most of these positive LHRs were  $\leq 1.6$ , with values  $\geq 10$  seen only for identification of the pre-pubertal growth phase for canine stage F and second molar stages D and E, and for the post-pubertal growth phase for second molar stage H. All of the combined dental maturation stages yielded positive LHRs up to 2.6.

**Conclusions.** Dental maturation of either individual or combined teeth has little role in identification of the pubertal growth spurt and should not be used to assess timing for treatments that are required to be performed at this growth phase.



### DIFFERENT TREATMENT RESPONSE IN SISTERS WITH PALATALLY IMPACTED CANINES.

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**Aim.** The etiology of impacted canines is due to several factors: localized, systemic, or genetic. The genetic origin of palatally displaced maxillary canines includes the association with dental anomalies, such as missing of lateral incisors or presence of conoid maxillary lateral incisors. Moreover, palatally impacted maxillary canines are genetically reciprocally associated with other anomalies such as enamel hypoplasia, infraocclusion of primary molars, aplasia of second premolars. The purpose of this study is to show the management and response to surgical and orthodontic treatment of palatally impacted canines in two sisters with the lack of permanent lateral incisors.

**Materials and methods.** Two sisters, aged 13 (patient A) and 10 (patient B), with maxillary palatally impacted canines associated to agenesis of lateral incisors, underwent to a orthodontic-surgical treatment. For both patients, the clinical examination was combined with the following radiographic exams: orthopantomography, teleradiography in norma lateralis, occlusal radiography. Patient A presented the inclusion of both maxillary canines, while patient B presented the inclusion of the dental element 1.3. According to Ericsson & Kuroi and Lindauer analysis, the impacted canines presented the same starting characteristic about site, position and inclination. The same protocol was adopted: exposure of the impacted tooth; apply of the anchorage system (mod – bottoncini con legatura metallica); mounting of the disinclusion appliance (Crozat appliance); activation of the appliance that moved the tooth palatally, in order to distance the teeth from the root of adjacent dental elements. After the surgery, the appliances were periodically activated (1/month).

**Results.** A year later the orthodontic-surgical intervention, only patient B presented the exposure of the crown of the impacted canine, in opposition to patient A. Patient A had minor number of activations. The resorption of the roots of the lateral deciduous incisors was observed in both cases.

**Conclusions.** The characteristic of the impacted teeth between the sisters were similar. In particular, all of them had the same inclination, considered either with Ericsson&Kurel analysis, and Lindauer analysis. The main difference between the patients was the age at which the intervention occurred. In particular, for patient A the surgery was late compared to her sister, since patient B was 10 years old and patient A was 13 years old. This could suggest that the response to the same treatment is different considering the age of intervention. An earlier intervention could lead to a better prognosis of the impaction, and to a shorter treatment period.





### EARLY PREDICTION OF MAXILLARY CANINE IMPACTION FROM PANORAMIC RADIOGRAPHS

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**Aim.** To identify a method that can give the clinician a reliable protocol for early diagnosis of displacement of a canine and prediction of subsequent impaction on panoramic radiographs.

**Materials and methods.** The study was conducted on a radiographic sample (orthopantomographs and CT) of patients with unilateral or bilateral impacted canine, selected from the Department of Orthodontics, Policlinico Umberto I, Sapienza University of Rome. Of 120 selected patients, 50 patients [22 male, 28 female; mean age 11,7 years] satisfied the inclusion criteria of the study, namely: no previous orthodontic treatment; no subject affected by craniofacial syndromes, cleft lip or palate and sequelae of traumatic injuries; earliest available pre-treatment panoramic radiographs realized in mixed dentition. In a second phase of the statistical survey, the sample of 50 patients was divided into two groups: Case group (SG): impacted maxillary canines (n. 69); case control (CG): not impacted maxillary canine (n.31). The initial phase of the data collection process involved the elaboration of an excel worksheet for data categorization against 29 variables including a, b, and g angles and Lindauer's sectors. Correlations (Pearson r or Spearman  $\rho$ ) between measurements on these occasions were 0.995 for angulation and 1.000 for sector [ $P < 0.0001$ ]. The descriptive statistics included mean, median, standard deviation (angular measures), minimum and maximum of the impacted and no impacted canine. Moreover the data were divided into different age groups to facilitate comparing the position of the impacted canine with the not impacted canine and also individual tables were created for each sectors and angular value (a, b, and g).

**Results.** The analysis performed showed that a angle was higher for impaction teeth, with a mean of  $29,3768^\circ$  compared with  $9,2516^\circ$  for non impaction teeth. b angle was higher for impaction teeth, with a mean of  $39,3043^\circ$  compared with  $16,2741^\circ$  for nonimpaction teeth. Instead g angle was higher for nonimpaction teeth, with a mean of  $76,419^\circ$  compared with  $51,1739^\circ$  for impaction teeth. The median sector for impacted teeth was III compared with I for nonimpacted teeth. Fifteen impactions were found in sector I, 15 in sector II, 13 in sector III, and 26 in sector IV. The greatest probability of impaction was found in sector IV (0.97-0.99), especially with high angular values. Low angle values included sectors between I and II appear to be very low (0.06-0.40)

**Conclusions.** Among the three angles that were considered (a, b, g), the b angle has proved to be the most statistically significant. Although the a angle is not statistically significant, both from a review of the literature from both our sample, it was found that values equal to and greater than  $30^\circ$  appear to be associated with an increased risk of inclusion. The angle g is not found to be statistically significant as well but, unlike the a and b angles, low values of this angle seem to be associated with an increased risk of impacted canine.



### EFFECTS OF RADIO/CHEMOTHERAPY FOR RMS ON DENTAL AND CRANIO-FACIAL DEVELOPMENT

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**Aim.** Rhabdomyosarcoma (RMS) is the most common tumor of soft tissue during childhood and adolescence. It generally arises before 20 years of age. RMS is furtherly divided into three istological types: embryonal, alveolar and pleomorphic. Embryonal RMS is the most common (66% of all RMS). Most of embryonal RMSs is an infiltrating, soft and grey mass. Tumor cells simulate skeletal muscle in different embryogenesis stages: they form the layers of malignant cells, circular or fusiform shaped, plunged in myxoid stroma. RMSs are aggressive neoplasms generally treated by surgery and chemotherapy, with or without radiotherapy. Istological type and localization influence the survival rate. Botroid subtype has better prognosis, followed by embryonal type, pleomorphic and alveolar. The aim of this study is to show a case of RMS in a 9 years old girl treated with surgery and radiochemotherapy, when she was 3,10 years old, and to evaluate the effects of this treatment on cranio-facial growth and dental development.

**Materials and methods.** A 9,11 years old Italian female patient with RMS located in the right parotid has been analysed. Neoplasia has been diagnosed in June 2007 at the age of 3,10 years. The patient has been submitted to surgical excision of the infiltrating tumor mass located in the right parotid lodge and parapharyngeal space in July 2007. Afterwards, chemotherapy has been dispensed following European Paediatric Soft Tissue Sarcoma Study Group (EpSSG) non metastatic 'high risk' protocol and radiotherapy too (41,4 Gy). EpSSG non metastatic for high risk patients protocol includes ifosfamide, vincristine, and actinomycin D and doxorubicin (nine cycles including induction, treatment and maintenance therapy lasted 24 weeks) Radiochemotherapy ended in October 2008. In October 2011 a MRI control detected a little mass in the deep portion of right parotid with irregular morphology, suspected to be local recurrence. During subsequent MRI controls in April 2013 and June 2013 no significant changes have been detected. The patient was visited in Orthodontics division of Dental School in May 2013.

**Results.** Extraoral examination detects asymmetry of the face. The profile emphasize the poor growth of mandible (Hypomandibulia). Intraoral examination detects mucosite especially in upper incisors area. The enamel of 5.3, 5.4, 5.5 show yellow/brown opacity. Orthopantomography made in April 2013 shows short V-shaped roots of lower incisors and first left molar, arrested root development of lower first and second right molar. Upper canines appear in the same position and development of their roots appears arrested comparing to a previous OPT made in April 2010.

**Conclusions.** Radiochemotherapy influences the cranio-facial growth and dental development according to literature. Dentists and especially orthodontists often treat patients who have been submitted to chemo and/or radiotherapy for neoplasms during their very first years of life, thanks to a better survival rate too; therefore they must know the odontostomatological consequences of these treatments in order to plan their therapeutic intervention.



### FACIAL ASYMMETRY: A RETROSPECTIVE STUDY

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**Aim.** The point at which "normal" asymmetry becomes "abnormal" can be defined by an aesthetic limit and a functional limit. When patient complain of facial asymmetry, the underlying cause should be studied; the etiology includes congenital disorders, acquired diseases, and traumatic and developmental deformities. Our purpose is to investigate about the possible genetic liability in the transmissibility of the asymmetric traits, through an initial analysis developed by twofold approach: (1) delving into family history by questionnaire and (2) examining differences in laterality between the patient and his corresponding parent by an aesthetic analysis.

**Materials and methods.** A total of 52 italian subjects (57% females, 43% males; mean age 11 years 7 months) were selected. Individuals in the sample were categorized according to diagnosis of facial asymmetry, nonsyndromic patients, participation by informed consent and negative medical history of the maxillo-facial complex. Differences in length between distance from the anthropometric points to the facial midline and to horizontal reference were measured on a frontal facial photograph. Subjects were categorized as having left- or right-sided laterality.

**Results.** Analyzing the questionnaire's answers, 65% of parents with correspondence of laterality reported a positive family history, and about each linear measurement, there is a high percentage of parent-child pairs with correspondence of laterality of asymmetry traits.

**Conclusions.** Finally, the data analysis shows that the mother is the parent most involved in the correspondence of laterality and then should be appropriate to investigate this result.



## FIRST MOLAR AGENESIS: GENETIC AND EPIDEMIOLOGICAL ASPECTS AND REPORT OF A CASE

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**Aim.** Tooth agenesis is a common developmental anomaly with reported prevalence of 0.3-16.2% in permanent dentition, without considering the agenesis of third molars. The most frequently missing permanent teeth excluding third molars, are the mandibular second premolar and the maxillary lateral incisor. Absence of permanent molars represents a rather rare condition. The purpose of this study is to perform a review about prevalence and characteristics of first molar agenesis and to evaluate the prevalence of this condition in a sample of Italian patients.

**Materials and methods.** Pubmed and Scopus scientific databases have been consulted. Articles regarding agenesis of first molars have been selected. 810 non syndromic patients arriving for their first visit between 2012 and 2013 at the Orthodontic Department of the Dental Clinic of Policlinic Umberto I in Rome have been examined to evaluate the prevalence of first molar agenesis.

**Results.** Agenesis of maxillary central incisors, maxillary and mandibular first molars and mandibular canines are very rare. Some authors have found that mutations in PAX9 can cause molar oligodontia inherited in autosomal dominant manner. PAX9 mutations determine more frequently agenesis of the maxillary first and second molars and the mandibular second molars. Other authors have shown that MSX1 haplosufficiency includes agenesis of second premolars and third molars and in only some cases of first and second molars. According to an existing meta-analysis, the prevalence of maxillary first molar agenesis has been reported to vary from 0.02 to 0.05% for maxillary first molars and from 0.00 to 0.02% for mandibular first molars (95% CI). Agenesis of first molars can determine clinically significant problems because of their important role in the mastication of food, in supporting the vertical dimension and as orthodontic anchorage. Some authors report more remarkable skeletal and dental deviations for subjects with maxillary first molar agenesis than those without agenesis of this class of tooth. In our sample, the relative prevalence of patients with first molar agenesis was 0.12%. One case of a 10 years old caucasian female with non-syndromic oligodontia and absence of permanent molars has been found. Clinical and radiographic examination of the patient revealed the absence of 8 teeth in permanent dentition (1.2, 1.6, 2.2, 2.6, 3.1, 3.5, 3.6, 4.5). No evaluation could be conducted on the presence of third molars due to the age of the subject. Cephalometric examination revealed a skeletal class III. In the family of the proband, no other cases of dental agenesis were referred.

**Conclusions.** Agenesis of first molars represents a very low-frequency condition although very important for the occlusion and the treatment planning. Genetic tests should be carried out to identify genetic mutations possibly determining this uncommon conditions.



### FLOATING NORMS FOR CEPHALOMETRIC INDEXES OF SAGITTAL DISCREPANCY

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**Aim.** The correct evaluation of the antero-posterior relationship between jaws with the aim of identifying the skeletal pattern, is a fundamental step in the orthodontic treatment planning. However, all the sagittal discrepancy parameters are based on standard mean values which are determined from populations of subjects with an ideal occlusion and well balanced faces and several studies showed that a certain pattern may be correlated with cephalometric skeletal variables. The aim of this study is to evaluate if indexes of sagittal discrepancy (ANB angle, Beta angle and MMBP Wits) are correlated with facial divergence and subsequently to elaborate floating norms related to individual skeletal pattern.

**Materials and methods.** A total of 119 subjects (74 females and 45 males) with ideal occlusion were included in the study (mean age, 11.2 ±1.5 years; range, 8.2-14.0 years). A customized digitization regimen and analysis with cephalometric software (Viewbox, version 3.0, dHAL Software, Kifissia, Greece) was used for all cephalograms examined in this study. The cephalometric analysis required the digitization of 9 landmarks and 1 fiducial point. The customized cephalometric analysis included four angular measurements as follows maxillary prognathism (SNA angle), maxillary inclination relative to the cranial base (SN/PP angle), mandibular inclination relative to the cranial base (SN/MP angle) and cranial base angle (NSBa angle) A multiple regression analysis was run to associate vertical and sagittal craniofacial measurements (SNA, SN/PP, SN/MP and NS-Ba angles) with ANB angle, Beta angle and MMBP Wits.

**Results.** The ANB angle was significantly associated with all the explanatory variables and, on the contrary, both the Beta angle and MMBP-Wits were significantly associated only with SNA and SN/MP angles. Floating norms were derived for Beta angle and MMBP-Wits according to the variations of SNA and SN/MP.

**Conclusions.** Each cephalometric index analyzed is subjected to an influence from facial divergence. ANB angle is statistically influenced from each of the facial divergence indexes analyzed (SNA angle, SN/PP, SN/MP and NSBa), while Beta angle and MMBP-Wits are statistically influenced only from SN/MP and SNA angle. Indexes of sagittal discrepancy are, in different ways, influenced from craniofacial variability and in our opinion, a totally independent index hasn't been developed yet. Therefore, it is useful to replace cephalometric normal values with mean values deriving from a population sample with individual norms based on the association between appropriate cephalometric variables (floating norms). Floating norms may be a reliable procedure to obtain individual cephalometric norms that consider variations of the craniofacial complex.



### IMPACTED MAXILLARY CANINES AND ROOT RESORPTION

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**Aim.** To evaluate the prevalence of root resorption of adjacent teeth to impacted canine and the statistical correlation with the variables considered.

**Materials and methods.** The study was conducted on a radiographic sample (orthopantomographs and CT) of patients with unilateral or bilateral impacted canine, selected from the Department of Orthodontics, Policlinico Umberto I, Sapienza University of Rome. Of 120 selected patients, 50 patients [22 male, 28 female; mean age 11,7 years] satisfied the inclusion criteria of the study, namely: no previous orthodontic treatment; no subject affected by craniofacial syndromes, cleft lip or palate and sequelae of traumatic injuries; earliest available pre-treatment panoramic radiographs realized in mixed or permanent dentition; CT imaging of the upper alveolar bones obtained after panoramic radiographs in order to evaluate the impacted canine; good quality radiograph views of canine regions available for each patient. In a second phase of the statistical survey, the sample of 50 patients and 69 impacted canine was divided into two groups: Case group (SG): resorbed incisors (n.23); case control (CG): no resorbed incisors (n. 46). The initial phase of the data collection process involved the elaboration of an excel worksheet for data categorization against 29 variables. Correlations (Pearson  $r$  or Spearman  $\rho$ ) between measurements on these occasions were 0.995 for angulation and 1.000 for sector [ $P < 0.0001$ ]. Relationships of data were studied by the chi-squared test [ $\chi^2$ ].

**Results.** The analysis performed showed that the total resorption (lateral incisor, central incisor) measured on CT was 34% of the sample of impacted canine. Only 1 resorption was bilateral (4%), against 22 cases of unilateral resorption (96%). In 92% of the sample lateral incisors were resorbed, while central incisors were resorbed in 4% of cases, and the remaining 4% included at the same time both central and lateral incisors. No resorption was observed at the expense of the first premolar. Apical third is the pattern of resorption in 50% (12) of cases, while 46% (11) of the resorption was located in the middle third and 4% (1) in the cervical location. 67% (16) of the resorption was slight, 25% (6) moderate, while 8% (2) of affected teeth had a severe resorption. 71% (17) of resorption was observed on the palatal side of the root of the lateral/central incisor. A significant correlation was found between root resorption and inclusion ( $X^2=0.002$ ), the site of root resorption and the site of inclusion ( $X^2= 0,002$ ), the crown-root contacts between the canine and the incisor and root resorption ( $X^2=0,009$ ), overlapping lateral incisor/canine and resorption ( $X^2= 0,05$ ).

**Conclusions.** In this CT study, resorption on the roots of the incisors adjacent to the ectopically positioned canine occurred in 34% of cases. This percentage is lower than that found by Ericson and Kuroi in the similar CT study [47%]. However, the high significant correlation between root resorption and the presence of inclusion ( $X^2=0.002$ ), in agreement with the literature, demonstrates a real risk of resorption in the case of inclusion of the maxillary canine. High statistical correlation was found between the site of inclusion and the site of root resorption, as well as between contacts relation crown/root canine/lateral incisor and resorption. These results, and the fact that the resorption is mainly unilateral, indicate the importance of local factors in the aetiology. No relationship between canine dental follicle and resorption was found. Probably, resorption is mainly caused by contacts relations and physiological pressure from the canine, even in the absence of systemic factors.



### INFRARED THERMOGRAPHY EVALUATION OF MASTICATORY MUSCLES IN ITALIAN AIR FORCE PILOTS AFFECTED BY BRUXISM

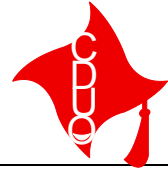
C. Cioffi, A. Nota, F. Ballanti, A. Baldini

**Aim.** The modern military airplane are capable of initiating and sustaining instantaneous acceleration forces up to +9 Gz. Air Force pilots due to the physical stresses to which they are subjected, are involved in experience of bruxism, an oral parafunction which can cause serious dental, periodontal and temporomandibular joint (TMJ) damage. As result of the muscular hyperactivity there is a mechanical compression of blood vessels and also the temperature is altered. The Aim of the work is to propose an analysis of infrared images of masticatory muscles and to investigate the temperature distribution and variations associated with the use of an occlusal splint.

**Materials and methods.** 11 military pilots of high performance aircraft (age 27-40 years) with 1000-3000 flight hours were enrolled and analyzed at the Istituto di Perfezionamento e Addestramento in Medicina Aeronautica e Spaziale (Dir. Brig. Gen. C.S.A.r.n. D. CIOFFI) in Rome. An Infrared camera Flir Systems® ThermaCAM SC640 with resolution of 640 x 480 pixels was used in order to evaluate the temperature of the right (MA-R) and left masseter (MA-L), right (TE-R) and left anterior temporalis (TE-L), right (T-R) and left upper trapezius (T-L), right (SCM-R) and left (SCM-L) sternocleidomastoid muscles. The mean temperature data for each muscle were recorded with and without the application for about 15 minutes of a temporarily fabricated "easybite" occlusal splint.

**Results.** The mean temperatures of every muscle results to be higher with strong statistical significance when pilots were wearing the occlusal splint (p-value < 0,01). No significant changes were of the thermal symmetry between the right and the left sides were found.

**Conclusions.** The temperature is altered when the blood flow decreases in the masticatory muscles due to a mechanical compression of blood vessels as a result of the muscular hyperactivity. The occlusal condition can locally affect the heat balance or exchange processes resulting in an increase or in a decrease of the skin temperature. Although no improvement in the thermal symmetry of the two sides was found, an increase of the temperature was recorded using a temporary occlusal splint. This could mean that the use of an occlusal splint can produce a reduction of the muscular hyperactivity typical of subjects affected by bruxism. More important conclusions could be found in longer treatments with highly precision balanced occlusal bites.



### IOTN: AN INDISPENSABLE TOOL TO MANAGE AN ORTHODONTIC DEPARTMENT

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**Aim.** The increased orthodontic treatment request is a daily reality for the clinicians that work in public hospitals and facing the user's requests is a real challenge. Particularly in orthodontic field an accurate visit and priority location are real firms. It is clear that establishing an index of orthodontic treatment need is not just a useful tool for the public department but a real priority. Recent literature provides indications for a sufficient but not complete indexing of treatment necessity suitable for a correct patient's priority identification. In this paper the authors carried out a brief literature review and analyzed one year of "IOTN" index combined with other specific evaluations for patients indexing method with the intent to better manage the waiting lists and guarantee an adequate treatment to greater need patients. The aim of this work is to review the literature articles on IOTN to better understand all the implications of the indexing and evaluate the benefits of IOTN use in a public health structure.

**Materials and methods.** In the first part of the paper, the authors carried out a literature review using the medline/pubmed databases and selected relevant articles directly exploring the Mesh tree on "orthodontic treatment need" as major topic. In the second half of the paper, the authors analyzed the improvements of one year of the IOTN use in a public department.

**Results.** The IOTN use in an orthodontic public department is a powerful managing tool able to accurately control the waiting lists and guarantee an adequate treatment to greater need patients. Other benefits recorded are related whit patients relation and working environment.

**Conclusions.** The IOTN use in an orthodontic public department is able to increase both the capability and the productivity of the structure itself, consequently increasing patient's satisfaction and better working environment.





### LIGAMENT LAXITY AND TMJ CHRONIC RECURRENT DISLOCATION THERAPY: A REVIEW OF LITERATURE

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**Aim.** The aim of the work is to perform a review about the therapy of TMJ chronic recurrent dislocation (CRD) related to loose ligaments. TMJ subluxation is a condition where the condyle translates anterior to its normal range and the patient exhibits a momentary inability to close the mouth from a maximally open position that either abates spontaneously or can be reduced with manual self manipulation. TMJ dislocation occurs when the condyle moves outside the glenoid fossa, locking anteriorly to the articular eminence, or it cannot be self reduced. This locking action is maintained by spasms of masticatory muscles.

**Materials and methods.** In order to perform our study we consulted scientific databases (Scopus, PubMed, Embase and Medline) searching the keyword: "TMJ chronic recurrent dislocation", "TMJ subluxation", "loose ligaments", "hyperlaxity" "hypermobility". The searches retrieved 97 articles from 1975 to 2013. We excluded case reports and animals experimentations. At the end 47 articles were used for our analysis.

**Results.** TMJ CRD therapy consists of limiting the forward excursion of the condylar head. 33 articles concerns the surgical approach that consists of two procedures. The first is creating a mechanical obstacle in the condylar path by down fracturing of the zygomatic arch and fixation medial to the eminence, bone grafting augmentation, application of alloplastic impediment (vitallium mesh or titanium plates). The second procedure is removing of the mechanical obstacles in the condylar path, by for example eminectomy, permitting free movement of the condyle. Otherwise 14 articles describe conservative/pharmacological approach that consist of injecting different solutions into the lax pericapsular tissue and superior joint space weekly over six weeks. They should be: sclerosing agents (sodium psyllate, sodium tetradecyl sulphate); autologous blood or platelet rich plasma; proliferant solution (for example a combination of dextrose, glycerin and phenol).

**Conclusions.** Surgical treatment must therefore be based on the type, mechanism, aetio-pathogenesis and predisposing factor/morphology of the joint, age, availability of materials and skilled manpower. The more complex and invasive method of treatment may not necessarily offer the best option and outcome of treatment, therefore conservative approaches should be exhausted and utilized appropriately before adopting the more invasive surgical techniques which should be done after thorough assessment and treatment planning. Surgical procedure should be used only when conservative/pharmacological methods failed.



### LONG TERM THERAPEUTIC EFFICACY OF A SOFT MONOBLOC MANDIBULAR ADVANCEMENT DEVICE (SMMAD) IN ADULTS WITH OBSTRUCTIVE SLEEP APNEA SYNDROME

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**Aim.** A mandibular advancement device (MAD) may be an alternative treatment for snoring and obstructive sleep apnoea (OSA). Long-term efficacy with mandibular advancement devices (MAD) in the treatment of obstructive sleep apnea syndrome (OSAS) are under-studied. The aim of this study was to evaluate the long term (36 months) therapeutic efficacy of a soft Monobloc Mandibular Advancement Device (sMMAD) in adult patients with mild or moderate Obstructive Sleep Apnea Syndrome (OSAS).

**Materials and methods.** The study population comprised 28 OSAS patients (6 female and 22 male, mean age  $52.2 \pm 6.8$  years). After a baseline medical and somnographic examination, a functional examination of the stomatognathic system, and a questionnaire focused on sleep-related qualities and a daytime somnolence, each patient received a individual sMMAD. These examinations were recorded and used to obtain the BMI (Body Mass Index), Epworth Sleepness Scale (ESS) and Apnea/Hypopnea Index (AHI). Two follow-up were made 6 months (T1) and 36 months (T2) after sMMAD treatment had been initiated, and all initial examinations were repeated.

**Results.** At the 36 months follow-up, significant subjective improvements were registered in 70% of the patients regarding a reduction of snoring and apneas. The results concerning the Quality of Life show an improvement of own lifestyle with the sMMAD treatment in 80% of patients. The Apnea/Hypopnea Index mean (AHI) was  $12,3 \pm 3,6$  before treatment (T0);  $9,4 \pm 3,5$  after 6 months (T1) and  $10,4 \pm 2,1$  after 36 months (T2). Body Mass Index mean (BMI) was  $25,7 \pm 1,6$  at T0;  $26,3 \pm 2,1$  at T1 and  $25,4 \pm 1,4$  at T2. Epworth Sleepness Scale index mean (ESS) was  $7,4 \pm 2,9$  before treatment (T0);  $4,6 \pm 1,9$  after 6 months (T1) and  $6,5 \pm 2,9$  after 36 months (T2). The Statistical Analysis showed a significant decrease in BMI value between T1 and T2 ( $p=0,012$ ), an increase of ESS value between T1 and T2 ( $p=0,012$ ) and a significant improvement and decrease of AHI index between T0 and T1 ( $p=0,010$ ) and between T0 and T2 ( $p=0,013$ ).

**Conclusions.** Treatment with the sMMAD is a therapeutic solution with long-term and stable effects (36 months) for patients suffering from mild or moderate Obstructive Sleep Apnea Syndrome (OSAS). The long-term prognosis of OSAS in adult patients depends on: accurate selection of OSAS patients and therapeutic process, sMMAD technical features, compliance of patient.



### LONGITUDINAL CHANGES IN DENTAL ARCHES DIMENSIONS FROM MIXED TO PERMANENT DENTITION

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**Aim.** The purpose of the present study was to investigate the longitudinal changes in dental arch widths in a group of 24 Italian children with Class I molars and canines relationship during the transition from mixed dentition to permanent dentition.

**Materials and methods.** Dental casts were taken from 24 Caucasian children (15F, 9M, mean age 9.13y), from the Department of Orthodontics, University of Rome Tor Vergata, with complete records from mixed to permanent dentition. The inclusion criteria were: Class I molars (either flush terminal plane or mesial step) and Class I deciduous canines relationship; mixed dentition; normal overjet and overbite; absence of anterior or posterior crossbite; absence of extensive restorations or tooth wear; no malformed or congenitally missing teeth; absence of current orthodontic treatment and negative history for previous orthodontic treatment; no significant medical history; no history of trauma. The casts represented 2 time points: T1 mixed dentition stage, with second deciduous molars and deciduous canines still in the mouth; T2, three years after T1, permanent dentition stage, with all permanent teeth erupted except for the third molars. Cast measurements were made by the same trained operator using a digital caliper at 0.02 mm precision. Maxillary and mandibular intermolar widths, maxillary and mandibular intercanine widths, Curve of Wilson, posterior and anterior transverse discrepancies were measured. Reproducibility of the measurements was estimated by repeating measurements after 10 days from the first measurement by the same examiner. Dahlberg's formula on 30 repeated measurements that were selected randomly from the total of the observations was used to assess differences among the measurements. The method error was less than 0.1 mm for linear measurements of on dental casts. The paired t test was used to verify the significance of the values. Results were considered statistically significant at  $P < 0.05$ .

**Results.** The results of the analysis of variance for the maxillary and mandibular arch widths indicated that there were no significant differences ( $p < 0.05$ ) of the maxillary ( $p = 0.077$ ) and mandibular ( $p = 0.328$ ) intermolar widths from T1 (mixed dentition phase) to T2 (permanent dentition phase). The mean difference was +0.5 mm in maxillary intermolar widths from T1 to T2 and it was +0.2 mm in mandibular intermolar widths from T1 to T2. There were no statistically significant changes in the posterior transverse interarch discrepancy ( $p = 0.08$ ; mean difference from T1 to T2: +0.3 mm) and in the curve of Wilson ( $p = 0.241$ ; mean difference from T1 to T2: -0.025 mm). The results showed statistically significant changes from mixed to permanent dentition in the upper ( $p = 0.000$ ) and lower ( $p = 0.032$ ) intercanine widths. Maxillary intercanine width increases on average of 1.6 mm from mixed to permanent dentition, while mandibular intercanine widths of 0.7 mm. Also the anterior transverse interarch discrepancy ( $p = 0.05$ ) was significantly different from T1 to T2 and the difference was on average 1 mm.

**Conclusions.** During the transition from mixed to permanent dentition the dental arch widths undergo changes. However when the posterior transversal occlusal relationship is established and the first permanent molars are in functional occlusion, the clinician should expect changes only in the anterior region with a significant increase in intercanine width due to the deciduous canines' replacement.



### MANDIBLE CONDYLAR HYPERPLASIA DIAGNOSIS AND ORTHODONTIC POST SURGICAL TREATMENT: REVIEW OF LITERATURE AND CLINICAL EXPERIEN

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**Aim.** Condylar hyperplasia (CH) can be defined as the excessive growth of the mandibular condyle and it presents with facial asymmetry without pain. The etiology and pathogenesis of Condylar Hyperplasia (CH) remain uncertain. It is not know what triggers a condyle to suddenly start growing and become hyperplastic. Suggested theories include trauma followed by excessive proliferation in repair, infection, hormonal influences, arthrosis, hypervascularity, and a possible genetic role. Treatment is primarily surgical, with or without orthodontics, and depends on the degree of severity and the status of condylar growth. The aim of our study was to perform a litterature review on Condylar Hyperplasia (CH) and its orthodontic treatment after surgery. We focused also our attention on TMJ function after condylectomy.

**Materials and methods.** In order to perform our work it was consulted the Pubmed database searching the keywords "condylar hyperplasia", "facial asymmetry", "condilectomy", "TMJ". The searches retrieved 127 articles from 1985 to 2013. We excluded case reports and animals experimentations. At the end 87 articles were chosen for our study. We therefore discuss the orthodontic post surgical treatment of one patient affected by CH. He was treated by unilateral condilectomy; then he was subjected to indirect bonding technique using self-ligating bracket and composite resin occlusal gains. He has been also advised to do periodic physiotherapy to improve TMJ rehabilitation.

**Results.** Although the diagnosis of CH is essentially clinical, there are supporting investigations that determine the activity and morphology of the condyle affected: CT (Computerized tomography) and SPECT (single photon emission computed tomography). From the functional point of view, the mandibular dynamic is maintained with no significant changes when the high condylectomy is performed; however the patients who underwent surgery had higher rates of TMJ osteoarthritis. From the orthodontic point of view, indirect bonding allows the operator to reduce time for positioning brackets and increases patient's compliance.

**Conclusions.** Using combined surgical and orthodontic treatment in CH therapy, we were able to keep the occlusal cant under control, as well as to restore the dental midline, improve facial aesthetics, and resolve the patient's TMJ dysfunction.



### MANDIBULAR IMPACTED CANINES: INCIDENCE, DIAGNOSIS AND A CASE REPORT

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**Aim.** The purpose of this study is to provide a comprehensive review of the literature to investigate the patterns of transmigration and eruption of permanent mandibular canines, in order to make easier the therapy and diagnosis. We also present a case report of a patient with a mandibular canine included.

**Materials and methods.** It was carried out a search in the major search engines (MEDLINE, SCOPUS, The Cochrane Library and Web of Science) on the included mandibular canines and were extrapolated some of the most significative papers.

**Results.** Incidence of canine impaction is higher in the upper (20 times more frequent) compared to the lower jaw, with a range between 0.05 and 0.4%. It's very important to screen periodically young patients using OPT. The main casual factors of inclusion are: insufficient space, premature loss of deciduous dentition, excessive extension of the crown, excessive inclination of the incisors, hereditary factors, disturbances in the function of endocrine glands, tumors, trauma, fractures of the mandible in the canine area, abnormal arrangement of the dental lamina, small fragments of root; small fragments of root. Sometimes canine impaction is associated with the presence of cysts and odontomas, but it is difficult to say whether these conditions are responsible for the inclusion or not. Mupparapu proposed a classification based on the position of the canine in the mandible:

- Type 1: Canine positioned mesio-angularly across the midline within the jaw bone.
- Type 2: Canine horizontally impacted near the inferior border of the mandible.
- Type 3: Canine erupting either mesial or distal to the opposite canine.
- Type 4: Canine horizontally impacted near the inferior border of the mandible below the apices of either premolars or molars on the opposite side.
- Type 5: Canine positioned vertically in the midline.

**Conclusions.** Most of the time the mandibular canine fails to correctly erupt in absence of any pathological entity, but in few cases it could be associated with a cyst or an odontoma. Etiology of this phenomenon is obscure. However, heredity, trauma at a very early age of the patient, and a very small obstacle, such as root fragment, could be sufficient. It is necessary to carefully consider the malposition of the germs of mandibular canines, in order to implement the therapy as early as possible.



### MASTICATORY AND POSTURAL EVALUATION OF A PATIENT WITH ANTERIOR OPEN BITE AND POSTERIOR UNILATERAL CROSSBITE

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**Aim.** This case report illustrates the treatment of unilateral posterior crossbites and anterior open bite during the mixed dentition as a result of disharmony in either the skeletal, functional or dental components of the orthognathic system. The patient was a 6,9-year-old boy with a unilateral posterior crossbite and anterior open bite. A functional shift and tongue thrusting were also diagnosed.

**Materials and methods .** Mandibular movement was measured with a kinesiograph (K7-I, Myotronics Inc. Tukwila, Washington, USA) which measures jaw movements within an accuracy of 0.1 mm. Multiple sensors (Hall effect) in a lightweight array (4oz) track the motion of magnet attached to the midpoint of the lower incisors (Jankelson, 1980). The kinesiograph was interfaced with a computer for data storage and subsequent analysis. The patient were instructed to chew a soft bolus (chewing gum) an then a hard bolus (wine gum), firstly non-deliberately an the right and left sides. The duration of each test was 10 seconds and each set was repeated three times. The test to evaluate the spinal column posture was performed with the Spinal Mouse (Idiag, Volestwil, Switzerland), that is an electronic inclinometer; a hand-held computer-assisted electromechanical device that can be used upon spinal curvatures in various postures. This device using accelerometers which record distance and changes of inclination with regard to the plumb line as it is rolled along the length of the spine. The patient was treated with a functional appliance: the ' Function Generating Bite, individually manufactured and made of acrylic resin and resilient stainless steel, with posterior metallic bite planes preventing the teeth from intercuspal contact. At the end of treatment, the buccal cusps of the teeth, which were previously in crossbite, overlapped the lower teeth, the providing, thus providing the appropriate physiological stimuli from peripheral receptors and proprioceptors.

**Results and conclusions.** The comparison of the data before/after therapy with FGB showed and the improvement of the posture balance the correct on the of dental malocclusion, of the masticatory function. The orthodontic treatment should consider not only the repositioning of teeth within the dental arches but also the effects on function, especially when the malocclusion involves the function, the muscular coordination and the skeletal structures. Anterior open bite and unilateral crossbite are malocclusions that involve the function of the tongue and the masticatory function, when they are together present in the same patient, the balance of the stomatognathic system is seriously altered. The orthodontic therapy should evaluate not only the dental malocclusion, but the functional affects also.



### MINISCREWS STABILITY: A SYSTEMATIC REVIEW

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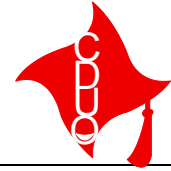
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**Aim.** This systematic review aimed to define the concept of miniscrews "stability", "success" and "failure" in the current literature as well as the factors associated to miniscrews stability, success and failure, such as morphological characteristics, clinical factors and patient's factors.

**Materials and methods.** Pubmed was screened for papers published between 2005 and 2012, where eligibility criteria included studies conducted on humans and in vitro, prospective and retrospective clinical studies, meta-analytic studies, reviews and systematic reviews. All of the papers had to deal with the use of ms only as orthodontic anchorage. The morphological characteristics detected were surface characteristics, threads number and geometry, length and diameter. The clinical factors evaluated were the techniques of insertion and removal of ms, the torque of insertion, as well as the surgical procedures and the loading time. The patients factors considered were sex, ethnics, age, anatomical characteristics (bone and soft tissues, safe zones for insertion), microbiological environment, malocclusion and the histological response.

**Results.** The inclusion criteria were met in 54 papers. In the current literature the concepts of of miniscrews "stability", "success" and "failure" vary: in fact the assessment methods of miniscrews success and failure, as well as the stability requirements for miniscrews to be considered successful, are controversial. The association between the morphological aspects and the ratio of stability/success of miniscrews varies in the different studies. The most significant aspect related to the patient is the bone quality and quantity. The failure of the miniscrew is strictly related to their insertion in/or close to specific anatomical sites, especially in proximity of dental roots. The CBCT is actually the exam of choice in detecting the better bone characteristics and the precise anatomy for optimizing the insertion site. The most significant aspect related to the clinical factors is the experience of the clinician, especially as to the insertion procedure.

**Conclusions.** The choice of the miniscrews was oriented by the anatomical structure where they are applied, bearing in mind the potential movements during the load. The most important factors to consider in miniscrew insertion planning are the anatomical structure and bone quality and quantity, because an insertion too close to the anatomical structures can lead to the premature loss of miniscrews and/or anatomical damages. However, the heterogeneity of the literature doesn't permit an univocal answer to all the questions at stake: more studies need to be carried on for a better definition of the issue.



### **MOLAR CLASS II- SYMMETRICAL AND ASYMMETRICAL: A FUNCTIONAL AND STRUCTURAL COMPARISON**

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**Aim.** In dental clinical practice it is very common to see contralateral differences between the right and left sides of the occlusion. Asymmetric molar class II is a malocclusion characterized by a different relationship between the first molars of the right and left side. An asymmetric sagittal molar relationship is a complex condition that often results in an unbalanced occlusion, difficult mechanical problems and may involve all districts of the stomathognathic system: basal bone structure, teeth alveolar process, temporo-mandibular joints, neuromuscular system and function.

The aim of this study is an evaluation of the chewing patterns, Posselt diagrams, palatal measures and postero-anterior X ray of the skull comparing patients with symmetric and asymmetric class II.

**Materials and methods.** Six patients, three with symmetrical class II and three with asymmetrical class molar II were selected. The patients underwent:

- clinical form,
- orthopantomography,
- latero lateral x ray of the skull
- postero-anterior x ray of the skull,
- casts, with the evaluation of the palatal asymmetry, calculating the distance between the first molar cusp and the palatal midline,
- patient and parents photographs,
- latero lateral cephalometrics
- postero anterior cephalometrics, to evaluate the position of the Menton point respect to the vertical axis and to calculate the area of triangles, in both left and right sides, described by Gonion-Menton-Middle point of Gonion-Gonion
- recording of chewing patterns,
- analysis of Posselt diagram, to evaluate the symmetry of mandibular movements on the frontal plane, calculating the angle between horizontal plane and the tangent to movement of laterality.

**Results.** Chewing patterns show different results in asymmetric class II malocclusion. It has been observed a significant asymmetry in bone structure and function. Analysis of casts shows, in fact, palatal asymmetry in the patients with asymmetric molar class II. The triangle areas comparison in postero-anterior cephalometric according to the school of Turin and lateral tracks of Posselt diagrams confirm a functional and structural asymmetry in patients with asymmetric molar class II.

#### **Conclusions**

Asymmetric molar class II is a severe malocclusion responsible of asymmetries of structure, function and growth of the little patients. These results highlight the anatomical relationships of structures supporting the occlusion and the symmetry/asymmetry of the cranium and masticatory apparatus.





### OCCLUSAL BITE RISES IN THE TREATMENT OF DEEP BITE IN PEDIATRIC AGE: AN ELETTRIMYOKINESIOGRAFIC EVALUATION

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**Aim.** The deep bite is a frequently observed feature in the pediatric population. The occlusal bite raises are often used during treatment of malocclusion with deep bite, but in literature there are very little studies that evaluate which kind of side effects they can produce against the neuromuscular system. The purpose of this study is to evaluate the occlusal bite rises's effects when are applied in the first phase of the orthodontic treatment. An electromyokinesiographic analysis was performed: the relationship with the muscle tone, the muscle activity, the kinetics of the mandible and the free way space (FWS) in pediatric patients with dental and skeletal deep bite was considered.

**Materials and methods.** A sample of 20 patients (12 males, 8 females, mean age 9,8 years) of the Orthodontic Department of the University of Padua with skeletal deep bite and comprehensive and traumatic dental deep bite was submitted for electromyokinesiographic examination performed with K7 Diagnostic System (Myotronics, Inc., Seattle). Four SCANS were performed at T0: before treatment and T1: 4 weeks after the application of simmetric and balanced occlusal bite rises in the posterior sites of the lower arch. Were performed four SCANS: SCAN9 to evaluate the basal tone of the muscles, SCAN 11 to evaluate the tone of the muscles during activity by clenching on natural teeth (CLENCH 1) and on cotton rolls (CLENCH 2), SCAN 1 to evaluate the kinesiography and SCAN 3 to evaluate the mandibular movement in rest position, during swallowing, clenching and the FWS.

**Results.** We have found a little and omogeneous diminuition of muscular basal tone in masseter and temporalis muscles bilaterally. A diminuition in the maximum opening of the mouth and a little augmentation of the deviation in opening movement although not statistically significant. FWS has not undergone significant changes. The difference between the potentials of the temporalis muscles in T0 and T1 was found to be statistically significant ( $p>0,05$ ) only in the SCAN 11 CLENCH 1.

**Conclusions.** According to the findings from this study and in this population occlusal bite rises seems to reduce the muscular basal tone in a mild way. The FWS and the kinetics do not appear to be changed even if the augmentation of verticality and the clockwise rotation of the mandible. Only the muscular activity of the temporalis muscles clenching on natural teeth seems to reduce in a significant way. We can therefore affirm that the occlusal bite rises do not produce functional alteration of the neuromuscular system of the stomatognathic apparatus.



### OPENBITE: CLASSIFICATION AND OPTION OF TREATMENT

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**Aim.** To define a classification of malocclusion with open bite on the basis of etiology and clinical and cephalometric features for appropriate treatment in the growing patient.

**Materials and methods.** Were examined nine patients with anterior open bite, ages between 7 and 10 years old, with a history of oral habits. Among these, three patients had a low posture lingual, three the habit of thumb sucking, three mouth breathing. For each patient, the clinical examination was performed for the evaluation of vertical discrepancy and cephalometric tracing was done to assess vertical and sagittal skeletal malocclusion.

**Results.** There was evidence that the low-lingual posture is associated with an open bite due to infra eruption of the upper incisors and/or lower incisor, while in patients with a thumb sucking or mouth breathing the open bite has both a skeletal and dental etiology; in fact it is characterized by super-erupted molars of the lower jaw and by a consequent post-rotation of the mandible (palatal-mandibular angle  $>34^\circ$ ). In eight of the nine patients we showed a skeletal or dental transverse contraction of the maxillary arch.

**Conclusions.** In patients with open bite growth, the identification of etiologic factors is essential for an adequate diagnosis and therapy. Indeed, in cases where there is an alteration of the function, this approach is of fundamental importance, since it has been reported that early myofunctional treatment and orthodontic open bite can reduce the need for treatment in a later period. The tongue thrust swallowing is often associated with anterior open bite, but is considered a consequence and not the cause of anterior open bite, since the duration of this thrust is insufficient to bring about significant shifts of the teeth. The treatment of open bite consists of first removal incorrect habit that if it occurs before the eruption of the permanent incisors, can by itself be sufficient to correct the malocclusion. In the remaining cases, you will need to associate the myofunctional treatment to orthodontic treatment for the habit removal, the transversal correction, if required, and the control of vertical growth.



### ORAL HABITS BREAKING IN THE OPEN BITE TREATMENT: A CASE REPORT

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**Aim.** Suction that occurs during intrauterine life first is only a pleasant functional activity that gives the child tranquility and protection. It is a need that can be considered physiological during the early six months of life and that decreases at the age of four years old. If it persists, it is considered a "vitiating habit", it causes alterations in the development of maxillary bones and changes in the occlusions, represented by open bite. It can also provoke the beginning of other vitiating habits, like the maintenance of a childish deglutition. The objective of this study is to demonstrate how the altered deglutition is caused by the anterior morphology, also altered by the vitiating habit of the thumb sucking.

**Materials and methods.** Case report of a six year old female patient, visited at the department of orthodontics of Naples Federico II. Diagnosis:

- Oval and symmetrical face, convex profile, little labial incompetence;
- Dentoskeletal class I malocclusion, during the early mixed dentition;
- Excess in DDB;
- Anterior and right and left mesial canine regions diastemas;
- Open bite in the anterior and left lateral sectors;
- OVJ 5mm, OVB -6mm;
- Oral habits: thumb sucking, lingual interposition.

The treatment consisted in the eradication of the oral habits through motivation, the use of a collaboration diary and psychological use of bilateral elastic bands in the function of proprioceptive stimulation.

**Results.** The use of this method gave us the possibility to handle the clinical case effectively, with a great amelioration of the open bite after thirty days; after ten months, it can be noticed a repositioning of ectopic teeth and a better OVB and OVJ. It can be noticed a decisive improvement in the aesthetics and a better function of soft and muscle tissues. The achievement of the objective has happened without excessive constraints and straining for the child, that can increase her obstinacy and the need of autonomous consolations.

**Conclusions.** In the early treatment of malocclusion it was demonstrated that the persistence of a childish deglutition is caused by an altered anterior morphology that is determined by the vitiating habit of the thumb sucking: once the habit has been eradicated, also the function has been normalized. The choice of a psychological motivational technique combined with the use of a proprioceptive stimulation, has been valid for the resolution of the clinical problems due to the pathological vitiating habit of thumb sucking (over six or seven years old). This gave us the possibility to achieve the predetermined orthodontic objectives with more effectiveness for the orthodontist and a major pleasure for the patient.



### PREVALENCE OF OCCLUSAL ALTERATIONS IN THE PRIMARY AND EARLY MIXED DENTITION: LITERATURE REVIEW

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**Aim.** To assess the prevalence of malocclusions on the sagittal, transverse and vertical planes in the transition phase from primary to early mixed dentition.

**Materials and methods.** A systematic review of the literature was carried on. The Pubmed library was searched using the following keywords: prevalence, need of treatment, malocclusion, primary dentition, early mixed dentition. The inclusion criteria for study selection were: a) age of the subjects, from 3 to 8 years, b) expression of prevalence of different types of malocclusion in primary dentition, early mixed dentition or both. Five types of malocclusion were analyzed: 1) increased overjet (OVJ >3 mm), 2) reversed overjet (OVJ <0 mm), 3) deep bite (OVB >3 mm), 4) open bite (OVB <0 mm) and 5) crossbite (single and bilateral).

**Results.** From the seventy-one articles found only seven were selected. On the sagittal plane, the prevalence of increased OVJ (> 3 mm) in primary dentition varies from 13.8% to 33%, while in the early mixed dentition varies from 16.8 % to 38 %, showing a slight increase. Reversed OVJ, typical of a Class III malocclusion, in primary dentition is found in approximately 1.3% of cases, while in the early mixed dentition increases and is found from 1.5 % to 3.9% of cases. On the vertical plane, the open bite is found in primary dentition from 6.7 to 37% of cases, while in the early mixed dentition tends to decrease from 2.8 to 18% of cases. Deep bite occurs in primary dentition in 5.9 to 33% of subjects, while in the early mixed dentition greatly increases ranging from 7.9% to 46% of cases. Finally, on the transverse plane, crossbite, single or bilateral, was analyzed; in primary dentition is present in 3.9 to 19 % of subjects, while in the early mixed dentition ranging from 3.1 to 29% of cases.

**Conclusions.** Children who have a malocclusion in primary dentition have a high probability of developing malocclusion in the early mixed dentition. The deep bite tends to get worse in the transition from primary to early mixed dentition, so early treatment is indicated. The open bite tends to resolve spontaneously in most cases, if you delete the vitiated habit, eg. thumb sucking. If posterior crossbite and increased OVJ are present in the primary dentition, they tend to maintain their characteristics in early mixed dentition. Reversed OVJ dramatically increases in the transition from primary to early mixed dentition, stressing the importance of early treatment.



### RESEARCH PROTOCOL OF PREDICTABILITY FACTORS OF MAXILLARY CANINE INCLUSION: PRELIMINARY REPORT

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**Aim.** Maxillary canine inclusion can cause problems such as root resorption of adjacent permanent elements, malocclusion, functional and aesthetical problems, smile asymmetry, dental asymptomatic cysts. Aim of this multicenter research in cooperation between School of Torino and School of Cagliari is to look for the existence of palatal inclusion canine predictability factors, giving the clinician objective parameters of evaluation for early intervention and targeted orthodontics planning.

Research also focuses attention on same cases in which the palatal canine is included despite the absence of risk factors.

**Materials and methods.** The study group is composed by sixty patients with unilateral or bilateral palatal impacted maxillary canines afferent to the Turin and Cagliari Department of Orthodontics, previous OPT and L L telerradiography, no dc+cd extractions, no systemic pathologies. The control group is composed by twenty two patients with the same age, no aplasia, no impacted canines, no previous orthodontic treatment. The OPT parameters evaluated are: alpha angle, lateral inclination, dental age (Moore's), stage of root development, stage of root development of canines and second molars, loss of second deciduous molar, presence or absence of deciduous canines, deciduous phlogosis, eruption obstacles and dental anomalies associated. Parameters evaluated in L L telerradiography are the direction of axial eruption, the distance between canine cusps and occlusal plane and between the canine axis angle and the perpendicular to the SN plane. The third group is composed by 19 patients that show palatal impacted canines as they apparently have no risk factors for palatal canine inclusion.

**Results.** In accordance with literature there are correlations between impacted maxillary canine and some dental anomalies.

**Conclusions.** Literature relates some dental anomalies and palatal impacted maxillary canines. Some dental anomalies occur with higher frequency in association with inclusion maxillary canines. Angular values are mostly higher, except for some unforeseen circumstances. An elaboration is undergoing to increase the numerosity and the statistic relevance. The goal for the future is to expand the sample of patients that show palatal impacted canines as they apparently have no risk factors to try to understand the reason for their inclusion.



### SKELETAL ALTERATIONS FOLLOWING RAPID PALATAL EXPANSION

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**Aim.** The purpose of this study was to evaluate changes in head posture and craniocervical angulation after treatment with rapid palatal expander (RPE) in growing patients with transverse maxillary deficiency associated with respiratory function.

**Materials and methods.** A sample of 14 adolescent patients (8 females, 6 males, within the age group 6-10 years) underwent Rapid Maxillary Expansion as part of normal orthodontic treatment. It was evaluated for each patient: deglutition (typical and atypical), breathing (oral, nasal, oronasal) and skeletal class of malocclusion (I,II,III). All patients reported frequent headaches and showed airway obstruction and narrow palate. 7 patients were treated by RPE and 7 patients by bonded palatal expander. For each patient it was analysed lateral cephalometric radiographs obtained at T1 (beginning of therapy) and immediately post-expansion (T2) and it was identified 10 cephalometric landmarks in craniofacial area and 4 landmarks in cervical spine area. The means and standard deviations for linear and angular cephalometric measurements were statistically analysed using T-student test and linear regression.

**Results.** To evaluate changes of cervical posture following palatal expansion were compared; the cervical lordosis angle (CVT<sup>^</sup>EVT), the downward opening angle between the mandibular and true vertical lines (SN<sup>^</sup>OPT, SN<sup>^</sup>CVT, Sna-snp<sup>^</sup>OPT, Sna-snp<sup>^</sup>CVT, ML<sup>^</sup>OPT, ML<sup>^</sup>CVT) before and after treatment with mode of breathing and skeletal class. Rapid maxillary expansion did not produce any statistically significant alteration ( $P > 0.05$ ) for any of the cephalometric landmarks evaluated when compared at T1 and T2. However, the correlation coefficients indicated a significant correlation between the malocclusion's correction and craniocervical angulation (SN<sup>^</sup>CVT, SN<sup>^</sup>OPT angle,  $P < 0.05$ ).

**Conclusions.** According to the literature, the results of this study suggest an ongoing change in head posture (SN/CVT) possibly due to a change in the mode of breathing from oral to nasal as a result of RME, contributing to a change in skeletal class. No correlations it was founded between cervical lordosis and RME treatment.



### SKELETAL AND DENTAL EFFECTS PRODUCED BY FUNCTIONAL REGULATOR-2 IN PRE-PUBERTAL CLASS II PATIENTS: A CONTROLLED STUDY

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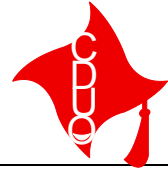
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**Aim.** The most frequent diagnostic finding in class II malocclusion is mandibular skeletal retrusion. Whether effects are obtained by functional appliances in class II subjects is still controversial. A wide range of different results has been reported, from no skeletal effects, to restriction of the maxillary growth or enhanced mandibular length. However, major limitations of most of these previous investigations, which may account for the different conclusions carried out, have recently been un-covered. In this regard, most of the available studies did not clearly identify the growth phases (i.e. pubertal or not) of the treated patients. This retrospective controlled study aimed at evaluating the skeletal and dental changes in class II subjects produced by the functional regulator (FR)-2 treatment during the pre-pubertal growth phase.

**Materials and methods.** The data were derived from records obtained at a university dental clinic. An initial sample of 128 subjects seeking orthodontic treatment, who had never been treated before was screened. Class II division 1 malocclusion was strictly diagnosed at baseline according to the following signs: full- or half- cusp class II molar relationship, excessive overjet (>4 mm), skeletal sagittal relationship of class II (ANB angle > 4°), mandibular retrusion (SNB angle < 78°) and no maxillary protrusion (SNA angle > 84°). After this selection a total of 17 treated subjects and a total of 17 untreated controls, all pre-pubertal, matched for malocclusion, age (8.8 ± 1.5 years) and sex (18 females, 16 males), were included. The overall observational period was 1.6 ± 0.8 years for both groups.

**Results.** Only minor skeletal changes with very little clinical relevance were seen after the observational period. Most of the changes produced by the FR-2 treatment were at the dental level including palatal tipping of the maxillary incisors and slight proclination of the mandibular incisors, both accounting for the noteworthy overjet reduction.

**Conclusions.** The present study has shown that functional treatment of class II malocclusion by FR-2 appliance during the pre-pubertal growth phase is limited to modification at the dental level.



### THE EFFECT OF ORTHOGNATHIC SURGERY ON VOCAL PRODUCTION AND PHONOARTICULATION

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**Aim.** To investigate and characterise the effect of orthognathic surgery on vocal production and quality  
**Materials and methods.** Video and audio recordings of 37 candidates for surgical mono-maxillary advancement (G1), mandibular advancement (G2) and mandibular setback (G3) were take one day before their scheduled surgery, then one and six months after. Recordings were subjected to spectographic and phonoarticulation analysis, and patients completed a purpose-designed self assessment questionnaire.

**Results e discussion.** The majority of patients assessed showed abnormal breathing and/or tongue position during swallowing before surgery 6 month after surgery to correct their malocclusion, many of these values werw within the normal range, although abnormalities still persisted in several cases. However, in only 25% of cases was orthognathic surgery found to produce a change in vocal production and phonoarticulation. In these patients, phonoarticulation analysis revealed a general improvement in the pronunciation of individual phonemes after surgery, although distortion was still apparent. Spectographic analysis showed an increase in F1 di\`a\`in G1 patients which can be explained by the increase in the volume of the oral cavity broyght about by forward displacement of the maxilla. In G2 patients mandibular advancement enables the tongue to move to a more forward position, thereby increasing the volume at the rear of oral cavity and bringing about the increase observed in the F2 values for \i\` (closed front vowel) and a decrease in F2\`u\` (open front vowel). Consistent whit the mandibular setback performed, the opposite pattern was detected in G3. The qualitative (descriptive) and quantitative (generalized linear models for dichotomous data) statistical analyses performed were, however, limited not only by the type of data, but also by the size of our sample, which made it impossible to investigate some inter-variable relationships.

**Conclusions.** Although the quality of the voice improves after orthognatic surgery consistent whit the improved shape and function of the jaws, this alone in sot sufficient to normalize vocal production and phonoarticulation, making speech therapy an essential adjunct to surgery in such patients.





### THE ERUPTIVE GUIDE APPLIANCES IN THE MANAGEMENT OF ERUPTIVE PROBLEMS: CASE REPORT

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**Aim.** Analyze a case report concerning a patient with eruptive problems on the incisors treated with the Erupted Guides Appliance LM Activator in biomedical silicone.

**Materials and methods.** The patient arrived at the first visit at the age of 8 years. It appeared in the late mixed dentition and all the teeth, deciduous and erupting or training permanent, were present. It also noted the inclusion of 2.2. At the clinical examination, we diagnosed a malocclusion of I Angle Class molar and canine with anterior crossbite in the 2.1-4.1 region and inclusion of 2.2. We chose to treat it with a preformed orthodontic appliance of the type LM Activator for use exclusively nocturnal. It is a device built in biomedical silicone for orthodontic treatment through the tooth eruption guide. LM - Activator allows the expansion of the dental arches, the alignment of the teeth and the normalization of overbite and overjet. The LM activator performs its functions thanks to buccal and lingual wall and tooth slots in which incisors, canines and premolars are guided into the correct position in the dental arch. Depending on the type of malocclusion to be treated, the molar section, however, is reduced or slightly increased to favor or less the eruption of the molars. The device, because of is designed to create a bite in advancing, works as an inclined plane and also stimulates condylar growth by promoting the development in length of the mandible. It's not a real functional activator because its effects are mainly dental. Therefore, for this action, it can also be used to correct early malocclusions of II dental Angle Class. Treatment is typically started when the first permanent lower incisor begins to erupt. It can also be used in the late mixed dentition or in the early permanent dentition. By intervening early with this device, it can avoid the onset or aggravation of a dental malocclusion. Moreover it greatly reduces the need for further orthodontic treatment.

**Results.** 15 days after application of the EGA, the anterior crossbite was already solved. After the cusp of 2.2 that was included, starts to appear in the dental arch. The next month, the 2.2 was fully erupted in the dental arch. The use of the EGA has allowed in a few days, with a night-only use, to reposition 2.1 in the dental arch thanks to his specific tooth's slot that has guided him in the right position. This has allowed to avoid any trauma to the tissues, to optimize compliance, to recover space in the arch for 2.2 which is immediately erupted, and to better manage of oral hygiene. Moreover it should be considered that, by an ergonomic point of view, it was necessary an extremely reduced chair time.

**Conclusions.** The EGA is an orthodontic appliance for early orthodontic treatment and eruption guidance can considered of first choice in selected cases allowing to intercept the onset of various malocclusions that would lead, if not early resolved, treatment more complicated. The particular conformation of the LM Activator, with differentials thicknesses, allows it to be particularly targeted in therapy according to the facial type. Moreover it greatly reduces the need for further orthodontic treatment.



### THE RELATIONSHIP BETWEEN THE ORTHODONTIC TREATMENT AND TEMPOROMANDIBULAR DISORDERS

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**Aim.** Since the orthodontic treatment is configured either in the process of finalizing the gnathological treatment itself and as a cause of temporomandibular disorders, the aim of this review is to show the relationship between temporomandibular disorders and orthodontic treatment in terms of cause and effect, with data from the literature.

**Materials and methods.** It has been made a selection of abstracts of scientific publications, obtained by the search engine Pubmed, filtering on those in English, referring to the human species, by entering keywords in the Mesh Database "temporomandibular disorders and orthodontic treatment". Our search returned 855 results, carefully screened according to the criteria of inclusion / exclusion below. *Criteria for inclusion/exclusion.* Only English-language articles, published between 1994 and February 2014, available as a free full-text PubMed or in the electronic library of the "Sapienza" University of Rome, were examined. The age considered is between 7 and 50 years old, with no gender predilection; TMJD issues considered are: joint and muscle pain with visual analogic scales, diagnosis made by the RDC / TMD with the exception of arthritis, evaluation indexes validated as the Helkimo Index or the guidelines of the American Academy of Orofacial pain. Case reports and reviews were excluded. In order to perform a systematic review, the articles have been cataloged according to the criteria of the CDR, Centre for reviews and disseminations in York, UK. After careful analysis, 16 articles were taken into consideration.

**Results.** 16 articles were found: 3 of them of evidence A; 8 of evidence B; 5 of evidence C, that show that orthodontic treatment does not cause TMD. Only one article of evidence A, 2 of evidence B and 3 of evidence C report that the patients might benefit from orthodontic treatment, in terms of improvement in TMD symptoms.

**Conclusions.** In relation to the criteria of the CDR, it can be concluded, with a strong scientific support, that orthodontic treatment is not a cause of temporomandibular disorders, basing our results on 3 studies with evidence A, and considering studies with evidence B and C studies that endorse the thesis previously exposed. Moreover, we can also affirm, with a moderately strong scientific support, that orthodontic treatment can improve the symptoms of patients with TMD.



### THE USE OF CANTILEVER MECHANICS IN STRAIGHTWIRE FIXED APPLIANCES FOR CORRECTION OF CANINE IMPACTIONS. A CASE REPORT

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**Aim.** The impaction of maxillary and mandibular canines is a frequent report in clinical practice. The aim of the study was to evaluate the clinical efficacy cantilever mechanics with straightwire fixed appliances that were used to relocate impacted teeth and to obtain an ideal torque control.

**Materials and methods.** We present the case of a woman aged 17 years, with permanent dentition, brachifacial typology, Angle class I, with full impaction of two canines (13, 33), and a severe ectopy of the maxillary left canine. Her main complaint was the position of the ectopic teeth. Cantilever mechanics was used to recover the impacted teeth.

**Results.** The treatment objectives were achieved in 26 months of treatment. The impactions were fully corrected with an optimal torque. The cantilever mechanics succeeded in obtaining tooth repositioning in short lapse of time. After treatment, the dental alignment was stable.

**Conclusions.** Cantilever mechanics are useful for orthodontic recovery of impacted teeth. This system can increase the predictability of tooth movement, reduce the need of appliance reactivation and the occurrence of possible intra-arch unwanted side effects.



### USE OF 3D IMAGING TECHNIQUES FOR THE DIAGNOSIS AND TREATMENT OF CANINE IMPACTIONS. A CASE REPORT

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**Aim.** A correct diagnosis is a main step for evaluating the possibility to recovery impacted canines. Although the intraoral palpation and traditional X-rays often allow to identify the canine position with a good approximation, sometimes the overlapping of adjacent structures with similar radiopacity addresses the orthodontist to the execution of 3D imaging radiograph techniques. The aim of this study was to describe the methodology used for the diagnosis and treatment planning of maxillary impacted canines by using a software for 3D imaging analysis, and to describe how this technique may be useful in the surgical-orthodontical recovery of impacted teeth.

**Materials and methods.** A case of a 13 years old girl with permanent dentition, Angle class II, with severe deep bite and full impaction of a maxillary canine is presented. Amira Software (FEI Visualization Sciences, Burlington, MA,US) was used to segment data retrieved by low dose CBCT scans, and to produce 3D renderings. The biomechanics for tooth recovery was planned by using 3D mesh protocols.

**Results.** The 3D evaluation allowed a proper treatment planning that resulted in a full correction of the malocclusion.

**Conclusions.** The use of low-dose CT and Cone Beam provides important advantages to the management of impacted teeth, adding information that are often not available with traditional X-rays.



### WHITE SPOTS AND CARIES PREVENTION DURING ORTHODONTIC TREATMENT: IN-VITRO STUDY OF A SELF-ADHESIVE FLOWABLE COMPOSITE

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**Aim.** To determine the resistance to brushing and acid wear in vitro of a self-adhesive flowable composite, which is used in order to prevent vestibular caries in orthodontic patients, and to assess the smoothness of the margins where the composite meets the enamel.

**Materials and methods.** The vestibular surface of four extracted premolars and four extracted molars with no caries, fracture or restorations, was covered with a self-adhesive flowable composite. A metal bracket was bonded on every tooth using light-cured composite, and the excess were removed. The teeth were subjected to incremental 28-hour cycles of brushing, in order to correspond to 6 months of brushing (3 minutes x 3 times a day x 6 months), while continuously immersed in an acid bath at pH 2.6. Sample teeth were examined under SEM after 1, 2, 3, and 4 brushing cycles to determine the percentage composite left adhering to the enamel. The same composite was then applied to the vestibular surface of another 4 premolars, and the margins were treated via 4 different methods, so SEM could be used to examine the smoothness of its margins in each case to determine which would be the most suitable means of reducing the potential risk of caries.

**Results.** Incremental brushing cycles in an acid environment brought about progressive abrasion of the material, without, however, leading to any fracture in the same. The percentage residual composite was found to diminish progressively with brushing time and duration of permanence in the acid environment. These experimental conditions did, nevertheless, lead to detachment of 16–40% of the composite, although all samples fell within ARI Grade 2. Furthermore there were no distinct step between the bonding material and the underlying enamel, and therefore no clear target for plaque accumulation, with any finishing system used: SEM revealed a smooth border and progressive mutual penetration between the mineralized tissue and composite resin.

**Conclusions.** The use of flowable composites for caries prevention appears to be an efficacious measure in orthodontic treatment. No additional risk of tooth decay at the gingival border seems to exist using a self-adhesive flowable composite for caries prevention.





### CLINICAL PERFORMANCE OF ACCESS FLAP IN THE TREATMENT OF THE MANDIBULAR FURCATION DEFECTS. A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CLINICAL TRIALS

D. Karapetsa , N. Discepoli, S. Gennai , S. Cei , M. Tonelli , M. Nisi, F. Graziani , M. Gabriele

### AGGRESSIVE PERIODONTITIS: A SIMPLE GENETIC TEST TO PREVENT THE DISEASE. CASE CONTROL STUDY

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### COMPARISON OF ENVIRONMENTAL SCANNING ELECTRON MICROSCOPY WITH HIGH VACUUM SCANNING ELECTRON MICROSCOPY FOR THE INVESTIGATION OF CELL BIOMATERIAL INTERACTIONS

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### DENTAL PULP STEM CELLS IN PERIODONTAL REGENERATION: A RANDOMIZED CONTROLLED CLINICAL TRIAL

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### IMPACT OF ACTIVE PERIODONTAL THERAPY ON SUBJECT-RELATED PERIODONTAL PROGNOSIS AS ASSESSED WITH A SIMPLIFIED METHOD FOR PERIODONTAL RISK ASSESSMENT

L. Minenna, R. Farina, V. Checchi, M. Nieri, L. Toselli, L. Checchi, L. Trombelli

### IMPACT OF ACTIVE PERIODONTAL THERAPY ON SUBJECT-RELATED PROGNOSTIC FACTORS FOR PERIODONTITIS

V. Checchi, R. Farina, L. Minenna, M. Nieri, L. Toselli, L. Checchi, L. Trombelli

### IMPLANT SURFACE ALTERATIONS FOLLOWING THE USE OF THREE INSTRUMENTATION SYSTEMS: 1 - EFFECTS OF A STANDARD CLEANING

C. Bertoldi, F. Battarra, D. Lusuardi, L. Giannetti, L. Generali, U. Consolo, D. Zaffe

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G. Gualini, S. Battistella, V. Manavella, F. Romano, F. Ferrarotti, F. Parducci, M. Audagna,  
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# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## PARODONTOLOGIA

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## PARODONTOLOGIA

SESSIONI >>>

### TRANSGLUTAMINASE 2 LEVELS AND RANKL/OSTEOPROTEGERIN RATIO IN PERIODONTAL LIGAMENT OF PATIENTS WITH CHRONIC PERIODONTITIS

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F. Diomede, I. Merciaro, J. Pizzicannella, S. Caputi, O. Trubiani



### CLINICAL PERFORMANCE OF ACCESS FLAP IN THE TREATMENT OF THE MANDIBULAR FURCATION DEFECTS. A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CLINICAL TRIALS

D. Karapetsa<sup>1,2</sup>, N. Discepoli<sup>2</sup>, S. Gennai<sup>1,2</sup>, S. Cei<sup>1,2</sup>, M. Tonelli<sup>1,2</sup>, M. Nisi<sup>2</sup>, F. Graziani<sup>1,2</sup>, M. Gabriele<sup>1,2</sup>

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<sup>2</sup>University Hospital of Pisa, Sub-Unit of Periodontology and Periodontal Medicine, Pisa, Italy

**Aim.** To systematically review the performance of access flap (OFD) in the treatment of mandibular furcation defects (MFD).

**Materials and methods.** RCTs evaluating surgical treatment of MFD with OFD and at least 6 months follow-up were identified through electronic databases, and hand searching. Screening, data extraction and quality assessment were conducted independently by 3 reviewers. The primary outcomes were tooth survival and change in horizontal clinical attachment level (HCAL). Changes in vertical clinical attachment level (VCAL), reduction of pocket probing depth (PPD), increase of recession (REC), horizontal bone level (HBL) and vertical bone level (VBL) were also collected.

**Results.** The search identified 1529 studies out of which 6 articles met the inclusion criteria. Data analysis was performed on a sample of 90 patients. Tooth survival was seldomly reported. The weighted mean difference was 1.01 mm (CI: [0.45, 1.57],  $p < 0.001$ ,  $I^2 = 87\%$ ) for HCAL gain and 0.55 mm (CI: [0.38, 1.29],  $p = 0.05$ ,  $I^2 = 97\%$ ) for VCAL gain. PPD reduction over 6 months was 1.51 mm (CI: [0.76, 2.26],  $p < 0.01$ ,  $I^2 = 91\%$ ). HBL gain and VBL gain were negligible. Potential risk of bias was identified.

**Conclusions.** Teeth affected by furcation defects treated with OFD show significant clinical improvements 6 months after surgery. Nevertheless, prospective long term trials on conservative surgical treatment of FD is still lacking.



### AGGRESSIVE PERIODONTITIS: A SIMPLE GENETIC TEST TO PREVENT THE DISEASE. CASE CONTROL STUDY

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**Aim.** The generalized aggressive periodontitis (AgP) is a periodontal disease characterized by deep pockets, severe loss of periodontal attachment, bleeding on probing, periodontal abscesses and intra-bone defects in healthy patients with positive familiarity for periodontitis. There are a lot of papers that show some alterations in function of monocytes and macrophages who produce abnormal quantity of cytokines as Interleukins. The aim of this study is to evaluate the presence of genetic mutations with two Single Nucleotide Polymorphism (SNPs) on Interleukin 1 alpha and 1 beta (IL-1 $\alpha$ -IL-1 $\beta$ ) and correlates their frequencies in patients with AgP compared with healthy controls.

**Materials and methods.** 81 subjects participated to this study. 21 were affected by AgP, while 60 healthy subjects formed the control group. The inclusion criteria for the cases provided a Diagnosis of AgP based on classification of American Academy of Periodontology 1999 in healthy subjects. The controls were healthy subjects without signs of periodontitis. DNA was extracted using a brush (QIAGEN) creeping 10-15 times on the oral mucosa of the cheek. Then DNA has been extracted, processed and sequenced using PCR to identify the SNPs in two different regions for IL-1 $\alpha$  (rs1800587) and IL-1 $\beta$  (rs1143634).

**Results.** the analysis of the IL-1 $\alpha$  SNP revealed the same frequency between patients and controls, while the analysis of the IL-1 $\beta$  SNP showed a statistically significant difference ( $p=0,0319$ ) between cases and controls. Moreover, considering two SNPs together, we found a 57,1% prevalence in the group of patients vs a 25% prevalence in the controls, with a  $p=0,0072$ .

**Conclusions.** the study shows a possible correlation between the analyzed IL-1 SNPs and AgP, in our cohort of patients. Given the results, the test could be considered as a prevention system especially for the IL-1 $\beta$  and positive genotype IL-1. So it could be useful to use this test on families that show cases of AgP to investigate the familiarity of this pathology in a direct manner and to identified young subjects at risk (without signs of illness) combining anamnestic and familiarity data with genetics in order to set up personalized and frequent "follow up" programs.



### ANTIMICROBIAL PHOTODYNAMIC THERAPY IN THE NON-SURGICAL TREATMENT OF PERIODONTITIS

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**Aim.** Recent preclinical and clinical data have suggested a potential benefit of photodynamic therapy (PDT) in the treatment of periodontitis. The aim of this study was to evaluate the clinical effects of the use of PDT to non-surgical periodontal treatment.

**Materials and methods.** Forty subjects with periodontitis were included (probing depth- PD: 4-6 mm); pregnant women and smokers were excluded from the study. Patients were treated with Antimicrobial Photodynamic Therapy (aPDT) and professional oral hygiene, including scaling and root planning. Bleeding on probing (BOP) and probing depth (PD) were measured at baseline, 1 week, 3 and 6 months after therapy.

**Results.** After 1 week from therapy ( oral hygiene and aPDT), the number of BoP-positive sites decreased statistically significantly; After 3 and 6 month from therapy, reducing in BoP value was maintained and PD decreased in all sites.

**Conclusions.** Non-surgical mechanical debridement with adjunctive PDT was effective in reducing mucosal inflammation and PD.



### COMPARISON OF ENVIRONMENTAL SCANNING ELECTRON MICROSCOPY WITH HIGH VACUUM SCANNING ELECTRON MICROSCOPY FOR THE INVESTIGATION OF CELL BIOMATERIAL INTERACTIONS

M. Mattarozzi<sup>1</sup>, I. Alfieri<sup>1</sup>, A. Lorenzi<sup>1</sup>, A. Toffoli<sup>2</sup>, G.M. Macaluso<sup>2</sup>, S. Lumetti, E. Manfredi, C. Galli

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**Aim.** The morphological analysis of cell-material interactions is an essential step in understanding how biomaterial can integrate into a living organism. The complex and time consuming procedures for sample preparation can introduce artefacts in the observation. Novel microscopy techniques, which allow for direct observation of biological samples could reduce this source of bias. The aim of the present study was to investigate the efficacy of conventional low vacuum scanning electron microscopy (LWSEM) and environmental SEM (ESEM) in the assessment of cell-material interactions.

**Materials and methods.** Mouse calvaria MC3T3 cells (ATCC) were seeded on commercially pure machined titanium discs of 10 mm diameter kindly provided by Sweden&Martina, Due Carrare, Italy in Dulbecco modified MEM (Life Technologies), 10% Fetal Bovine Serum, 1% Penicillin and Streptomycin and 1% Glutamine (Sigma-Aldrich). Samples were then processed for microscope observation by rinse in Phosphate Buffer saline and fixation in 4.5 Glutaraldehyde. Samples were then rinsed in Sodium Cacodylate buffer and observed at LWSEM or dehydrated in 35-50-75 alcohol prior to LWSEM observation. Fresh samples in 0.9 NaCl solution were observed at ESEM

**Results.** No significant loss of detail was observed when dehydrated or non dehydrated samples were analysed at LWSEM. Samples observation was slower and focus was more cumbersome than with traditional high vacuum SEM microscopy, due to the need for careful control of pressure and humidity conditions in the chamber. The observation of fresh samples at ESEM however proved difficult for the need to eliminate water covering the sample, to allow for correct cell imaging. This was obtained by decreasing chamber humidity, thus causing NaCl to precipitate.

**Conclusions.** ESEM does not require vacuum and therefore biological samples do not have to be processed prior to observation, as with high vacuum SEM microscopes. This is a clear advantage over traditional electron microscopy because processing artefacts can be avoided. However the presence of salts can hinder a correct visualisation of details. The use of low vacuum SEM after cell fixation, but without dehydration or gold sputter coating proved a viable alternative to traditional high vacuum SEM observation.



### DENTAL PULP STEM CELLS IN PERIODONTAL REGENERATION: A RANDOMIZED CONTROLLED CLINICAL TRIAL

F. Barbero, F. Ferrarotti, V. Manavella, F. Romano, M.N. Gamba, A. Quirico, E. Pigella,  
G.M. Mariani, M. Aimetti

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**Aim.** This study aimed to investigate the effectiveness of dental pulp stem cells (DPSCs) associated to equin collagen (gingistat) in intrabony defect regeneration compared to collagen alone.

**Materials and methods.** The analysis was carried out on 18 patients with periodontitis and at least one deep intrabony defect among those referred to the Section of Periodontology, C.I.R. Dental School, University of Torino (Italy). Furthermore the indication of a vital and untreated tooth extraction was needed. Radiographic intrabony defect must be  $\geq 3$ mm and PPD (probing pocket defect)  $\geq 6$ mm. Subjects were randomly assigned by a computer generated list to the test group (DPSCs and gingistat) and to the control group (gingistat). Random assignment resulted in 9 patients in the test group and 9 in the control one. Clinical measurements were recorded at baseline, 3 and 6 months by one masked and calibrated examiner. The Minimal Invasive Surgical Technique (MIST) was used. During surgery the following measurements were collected: distance between the cemento-enamel junction to the bottom of the defect (CEJ-BD); intraosseous defect and the number of residual walls. The treatment of the root surface was performed with 24% EDTA (Ethylenediaminetetraacetic acid) for 2 minutes before the graft positioning (gingistat with stem cells or gingistat only). Eventually, the sutures were done with Gore-tex 7-0. At 6 months the following measures were taken: full mouth plaque score (FMPS), full mouth bleeding score (FMBS), PPD (probing pocket depth), radiographic intrabony defect (INTRA-rx).

**Results.** The two groups were comparable in terms of demographic characteristics and morphology of the defects. In the Control group CAL (clinical attachment level) gain at 6 month was  $2.24 \pm 1.73$  mm ( $p=0.0037$ ), PPD reduction was  $2.57 \pm 1.73$  mm ( $p=0.0017$ ), INTRA-rx gain was  $1.50 \pm 1.31$  mm ( $p=0.009$ ), while in the Test group CAL gain was  $4.00 \pm 1.39$  mm ( $p<0.0001$ ), PPD reduction was  $4.00 \pm 1.63$  mm ( $p<0.0001$ ), INTRA-rx gain was  $2.92 \pm 1.80$  mm ( $p<0.001$ ). At 6 month the Test group, compared to the Control group, performed better in terms of PPD reduction, CAL gain, INTRA-rx with a statistically significant difference.

**Conclusions.** In this study dental pulp stem cells with a minimal invasive surgical technique, improved clinical outcomes in terms of CAL, PPD and INTRA-rx. During the follow-up no complications as edema or infection are been noticed. Patients didn't refer pain. Further studies are needed to confirm data.



### IMPACT OF ACTIVE PERIODONTAL THERAPY ON SUBJECT-RELATED PERIODONTAL PROGNOSIS AS ASSESSED WITH A SIMPLIFIED METHOD FOR PERIODONTAL RISK ASSESSMENT

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**Aim.** The present study was performed to evaluate the impact of active periodontal therapy (AT) on subject-related periodontal prognosis, as assessed with a simplified method (UniFe; Farina et al. 2007, Trombelli et al. 2009).

**Materials and methods.** Data from 109 patients (42 males; mean age: 42.2 ± 10.2 years, range 22-62 years; 5 former smokers and 32 smokers; 4 diabetics) undergone AT were retrospectively obtained from the record charts at 2 clinical centers, and used for analysis. According to the individual treatment plan, patients had undergone single or multiple sessions of non-surgical instrumentation and/or periodontal surgery and/or extraction of teeth with a hopeless prognosis. Also information on the detrimental effects of smoking and uncontrolled diabetes on periodontal status as well as treatment outcomes had been provided to smoker and diabetic patients, respectively. Before AT and at the completion of AT, the subject-related periodontal risk was calculated according to the UniFe method on the basis of 5 parameters (smoking status, diabetic status, number of sites with PPD ≥5 mm, Bleeding on Probing score, and bone loss/age ratio) and scored at the subject level on a scale from 1 (low risk) to 5 (high risk).

**Results.** The mean duration of AT was 1.4±0.8 years (range: 0.2 - 4.7). During AT, patients underwent 5.4 ± 2.9 sessions of non-surgical instrumentation and 2.9±1.7 sessions of osseous (resective or reconstructive) periodontal surgery. A mean of 1.1±1.5 teeth were lost during AT, with 51% of patients experiencing the loss of at least 1 tooth. Before AT, risk score was 1, 2, 3, 4 or 5 in 2%, 0%, 3%, 28% and 67% of patients, respectively. A mean decrease in risk score of 0.9 (95%CI: -0.8;-1.0) was obtained with AT (p< 0.001), mainly due to a reduction in the parameter scores related to the number of sites with PPD ≥5 mm and the Bleeding on Probing score. A decrease of 3, 2, and 1 risk scores was observed in 3%, 14% and 55% of patients, respectively; 27% of patients showed no change in risk score; and 1% of patients showed an increase in risk score of 1. After AT, risk score was 1, 2, 3, 4 or 5 in 5%, 6%, 18%, 60% and 11% of patients, respectively.

**Conclusions.** The UniFe method may represent an objective method to assess changes in periodontal prognosis following AT.



### IMPACT OF ACTIVE PERIODONTAL THERAPY ON SUBJECT-RELATED PROGNOSTIC FACTORS FOR PERIODONTITIS

V. Checchi<sup>1</sup>, R. Farina<sup>2,3</sup>, L. Minenna<sup>2</sup>, M. Nieri<sup>4</sup>, L. Toselli<sup>2</sup>, L. Checchi<sup>5</sup>, L. Trombelli<sup>2,3</sup>

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**Aim.** The present study was performed to evaluate the impact of active periodontal therapy (AT) on subject-related factors with a prognostic value for periodontitis incidence and/or progression.

**Materials and methods.** Data from 109 patients (42 males; mean age: 42.2 ± 10.2 years, range 22-62 years; 5 former smokers and 32 smokers; 4 diabetics) undergone AT were retrospectively obtained from the record charts at 2 clinical centers, and used for analysis. According to the individual treatment plan, patients had undergone AT consisting of single or multiple sessions of non-surgical instrumentation and/or periodontal surgery and/or extraction of teeth with a hopeless prognosis. Also information on the detrimental effects of smoking and uncontrolled diabetes on periodontal status as well as treatment outcomes had been provided to smoker and diabetic patients, respectively. The following subject-related parameters, all included in a simplified method (UniFe; Farina et al. 2007, Trombelli et al. 2009) for periodontal risk assessment, were considered either before AT as well as at the completion of AT: smoking status (assessed as: current smoker, former smoker, never smoked) and number of cigarettes/day, diabetic status (assessed as: diabetic with serum HbA1c levels ≥7.0%, diabetic with serum HbA1c levels <7.0%, non-diabetic), number of sites with PPD ≥5 mm, Bleeding on Probing score (BoP), and bone loss/age ratio.

**Results.** The mean duration of AT was 1.4±0.8 years (range: 0.2 - 4.7). During AT, patients underwent 5.4 ± 2.9 sessions of non-surgical instrumentation and 2.9±1.7 sessions of osseous (resective or reconstructive) periodontal surgery. A mean of 1.1±1.5 teeth were lost during AT, with 51% of patients experiencing the loss of at least 1 tooth. No significant differences in patient distribution according to smoking status were observed between pre-AT and post-AT observation intervals. The proportion of patients with 0-1, 2-4, 5-7, 8-10 and >10 sites with PPD ≥ 5mm shifted from 3%, 3%, 3%, 3%, and 88%, respectively, before AT, to 20%, 23%, 23%, 8%, and 26%, respectively, at AT completion. The proportion of patients with BoP of 0-5%, 6-16%, 17-24%, 25-36% and >36% shifted from 1%, 7%, 10%, 23%, and 59%, respectively, before AT, to 64%, 17%, 11%, 4%, and 4%, respectively, at AT completion. Due to the limited number of diabetic patients, it was not possible to evaluate the impact of AT on diabetic status.

**Conclusions.** Within the limits of the present study, AT showed a significant impact on periodontal pockets and the prevalence of bleeding on probing, while a limited to null effect on smoking status.





### IMPLANT SURFACE ALTERATIONS FOLLOWING THE USE OF THREE INSTRUMENTATION SYSTEMS:1 - EFFECTS OF A STANDARD CLEANING

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**Aim.** The scope of this in vitro work was to analyze the effects produced by the use of three different types of instruments, developed to control periodontal and peri-implant eco-systems, on the implant neck and abutment-smooth surfaces, simulating a standard professional cleaning.

**Materials and methods.** The effect of specific cleaning procedures was examined on the smooth neck surfaces of 27 commercially pure (ASTM fourth degree) titanium implants (M4, 1x13 mm), closely screwed with their same-diameter abutment. Each implant neck-abutment unit was axially shared out by a line-engraving into three equal vertical sectors formed by the curved surfaces of a portion of the implant neck, abutment, and the junction between the implant neck and abutment (FAJ). Each implant was set on a stable base to ensure a stable support and an ideal entry prospect to the single experienced operator who had to treat the different sectors. Twenty-one sectors were left untreated (negative control), whereas the remaining sectors were treated with 3 instruments (20 sectors per instrument) for 60 seconds: A) AISI 216 stainless steel Gracey curette, B) commercially pure titanium (ASTM fourth degree) curette, and Cavitron® ultrasonic scaling device with plastic-tipped insert. The morphological analysis of sectors was performed by scanning electron microscope (ESEM- Quanta-200), using the backscattered electrons at low vacuum (0.53 Torr), and X-ray microanalysis (INCA Oxford Instruments).

**Results.** The morphological analysis showed significant differences among the 4 groups. In negative control sectors, at great magnification (x1000), the smooth titanium surface appeared formed by almost horizontal circular ridges, due to turning manufacture, and a clean, not virtual FAJ resulted (gap of about 30-40 µm.) The stainless-steel treatment produced significant changes of the sector surface morphology: several axial grooves and cleavages with a considerable amount of titanium debris inside the FAJ were detected. The coronal edge of the fixture was slightly dragged toward the FAJ. The titanium treatment produced only marginal surface modifications, but the coronal edge of the fixture resulted heavily dragged toward the FAJ, where no debris inside was observed. The ultrasonic treatment with plastic-tipped insert did not produce substantial morphological modifications of surface sectors. Both fixture and abutment edges resulted unchanged.

**Conclusions.** The stainless steel curette, even if painstaking used by an expert operator, in an ideal entry prospect and along a limited period of time, produces significant and irreversible damages of the titanium surface. The use of titanium curette seems to be particularly favorable if an effective manual cleaning method, but the dexterity and skillfulness are, at the same time, required. The Cavitron® ultrasonic scaling device, with plastic-tipped insert, apparently ensures optimal outcomes, even if the plastic debris positioning inside the FAJ maybe not excluded.



### IMPLANT SURFACE ALTERATIONS FOLLOWING THE USE OF THREE INSTRUMENTATION SYSTEMS:2 – SIMULATION OF AN EXTENDED TREATMENT

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**Aim.** The scope of this in vitro study was to analyze the effects produced by the use of three different types of instruments, developed to control periodontal and peri-implant ecosystems, on the implant neck and abutment-smooth surfaces, simulating a 1-year extended supportive peri-implant treatment.

**Materials and methods.** The effect of specific cleaning procedures was examined on the smooth neck surfaces of 27 commercially pure (ASTM fourth degree) titanium implants (M4, 1x13 mm), closely screwed with their same-diameter abutment. Each implant neck-abutment unit was axially shared out by a line-engraving into three equal vertical sectors (radial angle =  $2/3 \pi$ ), formed by the curved surfaces of a portion of the implant neck, abutment, and the junction between the implant neck and abutment (FAJ). Each implant was set on a stable base to ensure a stable support and an ideal entry prospect to the single experienced operator who had to treat the different sectors. Twenty-one sectors were left untreated (negative control), whereas the remaining sectors were treated with 3 instruments (20 sectors per instrument) for 180 seconds: A) AISI 216 stainless steel Gracey curette, B) commercially pure titanium (ASTM fourth degree) curette, and Cavitron® ultrasonic scaling device with plastic-tipped insert. The morphological analysis of sectors was performed by scanning electron microscope (ESEM- Quanta-200), using the backscattered electrons at low vacuum (0.53 Torr). The sector surface was also analyzed using a raster scanning, white-light confocal profilometer (ConScan, CSM Instruments) to evaluate roughness indexes. The raster scanning allows for the creation of an overall large image with lateral and vertical accurate resolution of curved samples.

**Results.** The stainless steel treatment produced a very significant change of the sector surface morphology with the complete leveling of the original horizontal circular ridge morphology, and the formation of deep axial grooves and cleavages. The FAJ contained several titanium particles. The profilometer analysis showed longitudinal grooves, crevices and distortions varying in width and depth (0.6-1.8  $\mu$ m). The prolonged titanium treatment produced some surface modifications. Profilometer analysis highlighted both the reduction in height of the original horizontal ridges (depth 0.15 - 0.7  $\mu$ m) and the presence of longitudinal grooves (depth 0.15-0.25  $\mu$ m). The ultrasonic scaling device produced both the reduction in height of the horizontal ridges and some episodic longitudinal or slightly oblique grooves. The mean roughness did not differ among the 4 differently treated surface units, whilst the roughness depth resulted significantly greater after the stainless steel treatment, intermediate after titanium treatment, and lower after ultrasonic scaling treatment.

**Conclusions.** The use of the steel curette appears unsuitable in prolonged treatment. The titanium curette may be indicated when an effective system for removal calcified biofilm is necessary. Titanium curette should not routinely, but selectively used, by experienced operators and with optimal entry perspective. At last, it appears that the ultrasonic scaling with plastic-tipped insert has very little detriment.



### INDIVIDUAL SUSCEPTIBILITY TO THE DEVELOPMENT OF PERIODONTAL DISEASE: GENETIC SINGLE NUCLEOTIDE POLYMORPHISMS (SNPS)

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**Aim.** Our work has focused on the assessment of individual genetic profiles as well as on the general state of health and any risk factors that may provide an important data base for a reliable prognosis on the individual susceptibility to periodontal inflammation.

**Materials and methods.** Double salivary samples were performed on a sample of Italian-Caucasian population of 10 patients (6 females and 4 males), aged between 20 and 40 years, with the aid of standard oropharyngeal swabs (DNA free) rubbed on the buccal mucosa a distance of 30 minutes after eating and drinking. The samples were performed according to the criteria of PPD (personal protection devices) in order to avoid their contamination. Subsequently, sent to the laboratory, followed the analytical procedure for the genetic analysis that has provided the phase Extraction and Purification of DNA, and Quantification (Real Time-PCR) extract in order to investigate the presence of single nucleotide point mutations (five days long).

**Results.** Out of 10 patients undergoing predictive genetic testing only 4 showed an increased risk of developing periodontal disease: Patient 1, Patient 3 Patient 9 and patient 10. Furthermore, 2 of 4 male patients are at risk of developing periodontitis, compared to 2 of 6 female patients: obviously cannot be provided a parameter statistically significant, but reduced in this pilot study it can be said that the risk of onset periodontitis is more frequent in males than in females dependents of polymorphic genes coding for interleukin-1 (both the a and b isoforms) and for TNF $\alpha$  coding region, associated with the severity of periodontitis.

**Conclusions.** As in all infectious diseases, the host susceptibility plays an important role in determining whether or not the disease by the microorganisms and this susceptibility was found to be inherent in the DNA of the subject. The test is configured, then, as a tool for general screening and primary prevention of highly professional and innovative for all dental hygienists and dentists who wish to offer their patients a preventive and therapeutic full-service.



### INFLUENCE OF DIFFERENT INSTRUMENTAL TECHNIQUE ON THE EFFECTIVENESS OF NON-SURGICAL THERAPY

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**Aim.** In the non-surgical periodontal therapy, it is imperative that the edge of the blade of the curette is adapted in close junction to the tooth root anatomy. Several studies have suggested that the posterior regions are often more difficult to treat because of crown morphology, tight tooth contacts and furcation involvement. A novel technique for the sub-gingival instrumentation is studied to improve the effectiveness of non-surgical periodontal therapy in the posterior sites. In this modified technique, the curette is inserted at 0° and adapted the same way as of the conventional technique, however, the blade is tilted more than 70°. The goal of this randomized double-blind clinical study was to evaluate the effectiveness of the modified manual instrumentation technique, by tilting the curette more than 70°, compared with the classical conventional technique that uses an angle of 45°.

**Materials and methods.** In the Department of Periodontology, Dental School (University of Turin) eleven patients were selected, were diagnosed with chronic generalized periodontitis, presenting with at least one bleeding pocket in posterior sextants with PPD ≥ 5mm. A total number of 24 sextants were randomly assigned to 2 groups of non-surgical periodontal therapy: *Scaling and root planing with Classical use of Curettes (SRP CC)*; *Scaling and root planing with Modified use of Curettes (SRP MC)*. 12 sextants were randomly assigned to the test group SRP MC and 12 sextants to the control group SRP CC. Root planing was performed in each sites with PPD ≥ 4 mm. Every sextant underwent bone resective surgery and the presence of the remaining mineralized deposits was evaluated after each non-surgical instrumentation. The data was analyzed for every sextant and stratified for the maxillary, mandibular arches and for the buccal and lingual / palatal surface.

**Results.** The SRP MC was found to be more statistically significant and effective for the treatment of the mandibular buccal and lingual surfaces ( $p = 0.007$ ) and of the maxillary palatal surfaces ( $p = 0.04$ ) that of traditional technique. Moreover, no significant difference was found the maxillary buccal surfaces using traditional and modified instrumentations techniques. Using the SRP MC resulted in considerably better results in the removal of calcified deposits on premolars of both arches. Furthermore, in the literature the pockets with PPD between 4 and 6 mm often contain 15% to 38 % of residue calculus, while in SRP MC, only 14.7 % of the treated sites had calcified residue.

**Conclusions.** The modified technique for instrumentation is a valid alternative technique for the treatment of posterior regions, however there are a lot of limitations that are associated with the presence of various anatomical structures, such as the oblique ridge, that could block the operator working field.



### INFLUENCE OF IGFBP-3 IN ORTHODONTIC MOVEMENT

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**Aim.** The aim of the study was to understand if protein IGFBP-3 is involved in orthodontic movements during periodontal remodeling. The levels of three IGF were also evaluated, because they modulate the IGF availability.

**Materials and methods.** 6 patients were casually selected (11-23 years aged) and three samples of crevicular fluid were collected from element 1.1: the first before applying an orthodontic force (T0), the second after 4 hours of application (T1) and the third one after 10 days (T2). The applied force corresponded to an elastic band from 1.3 to 1.1, while the fluid samples were collected using "Periotron 6000, Harco Electronics Ltd., USA". To assess the IGFBP-3 availability, the samples were subjected to immune-electrophoresis, in un-reducing conditions, using the polyclonal antibody for IGFBP-3. The amount of free IGF-I was instead assessed by the immunoradiometric assay (IRMA, Nichols Institute Diagnostics).

#### Results.

- Volumes of crevicular fluid:
    - 0,582-1,703  $\mu$ l (average = 1,259  $\mu$ l) at T0,
    - 1,008-2,470  $\mu$ l (average = 1,598  $\mu$ l) at T1,
    - 1,241-2,566  $\mu$ l (average = 1,712  $\mu$ l) at T2.
  - Percentage values of the expression of IGFBP-3 compared to the control sample:
    - patient I 76% at T1 and 3% at T2,
    - patient II 54% at T1 and 4% at T2,
    - patient III 75% at T1 and 18% at T2,
    - patient IV 84% at T1 and 8% at T2,
    - patient V 120% at T1 and 23% at T2,
    - patient VI 65% at T1 and 20% at T2.
- The average value is 79% (D.S. = 22,6) at T1 and 12,67% (D.S. = 8,71) at T2.
- Values of free IGF-I calculated as a function of the total volume of crevicular fluid:
    - 16,8 pg/ $\mu$ l at T0,
    - 20,95 pg/ $\mu$ l at T1,
    - 1,67 pg/ $\mu$ l at T2.

One of the purposes of the study was to understand how the levels of IGF-I varied with respect to those of IGFBP-3. The ratio between the levels of IGF-I and IGFBP-3 at T0 was calculated, obtaining the result of 1 at T0, 1.58 at T1 and 0.78 at T2.

**Conclusions.** From the obtained results we can see that the inflammation induced by orthodontic movements leads to an increasing in the amount of gingival fluid, while the expression of the intact form of IGFBP-3 decreases (21% after 4 hours and 87% after 10 days). The cause has to be researched in the extracellular matrix metalloproteinases (MMPs), which can degrade IGFBP-3 and IGFBP-IGF complex. It would also explain the initial increase in free IGF-I (about 50% at T1). The reduction of IGF-I levels (approximately 22% at T2) might also be determined by the degradation by MMPs or may occur spontaneously, as the production of proinflammatory cytokines decreases after the third day of application of orthodontic force. In conclusion, IGFBP-3 certainly plays a key role in orthodontic tooth movement, but more studies are needed to understand the precise working of this phenomenon.



### LATERALLY MOVED, CORONALLY ADVANCED, TWO STEPS FLAP TO THE TREATMENT OF ISOLATED RECESSIONS IN MANDIBULAR ESTHETIC ZONE

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**Aim.** The aim of this study is to validate the use of a mucogingival technique for the treatment of gingival defects (Miller class I,II, or III), in mandibular esthetic zone. The result to reach is maximum root coverage possible of the defect, considering that on III Miller Class recessions you can't obtain a complete root coverage cause of the loss of interproximal bone. Also we want to obtain an increase of keratinized tissue, without an increase of the PPD value, both the recipient and the donor site.

**Materials and methods.** Nine isolated gingival recessions (at least 3mm deep) were included in the work. Keratinized tissue lateral and apical to the defects must be respectively  $KT < PPD + 3$  mm and  $KT < 2$  mm, characteristics that preclude laterally or coronally moved one step flaps. The shallow vestibulum is the main anatomical feature that required this kind of surgery for the impossibility to perform any coronally advanced procedures. The new approach consist of two different phases: in the first a palatal epithelio-connective graft is put in a recipient area, apical to the MGJ, relative to the tooth next the one with the recession; three months later, a flap including this graft is moved laterally and advanced coronally on the site affecting by the defect. The following parameters REC, PPD, KT were measured at baseline and at 6-months follow-up visit to compare their values before and after the surgery. 6-months following the second phase is made the esthetic evaluation of the surgery by means RES(Root Esthetic Score) system and the Predetermination of Root Coverage technique.

**Results.** The statistical analysis at 6-months examination reveals there is a significative reduction of the recession on the recipient site(from  $4.4 \pm 1.4$ mm to  $1.3 \pm 1$ mm). Furthermore there is a statistically significant increase of keratinized tissue both in the recipient ( from  $3 \pm 1.4$ mm to  $4 \pm 0.9$ mm)and in the donor site(from  $0.4 \pm 0.2$  to  $3.3 \pm 1.1$ ); there is no statistically significant difference in PPD values in the recipient and donor site after the surgery compared with the initial values. Based on the data collected by esthetic evaluation perform in accord to the Predetermination of Root Coverage (Zucchelli, Mele, Stefanini, Mazzotti, Mounssif, Marzadori, Montebugnoli, J Periodontol. July2010 V.81n.7) in all clinical cases we can state that the correspondence between the aspected line of coverage and the reached one is the 100%.

**Conclusions.** It is important to emphasize once again that this kind of surgery is to performed only in few patients in which coexistence of particular anatomical characteristics prevents to achieve excellent results with usual mucogingival techniques. Laterally moved, coronally advanced, two steps surgical technique is very effective in treating mandibular isolated gingival recessions, Miller class I,II and III. It allows to reach the esthetic result and root coverage of laterally moved, coronally advanced, flap and the increase of the height and thickness of keratinized tissue, the stability of the flap and a better management of shallow vestibulum situation of two steps procedures.



### MAY ANDROGENIC STEROIDS IMPROVE BONE REGENERATION? A NOVEL APPROACH WITH STANOZOLOL

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**Aim.** Androgen hormones play an important role in positive regulation of bone homeostasis. Stanozolol (ST) is a synthetic steroid derived from dihydrotestosterone which combines high anabolic and low androgenic action. Previous studies showed that ST may promote osteoblast growth and activity (Vaishnav et al, 1988), accelerate wound healing (Kornending et al, 2012), increase bone mineral density (Liao et al, 2003) and improve bone mechanical properties (Chesnut et al, 1983). Local administration of ST has been experimented in order to investigate its effects on synovial membrane and cartilage in a animal model of osteoarthritis. It has been observed that ST reduces osteophytes formation and subchondral bone reaction; moreover, it may promote cartilage regeneration at 3 and 9 months (Spadari 2013). The aim of this in vitro study was to assess the effects of ST on osteoblast growth and differentiation. To the best of our knowledge, this is the first investigation on the effects of local administration of androgens to improve bone regeneration.

**Materials and methods.** Primary osteoblasts from rat calvara were isolated and cultured in 96-wells plates for 3 weeks. Medium composition was given by alphaMEM, 10% FBS, 1% glutamin, 1% penicillin/streptomycin solution. Different concentrations of ST were tested: 0, 10, 100, 500, 1000 nM. Cell medium was renewed every 2 days. AlamarBlue test was performed every 2 days for 2 weeks to examine cell growth and metabolic activity. At 3 weeks, cells were stained with DAPI and Alizarin red to study cell density and bone mineral apposition. mRNA and protein profiles (alkaline phosphatase, osteocalcin, osteopontin and collagen-type I) were also measured to analyze cell differentiation.

**Results.** Tested concentrations of ST showed to have no significant effects on osteoblast growth: in fact, Boltzmann analysis of cellular growth revealed statistically superposable data using different ST concentrations. However, 10 and 100 nM ST were associated with higher mineral bone apposition, suggesting that ST may have significant effects on osteoblasts differentiation and activity. On the other hand, 1  $\mu$ M ST showed to inhibit bone mineralization, indicating that ST action is not linearly dose-dependent.

**Conclusions.** ST may promote osteoblasts differentiation and bone-formation through a direct local action. Standing to our preliminary results, we suggest to use 10 and 100 nM ST concentrations, as higher concentrations (1  $\mu$ M) may have inhibiting effects on osteoblast activity. Our further in vivo experiments will elucidate the effects of local administration of ST, in view of clinical applications of ST for bone regeneration.



### METABOLOMICS ANALYSIS OF SALIVA COLLECTED FROM PATIENTS WITH PERIODONTAL DISEASE

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**Aim.** This study proposed a novel metabolomic approach based on the thorough investigation of oral metabolites to study the potential use of a metabolomic analysis as a diagnostic periodontal tool. In this validation study we want to supply some evidence whether metabolomic profiling of saliva samples can provide a signature of the disease.

**Materials and methods.** Saliva samples were collected from a cohort of 157 subjects (36 males, 31 females, mean age  $45.27 \pm 10.74$  years) referred to the Section of Periodontology, University of Torino (Italy). The diagnosis of periodontal diseases was made by an experienced clinician according to the classification proposed by Armitage (1999). 39 healthy subjects (HS) and 118 patients with clinical and radiographic diagnosis of periodontal diseases (PD) were consecutively selected: 16 gingivitis (G), 83 chronic periodontitis (CP) and 19 aggressive periodontitis (AP) patients. The collection of saliva was done in the morning pre-prandial, between 8 a.m. and 10 a.m. for all subjects. The day scheduled for saliva collection the patients had no food or beverage, with exception of water and did not wash their teeth with toothpaste or mouthrinsing. Every subject was seated comfortably and was advised not to force salivation, then was asked to spit saliva into a sterile graduated tube for 10 min. About 1 ml of saliva was collected from every patient and immediately frozen. For each saliva sample, one-dimensional (1D) NMR (nuclear magnetic resonance) spectrum was acquired with water peak suppression using a standard pulse sequence (Bruker terminology: noesygppr1d.comp), 64 scans, 96 k data points, a spectral width of 18028 Hz, a relaxation delay of 4 s. All metabolites of interest were then manually checked and their NMR signals were assigned on template 1D NMR profiles by using matching routines of AMIX 3.8.4 (Bruker BioSpin) in combination with the BBIORFCODE (Version 2.0.0; Bruker BioSpin) reference database and published literature when available. Unsupervised Principal Component Analysis (PCA) was run for obtaining a general overview of the variance of NMR profile.

**Results.** The pattern recognition analysis of NMR profiles could discriminate CP patients ( $n = 83$ ) from HS ( $n = 39$ ) with an accuracy of 73%. Metabolic profiles of CP patients exhibited higher concentrations of acetate, c-aminobutyrate, n-butyrate, succinate, trimethylamine, propionate, phenylalanine and valine, and decreased concentrations of pyruvate and N-acetyl groups compared with controls ( $P < 0.05$ ).

**Conclusions.** Our results can provide a contribution to the understanding of the biochemical network and pathway in the PD, however at this stage the method can not be extended to the general population as a ready-to-use clinical tool, due to the limited cohort recruited and the exploratory nature of this work. Anyway, a further validation of the statistical model on a larger cohort is in progress with the aim to demonstrate the potential impact on the clinical practice of our findings.





### ONE-STAGE FULL-MOUTH DISINFECTION VERSUS QUADRANT-WISE SCALING AND ROOT PLANING IN THE TREATMENT OF GENERALIZED AGGRESSIVE PERIODONTITIS: A RANDOMIZED 6-MONTH CLINICAL AND MICROBIOLOGICAL TRIAL

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**Aim.** Data concerning treatment outcomes in patients with generalized aggressive periodontitis (GAgP) are limited. The aim of the present study was to investigate six-month clinical and microbiologic outcomes of the one-stage full-mouth disinfection (OSFMD) with compared to conventional quadrant scaling and root planing (SRP) in the management of patients with GAgP.

**Materials and methods.** Thirty-two consecutive patients with previously untreated GAgP were selected among those referred to the Section of Periodontology, C.I.R. Dental School, University of Torino (Italy). Subjects were randomly assigned by a computer generated list to the OSFMD according to the protocol by Quirynen et al. (test group) and to conventional quadrant-wise SRP (control group) at one-week interval. Random assignment resulted in 17 patients (mean age  $34.76 \pm 4.78$  years) in the test group and 15 in the control one (mean age  $36.87 \pm 3.87$  years). Clinical measurements were recorded at baseline, 3 and 6 months by one masked and calibrated examiner. Subgingival samples were collected at the same time points from moderate (4 to 5 mm) and deep ( $\geq 6$  mm) pocket sites and analyzed using a polymerase chain reaction for *Aggregatibacter actinomycetemcomitans*, *Prevotella intermedia* and bacteria of the red complex.

**Results.** All patients completed the study. At baseline there were no statistically significant differences between test and control groups relative to demographic characteristics, clinical as well as microbiological parameters ( $p > 0.05$ ). Both therapies led to a statistically significant decrease in Full Mouth Plaque Score (FMPS), Full Mouth Bleeding Score (FMBS) and in overall mean Probing Depth (PD) and clinical attachment level (CAL) at 3 and 6 months compared to baseline ( $p < 0.001$ ). The FMPS and FMBS values remained below 20% during the experimental period in both groups. The clinical parameters improved during the first three months postoperatively whereas remained nearly unchanged between 3 and 6 months. At 6 months the mean overall PD reduction and the mean CAL gain amounted to  $1.3 \pm 0.3$  mm and  $1.1 \pm 0.4$  mm, respectively, in the test group and to  $1.1 \pm 0.5$  mm and  $0.9 \pm 0.6$  mm, respectively, in the control group. Between-group analysis did not indicate significant statistical differences except for the greater PD reduction at initially deep pocket sites ( $\geq 6$  mm) favoring the test group. The OSFMD resulted in a mean reduction of  $2.5 \pm 0.5$  mm ( $p < 0.001$ ) at 3 months and  $2.4 \pm 0.7$  mm ( $p < 0.001$ ) at 6 months. With regard to microbiological parameters the quadrant SRP decreased significantly the number of sites colonized by *A. actinomycetemcomitans*, *P. gingivalis*, *T. forsythia* at 3 months. However, a nearly complete recolonization was observed at 6 months. The OSFMD resulted in a reduction of all five periodontal pathogens ( $p < 0.001$ ) at 3 months. At 6 month from baseline a recolonization of all the target bacteria was observed except for the *P. gingivalis* that maintained the 3-month values.

**Conclusions.** The OSFMD is a viable approach to deal with GAgP patients resulting in statistically significant greater decrease in the number of sites with  $PD \geq 6$  mm and in better early control of subgingival recolonization by periodontal pathogens.



### ORAL HEALTH STATUS AND PERIODONTITIS IN ALZHEIMER'S DISEASE PATIENTS: A CASE CONTROL PILOT STUDY IN A SICILIAN RURAL COMMUNITY

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**Aim.** Dementia is a common disorder among the elderly. Alzheimer's disease (AD) is the most common cause of dementia. In addition to known risk factors (e.g. age and familiarity) of AD, recently it has been suggested a possible promoting role for chronic inflammatory infective diseases. Periodontal disease (PD) is a frequent chronic multi-bacterial infection involving the tissues supporting the teeth; in addition to promoting inflammation locally, the periodontal pathogens possess mechanisms able to influence the systemic balance of inflammatory mediators. Similarly to other systemic diseases (e.g. cardiovascular disease, diabetes, renal diseases and low birth weight), a possible link has been proposed between PD and the development and progression of AD. Aim of the present study was to evaluate the oral health status and the prevalence/severity of PD in a group of patients affected by AD compared to a control group of healthy subjects.

**Materials and methods.** A case-controlled clinical trial was designed to compare patients with AD (Test group - T; n = 16; M: 8; F: 8, range age 64-93 yrs) with healthy controls (Control group - C; n = 16; M: 8; F: 8; range age 64-92 yrs). The population study was named ZAP (Zabut Aging Project) and all participants, enrolled in a Sicilian rural community (Sambuca di Sicilia, AG, Italy), were matched for age and sex. Following variables were recorded: smoking and drinking habits, number of teeth, Decayed Missed Filled Teeth scoring (DMFT), measurement of the probing depth (CPI and PSR index). The association between AD and PD, socio-demographic and behavioural-clinical variables was assessed using the  $\chi^2$  test or Fisher's exact test, as appropriate. To measure the association level, crude OR and the 95% Confidence Interval (CI) were calculated. Statistical significance of the difference in the average DMFT between cases and controls was assessed using the Student's t-test. A p value  $\leq 0.05$  was considered statistically significant.

**Results.** One patient of T group was a smoker versus four of C group; four T patients were drinker versus two of C group. Seven of T group (43.7%) were totally edentulous, conversely only 2 (12.5%) of controls have the same condition (p=0.04). With respect to oral status, DMFT index was  $23.7 \pm 9.0$  in T patients versus  $25.2 \pm 7.8$  in controls (p=0.633). There were no significant differences between T and C groups regarding periodontal index: high PSR and CPI scores (>3) were recorded in 77.8% of AD patients and 46.1% of health cases (p >0.05). A similar distribution among two groups was observed regarding the other investigated variables (e.g. smoking and drinking habits).

**Conclusions.** In this rural Sicilian adult/elderly community, poor oral health is frequent with a DMFT score higher than general population. The obtained data do not support the hypothesis of a major prevalence and severity of PD among AD patients. However, to confirm these preliminary results the recruitment of a wider sample size and further data, regarding proteomic salivary profiles and RT PCR-based microbiological investigation on sub-gingival plaque samples, still need in order to better clarify the role of PD and periodontal pathogens in the AD natural history.



### PERIODONTAL LIGAMENT-DERIVED STEM CELLS: EFFECT OF DYNAMIC THREE-DIMENSIONAL CULTURE ON OSTEOGENIC POTENTIAL

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**Aim.** Periodontitis diseases lead to destruction of periodontal ligament (PDL). Tissue engineering approach based on the use of stem cells, growth factors and scaffolds is an important challenge for periodontal therapy and restoration of the architecture and function of this complex tissues. Different in vitro models are addressed to explore this microenvironment in all their components. Cell population within PDL, the stem cells fraction (PDLSCs), has been demonstrated to have osteogenic potential that can be exploited to recreate in vitro a construct mimicking bone tissue. It is well accepted that certain cellular processes of differentiation for tissue engineering occur preferentially in three-dimensional (3D) instead of two dimensional (2D). It is therefore necessary to employ 3D cell culture systems to conduct relevant research and generate more useful and applicable data. Considering this important premise, the aim of this study was to investigate the behavior of PDLSCs in terms of viability, proliferation and osteogenic potential when cultured in an unexplored 3D condition represented by PDLSCs embedded in alginate microbeads and grown in rotating bioreactor.

**Materials and methods.** PDLSCs were obtained from healthy patients undergoing to impacted third molar extraction after verbal consent. After washing with sterile phosphate-buffered saline, PDL was removed, plated onto 25-cm<sup>2</sup> flask, expanded in Dulbecco's Modified Medium supplemented with 10% fetal calf serum. PDLSCs were tested for MSC markers (CD90; Stro-1; CD45) and then committed to osteogenic differentiation, embedded in alginate beads prepared using an air-driven droplet generator for cell encapsulation. Calcein AM/PI was used to evaluate cell viability. qRT-PCR was used to analyze the expression osteogenic markers (Runx2 and COL1) expression, while to assess mineral matrix deposition Alizarin Red Staining and the Fourier transform infrared spectroscopy (FT-IR) were chosen. Three-dimensional dynamic culture experiments were performed in Rotary Cell Culture System™ (RCCS-4™ bioreactor, Synthecon™, Inc., Houston, TX, U.S.A.), with High Aspect Ratio Vessel (HARV™). For all experiments 10 ml HARV™ vessels were used.

**Results.** In all experiments PDLSCs were compared with human mesenchymal stromal cells from Wharton's Jelly (hWJMSCs) of healthy human umbilical cords, as control cells routinely used in our laboratory. Considering the aim of our experimental approach:

- 1) Alginate encapsulation didn't affect PDLSCs viability and their behavior;
- 2) Exposure to bioreactor significantly anticipated osteogenic differentiation and improved mineral matrix deposition;
- 3) The combination here proposed could represent a promising opportunity to create a PDLSCs based smart system with enhanced osteogenic potentiality useful for dental applications.

**Conclusions.** The dynamic bioreactor chosen for our experiments reduced medium sedimentation and maintained cells suspended in a "free fall" condition that circumvents the harmful effects associated to shear stress. On the other hand, encapsulation technology didn't affect our results in term of cell viability and differentiation. It has to be considered as great tool to achieve success in cell transplantation allowing a more efficient and functional integration of cells in tissue regeneration.

Therefore, we demonstrated that PDLSCs differentiation toward osteogenic lineage can be enhanced before in vivo transplant through specific culture strategies, such as the use of dynamic three-dimensional culture condition.



### PHYSICO-CHEMICAL CHARACTERIZATION OF TWO OZONATED OILS USED IN ORAL FORMULATIONS

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**Aim.** Ozonated oils (O3-Oil) are antiseptics obtained from the chemical reaction between ozone and unsaturated fatty acids of vegetable oils. The mechanism of this reaction, known as ozonolysis, consists in a multi-step reaction. Once ozone is combined with a vegetable oil, its primary targets are carbon-carbon double bonds of unsaturated fatty acids to form an initial molozonide. The molozonide is very unstable and rapidly cleaves to a carbonyl compound and a carbonyl oxide. In an anhydrous environment, these two compounds join together to form a secondary stable ozonide (1,2,4-trioxolane). When the secondary ozonide comes into contact with tissues or wounds, it reacts with the wetness and there is a slow release of peroxides. However, the ozonolysis reaction is meaningless if we are not able to quantify how much peroxide could be released by O3-Oil. The main quantitative methods developed for determining the quality of O3-Oil are: the peroxide value (IP - an indicator of how much active peroxide could be released) and the acid value (IA - a measure of the products of oxidation as a result of the ozonolysis). Since these two parameters are not reported in the medication label by the manufacturers, the purpose of this study is to assay and compare the physico-chemical properties of two commercially available O3-Oil oral formulations: Ozonia3000<sup>®</sup> and Novox<sup>®</sup>.

**Materials and methods.** In this study, two O3-Oil were tested: an ozonated sunflower seed oil (Ozonia3000<sup>®</sup>, Innovares S.r.l., Sant'Ilario d'Enza - RE, Italy) and an ozonated olive oil (Novox<sup>®</sup>, MOSS S.r.l., Lesa - NO, Italy). For both samples, the following parameters were assayed: the IP and the IA. The two variables were assayed according to procedures of the European Pharmacopoeia and the Official Methods of Analysis of the Association of Official Analytical Chemists. The experiment was performed independently in triplicate. Raw data fitted to the Gaussian model (Shapiro-Wilk test). The high difference of variability between the two oils suggested to standardize the data (unit of standard deviations), being moreover the low number of specimens. A two-sided Student's t-test for independent samples was performed with an alpha level of 0.05.

**Results.** Data are reported as mean  $\pm$  SD. IP was 3011,67 $\pm$ 205,20 mEq O<sub>2</sub>/kg for Ozonia3000<sup>®</sup> and 3572,40 $\pm$ 54,74 mEq O<sub>2</sub>/kg for Novox<sup>®</sup>. IA was 26,50 $\pm$ 5,5 mg KOH/1 g for Ozonia3000<sup>®</sup> and 30,60 $\pm$ 0,8 mg KOH/1 g for Novox<sup>®</sup>. For both tested parameters, the Student's t-test failed to demonstrate a significant difference between the two tested O3-Oil.

**Conclusions.** To date, it is difficult to attribute a clinical significance to these results, because the evidence evaluating the effect of O3-Oil in dentistry is poor and lacks the evaluation of the clinical effects with the change in these parameters. It would be desirable that the manufacturers of O3-Oil oral formulations clearly report in the medication label the parameters IP and IA, because there is clear evidence indicating that these parameters are close connected with: the antimicrobial effectiveness of O3-Oil and their ability to accelerate the wound healing. The findings of the present paper are based on initial preliminary data of an ongoing study underway using a much larger sample. Further preclinical and clinical investigations are warranted.



### PREVALENCE OF PROTOZOA IN PERIODONTAL DISEASE

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**Aim.** Protozoa are unicellular eucariota microorganism, their morphology is vary and they have an adaptive physiology and metabolism. Only two protozoa have colonized oral cavity: entamoeba gingivalis and trichomonas tenax. The aim of this study was to identify protozoa in periodontal biofilm and link their presence to periodontal disease.

**Materials and methods.** Participants were diagnosed and then categorized into 3 clinical groups according to AAP periodontal classification (Armitage, 1999). Eighty-nine individuals were randomly selected from among those referred to the periodontal and general dentistry department at the Fatebenefratelli "S. Giovanni Calibita" hospital in Rome, Italy, and were divided into groups as follows: 30 periodontally healthy (mean age, 51 yrs; age range, 25-68 yrs; males, 15; females, 15), 36 with chronic periodontitis (mean age, 57.2 yrs; age range, 36-75 yrs; males, 22; females, 14), and 23 with aggressive periodontitis (mean age, 41.8 yrs; age range, 24-56 yrs; males, 17; females, 6). Biofilm samples were collected, by means of a sterile curette, from the deepest pocket area of individuals with periodontitis after careful removal of supragingival plaque. The biofilms were dispersed in 200 µL of sterile physiologic, or distilled water by means of a sterile hypodermic syringe, and a 50 µL quantity of the pool obtained was applied to a glass slide and covered with a coverslip. A microscopic image was obtained with an optical microscope in phase contrast and dark-field at 200x, 400x, and 600x magnifications (BA310 LED Motic Asia, Hong Kong) and with a scanning electron microscope (SEM). The images were captured with a digital camera (Canon 7D).

**Results.** A very low correlation was observed in healthy patients: on 30 patients only 8 had showed protozoa (26.6%). A low correlation was found between protozoa and Aggressive periodontitis: only 10/27 patients (37%) had showed protozoa divided in 7/20 (35%) for aggressive active and 3/7 (43%) for inactive one. High correlation was found between protozoa and chronic periodontitis: 20/36 patients (55%) had presented protozoa divided in 7/15 (46%) in inactive and 13/21 (62%) for active.

**Conclusions.** The prevalence of protozoa in periodontal disease seems linked to the amount of oral biofilm in patients with chronic periodontal disease and the presence of protozoa is lower in patients with aggressive periodontitis.



### RELATIONSHIP BETWEEN MACROVASCULAR AND MICROVASCULAR HEMODYNAMIC ASSESSED BY OPTICAL SPECTROSCOPY IN PERIODONTITIS

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**Aim.** Visible – near infrared (optical) spectroscopy can be used to measure regional tissue hemodynamics and edema and, therefore, may represent an ideal tool with which to non-invasively study periodontal inflammation. The IR spectrum of a tissue sample can be regarded as molecular fingerprint of the tissue. If this molecular fingerprint is modified by a disease process, then IR spectroscopy can be used to detect and monitor the disease process. The study objective was to evaluate the ability of optical spectroscopy to simultaneously determine multiple inflammatory indices (tissue oxygenation, total tissue hemoglobin, deoxyhemoglobin, oxygenated hemoglobin, and tissue edema) in periodontal tissues in vivo.

**Materials and methods.** The measurement of individual inflammatory indices, such as pocket oxygen tension, oxygen saturation of hemoglobin and temperature, has been posited to represent a potential diagnostic approach to inflammatory periodontal diseases for some time now. Spectra were obtained, processed, and evaluated from healthy, gingivitis and periodontitis sites using a portable optical – near infrared spectrometer.

**Results.** Site-specific variations in a number of inflammatory indices measured (oxygen saturation; deoxygenated hemoglobin; and water band centre of gravity) were observed. In particular, tissue oxygen saturation was significantly decreased in both gingivitis and periodontitis sites compared to control sites. Such decreased oxygen saturation likely reflects tissue hypoxia resulting from an ongoing inflammatory response leading to increased oxygen consumption. It is well known that in destructive periodontal diseases, anaerobic microorganisms predominate in the periodontal pocket; and, diminished oxygen tension in deep pockets would be expected to promote growth of anaerobic bacteria. Site-specific variations in a number of inflammatory indices measured (oxygen saturation; deoxygenated hemoglobin; and water band centre of gravity) were observed. Gingival blood flow, which is altered by the vascular dilation and angiogenesis intimately associated with inflammation, may serve as a further prognostic marker for periodontal disease. The decreased Hb signals and altered tissue oxygen saturation observed in the optical spectra from periodontitis sites likely reflect such altered vascularity. Periodontal edema (water content, as interpreted by optical spectra) results from an increase in vascular permeability in response to infecting bacteria leading to interstitial fluid accumulation and, subsequently, the release of a variety of this inflammatory exudate in the gingival crevice.

**Conclusions.** In summary, the results of this study revealed that hemodynamic alterations can be detected around diseased periodontal sites by optical spectroscopy, and this method may be considered an alternative and feasible approach for the monitoring and diagnosis of periodontal diseases.



### SELF-REPORTED MEASURES OF PERIODONTAL STATUS IN A DIABETIC POPULATION

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**Aim.** The present study was performed to evaluate the measures of self-perceived periodontal status in a large cohort of patients affected by diabetes mellitus (DM) and their association with the main parameters used to characterize DM status.

**Materials and methods.** Diabetic patients attending the Operative Unit of Diabetology, Dietology and Nutrition (University-Hospital of Ferrara, Italy) were screened for eligibility. Edentulous patients and women affected by gestational diabetes were excluded from the study. For each patient, data on type of DM, years elapsed from DM diagnosis, assumed drugs, Hb1Ac serum levels, DM complications and body mass index (BMI) were retrieved from the patient chart. A self-reported questionnaire on oral health was designed as a modification of previous, validated questionnaires, including specific questions on oral health status, self-performed hygiene habits (daily frequency of use of the toothbrush, additional use of toothpaste), and professional dental care (frequency of dental visits, date of the last visit). The questionnaire was administered to each patient along with written instructions on questionnaire filling.

**Results and conclusions.** Seven hundred seventy-one patients were screened for the study. One hundred thirty-two patients were excluded in accordance with the selection criteria, while 110 patients did not give their consent to fill the questionnaire. The per protocol study population consisted of 529 diabetic patients (type I DM: 80%; type II DM: 19%; non type I, non type II: 1%). The proportion of patients perceiving their oral health status as excellent, very good, good, sufficient, scarce, or unknown amounted to 4%, 5%, 43%, 25%, 22% and 1%, respectively. The majority of patients perceiving their periodontal status as sufficient/scarce were affected by type 2 DM and showed diabetes complications, had serum Hb1Ac levels >8%, and were overweight or obese. On the other hand, the majority of patients reporting an excellent/good periodontal status had a recent ( $\leq 5$  years) DM diagnosis. Patients reporting spontaneous tooth loss were frequently obese, and had uncontrolled DM and DM complications. Patients with a history of periodontal surgery were predominantly affected by uncontrolled DM.



### SINGLE FLAP APPROACH AND ENAMEL MATRIX DERIVATIVE: EFFECTIVENESS IN INTRABONY DEFECTS

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**Aim.** The present study was performed to evaluate the clinical effectiveness of a simplified procedure for the treatment of periodontal osseous defects (Single Flap Approach, SFA) with enamel matrix derivative (EMD) either alone or in association with deproteinized bovine bone mineral (DBBM) in the treatment of periodontal intrabony defects. A secondary aim was to evaluate which patient and defect/site characteristics influenced the clinician's decision on whether or not use the combined approach.

**Materials and methods.** Three experienced periodontal surgeons performed the clinical procedures, including surgical treatments and clinical recordings. Twenty-four periodontal intrabony defects in 24 patients (mean age:  $49.1 \pm 9.6$  years; 16 males; 16 non-smokers, 8 current smokers; mean daily cigarette consumption at the time of surgery:  $11.3 \pm 6.5$  cigarettes/day) were accessed with a buccal SFA. In order to evaluate which patient/defect characteristics may influence the selection of the regenerative approach (i.e. EMD vs EMD+DBBM), the choice of using the additional xenograft to EMD treatment was left to the operator's judgement. Factors such as smoking habit as well as characteristics of the defect (depth of the intrabony component, residual bone walls, defect angle and width) that had been previously shown to affect the regenerative outcome were thus recorded for analysis. Clinical operators were kept blinded as to the secondary aim of the study.

**Results.** Twelve defects were treated with EMD, whereas 12 defects were treated with EMD+DBBM. EMD group showed a higher prevalence of incisors and canines, while EMD+DBBM group showed a higher prevalence of premolars and molars. The interaction between the morphology of the intrabony defect (as assessed in terms of bony wall composition) and the surgical treatment was statistically significant, with the proportion of the 1-wall component and 3-wall component being more prevalent in EMD+DBBM and EMD groups, respectively. At 6 months, both EMD and EMD+DBBM groups showed a statistically significant CAL gain and PPD reduction, as well as a significant 6-month increase in REC. No significant difference in CAL, PPD, and REC 6-month changes was observed between groups.

**Conclusions.** Both EMD and EMD+DBBM were clinically effective in the treatment of periodontal intrabony defects accessed with a buccal SFA. The adjunctive use of DBBM in predominantly 1-wall defects located at posterior teeth seems to compensate, at least in part, the unfavorable osseous characteristics on the outcomes of the procedure.





### THE FREE GINGIVAL GRAFT: EVALUATION OF HEALING AT THE PALATAL DONOR SITE. A RANDOMIZED COMPARATIVE CLINICAL TRIAL

P. Lorusso, C. Iaconi, M. Serroni, V. Cardelli, L. Romano, M. Di Tullio

**Aim.** The aim of this study was to evaluate early healing results of the palatal wound after a Free Gingival Graft by comparing two different methods of treatment at the donor site.

**Materials and methods.** No-smoker patients requiring an epithelial-connective grafting procedure were enrolled in this study. The size of the graft and its thickness ranged from 13x8 mm to 18x9 mm and from 2 to 2,5 mm respectively. In the control-donor sites the palatal wound was sutured and medicated by fibrin sponges; the test-sites were sutured and covered by platelet rich fibrin (PRF) autologous membranes obtained by centrifugating the patient's blood sample into a PC-02 centrifuge (3000 rpm for 10 minutes); this process allowed to get a fibrin concentrate that was suitably pressed to obtain an elastic and flexible membrane. The following parameters were recorded at 1, 2, 3 and 4 weeks postsurgery: immediate and delayed bleeding (iB, dB), sensibility (S), complete epithelialization(CE), discomfort (D) and variation of feeding habits (FH).

**Results.** the difference in CE between the test- and control- groups was statistically significant at the second postoperative week. The dB and the D rate at the first week postsurgery were lesser in the test group. No significant differences were found between the two groups for the other parameters.

**Conclusions.** Statistically significant differences were found between the test- and control-groups in terms of CE, which occurred faster in the test group. The discomfort rate recorded for the test group was significantly lower than for the control group. The results of this preliminary study represent an important basis for a comparative clinical study, with a larger sample of participants.



### TRANSGLUTAMINASE 2 LEVELS AND RANKL/OSTEOPROTEGERIN RATIO IN PERIODONTAL LIGAMENT OF PATIENTS WITH CHRONIC PERIODONTITIS

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**Aim.** A possible useful clinical model for monitoring cell response in inflammatory microenvironments including periodontitis-dependent tissue response is osteoprotegerin (OPG) and the receptor activator of nuclear factor (NF)-kappa B ligand (RANKL) that are secreted by periodontal ligament cells.

Several study highlighted the role of transglutaminase 2 (TG2), a calcium-dependent enzyme which catalyzes post-translational protein modifications in the initial phase of inflammation, we evaluated TG2 involvement in PDL inflammatory response and the alterations in RANKL/OPG ratio occurring in periodontitis.

**Materials and methods.** A cross-sectional and analytic study was conducted in 21 patients with Chronic Periodontitis (CP) and 21 healthy subjects. A baseline visit was conducted by a blind calibrated examiner who collected a complete medical history and a standard clinical periodontal parameters. Biopsies were carried out during extraction for advanced caries and orthodontic indications for the healthy control group and for the CP group from the site with severe periodontal destruction and inflammation during extraction of teeth attributable to CP.

**Results.** There was an up-regulation of different inflammation markers, such as IL-6, TNF- $\alpha$  and HMGB-1, and at the same time an increase of TG2 mRNA levels in human periodontal ligament (HPDL) cells from CP patients compared with healthy subjects. A marked increase in RANKL expression, that was 2.6-fold higher compared with normal subjects, was also observed in HPDL cells from patients with periodontal disease, while no significant changes were observed for OPG gene transcription. We found also a positive correlation existing between RANKL/OPG ratio and TG2 mRNA levels in HPDL cells from periodontal disease patients. Furthermore in macrophage cell line THP-1 we demonstrated that inhibition of TG2 reduced RANKL expression.

**Conclusions.** Our data suggest the TG2 involvement in molecular mechanism of inflammatory response and bone resorption induced by periodontal disease given the RANKL key role in bone remodeling and the high expression levels of pro-inflammatory cytokines. In particular, we show clear evidence for a positive correlation between TG2 and RANKL/OPG ratio mRNA transcripts, suggesting that the increase in TG2 expression may be considered an early event in tissue changes induced by periodontal disease. Collectively our results demonstrate that increases in TG2 expression in PDL could be associated with high levels of pro-inflammatory markers promoting the interaction between molecular mechanisms involved in tissue repair and bone resorption.



### **XENO-FREE CULTURE OF HUMAN PERIODONTAL LIGAMENT STEM CELLS: A NOVEL PLATFORM FOR TISSUE ENGINEERING**

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**Aim.** The purpose of this study was to develop a culture system for the expansion and production of human Periodontal Ligament Stem Cells (hPDLSCs) using a new xeno-free media formulation ensuring the maintenance of the stem cells features comprising: the multiple passage expansion, mesengenic lineage differentiation, cellular phenotype and genomic stability, essential elements for conforming to translation to cell therapy.

**Materials and methods.** hPDLSCs were isolated from the human periodontium using a minimally invasive periodontal access flap surgery. Expanded hPDLSCs in a xeno-free culture showed the morphological features of stem cells, expressed the markers associated with pluripotency, and a normal karyotype. Under differentiation culture conditions, hPDLSCs presented adipogenic and osteogenic potential; indeed, a very high accumulation of lipid droplets was evident in the cytoplasm of adipogenic induced cells, and indisputable evidence of osteogenic differentiation, investigated by transmission electron microscopy, and analyzed for gene expression analysis has been shown.

**Results.** xeno-free culture maintained the characteristic immunophenotype (11) as well as the cells grown under FBS (foetal bovine serum)-medium. The proliferation rate and the differentiation into mesengenic lineage of hPDLSCS xeno-free culture was significantly increased, and the cells retained their functionality. Real-Time PCR expression of 92 osteogenesis-associated genes that revealed a significant modulation of 52 transcripts during the xeno-free hPDLSCs osteogenic differentiation.

**Conclusions.** Based on these data, the novel xeno-free culture method might provide the basis for GMP culture of autologous stem cells, readily accessible from human periodontium, and can be a resource to facilitate their use in human clinical studies for potential therapeutic regeneration. Adult stem cells transplantation into damaged organs has opened new perspectives for the treatment of several human pathologies.



# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## PATOLOGIA ORALE

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## PATOLOGIA ORALE

SESSIONI >>>

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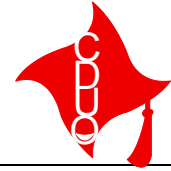
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### 1,25-DIHYDROXYVITAMIN D3 RECEPTOR EXPRESSION IN ORAL SQUAMOUS CELL CARCINOMA

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**Aim.** Vitamin D has been associated with anti-tumour properties and a lower risk of several types of cancer, including oral squamous cell carcinoma (OSCC). Vitamin D action is mediated through the 1,25-dihydroxyvitamin D3 receptor (VDR), which is expressed both in normal and neoplastic cells. It has been suggested that an alteration of the VDR pathway may be associated with an increased susceptibility to cancer risk and a more aggressive disease. Indeed the expression of VDR and has been described in many types of cancer cells, including cells of breast, prostate, pancreas, colon, cervix, thyroid and skin. The purpose of this work is to evaluate the difference in expression of VDR between OSCC and normal mucosa.

**Materials and methods.** A total of 10 patients with a mean age of 55 years (range 25-92 years) who underwent surgical treatment for OSCC with curative intention, were analyzed in this study: 2 cases in Stage I, 2 cases in Stage II, 3 stage in stage III, and 3 in Stage IV. Additionally, 5 healthy controls were subjected to immunohistochemical analysis. None of the patients have been previously treated or had multicentric lesions. Histological grading has been evaluated on histological sections stained with hematoxylin-eosin, according to the WHO classification: 4 cases were G1, 3 cases were G2, and 3 cases were G3. As regards TNM, tumors were classified according to UICC. Immunohistochemical expression of nuclear and cytoplasmic VDR was examined.

**Results.** The VDR expression pattern in normal oral mucosa showed immunoreactivity in basal and parabasal layers. Normal mucosa exhibited predominant nuclear positivity for VDR, although a slight cytoplasmic expression and was recorded in some areas. In OSCC cases, VDR showed an uniform staining pattern, primarily in the cytoplasm. Cancer cells lost nuclear staining, except in cases of poorly differentiated OSCC.

**Conclusions.** These results in OSCC confirmed those obtained in other studies regarding the involvement of the VDR pathway in the mechanism of carcinogenesis.



### A CHOLESTEROL GRANULOMA INVOLVING THE NASOPALATINE DUCT

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**Aim.** The cholesterol granuloma is a histological entity consisting of granulation tissue in which large quantity of cholesterol crystals provoke foreign body giant cell formation. The pathogenesis of cholesterol granuloma is still unknown. Numerous ethiopathological hypothesis have been proposed, but the majority of the authors support the concept of airway obstruction in the cells well pneumatized of temporal bone and paranasal sinuses. Obstruction of the air cells leads to rupture of blood vessels and hemorrhage. Red blood cell degradation into cholesterol crystals produces a foreign body giant cell. Cholesterol granuloma can be found in several areas of the body, including middle ear (its most common site, usually associated to chronic middle ear diseases), mastoid process, breast, sella turcica, pontocerebelline angle, testis, lungs, brain, kidneys and in the apex of the temporal bone pyramid. We report a case of cholesterol granuloma involving the nasopalatine duct.

**Materials and methods.** History: A 54-year-old male reported to the dental clinic with the chief complaint of painless swelling over the palate and anterior maxilla. The patient didn't present systemic pathologies and there was not history of trauma and hematoma. It was performed a test of pulp vitality on the teeth of the anterior sector. All the teeth were found to be vital and respond negatively to the test of percussion. No other sign was present at the time of the visit.

**Results.** Radiographic features: Orthopantomography showed a well-defined radiolucency approximately 2 cm in size with corticated margins in the midline and between the central incisor. CT scan also showed a well-defined radiolucency in anterior maxilla in the region of incisive canal, 2.0cm x 1.8 cm in size.

**Conclusions.** Treatment: The clinical and radiological features suggest that the lesion could be a nasopalatine duct cyst. A surgical enucleation was done with intact removal of the cyst and the specimen was sent for histopathological examination. Histological sections stained with hematoxylin and eosin showed a connective tissue containing extensive areas of cholesterol clefts, surrounded by multinucleated foreign body giant cells, chronic inflammatory cells, macrophages and foam cells. With amazement histological analysis revealed the diagnosis of cholesterol granuloma.



## A SIMPLE SURGICAL-MEDICAL PROTOCOL TO CARRY OUT DENTAL EXTRACTIONS IN PATIENTS IN THERAPY WITH BISPHOSPHONATES: OUR EXPERIENCE

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**Aim.** Bisphosphonate Related OsteoNecrosis of the Jaw (BRONJ) is described as an adverse event related to amino-bisphosphonate (NBP) therapy, occurring as a result of reduced bone resorption and bone turnover. One of the most significant risk factor associated with the onset of BRONJ is tooth extraction even if not yet supported by definitive scientific evidences. The aim of this study is to propose a simple surgical/medical protocol to carry out dental extractions in patients in therapy with NBPs in order to minimize the BRONJ risk.

**Materials and methods.** Eighty-eight patients currently or previously treated with NBPs were selected for extractions of compromised teeth. Patients were divided into two groups on the basis of the risk of BRONJ. Patients were subdivided in high risk (HR) group (i.v. NBPs administration) and in low risk (LR) group (i.m./oral NBPs administration >36 months or oral NBPs < 36 month plus other risk factors). Tooth extractions were carried out using the following surgical-pharmacological protocol: 1) exposure of the alveolar bone through the creation of surgical edges; 2) nontraumatic avulsion, curettage of the area, irrigation of the alveolus with a local antibiotic and 3) closure by primary intention. Furthermore, all patients received a pre- and post-operative pharmacological therapy. The antibiotic systemic therapy was different for HR and LR patients. For HR, the antibiotic systemic therapy based on administration of ampicillin and sulbactam by i.v. and metronidazole per os (1 day pre-operative and 7 days post-operative); for LR patients, amoxicillin and clavulanic acid and metronidazole per os (1 day pre-operative and 7 days post-operative). For both groups, the use of antiseptic (chlorhexidine 0,2% mouthwashes 7 days pre-operatively and 15 days post-operatively) and sodium-hyaluronate (post-operative local application for 15 days) were also prescribed. A follow-up of at least 4 months was needed. Data were included in Microsoft Excel® spreadsheet. A descriptive statistical analysis was performed.

**Results.** Sixteen (18.2%) of eighty-eight were treated with i.v. NBPs, twelve (13.6 %) with intramuscular NBPs and fifty-nine (67.1%) with oral NBPs. One patient was treated with either oral and intramuscular NBPs. After two hundred thirty-one tooth extractions performed, there was no evidence of BRONJ in eighty-two (93,18%) patients treated at follow-up (225 tooth extractions; 97.4%). In six (6.81%) patients of HR group, it has been diagnosed BRONJ according to Bedogni et al: five of these patients were treated with endovenous NBPs for at least 6 months (mean±SD: 27.6±13.14) and one patient with oral NBPs for 36 months. Neither of these patients reported other systemic risk factors.

**Conclusions.** The proposed surgical-medical protocol obtained the complete healing of wound and the absence of radiological signs of BRONJ in more than 90% of patients after tooth extractions. It appears to be a valid choice for patients treated with NBPs who need tooth extraction, in terms of prevention of BRONJ.



## ALEXITHYMIA AS A PECULIAR PERSONALITY TRAIT IN BURNING MOUTH SYNDROME: CASE - CONTROL STUDY

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**Aim.** The pathophysiology of Burning Mouth Syndrome (BMS) is uncertain, and it has long generated controversy, which is now mainly involving psychogenic and neuropathic issues. Nevertheless, previous studies in the literature report personality disorders or abnormal personality traits in BMS subjects. Alexithymia is a personality trait characterized by "a deficit in the cognitive-experiential domain of emotion response system". The onset of alexithymic traits is supposed to be related to environmental factors in early childhood and such traits persist in the lifetime of subjects. The present study aims to assess the prevalence of alexithymic traits in a group of BMS subjects.

**Materials and methods.** The study was prospectively performed on patients with BMS. A control group matched for sex, age and education was selected. Alexithymia was measured with the 20-item Toronto Alexithymia Scale (TAS-20) and patients were dichotomized to alexithymic and non-alexithymic based on recognized cut-off values (TAS-20 score  $\geq 64$ ).

**Results.** Among 133 patients reporting oral symptoms suggestive of BMS, 58 patients fulfilled the diagnostic criteria for BMS. The group of study was composed by 46 females and 12 males with a mean age of  $65.6 \pm 10.49$  years. The mean TAS-20 scores were  $70.6 \pm 13.2$  and  $48.3 \pm 7.7$  in BMS patients and control groups, respectively (t-test;  $p < 0,001$ ). The prevalence of alexithymic traits was 74.1% in the BMS group and 1.7% in the control group (chi-square test;  $p < 0,001$ ).

**Conclusions.** The association between alexithymia and chronic pain has been pointed out in several studies, its prevalence rate ranges from 19% to 53%, while the prevalence in the general population is 7-10%. In agreement with one single previous preliminary study, data from our study showed that BMS patients presented a higher prevalence of alexithymia than the control group. Alexithymia is a trait not attributable to chronic pain. Conversely, it has been shown to be associated with somatization and somatosensory amplification. Such results seem to support a psychogenic pathogenesis of BMS. Nevertheless, alexithymia could well represent a predisposing factor for the onset of BMS even if a neuropathic pathogenesis would be proved. The cognitive behaviour therapy is known to be effective in both alexithymic subjects and BMS patients; this could both suggest a common pathogenesis between alexithymia and BMS and a previously unrecognized high prevalence of alexithymia in BMS patients.



### AN UNUSUAL CASE OF BLADDER CANCER DIAGNOSED FROM AN ORAL METASTASIS

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**Aim.** To report a case of metastasis to the anterior region of the lower jaw from a previously undiagnosed squamous cell carcinoma of the bladder.

**Materials and methods.** A 86 year-old man with a compromised medical situation was referred to the Center of Oral Laser Surgery and Oral Pathology, University of Parma, Italy, because of a vestibular swelling in the anterior region of the right edentulous mandible. The lesion was present since one month and it was previously treated on the basis of a tentative diagnosis of an abscess. Lower lip paresthesia was present since the last three weeks. Medical history disclosed the presence of benign tumours of the bladder, acute myocardial infarction and a recent fracture of the head of the femur. Such a fracture was surgically reduced without success.

**Results.** No specific signs could be detected on orthopantomography, but computed tomography scan showed a grossly rounded osteolytic area of about 1.5 cm in diameter in the spongy bone which was extended at the vestibular plate. The osteolysis was localized at the level of the mental foramen. Mainly on the basis of the anterior localization, working diagnosis included focal lesion from multiple myeloma, osteosarcoma, Ewing's sarcoma and lymphoma. An incisional biopsy in the central part of the lesion was performed. The histopathological and immunohistochemical examination demonstrated the presence of a squamous cell carcinoma deriving from the urothelium. A diagnosis of metastasis most likely from an urothelial carcinoma was rendered. Further work-up (CT scan total body, PET scan) showed the presence of a big neoplastic process of the bladder altogether with metastases at the head of the femur.

**Conclusions.** The oral region is an uncommon site for metastases colonization. Oral metastases represent about 1% of all malignant tumour at this anatomical site. About 25% of oral metastases are the first sign of a metastatic spread and in 23% of cases they represent the first manifestation of an undiagnosed malignancy. The jawbones, particularly the mandible (82%) and specifically the vestibular posterior region, are more frequently affected than the oral soft tissues (2:1). With regard to the oral soft tissues, the attached gingiva is the most commonly affected site (54%). Differences exist concerning the preference of some primary tumours to metastasize to specific oral sites: 11% of the jawbone metastases and 1.5% of the soft tissue metastases in men originate from the prostate gland and the bladder. The four most common tumor sites that metastasize to the jawbones of male patients, are lung, prostate, kidney and liver; in women, oral metastases derive from breast, adrenal glands, female genital organs (uterus, cervix, ovaries) and colorectum. Metastatic lesions are considered a negative prognostic factor and they are related to advanced stage of the primary disease. These conditions may mimic other neoplastic tumours either benign or malignant. Among benign lesions there are pyogenic granuloma, peripheral giant cell granuloma and peripheral ossifying fibroma.



### **AWARENESS OF PREVENTION AND TREATMENT OF BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAWS AMONG DENTAL PRACTITIONERS IN FERRARA**

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**Aim.** The aim of this study was to assess the awareness of bisphosphonate-related osteonecrosis of the jaws (BRONJ) among dental practitioners from Ferrara (Italy) and to verify their knowledge about BRONJ primary and secondary prevention, early diagnosis and therapy.

**Materials and methods.** Within a period of 12 months two different questionnaires were created ad hoc, consisting of 27 questions and delivered as online and hard copy form to 310 dental practitioners. The online survey was carried out by the data processing platform Google Docs®. During local cultural meetings, developed periodically by cultural Association A.N.D.I. and A.I.O. in Ferrara, printed questionnaires were delivered hand by hand to dental practitioners.

**Results.** Total responsiveness was 37.3%. 7% of respondents had never treated patients taking Bisphosphonate (BP) medications. Among dentists who have been in contact with patients taking BP medications (93%), both oral or intravenous. Large part noticed BRONJ in patients taking BP medications (34.6%). Considering BRONJ onset, 21% lesions were related to dental extractions or trauma to the jaw bones. 70% of those observing BRONJ required x-ray of jaws for complete staging and diagnosis. After BRONJ diagnosis, 56% of respondents haven't dealt with BRONJ patients anymore. 10.5% of respondents who diagnosed at least one lesion, decided to recommend drug holiday, local antiseptic and oral antibiotic therapy, analgesic / anti-inflammatory therapy and surgical debridement of necrotic bone. 36% of respondents chose clinical features and guidelines for the management of BRONJ from articles in scientific journals and national and international guidelines. 87% are interested in more information on the prevention and management of risk of bronj.

**Conclusions.** The advantages of the online questionnaire are related to a larger pool of sampling and to the great congruence between answers provided. Considering different studies in literature, responsiveness to this questionnaire achieved the highest percentage reported. The dual mode of administration of the questionnaire was useful to overcome many delivery bias. Physicians and dentists have awareness and knowledge regarding BRONJ risk and management. Therefore, due to BRONJ cases expected increase, intervention to raise awareness and knowledge among healthcare providers is still needed.



### BARTH SYNDROME ASSOCIATED WITH DENTAL ANOMALIES: A CLINICAL CASE

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**Aim.** Barth syndrome is a rare X-linked recessive disease caused by mutations in the TAZ gene encoding the tafazzin protein. This protein is involved in the metabolism of cardiolipin, a mitochondrial-specific phospholipid (it is a component of the mitochondrial inner membrane) which is necessary for proper function of the respiratory chain. This syndrome is typically characterized by cardiomyopathy, skeletal myopathy, growth delay, neutropenia and increased urinary excretion of 3-methylglutaconic acid. The phenotypic variability is wide and patients can exhibit some or all of the previously mentioned features. The aim of the study is to present the case of a patient with Barth syndrome and an unusual clinical condition because of some anomalies of the shape and size of teeth.

**Materials and methods.** A 28-year-old man who had problems in chewing function and needed a prosthetic rehabilitation, came to our attention in the Department of Oral and Maxillofacial Sciences at Sapienza University of Rome. In the anamnestic phase he reported to be affected by Barth syndrome. The extraoral examination revealed short stature, full cheeks, deep set eyes and prominent ears and these features were compatible with Barth syndrome. The intraoral examination revealed poor oral hygiene (with signs of gingivitis) and the absence of several teeth both in the upper and the lower dental arches. The present teeth were characterized by a small size, a rudimentary shape of the crowns and a severe mobility (grade II) and the patient did not give any history of trauma. In the oral mucosa Barth syndrome is generally manifested by recurrent oral ulcers; however, these lesions were absent in this patient. The panoramic radiograph confirmed the absence of several teeth, revealing generalized short dental roots with a rudimentary shape, horizontal bone resorption and a periapical radiolucency in the area of the maxillary left molars.

**Results.** Due to the complexity of this clinical case, a multidisciplinary approach was necessary to obtain a correct treatment planning. Unfortunately, all the present teeth were severely compromised and they had a poor prognosis. In this way, the multidisciplinary approach included mainly surgical procedures (extractions of the teeth) and a prosthetic rehabilitation with adequate manufactures in order to restore the aesthetics and the functions of the stomatognathic system.

**Conclusions.** Oral rehabilitation of patients with complex clinical conditions requires an elaborate treatment planning with a multidisciplinary approach. An early diagnosis and a correct treatment are fundamental in order to obtain a favourable prognosis. In fact, if the treatment is made later it can become more complex and invasive.



### BILATERAL METASTASES FROM RENAL CLEAR CELL CARCINOMA: FIRST CASE REPORTED

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**Aim.** Renal clear cell carcinoma (RCC) accounts for about 2-3% of adult malignancies and about 85% of tumors of the kidney. RCC has different manifestations, including metastasis in uncommon sites and paraneoplastic syndromes. The most frequent sites for RCC metastases are the lung, bone, liver, adrenal gland, contralateral kidney, retroperitoneum, brain, and skin. RCC metastases to the head and neck region are very rare, with about 30 cases of parotid metastases that have been reported over the past 50 years. Metastases account for less than 4% of all salivary gland neoplasms, with the parotid being the most common involved site. The aim of this work is to present a very rare case of bilateral parotid gland metastases from RCC.

**Materials and methods.** A 76 years-old Caucasian male presented to our Institution with painless and palpable bilateral swelling for three weeks. Her past history revealed left radical nephrectomy for clear cell type RCC with Fuhrman grade 2, 12 years ago. Examination revealed a firm, painless, mobile mass bilaterally, posterior to the molar region. A panoramic radiography was performed, showing an ill-defined radiolucent lesion in the parotid region. The right and left mass dimensions were 2 x 1,8 cm and 2 x 1 cm respectively. The Fine-needle aspiration biopsy (FNAB) was difficult to interpret due to the amount of blood in it. A superficial parotidectomy was performed 1 month later.

**Results.** Histopathologic evaluation revealed the presence of a solid nest of epithelial cells with clear cytoplasm and small, round hyperchromatic nuclei. Considering his medical history, the pathologist reported the presence of a bilateral metastasis of RCC. The patient was referred onto the urological clinic of University Hospital "Ospedali Riuniti" in Ancona, for further assessment.

**Conclusions.** To the best of our knowledge, this is the first reported case in literature of bilateral parotid gland metastases from RCC. Although metastases renal neoplasms comprise barely 0.1% of all gland salivary tumors, they are important to recognize in order to find occult malignancy or possible recurrence of previously treated tumors, even after several years. Therefore, metastatic disease should always be considered in the differential diagnosis for patients who present with painless parotid swelling with a previous history of RCC.





## BISPHOSPHONATES-RELATED OSTEONECROSIS OF THE JAWS (BRONJ): A RETROSPECTIVE ANALYSIS OF 203 PATIENTS WITH 266 LESIONS FROM UNIVERSITY OF BARI

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**Aim.** Millions of people receive bisphosphonates (BPs) to treat common bone disorders as osteoporosis and skeletal complications associated with osseous metastasis and multiple myeloma. However, a serious complication and adverse effect of BPs therapy is bisphosphonate-related osteonecrosis of the jaw (BRONJ) consisting of progressive destruction and death of bone that affects the mandible or maxilla. We report the analysis of demographic variables and drugs distribution in a sample of 144 neoplastic and 59 osteoporotic patients with BRONJ of University of Bari.

**Materials and methods.** A retrospective study of neoplastic and osteoporotic patients with BRONJ referred to the Odontostomatology Unit of the University of Bari between 2004 and 2013, was performed. The following data were recorded: gender, age, primary disease, comorbidity, site, trigger, symptoms, size, multifocality, recurrences, AAOMS stage, treatment, type and duration of BPs therapy. Data were entered into a File Maker Pro database and analysed using STATA MP11. The association among several variables was tested using the  $\chi^2$  test, whereas a multiple logistic regression model was used to investigate the association between the primary disease and the multifocality of BRONJ, estimating the odds ratio (OR) and the value of Z-test (significance level  $p \leq 0.05$ ).

**Results.** Out of 203 patients, 75.37% ( $n=153/203$ ) were female, and the age range was 38 to 94 years (mean age  $67.8 \pm 11.3$  SD). An oncologic diagnosis had been made in 71.43% of cases ( $n=145/203$  patients with 195 lesions), breast cancer was the primary pathology in 40% of cases ( $n=58/145$ ), followed by multiple myeloma in 28.97% ( $n=42/145$ ) and other tumours in 31.03% ( $n=45/145$ ); whereas 58 patients with 71 lesions received BPs for osteoporosis (28.57%). Comorbidity was present in 70.69% ( $n=41/58$ ) of osteoporotic patients and in 49.65% ( $n=72/145$ ) of neoplastic patients ( $\chi^2=7.43$ ;  $p=0.0064$ ). In both neoplastic and osteoporotic patients, there was a higher predilection for mandible involvement rather than maxilla location, and tooth extraction was the most common triggering factor (63.53%). The medium size of the lesions was  $3.8 \pm 1.6$  cm (range 0.6-8 cm) and the medium lesions number was  $1.3 \pm 0.6$  per patient (range 1-4). The majority of osteoporotic patients presented lesions in the II stage AAOMS (74.65%,  $n=53/71$ ), whereas neoplastic patients presented the 58.97% of lesions in the II stage ( $n=115/195$ ), and the 33.33% in the III stage ( $n=65/195$ ).

The BP most used was zoledronate, administrated in 69.46% of patients (97.16% of which were neoplastic patients), followed by alendronate, administrated in 14.78% of patients (all osteoporotic), clodronate in 5.91% of patients (two-thirds of which were osteoporotic), and risedronate, ibandronate, and pamidronate in the remainders. Off label BPs therapy was administered in 7 osteoporotic patients. BRONJ was due to oral administration of BPs in 22.66% ( $n=46/203$ ) of patients of this sample, and to parenteral administration of BPs in the other 77.83% ( $n=157/203$ ). Patients with osteoporosis showed the increase of multifocal lesions odds (OR=1.75; Z=11.3;  $p < 0.0001$ ).

**Conclusions.** In accordance with other series reported in the literature, statistical relations were found between comorbidity and primary disease, and between way of BPs administration and BRONJ. The association between multifocality and osteoporosis can be related to the lower importance given to this primary disease by patients and dentists underlining the role of the latter to prevent BRONJ. The BRONJ phenomenon is growing exponentially and the prevention of local risk factors is mandatory, even when oral BPs are prescribed.



### BURNING MOUTH SYNDROME: SYMPTOMATOLOGICAL FEATURES OF 318 PATIENTS

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**Aim.** The aims of this study are to observe if there are typical traits in a significant sized cohort of patients affected by BMS (n=318) and to compare our data to the actual epidemiological knowledge.

**Materials and methods.** We ruled out local or systemic causes of oral pirois through medical history, physical examination, radiography, hematochemical exams, brush cytology, ultrasound of the salivary glands and collecting unstimulated/stimulated salivary flow. We recorded and analyzed data from 318 patients affected by Burning mouth syndrome over five years (from 2008 to 2013). To compare our data to the international literature, we searched for articles containing the keywords "Burning mouth syndrome", "epidemiology" and "prevalence" in the title or abstract in PubMed, and Scopus databases; including articles published between 1985 and 2013.

**Results.** The typical patients affected by burning mouth syndrome are postmenopausal women, generally with a mixed anxiety-depressive disorder. Oral pirois is often localized at the tongue or at the lips and is combined with xerostomia or disgusia. The patients have a mid-level or poor education and low skilled work, usually they are retired. They live in urban areas and their attention is focused on the burning sensation which usually increases during the day or is constant. A recent medical/surgical procedure, such as an implant insertion or a prosthetic restoration is blamed as the cause of the burning sensation in many of the patients included in the study. The patients are usually cooperative. After 5 years we had a high dropout (64%) level.

**Conclusions.** Data arising from this study reflects in part the epidemiological knowledge, but indicate also the need to establish a consensus regarding the diagnostic criteria of BMS. Shared clinical guidelines are needed to make the cohorts homogeneous and the data comparable. In this way, we will be able to analyze the epidemiological data and to compare the various pathogenic hypotheses. Moreover, it would be important to share the interpretations of the etiology and pathogenesis of this idiopathic syndrome. In fact, sharing the results on the nature of this disorder might help the development of valid therapeutic approaches.



### CLINICOPATHOLOGICAL FEATURES AND MALIGNANT TRANSFORMATION OF ORAL LICHEN PLANUS: A 12-YEARS RETROSPECTIVE STUDY

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**Aim.** Oral lichen planus (OLP) is known to be associated with the risk of developing oral squamous cell carcinoma (OSCC). The objective of this study was to investigate the clinicopathological features of OLP and the prevalence of malignant transformation in this setting.

**Materials and methods.** This retrospective study was carried out on 204 medical records of patients with histologically proven OLP who received long-term follow-up (range 6 months–12 years). Data were entered in an informatic database. The statistical analysis, when needed, was performed with the chi-squared test for significance ( $p < 0.05$ ).

**Results.** At the moment of the diagnosis, out of 204 patients (163 female and 41 male; mean age 54.5 years), 107 patients (52.45%) suffered from systemic chronic diseases, in particular 46 (22.5%) from hepatitis C. Clinically, the reticular form of OLP was the predominant one and most patients had multiple oral sites of involvement. Fourteen patients showed extraoral lesions. A percentage of malignant transformation less than 1% was found. In fact, two patients (0.98%) underwent a malignant transformation at a site previously diagnosed as OLP.

**Conclusions.** At present, OLP is accepted as being a potential malignant disorder, therefore lifelong follow-up is recommended.



#### CYTOKINE GENE POLYMORPHISMS IN ORAL LICHEN PLANUS

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**Aim.** Oral lichen planus (OLP) is a chronic inflammatory condition of the mucosa mediated by a complex signalling network between the keratinocytes and the sub-epithelial lymphocytes. Interferon-gamma (IFN- $\gamma$ ) is highly expressed in oral lichen planus (OLP). IL12 is a cytokine involved in the Th1 response in oral lichen planus (OLP). Cytokines are mediators of immune reaction and inflammation, and STATs (signal transducer and activator of transcription) proteins transmit signals from the extracellular milieu of cells to the nucleus. Phosphorylated STATs (pSTATs) enter the nucleus and bind specific regulatory sequences to activate or repress the transcription of target genes. STATs in humans are activated by a plethora of cytokines, including interferons and interleukins, as well as growth factors and hormones. IFN- $\gamma$ , IL12 and IL13 are implied in the activation of the STATs. The main aim is To investigate the individual susceptibility on the basis of the genetic polymorphisms of the regulatory regions of IFN- $\gamma$ , IL12, IL13 cytokines in OLP patients.

**Materials and methods.** Systemically 24 OLP patients and 24 healthy control subjects were recruited after obtaining the institutional review board approval. Twenty-four paraffin-embedded samples (thickness 40  $\mu$ ) diagnosed for OLP using the WHO diagnostic criteria for lichen planus were analyzed for 5 AGC (Ser)/ACC (Asn) IL-12 exon, 4 CGG(Arg)/CAG(Gln) IL-13 exon, and A155G and G-183T IFN- $\gamma$  promoter. Polymorphisms were identified using the polymerase chain reaction (PCR) sequences specific primer method.

**Results.** Genotype and allele frequencies for the IFN- $\gamma$ , IL12, IL13 cytokines showed none significant mutation between OLP patients and healthy controls ( $P > 0.05$ ).

**Conclusions.** The lack of significant polymorphisms for the analyzed cytokines could be related to the small number of the OLP patients and healthy control group. These preliminary results need to be confirmed in a more extensive study by including other regulatory regions, particularly of IFN- $\gamma$  gene, which have been reported to be correlated in vitro with a high production of IFN- $\gamma$ .



### DAILY VITAMIN B12 INTAKE IN PATIENTS WITH RECURRENT APHTHOUS STOMATITIS: THE TURIN EXPERIENCE

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**Aim.** The frequency of recurrent aphthous stomatitis (RAS), probably the most common oral ulcerative lesions seen in primary care, is up to 25% in the general population. However, to date, there has been no optimal therapeutic approach useful to reduce the recurrence. Recently it has been reported the beneficial treatment of RAS with vitamin B12, regardless of its serum level. We decided to evaluate retrospectively the reported efficacy of vitamin B12 treatment in patients having RAS with normal serum cobalamin levels.

**Materials and methods.** In the last 2 years patients suffering of RAS were treated in the Oral Medicine Section of the University of Turin with sublingual vitamin B12 tablets (1000 mcg each), to be taken daily for 6 months. Duration of ulcerative episodes, monthly number of aphthous ulcers, and patient related outcomes (visual analogue score of pain), were recorded in a diary. At the time of first diagnosis patients were also asked for serum tests, which included vitamin B12, folic acid, iron (Fe<sup>++</sup>), Fe<sup>++</sup> saturation levels, total iron-binding capacity, ferritin, full blood count with hemoglobin and hematocrit levels, serum levels of IgA anti-reticulin and IgA anti-endomysial antibodies.

**Results.** Fifty patients took part in the study. The duration of eruptions, the number of ulcers, and the level of pain were reduced significantly ( $P < .05$ ) at 6 months of treatment with vitamin B12, regardless of initial levels in the blood. Only 2 patients did not report any benefit and decided to stop the therapy after 3 months. No patient complained of undesired side effects during the treatment period.

**Conclusions.** As previously reported, also our population confirmed the statement that vitamin B12 treatment, which is unpretentious, low-priced and low-risk, seems to be successful for patients suffering from RAS. Whilst these results are not conclusive but more of a step forward for enhanced management of this common condition, it would be very interesting to know if this statement would be the same with a greater number of patients, randomly and in different clinical settings.



## DENTAL PULP STEM CELLS, DIFFERENTIATING INTO OSTEOBLASTS, BECOME A SOURCE OF THE PRO-APOPTOTIC FACTOR TRAIL: EVALUATION OF AN EXPERIMENTAL MODEL FOR CANCER THERAPY

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**Aim.** Dental Pulp Stem Cells (DPSCs) belong to the family of mesenchymal stem cells (MSCs) and are capable, if properly stimulated, to differentiate into different cell types including osteoblasts. It has been shown, in animal models, that MSCs derived from bone marrow, producing TNF-related apoptosis-inducing ligand (TRAIL), inhibit the growth of tumors that metastasize to the bone tissue, including lung cancer; however, the expression of TRAIL by the MSCs to be effective, must be stimulated with genetic engineering techniques with the involvement of bacterial vectors. TRAIL is a pro-apoptotic factor, member of the super-family of tumor necrosis factors, known for its peculiarity to selectively induce apoptosis in cancer cells. TRAIL can activate apoptotic signals by binding two different death receptors, DR4 and DR5. In our work we evaluated the production of TRAIL by DPSCs differentiated toward the osteoblastic phenotype and the capability of differentiated DPSCs to induce apoptosis in a tumor cell line (H929) through the production of TRAIL.

**Materials, methods and results.** Microarray experiments, also supported by real-time PCR, showed that in DPSCs after differentiation, the expression of TRAIL increased fifteen times. Moreover, cell viability tests have shown that DPSCs differentiating into osteoblasts become resistant to the pro-apoptotic effect of the molecule. This strong resistance derives from a significant decrease in the expression of TRAIL receptors DR4 and DR5, and is confirmed by the weak activation of the intracellular apoptotic signal (caspase 3) following the exposure to the molecule. Conversely, different tumor cell lines express high levels of DR4 and DR5, and in the presence of TRAIL, activate the intracellular apoptotic signals (caspase 3-8). To demonstrate the capability of TRAIL expressed by differentiated DPSCs, to induce apoptosis in cancer cell lines, H929 were co-cultured with DPSCs differentiated for 0, 5 and 10 days in the absence or presence of anti-TRAIL antibody and analyzed by MTT assay to evaluate cell viability. Results demonstrated that the antibody induced a significant increase of H929 cell viability only when these cells were co-cultured with DPSCs differentiated for 10 days. The DPSCs differentiated toward an osteoblastic phenotype express high levels of TRAIL and after the differentiation process, they become resistant to the apoptotic effect of the molecule, due to the balance of the decoy receptors that turns in favor of decoy ones. DPSCs co-cultured with the tumor line H929 decrease the cell viability through the secretion of TRAIL.

**Conclusions.** The DPSCs therefore could constitute a valid model for studying the anti-tumor effect of mesenchymal cells.



### DNA ANEUPLOIDY AS ASSESSED BY HIGH RESOLUTION FLOW CYTOMETRY IN ORAL LICHEN PLANUS

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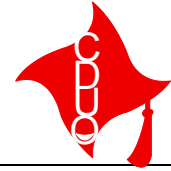
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**Aim.** Oral lichen planus (OLP) is a potentially malignant disorder with a quite low incidence of malignant transformation. Several studies assessed the role of DNA content as a biomarker in oral oncology for both malignant and premalignant lesions. Nevertheless, when addressing the prevalence and the potential prognostic value of DNA-aneuploid status in premalignant lesions, these studies mainly evaluated oral leukoplakia and only a few papers considered oral lichen planus patients. Previous studies addressing on OLP were based on image cytometry and overall reported a wide range of aneuploidy prevalence (0-41%); this could be due to different sampling techniques and inclusion criteria (sometimes dysplasia had been included). This study aims to determine the degree and frequency of DNA-aneuploidy in OLP patients as assessed by high-resolution DNA flow cytometry (hr DNA-FCM) on fresh/frozen samples.

**Materials and methods.** OLP patients referred to our clinic and scheduled for incisional biopsy were consecutively enrolled. Sampling was performed by means of incisional biopsy or microbiopsy. Samples were subdivided for formalin fixation and assessment of both OLP diagnosis and ruling out of dysplasia by routine hematoxylin and eosin staining and for immediate storage at -20°C for later hr DNA-FCM. The nuclei suspensions obtained were filtered, processed, and stained with DAPI as previously described. Nuclear DNA content FCM measurements (hr DNA-FCM) were performed using a CyFlow ML cytometer (Partec, Muenster, Germany) according to consensus criteria. Only samples with at least 2 clear-cut separated G0-G1 peaks were considered DNA aneuploid. DNA Index (DI) values were evaluated as the ratio of the mean channel number of the DNA aneuploid G0-G1 peak to the mean channel number of the diploid G0-G1 peak. Thus, DNA diploid and aneuploid sublines have values, respectively, of DI = 1 and DI≠1.

**Results.** Forty-two OLP patients entered the study: 36 patients with a reticular and plaque clinical form and 6 with an atrophic-erosive form. The histological assessment confirmed the diagnosis of OLP and ruled out the presence of dysplasia in all the patients. A DNA-aneuploid status was overall observed 2 out of 42 (4.7%): 1 near-diploid (DI≠1; DI<1.4) and 1 high-aneuploid (DI≥1.4). When considering the clinical aspect of the OLP lesions, all the aneuploidy cases showed a reticular form, but the low prevalence of the DNA-aneuploid status did not allow the assessment of statistical significance.

**Conclusions.** DNA-aneuploidy does not seem a common event in OLP lesions. When comparing the present data to the results from our previous studies on leukoplakia using the same methods, OLP seems to have a lower rate of DNA-aneuploidy when compared to non-dysplastic leukoplakia (4.7% versus 19%; p=0.0129 Fisher's exact test). Nevertheless, given the present low number of OLP cases, other patients will be enrolled to get more consistent data.



### ENDOCANNABINOIDS CB1 AND CB2: A POSSIBLE ROLE IN ORAL SQUAMOUS CELL CARCINOMA PATHOGENESIS

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**Aim.** Cancer of the oral cavity is the eighth most common malignancy in the world. The disease is diagnosed after a considerable delay and predict the individual progression is difficult. The improvements of the therapy did not increased the rate of survival at 5 years, that is still about 50%. The identification of the possible markers that indicates the progression of the tumor is therefore necessary. Endocannabinoids may play an important role in the process of carcinogenesis in the oral mucosa. They are able to bind and activate specific membrane receptors coupled to G proteins, cannabinoid receptors CB1 and CB2. The purpose of this study is to evaluate the expression of CB1 and CB2 receptors in the development of oral cancer through the immunohistochemical study on samples of OSCC.

**Materials and methods.** We selected 44 cases of patients with the primary tumor in the oral cavity. The stage of the tumor was classified according to the TNM system. The tumors grading was divided into I, II and III grade. The paraffin sections were analyzed by immunohistochemistry. The assessment of the immunoreactivity for CB1 and CB2 receptors was weak or strong. For quantitative analysis the expression of CB1 and CB2 receptors was evaluated in percentage with scale of values ranging from 0 to 100%.

**Results.** The immunohistochemical examination of the samples analyzed showed the absence of expression of CB1 and CB2 receptors in normal mucosa, while peritumoral mucosa showed a weak expression in the vicinity of cancer and tumor mucosa showed an overexpression of receptors. Furthermore, the intensity of staining increased with the increase of the grading. It can be concluded that the strong immunoreactivity of CB1 and CB2 receptors is related to aggressive behavior of oral carcinoma.

**Conclusions.** The analysis of endocannabinoids and their receptors on tissue biopsies taken from carcinoma of the oral cavity may therefore indicate future therapeutic targets and new prognostic biomarkers in these patients, especially in the early stages of the disease. The ultimate goal of this work is to indicate the possible role of CB1 and CB2 receptors such as tumor biomarker that may help in the early diagnosis of oral cancer and therefore contribute to reduce drastically the mortality of this disease.





### EVALUATION OF ORAL MICROFLORA IN DENTAL PLAQUE OF CANCER PATIENTS UNDERGOING CHEMOTHERAPY AND ITS RELATIONSHIP WITH MUCOSITIS

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**Aim.** To assess oral microflora change in dental plaque from oral cavity of cancer patients within 7 days from the first course of chemotherapy and its relationship with mucositis.

**Materials and methods.** 30 cancer patients, divided in a test group undergoing chemotherapy and a control group no undergoing chemotherapy, were enrolled in the study. Three samples of dental plaque at t0 (before chemotherapy), t1 (1 day after chemotherapy) and t2 (7 days after chemotherapy) were the mean of collecting cultivable oral flora. Single and crossed descriptive analyses were used to establish prevalence, and the chi-squared test used to establish the statistical significance of the differences observed in distributions (significance level:  $P < 0.05$ ).

**Results.** In the most patients (57%) the oral microflora consisted mainly of Gram-positive cocci, while the remaining 43% of the bacterial flora of the patients also had periodontal-pathogenic species. No *Porphyromonas Gingivalis* appeared in test group. *Actinobacillus* spp was the bacterium less found in test group among periodontal pathogens while *F. Nucleatum* was the most found. No statistically significant differences were found in quantitative bacterial changes between t0, t1 and t2 in test and control group and between them. According to WHO scores oral mucositis developed in 10 patients (66.6%) from test group.

**Conclusions.** These results indicate that no effect of microflora change in dental plaque from oral cavity of cancer patients undergoing chemotherapy occurred within 7 days from the first course. No correlations between oral mucositis and specific microorganisms were assessed.



#### EXPRESSION OF TRANSGLUTAMINASE GENES IN PATIENTS WITH CHRONIC PERIODONTITIS

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**Aim.** Gingival epithelium play a key role in the protection of oral tissues from microbial challenge, especially during the periodontal disease. Oral mucosal epithelial cells (i.e. oral keratinocytes) actively participate in immune responses and inflammation by secreting a variety of cytokines, chemokines, growth factors and neuropeptides and that responses is related to periodontal pathogenesis. Transglutaminase 1 (TG1) is primarily expressed in stratified squamous epithelia, in which the ordered expression of specialized genes is associated with proliferation and terminal differentiation of keratinocytes. TG1 is also involved in cell envelope formation by cross-linking of precursor proteins, such as loricrin and involucrin. This study was aimed to evaluate levels of mRNA transcripts of different forms of transglutaminase in the human gingival tissues from patients with chronic periodontitis and relative controls.

**Materials and methods.** This study included 22 patients with chronic periodontitis (CP) and 22 healthy controls. For each patient, the values of Probing Depth, Clinical Attachment Level and Bleeding on Probing were recorded. Gingival specimens obtained from patients and healthy subjects were fixed with neutral buffered formalin for 24 h and then the sagittal sections (5 µm thick) were made from the specimens and stained with hematoxylin and eosin. Gene expression of transglutaminase1, transglutaminase2, transglutaminase3 and metalloprotease2 was evaluated by Real-time PCR, while that of Factor XIIIa and metalloprotease9 by RT-PCR. The level protein were evaluated by western blot analysis.

**Results.** The values of all the clinical parametres were significantly higher in the CP group than in the healthy control group ( $p < 0.05$ ). In the CP group the mRNA expression of transglutaminase1 and transglutaminase3 was significantly decreased in comparison with healthy control group. A slight insignificant changes of transglutaminase2 gene expression was observed in samples from CP patients in comparison to controls. We showed also that protein contents of both TG1 and TG3 were reduced in gingival tissues from patients in comparison to normal samples, whereas no significant differences were observed in TG2 expression in samples from normal and periodontal tissues.

**Conclusions.** This study demonstrates that different types of TGs are expressed in the human gingival tissues and alterations of mRNA transcript and expression levels. In this study, for the first time we reported the reduced expression of TG1 associated with altered structure of gingival tissues in course of periodontal diseases. These observations suggest that transglutaminase gene expression may be modified in response to chronic injury in the damaged gingival and emphasize the key role of these enzymes in gingival remodelling/healing and adaptive processes. This change is potentially capable of exerting a considerable influence on disease activity and treatment outcomes, especially for the role of this mediators during the regeneration process. Further studies aimed at identifying the molecular mechanisms responsible for these changes and their reversibility may have a significant impact on our understanding of the complex processes involved in periodontal disease.



### FAECAL CALPROTECTIN CONCENTRATIONS IN PATIENTS WITH RECURRENT APHTHOUS STOMATITIS

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**Aim.** Recurrent aphthous stomatitis (RAS) is considered the most frequent oral mucosal lesion and is characterized by the periodic eruption of painful, solitary or multiple ulcerations with circumscribed margins, erythematous haloes, and yellow or grey floors that present first in childhood or adolescence. The association between different gastrointestinal disease and RAS has been evaluated in several studies, but variable results have been reported. Calprotectin is a cytosolic protein with immunomodulatory, antimicrobial, and antiproliferative actions; its concentration increases in infection, inflammation, and malignancy. Faecal calprotectin (FC) has been reported to be a non-invasive marker of gastrointestinal inflammation (GI).

The purpose of this study was to investigate the FC levels in Northern Italian patients with RAS.

**Materials and methods.** Consecutive Caucasian patients, attending for the first time the Oral Medicine Section of CIR – Dental School, University of Turin, between May 2008 and May 2010, referred because of RAS, were visited by specifically trained experts. If the diagnosis was clinically confirmed, patient was asked for serum tests, which included vitamin B12, folic acid, iron (Fe<sup>++</sup>), Fe<sup>++</sup> saturation levels, total iron-binding capacity (TIBC), ferritin, full blood count with haemoglobin and haematocrit levels, serum levels of IgA anti-reticulin and IgA anti-endomysial antibodies, and finally FC. Calprotectin was measured on a continuous scale. Values were also dichotomized to <100 µg/g or ≥100 µg/g. Comparisons of the dichotomized values were performed by chi-squared test.

**Results.** The data included serum evaluation for 50 patients who had at least three aphthous attacks in the previous last year. The overall frequency of hematinic deficiencies was 18% in the study population. Fifteen patients (30%) showed FC levels higher than 100 µg/g. All those positive patients were referred to gastrointestinal clinic. Six cases were later diagnosed with GI and after been treated they also showed an improvement in oral conditions.

**Conclusions.** FC is a sensitive and specific marker for the presence of inflammatory bowel disease or other intestinal illnesses; for the first time this test has been used to assess subclinical gut inflammation in patients with RAS. The analysed sample is limited as a result of a firm diagnostic protocol and exclusion criteria. Moreover, the reduced number of subjects included in the sample and the missing of a control group surely represent a significant limit to this study, even though we present data that are unique in literature. More research is however needed to obtain objective evidence of the analysis of FC in RAS patients, and this work needs to be reconfirmed by a large scale multicentre clinical trial.



### FOCAL BRAIN ABSCESS FROM LEFT MANDIBULAR THIRD MOLAR APICAL LESION

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**Aim.** Brain abscess of dental origin is an extremely unusual pathology, that it needs a great attention because it is not a simple diagnosis and nowadays it is still a cause of death. By the way there is not a great literature about it.

**Materials and methods.** We presents the case of a 72 years-old woman diagnosed with cerebral abscess that begins from an abscessualization of an apical endodontic lesion of the left mandibular third molar element. She went to the ER with confusion and incongruous attitudes. Then she feels sickness, sudden loss of consciousness, deflection of oral rhyme and comitial-like crisis with morsus. She presented hypotony and flaccidity at limbs. There were no responses at harm stimulation, they couldn't be evoked deep tendon reflex except ankle jerk ones. She also had a central deficit of VII pairs of cranial nerves. At once physician tested Troponin I which resulted negative, a contrast MRI was performed and cerebrospinal fluid cytology. A total body TC was then performed to exclude neoplasia. Are performed other contrast MRI, after those patient was subjected to a broad spectrum antibiotics therapy. A PET/CT was performed to exclude a neoplasia. Finally Panoramic X-ray was performed.

**Results.** The diagnosis of such cases is challenger, because the symptoms are more usually related to other pathologies as ictus, primary or secondary brain cancer. Diagnosis could be possible thanks to high definition of diagnostic imaging like MRI and CT with and without contrast medium and also CT/PET. After all the others possible diagnosis were excluded, the patient has been sent to us.

We also notice that there are an apical lesion of the left mandibular third molar element. So we pull out the tooth and sent a cultural, histological and microbiological examination of the tooth and of the apical lesion. It points out that the pathogens are *Pseudomonas aeruginosa* and *Prevotella denticola* and *Candida albicans*. They make antibiogram of that abscess and we determine the right therapy with ciprofloxacin iv and metronidazole os.

The patient leaves after 3 months the hospital without any sequelae. Last Panoramic X-ray showed the healing of the socket.

**Conclusions.** The main score to rise up the chance of patients survive bounding the infection mortality or the high possibility of subsequent problems due to local brain afflict is to be able to make the right diagnosis and to find out the main pathogens as soon as possible due to make the right therapy.



## GINGIVAL METASTASIS OF ANAPLASTIC LUNG CANCER: REPORT OF A CASE

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**Aim.** Lung cancer is one of the most malignant solid tumours, and some patients may experience distant metastasis which usually occur in the late state of the disease. Possible routes of metastasis to the oral cavity include lymphatic and blood circulations. Oral metastatic tumours are rare, accounting for just the 1% of all oral tumours. Bone involvement is much more frequent than soft tissue involvement (less than 10%), occurring mostly in the gingiva, followed by the alveolar mucosa and the tongue. In the soft tissue involvement, the lung cancer is the most common primary source. In 30% of cases, oral metastasis are the first manifestation of cancer, but it is often a sign of advanced disease with multi-metastatic involvement. Thus, survival after recognition of gingival metastasis ranges from a few weeks to less than six months, with five-year survival lower than 5%. The following report describes a case of anaplastic cancer metastatic to the maxillary gingiva.

**Materials and methods.** *Case presentation.* A 71-year-old man presented with an ulcerated mass in the vestibular gingival mucosa in the maxillary left region, measuring 1.5 cm, developed 2 months before. Radiographic examination of the jaws disclosed no involvement of the underlying bone. Excisional biopsy followed by histopathological examination and immunohistochemical analysis were performed. Histopathological examination revealed malignant infiltration of giant and anaplastic cells with epithelioid appearance, pleomorphic nuclei, and huge nucleoli. Immunohistochemical analysis was strongly positive for Cam 5.2, vimentin and CD30, and negative for leukocyte common antigens, CK7, CK20, and melanocytic markers S100, HMB45, and melan-A. The histological and immunohistochemical features were consistent with a gingival metastasis from an anaplastic carcinoma, of probable lung origin. A Computed of the chest showed a lung mass in the left high region measuring almost 10 cm, and multiple lesions in several lymph nodes, liver, adrenal glands, and bones were associated. A fine-needle aspiration cytology examination of the lung tumour was performed, and it confirmed the presence of high malignant cells similar to those found in the oral biopsy.

**Results and conclusions.** Because of its rarity, the clinical presentation of a metastatic lesion in the oral cavity may lead to a misdiagnosis of benign process or primary malignancy. Thus, a biopsy of an oral mass is mandatory for a proper evaluation of the patient, since it can reveal histopathological features of a secondary lesion, whether in patients with known history of cancer or when a primary tumour is not yet disclosed. Moreover, the high variable morphological features of metastasis, due to their lower differentiation, requires additional techniques such as disclosure of histogenetic markers by immunochemistry.



## HISTOLOGIC EXAMINATION OF LICHENOID INTERFACE MUCOSITIS: DIFFERENT ASPECTS OF ORAL LICHEN PLANUS, ORAL LICHENOID LESIONS AND LICHENOID DYSPLASIA

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**Aim.** Several lesions affecting the oral cavity are included in the Lichenoid interface stomatitis group. Oral Lichen Planus is an autoimmune disease which is clinically characterized by an heterogeneous group of lesions but with the presence of papules-confluencing hyperkeratotic Wickham's striae. These lesions are typically located bilaterally upon the buccal mucosae, gingiva or tongue and their aspect is typically symmetric. Different pathologies, however, resemble the clinical features of Oral Lichen Planus, such as Oral Lichenoid Lesions and Lichenoid Dysplasias. Oral lichenoid lesions typically are the expression of a substaying hypersensitivity to exogenous antigens. They usually appear nearby dental restorations or fillings containing mercury and metals, but their clinical appearance is identical to that of OLP or oral lichenoid drug eruptions with the exception of a predominant monolateral topography. Lichenoid dysplasia is a new entity described in the literature as a particular form of epithelial dysplasia associated with a band-like lichenoid interface inflammation. Whether the lichenoid infiltrate is the primary stimulus to dysplasia or if it is only a secondary feature is discussed among researchers.

**Materials and methods.** 4 patients were recruited in this case-report series. The first one presented at our hospital with the presence of a bilateral reticular hyperkeratosis upon a reddish background and the lesions were highly suggestive of oral lichen planus. The second clinical case showed the presence of a monolateral lichen-like lesion in contact with a gold-acrylic fixed restoration. The latter two cases showed two forms of erosive-reddish lichenoid-resembling lesions but they were also indicative of a phenomenon of epithelial proliferation and loss of tissue organization. All the patients underwent a detailed histologic examination after the performance of a cold-blade biopsy. The latest case revealed the presence of a squamous cell carcinoma.

**Results.** Although there is a very strong similarity among the lichenoid lesions regarding their histologic appearance, some key elements are helpful to be evidenced to rule out a thorough differential diagnosis. The presence of drop-like shaped rete ridges, a mixed lymphoplasmacellular and eosinophilic infiltrate, the preservation of several areas of the basal layer, a perivascular infiltrate of lymphocytes could exhibit as key features to distinguish an oral lichenoid lesion from OLP, while the presence of an epithelial dysplasia associated with a chronic subepithelial lichen-like infiltrate is a characterizing element of lichenoid dysplasias.

**Conclusions.** Differentiating the histologic features of oral lichen planus, lichen-like lesions and lichenoid dysplasia results very helpful to determine the prognosis and the treatment plan for every lesion: a follow-up programme for OLL, steroid drugs in the acute in OLP and surgical excision in non-responding lichenoid dysplasia.



#### IS NARROW-BAND-IMAGING AN "ADDED-VALUE" IN ORAL MEDICINE?

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**Aim.** Il carcinoma del cavo orale è una patologia diffusa e sfortunatamente, sebbene i processi diagnostici e le innovazioni terapeutiche, tutt'ora presenta una prognosi infausta e una percentuale di mortalità a 5 anni del 50%. Per la diagnosi precoce di questa patologia sono state sviluppate diverse metodiche (blu di toluidina, la brush biopsy e il VELscope), più o meno efficienti; negli ultimi anni, l'Olympus&Co ha proposto per il campo odontoiatrico una nuova tecnologia denominata Narrow Band Imaging (NBI). Questa metodica, utilizzando lunghezze d'onda specifiche per l'assorbimento dell'emoglobina, permette di visionare la distribuzione vascolare della mucosa orale evidenziandone le anomalie. In questo studio viene valutata se, anche con un personale poco esperto, l'NBI possa essere utilizzato come metodologia diagnostica o se necessiti di un percorso formativo, che permetta di eseguire valutazioni più accurate e corrette possibili.

**Materials and methods.** Tra Luglio 2011 e Luglio 2013, sono stati visitati presso l'Ambulatorio di Patologia e Medicina Orale dell'Ospedale Maggiore di Trieste 114 pazienti: 91 di questi sono stati inclusi nello studio. Un totale di 91 lesioni sono state sottoposte ad esame biotico e tre patologi hanno eseguito le valutazioni istopatologiche. Un totale di 38 lesioni sono risultate essere iperplastiche o infiammatorie, 17 displasie lievi, 6 displasie medie, 7 displasie gravi e 23 carcinomi. È stata eseguita l'analisi statistica per il main rater valutando l'affidabilità dei suoi risultati correlandoli al referto istopatologico (reference standard). Infine, sono state calcolate le percentuali di sensibilità, specificità, positive likelihood ratio, valore predittivo positivo e negativo e accuratezza per ogni grado displastico e carcinoma. Per determinare il grado di accordanza tra ogni operatore inesperto in relazione sia al referto istopatologico che al main rater è stato applicato il weighted kappa coefficient.

**Results.** Dall'analisi statistica sono state evidenziate alte percentuali di sensibilità, di specificità, del positive likelihood ratio, del valore predittivo positivo e negativo per ogni tipo di lesione (mucosa sana, displasia lieve, moderata e grave e carcinoma). Inoltre, l'analisi statistica del main rater in relazione al reference standard presenta un'accuratezza di 0,74 e un'accordanza del 72,5%.

L'accordanza tra operatori inesperti sia con il reference standard che con il main rater è rispettivamente pari al 21,7% e al 26,8%.

**Conclusions.** Questo studio indica come l'NBI sia una metodologia diagnostica efficiente e altamente precisa per eseguire valutazioni di lesioni displastiche o neoplastiche del cavo orale. Tuttavia, è necessario che vi sia la creazione e la pubblicazione di manuali con linee guida al fine di ottimizzare e uniformare le caratterizzazioni cliniche e contestualizzare l'analisi delle lesioni. Sulla base di queste evidenze scientifiche, sarebbe possibile istruire nuovi operatori che si avvicinano per la prima volta a questo strumento innovativo.



## OCCULT HEPATOCELLULAR CARCINOMA DISCOVERED FOLLOWING DIAGNOSIS OF ORAL LICHEN PLANUS

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**Aim.** To report a case of occult hepatocellular carcinoma discovered following the diagnosis of erosive type oral lichen planus.

**Materials and methods.** A 66 year-old man in good health conditions was referred to the Center of Oral Laser Surgery and Oral Pathology, University of Parma, because of the presence of oral erosive lesions. Such lesions were previously treated by his physician with Acyclovir, on the basis of a provisional, clinical diagnosis of herpes virus infection. The lesions were present since three months and they were very painful. The patient showed also purple and itchy skin lesions spread to the forearms and pretibial regions.

**Results.** Clinical examination showed bilateral erosive and reticular areas in correspondence of the buccal mucosa and in correspondence of the lower labial mucosa. White papular lesions were observed on the dorsum of the tongue. The clinical presentation was compatible with a case of oral lichen planus. An incisional biopsy was performed and the histopathological diagnosis confirmed the clinical suspicion. Following our diagnostic pathway, blood tests were requested, in particular to evaluate the possibility of presence of infection from HBV and HCV viruses and to assess the possible presence of liver pathologies. Blood analyses highlighted the presence of HCV infection as well as a marked alteration of the indices of hepatic metabolism. The patient was thereafter evaluated at the infectious disease department. Further work-up, including magnetic resonance imaging (MRI) showed the presence of hepatic cirrhosis and a small mass within the liver compatible with hepatocellular carcinoma. Such a mass was surgically removed and the histopathological diagnosis confirmed the radiological suspicion of an hepatocellular carcinoma. The patient is still alive after 3 years follow-up.

**Conclusions.** It is widely reported in the literature the higher prevalence of HCV infection in patients with oral lichen planus compared with the healthy population. Approximately 40% of patients with erosive type oral lichen planus suffer from liver disease HCV-related. The cause of such a strong correlation, however, has not yet been fully explained. It is also known the possible occurrence of a malignant neoplasm of the liver in patients with HCV. This report shows a very unusual diagnostic pathway for hepatocellular carcinoma, starting from oral lesions compatible with erosive type oral lichen planus.





### ORAL CHANGES ASSOCIATED WITH MARFAN SYNDROME IN THE ADULT POPULATION

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**Aim.** The aim of this study was to evaluate the incidence of dental and/or skeletal's abnormalities related to Marfan Syndrome, in the adult population.

**Materials and methods.** From September 2013 to February 2014 were examined in the Department of Special Pathology Odontostomatology of the "Policlinico Tor Vergata", 85 patients in total, of which 52 M and 33 F aged 16 and 75 aa. All the patients were subjected to a dental's visit to evaluate the incidence of the following alterations, described in the literature as pathognomonic of the Syndrome: Mandibular retrognathia, Arched Palate, Joint disorders (TMJ), Dental Crowding, Dolichocephaly, Maxillary Hypoplasia.

**Results.** From the multidisciplinary path, runs between cardiac surgery, orthopedics, ophthalmology, dentistry and genetics, only 6 patients were affected by Marfan Syndrome, 4 males and 2 females. All this 6 patients has dolichocephaly and arched palate. In only 2 cases TMJ dysfunction was found, in 3 cases maxillary's hypoplasia, and in none mandibular retrognathia.

Of the 79 patients potentially affected, the presence of arched palate was found in 7 cases, failures to TMJ in 5 cases, and the presence of mandibular retrognathia in one case. All the others have not submitted the presence of alterations characteristics of Marfan Syndrome.

**Conclusions.** The cranio-facial alterations are typically well-defined in Marfan's Syndrome. We can thus understand the importance of prevention, during the follow-up since childhood. Patients, in fact, have to undergo proper screening and early detection, to prevent oral diseases to which they are particularly susceptible, as well as significantly improve the quality of their lives.



### ORAL CHRONIC CANDIDIASIS AND ENAMEL HYPOPLASIA IN APECED SYNDROME: STUDY BY CONFOCAL LASER SCANNING MICROSCOPE (CLSM) IN SIX CASES

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**Aim.** Autoimmune Polyendocrinopathy-candidiasis-ectodermal dystrophy (APECED), also known as autoimmune polyglandular syndrome type I (APS I), is an autosomal recessive disease caused by mutation of the autoimmune regulator gene (AIRE). APECED shows a relatively higher prevalence in genetically isolated population such as Iranian Jews (1:9000), Finns (1:25000), Sardinians (1:14.500). Chronic muco-cutaneous candidiasis (CMD), chronic hypoparathyroidism (CH) and Addison's disease (AD), represent the clinical hallmark of the syndrome and the clinical diagnosis of APECED requires the presence of at least two of these three major components. CMC has been reported as the first sign to appear in most reported patients. It preferentially affects the oral mucosa causing a mild form of angular cheilitis. More severe cases include hyperplastic CMC, atrophic CMC and leukoplakic area. Other oral common manifestation is hypoplasia of dental enamel in deciduous and permanent teeth.

This study was aimed at describing the main histological aspects of oral chronic candidiasis and enamel hypoplasia in 6 patients affected by APECED highlighted by Confocal Laser Scanning Microscope (CLSM).

**Materials and methods.** Six patients affected by APECED (middle age 22) referred to Oral Surgery Unit of University of Bari, Policlinico. We obtained prior consent to examine and photograph the mouth. They showed both oral manifestation: CMC and hypoplasia of dental enamel. CMC presented as multifocal lesions (70% white, 30% red) on cheek, lips, gums and tongue. In traumatic areas we noticed the verrucous aspect of tissues. The enamel defects noticed were numerous: in anterior teeth, wide horizontal groove occupied the middle one-third of the crown with hypoplasia of canines cusps and fracture of incisal edges; in posterior teeth the most frequent was deep pits on the surface arranged horizontally, especially on premolars. Under local anaesthesia, a soft tissue excisional biopsy was performed and the surgical sample were formalin-fixed, paraffin-embedded, and stained with hematoxylin-eosin and Picrosirius red. Moreover we collected the naturally exfoliated deciduous of one patient and upper first premolar of another patient extracted because of a Ellis class III fracture, and we prepared enamel ground sections. Histological examination of both samples was carried out by CLSM Nikon Eclipse E600 microscope (Nikon Corporation, Tokyo – Japan), equipped with Argon-ion and Helio-Neon lasers, emitting at 488- and 543 nm wavelengths, which allows both optical and confocal laser scanning analysis. The Nikon EZ C1 software (Nikon Corporation, ver. 2.10 Coord Automatisering) was used for bi-dimensional image processing.

**Results.** Conventional histological examination of CMC sample showed poor inflammatory infiltrate in lamina propria, intra-epithelial Candida hyphae, hyperortho-parakeratosis, and in 60% of the samples Oral Intra-epithelial Neoplasia (OIN) grade one or two. CLSM showed disorders of keratinization with irregular and dishomogeneous fluorescence in upper two third of epithelium. CLSM examination of undecalcified dental tissues highlighted the presence of hypoplastic and dysplastic areas in the enamel and different pattern of fluorescence in the external layers due to both the disease and the decalcification caused by infections.

**Conclusions.** CLSM, allowing both conventional and confocal laser scanning analysis, is essential to highlight epithelial tissues alterations (OIN) induced by chronic candidiasis that could become malignant lesions, so it could allow an early diagnosis. Nevertheless it highlights the major teeth infection risk due to the enamel alterations.



## ORAL LESIONS DUE TO ACINETOBACTER BAUMANNII INFECTION IN A PATIENT AFFECTED BY AUTOIMMUNE HEMOLYTIC ANEMIA (AIHA): FIRST CLINICAL REPORT

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**Aim.** *Acinetobacter Baumannii* (coming from the Greek "akinetos," i.e. non-motile) is an opportunistic bacterial pathogen primarily associated with hospital-acquired infections. Commonly associated with aquatic environments, *A. Baumannii* easily contaminates the surrounding environment and it colonizes acute ill patients in which can survive for several days. Generally, *A. Baumannii* is able to damage mucous membranes or exposed skin after accident or injury; it may be responsible of many diseases such as pneumonia, bacteremia, meningitis, urinary tract infections, peritonitis and infections of skin and soft tissues. Tissues infected by *A. Baumannii* initially present "orange peel" appearance followed by sandpaper-like presentation, when there is a disruption, hemorrhagic bullae can be seen with a visible necrotizing process followed by bacteremia. Current therapy is based on intravenous administration of tigecycline 100-200 mg (first dose) and 50-100 mg every 12 h for up to 14 days, unless complications. If untreated, this infection can lead to septicemia and death. The mortality rate of this infection is high, especially in case of bacteremia (52%) and pneumonia (23–73%). *A. Baumannii* is resistant to many drugs and represents an important nosocomial pathogen that particularly infects critically ill patients. At the best of our knowledge, no case of oral infection has been reported. To present the first one case characterized by oral soft tissue infection due to *A. Baumannii* responsive to imipenem.

**Materials and methods.** A 78 years male was hospitalized in August of 2013 at the Hematology unit of the A.O.U.P. "P. Giaccone" of Palermo with a diagnosis of autoimmune hemolytic anemia (AIHA). He was treated per os with corticosteroids (Prednisone) and immunosuppressants (Rituximab and Cyclophosphamide), also IVIG (Intra Venous Immuno-Globulin) was administered. In November 2013, the patient was treated with piperacillin IV (Tazocin) for treating an urinary tract infection; four days after, multiple oral ulcerative bullous lesions on the lingual and buccal mucosa and crusted lesions on the lip vermilion appeared, associated with intense pain. An oral swab for bacteria research was carried out; topical therapy (chlorhexidine rinses and hyaluronic acid gel) has been prescribed and piperacillin therapy was stopped. Oral swab outcome resulted positive for *A. Baumannii* and *Enterococcus Faecalis*, both sensitive only to imipenem, that was administered (500 mg IV every 8h) for 10 days. The patient was immediately isolated in a single room for preventing and controlling the spread of *A. Baumannii*.

**Results.** From diagnosis, every 3 days clinical examination of the oral cavity was performed, revealing the progressive regression within thirty days until complete healing without leaving scars. After, a second oral swab confirmed the absence of any bacteria.

**Conclusions.** The World Health Organization has recently identified antimicrobial resistance as one of the three most important problems facing human health and among the most common and serious pathogens, including *A. Baumannii*. It is an emerging potentially drug-resistant micro-organism and its isolation must alert physicians to carry on all preventive measures for avoiding contamination of other patients, especially those immunosuppressed, at risk for severe persistent infections or death. This precaution should be continued for all the duration of hospitalization and until the negativization of culture samples was obtained. It is important that physicians and dentists recognize suspicious lesions in unusual locations, such as oral mucosa, in absence of other known etiological factors in a timely manner before the diffusion among other patients in order to avoid the spread of a nosocomial outbreaks.



## PERIPHERAL AMELOBLASTOMA OF THE GINGIVA: A CASE REPORT AND REVIEW OF THE LITERATURE FOCUSING ON THE DIFFERENTIAL DIAGNOSIS

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**Aim.** Ameloblastoma is a locally aggressive odontogenic tumor which has been described in three major clinical variants: multicystic, single cystic lesion and peripheral or extra-osseous. Peripheral lesions are rare and may occur in the gingiva or in the oral mucosa. The aim of this presentation is to describe a new case of gingival ameloblastoma and to review the literature focusing on the differential diagnosis, since benign and malignant lesion can arise on the gingiva.

**Materials and methods.** - Case presentation: An healthy, 74 yo man was referred to our Department to evaluate a papillary lesion on the gingiva between elements 34 and 35. Medical history was non contributory (non smoker and non drinker); oral examination revealed poor oral condition and a non painful, non bleeding epulid-like lesion, pinkish in color, with a granular surface, arisen some months before. The lesion was pedunculated and could be easily moved from its place. Intra-oral X-ray was non contributory. After local anesthesia, an excisional biopsy was performed and healing was uneventful: pathology revealed a peripheral ameloblastoma with an overlying squamous papilloma.

**Results.** Peripheral ameloblastoma can arise either on the gingiva or on oral mucosa: gingival lesions can appear as pediculate or sessile, with a slow growth, and are usually asymptomatic. Lesions can be diagnosed occasionally or because of possible slight bleeding after ulceration or to the onset of a diastema. Radiology is usually non contributory, but sometimes it can reveal a slight impression on the alveolar bone; cortical bone is usually preserved suggesting a pressure on the cortical bone.

**Conclusions.** Benign (i.e., human papilloma virus induced lesion, fibroma, giant cell granuloma, epulis, gingival abscess) and malignant (verrucous squamous cell carcinoma, lymph-proliferative diseases) lesions should be considered in differential diagnosis. Medical history, clinical presentation and radiology are often non contributory, thus biopsy is mandatory to reach a correct diagnosis; in rare cases immunohistochemistry could help in address the diagnosis. Even if malignant transformation is rare, recurrences can happen and a wider excision can be necessary: for this reason patient should be taken under regular follow-up.



#### POSSIBLE ROLE OF CRY1 AND CRY2 IN ORAL CARCINOGENESIS

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**Aim.** Dysfunction of the circadian clock is involved in tumorigenesis, and altered expression of some clock genes has been found in cancer patients. It has been shown recently that the occurrence, development, prognosis, and treatment of cancer are closely related to the abnormal expression of certain circadian-clock genes. CRY1 and CRY2 circadian-clock gene plays an important role in the regulation of many normal physiological rhythms. These proteins act as light-independent inhibitors of CLOCK-BMAL1 components of the circadian clock. It has been revealed recently that abnormal expression of CRY1 and CRY2 correlate closely with the occurrence and development of many cancers. However, the expression and significance of these proteins in oral squamous cell carcinoma (OSCC) remains unknown. The aim of this study was to evaluate the expression levels of CRY1 and CRY2 in oral cancer.

**Materials and methods.** CRY1 and CRY2 expression in cancerous and peritumoral tissues (when it was present) from 27 patients with OSCC was detected by immunohistochemistry techniques. Of all samples were received medical records (age, sex, grading, TNM, site of localization of the tumor). Immunohistochemistry was then performed on two sections for each of 27 sample mounted on poly-L-lysine-coated glass slides to evaluate respectively the expression of CRY1 and CRY2.

**Results.** In this study, out of the 27 cases, 11 were +/- positive in tumor area for CRY1 (most of which are well differentiated), while out of 23 cases in which we evaluated the peritumoral tissue present in the section, 18 were positive. Also in the cases of positive tumor, almost always cytoplasmic, the CRY1 appears to be more strongly positive in dysplastic areas or even more in healthy epithelium, with a negative regulation in the areas most undifferentiated. As for the CRY2, out of the 27 cases analyzed, 17 were positive in the tumor area while about 23 cases in which we evaluated in peritumoral tissue present in the sections, 20 cases were positive. In tumor epithelium were found positivity also medium / high, present in tumors of different degree of differentiation, in some cases in other nuclear or cytoplasmic and nuclear/cytoplasmic, but when present the CRY2 is expressed, in most cases, in a manner similar or more intensely in peritumoral dysplastic epithelium. In the case of CRY2, there were no positivity in healthy epithelium (when present), but only in dysplastic epithelium. In addition, the positivity observed especially in peritumoral epithelium were present in states intermediate/surface.

**Conclusions.** In conclusion, abnormal expression levels of CRY1 and CRY2 in OSCC tissue compared to healthy or dysplastic tissue may be related to the process of tumorigenesis. Further research focusing on these genes may, from the perspective of biological rhythms, provide novel ideas and methods for a better understanding of the occurrence and development of tumors, and for treatment of oral cancer.



### PREVENTION OF THE JAW'S OSTEONECROSIS IN PATIENTS TREATED WITH BIPHOSPHONATES: THE USE OF PRP IN POLICLINICO TOR VERGATA

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**Aim.** The aim of the work is to evaluate the PRP's use in preventing the development of the jaws osteonecrosis in patients treated with bisphosphonates in need of oral surgery.

**Materials and methods.** In the Oral Special Pathology Ward of Tor Vergata University, between November 2011 and January 2014, 74 patients using bisphosphonates were treated with teeth extraction. 60% were taking the drug orally for over three years, and the remaining 40%, intravenously for at least one year. Patients were chosen in the first dental visit, were selected by collecting all the medical records and were sent to ambulatory to be treated following this protocol: a combined antibiotic prophylaxis with 1g of amoxicillin and clavulanic acid every 12 h associated with metronidazole, one week before and after the surgery, and the local insertion of PRP, after venous blood samples and the processing of the product. All patients have taken the antibiotic prophylaxis, but 45 were subjected to teeth extraction followed by the insertion of PRP, while the remaining 29 simply surgical procedure (without PRP).

**Results.** Full post-operative recovery showing that none of the patients, those who followed traditional protocol and those treated with PRP, developed osteonecrosis. Examination did not reveal any presence of bone deficiencies, no signs of post-extractive alveolitis, or areas with exposed bone. Radiographic examination did not reveal radiolucent lesions attributable to osteolysis. The duration of the healing was faster in patients treated with the insertion of local PRP than in patients treated just with surgery. In these patients who were only using antibiotic therapy we have noticed 4 cases with a difficulty of re-epithelialization in the postextraction place, and two of them reevaluated after 30 days of topical application of gel to clorexidina and integration of antibiotic therapy.

**Conclusions.** The use of the PRP in the prevention of osteonecrosis of the jaws during the teeth extraction in patients who use oral or intravenously bisphosphonates, does not appear to be decisive, but appears to be significant in the velocity of the healing time and with a post-operative recovery significantly better for the patient.



### PRIMARY ORAL MUCOSA MELANOMA: A REPORT OF AN UNUSUAL CLINICOPATHOLOGICAL CASE

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Primary oral melanoma is a rare malignancy with an aggressive behaviour. Up to date, the wide clinical-histological variability of this oncological entity does not clarify the etiopathogenetic characteristics of these cancers and limit the therapeutic strategies. We report a case of a 64-year-old white female referred to the Dept. of Surgical, Oncological and Oral Sciences for a pigmented lesion of the mandibular gingiva, already arising 20 years ago but dimensionally increased in the last three months. Clinically, a black plaque-like pigmentation of the vestibular alveolar mucosa of the mandible (from 3.6 to 3.3) was observed. This lesions was still painless. CT dentalscan and ecography of the head and neck lymph nodes have showed no signs of bone and lymph nodes involvement. An incisional biopsy of the lesion was performed under local anaesthesia. Histopathologic examination showed a nodular proliferation of atypical melanocytic elements with epithelioid aspect and nuclear alterations; numerous abnormal mitotic figures were evident and the malignant melanocytes were characterized by marked intra/extracellular pigmentation. Immunohistochemical staining showed strong and diffuse positivity for Melan A and HMB45, 40% positive for Ki67 and positive/negative result for p16. These histopathologic features were suggestive for *animal-type invasive melanoma*. After diagnosis, the patient was referred to the Dept. of Head and Neck Surgery for staging and chirurgic approach of the lesion. At the best of our knowledge, only a very small number of animal-type melanomas have been reported in the oral cavity and usually with a more indolent behavior than conventional melanoma and a better prognosis. However, future reports are necessary to characterize the features of this cancer and to determine any factors that may correlate with outcome.



## PROSPECTIVE EVALUATION OF THE EFFICACY OF PILOCARPINE MOUTHWASH IN SJÖGREN'S SYNDROME

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**Aim.** Sjögren's syndrome is a slowly progressing autoimmune disease, characterized by the lymphocytic infiltration of the exocrine glands, mainly the lacrimal and salivary, leading to xerostomia and keratoconjunctivitis sicca. The prevalence of Sjögren's syndrome is keep growing each year, and it is estimated between 0.1 and 0.6% of the population in middle-aged patients with a higher female predominance. Besides the involvement of exocrine glands entailing the classical sicca syndrome, systemic manifestations resulting from the lymphocytic infiltration of organs can be present in up to 20% of cases. Several diagnostic criteria have been proposed over the years for Sjögren's syndrome. However, they lacked of validation and wide acceptance. Many diagnostic tests assess salivary and lacrimal involvement in Sjögren's syndrome, but there is still disagreement regarding their sensitivity and specificity. The evaluation of subjective and objective sicca manifestations is based on xerostomia, keratoconjunctivitis sicca, the presence of histopathological salivary involvement, and of autoimmune antibodies production against the ribonucleoprotein. Currently the therapy of patients with Sjögren's syndrome consists in palliative therapies, such as mechanical stimulation or pharmacological therapy based on the use of sialagogues, which act on parasympathetic muscarinic receptors, able to induce an increased in the salivary flux. The most common used are Cevimeline and Pilocarpine, which in particularly stimulates the secretion of the lacrimal, salivary and respiratory mucous glands. Pilocarpine is actually only available in tablet formulation; despite it is associated to great results, it has several side effects. Bernardi et al. demonstrated the beneficial effect of different concentrations of Pilocarpine mouthwash compared to 0.9% of saline solution both in patients affected by Sjögren's syndrome and in healthy volunteers. The aim of the present study is to evaluate the efficacy of 2% Pilocarpine mouthwash in a population diagnosed by Sjögren's syndrome.

**Materials and methods.** A total of 24 patients were enrolled in the study: they were divided into two different groups. The first one consisted in 10 healthy subjects, aged between 22 and 35, the second one, in 14 subjects aged between 35 and 71 diagnosed with Sjögren's syndrome. The first group was asked to perform a mouth rinse with 25ml of 2% Pilocarpine solution for 5 minutes. They waited 30 minutes during which they were asked to report any side effects appearance. All of them were submitted to a blood withdrawal to quantify the concentration of Pilocarpine, to pressure and to ECG measurements and to a salivary collection. Concerning patients of the second group, they received a flacon containing the mouth rinse and were trained to use 25ml 3 times a day. They followed the same protocol and were visited once a week for 5 weeks. All patients were asked to fill out a form regarding subjective parameters.

**Results.** 3 cases of drop-out occurred during the study, due to the development of side effects: 2 of them revealed high plasmatic concentration of Pilocarpine. The statistical analysis showed significant improvements in all treated subjects concerning both subjective and objective parameters, with absence of changes in patients' vital parameters.

**Conclusions.** This pilot study demonstrated that 2% Pilocarpine mouthwash increase the salivary flux along with an improvement in patients' subjective symptoms related to xerostomia. The low incidence of side effects and the absence of cardiovascular alterations would render the therapy safe. Nevertheless, other studies are necessary in order to confirm the present results.





## RARE ORAL MANIFESTATIONS OF THE LANGERHANS CELL HISTIOCYTOSIS IN TWO YOUNG PATIENTS MIMICKING AGGRESSIVE PERIODONTAL DISEASE

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**Aim.** Langerhans Cell Histiocytosis (LCH) is a rare neoplasm usually affecting children and young adults and characterized by intense and abnormal proliferation of bone marrow-derived histiocytes (Langerhans cells). It may have local (usually single bone, cutaneous and/or mucosal lesions) or systemic involvement (e.g. multiple bone lesions and/or internal organs). When LCH is localized in oral cavity, it may present different clinical forms (alveolar or basal bone osteolysis, ulcerated mucosal lesions and/or gingival/periodontal inflammation with dental hypermobility and premature loss of teeth). Aim of this work is to describe two cases of LCH with oral manifestations.

**Materials and methods.** Description of two cases report.

**Results.** Case 1: a 28 years old boy, observed firstly in 2011, presented in the maxilla erythematous and ulcerated lesions on the masticatory/alveolar mucosa with severe tooth mobility of all elements (1.4-1.3-1.2-1.1-2.1-2.2-2.3-2.4-2.6), in the mandible, mucosal ulceration and bone exposure of the fifth sextant were showed, and as well as a serious mobility of 4.7 and 4.8 (the only two teeth kept). The panoramic radiograph showed diffuse horizontal and vertical bone resorption, with areas of radiolucency in the parasymphiseal mandibular region. After a biopsy, histopathological examination was performed, confirming the presence of cells with wide eosinophilic cytoplasm and immunohistochemical profile positive at S100+ and CD1A+, resulting the diagnosis of LCH. The patient was treated by oncological department of another hospital with vinblastine, pamidronate, carbamazepina and corticosteroids.

After 30 months from the first observation, the patient had lost 2.6, 4.7 and 4.8 and no oral mucosal lesions were found and up to date he is in follow up every three-six months. Case 2: a 13 years old child, observed in 2006, showed erythematous and erosive lesions on the masticatory/ alveolar mucosa of the fourth and sixth sextant, exposure of dental roots and serious tooth mobility. Maxilla appeared clinically harmless. The panoramic radiograph showed horizontal and vertical bone resorption of mandibular area. After a biopsy, histopathological examination was performed, confirming the presence of cells with immunophenotype positive at S100+, CD1A+ and Cd68, compatible with diagnosis of LCH. The patient was underwent to chemotherapy with vinblastine and corticosteroids. Seven years after, the patient has showed recurrence of the tumour in the area of the fifth sextant and is actually in treatment.

**Conclusions.** Oral examination plays a crucial role in the diagnosis and multidisciplinary approach of patients affected by LCH, being oral manifestation sometimes the first or only signs of LCH. Since oral LCH may simulate an aggressive periodontal disease in children and young adults, in absence of the common risk factors, the differential diagnosis with necrotizing ulcerative gingivitis, aggressive periodontal disease and LCH is based on the immunohistochemical analysis. Anyhow, since the aggressiveness of periodontal involvement with progressive teeth loss, it is essential performing routine dental examinations and maintenance of good oral hygiene.



### REDUCED BASAL SALIVARY FLOW AND BURNING MOUTH SYNDROME: A NEW CORRELATION

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**Aim.** Burning Mouth Syndrome still remains an enigmatic condition; many theories have been proposed to explain the pathogenesis of this syndrome, but we still don't know much about it. One of the most referred symptoms is xerostomia: usually the disease comes along with a clear evidence of dry mouth. The current case-control study proposes to measure the basal and the stimulated salivary flows in a group of Burning Mouth Syndrome patients.

**Materials and methods.** Three groups of patients were recruited: 44 people suffering from the BMS, 27 people suffering from OLP and 40 people with no disease at all. Non cooperative patients, pregnant woman and patients with a history of oral radiation were excluded from this study. The authors chose to measure the basal salivary flow and the stimulated salivary flow in the three groups of patients through the use of the "spitting" method. The procedure was performed by the same operator, in the same location, at the same time in the morning. Patients were asked to spit every minute for 5 minutes. Afterwards, they were asked to repeat the procedure a second time, but a drop of citric acid was positioned upon their tongue every minute in order to stimulate their salivary secretion. After 14 days the same procedure was repeated for 15 minutes.

**Results.** While there wasn't a significant difference between the Burning Mouth Syndrome group and the other two groups regarding the stimulated volumes, an important difference was found about the basal volumes, where the Burning Mouth Syndrome patients showed lower values.

**Conclusions.** The outcomes of our research demonstrate the presence of a very low basal salivary flow in Burning Mouth Syndrome patients when compared with the other two groups, but the stimulated salivary flow is equal, even if not higher, in Burning Mouth Syndrome patients. At the end, it can be realized that there still are some issues which need to be explored and examined in order to draw a conclusion and solve the enigma represented by the pathogenesis of this disease.



#### RELATIONSHIP BETWEEN PERIODONTITIS AND ADVERSE PREGNANCY OUTCOMES

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**Aim.** A lot of study have shown periodontal disease as a risk factor for adverse pregnancy outcomes. The aim of this work was to review the evidence on the association between periodontitis and preeclampsia (PC), preterm (PT) and low birth weight (LWB).

**Materials and methods.** The aim of the work was to do a comparison of the data from cross sectional, case control or cohort epidemiological studies. In selected studies PC was defined as blood pressure (>140/90 mmHg) and proteinuria (+1); PT was defined as weeks gestation (<37); LWB as (<2500) gr. The review is limited to studies identified by computer searching using terms: periodontitis, preterm, low weight birth and preeclampsia.

**Results.** Maternal periodontal status has been reported by many authors as a possible risk for adverse pregnancy outcomes, though not all of the actual data support such hypothesis. Evidence suggest that subclinical infection sites, that are also distant from genitor-urinary tract, may be important cause for PT/LWB deliveries and indicates that periodontal infection can lead placenta-fetal exposure and, when coupled with fetal inflammatory response, can lead to PT/LWB delivery.

**Conclusions.** This review found a consistent association between periodontitis and adverse pregnancy outcomes. Generally all the study reviewed suggest that periodontal disease may be a potential risk factor.



#### RESTITUTIO AD INTEGRUM IN A CASE OF ONJ RELATED TO BEVACIZUMAB

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**Aim.** Bevacizumab is a humanized recombinant monoclonal antibody that blocks vascular endothelial growth factor (VEGF). The activity of VEGF is the ability to promote the vascular endothelial cells proliferation inducing the formation of new blood vessels. Bevacizumab is used in the treatment of selected advanced colon, lung, renal and central nervous system tumours and plays a developing role in the management of breast and ovarian cancers. It is also injected intraocularly for treatment of macular degeneration. Recently, bevacizumab has been reported as responsible of drug-related osteonecrosis of the jaw (ONJ), showing a histological pattern similar to bisphosphonate-related ONJ. Moreover, it may increase the risk for osteonecrosis of the jaw when administered in isolation or when given concurrently with bisphosphonates.

**Materials and methods.** Only few case reports in literature have been reported describing ONJ after bevacizumab administration. In June 2011, a 57-year-old female patient was referred to our department for pain in the left posterior mandibular region. She reported the following anamnestic data: in 2002, for the diagnosis of breast cancer, she underwent to left quadrantectomy and radiant treatment; from October 2010, she was receiving multimodal chemotherapy containing bevacizumab. No previous treatment with bisphosphonates, or other known local and systemic risk factors were reported. Intraoral examination showed a painful area of bone exposure in the left posterior lingual mandible. The surrounding soft tissue was erythematous with purulent discharge and with swelling of the extraoral soft tissue of the left mandible. After interaction with her oncologist, bevacizumab has been suspended and systemic antibiotic (ampicillina/sulbactam intramuscularly twice daily for 8 days and metronidazole 250 mg per os twice daily for 8 days), local antiseptics (chlorhexidine 0.2% mouth rinses and 0.5% chlorhexidine gel) were administered.

**Results.** After 15 days, she showed a complete healing after spontaneous sequestration of a necrotic bone fragment.

**Conclusions.** The antiangiogenic and antiresorptive effects of bevacizumab are dose-dependent and time-dependent. Probably this implies that angiogenesis, bone remodelling and healing processes should restart after drug cessation. The present case supports the necessity to apply BRONJ prevention protocol also in patients in therapy with bevacizumab.



## REU VERSUS THONGPRASOM SCORING SYSTEMS FOR ORAL-LICHEN-PLANUS DIAGNOSIS: CLINICAL EVALUATION

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**Aim.** Oral lichen planus (OLP) is a chronic autoimmune mucocutaneous disease that affects the oral mucosa as well as the skin, genital mucosa, scalp and nails. An immune-mediated pathogenesis is hypothesized although the exact etiology is unknown. The erosive and atrophic forms of OLP are less common, yet they are more likely to cause symptoms. Periodic follow-ups of all patients with OLP is recommended; it is important for clinicians to maintain a high index of suspicion for all intraoral lichenoid lesions due to their potential for malignancy. The REU scoring system was ideated to evaluate OLP lesions in relation to anatomic sites, characteristic of the lesions and pain score. The severity of the lesions in each site is scored according to the presence of reticular/hyperkeratotic, erosive/erythematous and/or ulcerative lesion(s). In Thongprasom scoring system each score is associated with appearance and extension of clinical lesions. The score goes from 0 to 5 according to the appearance of the mucosa. This criteria is very simple to use but has important limitations. In fact, neither ulcers nor non-striae are taken into consideration, lesions bigger than 1cm are not discriminated as well as extension is not registered.

**Aim.** In the present study REU and Thongprasom scoring systems were used to evaluate Oral-lichen-planus (OLP) lesions. The aim of the study was to assess the reproducibility and the learning curve of both systems, according to evaluations made by 3 differently experienced raters.

**Materials and methods.** 50 patients were included in this study after a diagnosis of OLP made by an incisional biopsy. Each patient was photographed according to 10 intraoral sites (lips, right/left buccal mucosa, dorsum/ventrum tongue, floor of the mouth, maxillary/mandibular gingiva, hard/soft palate) before-starting and three-weeks-after, topical steroid therapy. Three differently experienced observers were designated as raters and evaluated each photo using both Thongprasom and REU scores, after appropriate training. The main rater (1) was a professor in the field of oral medicine, the second rater (2) was a dental student trained in oral medicine whereas the last rater (3) was a non-experienced trainee. Data were analyzed using SPSS for Windows 16.0. Kendall's W and interclass correlation coefficient (ICC) were calculated. Concordance grades were established as follows: low: <0.20; modest: 0,21-0,40; moderate: 0,41-0,60; substantial: 0,61-0,80; >0,81 excellent.

**Results.** The inter-observer agreement analysis yielded high Kendall's W coefficients of 0.89 and 0.81 for the REU and Thongprasom scoring system, respectively. ICCs evaluated using REU score system ranged from 0.87 to 0.90 for the observer 1 vs 2 and for the Observer 2 vs 3, respectively.

On the contrary, for the Thongprasom scoring system, the ICCs between observers ranged from 0.58 to 0.87 for the agreements between observer 2 vs. 3 and observer 1 vs. 2, respectively.

**Conclusions.** our results demonstrate that both systems have an excellent reproducibility among observers. Anyway, reproducibility between observers was slightly higher for REU than Thongprasom score system. Eventually, Thongprasom scoring system resulted more difficult to comprehend and more affected by operator experience.



### RISK FACTORS AND BRONJ: A SINGLE CENTER 10 YEARS EXPERIENCE

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**Aim.** Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is a well-recognized side-effect of amino-bisphosphonate therapy in patients suffering from bone metastases from solid tumors, multiple myeloma and osteoporosis. This study describes the 10 years experience of a Day Surgery Unit in the management of patients affected by this avascular necrosis pathology of the maxillo-facial district, evaluating the relationship between risk factors and onset and progression of BRONJ.

**Materials and methods.** During a period ranging from 2005 to 2014 a group of 76 patients affected by BRONJ was consecutively observed and treated by the Day Surgery Unit of the School of Dentistry of the University of Messina. The patients (20 males, 56 females) aged between 46 and 83 years. BRONJ diagnosis and staging was assessed according to the SIPMO - SICMF criteria, adopting a work-flow including CT examinations. According to the BRONJ stage, antimicrobial therapy (systemic antibiotics and topical antiseptics) surgical treatment (sequestrectomy, alveolar resection) and/or palliative treatments were adopted to manage the patients. Different parameters were evaluated to analyze BRONJ onset and progression: demographic data; local risk factors (tooth extraction, oral infections, decubitus ulcers by dental prosthesis, etc.); systemic risk factors (diabetes, hypertension, etc.), contemporary use of other drugs; cumulative dose of each bisphosphonate taken on. Statistical analysis was conducted using multiple regression, ANOVA and Spearman correlation. A scoring system to evaluate the severeness of the BRONJ was used considering the following phenomena (indicating with 0 the absence of event and with 1 its presence): pain, bone exposure, purulent discharge, extra-oral fistula, displaced mandibular stumps, nasal leakage of fluids.

**Results.** The statistical analysis showed how the BRONJ is far more severe in the oncologic patients treated with zoledronic acid, with a strong correlation between the cumulative dose and the BRONJ score. The data demonstrate how the main oral triggers are tooth extraction, periodontal disease and decubitus ulcers by dental prosthesis. On the other hand, drug therapies including steroids and antiangiogenic factors, as long as hypertension and diabetes had lower cumulative dose related to the pathology onset.

**Conclusions.** A group of BRONJ patients consecutively treated in 10 years was analyzed. Data regarding diagnosis and treatment were exposed. Oncologic patient showed the worst clinical outcomes. Hypertension, diabetes, and specific drug therapies that interfere with the vascular asset of the patient are the most significant risk factors involved, lowering the mean cumulative dose of the drug hastening the BRONJ onset.



## SALIVARY PROTEOME ANALYSIS BY 2D-PAGE AND SELDI-TOF/MS TO SEARCH POTENTIAL BIOMARKERS OF ORAL SQUAMOUS CELL CARCINOMA

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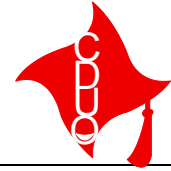
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**Aim.** Oral squamous cell carcinoma (OSCC) is the most common malignant tumor of the oral cavity and is a neoplasia characterized by a poor prognosis. In fact, the estimated survival rate is 44% after 5 years from the diagnosis. The prognosis of the disease is significantly related to the stage in which the disease is diagnosed. Moreover the therapies are not very efficient and are so invasive, disfiguring and debilitating that in the survivors the quality of life is poor. Nowadays there is not a reliable and non-invasive method for early diagnosis of oral squamous cell carcinoma and the simple visual examination of the oral cavity is characterized by a low sensitivity and specificity, also because in a significant number of patients the early stages of oral carcinogenesis are not associated with clearly evident clinical abnormalities. The aim of the study was to determine the potential biomarkers of early and non-invasive diagnosis and to use a test that was less subject to the clinical experience of the examiner. Furthermore, we tried to use the saliva as a biological matrix to make a rapid, simple and economic diagnosis.

**Materials and methods.** In the current study, we analysed 65 saliva samples of patients with OSCC (25 stage I and II, 40 stage III and IV) and 34 healthy controls (HS). Stage I and II OSCC patients were classified as Early Stage OSCC (ES-OSCC), while stage III and IV patients were classified as Late Stage OSCC (LS-OSCC). All samples were collected and processed for proteomics research. Each sample has undergone an ethanol frozen precipitation to be purified and then was made a 2D-PAGE electrophoresis. Separated proteins were eluted for SELDI-TOF mass spectrometry analysis. Protein profiles of all samples were analysed using BIORAD DataManager™ software (Ver 3.5).

**Results.** From this analysis we identified a list of differently expressed mass peaks (clusters). We noted the presence of protein spots in gel of samples ES-OSCC. No spots were found in LS-OSCC and HS samples. After a passive elution of spots, we identified the same peaks more expressed in ES-OSCC: 13512, 13509, 14168, 14041, 14040, 13649, 13652, 13,493, 10899 and 10895 m/z. The same peaks were more expressed in ES-OSCC rather than in LS-OSCC.

**Conclusions.** Overall, our data confirm that the salivary proteome of patients with OSCC seems to be different in each stage of oral cancer progression. These data also indicate a strong association between the levels of salivary marker of 13512, 13509, 14168, 14041, 14040, 13649, 13652, 13,493, 10899 and 10895 m/z and the OSCC. For this reason, if confirmed on large series of patients, these biomarkers can be useful for a rapid and non-invasive diagnosis of the disease.



#### SUBMANDIBULAR PARAGANGLIOMA: REPORT OF A CASE

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**Aim.** Paraganglioma is an uncommon neuroendocrine tumour arising from the paraganglia of the autonomous nervous system in the head and neck, retroperitoneal and mediastinum regions. The overwhelming majority of head and neck paragangliomas are benign, but tend to be locally aggressive. Malignant behaviour has been noted in less than 10% of cases. Head and neck paragangliomas could be sporadic or familial, the latter are more frequently multiple and are related to the mutation of PGL1 gene mapped to chromosome 11q23, coding for subunits of mitochondrial complex with loss of enzymatic mitochondrial activity and normal morphology. Clinically the tumour has a slow rate of growth and is asymptomatic; the diagnosis can be performed by: Somatostatin Receptor Scintigraphy thanks to the expression of somatostatinergic receptors in the tumour, arteriography because of the hypervascularization of the lesion, Computer Tomography, and Magnetic Resonance Imaging (MRI) which represents the most important imaging technique for the evaluation and characterization of these tumours. The main treatment modalities for paragangliomas are surgery and radiation therapy. The aim of this work is to report the management of a patient affected by a submandibular paraganglioma

**Materials and methods.** *Case presentation.* A 31-year-old male complained chewing and swallowing discomfort in the left side of the mandible. The clinical examination showed a swelling of the lower mandibular margin, in the submandibular region. The medical history revealed the absence of family history for these tumours. Radiographic examination showed no radiolucency or radiopacity, whereas ecographic examination revealed a hypoecogen area. Thus, the patient underwent to a second level examination, the MRI, highlighted the presence of a circumscribed mass filling the sub-mandibular region. A surgical approach followed by histological examination and immunohistochemical analysis were performed, but during the operative period two masses were excised from the same region.

**Results.** The major mass was red and measured 2 cm in diameter, the minor one was white and measured 1 cm. Histologically, the major mass was characterized by monomorphic cells with central nuclei and a granular eosinophilic cytoplasm organized into nests surrounded by a fibrous capsule. Mitotic figures, cellular atypia, and necrosis were absent. Immunohistochemical analysis was positive for S-100 protein, focally positive for Neuron Specific Enolase (NSE), and didn't show positivity for cytokeratin. The presence of these features were suggested of paraganglioma. The white mass was a reactive lymph node. During the 4 years follow-up any local recurrence or metastasis were observed.

**Conclusions.** Histological analysis is essential for a correct diagnosis of paraganglioma, even if it couldn't allow a predictable prognosis because the only acceptable criterion of malignancy is the presence of metastasis to the cervical lymph nodes or distant sites. Due to the local aggressive behaviour and the possible malignancy, a long-term follow-up is necessary.





### SUBTOXIC DOSE OF ZOLEDRONIC ACID KEEPS HUMAN PRIMARY OSTEOBLASTS ACTIVE IN VITRO

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**Aim.** Bisphosphonates, a family of chemotherapeutic compounds, which zoledronic acid belongs to, are used in the treatment of patients with osteoporosis and osteolytic malignant processes, such as Paget's disease, the neoplastic hypercalcemia, multiple myeloma, the postmenopausal osteoporosis and osteolytic processes associated with tumors. However, several are the negative effects of zoledronic acid, among them, osteonecrosis of the jaw (ONJ) is the most represented. The pharmacological action of zoledronic acid is to block bone resorption through a direct action on osteoclasts along with an indirect action on osteoblasts that seems to lead to a bone repair process. The purpose of this work is therefore to verify the effect of a subtoxic dose of zoledronic acid on Human Osteoblasts (HOs) in terms of cell viability, occurrence of apoptosis and induction of differentiation versus the osteocitary lineage.

**Materials and methods.** HOs were treated by choosing the highest concentration limit ( $10^{-5}$  M), which does not induce toxic effects. Several tests were performed:

- Evaluation of the depolarization of the mitochondrial inner membrane through the mitochondrial membrane potential
- Assessment of the proportion of osteoblasts by ALP
- Assessment of the proportion of live cells using MTT
- Assessment of the proportion of live and dead cells by Live / Dead test
- Annexin /PI flow cytometric analysis of necrotic and apoptotic cells
- Bax level evaluation
- Evaluation of the release of collagen type I and PGE2 by ELISA

**Results.** Similar level of living cells between control samples and samples treated with ZA was found, in addition no significant increase of apoptotic cells and necrotic ones was evidenced in ZA treated cells respect to control. On the other side, in both experimental points, there ~~has been~~ was a good integrity of the mitochondrial membrane. To establish whether an early apoptotic pathway was triggered, levels of Bax were evaluated, revealing a higher protein expression in the control sample. The secretion of type I collagen and ALP activity appear increased in the samples treated with ZA, while no differences were detected in PGE2 levels.

**Conclusions.** These results show that ZA, at subtoxic dose, delaying the process of differentiation of osteoblasts in the osteocytic lineage, improves the production of bone matrix, and does not determine a cytotoxic effect. Therefore those results assume a significant clinical value because the understanding of the effects of ZA on osteoblasts at subtoxic dosages can improve the therapeutic protocols in order to enhance the pharmacological activity of drugs avoiding that such concentrations result to be cytotoxic.



## TARGETING CELLULAR METABOLISM AS PROMISING STRATEGY IN ORAL SQUAMOUS CELL CARCINOMA TREATMENT

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L. Lo Muzio<sup>1</sup>, N. Capitanio<sup>1</sup>, C. Piccoli<sup>1,2</sup>

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**Aim.** Glucose metabolism is a crucial factor in the progression of oral squamous cell carcinoma (OSCC) and the glycolytic phenotype is a significant negative biomarker of prognosis and overall survival in OSCC patients (1). Abnormalities of mitochondrial energy metabolism, marked by a metabolic shift from oxidative phosphorylation to glycolysis ("Warburg effect"), is a hallmark of several tumour types (2). Dichloroacetate (DCA), an inhibitor of the pyruvate dehydrogenase kinase that activates the pyruvate dehydrogenase complex and promotes oxidative metabolism of pyruvate has been recently demonstrated as a promising nontoxic antineoplastic agent (3). The aim of this study was to investigate the biochemical phenotype of a panel of OSCC cell lines and to correlate it to their biological response to DCA.

**Materials and methods.** We investigated the mitochondrial respiration. The effect of the compounds on cell viability was studied using the 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide (MTT) assay.

**Results.** A comparative analysis of the rate of mitochondrial respiration and of the functionality of the respiratory chain complexes I and IV revealed a significant difference among three representative human OSCC derived cell lines, HSC2, HSC3 and PE15 cells. Interestingly, MTT assays and apoptosis measurements showed a remarkable cytotoxic effect of DCA treatment only in HSC2 and HSC3 cells, characterized by the lowest rate of oxygen consumption and the lowest activity of respiratory chain complexes. Epithelial non-cancerous HEK 293 cells were not affected by DCA, confirming the selective effect of the molecule on cancer cells. Moreover, irrespectively of the presence of differences in the respiratory chain functionality, OSCC cells did not report discrepancy in the ability to generate and maintain  $\Delta\psi_m$ , but a significant dose-dependent increase in ROS formation was, instead, observed only in HSC2 and HSC3 cells exposed to DCA.

**Conclusions.** our findings demonstrate that the characterization of the metabolic phenotype of cells derived from OSCC patients' oral biopsies can potentially predict the patients' clinical response to metabolic drugs as DCA and aid the development of new personalized treatment approaches.



### THE HUMAN PERIAPICAL CYST- MESENCHYMAL STEM CELLS (HPCY-MSCS): A NEW INNOVATIVE SOURCE FOR MSCS USED IN REGENERATIVE MEDICINE

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**Aim.** The search for alternative sites, easily accessible, free of morbidity for the patient, rich in stem cells, is the current challenge of regenerative medicine. Human periapical inflammatory tissues that are formed resulting from endodontic infection are usually termed periapical granuloma, and the condition is referred to as apical periodontitis. This pathological condition, if untreated, can lead to a periapical cyst. The aim of our research is to determine if cells isolated from human periapical inflammatory cyst can express mesenchymal stem-like properties.

**Materials and methods.** Human periapical cystic tissue was obtained from healthy volunteers donors. The cysts received several washes in sterile phosphatase buffer saline (PBS, Invitrogen) containing antibiotics. We isolated and characterized cells from human periapical cystic tissue: these cells expressed mesenchymal stem-like properties, so we termed them "human Periapical Cyst- Mesenchymal Stem Cells" (hPCy-MSCs).

**Results.** No study has yet evaluated the possible existence of MSCs in human periapical cysts. In the present pilot research, we demonstrated that cells isolated from human periapical inflammatory cysts display MSC-like properties, as evidenced by the expression of the MSC markers CD13<sup>+</sup>, CD29<sup>+</sup>, CD44<sup>+</sup>, CD73<sup>+</sup>, CD90<sup>+</sup>, CD105<sup>+</sup>, CD45<sup>+</sup>, STRO-1<sup>+</sup>, CD146<sup>+</sup> as well as their self-renewal capability and osteogenic and adipogenic potential. We successfully isolated and characterised hPCy-MSCs from human periapical cysts, without recourse to the removal of biologically healthy tissues, since human periapical cysts are destined for surgical removal to prevent the development of disabling, pathological conditions.

**Conclusions.** Until now, the most common sources of adult stem cells were usually identified in bone marrow, adipose tissue, and, recently, in some structures such as intraoral dental pulp. The dental inflammatory periapical cysts are usually not dangerous from a histopathological point of view, on the contrary, they represent a neof ormation absolutely free of utility for the patient, in fact, usually the cysts are stored in biological waste: the possibility of obtaining mesenchymal stem cells from a "biological waste" puts us in a position to really take advantage of an "alternative" source, at practically zero biological cost. We have discovered, isolated and characterized, for the first time, cells from inflamed periapical cyst, which have the characteristics of mesenchymal stem cells. Therefore, hPCy-MSCs could be a useful source of mesenchymal stem cells for research and we suggest that these mesenchymal stem cells have potential therapeutic properties in regenerative medicine.



### THE ROLE OF MATRIX METALLOPROTEINASES IN RADICULAR CYSTS AND PERIAPICAL GRANULOMAS

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**Aim.** The aim of the present study was to evaluate the expression and distribution of different classes of matrix metalloproteinases (MMPs) in order to investigate their role in the development of two frequent periapical diseases, which represent the progression of microbial infection in root canal system: radicular cysts and periapical granulomas.

**Materials and methods.** Twenty consecutive specimens of radicular cysts and 20 of periapical granulomas, from the archives of the laboratory of Anatomic Pathology, Department of Medical, Oral and Biotechnological Sciences, University of Chieti-Pescara, Chieti, Italy, were selected. Expression of MMP-2, -9, -8, -13, -3 was immunohistochemically evaluated in different cell types: keratinocytes, endothelial cells lining the vessels, cells of the inflammatory infiltrate (macrophages, lymphocytes, plasma cells and granulocytes), and finally fibroblasts. The intensity of expression of the MMPs was evaluated using a semi-quantitative analysis: low = +; intermediate = ++; high = +++.

**Results.** In both groups, positive expression of MMPs was present with different distribution. MMP-9 expressed differently in the lesions. Indeed, in periapical granulomas low expression was found in endothelial cells and fibroblasts, whilst high intensities were only detected in inflammatory cells, such as lymphocytes, plasma cells and granulocytes. On the contrary, in radicular cysts the high intensities were mainly present in keratinocytes and fibroblasts. MMP-8 showed a variable intensity of expression; particularly, it was mainly expressed in inflammatory cells of periapical granulomas. MMP-2 presented a low intensity of expression in both groups. MMP-3 showed low intensities of expression in all specimens of radicular cysts. MMP-13 showed a variable pattern of distribution in the different cell types of the two different lesions.

**Conclusions.** The present investigation supports the role of MMPs in the inflammatory process leading to the development of radicular cysts and periapical granulomas. The results of the present study suggested that the increased enlargement of radicular cysts, compared to periapical granulomas, might be related to a higher expression of MMP-9. On the other hands, the higher intensity of expression of MMP-8 in periapical granulomas could be related to an active inflammatory process. MMP-8 could play an important role in the inflammation processes during the development of periapical lesions.



## THERAPEUTICAL APPROACHES IN BISPHOSPHONATES-RELATED OSTEONECROSIS OF THE JAWS: A SYSTEMATIC REVIEW

**K. Rupel, G. Ottaviani, M. Gobbo, R. Di Lenarda, M. Biasotto**

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**Aim.** Since bisphosphonate-related osteonecrosis of the jaw (BRONJ) was first reported in the early 2000s, it is now a well-established entity. Many different therapeutic approaches have been reported including antimicrobial rinses, antibiotics, local debridement and surgical resection, or a combination of previous. Clinicians chose their therapies based on their own empirical experience as well as on guidelines from position papers from professional societies. According to the 2009 American Association of Oral and Maxillofacial Surgeons position paper, the goal of treatment should be conservative with a focus on palliation since healing rates for surgical treatment appeared to be initially low. However, since several recent studies have shown durable disease-free status after surgical resection of BRONJ lesions, the goal of therapy may not only be palliation. Up to date, there are no universally accepted treatment protocols and no systematic reviews or meta-analyses have been published on this issue. The aim of this systematic review is to identify different treatment approaches for BRONJ that have been described in literature and to assess their effectiveness overall and for each stage disease, considering the AAOMS staging system.

**Materials and methods.** A Medline via Pubmed and Scopus database literature search was conducted and all publications fulfilling the inclusion, exclusion and eligibility criteria were included in the final review. The titles and the abstracts of the English-language retrieved articles were then screened by two independent reviewers. Two different analyses to determine overall healing rates and healing rates based on each BRONJ stage have been conducted.

**Results.** The electronic database search last updated on February 2013 yielded 1183 hits from Medline and 925 hits from Scopus. 145 articles were considered relevant to the topic after title and/or abstract screening. A manual reference list search of the 145 selected articles yielded one further article. Full texts of these 146 articles were then assessed for eligibility leading to the selection of 40 full text articles for the final review. 22 articles out of 40 were screened for stage-related outcomes. The overall outcome results and results for every disease stage were low when patients were treated with nonsurgical therapies, higher when treated with conservative surgery and the highest when treated with extensive surgery or extensive laser assisted surgery.

**Conclusions.** In conclusion, a surgical approach to BRONJ lesions seems to be the more effective even in lower stages.



## WHOLE TRANSCRIPTOME EXPRESSION ANALYSIS AND PROFILING OF ORAL SQUAMOUS CELL CARCINOMA IN RELATIONSHIP TO LYMPH NODE INVOLVEMENT

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<sup>4</sup>Medical Genetics, IRCCS Scientific Institute and Regional General Hospital "Casa Sollievo della Sofferenza", S. Giovanni Rotondo (FG), Italy

**Aim.** Oral squamous cell carcinoma (OSCC) is the most common oral or pharyngeal cancer and the most common at head and neck sites. OSCC is responsible of approximately 3% of cancers in men and 2% in women in the Western World. Early detection by screening is necessary to prevent fatal disease because early, curable lesions are rarely symptomatic. Treatment options are represented by surgery, radiation, or both, and the overall 5-yr survival rate (all sites and stages combined) is > 50%, but is greatly influenced by node involvement, which is associated with poorer survival, decreasing survival rate by about 50%. The aim of our study was to find genetic signatures associated with lymph node metastasis, and we addressed this issue evaluating the whole transcriptome by cDNA microarray analysis of OSSC tissue of patients with (N+) and without (N-) node involvement.

**Materials and methods.** We utilized the classic cDNA microarray chip containing up to 30000 genes by Affymetrix (Human Genome U133 Plus 2.0 Array, Affymetrix, Inc., U.S.) and 54675 probe sets. Arrays will be scanned using the Affymetrix GeneChip Scanner 3000 (Affymetrix). Expression data have been analyzed using GeneChip Operating Software 1.1 (Affymetrix) and GeneSpring 6.1 (Silicon Genetics, Redwood City, CA).

**Results.** By gene expression profiles analysis of 11 N+ patients and 10 N- patients, we obtained 83 differentially expressed genes, whichever represented the insulin-like growth factor II binding molecular function ( $p=9.363E-3$ ), and the response to fatty acid ( $p=2.230E-2$ ), the positive regulation of cell proliferation ( $p=2.923E-2$ ) and the negative regulation of epithelial cell differentiation ( $p=4.246E-2$ ) biological processes. The interaction network wiring these genes exhibited a long diameter (10) and a low-density value (0.031), mirroring the low degree of connectivity and the highest number of connected components (18). Three tightly connected clusters of genes were analytically determined, which confirmed the in-silico functional analysis inference.

**Conclusions.** In conclusion, our results put in evidence important differences in gene expression between OSCC patients affected by OSCC without node involvement in respect of OSCC patients with metastatic disease.



### **"ACCIDENTAL" OBSERVATION ON EPITHELIAL ATTACHMENT OVER THE HEALING ABUTMENTS**

A. D'Ambrosio, G. Murmura, T. Traini, B. Sinjari, S. Caputi

### **ALTERATION IN THE SALIVARY FLOW RATE AND CITO-MICROBIOLOGICAL ANALYSIS OF THE ORAL MUCOSA IN PEOPLE WEARING ORAL PIERCING. A PILOT STUDY**

A. Zanchetta, G. Val, L. di Benedetto, M. Val, V. Zuccolotto, E. Stellini, M. Val

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F. Profili, T. Traini, L. Ciembrignoni A. Quaranta, S. Caputi, M. Procaccini

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A. Pardo, G. Corrocher, G. Rigoni, S. Merlini, D. Antoniazzi, G. Lombardo, N. Zerman

### INFLUENCE OF SURFACE COATING ON STAINING SUSCEPTIBILITY AND SURFACE ROUGHNESS OF ESTHETIC COMPOSITE RESIN MATERIALS

G. Bellagarda



# XXI CONGRESSO NAZIONALE

Odontoiatria Traslazionale

(Roma, 10-12 Aprile 2014)



Collegio dei Docenti Universitari  
di discipline Odontostomatologiche

## PREVENZIONE ED IGIENE DENTALE

SESSIONI >>>

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## PREVENZIONE ED IGIENE DENTALE

SESSIONI >>>

### PH ROLE IN NUTRITION, PRIMARY PREVENTION AND MAINTENANCE OF ORAL HEALTH

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R. Franco, N. Galli, S. Denti, N. Zagay, Marchi, F. Aspesi, M.A. Mauri, S. Magistro, A. Amodeo, M. Tremolati

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### PREFERENCE OF SWEET TASTE AND PREVALENCE OF DENTAL CARIES IN 13-15 YEARS OLD ADOLESCENTS: A MULTICENTRIC STUDY

S. Sale, A. Mura, C. L. Capi, E. Filigheddu, G. Carta, G. Campus



### “ACCIDENTAL” OBSERVATION ON EPITHELIAL ATTACHMENT OVER THE HEALING ABUTMENTS

A. D'Ambrosio, G. Murmura, T. Traini, B. Sinjari, S. Caputi

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**Aim.** To evaluate the brushing effectiveness on reducing plaque around the peri-implant healing screws of variable surface topography. A pilot study.

**Materials and methods.** Five patients in need of implant prosthetic treatment were enrolled in this pilot study. They all had placed Geass Way Milano Implants. During the second stage surgery 5 healing abutments of variable surfaces were inserted. The latter presented half surface machined while the contralateral part laser treated. The patients were carefully instructed for the domiciliary oral hygiene according to a standardized method that included: brushing of all tooth surfaces with roller method, cleansing of the healing abutment with brush tuft and application of chlorhexidine gel 0.20% around the healing abutment and peri-implant mucosa. Two weeks from healing abutment insertion, during the impression taking, they were removed from the oral cavity and fixed in a solution of 10% formalin. The samples were subsequently dehydrated using the critical point, and then observed under a scanning electron microscope (SEM).

**Results.** The presence of a conspicuous cell layer observed on the laser treated surface part did not make possible to verify the objective and the hypotheses of this study. Indeed, a substantial layer of epithelial-like cells adherent over the laser treated surface of all healing abutments was observed. Conversely, the machined side appeared completely devoid of cellular elements adherent to it. Moreover, the cells showed to be adherent to the laser treated surface and especially to the neck of the healing abutment, which is in close contact with the internal part of the fixture, whilst on the machined surface bacteria colonisation were shown. From a qualitative point of view the Sem images demonstrated the presence of bacterial coccid clusters on the machined part of the healing abutment, while the tiny surface portions of the laser treated part colonized by bacteria there were present bacterial complex associations (coccoid/rods). However, the SEM observations show that a small amount of bacteria had also colonized the laser treated surface, although above the cell layer and with weak penetration power in it. Moreover, it seems that the process of cell adhesion triggered on the laser treated surface can be extended even further.

**Conclusions.** This casual observation opens the door to a variety of assumptions, including the one that the cell adhesion capacity on surface laser treated surface is superior to that present between the individual layers of the epithelium cells in the physiological architecture. In addition, the apparent error introduced by the unexpected presence of cellular elements on the laser treated part made it impractical to compare between the surfaces the bacterial adherence. It remains clear that the casual observation of the epithelial cells to the laser treated surface of all the screws analysed, requires further and more incisive investigations, for which the present work may constitutes an essential basis. If the submissions are confirmed by further studies, the clinical implications are relevant opening up the possibility of introducing the epithelial seal on implant abutments.



### ALTERATION IN THE SALIVARY FLOW RATE AND CITO-MICROBIOLOGICAL ANALYSIS OF THE ORAL MUCOSA IN PEOPLE WEARING ORAL PIERCING. A PILOT STUDY

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**Aim.** Analyze how oral piercing can modify salivary flow rate, the morphology of the mucosal epithelium and the normal flora in the area of the piercing.

**Materials and methods.** The survey involved 20 subjects, 10 carriers of oral piercing (experimental group) and 10 without oral piercing (control group), all belonging to the Unit of pedodontics at the Civil Hospital of Castelfranco Veneto. The subjects enrolled were aged between 17 and 57 years, all the subject hasn't oral diseases. A questionnaire was given to each subject, it has been created to include the most important variables for the study. The questionnaire was divided into two parts:

1. a general section in which patients were asked for demographic information and oral hygiene habits;
2. a specific part related to the type of piercing.

Sample taking using scraping technique allowed the citologic and microbiologic analysis of the tissue 5 mm far from the piercing. Then was analysed the salival flow rate by stimulating salivation with the chewing of paraffin wax. So was collected the saliva produced in 5 minutes and the flow rate was measured in ml/minute. Statistical analysis: Categorical data were compared with Fisher exact test, while those continuous numeric were compared with the Mann-Whitney U test. A p-value less than 0.05 was considered significant.

**Results.** At periodontal examination the presence of plaque ( $P = 0.009$ ) and the bleeding on probing (BoP) ( $P = 0.04$ ) were statistically significant in the group with piercing instead gingival recessions ( $P = 0.65$ ), probing pocket depth (PPD), ( $P = 0.65$ ), tooth mobility ( $P = 0.99$ ) were not increased in the study group. While the salivary flow rate ( $P = 0.002$ ) demonstrate to be clearly enhanced. Microbiological test: no significant presence of pathogenic bacteria was demonstrated (streptococci and staphylococci). Cytological analysis: No significant alteration in cells was noted.

**Conclusions.** Piercing can produce a greater accumulation of plaque ( $P=0.009$ ) and an increasing of gingivitis (with gum bleeding  $P=0.04$ ). Then there is a major production of saliva ( $P=0.002$ ) in people wearing piercing, this phenomenon generated bigger quantity of tartar. In the cytological analysis failed in showing *Candida Albicans* colonies and other pathogenic bacteria, but pointed out the presence of groupings of neutrophils related to the piercing, which showed the constant state of inflammation of the tissue.



### AN IN VITRO ASSESSMENT OF THE EFFECTIVENESS OF GLYCINE POWDER AIR POLISHING IN THE TREATMENT OF CONTAMINATED IMPLANT SURFACES

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**Aim.** Air polishing is a procedure which uses air and water pressure to deliver a controlled stream of specially processed sodium bicarbonate over hard tissues. A less abrasive method using an amino acid glycine based powder has been proven to be effective in removing bacterial biofilm structures from shallow periodontal pockets and peri-implant tissues. The aim of this study was to evaluate the effects of glycine powder air polishing on contaminated implants.

**Materials and methods.** A total number of three implants (Winsix, Biosafin®, Ancona, Italy) were evaluated with SEM imaging (Zeiss® EVO 50 XVP; LaB6 electron gun) and EDX (Energy Dispersive X-ray spectroscopy) (EDS INCA, Oxford Instruments, Oxon, UK). The first implant (n. 1) was brand new, it was open from its package and assessed by SEM for surface analysis and chemical properties. The other two samples (n. 2 and n. 3) were implants removed from the same patient, due to advanced perimplantitis and complete loss of osseointegration. N. 2 was analyzed, as it was, after the removal, so it served as a negative control, because high contamination of its surface. Sample N. 3 was tested before and after the glycine powder air-polishing decontamination. The air polishing treatment was standardized as follows:

- the implant was connected to a straight abutment;
- a reference point was marked on the abutment surface;
- the abutment was stuck inside a plaster block;
- the entire surface of the implant and a 2 mm cervical area of the abutment were not sunk in plaster;
- the angle between the plaster block and the fixture was of 90 degrees.

The treatment was carried on for 5 seconds on each implant surface. The plastic nozzle was used with a 4-5 degrees angle to the fixture maintaining a 1 mm distance from the implant. The implant abutment block was steadily and slowly twisted during the entire procedure until the reference point was visible again.

**Results.** EDX analysis showed a successful removal of proteins and calcium from the contaminated implant surface. However, some residual oxygen carbon and phosphorus remnants were visible.

**Conclusions.** Within the limits of the present in vitro study it is possible to state that decontamination procedure with glycine based air-polishing powder is safe and effective on implant surfaces contaminated by a complex biofilm. Further in vitro and in vivo studies are required in order to confirm these results.



### AN IN-VITRO STUDY COMPARING DIFFERENT METHODOLOGIES OF PROFESSIONAL HYGIENE TECHNIQUES FOR THE MAINTENANCE OF POLY-METHACRYLATE PROVISIONAL ELEMENTS

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**Aim.** Comparing different methodologies of professional hygiene in decontaminating and preserving the structural integrity of provisional prosthetic elements (PPE).

**Materials and methods.** We developed an in-vitro model of *S. Mutans* biofilm formation on PPE and compared the most common professional hygiene techniques in terms of decontamination efficiency and resin surface damage. We measured the growth curve of the residual biofilm after hygiene procedures and the integrity of the resin surface by means of confocal microscopy.

**Results.** Our results show that the different protocols had a comparable efficacy in decontaminating the PPE with powder containing chlorhexidine being the most efficient. Interestingly, we found that the use of ultrasonic scaler (US) didn't improve the decontamination efficiency of other techniques but rather were particularly aggressive on the resin surface. Furthermore, the use of US gave more variable results if compared with the matched working group without US.

**Conclusions.** Within the limitation of this study, our data provide provisional indications for the best methodology to maintain PPE in the clinic (i.e. "Plus" powder containing chlorhexidine), discouraging the use of most common techniques (i.e. US) because of its potential to produce iatrogenic damages to prosthetic element surfaces. Further clinical studies will be necessary to confirm and strengthen these data and to translate our results into the daily hygienist practice.



#### AN ORAL HYGIENE PROTOCOL FOR AN ALZHEIMER'S RSA CORE

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**Aim.** The study focused on the introduction of the professional figure of the Dental Hygienist, in order to prevent, improve and maintain the oral health status of these patients. This project has allowed the creation of a working group within three operating involved units, consisting of 63 medical figures (geriatricians, nurses, OG, OSS, physiotherapists) in Alzheimer's department and 3 students of oral hygiene in the Dentistry Department.

**Materials and methods.** The RSA Alzheimer's operational units included 80 patients (13 male and 67 female). 65% of these patients was between 70 and 90 years aged, 27% was over 90 years old and 8% was less than 70 years old. 100% of patients presented different types of dementia with BPSD. 70% of the patients suffered from heart diseases and hypertension, 40% was diabetic and 35% had COPD. The project followed particular and precise steps and timing:

1. First Observation: stating an information consensual letter for attendance in the departments, mentoring by geriatricians in order to know the reality and organizational needs of the department and also learn about the current and remote medical situation, the behavioral profile, skills, feeding and peculiar characteristics of the single patient in order to identify the correct operator/patient approach. Another aim was to define a renting for the permanent storage of the mobile units (trucks and self-priming portable scalers).
2. Operational management of first examination: evaluation of the oral cavity and filling out medical records (via module OHAT) and develop of a basic protocol (simplified, universal for everyone, and which can be extended to family members and medical staff).
3. Training for Healthcare Professionals: basic protocol adherence, through training for appropriate strategies and right products for a proper daily oral hygiene.
4. Reevaluation of all patients, development of specific and personal protocols, reporting to medical staff the importance and need of dental examination and oral hygiene sessions, insertion of medical records in the integrated nursing records on each patients.
5. Identification of extensible indicators through the collaboration of the Department of Microbiology and verification of results.
6. Delivery specific schedule of satisfaction of the oral hygiene service towards patients and relatives and to medical staff.

**Results.** The results showed an improvement in the assessment of oral health and a decrease in bacterial load, demonstrated by laboratory tests. Assumptions let us assume that a restoration of 46% of oral health of the evaluated patients might be reached.

**Conclusions.** The effectiveness of this project can not ignore the presence and activities carried out by the dental hygienist within RSA Alzheimer's departments like a bridge between geriatrician, dentist, patient and caregiver.



#### BABY FOOD AND ORAL HEALTH, COMPARATIVE ANALYSIS

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**Aim.** Infants need to be exposed to a variety of tastes, but the amount of sugar should be limited. Understanding the nutritional content of baby food is particularly important to advise correctly the parents and avoid the risks of a sugar-based diet. Aim of this study was to describe the types of baby food commercially available and compare their content in terms of energy, carbohydrates, protein, fat and percentage of kilocalories from each nutrient.

**Materials and methods.** All baby foods produced by five main brands (Humana, Mellin, Milupa, Nestle and Plasmon) were identified between March and July 2013. Nutritional information (carbohydrates, dietary fiber, minerals, vitamins, lipids, proteins, energy value) for each product was collected from original product boxes and manufacturers' website. Finally the products have been recorded into an Excel spreadsheet. All analyzes were performed with dedicated software SPSS 20 (IBM, Armonk, NY, USA). Statistical significance was set at 0.05.

**Results.** Of the 415 products identified, 339 were included in the analysis, in particular 119 (35%) were baby puree, 78 (23%) were baby meal, 27 (8%) were milk, 76 (22.4%) were snacks or biscuits and 33 (10%) were pasta. Among the 339 foods analyzed, 169 (49.9 %) are perceived sweet and 143 (42.2 %) have sugar added between the main ingredients. The mean content of energy, carbohydrates, fat, proteins and lipids were significantly different at bivariate analysis, while multivariate cluster analysis highlighted that baby food were similar in nutrient contents, except for carbohydrates content of pasta and meat puree, where statistically significant differences ( $p < 0.001$ ) exist between the brands. As regards to herbal teas that have been listed, it was observed that all examined companies did not report the content of nutrients per 100 ml of the product or the quantity of sugar added, but only their presence among the ingredients. For this reason it was not possible to include herbal teas in the quantitative analysis and therefore cannot be compared to each other. Nevertheless, it has to be highlighted that all infusions taken into account are constituted by sugars in addition to the flavoring ingredients.

**Conclusions.** From the results that have emerged, almost half of the examined foods for infants, marketed in Italy, have a considerable content of carbohydrates and added sugars. The majority of baby food products are similar in terms of nutrient contents and energy, but significant differences exist in pasta and meat puree, therefore parents should orient their choices to not excess carbohydrates intake. Herbal teas lack of sugar content labelling is also very important, because parents often completely ignore the composition of these products, thus increasing the level of risk of ECC in children. It is essential to inform consumers and to raise awareness of manufacturing companies in order to promote projects that target the child's oral health.





## CARIES-RISK ASSESSMENT AND MANAGEMENT PROTOCOLS FOR CHILDREN IN A DENTAL HYGIENIST PRACTICE

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**Aim.** The recent increase in the prevalence of dental caries among young children has highlighted the need for a new approach to prevent caries in children at younger age. The American Academy of Pediatric Dentistry (AAPD) recognizes that caries-risk assessment and management protocols can assist clinicians with decisions regarding treatment based upon caries-risk are essential elements of contemporary pediatric dentistry. The aim of this study is intended to educate Dental Hygienist on caries-risk assessment and provide a protocol to be follow in clinical decision making regarding diagnostic, fluoride, diet.

**Materials and methods.** This study presents an updated approach with practical forms and tools based on the principles of caries management by risk assessment. Content of the present caries management protocol is based on Caries-risk Assessment Tool (CAT) for Infants, Children, and Adolescents and results of clinical trials, systematic reviews, and expert panel recommendations that give better understanding and recommendations for diagnostic and preventive treatment. Caries risk assessment is the determination of the likelihood of the incidence of caries (ie, the number of new cavitated or incipient lesions), with the ability to detect caries in its earliest stages (ie, white spot lesions), health care providers can help to prevent cavitation. For individual patients risk assessment categorization of low or high risk is based on preponderance of factors for the individual and according to risk is included in the protocol. This method will aid the general practitioner to develop and maintain a comprehensive protocol adequate for infant and young children oral care visits. Perinatal oral health is vitally important in preventing early childhood caries (ECC) in young children. General dental practice can adopt easy protocols that will promote early preventive visits and anticipatory guidance/counselling rather than waiting for the need for restorative treatment. New disease prevention management models suggest that children should have their first visit at age 1 or when their first tooth erupts.

**Results.** The results of this study was determined a new protocol that dental hygienist or general dentist may use in clinical practice and also allow to work together with dentists and pediatricians for the same goal of great social impact in health. The management protocol is formed by an interview for parents understand the factors that contribute to or protect from caries and a clinical finding for the child. Risk assessment categorization of low or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor (eg, frequent exposure to sugar contained into snacks or beverages, visible cavities) in determining overall risk. Caries management protocols for children further refine the decisions concerning individualized treatment and treatment thresholds based on a specific patient's risk levels, age, and compliance with preventive strategies.

**Conclusions.** Clinical management protocols, based on a child's age, caries risk, and level of patient parent cooperation, provide health providers with criteria and protocols for determining the types and frequency of diagnostic, preventive, and restorative care for patient specific management of dental caries. The promotion of health, including oral, is a growth factor of socio-cultural and multi-disciplinary interventions must be based on the involvement of different actors (pediatricians, neonatologist, dentists, dental hygienist, teachers, parents, caregivers).



### COMPARATIVE EVALUATION ON THE EFFECTS OF TWO MOUTHRINSES ON BACTERIAL BIOFILM FORMATION

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**Aim.** The aim of this study was to evaluate the efficacy of two different mouthwashes on reducing the oral biofilm over two different titanium surfaces.

**Materials and methods.** Four volunteer patients in systemic and local good health conditions were enrolled in this investigation (age range: 20-20 yrs). At the beginning of the study all subjects signed an informed consent. All the participants were females and two of them were light smokers (<5 cigarettes/die). During the study the volunteers were not in systemic antibiotic therapy or they did not use mouthwashes 12 months before study start. They shown an excellent oral hygiene indexes. Six titanium disks: 3 machined and 3 lasers treated, were positioned on individual acrylic maxillary splints, used to evaluate the efficacy of the mouthwashes. During the splints wear the volunteers were instructed to do not drink, eat and make manoeuvres of home oral hygiene from the night before. Also the volunteers were divided into two groups: In group A they were instructed to use a 0,20% ADS chlorhexidine mouthwash for 2 minutes, at time zero and at 3 hours after the splint's insertion, whereas the group B used an essential oils based mouthwash with the same instructions. The acrylic splints were maintained for 6 consecutive hours, and at the end of the study time, they were detached and transferred to aluminium stubs to be processed for scanning electron microscopy (SEM) observations. The images were elaborated by Image J 1.48f for quantitative evaluations, and carefully analysed for qualitative observations.

**Results.** The results of this study shown that both the mouthwashes, had a positive effect on reducing bacterial loading over the both titanium disks surfaces. However, the statistical analysis showed that does not exist a statistically significant difference between the two groups of mouthwashes. Moreover, it was noticed for both groups that, over the laser treated surfaces, the percentage of area (area %) covered by bacteria was lower compared to machined one. In fact, the results shown that this kind of surface has a positive effect in attracting fewer bacteria than machined one, regardless of the mouthwash used.

**Conclusions.** Both the mouth rinses containing Chlorexidine 0.20% or Essential Oils within, could be successfully used on domiciliary oral hygiene manoeuvres. Since the present results, it has been hypothesized that the differences between the two Ti surfaces were due to the smooth surface at the bottom of the laser treated pores without groove or other irregularity as in the machined one. Moreover, the SEM observations of dis-epithelialized cells associate with bacteria open the way to take hypothesis like: "Can the epithelialized cells be a means of transport for the bacteria from one site to another within the oral cavity?" Further studies are necessary to better understand and confirm the present results.



### CORRELATIONS BETWEEN IMPLANTED CARDIAC DEFIBRILLATORS AND ULTRASONIC DENTAL SCALERS

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**Aim.** Currently, there is some confusion as to whether ultrasonic dental scalers should be contraindicated in patients with implantable rhythm devices and the dental profession has become increasingly aware of the possibility of electrical interference in patients with ICDs. The aim of this study was to examine whether electromagnetic interferences (EMI) emitted by an ultrasonic piezoelectric dental scaler interfered with the function of implanted cardioverter defibrillators (ICDs).

**Materials and methods.** The study was carried out in vivo at Department of Oral Surgery and Implantology, School of Dentistry of the University of Milan, with the collaboration of the Cardiology Division. A total of 12 consecutive patients with an implanted cardioverter defibrillator (ICD) have been selected (3 F and 9 M, mean age 75 years) during their scheduled follow-up visit in the Cardiology Division. All subjects gave their informed consent to the investigation. The dental devices tested was miniMaster® (Ems Electro Medical Systems Sa, Ch-1260 Nyon, Switzerland), a multifunctional stand alone piezoelectric scaler. Five different types of ICDs were tested. Each device was interrogated record programmed bradyarrhythmia (pacing mode, output and sensibility) and tachyarrhythmia parameters (rhythm detection frequencies and therapy parameters and outputs). With the telemetry wand in place, surface ECG and intracardiac electrocardiograms were continuously printed and evaluated by a cardiologist during testing.

**Results.** No adverse events were detected in any patient. No patient experienced palpitations or any cardiovascular symptom. No interferences were detected by any ICD. Evaluation of the electrocardiograms for each patient failed to show any abnormalities in pacing during testing. Specifically, evidence of reset, inhibition, defibrillation, or antitachycardia pacing was not observed. Pacing rate and time delay between the atrial and ventricular peaks remained unchanged for all the tests indicating successful noise filtering. The devices operated as expected throughout the various dental procedures. Postoperatively, the ICDs were subjected to manufacturing functional tests that confirmed normal device function, indicating that the scaler procedures did not affect the device hardware or software. No extraneous atrial- or ventricular-sensed events were noted on the intracardiac electrogram (IEGM) marker channel.

**Conclusions.** The results of this study suggest that the clinic use of piezoelectric dental scalers do not interfere with the functioning of any of the tested ICDs. Further in vivo clinical trials are required to confirm our findings and to provide clinicians and patients with definitive guidelines.



### DENTAL-PERIODONTAL HEALTH CARE AND ORAL DISEASE PREVENTION IN PREGNANCY. CLINICAL AND MICROBIOLOGICAL ASSESSMENT OF THE EFFECTIVENESS OF ORAL HYGIENE SESSIONS IN PREGNANT PATIENTS WITH GINGIVITIS AND/OR PERIODONTAL DISEASE

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**Aim.** The purpose of this study is to clinically assess the qualitative and quantitative changes in the bacterial flora of the oral cavity of a group of pregnant women, and to demonstrate how the application of an appropriate protocol of oral hygiene, conducted by a team of dental hygienists, can positively influence and modify the dental-periodontal health situation of patients during pregnancy.

**Materials and methods.** Selected for this study were 22 pregnant women attending clinics in districts 9 and 10 of ASL 1 and 2 (Local Health Authorities) of Turin, aged between 18 and 45. The patients were randomly divided into one case group (12 pregnant patients) and one control group (10 pregnant patients). The case group was followed by a team of hygienists who carried out periodic checks and sessions of oral hygiene, demonstrating during follow-ups that the patients had in fact carried out precise and efficient brushing operations. The women in the control group, on the other hand, received no particular instructions as to oral hygiene practices, nor were they submitted to professional sessions during treatment, but were encouraged to continue their normal oral hygiene procedures at home. The 22 patients were examined in accordance with the following scheme:

- T<sub>0</sub>: recruitment within the 20th week of gestation;
- T<sub>1</sub>: follow-up 1 between the 21st and 30th week of gestation;
- T<sub>2</sub>: follow-up 2 between the 31st and 40th week of gestation;

At the Department of Prosthodontics and Oral Rehabilitation, University of Turin, at each time point the following were recorded:

- OBJECTIVE DENTO-PERIODONTAL DATA, examined with circumferential probing, using a periodontal round cross-section probe (Hu Friedy PCPUNC 15), on 6 sites per element (mesio-buccal, central, disto-buccal, mesio-lingual/palatal and disto-lingual/palatal).
- SALIVARY DATA, which included pH, quantity and buffering capacity of the saliva.
- PLAQUE INDEX (FMPS) and BLEEDING INDEX (FMBS), from which we obtained the percentage of sites with plaque and bleeding respectively on the total of sites probed.
- MICROBIOLOGICAL DATA, obtained from a sample of plaque following the "Pool Test" method, and subsequently processed at the Molinette Hospital analysis laboratory.

**Results.** The final outcome of the study was a significant improvement in the oral health of the pregnant patients treated with periodic checkups and sessions of oral hygiene. There was a considerable improvement in periodontal probing, salivary data, plaque and bleeding scores and in the average number of periodontal bacteria between the sample taken during the first examination (T<sub>0</sub>) and the last (T<sub>2</sub>).

**Conclusions.** Good oral hygiene, understood as the daily removal of bacterial plaque combined with periodical professional sessions, can play a vital role in maintaining oral health during pregnancy. A screening programme capable of providing diagnostic tests and targeted treatments, specifically for pregnant women, would be beneficial for both patients and their babies, without considering that prevention protocols would reduce future healthcare interventions, which have a significant impact on both household and public health budgets.

Raising public awareness through prevention campaigns and periodic checks helps to develop and enrich one's knowledge and opportunities related to healthcare, thus ensuring prevention objectives for both mother and child. All this must be sustained by competent and qualified health professionals, in a multidisciplinary vision, such as: gynaecologists, obstetricians, pediatricians, dentists and dental hygienists.



### DENTIN HYPERSENSITIVITY: ETIOLOGIC FACTORS AND METHOD OF TREATMENT

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**Aim.** The dentine hypersensitivity is a painful symptom felt by the patient in response to stimuli that do not cause physiological condition. Referred pain is acute and short, caused by physical, chemical and osmotic stimuli. The pain response varies from one person to another. The most accepted theory on the physiology of pain is the Hydrodynamic Theory of Brannstrom on the movement of fluids within the dentinal tubules, which causes a stimulation of nerve endings. The main etiological factors of exposure of dentinal tubules were: gingival recession and loss of tooth structure due to incorrect brushing technique, abnormal tooth development, malocclusion, dentin-enamel crack, incorrect procedures of Curettage and dental erosion due to the altering the pH level of the oral cavity (gastro-esophageal reflux disease, bulimia, frequent intake of acid foods and drinks). The aim of this study is to analyze the pathological condition of dentinal hypersensitivity, showing the different possibilities of treatment analyzing modern therapeutic devices in order to identify a tailoring therapy in relation to the clinical condition of the patients.

**Materials and methods.** The studies have shown different possibilities of treatment. Topical applications of products (gels, toothpastes and mouthwashes) containing sodium fluoride, stannous fluoride, calcium phosphate, calcium carbonate, strontium chloride and potassium oxalate, determine the obliteration of the dentinal tubules, preventing the receptor stimulation of nerve endings. Sealants and adhesives based paints fluorides constitute a physical barrier against the exposed dentinal tubules. Potassium nitrate desensitizing agents to prevent nerve depolarization, eliminating the painful symptoms. Further studies have evaluated the efficacy of experimental therapeutic devices for the treatment of dentine hypersensitivity. It has been considered the "Nd- YAG laser" for the occlusion of dentinal tubules exposed and the "GaAlAs diode laser alone and with sodium fluoride topical gel (NaF). A clinical study carried out on parallel thirty subjects followed for three months, half of which was taken with Nd-YAG laser in the treatment of dentinal hypersensitivity and the other only subject to control in the first group showed a result of physical stimulation, and a mechanical reduction of dentinal sensitivity of 65% and 72% respectively. The other study, conducted on ten patients, compared the efficacy of the treatment by the use of GaAlAs laser diode used in association with sodium fluoride topical gel and the effectiveness of treatment by the application of sodium fluoride in topical gel. It showed a significant reduction in the first treatment (GaAlA diode laser + NaF topical gel).

**Results and conclusions.** Laser treatments are presented as an immediate therapeutic solution, although, long term topical therapy at home and/or professional tailoring treatment shows a comparable result. Literature shows a topographical classification about pathological exposure dentine points (Coronal; Cervical; Radicular) and no mention on a pathological classification concerning the extent of the dentine lesions.



## EFFECT OF A DENTAL WATER JET ON THE REMOVAL OF TWO DIFFERENT FOODS ON PROSTHETIC MATERIALS

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**Aim.** The dental water jet (DWJ) has been used as an adjunct device to tooth-brushing to enhance plaque control. It is widely accepted that floss is effective at reducing interproximal bleeding, gingivitis and plaque. The purpose of this study is to evaluate the efficacy of the dental water jet on the removal of two viscous foods from materials most used for prosthetic rehabilitation.

**Materials and methods.** The dental water jet (water Pik, Inc., 1730 East Prospect RD, Fort Collins, CO 80553) was used in this work: 20 disks (1,5 cm diameter per 2 mm thickness), 10 ceramic (CER) (Noritake co., limited, 3-1-36 Noritake-shinmachi, nishi-ku, Nagoya, Aichi 451-8501, Japan) and 10 resin (RES) "triplex cold" (Ivoclar, Vivadent srl, via Gustav Flora 32, I-39025 Naturno (BZ), Italy) was projected and realized. Subsequently was applied on these disks two kinds of viscous foods, cacao cream (food 1) and eucalyptus honey (food 2). On all disks was used DWJ with 10 psi power, from a distance of 10 cm, maintained by a support. Each disk was measured before and than the use by precision weighter "Mettler PM480" (Mettler-Toledo International Inc. Im Langacher Greifensee 8606 Switzerland). After that each disk was photographed by a 8 megapixel photo camera and analyzed by a computer through a graphic software (imageJ version 1.46r, Wayne Rasband, National Institutes of Health, USA, <http://imageJ.nih.gov/ij>). Each picture was made perpendicular to the disks and the pixel was used as misure unity. Finded disks area, was defined the margin of remaining food. With a proportion it was possible to calculate the residual food percentage. This made possible to find disk area, residual surface and the remaining percentage. Main analysis has been based on a linear ANOVA model, allowing for interactions among study factors. Results: The water jet has a statistically better capacity to remove viscous substances from the prosthetic components. Ceramic has caratheristics that made it easilly cleanable through the resin (p-value <0,001). Use of a food didn't produced any significant difference (p-value 0.09).

**Conclusions.** By the analysis of the results, the water jet resulted to be effective on ceramic and even on resin, with both the foods. Differences are due to the superficial morphology of materials and to physics properties of the foods.



## EFFECT OF LOCALLY DELIVERED TOPICAL DESSICANT AGENT (HYBENX®) AS AN ADJUNCT TO ULTRASONIC DEBRIDEMENT IN PATIENTS WITH PERSISTENT/RECURRENT PERIODONTITIS: CLINICAL AND MICROBIOLOGICAL PRELIMINARY RESULTS IN HUMANS

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**Aim.** The topical desiccant agent is a liquid form intended for routine daily use by the dentists and hygienists as an oral tissue surface cleanser. This topical agent is designed to be delivered as a focal irrigation to tissue surfaces involved in a dental procedure. An application of agent can be performed quickly and easily during any type of dental procedure ranging from the simple routine prophylaxis to the most technically complex operation. The aim of this study is evaluate the adjunctive effect of a topical desiccant agent on the ultrasonic re-instrumentation of pockets persisting after initial periodontal therapy.

**Materials and methods.** 20 chronic periodontitis patients underwent initial full-mouth ultrasonic debridement. At the three months reevaluation, two different treatments were randomly applied to persisting pockets, following a split-mouth study design: control quadrants were subjected to ultrasonic debridement alone; test quadrants were subjected to supra and subgingival application of a topical desiccant agent (HYBENX®) before ultrasonic instrumentation. The agent was left in contact with the tissue for 45 seconds and is then rinsed away with water and an evacuator. The entire cleansing treatment usually requires only minutes to complete. HibenX achieves its actual cleansing action within seconds after application by denaturing and coagulating plaque and necrotized infectious tissues on oral cavity surfaces. Periodontal charts were obtained at baseline and 45 days after. The presence of supra-gingival biofilm and gingival inflammation was evaluated by the visible plaque index (VPI) and the gingival bleeding index (GBI), dichotomously at six sites on all teeth in the mouth (Ainamo & Bay 1975). Subgingival microbiological samples were obtained before, immediately and 6 weeks after the re-treatment. Analysis of variance/covariance was used to compare changes in clinical parameters and aerobic and anaerobic bacterial counts.

**Results.** Baseline examination revealed no significant differences between study groups. At 6-weeks reevaluation test group showed a statistically significant ( $P < 0.05$ ) greater reduction in plaque index and bleeding on probing (VPI and BOP reduction: 16% and 20% in the control group and 35% and 48% in the test group respectively). No statistically significant differences were found in the mean PPD reduction and mean gingival margin (GM) recession. The count of anaerobic subgingival microbiota showed only in the test group a significantly greater decrease in the number of anaerobic UFC, both immediately and 45 days after retreatment. The only detected side effects in test group was a transitory hypersensitivity.

**Conclusions.** The results indicated that the adjunctive subadministration of a desiccant agent before ultrasonic debridement has shown to improve at 6 weeks the clinical and microbiological outcomes of the ultrasonic instrumentation.



#### EFFECT ON PLAQUE CONTROL IN CHILDREN PATIENTS WITH DOWN SYNDROME USING DIGITAL BRUSH WITH OR WITHOUT CHLOREXIDINE

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**Aim.** The aim of this study was to evaluate efficacy of "Digital Brush" (Digital Brush, Mycerium, S.p.A., Avegno, Ge) in terms of Plaque Index reduction added to the daily oral hygiene procedures. We compared Plaque Index variations in two groups of patients: the Test group using Digital Brush, TNT gauze sanitizing and antiseptic impregnated with chlorhexidine 0,12%, and the Control group using simple steril gauze soaked in water.

**Materials and methods.** Were recruited 20 patients with Down Syndrome in childhood related to "Servizio di Assistenza Odontoiatrica per Disabili, Dipartimento di Scienze Biomediche e Neuromotorie", University of Bologna, sent for counseling by Departments of Pediatrics, Policlinico S. Orsola-Malpighi in Bologna in the period between September 2012 and May 2013. Patients were randomly included in the two groups by tossing coin. All patients belonging to the two groups have been subjected to an initial visit (T0) with measurement of Plaque Index (Silness and L oe 1964) and then subsequently according to the assigned study group were instructed to use either Digital Brush or gauze soaked with water for 2 weeks. 15 days from the initial visit, patients were reevaluated (T1) and the Plaque Index measured again.

**Results.** The Control group was composed of 10 patients with Down Syndrome, including 4 females (40%) and 6 males (60%) with a mean age of 10.6 years. The Test group was composed of 10 patients with Down Syndrome, including 3 females (30%) and 7 males (70%) with a mean age of 9.6 years. In the control group Plaque Index measurements were: IP (T0) =  $2.19 \pm 0.46$  IP (T1) =  $1.84 \pm 0.49$  The changes in plaque index from T0 to T1 was 11.7%. In the study group Plaque Index measurements were: IP (T0) =  $2.2 \pm 0.5$  IP (T1) =  $1.475 \pm 0.49$  The changes in plaque index from T0 to T1 was 24.1%. At time T0 the difference in plaque index between the two groups was not statistically significant ( $p = 0.948$ ), while at time T1 the difference was statistically significant ( $p = 0.019$ ).

**Conclusions.** This study demonstrates how the Digital Brush (Mycerium, SpA, Avegno, Ge), added to the daily oral hygiene procedures, obtains significant improvements in supragingival plaque index in children and adolescents with Down Syndrome. Its efficacy could be ascribed for both the mechanical removal of plaque and for its antiseptic component of chlorhexidine. Further studied with a larger number of included patients and longer follow up are advocated to demonstrate the adjunctive effect of the Digital Brush.





### EFFECTIVENESS OF A NEW CUSTOM MADE HOME MAINTENANCE HYGIENE PROTOCOL

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**Aim.** The aim of this study is comparing the efficacy of two different hygiene protocol: a custom made home care oral hygiene program versus a traditional technique, through the clinical outcomes of the following indexes:

- Plaque Index (PII)
- Bleeding on Probing (BoP)

**Materials and methods.** For this randomized clinical study in two groups, we recruited patients with diagnosis of mild gingivitis, not wearing orthodontic appliances, prosthodontic restorations or implants. Patients in pregnancy, nursing, taking medications or smokers were excluded from the study. All the patients have been observed in two times.

- *Time 0 (baseline).* The following clinical indexes have been recorded in all patients: PII and BoP, using a two-tone plaque detector and a periodontal probe PCP 15 UNC. The values have been noted in their case history. All the patients received ultrasonic scaling with universal tip for supragingival scaling and airpolishing with glycine powder. Collected the clinical indexes, we gave the patients of the test group (G1) instructions about home maintenance according to the new protocol, whereas the patients of the control group (G2) have been asked to adopt a colorimetric method. The patients of the G1 received instructions considering their gingival biotype, presence/absence of diastemas, tooth misalignment, and the clinicians chose both toothbrushes and interproximal brushes for them. To the patients of the G2 was said just to remove plaque where coloured by a plaque detector.
- *Time 1.* After a period from the thirtieth to the thirty-fifth included day, PII and BoP were collected again. We analyzed their positive or negative variation, and compared them with the ones of the baseline.

**Results.** None of the patients dropped out of the study. The patients of the G1 have shown significant improvements of both indexes, compared with the patients of the G2. At baseline PII was comparable in G1 and G2. PII of G1 at T0 was 43%, PII of G2 at T0 was 45%. At the end of the study, PII of G1 was 22%, while PII of G2 was 31%. At baseline BoP of G1 was 38%, BoP of G2 was 37%, while at the end of the study G1's BoP was 15% and G2's BoP was 25%.

**Conclusions.** The results suggest the importance of the personalization of the home care protocol by the clinician, considering all the crucial aspects when cleaning a mouth: gingival biotype, presence absence of diastemas, tooth misalignment. The only plaque removal guided by the plaque discloser is not efficient as a custom made home care oral hygiene protocol.



### EFFECTIVENESS OF A NEW ORAL RINSE WITH CHLORHEXIDINE 0,3%: BLIND STUDY

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**Aim.** To evaluate the efficacy of chlorhexidine 0,3% mouthwash (used in addition to traditional methods of domestic oral hygiene) in the control and the reduction of bleeding and plaque indices, versus a placebo mouthwash.

**Materials and methods.** 15 patients were collected. The order of delivery of mouthwashes was randomized. Clinical procedure is divided in three steps: t0, t1 and t2. At t0 patients are motivated and educated to correct practices of domestic oral hygiene, then checked for plaque and bleeding indices, submitted to professional oral hygiene procedures and detected the dental color by spectrophotometer. After baseline, patients had to rinse for seven days with the first assigned mouthwash then, at t1, were registered new values for plaque and bleeding indices and another dental color. Finally, procedures of tooth polishing were performed and the first mouthwash has been replaced with the second one and used for other seven days, then, at t2, the same indices and the final dental color evaluation were recorded.

**Results.** Data collected were evaluated by T-Test. With regard to dental color, the use of chlorhexidine mouthwash lead to significative changes in dental color parameters, and better values for bleeding and plaque indices. However, dental color changes are only instrumentally evaluable with spectrophotometer.

**Conclusions.** The use of chlorhexidine 0.3% mouthwash should be a useful aid for obtain a better domestic plaque control and for reduce inflammation in periodontal tissues.



### EFFECTIVENESS OF HELBO COMBINED PHOTODYNAMIC THERAPY WITH ULTRASONIC SCALING AND ROOT PLANING IN GENERALIZED AGGRESSIVE PERIODONTITIS TREATMENT

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**Aim.** The purpose of this study is to evaluate the effectiveness of a photodynamic therapy combined with ultrasonic scaling and root planing compared with the ultrasonic debridement alone in generalized aggressive periodontitis treatment.

**Materials and methods.** Seventy patients with diagnosis of generalized aggressive periodontitis were randomized divided into two group (test and control). The patients weren't in pregnancy or nursing, not taking medications, not smokers. At baseline plaque index (PII), probing pocket depth (PPD), and bleeding on probing (BOP) were collected using a plastic periodontal probe. The control group was treated only with ultrasonic scaling and root planing using Mectron's tips S1 (for supragingival scaling) and P10 (for root planing), while the test group received also HELBO photodynamic therapy in addition to the ultrasonic scaling and root planing. We gave oral hygiene instructions for home maintenance, suggesting to brush twice per day for at least two minutes with oscillating rotating mechanical toothbrush and to rinse mouth after brushing with zero alcohol essential oils mouthwash for 30 seconds. PPD, BOP and PI were collected again after two months (T1), six months (T2) and one year (T3). Supragingival scaling was also performed at T2 and T3 combined with glycin powder airpolishing.

**Results.** None of the patients dropped out of the study. At T1 all the indices improved in both groups without differences.

- PII was 20% in the test group and 19% in the control one.
- PPD was £ 4 mm in both groups.
- BoP was 15% in the test group and 17% in the control one.
- At T2 the results gained at T1 in test group were confirmed.
- PII was 22% in the test group and 28% in the control one.
- PPD was £ 4 mm in both groups.
- Bop was 18% in the test group and 24% in the control one.
- At the end of the study there were significant differences in the indices measured. PPD and PI improved in both groups without significant differences, while BoP improved significantly in test group.
- PII was 21% in the test group and 25% in the control one.
- PPD was £ 4 mm in both groups.
- BoP was 18% in the test group and 30% in the control one.

**Conclusions.** The combination of photodynamic therapy with ultrasonic debridement should be considered by the clinician as a more effective protocol in generalized aggressive periodontitis treatment, despite to the ultrasonic debridement alone.



### EFFECTIVENESS OF NEW TIPS FOR IMPLANT CLEANING COMPARED TO TRADITIONAL METHODS FOR IMPLANT MAINTENANCE

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**Aim.** The aim of this study is evaluating effectiveness of new tips for ultrasonic scaler compared to manual debridement with implant curettes in the perimplant treatment in patients with perimplantitis.

**Materials and methods.** Thirty patients with diagnosis of perimplantitis on two different implants located in two different quadrants of the mouth were selected for a split mouth study. The patients weren't in pregnancy or nursing, not taking medications, not smokers. At baseline plaque index (PII), probing pocket depth (PPD), and bleeding on probing (BOP) were collected using a plastic periodontal probe. In each patient a peri implant area (test) was treated with Mectron<sup>®</sup> Implant Cleaning System, consisting of a tipholder ICS and a tip IC1, and the other one (control) with a carbon-fiber reinforced plastic manual instruments for implant deplaqueing. Times of intervention were measured in minutes for both groups. Instructions for home maintenance hygiene protocol were given to all the patients, suggesting to brush twice per day for two minutes at least with an oscillating-rotating mechanical toothbrush and to rinse mouth once per day with a zero alcohol essential oils. After six weeks of treatment (T1) all the clinical indexes were collected again.

**Results.** None of the patients dropped out of the study. At the end of the study there were significant differences in the indices measured. The ultrasonic tips were more efficient than the manual deplaqueur. BoP was largely higher in control group than in the test one, while PPD and PII showed similar values in both groups.

- BoP was 10% in the test group and 17% in the control one.
- PII was 16% in the test group and 18% in the control one.
- PPD was  $\approx$  4 mm in both groups.

Talking about time of intervention, the scores were significantly different. The treatment lasted from 2 to 3 minutes for each implant in the test group, while from 4 to 6 in the control one.

**Conclusions.** Implant treatment is currently considered routine in dentistry, although implant failure represents a difficult challenge for dentists. Having said that, to preserve implant health and to treat initial perimplant lesions with appropriate instruments is crucial, thereby research has provided for innovative tips for implant care. New implant tips offer advantages in treating implant areas with perimplantitis or signs of mucositis. In the light of this, they should be considered for implants treatment in spite of traditional manual deplaqueur.



### EFFECTS OF SONIC AND ULTRASONIC SCALING ON THE MICROLEAKAGE OF TOOTH-COLORED RESTORATIVE MATERIALS

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**Aim.** Poor knowledge is present about effects of periodontal sonic and ultrasonic instrumentation on composite resin restoration margins. The aim of this study was to evaluate the influence of sonic and ultrasonic scaling on microleakage of tooth-colored restorative materials.

**Materials and methods.** 18 mandibular molars, extracted for periodontal reasons, were selected for this study. A total of 36 class II cavities were prepared: 18 with the cervical margin 1mm above the CEJ; 18 with the cervical margin 1 mm under the CEJ. After adhesive procedures with a one-step adhesive system (Xeno V, Dentsply), cavities were divided according to the restoration material. Subgroup 1 (n=9) was treated with 1mm of horizontal layer flowable composite (Venus Diamond Flow, Heraeus Kulzer) and subsequent oblique layers of nanoybrid composite (Venus Diamond, Heraeus Kulzer); subgroup 2 (n=9) was treated with oblique layers of nanoybrid composite (Venus Diamond, Heraeus Kulzer). After finishing and polishing procedures, all filled cavities were divided in six subgroups (n=6) according to the periodontal debridement technique employed: 1, flow + composite + ultrasonic scaling; 2, flow + composite + sonic scaling; 3, composite + ultrasonic scaling; 4 composite + sonic scaling; 5, flow + composite; 6, composite. Sonic and Ultrasonic scaling was performed under a calibrated load of 100 g at a constant speed for 5 minutes on each tooth-restoration surface. Samples were immersed in methylene blue for 30minutes and subsequently were washed under running water for 10 minutes. The specimens were sectioned, observed under stereomicroscope at 40x magnification and a 0 to 3 score was given. The microleakage values were statistically analysed using one-way ANOVA test and Bonferroni test as needed.

**Results.** The statistical analysis did not show any significant differences between groups. Both sonic and ultrasonic instrumentation did not increase microleakage along restoration margins, either above either under the CEJ.

**Conclusions.** Within the limitations of an in vitro study we can affirm that the use of sonic or ultrasonic scaling do not influenced the microleakage at enamel- and dentin-composite interface, either with or without flowable material. Further studies on artificial aged samples and on the effect of scaling and root planing on composite restoration microleakage are necessary.



## EFFICACY OF NON-SURGICAL PERIODONTAL THERAPY IN REDUCING PERIODONTAL INDEXES IN KIDNEY-TRANSPLANT PATIENTS

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**Aim.** Kidney transplant patient must take cyclosporine-A and calcium channel blockers chronically. Both medicines involve a gingival overgrowth (G.O.) as a collateral effect and this is due to their dosage: it appears 1-3 months after the beginning of the therapy. The prevalence of the G.O. is 84%. The G.O. originates from anterior interdental papilla and it appears as a red and soft tumefaction, that becomes more fibrous as time goes by. The G.O. takes place in apical-coronal verse and also in vestibular-lingual verse and it looks like a gingival hypertrophy and hyperplasia, which is due to an abnormal increase of the number of fibroblasts into gingival connective tissue. The G.O. involves a great aggregation of extracellular Matrix, or less degradation of it, or both these processes simultaneously. The G.O. leads to the formation of pseudopockets, which interfere with the correct oral hygiene practices. This condition gives rise to mature plaque retention, that leads to infection, inflammation and the increase of the G.O. This condition becomes worse because of bad pre-transplant oral hygiene state. The aim of this study is to estimate the efficacy of non-surgical periodontal therapy in reducing the G.O. in kidney-transplant patient.

**Materials and methods.** A sample of 32 simple random kidney transplant subjects was enrolled in this study (mean age: 58,44; range: 33-81, 21 m., 11f.). All of them were taking cyclosporine A and calcium channel blockers. Patients taking idantoin, pregnant women, patients suffering from diabetes mellitus or people who have undergone gingival surgery were excluded. The study started on November 2012 and finished on September 2013. Periodontal indexes and professional oral hygiene practices were performed by the same dental hygienist. The plaque, calculus, bleeding, G.O. and probing depth indexes were evaluated at T0, T1, T2, T3 (at 0, 2, 4, 6 months respectively). Every time the same oral hygiene protocol was applied: non-surgical periodontal therapy with ultrasonic instruments above and below the gum.

**Results.** 787 teeth analysed and 4722 periodontal sites probed. Plaque index (PI), calculus index (CI) and bleeding index (BoP) show significant statistical reduction ( $p < 0,0001$ ). T-test was used for statistic analysis. PI at T0=82,09%, at T3=29,89%/ CI at T0=53,44%, at T3=23,70%/ BoP at T0=71,98%, at T3=26,18%. Probing depth (PD), at six-monthly control, shows a significant statistical reduction ( $p < 0,0001$ ). PD 1-3 mm at T0=16,58%, at T3=30,45%. PD 4-6mm at T0=74,06%, at T3=64,70%. PD 7-9 mm at T0=9,36%, at T3=4,85%. G.O. At T0=54,93%, at T3=44,98%, with a significant statistical reduction ( $p < 0,0001$ ).

**Conclusions.** The applied oral hygiene protocol is simple but effective in reducing drug-induced gingival overgrowth in kidney-transplant patient taking Cyclosporine-A. These clinic results assure a better oral health, improving the quality of life from an aesthetic and functional point of view.



## EFFICACY OF PROFESSIONAL ORAL HYGIENE AND MUCOSAMIN® SPRAY FOR SYMPTOMATIC TREATMENT OF MUCOSITIS IN PATIENTS DURING HEMATOPOIETIC STEM CELL TRANSPLANT: A CASE CONTROL STUDY

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**Aim.** The aim of this study is to evaluate the importance of professional oral hygiene and the efficacy of Mucosamin® spray (Sh-AAAs) a spray preparation containing sodium hyaluronate (1.33%) and synthetic amino acids precursors of collagen including L-Proline (0.75%), L-Leucine (0.15%), L-Lysine (0.1%) and glycine (1%) in healing oral lesions and to manage pain caused by oral mucositis, which is a complication that frequently occurs when patients are submitted to the conditioning regimen before the hematopoietic stem cell transplant (HSCT).

**Materials and methods.** 68 patients were enrolled, all hospitalized before HSCT in the Department of Hematology, and randomized in two groups:

- Case group: patients were visited before HSCT at the Oral Surgery Department, underwent a professional oral hygiene, educated and motivated to oral hygiene procedures, informed and instructed in the use of Mucosamin, to be used since the early days of the conditioning regimen.
- Control group: they were directly recruited in the Department of Hematology, among patients not visited before. The mucositis treatment for them was Hydrochloride benzydamine rinses.

Both case and control group were visited during four weeks after the conditioning regimen and an assessment of mucositis and its symptoms was made with rating scales (VSN, WHO, and OMAS). Mucositis lesions were investigated both in extension and diffusion in the oral cavity, and each lesion was classified according to the severity as pseudomembranous, erythema and ulceration lesion.

**Results.** Our data show that the prevalence and severity of general mucositis increases as consequence of increase in time passed since the last professional oral hygiene. Control group patients have maximum mucositis score, independently from the last hygiene, and some have a maximum mucositis score even though they have undergone hygiene recently. However, Case patients have on average less severe scores of mucositis and show maximum values of severe mucositis only if they did oral hygiene a very long time before HSCT. About type and severity of individual mucositis lesions in oral cavity, it is possible to observe how Control patients showed very high number and severity of lesions, all "erythema" or "ulceration", the most severe and painful, while Case patients never had more than 65% of incidence of the most severe forms in every oral site.

**Conclusions.** It can be said that the Mucosamin, can reduce the occurrence of mucositis, influencing the type and severity of the single lesion. This because it has an important role in tissue repair through the activation and modulation of inflammatory responses and the promotion of cell proliferation and cell migration, angiogenesis, re-epithelialization of the increase of the basal keratinocytes and the deposition of collagen. This significantly improves the quality of life of the patient. The study also showed that the combination of a recent professional oral hygiene, a proper oral hygiene done by the patient during hospitalization and the use of Mucosamin, could reduce the severity/duration of mucositis, especially in painful symptoms and in patient discomfort. The results regarding the correlation between good oral hygiene and the improvement of this severe and frequent complication corroborate the importance of the role of the dental hygienist and confirm the necessity of creating a hematologist-dentist-hygienist team to manage the complications of the oral cavity during HSCT.



## EVALUATION OF CLEANING EFFICACY BETWEEN INTERDENTAL BRUSH AND INTERDENTAL FLOSS

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**Aim.** The aim of this study is to analyze and study the difference in cleaning efficacy between interdental brush and interdental floss and to verify if this depends on the received knowledges of dental hygiene.

**Materials and methods.** Six human teeth were used to create three different sizes of interdental space (small, medium and large). Teeth were fixed pairwise in a socket using a split cast to allow removal and replacement in a reproducible manner. Two groups have been formed, "experts" and "non-experts", the first includes students in dentistry and student in dental hygiene. Each group has simulated the cleaning of interproximal space for ten times, both with the interdental brush and interdental floss, applying at the beginning of each test, a new layer of dye coating. To obtain a valid comparison, a series of photos of interdental face were taken at baseline and after finishing the cleaning procedure. In the pictures was evidenced only the area of our interest, then using a special software we did the pixel count of the cleaned area.

**Results.** In term of cleaning efficacy the comparison between interdental floss and interdental brushes shows that in all three interdental spaces we get more cleaning surface using the interdental brushes.

The median value calculated for the large, medium and small space is 0.39, 0.41, 0.58 for the floss and 0.69, 0.65, 0.69 for the brush. The result of the study in operator influence using the floss are in favor of experienced operators (median is 0.48 in large space, 0.50 in medium space and 0.64 in small space), in contrast with non-experienced operators (median is 0.30 in large space, 0.33 in medium space and 0.57 in small space). A similar result was observed with the use of interdental brush. The experienced operators obtain a higher cleaning rate with a median of 0.71 in large interdental space, 0.70 in medium space and 0.73 in small space, while the non experienced operators get a median of 0.67, 0.64 and 0.68 respectively.

**Conclusions.** The results show that the interdental brush ensure a better interdental cleaning but, as the interdental space reduce, the difference between the two instruments is less remarkable. The second part of this study show that having greater mastery of these tools lead to a better cleaning, because of that it is important to instruct the patient step by step. Finally, the data collected shows that the brush used for the large and small interdental space reaches an higher cleaning level if compared with the cleaning obtained by the medium interdental brush in the same interdental space. For this reason it is very important to search the most appropriate measure for the interproximal area, paying more attention to this surface if it is located in an intermediate range of dimensions.





## EVALUATION OF SUPPORTIVE PERIODONTAL THERAPY IN A 'WELL MAINTAINED' POPULATION AFTER 9 YEARS: CLINICAL AND STATISTICAL RESULTS

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**Aim.** The supportive periodontal therapy (SPT) is a continuing diagnostic monitoring of patients, aimed at stopping the disease with therapeutic interventions adapted to the individual needs of patients. Pioneering oral health professionals believed that hard and soft deposits on the teeth somehow caused periodontal disease and their removal by the operator followed by oral hygiene by the patients were the most important measures for treatment. Active periodontal treatment (APT) by scaling and root planing, respective procedures, and oral hygiene measures, although slowing down the progression of disease, is of little value in terms of maintaining periodontal health. However, when combined with a program of periodic maintenance, it may lead to better periodontal health and prognosis. The aim of this study was to investigate the survival rates and possible risk factors associated with tooth loss and progression of periodontitis in patients undergoing supportive periodontal therapy (SPT).

**Materials and methods.** In this retrospective cohort, 17 patients (10 women and 7 men), ranging from 30 to 67 years old, 9 were smokers, were examined after active periodontal therapy (APT) and supportive periodontal therapy (SPT). The maintenance protocol includes a frequency of three/four recalls every year. The periodontal health reevaluation was made through the assessments of clinical and radiographic parameters, and each tooth was given a diagnostic individual score, in accordance with AAP criteria. Medical records, periodontal charts and radiographic examinations of each patient catalogued the number of lost teeth and their features.

**Results.** Patients were subjected to supportive periodontal therapy (SPT) for an average period of nine years. At the beginning of the protocol, a total of 399 teeth was recorded. At the start of SPT 12 teeth (3%) presented a slight periodontal compromise, 345 (86.5%) and 42 (10.5%) a medium and grave level. At the reevaluation, the extraction of 12 teeth was observed, giving a total survival rate of 96.3%. Of these, the percentage of teeth removed due to periodontal disease recurrences was 27%, while 73% was removed due to conservative, endodontic and prosthetic complications. The main factors associated with tooth loss during SPT were: SPT duration period (OR: 24x); presence of high values of %BoP (OR: 13x); male gender (OR: 10x); beginning of SPT after 55 years old (OR: 6.7x); high risk levels registered according to PRA (OR: 6x); presence of more than nine periodontal sockets (OR: 6x); smoking habits (OR: 3.7x).

**Conclusions.** The supportive periodontal therapy (SPT) is a primary factor in preventing the progression of periodontal diseases. Within the limits of this study, results have shown that an adequately performed SPT can be determinant for tooth preservation in periodontally compromised patients.



### INFLUENCE OF SURFACE COATING ON STAINING SUSCEPTIBILITY AND SURFACE ROUGHNESS OF ESTHETIC COMPOSITE RESIN MATERIALS

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**Aim.** Surface coating sealer are resin materials that could be applied on composite restorations after annual professional hygiene procedures to provide composite restoration seal and protection. The aim of this in vitro study was to evaluate the influence of surface coating on color stability and surface roughness of composite resin materials when exposed to several staining agents. The hypothesis is that surface coating sealer reduces color change and roughness of nanofilled composites.

**Materials and methods.** Pressed 2mm thick disk-shaped specimens were prepared with eight different composites: Venus Pearl (Heraeus Kulzer), Venus Diamond (Heraeus Kulzer), Clearfil Majesty (Kuraray), Filtek Supreme XTE (3M ESPE), Gradia (GC), Adonis (Sweden&Martina), Tetric (Ivoclar), GC Calore (GC). Each specimen was finished and polished and one-side was coated with a surface coating sealer (BisCover, Bisco, USA). The initial color of each specimen's side (with and without surface coating layer) was assessed by a calibrated reflectance spectrophotometer (SpectroShade, MHT) either on black either on white background and the surface roughness (Ra) was assessed using a RT-70profilometer with a 5µm Diamond stylus. After seven days, the specimens were placed into six different staining solutions: coffee, tea, red wine, orange juice, coca-cola and water. L\*a\*b\* scores, which determined the color changes, and surface roughness were calculated at 0, 1, 7, 30, 90, 180 days. The differences among coated and polished composites surfaces for each staining solution were statistically analyzed using ANOVA and Student-Newman-Keuls post-hoc tests ( $p < 0.05$ ).

**Results.** The presence of a surface coating sealer significantly influenced ( $p < 0.0001$ ) both color changes and roughness of all tested composites after immersion in staining solutions. Coca-Cola and Orange Juice significantly increased composite roughness than other solutions, after 30 days of immersion. Red Wine and Tea significantly increased color change than other solutions, after 7 days of immersion.

**Conclusions.** The null hypothesis is accepted since surface coating sealer do prevent composite surface from color change and roughness increase after immersion in several staining solutions. Color changes can be observed after 7 days of immersion when surface sealer is not employed. Further studies on the effect of daily brushing on long-term protective effect on composite materials provided by surface coating sealers must be performed.



## LEVELS OF HbA1c IN TYPE 2 DIABETES PATIENTS EXPOSED TO NON SURGICAL CAUSAL THERAPY

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**Aim.** The aim of our study is to demonstrate that in diabetic patients entered into a protocol of hygiene and prevention there is an improvement of the state of periodontal health than optimal levels of circulating HbA1c. The HbA1c value is more stable than glucose because it can vary from minute to minute, while HbA1c refers to the 3 months prior to sampling. Diabetic patients, as amply demonstrated in the literature, this proportion two and half times higher than the onset of periodontal disease compared with metabolically healthy subjects. Periodontitis is an inflammatory disease that destroys the supporting structures of the tooth. Emerging evidence suggests that periodontal disease may affect your blood sugar is that increase the risk of developing diabetes. At the Department of Diabetology of the hospital Pio Albergo Trivulzio in Milan was implemented a standardized protocol including the development of periodontal disease prevention, causal therapies and non-surgical periodontal therapy support to improve and/or maintain optimal levels of HbA1c.

**Materials and methods.** At the Department of Diabetology of the hospital Pio Albergo Trivulzio in Milan were selected 10 patients with age range between 45 and 70 years in which it was implemented a standardized protocol to prevent the development of periodontal disease, causal therapies and non-surgical therapies of periodontal support in order to improve and/or maintain optimal levels of HbA1c. The patients performed a first visit. Were taken into consideration: plaque index, bleeding index, tooth mobility, probing depth and possible loss of attachment, involvement of the furcation and the initial value of HbA1c. The patients selected were performed supragingival and subgingival scaling, scaling and root planning, polishing, removal and restoration restorations incongruous and/or overflowing. Each patient was then placed in a maintenance program in order to preserve the periodontal structures and submitted to a new control of HbA1c levels for the purpose of a careful assessment of a possible improvement.

**Results.** At the moment we are not yet in possession of the actual data, because the values of HbA1c should be re-evaluated after 3 months treatment. In this period of time in the group of patients examined we found improvements in periodontal health (reduction of plaque and bleeding indices, probing depth reduction). Associated with the improvement of periodontal indices has also found an improvement although not significant glucose values reported by patients themselves.

**Conclusions.** Not yet in possession of the data from our study we cannot evaluate the direct effect of periodontal treatment on HbA1c levels. The improvement is not significant, blood glucose has been reported in other studies in the literature. The fluctuation of blood glucose levels and self-assessment during the same day were seen as possible bias and this was preferred dose glycosylated hemoglobin. A review of the emerging literature conflicting results on the actual effectiveness of the treatments on the reduction of HbA1c. According to the meta-analysis of clinical trials as a result of periodontal therapy was observed a decrease of 0.66% in HbA1c.



## METALLOPROTEINASES IN CREVICULAR FLUID: EVALUATION OF CONCENTRATION CHANGES AFTER NONSURGICAL TREATMENT OF CLASS II AND III FURCATION DEFECTS

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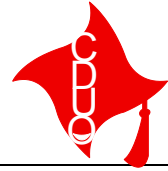
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**Aim.** Non-surgical periodontal therapy in furcation areas of molars is arduous and can rarely remove subgingival plaque and calculus completely. Thorough cleansing of these critical areas is a key factor for the maintenance of multi-rooted teeth of periodontally compromised patients. In presence of periodontal inflammation, increased levels of metalloproteinases 2 (MMP-2) and 9 (MMP-9) have been found in the crevicular fluid. It has been shown that an effective periodontal treatment reduces the levels of these enzymes. The aim of this preliminary work was to assess the effectiveness of modified ultrasonic inserts for the instrumentation of class II and III furcation defects in mandibular molars considering MMP-2 and MMP-9 as biomarkers of active periodontal disease.

**Materials and methods.** Eighteen patients (7 males and 11 females, aged between 40 and 70 years) with a mandibular molar presenting a class II or III furcation defect were enrolled. At baseline, the following periodontal indices were registered using PCP12 and Nabers probes: plaque index (PI), bleeding on probing (BoP), probing pocket depth (PPD), clinical attachment level (CAL). After preliminary intraoral radiographic examination, samples of gingival crevicular fluid of selected teeth were taken by means of Periopaper (Oraflow). Quantification of MMP-2 and MMP-9 levels in crevicular fluid was performed using the QuantiSir General Knockdown Quantification Kit (Epigentek). The optical density absorbance value of each sample was read on a Minireader (Biorad) at 450 nm and the amount of MMP-2 and MMP-9 (ng/ $\mu$ L) were calculated from the standard curve using purified MMP-2 and MMP-9 enzymes. Patients were randomly assigned either to a group treated with PFL, PFR, PFU Slimline inserts mounted on a Satelec Suprasson p5 newtron unit (G1, n=9) or with standard tips (G2, n=9). Patients were recalled after 45 days for periodontal indices reevaluation and samples of crevicular fluid were collected again to determine variations of MMP levels. Collected data were statistically analyzed with dependent and independent samples t-tests ( $p < 0.05$ ).

**Results.** At recall, an improvement of all considered periodontal indices was observable, although there were no statistically significant differences between the two groups. The concentration of MMPs was found to be significantly decreased after 45 days in both groups ( $p < 0.01$ ). In G1, the values of MMP-2 dropped from  $10.44 \pm 1.13$  to  $4.84 \pm 0.63$  ng/ $\mu$ L and MMP-9 from  $5.40 \pm 1.26$  to  $3.22 \pm 0.58$  ng/ $\mu$ L; in G2, MMP2 concentration diminished from  $11.35 \pm 0.85$  to  $4.79 \pm 0.71$  ng/ $\mu$ L and MMP-9 from  $5.04 \pm 1.32$  to  $2.57 \pm 0.63$  ng/ $\mu$ L. Differences in terms of MMP concentration between groups were not statistically significant.

**Conclusions.** The use of the different types of ultrasonic inserts caused similar decrement of MMP-2 and MMP-9 concentration in crevicular fluid. The improvement of all analyzed periodontal indices and the values of MMP-2 and MMP-9 at the 45th day are likely expression of a reduction of the periodontal tissues inflammation. Our work suggests that similarly effective treatment can be performed with standard inserts and with tips dedicated to the debridement of furcation lesions.



### MONTESSORI METHOD AND ORAL HYGIENE DURING SCHOOL AGE

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**Aim.** In an increasing multiethnic society, a preventive intervention on oral hygiene in elementary schools is necessary, that should not only be based solely on verbal communication, but on the stimulation of the receptor activity of senses.

**Materials and methods.** At the elementary schools of the Milanese hinterland, a pilot study intervention has been carried out with the purpose of educating 10 children, aged between 5 years and 10 years, with a proper oral hygiene, making a preliminary visit of the oral cavity and later through the creation of a "circuit - game" relying on the Montessori M. method. At the same time children were asked to realize the tools needed to learning of correct oral hygiene at home, with materials of everyday life (cardboard, plastic, Play Doh (Hasbro), watercolors, scissors, glue, etc...):

- Play Doh (Hasbro) model of the mouth, useful to understand the anatomy of the oral cavity and the use of mechanical aids for the oral hygiene;
- Colored card, with the creation of a silhouette of the same shape of the tooth explaining the structure of the single dental element;
- "Healthy apple and decayed apple" to learn about carious formation processes;
- Collage of healthy foods and tools to proper oral hygiene around a cardboard silhouette named: tooth "smile";
- Collage of potentially cariogenic foods images and tools that are not suitable for proper oral hygiene around a cardboard silhouette named: tooth "sad";
- Silhouette plasticized shaped tooth that will be soiled with watercolors by children, and the same time children will remove the "spots" with a toothbrush and mimicking the movements of the Bass modified brushing technique;
- Pupils have been divided into two groups, each one had to depict on billboards a healthy tooth and carious one, to connect words with mental association, and later to proceed to the creation of a song or rhyme that contains them all;
- Sensory responses caused by interaction with toothpaste Has been analyzes;
- Creation of memory cards in order to assess the cognitive development as a result of the proposed learning games;
- Creating an hourglass, that with a song, remember the necessary time for their oral hygiene;
- Creation of a "book - brush" in rhyme and with drawings of some simple rules to remember.

**Results.** During the study, it was found much interest and enthusiasm in the "learn to play the oral hygiene", in addition, a subsequent reevaluation were found improvements in the maintenance of oral hygiene of children subjected to the above submission and a perception positive to the professionals working in the dental field.

**Conclusions.** There is currently no scientific evidence that lead to the effectiveness of prevention intervention on oral hygiene in elementary schools. An analysis of the scientific literature revealed a study of 85 Montessori American schools, relevant improvements were found in learning tough failing to statistically validate these results.



### MORPHOLOGICAL AND CHEMICAL CHARACTERISTICS OF DIFFERENT TITANIUM SURFACES TREATED BY BICARBONATE AND GLYCINE POWDER AIR ABRASIVE SYSTEMS

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**Aim.** The aim of this in vitro study was to investigate possible morphological and chemical changes induced by air polishing using glycine powder or sodium bicarbonate powder on machined and acid-etched titanium surfaces.

**Materials and methods.** Two types of healing abutments made of commercially pure titanium (grade IV) were used: 2 machined abutments ( $Ra = 0.0263 \pm 0.0036$ ) and 2 acid-etched healing abutments ( $Ra = 0.489 \pm 0.079$ ). Two abutments (one machined and one acid-etched) underwent air polishing using glycine powder. Two abutments (one machined and one acid-etched) underwent air polishing using sodium bicarbonate powder. The powders tested were glycine powder with granulometry  $<65 \mu m$ , and sodium bicarbonate powder with a granulometry  $<150 \mu m$  (Mectron S.p.A., Carasco, Italy). The air-polishing device was permanently fixed at a constant distance of 5 mm from the center of the healing abutment surface with an inclination of  $60^\circ$ . The healing abutments were characterized by scanning electron microscopy (SEM) coupled with energy dispersive X ray spectroscopy (EDXS) at differing steps: 1) as received (right after opening their packaging); 2) after 20 minutes air exposure; 3) after aging in artificial saliva; 4) after air polishing with glycine powder or sodium bicarbonate powder for 5 sec; 5) after repetition of steps 3 and 4 with longer time of treatment (20 sec of air polishing).

**Results.** SEM observations did not reveal any change in the morphological characteristics of titanium surfaces either using glycine or bicarbonate powder. EDX analysis demonstrated a greater quantity of carbon on abutments treated with sodium bicarbonate and a greater amount of silicon on abutments treated with glycine. After immersion in artificial saliva, abutments treated with sodium bicarbonate showed a greater amount of salts on their surface. Greater oxidation and more salts were visible on acid-etched surfaces compared with machined ones.

**Conclusions.** Air polishing using glycine and sodium bicarbonate powder appeared to be a safe system for professional oral hygiene of titanium dental implants with both machined and acid-etched surfaces, although acid-etched abutments and abutments treated with bicarbonate harbored more salts. More studies are needed to evaluate the clinical significance of the present results.



#### MULTIDISCIPLINARY APPROACH IN THE MANAGEMENT OF THE DOWN PATIENT

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Division of Paediatric Dentistry (Prof. A. Polimeni – Prof. Gian Luca Sfasciotti)

**Aim.** The aim of our work is to analyze the characteristics of Stomatology present in patients with Down syndrome and find an appropriate therapeutic approach. Down syndrome is caused by the presence of a third copy of chromosome 21 or a part of it.

This syndrome is due to a meiotic event NOT – disjunctional during meiosis I.

Since the birth, in people affected by Down syndrome, we can find many features in Dentistry:

- difficulty in sucking, swallowing, talking and chewing; due to a significant oro-facial hypotonia;
- relative macroglossia: the volume of the tongue seems to be increased to a reduced size of the oral cavity;
- atypical swallowing;
- occlusion problems;
- morphological alteration of dental crowns (presence of conic elements);

Is also usual, the presence of dental Agenesis and periodontal diseases, especially gravating on the anterior-inferior areas.

**Materials and methods.** First, before proceeding with the visit, each patient prepared a dedicated medical record, containing not only the data of the patient and their relatives/tutors, but also all the essential information associated with the syndrome, affecting the oral cavity but also the stages of development and systemic aspects. In the first visit was performed Anamnestic Survey, the Clinical Examination, where the patient's cooperation, closely related to mental retardation present in all individuals with Down syndrome, had permitted it, and finally the acknowledgment of radiographic Examinations, if it were possible to run them. In the second phase, the treatment implemented was closely correlated with the degree of cooperation of the patient:

- Patient fully cooperative: Ablation, the survey was carried out to assess the presence of periodontal pockets and their severity, if necessary following is performed curettage and Root Planing, in case of Agenesis of permanent molars and premolars were made Sealing grooves of deciduous teeth, in order to reduce the risk of caries lesions. Frequency of references: 4 months.
- Patient partially cooperative: it was performed removing soft and hard deposits whenever possible by mechanical means such as Ultrasonic Piezo Scaler, or with manual instrumentation. Frequency of references: 2-4 months.
- Patient uncooperative in this case the right approach is critical not only to the patient but also with their families/carers, which will therefore be entrusted with the important task of oral hygiene at home, in dental Surgery is done to the patient to become familiar with the surroundings, with the dental chair and step by step with all the dental instruments. Frequency of calls: 1 month, to keep alive the memory of the positive experience in patient experienced in the surgery.

**Results.** Looking through the constancy and accuracy Operating Protocol and establishing a relationship with the patient confidence in a clear environment, in which stress decreases drastically, you are having good results in the maintenance of good oral hygiene, reducing the onset of carious lesions and regression of Periodontal Disease, What uncooperative subjects that we consider satisfactory the result is their approach to medical environment with greater serenity and improving their oral hygiene.

**Conclusions.** In individuals with Down Syndrome Prevention is an essential tool in our possession to maintain and promote the health of the oral cavity, already packed with features that restrict and hinder the everyday powerfully in these subjects.



### OCCLUSION OF DENTINAL TUBULES BY A RECENT CALCIUM PHOSPHATE-BASED IN-OFFICE DESENSITIZER

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**Aim.** Dentinal hypersensitivity is a painful clinical condition affecting 8-57% of the adult population correlated to the exposure of dentin surface. Dentinal hypersensitivity is characterized by pain provoked by tubular fluid movement inside open tubules exposed to the oral environment. The tubule occlusion is a method of dentin desensitization. The aim of the study was to test the ability of a recent calcium phosphate containing treatment for dentinal hypersensitivity to occlude the exposed open tubules of dentin surface (Brännström et al. *Int Dent J* 1972;22:219-27; Sauro et al. *Arch Oral Biol* 2006;51:655-64; Gandolfi et al. *Arch Oral Biol* 2012;57:1054-61).

**Materials and methods.** Dentin slices (0.9±0.1 thick) and crown segments (1.5±0.3 cm thick) were prepared from erupted caries-free human third molars.

TEETHMATE™ DESENSITIZER (Kuraray Noritake Dental Inc., Okayama, Japan) was prepared by mixing the mineral powder (tetracalcium phosphate and dicalcium phosphate anhydrous) with the liquid (water and preservative). The suspension was applied for 45 seconds on the EDTA-treated coronal dentin surface, left in place for 30 seconds and then gently rinsed. ESEM-EDX (Environmental Scanning Electron Microscope with Energy Dispersive X-ray) was used to perform the morphological analyses and the microchemical characterization of the freshly mixed material and of the dentin surface (tubules occlusion and mineral deposition) after 1-day soaking in simulated body fluid (Hank's Balanced Salt Solution, HBSS) at 37°C.

**Results.** ESEM-EDX data of the freshly prepared TEETHMATE showed a crystal-based material composed of 1-5 micron nanocrystals. EDX analysis detected C (2.63 wt%), O (51.64 wt%), Na (8.91 wt%), Si (1.07 wt%), P (15.82 wt%) and Ca (19.94 wt%) elements. Ca/P atomic ratio was approx. 0.98. Morphological analyses of TEETHMATE-treated dentin after 24-hour in HBSS showed the presence of irregular precipitates on the surface and in the dentinal tubules. Microchemical EDX revealed C (5.21 wt%), O (45.85 wt%), Na (1.00 wt%), Si (0.37 wt%), P (17.16 wt%), Ca (28.64 wt%), Mg (0.71 wt%) and Cl (1.07 wt%) elements. Ca/P molar ratio was 1.29. No calcium phosphate deposits were found on EDTA-treated control dentin soaked in HBSS and Ca/P molar ratio was 1.50.

**Conclusions.** The application of TEETHMATE DESENSITIZER creates a layer calcium phosphate deposits on the dentin surface and favours the remineralization through the nucleation of new calcium phosphate when in contact with simulated body fluid (Gandolfi et al. *Dent Mater* 2011;27:1055-69; Gandolfi et al. *J Biomed Mater Res B* 2013;101B:1107-23). Therefore the treatment can reduce the fluid flow through the dentinal tubules and enable a rapid relief towards dentinal hypersensitivity pain.





## ORAL HEALTH IN CANCER PATIENTS: IS IT POSSIBLE TO OBTAIN A SATISFACTORY COMPLIANCE?

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**Aim.** The occurrence of oral complications in patients undergoing cancer therapies is universally recognized and widely demonstrated. A scrupulous oral hygiene seems to be linked to lower incidence and severity of oral side effects, above all oral mucositis, xerostomia and dental disease. The aim of the present work was to confirm the crucial role of the dental hygienist among the multidisciplinary team involved in the management of oncological patients. At the diagnosis of a malignancy, the patients' energies and thoughts are entirely absorbed causing the onset of a psychological and emotional condition called distress, related to issues such as uncertainty with adjusting their life beyond cancer and fear of recurrence. These leads to depression, self-neglect and diminished self-care, including reduced interest in maintain a good oral hygiene. Through constant instruction and monitoring of oncological patients, before, during and after the starting on cancer treatments, we have evaluated if the severity of direct and indirect stomato-toxicity related to these therapies could be reduced or even eliminated.

**Materials and methods.** 21 patients affected by malignancies of various type, were enrolled in the present study. Sample was composed of 11 men and 10 women aged  $60.0 \pm 10.9$ . During the first visit, all patients were subjected to a complete dental examination, performed by an oral pathologist. During a second examination, the dental hygienist assessed bleeding on probing (BOP), plaque index (PI) and periodontal screening and recording (PSR). This session also allowed operators to instruct patients to proper and personalized oral hygiene procedures. All patients were than inserted in a monthly recall schedule. During follow-ups the dental hygienist, not only monitored the trend of patients' compliance, but also visual analogue scale (VAS) and the occurrence of oral complications, such as oral mucositis, xerostomia, dysgeusia and dysphagia. At the end of patients' oncological therapies, the distress was assessed using the distress thermometer.

**Results.** All patients showed a marked improvement in maintaining a correct oral hygiene. Specifically, the improvement of plaque index during each follow up recall was the most important registered outcome, according to the Wilcoxon test ( $p=0.000$ ). Moreover, patients' compliance after instruction and motivation was excellent, since all patients followed scheduled correctly, as well as they adhered to therapies assigned. In addition, oral side effects were limited.

Surprisingly, a high level of distress, corresponded to high adherence to therapies and to follow up recalls, together with evident improvement of all parameters considered.

**Conclusions.** Although a limited number of patients were included in the present study, important issues and hypotheses can emerge. First, the crucial role of the dental hygienist in the oncological team, second the necessity of managing the oral status of oncological patients. Even if oncological patients are often thought to be not compliant and difficult to treat, we have demonstrated that, if correctly supported, patients understand the importance of maintaining a proper oral care and not to underestimate the onset of complications. In conclusion, the dental hygienist becomes an empathic figure and an additional reference point and support in the multidisciplinary team.



#### ORAL HYGIENE ASSESSMENT IN NON COLLABORATIVE HCP PATIENTS

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**Aim.** The aim of this study is to evaluate the efficacy of an oral hygiene treatment protocol in disabled patients treated with dental implants

**Materials and methods.** 8 disabled patients (Spastic Tetraparesis, Down Syndrome, Debilitating tumors, glucoside body disease) were treated with 25 implants supporting 5 dental crowns, 4 overdentures and 3 All-on-Four™. Patients were visited in order to record: Plaque Index (Silness and Loe), FMBS (Full Mouth Bleeding Score), PD (Probing Depth), Gingival Recessions, Implant mobility and the presence of keratinized mucosa around implants. During the first visit a questionnaire was given to the patients to assess the oral hygiene habits together with an interproximal hygiene aid (interdental brush with a "screw" section or Implant-floss) and his own information brochure. Patients were recalled at 15 and 45 days. In the second follow-up the use of a 0.2% Chlorhexidine mouthwash was recommended at least 1 time a day for 15 days. At each follow-up a non-surgical therapy was performed using a 12mm North Carolina plastic probe and Universal Columbia Plasteel® curette in order to remove plaque and tartar deposits.

**Results.** Mean Plaque Index decreased from 1,85 (SD 0,73) to 0,78 (SD 0,72). Mean FMBS decreased from 36% (SD 0,3) to 6,6% (SD 0,1). Mean PD of the implants was 4,80 (SD 2,4) mm at the beginning of the protocol and decreased to 4,15 mm (SD 3,0). Suitable keratinized mucosa was detected in only five patients with an average of 4.93 mm. Implant Mobility and Gingival recession remained at initials values. The questionnaire founds that about 50% of patients brushes the teeth 3 times a day, 37.5 % of the patients brushes teeth at least 2 minutes each time, 75% undergoes annual oral hygiene visit, 50% uses a correct brushing technique and about 75% is autonomous in oral hygiene procedures.

**Conclusions.** Oral hygiene protocol was efficient in improving the oral health in non collaborative patients. Implants don't represent a negative risk factor in oral hygiene maintenance in this kind of patients. Most of the patients does not have a good oral hygiene habits, therefore is mandatory to improve their oral hygiene knowledge and technique in order to reach a better quality of life.



## ORAL HYGIENE IN PATIENTS IN A VEGETATIVE STATE WITH CONSEQUENT PROBLEMS OF DYSPHAGIA

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**Aim.** The aim of this study is to demonstrate how oral hygiene is essential in helping to maintain good systemic health in patients in a vegetative state with associated dysphagic complications. The above mentioned complications are often due to the type of nutrition. Patients are fed through a Percutaneous endoscopic gastrostomy (PEG Enteral Nutrition). This type of alimentation increases the risk, both of regurgitation, and, consequently, of oropharyngeal colonization by potentially pathogenic microorganisms that increase the bacterial load, not only in our district. Bacteria mostly found were: *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Enterobacteriaceae*.

**Materials and methods.** In the ASP Pio Albergo Trivulzio in Milan, thanks to the Interdisciplinary work among the Speech Therapist and Hygienist, Oral Hygiene's protocols were proposed; with the use of brushes of various sizes, electric toothbrushes, gauze soaked in chlorhexidine, mouthwashes disinfectants and antibacterial, opener of various sizes, stretching maneuvers muscle of the masticatory muscles in eight patients. Have also been undertaken with careful maneuvering of causal therapies tartar removal through manual instrumentation, following antibiotic prophylaxis. Thanks to the collaboration with the Speech Therapist Dr. Elisabetta Cattaneo, speech therapist maneuvers were undertaken to restore a functionally correct and valid swallowing, clearly at the base of the dysphagic problems and the possibilities to influence the patient is awake.

**Results.** After a careful observation of patients, followed also by their families, within 6 months significant improvements in the health of the periodontium were recorded, with gingival bleeding and redness reduction and improvement of halitosis. Regarding bleeding index a reduction from level 3 to level 1 was detected, that means a significant decrease in inflammation. Finally, the patients slowly show to accept more and more maneuvers hygiene, sometimes with partial cooperation and always enormous satisfaction from relatives.

**Conclusions.** In the present study fully confirms the need for dental hygienist in the departments that not self-sufficient patients and unable to correct oral hygiene at home and independent. Furthermore it was noted that external stimulations of the oral cavity are needed to make possible the awakening of the patient by restarting physiological processes, including swallowing; in fact during treatments occurred small demonstrations of awareness, as light nods of head in response to verbal questions. It is now crucial to our professional role to maintain good oral hygiene and also protects systemical health of the patient.



## ORAL HYGIENE PROTOCOL IN RESPONSE TO THE NEEDS OF THE HEAD AND NECK RADIO TREATED PATIENT

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**Aim.** Head and neck cancer includes mouth, larynx, pharynx and salivary glands cancers and represents about 5% of all Italian tumors and it is located at the 5th place as frequency. Every year about 12.000 new cases are diagnosed and to date the therapeutic treatments for the above mentioned tumors are: surgery, radiotherapy and chemotherapy, often combined. The oral complications, associated with radiotherapy (xerostomia, mucositis, caries, trismus, candidiasis, dysgeusia, dysphagia and osteoradionecrosis), are many and they are difficult to manage, therefore it is necessary to identify protocols and means of assistance able to relieve the discomforts and to improve the quality of life of the patients. The aim of this study is to evaluate the efficacy of oral hygiene in response to the particular needs of the head and neck radio treated patient.

**Materials and methods.** The study was conducted in order to detect and describe the oro-dental characteristics of patients undergoing radiotherapy and to detect any oral health needs. 15 head and neck radio treated patients (10 f., 5 m.) aged between 20 and have been selected. During the first visit, at t0, were performed: extra and intra-oral examination, detection of oral health indexes: plaque index and bleeding index of Ainamo & Bay (1975), motivation and home oral hygiene education; professional oral hygiene performed by the dental hygienist using: mechanical ultrasonic instrument, manual instrument above and below the gum; polishing with soft and non-abrasive cups on a low speed handpiece. Prophylaxis paste used: Elmex sensitive professional (RDA <40). At t1 (3 months) and at t2 (6 months) were performed: extra and intra-oral examination, detection of oral health indexes, motivation and home oral hygiene education, professional oral hygiene.

**Results.** For the comparison of the data it was used the T-Test for paired data. Data were compared at T0 vs T1, T0 vs T2 and T1 vs T2 for both indexes (PI, BoP). Descriptive statistic shows as the above mentioned indexes were considerably and significantly reduced from t0 to t2. Plaque index average: t0: 79%, t1: 51%, t2: 35%, Bleeding index average: t0: 69%, t1: 44%, t2: 22%. In all the comparisons it has been found a statistically significant inferential difference ( $p < 0.0001$ )

**Conclusions.** The applied protocol is efficacious in oral hygiene in response of the particular needs of the patient undergoing radiotherapy to head and neck. Despite the real improvement in survival is linked to early diagnosis, we should not underestimate how patients can benefit from physical and psychological help in control of the side effects of chemo-radiotherapy. The role of the oral hygienist is essential in the follow-up of oral hygiene and food habits, in the short, medium and long term.



### ORAL HYGIENE TREATMENT AND TOPICAL APPLICATION OF FERTOMCIDINA-U IN PATIENTS WITH DESQUAMATIVE GINGIVITIS: A SPLIT-MOUTH CLINICAL TRIAL

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**Aim.** It has been lately reported an impairment of periodontal status in cases of desquamative gingivitis (DG), described as the presence of epithelial desquamation, erythema, and erosive lesions on the gingival tissue in patients affected by different autoimmune disease (such as oral lichen planus, mucous membrane pemphigoid and others). The Fertomcidina-U is a salsobromiodic solution containing salicylic acid and magnesium biphosphate, used as a strong bactericide and fungicide tool applicable for tissues reparation and their re-epithelization. The aim of this pilot report was to describe prospectively the clinical efficacy of and oral hygiene protocol, together with the use of Fertomcidina-U, in patients affected by DG.

**Materials and methods.** A split-mouth study was designed: patients received oral hygiene instructions followed by non-surgical periodontal therapy in a 4-week cohort report. Fertomcidina-U was topically applied in 2 quadrants randomly for each patient for ten minutes every clinical session (n: 4). Outcome variables included full mouth plaque (FMPS) and bleeding (FMBS) scores, activity clinical score (to record the severity of the disease) and patient related outcomes (visual analogue score of pain).

**Results.** Ten patients have been recruited in a twelve-month period. The statistical test used for data processing was the Wilcoxon signed-rank test. The mean age at presentation was  $61.2 \pm 11.22$  years. Five weeks after finishing the proposed protocol, a statistical significant reduction was observed for FMPS ( $P=.037$ ), FMBS ( $P=.022$ ) and reported pain ( $P=.005$ ). No statistical differences were noted in the gingival sites treated or not treated with the Fertomcidina-U ( $P=.083$ ).

**Conclusions.** To date, there are no studies describing if oral hygiene therapy in combination with Fertomcidina-U as causal treatment in cases of DG. The proposed protocol reduces gingival bleeding, plaque index and reported symptoms, independently by the use of the topical application of the medication studied. As already described by our group, non-surgical periodontal therapy is positively connected with enhancement of gingival status and decrease of gingival related pain, in patients affected by different types of DG.



#### ORAL PIERCING COMPLICATIONS

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**Aim.** The purpose of this research is to highlight the impact that oral piercing can produce both on stomatognathic apparatus and at systemic level.

**Materials and methods.** It has been used the PubMed search engine. For research have been used words key like: "oral piercing", "lip and tongue piercing", "Oral piercing and health risk", "oral piercing complications", with the discriminating of scientific validity.

**Results.** More than 100 articles were evaluated and kept those with greater scientific evidence. First it was found that the most frequent sites for oral piercing were tongue, both in the dorsoventral area (the most frequent) that in the dorsolateral area, and the lips, where the jewel is placed above the chin, centered under the edge of vermillion. Immediate complications include the insertion of piercing, mostly related to the risk of prolonged bleeding or possible damage to the trigeminal nerve, facial nerve, hypoglossal nerve and glossopharyngeal nerve. Short-term complications are to be referred first of all to bacteraemia and a possible localized infection, as the piercing hole can provide a permanent entry pathway for microorganisms already present in the oral cavity. Might occur during an inflammation of connective tissue, which spreads quickly involving submandibular area, sublingual area below the submental space (Ludwig's Angina). It may also cause gingival trauma from "rubbing" the jewel. Long-term complications can be, at the level of the oral cavity, the dehiscence or bone loss due to friction of the ball or bar against the contact gum, tissue hyperplasia, dental fractures, the diastema due to the habit of pushing the screw or the ball between the teeth, gingival recessions and tooth-erosion. There is also the risk of swallowing or aspiration of the jewel. At systemic level, endocarditic may occur mainly as a result of complications due to the introduction of the bacterial microflora in the mucous membrane or the skin at the level of subcutaneous tissue, or for the continued presence of colonies of this microflora at the perforated site level. A cyst, a scar or a keloid can form at level of perforated site and are been reported cases of Neisseria and Staphylococcus in the mitral valve after tongue piercing. Do not underestimate the occurrence of infectious diseases such as HVB, HCV and HIV, possibly transmitted at the time of the piercing insertion.

**Conclusions.** The oral piercing can have immediate complications and in the short and long term, involving not only the maxillofacial but also causing diseases at systemic level. Many of these complications can be avoided by following strict practices of first sterilization at the time of piercing insertion and however maintaining a high degree of oral hygiene.



### PERIODONTITIS AND ATHEROSCLEROSIS: META-ANALYSIS ON THE CORRELATION WITH PORPHYROMONAS GINGIVALIS

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**Aim.** the aim of the study was to evaluate the correlation between chronic periodontal disease (PD) and atherosclerotic vascular disease (ASVD). From 1989 to 2010 there has been an exponential increase in the number of publications and articles related to this topic.

Different pathophysiological pathways have been proposed as potential links between PD and ASVD. These pathways involve both direct and indirect interactions between the mechanisms of periodontal pathogens and endothelium and the impact of bacteria on atherosclerotic processes. The pathogen considered is the *Porphyromonas gingivalis* (Pg), a gram-negative anaerobic periodontal bacteria; the aim of this work is to prove his involvement with cardiovascular disease.

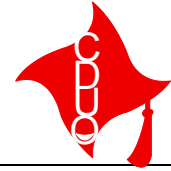
**Materials and methods.** from September 2012 to September 2013 was conducted a series of literature research. Databases utilized were: Pubmed, Medline, Embase, Cochrane Library and Scopus. The articles were selected using as a "Mesh Terms": Atherosclerosis, periodontal disease, *Porphyromonas gingivalis*; while as "Free Text Terms": Coronary disease, Bacteremia, Smooth muscle cells, Carotid disease, Chronic periodontitis, periodontal bacteria, Aortic aneurysm. The search covered the period from 1980 to 2012.

**Results.** Since the mid-70s has been supposed the possible correlation between periodontal disease and cardiovascular diseases. Among the mechanisms proposed, into the foreground there are the direct action of periodontal bacteria in the pathogenesis of atherosclerotic plaque and the involvement of inflammatory mediators resulting from the periodontal infection. It has been proven that some bacterial species such as Pg and the toxins produced by these can penetrate the epithelial barrier of the supporting tissues of the tooth, invading the neighbouring districts and, through the circulation, reaching the atherosclerotic plaques, promoting the formation of thrombi or emboli which may consequently lead to myocardial infarction (MI). Indirectly, periodontal bacteria recall the release of pro-inflammatory mediators: in particular interleukins (IL), which could induce the secretion of hepatic acute phase proteins (APR), such as C-reactive protein (CRP) and fibrinogen, thus contributing to atheroma formation.

**Conclusions.** In recent decades, the possible role of oral infections, especially the periodontal as a risk factor of systemic diseases, has created considerable interest as well as numerous criticisms.

Indeed, the infection of the supporting tissues of the tooth can be considered an important risk factor of cardiovascular disease.

The literature specifies that periodontal disease is associated with the lesions induced by atherosclerosis, although the importance in the onset and progression of atherosclerosis has yet to be totally elucidated. It can be concluded that oral health has significant importance also in the cardiovascular system, as a controlled oral hygiene can clearly reduce the inflammation and the diffusion of the same at the systemic level.



### PH ROLE IN NUTRITION, PRIMARY PREVENTION AND MAINTENANCE OF ORAL HEALT

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**Aim.** Evaluate if is possible to reach an optimal metabolic balance through the increase of pH of the saliva (pHS) and urine (pHU) due to a diet that computes the PRAL (renal acid load) food and the use of a saline solution as a mouthwash for the oral cavity.

**Materials and methods.** Three randomized group (25 patients each) were formed:

- GROUP-1 (study): 25 patients with absence of systemic diseases, no drug therapy, no diagnosis of periodontal disease.
- GROUP-2 (study): 25 patients with gingivitis, absence of systemic diseases, no drug therapy.
- GROUP-3 (control): 25 patients with or and without gingivitis, absence of systemic diseases, non drug therapy.

The operative protocol for Groups 1, 2 and 3 provides, at t0, the recording of anamnesis, saliva pH, urine pH, and PSR code. At t1 (X days), only for patients in Groups 1 and 2, the protocol provides to follow the diet that respect the PRAL (renal acid load) of food for 15 days, rinse with Basenpulver for 15 days (4 gr. in a glass of water) and recording the pH of saliva and urine. Data analysis were performed using T-Test for independent samples to assess the difference in average pH (saliva and urine) tests within each group considered.

#### **Results.**

- Group1-Group2 → t (73) = -686 ns;
- Group1-Group CTR → t (73) = 5.197; p < 001
- Group2-Group CTR → t (73) = 4.505; p < 001

Were performed T-Test with unique mathematical value of "0" (corresponding to no change) to observe that means values of the changes in subjects pH corresponds to an absence or presence of variations:

T-Test single sample (zero value).

- 0-group-1 t (24) = 5.61; p < 001
- 0-group-2 t (24) = 6.4; p < 001
- 0-group.3 CTR t (25) = -6,7 ns.

**Conclusions.** The dependent variables pHS and pHU were obtained by difference between scores in t0 and t1. Results offer an indication about changements in pHS and pHU: positive values indicate an increased (alkaline) pH, negative values indicate a decreased pH (basic). Statistical analysis lead us to observe that there are significative variation for both pHS and pHU in patients who followed a diet that considers the foods PRAL and used a saline solution as mouthrinse for 15 days (M=0.352), (M=0.412) or subject of the group control.





#### PROFESSIONAL ORAL HYGIENE IN INTENSIVE CARE UNITS: NEW PROTOCOLS

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**Aim.** The oral cavity is normally colonized by microorganisms that adapts to the environment in which they are, but sometimes this balance is altered resulting in the formation of tooth decay and periodontal disease. The environment where this balance is altered are intensive care units, such as anesthesia and burn centers, as patients hospitalized for long periods are not able to carry out the activities of daily hygiene and have their immune defenses compromised. This obviously implies a predisposition to those infections that develop in colonized environments, just like the oral cavity. The aim of the present work is to investigate and detect the presence of bacterial colonies in the oral cavity and implement the most appropriate prophylaxis against them.

**Materials and methods.** This work focuses on two patients admitted to an intensive care unit with third-degree burn on 40-45% of the body, caused by the explosion of a flammable liquid. After a physical examination of the oral cavity and an evaluation of the periodontal history, the following procedures were carried out: bacteriological swab, washing with saline, mechanical cleansing with chlorhexidine gel, rinsing with saline, cleansing with dental floss, massage of the oral mucosa with adjuvant gel and finally another bacteriological swab.

**Results.** The protocol we used had a good outcome while respecting the needs of patients, clinicians and nurses and we managed to achieve that goal: that oral hygiene can and must improve the life of patients during their long hospital stay.

**Conclusions.** In conclusion, we can say that carrying out periodic treatments of oral hygiene (not only debridement) allows the not self-sufficient patient to maintain a state of optimal health of the oral cavity and to control localized and systemic superinfections, which may be very dangerous in some particular cases. Last but not least, the chance for the patient to have a clean and fresh mouth which, as we could establish, helps to increase his/her self-esteem.



#### PURPOSES AND APPLICATIONS OF ALOE VERA IN DENTISTRY AND DENTAL HYGIENE

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**Aim.** Highlight how products containing Aloe Vera could be useful in dentistry and dental hygiene.

**Materials and methods.** The following electronic databases were searched: The Cochrane Library (to 2013), MEDLINE (to 2013). Keywords used: Aloe vera, Aloe vera properties, Aloe vera caries, Aloe vera periodontal disease, Aloe vera oral lichen planus, Aloe vera halitosis, Aloe vera affthous stomatitis, Aloe vera oral mucositis. 310 articles were identified, but only 189 were selected, they covered a period from 1935 to 2013. Types of studies considered: Review, Meta-Analysis, Interview, Case Reports, Clinical Trials.

**Results.** Anticariogenic effect many Authors have shown how Aloe Verà's extracts have an antibacterial action, in particular, they can reduce the quantity of Streptococcus Mutans and other bacteria connected with the genesis of dental caries. Effect against periodontal disease substances obtained from Aloe Vera have an important antibacterial action against bacteria of the red complex, they can reduce the secretion of prostaglandins and free radicals by polimorfo nucleati and they inhibit metalloproteinase, they produce a better healing of the tissues after periodontal debridement, with a reduction of the probing depth. Finally, Aloe Verà's extracts can treat gengivitis and reduce edema. Effect against Alitosis many studies revealed that mouthwashes containing Aloe Vera could help people suffering from iposalivation to solve all problems connected with this disease (infection, caries...). In particular, Aloe could be useful in treating alitosis, which is usually a limit for normal public relations. Effect against affthous stomatitis An analysis of literature suggests that the treatment of affthous stomatitis's lesions with Aloe Vera gel might reduce the dimension of lesions themselves and the pain perceived. Effect against Oral Lichen Planus a systematic review of literature shows that Aloe Vera has a weak effect on reducing the size of lesions and the symptoms when it is compared with a placebo. Effect against Herpes Virus the activity of anthraquinones (substances contained in Aloe Vera extracts) has effects against Human Herpes Virus, HIV-1 and other Viruses with envelope. Finally, Uses in endodontics Thanks to the antimicrobial activity against E. Coli and C. Albicans, Aloe vera solutions could be used as irrigant during tooth devitalization. In particular, when the first therapy fails, because in the most part in several cases the cause of failure are the bacteria just mentioned. Another studied use of Aloe Vera in Endodontics is the disinfection of guttaperca cone.

**Conclusions.** Aloe Vera has proven effects in the treatment of periodontal disease, alitosis, affthous stomatitis, herpes virus while it has possible uses in endodontics. Aloe has not shown a preventive effect against caries, because there are not enough trials on this topic, more studies are needed. Finally, extracts from Aloe Verà's extracts have not proved to play a role in the therapy of Oral Lichen Planus.



### QUALITATIVE AND QUANTITATIVE VARIATIONS OF MICROBIAL PLAQUE IN ORTHODONTIC PATIENTS DURING PREVENTOLOGICAL ITER

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**Aim.** The aim of the research was to verify the qualitative and quantitative differences of oral microflora in patients treated with different orthodontic devices, inserted in a preventive iter.

**Materials and methods.** The study led on 101 patients, selected and divided in groups, according to the type of the ongoing orthodontic treatment: 17 with R.P.E., 13 with Frankel II, 12 with Frankel III, 9 with Cervera Functional Appliance, 24 with monoblock, 9 with fixed appliance and 17 without therapy. A sample of plaque (from the lingual surface of elements 3.6 and 4.6) was drawn from each patient and analyzed with qualitative and quantitative procedures. The amount of cocci and bacilli was quantitatively determined (chamber Thoma-Zeiss), while the number of Gram-negative and Gram-positive bacteria was qualitatively researched (Gram coloration). This procedure was executed at every step of the iter.

**Results.** At the end of the study, comparing the data of the first visit and the following visits, it came out that patients with "R.P.E.", "Frankel II" and, in particular, with "monoblock", had a significant reduction of the total number of cocci (Gram+ and Gram-), while bacilli remained stable at low values. In coincidence with the placing of "Cervera functional appliance" and "fixed appliance", an increase of the general microbial charge in the second and third draw was registered. A decrease of Gram+ and Gram- cocci and Gram- bacilli followed, together with an increase of Gram+ bacilli. Patients carrying Frankel III had a slight decrease of cocci, stability of Gram+ bacilli and a remarkable reduction of Gram- bacilli. Finally, a rapid decrease of Gram+ and Gram- cocci and a slight increase of Gram+ bacilli, with reduction of Gram-, were observed in patients without orthodontic therapy.

**Conclusions.** The result of the experimentation was that oral hygiene in orthodontic patients, especially with fixed appliance, is more difficult, due to the presence of foreign bodies, which hinder the manoeuvres. Therefore, the preventologic iter appears to be particularly effective and necessary in this subjects, controlling potentially pathogen species, taking part in the reduction of potential causes of inflammatory events, which could interfere with the success of the ongoing orthodontic treatment.



#### RELATIONSHIP BETWEEN NEURODEGENERATIVE DISEASES AND QUALITY OF LIFE, USING A OHIP-14 TEST

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**Aim.** Oral diseases have recently been related with a possible risk factor for neurodegenerative patients affected by cognitive impairments symptoms like Dementia. Even if there are no specific studies investigating oral health in this patient group, dental diseases is known to be a potential cause of pain and to influence quality of life and disease progression. The aim of this study was to investigate how oral health status may influence quality of life of subjects affected by early stage of cognitive decline and mild cognitive impairment (MCI). To perform the quality of life evaluation, it was chosen OHIP-14 test, consisting of seven points that focuses on functional limitation, pain, psychological discomfort, physical, psychological and social disability.

**Materials and methods.** Oral health status was investigated in a sample consisting of 140 patients affected by different grade of neurodegenerative diseases. 61 patients were affected by early stage of cognitive decline while 79 patients by MCI. The evaluation was performed using Decayed Missed Filled Teeth (DMFT) and Clinical Investigation, consisting in the detection of dental carious cavities and measurement of the probing depth in each patient. Other parameters, like gingival bleeding, biofilm index and tooth mobility degree test, have been recorded. After the clinical examination Oral Health Impact Profile-14 (OHIP-14) test was administrated to the sample by a trained interviewer. The available answers were connected to a frequency 5-point Likert scale: never (score 0), hardly ever (score 1), occasionally (score 2), fairly often (score 3) and very often (score 4).

**Results.** The ratio between diagnosis of periodontal disease and impact on quality of life was significant in individuals with periodontitis ( $p < 0.001$ ) and missed filled teeth. Gingival bleeding, and probing depth  $> 4$  mm were associated with intensely negative impact on quality of life ( $p = 0.013$ ,  $p < 0.001$ , and  $p = 0.012$  respectively). Moreover, the absence of more than 2 molar teeth increases the chewing inability, decreasing the patient quality of life.

**Conclusions.** It was observed a correlation between the age and the high index of pathologies analyzed, due to the progressive nature of the disease. High prevalence of oral disease was also linked to functional decline, poor oral hygiene care, and less use of dental services. Ours results showed that oral diseases had a bad impact on quality life of this subjects; higher prevalence of periodontal disease was funded in MIC patients.



## SQUAMOUS CELLS CARCINOMA: QUALITATIVE AND QUANTITATIVE ANALYSIS OF ORAL BACTERIAL FLORA

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**Aim.** This experiment aims to study the bacterial flora of the oral cavity in patients with squamous cell carcinoma to determine the microbiological components, so as to establish useful parameters to the drafting of a protocol for prevention of oral hygiene, in order to prevent carcinoma complications and to improve the quality of life in cancer patients.

**Materials and methods.** Patients were examined by an oral hygienist during the different phases of the cancer care (pre- surgery, post- surgery and post radio and chemotherapy). In the meantime I: collected samples of bacterial plaque field in periodontal folders and I examined those in the biological laboratory with a microscope and the Gram coloration technique, took full mouth plaque score and bleeding score with detector plaque and periodontal probe, took photos, made objective analysis of the oral cavity, given directions for Domiciliar Oral Hygiene (brushing technique, use of dental floss, mouthwash). We did Professional Oral Hygiene and full mouth disinfection to agreeing patients.

**Results.** Thanks to collected data we found a lower proportion of adverse events on the radio and chemotherapy (xerostomia, candidiasis, mucositis) in patients treated with Professional Oral Hygiene in the pre -surgical phase and the same showed a better compliance throughout the course of treatment, following the directions of Oral Hygienist for the treatment of oral cavity. Microbiological analysis of the initial sampling has identified a greater presence of Gram negative bacteria in all patients, in subsequent samplings (after surgery and radiation treatment) the presence of Gram-negative bacteria is significantly decreased in patients who have followed the directions given about domiciliar oral hygiene and we found a better presence of Gram positive bacteria. So bacterial flora of oral cavity changed completely in those patients.

**Conclusions.** Antitumoral therapy has developed a great evolution in time, but up to day there isn't any accurate protocol on oral care for patients undergoing radio and chemotherapy. Results of this study show that the treatment of oral cavity in cancer patients with squamous cell carcinoma using the correct techniques of oral hygiene and the right therapeutic aids, can greatly improve the condition of these patients from medical, psychological and social point of view, consequently their quality of life. Therefore a collaborative work is necessary, which includes the figure of Oral Hygienist, Dentist, Cancer Doctor and Psychologist in the medical equipe, throughout the cancer treatment.



### **SURFACE ALTERATIONS OF TITANIUM GRADE 4 SURFACES BY USE OF CONVENTIONAL AND NOVEL SCALER TIPS.**

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**Aim.** to assess and compare the effects of conventional and recently developed ultrasonic scaler tips on titanium surfaces.

**Materials and methods.** A conventional, steel, type Piezon ultrasonic scaler tip, belonging to the control group and a IS Tip, consisting of a core alloy of copper, and an outer coating of silver, belonging to the test groups were evaluated in this study. Twenty unalloyed grade IV Titanium disks, ten for each group, were prepared according to ISO 583/2 (GEASS Ltd., Udine, Italy). The disks had machined surface with a diameter of 10 mm and a height of 2.5 mm. Both types of tips have been included in mectron ultrasonic scalars, fitted with a fixed angle of 45 °, using a custom made swinging arm integrated with the recording equipment. The disks were in turn blocked in a container, equipped with a safety valve for the custom made piezoelectric water irrigation hand piece anchored stationary below the swinging arm. To obtain a constant calibration of the force, time, cycles and the application tips angle on the titanium disks a LR30K Equipped with loading cell machine with a primary code generated ad hoc for this study, was used. The primary code established that there were continuous cycles of the oscillating arm with an excursion fixed at 3 mm and a speed of 1 mm/min, such as to be compared to that normally used in manual operation of the ultrasonic scalar. The power of the scalar tips was set to intermediate according to the manufacturer's advice. The surface morphology of each Ti disks was examined using a scanning electron microscopy (SEM). Statistical analysis was performed through one-way analysis of variance and post hoc Scheffé test. All values were considered significant when  $P < .05$ . The images obtained by SEM were then transported and analysed using the software ImageJ 1.48f 3D, in order to highlight the incongruity of the surface in each disks and reconstruct a faithful 3D image of the same for the collection of data for statistical analysis.

**Results.** The statistical and fractal analysis showed a statistically significant difference between the two scalar tips taken into consideration. Surface alterations of titanium disks by conventional tips were much greater than those caused by the novel one.

**Conclusions.** Within the limitations of this study, the surface alterations induced by the conventional tip on the surfaces of titanium disks were higher than those of the test one. Therefore, this novel ultrasonic copper alloy scalar tip should possibly be used for the maintenance of implant prostheses.



## THE APPROACH AND COMMUNICATION BETWEEN DENTAL HYGIENIST AND THE DISABLED CHILD

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**Aim.** For children, to draw is to play and pictures are the "story" that he makes of himself. The study was carried out at the Department of Orthodontics at the Dental Clinic at the Policlinico IRCCS Cà Granda in Milan that houses disabled patients. Children with Down syndrome, Williams syndrome - Beuer, autism and severe cognitive delay were followed by Dental Hygienist. Pictures were utilized as a communication tool, to be able to perceive fears and hardships that the dental environment arises. The purpose of the present research was to:

- Evaluate, through the reading of children's drawings, how the experience "at the dentist" is lived and transposed graphically (real or imagined) in a sample of 30 children with disabilities between the ages of 10 and 16 years old;
- Evaluate graphic differences in the designs of the little disabled patient and between the small patient;
- Ensure that the use of this tool can be used in the relation dental hygienist – little patient with a disability.

**Materials and methods.** The research took place from september 2012 to september 2013. 30 drawings were collected of which it was possible to analyze 9:

- Down syndrome: 1 male of 13 years - 1 female for 11 years;
- Williams syndrome: 1 female for 11 years;
- Autism: 3 males of respectively 11, 13 and 16 years;
- Severe cognitive delay: 3 males of respectively 10, 11, 10 years.

**Results.** *Down syndrome:* two designs were analysed, the presence of more varied colors, harmonious use of space, hair standing by fear and young patients as if they were lying on an operating table  
*Williams syndrome - Beuer:* one design was analysed where the peculiarity is the presence of the door as an escape route.  
*Autism:* three drawings analysed, no special characters, no colour and repeated erasures.  
*Severe cognitive delay:* three drawings analysed, special use of the entire space on the sheet and gigantic figures. The feature that is common to all designs is the presence of red, representing the blood and then fear. We have therefore obtained the characteristics that patients seek primarily in their dental hygienists:

- Ability to perceive the patient's anxiety and to face it;
- Ability to establish and maintain relationships;
- Ability to properly inform the patient and provide explanations.

**Conclusions.** Through drawing and on the basis of a task, the child is able to convey thoughts and feelings related to experiences or imagined.

These are the difficulties perceived with young disabled patients:

- Times of listening and concentration limited;
- Difficulties in communication;
- Difficulty in receiving the transmitted message;
- Fast learning procedures elongated;
- The need for use of graphics and visual media.

The dental hygienist must always be ready to approach each type of patient, the design can be a good method of communication.



### THE DIODE LASER: CLINICAL AND AESTHETICAL IMPLICATIONS IN PERIODONTAL PROBLEMS WITH PROBING UNDER 6 MM

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**Aim.** The aim of the study was to value clinically the efficiency of the diode laser in the management of periodontal tissues and lesions with probing under 6mm of depth.

**Materials and methods.** At the "Clinical, Reconstruction and Diagnostic Department" of Policlinico Hospital in Milan, 60 patients (33 women and 27 men), mean aged 54 years and affected by periodontal disease, were selected and casually divided in two groups (A and B). The patients of the first group were inserted in a "traditional causal therapy protocol", while the ones of the second group, followed the same protocol added with diode laser treatment (200 nm, 1W pulsed mode).

**Results.** The patients treated with diode laser pointed out statistically significant progresses. A greater speed in biostimulation processes- with a reduction of the bleeding index and probing depth-, that would have required a longer time with the only traditional therapy, was clinically observed. In particular, the bleeding index decreased to a rate under 10%, from an initial rate of 37-97%, while the probing of 100 treated periodontal pockets (67 in monoradicular elements and 33 pluriradicular) obtained an average clinical gain of 1,5 mm and 1,22 mm in the diode laser protocol, against 1,2 mm and 0,8 mm in the traditional protocol. This showed an improvement in the morphology of the tissutal tropism and helped efficiently the periodontal health and aesthetic of this patients' smile.

**Conclusions.** The use of diode laser, added to traditional causal therapy, allows. From a clinical point of view, satisfying results in shorter time and with a reduced discomfort for the patient. We have to consider that treated patients were inserted in the casuistry of the study. The results refers only to a clinical valuation. More researches on the biological answer of the tissues are needed, because nowadays there is no difference in literature.





### THE INFLUENCE OF EDUCATIONAL LEVEL AND ORAL HYGIENE BEHAVIOURS ON DMFT INDEX AND CPITN INDEX IN AN ADULT ITALIAN POPULATION: AN EPIDEMIOLOGICAL STUDY

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**Aim.** Social determinants in health and disease have been one the focus of the recent literature. Epidemiological studies are emphasizing the effect of the social context in oral health as the latter appears to relate consistently with socioeconomic and environmental characteristics. Dental caries and periodontal diseases are among the most widespread oral pathologies. They both have a multifactorial etiology and can affect all populations throughout the life span. The aim of the present cross-sectional study is to estimate the influence of educational level and oral hygiene behaviours on the prevalence and severity of dental caries and periodontal disease in an adult Italian population attending the Oral Hygiene department of a public Dental Clinic.

**Materials and methods.** Dental caries was diagnosed according to the World Health Organization criteria. The DMFT index (decayed, missing, filled tooth) was used to record the dental caries experience. The periodontal status was assessed using the community periodontal index of treatment needs (CPITN). Questionnaires on educational level and oral hygiene behaviours were also collected. Level of education was assessed as having graduated from (1) elementary school, (2) middle school, (3) high school, (4) university. Behavioural items included questions concerning: (1) frequency of tooth brushing, (2) frequency of dental professional examinations and (3) frequency of professional oral hygiene. Information on the use of oral hygiene aids and smoking habits were also recorded.

**Results.** A total of 350 patients were enrolled. The mean DMFT value reported was  $4.37 \pm 3.06$ , higher values were observed for male patients ( $p < 0.05$ ). Increased CPITN scores and DMFT values were significantly correlated with lower level of education ( $p < 0.05$ ). Subjects of high educational status showed significantly better oral hygiene habits ( $p < 0.05$ ). With regards to the domestic oral hygiene attitudes tooth brushing twice a day was reported by 72% of females and 52% of males ( $P < 0.05$ ), while tooth brushing once a day was reported by 12% of females and 34% of males ( $P < 0.05$ ). Tooth brushing twice a day was reported by 66% of the university group versus 38% of the elementary group ( $P < 0.05$ ). The great majority (68%) of the participants was using a manual toothbrush; only a small number reported using interdental floss (27%) or interdental brushes (13%). The frequency of self-reported tooth brushing, use of mouth-rinse, of dental floss and interdental brush, was dependent on the level of education. Subjects of high educational status brushed their teeth significantly more often and had better oral hygiene habits than those of lower education status ( $p < 0.05$ ).

**Conclusions.** The oral health status, in terms of periodontal disease and dental caries, appears correlated to patients' socio-economic level.



#### DENTAL AND PERIODONTAL HEALTH STATUS IN PREGNANT WOMEN AND PRETERM BIRTH

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**Aim.** The aim of this work is to relate through an observational study the dental and periodontal health status of a sample of pregnant women, respectively, with age, gestational week of delivery, type of delivery and birth weight.

**Materials and methods.** 88 out of 132 women inpatients of the Department of Obstetrics and Gynecology, Hospital Santa Maria Goretti (Latina, Italy) at the last trimester of pregnancy were enrolled in the study and followed in data collection. Indices used for dental and periodontal health status assessment were: simplified oral hygiene index (OHI -S), bleeding on probing (BOP) index, CPI (Community Periodontal Index). For each clinically examined pregnant woman the following data were detected through the birth register: actual date of birth, gestational week of delivery, birth weight, type of birth, causes of birth.

**Results.** The survey shows a statistically significant correlation between age of the mother, CPI and preterm delivery ( $p = 0.000209$ ), i.e. in the study the greater preterm birth frequency is recorded in middle/high aged women with high degree of CPI. While there were no significant statistical correlations between preterm birth, smoking, ethnicity and educational level. Current trends of high percentages of elderly primipara, would make more common the exposure to risk factors such as periodontal disease with potential consequences on the timing of delivery and birth weight.

**Conclusions.** The study highlights the importance of oral health assessment in pregnancy. It is indeed relevant that gynecologists should consider dental and periodontal checkup among antenatal care screenings, with targeted interventions on the basis of the age of the mother and other risk factors.



### PREFERENCE OF SWEET TASTE AND PREVALENCE OF DENTAL CARIES IN 13-15 YEARS OLD ADOLESCENTS: A MULTICENTRIC STUDY

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**Aim.** Taste sensitivity is related to nutrition and to fluid intake. Sweet substances cause a pleasurable sensation and trigger the salivation reflex, the deglutition and the preparation of the digestive tract for digestion and absorption. The degree of pleasantness of some taste, however, is subjective and can be influenced by the experience and the nutritional needs. In this multicentric study, we evaluated the different experience of caries and dietary habits in four different geographical areas: Sweden, Saudi Arabia, Italy and Mexico; clarifying the potential relationship between sweet taste preference and caries prevalence in an age included between 13 - 15 years old. The population in question corresponds to the 6,58% of the total youth population of the city of Sassari.

**Materials and methods.** The cross-sectional study has been conducted including a population of 220 adolescents, aged 13-15 years old, for each country. Each sample group was representative of the area from the point of view of the Socio Economic Status. In each area a cluster sampling method has been performed, using the classroom as a unit. The first cluster was selected at random while others were selected at a systematic interval every 8 classes. Only the children who live in the country of reference since when were aged six were included, while were excluded children affected by local and/or systemic diseases and those undergoing orthodontic treatment. A letter was sent to parents to explain the purpose of the study along with an informed consent form. The clinical evaluation was performed within its own class with artificial light, an intra-oral mirror and a WHO-CPI probe. Caries was assessed used following DMFT/S to D<sub>3</sub> level. Contextually to the dental examination a dietary questionnaire was submitted to each subject, with the aim to investigate eating habits and oral hygiene of the adolescents. Subjects underwent a test to assess the sweet taste following a standardized protocol. Using the full mouth technique, every adolescent tasted 6 sugary solutions at different concentrations, interspaced by a solution containing only de-ionized water. To each subject was asked when he perceived sweet taste and which solution he preferred.

#### Results and conclusions.

1. There is an association between sweet taste and caries experience. Sweet taste preference should be considered a risk for caries disease in the age group considered ( $p=0.04$  for the experience of the sweet,  $p=0.03$  for the sweet threshold).
2. Sweet taste seems to be more perceived, even if the data is not statistically significant, particularly in individuals with a diet rich in fermentable carbohydrates.

As widely stated in the literature and confirmed by the data, diet, and hence the preference to the taste of sweet, may play a major impact on oral and dental health. Therefore it appears evident the importance of a proper work of health education and dietary recommendations by dental personnel (dentist and the dental hygienist).





### "TORONTO-SINGLE-TOOTH" (TST) PROsthESIS: THE PERFECT SYNTHESIS BETWEEN A SCREW-RETAINED AND A CEMENTED PROsthESIS, WITH A HIGH-QUALITY AESTHETIC APPEARANCE

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E. Bigelli, F. Germano, C. Arcuri

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E. Infusino, L. Passaretti, B. Pacella, E. Brauner, G. Pompa, O. Poli

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M. Rolfo, P. Tufino, N. Corino, G. Audenino, F. Bassi, S. Carossa

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A. Di Fiore, A. Fioretti, A. Berto, E.A. Gobbato, M. Val, S. Mazzoleni

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A. Di Fiore, C. Zalunardo, R. Meneghello, M. Turchetto, M. De Francesco, E. Stellini

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G. Gassino, P. Ceruti, L. Sordella, S. Carossa



### **FRACTURE RESISTANCE OF CAD/CAM VERSUS THERMOPRESSED LITHIUM DISILICATE CROWNS**

P. Cardelli, N. Serafini, B. Sinjari, G. Murmura

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A. Fasiol, N. Mobilio, S. Catapano

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M. Corsalini, F. Pettini, G. Stefanachi, A. Boccaccio, L. Lamberti, C. Pappalettere, A. Cervo, M. Pellegrino, D. Di Venere D.

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A. Di Fiore, S. Sivolella, M. Val, A. Berto, A. Zuccon, E. Stellini

### **INFLUENCE OF FINISH LINE ON THE MARGINAL SEAL OF NANOHYBRID COMPOSITE CROWNS AFTER PERIODONTAL SCALING: A MICROLEAKAGE STUDY**

D. Angerame, M. De Biasi, V. Del Lupo, L. Bevilacqua, R. Sorrentino, F. Zarone

### **INFLUENCE OF INCREASING THE NUMBER OF IMPLANTS AND INCORPORATING A TITANIUM FRAMEWORK ON OCCLUSAL STATIC LOAD TRANSMISSION IN A MAXILLARY FULL ARCH PROSTHESIS**

C. Sabione, P.G. Cacciabue, S. Ali C. Manzella, G. Menicucci, S. Carossa

### **MAXILLARY OVERDENTURE RETAINED WITH AN IMPLANT-SUPPORTED CAD-CAM BAR: A PRELIMINARY STUDY**

M. Corsalini, D. Di Venere, G. Stefanachi, G. Muci, F. Cervinara, A. Re, A. Palminteri, A.M. Ingrosso, F. Pettini

### **MOLAR UPRIGHTING WITH ORTHODONTIC MINISCREWS FOR PROSTHODONTIC PURPOSE: A CLINICAL CASE REPORT FOR THE MONOCORTICAL ANCHORAGE**

L. Passeretti, E. Infusino, R. Minasi, V. Lombardi, M. Galli, G. Pompa, O. Poli

### **OVERDENTURE: CLINICAL STATISTICAL CONTRIBUTION**

C. Rosa, R. Sorrentino, E. Epifania

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E. Bellia, G. Audenino, A. Montalvillo, F. Bassi



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M. Marrelli, L. Fortunato, O. Lorenzoni, F. Inchingolo, R. Mingrone, M. Tatullo

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A. Sedran, M. Randisi, G. Gassino, S. Carossa

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G. Gassino, P. Ceruti, L. Sordella, G. Ramieri, S. Carossa

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R. Leone, F. Zarone, B. Borelli, E. Epifania, R. Sorrentino

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G. Gassino, P. Ceruti, L. Sordella, S. Carossa

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S. De Carli, P. Cardelli, F. Balestra, M. Montani, E. Bigelli, V. Vertucci

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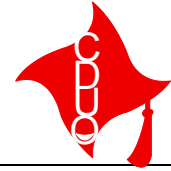
I. Gallarato, F. Campanella, E. Bellia, G. Audenino, S. Carossa

### **THE INFLUENCE OF SELF-ESTEEM, DEPRESSION, TEMPERAMENT AND CHARACTER IN THE AESTHETIC SATISFACTION OF THE PATIENTS WITH REMOVABLE COMPLETE DENTURE**

E. Fossati, P. Ceruti, E. Del Malvò, G. Gassino, S. Carossa

### **Z.I.L. ZIRCONIA INSIDE LAMINATE. AN INNOVATIVE FRAMEWORK DESIGN**

A. Agnini, G. Malaguti, A. Esposito, C. Santoni, S. Granata, U. Consolo



### "TORONTO-SINGLE-TOOTH" (TST) PROSTHESIS: THE PERFECT SYNTHESIS BETWEEN A SCREW-RETAINED AND A CEMENTED PROSTHESIS, WITH A HIGH-QUALITY AESTHETIC APPEARANCE

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**Aim.** Nowadays, patients do not require "a smile," but "their own smile." From this requirement was born the prosthesis TST, "Toronto-single-tooth": a prosthesis that can provide all of this, and that re-creates a "natural" smile. Tooth for tooth.

**Materials and methods.** We report the case of a rehabilitation of a mandibular arch, completely edentulous. Seven endosseous implants were inserted, we used the implant system "Dentsply-AstraTech." We used a TST prosthesis. The TST prosthesis rests on a milled bar: it is realized through the CAD-CAM technology. After production, the bar is screwed to the implants, and crowns will be produced individually, tooth for tooth, and then they are cemented to titanium abutments, which are present on the structure of the bar. The interaction with the dental laboratory will be crucial: we must acquire the dental impressions with polyether, we must carry out the study with face-bow, and the waxing of both dental arches.

**Results.** The TST is a prosthesis certainly innovative. From the point of view of "dental technician" it is innovative for the following reasons:

- TST allows you to inspect and repair the prosthesis, without damaging the sub-structure.
- The TST allows to avoid the replacement of the block ceramic, because of breakage.
- The gingiva of the TST is built in composite resin: it allows the simple repair, because of breakage.

From the point of view of "physician" it is innovative for the following reasons:

- screwed-bar allows perfect marginal adaptation, to the implant structures, even in angled positions.
- screwed-bar allows the absence of cement between the implant and bar

the presence of single-customized crowns, cemented, make that the occlusal surfaces are perfectly reproduced, preventing that the connection screws are in the middle of the occlusal surface.

- Excellent aesthetics: you can perfectly characterize the individual crowns. This is unthinkable with other prostheses.

**Conclusions.** The TST is an "innovative" prosthesis: it has both the advantages of screw retained prosthesis, and the advantages of cemented prosthesis and it ensures incomparable aesthetics. In this prosthesis, nothing is left to chance, colors, materials, emergencies, everything is part of a major project: to recreate in our patient "his own" smile.





## A COMPARISON BETWEEN METAL-CERAMIC AND ZIRCONIA IN MAKING OF THREE-UNIT BRIDGES IN POSTERIOR SECTORS

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**Aim.** In the last years, prosthetic techniques have tried to adapt to a growing request for high bio-aesthetic quality of the product. The interest of dentistry market for this issue has increased the offer of "All-Ceramic" systems ensuring an excellent cosmetology and high biocompatibility together with proper mechanical endurance. Yet, in this context the fixed metal-ceramic prosthesis is still considered the standard in everyday practice. The aim of the present study is the comparison between fixed metal-ceramic prosthesis and zirconia fixed prosthesis assessing (three-unit bridges in posterior sectors), after some years from their cementation in the patient's mouth, the keeping of all cosmetic and mechanical features.

**Materials and methods.** At the Department of Odontostomatology and Surgery of the Polyclinic Hospital of Bari (Italy), from January 2007 to May 2013, we set two patient groups, homogeneous for average age, treatment type and follow up duration. In both groups, the antagonists of the prosthetic structures were natural teeth. Parafunctional patients and patients with antagonist already prosthodontized teeth were excluded. The first group, composed of 40 patients (24 males and 16 females) was treated with metal-ceramic bridges (4-6 or 5-7) with distal pillars in the lower arch. The average follow-up was 54 months. For metal-ceramic bridges we used the cobalt chromium alloy "Remanium Star" (Dentaurum GmbH & Co. KG, Germany) and ceramic IPS-Inline (Ivoclar Vivadent, Germany). The second group, composed of 40 patients (18 males and 22 females) was treated with zirconia bridges (4-6 or 5-7) with distal pillars in the lower arch. The prosthetic product was produced with CAD-CAM technology. The average follow-up was 52 months. For zirconia bridges, we used the ceramic Cercon-Zirconia (Dentsply, Germany). During follow-up, together with the assessment of periodontal indices, we carried out the evaluation of the prosthetic product characteristics and its relations with the surrounding tissues, according to the evaluation file as elaborated by CDA (California Dental Association). The assessed parameters were:

- color and surface;
- shape;
- marginal integrity.

**Results.** In each observed patient group two unsuccessful cases were reported, corresponding to the 5% of observed treatments.

**Conclusions.** All-ceramic prosthetic products now show mechanic and cosmetic characteristics comparable to those of metal-ceramic products. Metal-ceramic bridges show a higher criticality in the keeping of marginal integrity whereas zirconia bridges may face chipping and the consequent fracture of the prosthetic structure.



### AN ANALYSIS OF MAXILLARY ANTERIOR TEETH: ANATOMIC CROWN WIDTH/LENGTH RATIO AND MEASUREMENT OF THE EXTERNAL SURFACE OF TEETH

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**Aim.** The aim of this study was to analyze the anatomic crown of anterior maxillary teeth with regard to width, length and width/length ratios in the Caucasian population and to give an update of normative data on the external surface of maxillary anterior teeth with regard to both the crown and the root.

**Materials and methods.** A total of 562 maxillary anterior teeth were collected. Width, length and width/length ratios were calculated for an aesthetic evaluation of anterior dentition in the Caucasian population. Nineteen anatomical measurements were recorded of the overall tooth of each sample by two operators with different skill and measurement values were statistically analyzed.

**Results.** The mean crown widths reported were 8.26 mm, 6.32 mm and 7.78 mm for central incisors, lateral incisors and canine respectively. The mean crown length recorded were 11.05 mm, 9.61 mm and 9.97 mm for central incisors, lateral incisors and canine respectively. The mean width/length ratios were 75%, 66% and 78% for central incisors, lateral incisors and canine respectively. The average total length recorded were in central incisors 23.47 mm, in lateral incisors 23.03 mm and in canines 25.63 mm. No statistically significant differences in the observers' skill was found ( $p=0.814$ ).

**Conclusions.** Besides other esthetical considerations and objective parameters, the knowledge of tooth width, length and width/length ratio could be a helpful guideline for diagnosis and treatment planning for esthetic restorative dentistry of maxillary anterior dentition, as well as the knowledge of root size is paramount for a successful outcome in all fields of clinical dentistry.



## ANALYSIS OF BACTERIAL DISTRIBUTION IN SUPRAGINGIVAL AND SUBGINGIVAL PLAQUE BY REAL-TIME PCR: DIFFERENCE BETWEEN NATURAL TEETH AND DENTURE

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**Aim.** Periodontal diseases are infectious disorders and the pathogenic microbial populations involved are known to be highly complex. Numerous reports have demonstrated an association between periodontitis and a small subset of microbial species. Quantitative analysis, with identification of periodontopathic bacteria, is important for the diagnosis, therapeutic evaluation and risk assessment of periodontal disease. The aim of this study has been to investigate the microbial species present in supragingival and subgingival plaque and to evaluate the possible differences between the subgingival plaque on teeth and one on the prosthesis. Specifically the role of the *Tannerella forsythia* and *Prevotella intermedia* has been examined.

**Materials and methods.** 24 patients have been recruited for this study. Sterile paper tips have been used for plaque samples. For each patient three samples have been taken: supragingival plaque sample on natural tooth, subgingival plaque on natural tooth and subgingival plaque on fixed partial denture. All samples have been delivered to Department of Biomedical Sciences for genomic DNA extraction. DNA isolation has been performed using a specific kit according to the manufacturer's instructions. Real-time polymerase chain reaction (PCR) has been used to detect and quantify the periodontal bacteria. The bacterial DNA levels have been quantified by real-time PCR and then converted to theoretical cell numbers.

**Results.** The mean universal of the supragingival plaque is  $3,30E+06$  (A); the mean universal of the subgingival plaque on natural teeth is  $4,02E+07$  (B); the mean universal of the subgingival plaque on fixed partial denture is  $7,15E+08$  (C). The difference between A and B is not statistically significant; while the difference is statistically significant both between A and C that between B and C. The mean of the *Tannerella forsythia* is:  $3,64E+05$  on supragingival plaque (D);  $3,57E+07$  on subgingival plaque of the natural teeth (E) and  $7,15E+07$  on subgingival plaque of the fixed partial denture (F). The difference between D and E is not statistically significant; while the difference is statistically significant both between D and F that between E and F. The mean of the *Prevotella intermedia* is:  $1,46E+05$  on supragingival plaque (G);  $5,65E+04$  on subgingival plaque of the natural teeth and  $1,65E+05$  on subgingival plaque of the fixed partial denture (H). The difference between G and H is not statistically significant.

**Conclusions.** The results of this study showed that in the subgingival plaque on the fixed partial dentures the concentration of bacteria is much higher than the subgingival plaque on the natural teeth and to the supragingival plaque. Also the concentration of the *Tannerella forsythia* in the subgingival plaque on the fixed partial dentures is much higher than the subgingival plaque on the natural teeth and to the supragingival plaque; while the concentration of the *Prevotella intermedia* is similar both in the subgingival plaque on the fixed partial dentures that in the supragingival plaque. Further, results of this quantitative analysis of clinical specimens suggest that the microbial population in the oral cavity is varied depending on periodontal health status and site of sample collection. Therefore, in patients with fixed partial dentures, careful oral hygiene is recommended. Future microbial studies are needed to evaluate all the microbial species present in supragingival and subgingival plaque in relation to socio-economic, systemic and local factors.



## CEREC CHAIRSIDE SYSTEM AND VIRTUAL ARTICULATOR

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**Aim.** we want to analyze an important tool of the newest software 4.2 Cerec chairside: the virtual articulator and compare it with the traditional articulator; we want to master if this tool is really an articulator or if it has only an occlusor function.

**Materials and methods.** to achieve the intra oral scans some steps are required: - make the teeth surfaces opaque with a sprayed coat of aluminum dioxide powder;- do the scans either on occlusal surface, vestibular and lingual surfaces with maximum 15°degrees of tilt;- finally the last scan with closed mouth in MIP (buccal byte). In this way we give to the software all the informations to realize the project. After the realization of virtual model it's important to correlate both arches in the software and we have to control the likeness between the occlusion in oral cavity and on virtual model. We have to correlate and check the correct position of the model on virtual articulator. At this stage of development the biggest difference between the virtual articulator and the traditional articulator is that on the virtual we can correlate the two arches only in MIP, while in the traditional we can correlate the arches in MIP and mostly important in CR. This make still a huge difference because in CR we can accomplish an occlusal analysis. For what concerns the traditional method we need:- the impression of both arches;- we have to deprogram the jaw muscles (if we want to register CR position). To complete the mounting on traditional articulator is mandatory to have the face bow registration and to take and trim the occlusion keys for mounting the models in correct position ( CR or MIP).

**Results.** we can say that in MIP position there is likeness between the occlusal contacts in oral cavity and those found on virtual models; likewise for the contacts on stone models mounted on the traditional articulator in MIP and those on virtual models.

**Conclusions.** the virtual articulator is still, at this stage, an occlusor that works in patient MIP but with the add of average anatomy values like an average value traditional articulator and the possibility of showing the VGP( virtual generated path of mandibular movement).The virtual articulator is an additional tool that improves the prosthetic restoration, it can be very useful for prosthetic restoration but in this moment we can't transfer on Cerec neither the face bow nor the patient's arches position in CR, then with Cerec we can mount only the models in MIP. Cerec Chairside make it possible to obtain very good results with all kind of restoration.



## **DIMENSIONAL STABILITY OF PERI-IMPLANT BONE TISSUE AND PAPILLA PRESERVATION: A RESTROPECTIVE STUDY**

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**Aim.** The purpose of this study is the retrospective evaluation of DIB value (peri-implant bone tissue dimensional stability) and Jemt Index (papilla preservation) of 47 IAC (Integrated Abutment Crown) over Bicon implants (Bicon Dental Implant, Boston, MA, USA) inserted in 23 patients between October 2009 and January 2013.

**Materials and methods.** T0 and T1 periapical x-rays performed accordingly to the long cone paralleling technique using a Rinn positioning system and a radiographic template in order to compensate possible distortions have been used in order to evaluate and assess the distance between the implant shoulder and both the first mesial (mDIB) and distal (dDIB) bone contact. Average values for each implant between T1 and T0 have been calculated, while the Jemt Index has been evaluated from photographs taken at T0 and T1.

**Results.** IACs of this study have been monitored for an average period of 24,6 month (6 to 48 months) with a survival percentage of 100%; 85% of IACs involved the restoration of posterior sectors. Within 8 cases we could register excessive plaque accumulation (mPLI 1,4) with colour alteration due to technical failure of the initial composite resin polishing; the composite resin, once properly polished, showed to be less irregular than ceramic material. Within 3 cases we experienced the failure of the connection, most likely due to the lack of connection itself for the presence of too much soft tissue: 2 stealth abutment of 2mm diameter within frontal sectors restoration and the third one being a 4.4 restoration with a 2mm diameter standard abutment. In all of the three cases the problem has been solved by cleaning the gingival sulcus with the use of a sulcus reamer and by successfully reactivating the connection. Average Jemt index (both distal and mesial) at T0 resulted to be 0 within 3 cases, 1 within 3 cases, 2 within 29 cases, 3 within 11 cases e 4 in 1 case while we assisted a spontaneous regeneration of the papilla in more than 50% of the cases at T1. We could also assess optimal marginal fit with only 5 cases affected by gingival recession; 2 of these cases regarded frontal sector and have been addressed correcting the IAC to the new marginal position while 3 cases were associated with peri-implantitis of the posterior sector.

**Conclusions.** This study shows how IAC system represents a valuable option for the prosthodontics rehabilitation. Optimal marginal fit, bone tissue stability within the bone ridge and papilla preservation are supported thanks to the particular design of the implant neck (sloping shoulder) the emispherical base design and the taper locking connection; thanks to the precision of the crown, the mechanical stability and performance of the bacterial seal and the construction of an individualized profile we are able to realize a highly valuable prosthetic restoration with optimal aesthetics, avoiding cement-induced misfit problems and optimizing every operational time.



## EVALUATION OF ABLATION EFFECT OF THREE DIFFERENT ULTRASONIC SCALER TIPS ON TITANIUM SURFACES

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**Aim.** During professional oral hygiene sessions particular care should be taken in order to not scratch or damage in any way the implant titanium surfaces and the surfaces of the prosthetic components. This damage might result in an increased bacterial colonisation causing a loss of osteointegration on dental implant. The aim of this work is to analyse and compare the effects of different ultrasonic scaler tips for EMS handpiece and to define the one resulting in less damaging and more effective in tartar removal. The experiments are made both in vitro and in vivo.

**Materials and methods.** To perform the research a compact ultrasound unit (miniPiezon EMS®) with three different scaler tips has been used: STS 3E (BL®), PH1 (Suprasson®) and Tip A (EMS®). For in vitro tests two different titanium grade 4 samples were used: the first one with sandblasted surfaces, the other one with polished surfaces. For in vivo tests fixed implant prostheses (Toronto type) were employed. Samples were subsequently observed with a digital electronic microscope Dino-Lite Digital Pro AD413T-A in order to evaluate the presence and the dimension of resulting damages.

**Results.** Confirming the visual observations, the scaler tip that cause the greatest damage to titanium surfaces, independently on the kind of sample, is tip A in stainless steel. Tip STS 3E, in silver alloy, results the less harmful in all samples, whereas tip PH1, in composite carbon, shows intermediate behaviour. All the three scaler tips involved in in vivo experimental study result to be effective in the plaque and tartar removal from Toronto implant prosthesis. Furthermore, none of the tips used during all the study break. As far as concern wear and tip's life, after the experiments tip A remains in almost new conditions. Tip PH1 reports only few damages while tip STS 3E shows an intensive wear. This last result contradicts what is reported in relevant literature.

**Conclusions.** On the basis of the experimental research performed, it is possible to identify tip STS 3E in silver alloy as the most indicated scaler tip to be used during professional oral hygiene sessions on implant surfaces. On the other hand its remarkable wear it's an economical drawback.



## EVALUATION OF MARGINAL GAP AND INTERNAL FIT OF COPINGS OBTAINED WITH CAD/CAM TECHNOLOGY, MADE WITH DIFFERENT MATERIALS AND IMPRESSION TECHNIQUES

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**Aim.** The aim of this study is to evaluate the marginal gap and internal fit of two groups of copings obtained with CAD/CAM technology. The first group counts 20 zirconia copings resulting from conventional impressions and digital scans, performed with different techniques and data acquisition systems while the second group includes 25 copings obtained with different materials.

**Materials and methods.** In the first part of the study, a single zirconia master model of a left maxillary first molar, prepared to receive a fixed restoration, was used to fabricate 20 zirconia copings divided into four test groups of 5 copings each. Five copings were obtained from scans of the model with the intraoral scanner and 15 from scans with the laboratory scanner: 5 obtained from the scans of the master model, 5 from the scans of the elastomeric impression of the model and 5 from the scans of the stone die resulting from the previous impressions. The zirconia master model was also used to fabricate 25 copings divided into five test groups of 5 copings each: 5 obtained by milling a zirconia block, 5 by milling a Co-Cr alloy block, 5 by die-casting of lithium-disilicate, 5 by milling a wax disc and subsequently investment casting of a gold alloy, 5 by milling a wax disc, manual finishing of the margins and investment casting of the same gold alloy. All the 45 copings were seated on the master die and digital photographs were made of the marginal area on three different positions of the model. The absolute marginal discrepancy was then measured using a calibrated digital software program. Afterward the internal fit of the copings was measured using a replica technique in which the internal gap between the coping and the abutment is reproduced by using an elastomeric impression material; the thin film was measured in five different points using a precision gauge. Statistical tests were made to determine the presence of statistically significant differences.

**Results.** In the first part of this study, the copings obtained from the scans of the stone die, showed the bigger average marginal gap and the bigger average internal gap. The analysis revealed a statistically significant difference between the four test groups. In the second part of this study, the gold alloy copings, that received the manual finishing of the margins, showed the smaller average marginal gap; the zirconia copings showed the smaller average internal gap. The analysis revealed a statistically significant difference between the five test groups.

**Conclusions.** In both the two parts of this study the statistical analysis showed differences between the tests groups. All the values obtained in this study were bigger than the ideal ADA values but in the literature acceptability range.



## EVALUATION OF MARGINAL PRECISION OF DIFFERENT IMPRESSION MATERIAL

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**Aim.** In the last years there has been an increase in the number of impression materials for fixed rehabilitations. Accurate reproduction of teeth or edentulous mucosa is of paramount importance in prosthodontics and restorative dentistry. Failures during the replication process will ultimately have an adverse effect on adaptation and fit of the prostheses. Tissue displacement is commonly needed to obtain adequate access to the prepared tooth and expose all the necessary surfaces, both prepared and unprepared. A good impression should record not only the finish line and all the prepared surfaces of the tooth, but also an area of unprepared tooth surface immediately beyond the finish line. An ideal impression material must have several characteristics including the dimensional stability, dimensional accuracy, and excellent elastic recovery, ease of manipulation, superior electroplating qualities and good shelf life. Therefore, the purpose of this study is to evaluate the precision of three different type of impression materials.

**Materials and methods.** Eight patients were chosen to receive fixed rehabilitation. Ten teeth were prepared and an impression with Permadyne was taken. On the cast from this impression a zirconia crown was made with CARA Cad Cam. Each coping was filled with a light white silicone and positioned intraorally onto the abutment. After setting, the coping with the white silicone attached was removed, and a harder fuchsia silicone was used to fill the internal space, simulating the clinical abutment.

The samples thus obtained were then embedded in acrylic resin having care of keeping the correct position of major axis. The resin blocks were sliced in the frontal plane and analyzed with optical microscope. Photos of different sections were taken using 1 mm=580 pixel calibration. In accordance to the literature, 45 sections with 90 measurements for each crown were performed. Other 3 different type of impressions (Impregum, Flexitime, Aquasil Ultra) were taken and the zirconia crown was checked in the same way, on the stone cast.

**Results.** The precision of the master impression is 0,074mm (Permadyne); for the impregum 0,076 mm; for the flexitime 0,076 mm and for the Aquasil 0,077 mm. The differences between the precision of the master impression and all other materials are statistically significant; however the clinical relevance is not significant.

**Conclusions.** The impression materials tested met the acceptable standard of marginal precision found in the literature about fixed prosthodontics (0,120 mm).





## EVALUATION OF PROSTHETIC COMPONENTS ON PERIIMPLANT PROBING: A CROSS SECTIONAL CLINICAL STUDY

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**Aim.** Correct occlusion and oral hygiene are critical to the long-term success and survival of dental implants. Overloading occlusion can upset peri-implant health and provoke inflammation that may lead to future peri-implant bone loss. The parameters used to evaluate the peri-implant tissues are: bacterial plaque, probing depth, bleeding on probing, keratinized mucosa width and crevicular fluid volume. The aim of this cross sectional study is to evaluate, by the relevations made by two independent operators, how the periimplant probing depth could be influenced, or not, by the presence, or not, of an implant supported prosthetic crown.

**Materials and methods.** The sample was formed by 7 patients, (5 females and 2 males, including 6 non smokers and 1 smoker) with at least one implant. A total of 18 implants were evaluated. For each implant has been executed 4 probings: with and without prosthetic crown, and then, after at least 15 days, by a second "blind" operator. Four probing points were set (mesial, distal, buccal, lingual e/o palatal). The accuracy of probings misurations independently done by the two operators has been calculated by the Paerson's correlation test. The unilateral Wilcoxon sum rang test was utilized to evaluate the presence of statistically significant differences between the probings done with and without prosthetic crowns. The level of statistical significance was set as  $\alpha=0.05$  and statistical power of 80%. All testing was performed by the use of SPSS 16.0 software package (SPSS inc, Chicago, Illinois, USA).

**Results.** By the data obtained with the periimplant probings recorded by the two operators clearly appears that there isn't any statistically significant difference between the probing made with the crown inserted and without the crown inserted, because the p values are all superior to the significancy level of the test ( $\alpha=0.05$ ).

**Conclusions.** Many studies have been recorded in literature regarding the confrontation of periimplant and parodontal probings, but a study regarding the influence of the prosthetic manufact was never done. This study tried to verify if differences between the sample implants with and without crown were present, but the limit of the study was the little amount of clinical cases. This preliminary clinical study underlined that probings made when the implant is supporting the prosthetic crown, or not, is not presenting statistically significating differences.



## EVALUATION OF TWO DIFFERENT IMPRESSION TECHNIQUES ON IMPLANT THROUGH OPTOMECHANICAL COORDINATE MEASURING MACHINE

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**Aim.** The passive fit is an important factor for the success and survival of an implant-retained prosthesis. The precise transfer of the three-dimensional intraoral relationships of implants from the mouth to the master cast is a critical step to get a passive fit. The aim of this study is to evaluate two different techniques in implant impression through optomechanical coordinate measuring machine.

**Materials and methods.** A titanium cast of a mandibular edentulous with six implant analogs was created to serve as a clinically relevant simulation (master cast). The six analogs (Certain implant lab analog 4.1 mm(D) IILA20 Biomax 3i) were positioned symmetrically to correspond to the mandibular first molar, first premolars and lateral incisors bilaterally. The master cast was measured with a coordinate measuring machine (SmartScope Flash, CNC 300 Optical Gauging Products), an optomechanical system that is capable of moving a measuring probe to determine the spatial coordinates of points on a workpiece surface. The samples were divided into two groups based on impression technique. The exact number of the samples for each group were calculated with a pilot study. Group A the coping pick up were splinted with a Duralay acrylic resin (GC Pattern Resin). The dental floss was used to create a matrix around the coping pick-up where to place the Duralay by means of the "Brush Technique". The splinting was allowed to polymerize for 4 minutes. The impression was made with a putty impression material. After the impression had polymerized, the transfers were unscrewed and the tray was separated from the master cast. Group B the coping pick up were splinted with a Duralay acrylic resin. The dental floss was used to create a matrix around the coping pick-up where to place the Duralay by means of the "Brush Technique". The splinting was allowed to polymerize for 4 minutes and after sectioned with a cutting disk to span the spaces between the adjacent coping pick-up. The splinting was rejoined with Duralay in the spaces between the transfers. This additional step was performed to reduce the effects of polymerization shrinkage. The impression was made in a similar procedure as the group A. Wilcoxon matched-pairs signed-ranks test (1-tailed) was used to compare groups. The impression were measured in the same manner of the master cast with the optomechanical coordinate measuring machine and analyzed by means of the aforementioned 3D CAD geometric modeling software (Rhinoceros 5.0 Beta, Robert McNeel & Associates).

**Results.** A statistically significant difference were present between the group A and the group B with a p-value=.001. The deviation in the center point position at each implant analog level were for group A along x-, y-, and z- axes respectively 10,11  $\mu\text{m}$ (6,4); 19,3  $\mu\text{m}$  (11,2); 7,37  $\mu\text{m}$ (5,3). The deviation in the center point position at each implant analog level were for group B along x-, y-, and z- axes respectively 10,46  $\mu\text{m}$ (5,4); 13,3  $\mu\text{m}$ (7,2); 3,37  $\mu\text{m}$ (2,3). The deviation of the center of the analogues of the group A is greater than the deviation of the center of the analogues of the group B.

**Conclusions.** The impression technique described in Group B is the most accurate and precise respect the impression technique described in Gruppo A.



## EXTRAORAL SURGICAL MODIFICATIONS AIMING TO FINALIZE THE REHABILITATION BY MEANS OF AN EPITHESES

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**Aim.** Many patients prefer masking a small defect with their own tissue rather than with a prosthetic restoration. It is safe to say however, that it is difficult, if not impossible, for the surgeon to fabricate a facial part that is as effective in appearance as well as a well-made prosthesis. The application of osseointegrated implants in facial defects has, in part, changed patient perceptions about facial prostheses because of the effectiveness of retention achieved.

**Materials and methods.** The choice between surgical reconstruction versus prosthetic restoration of large facial defects is difficult and complex and depends on the size and aetiology of the defect as well as the wishes of the patient. Surgical reconstruction of a small facial defects is possible and in most cases is preferable but a variety circumstances may dictate prosthetic restoration of rhinectomy-orbital defects. If recurrence of tumour is likely, it is advantageous to be able to monitor the surgical site closely. A prosthesis permits such observation, whereas primary surgical reconstruction may make it more difficult. Surgical restoration of large defects is technically difficult and requires multiple procedures and hospitalizations. Patients confronted with this type of defect are usually older and less able or willing to tolerate the multiple procedures required for surgical reconstruction. Increasing numbers of these types of tumors are being treated with radiation therapy. Reduced vascularisation, increased fibrosis, and scarring of the tissue bordering the defects increase the risk of complications associated with reconstruction. In many patients, a full course of radiation therapy precludes successful surgical reconstruction. Even when surgical reconstruction is deemed possible, significant delay may be necessary to ensure control of the tumor. Many surgeons prefer to wait at least one year after a large resection before beginning surgical reconstruction of a facial defects resulting from removal of malignant tumor. A prosthetical - guided surgical modeling may be in such cases a good help for obtaining a better success (stability retention and support) and prognosis of the prosthetic rehabilitation.

**Results.** The experience gained in the surgical treatment of defects resulting from surgical resection of tumors of the nose, eyes and ears has brought improvements in prosthetic prognosis. Careful study of the anatomical site to be treated, the treatment of bone and soft tissue margins and the use of implants osseointegration have led to these results.

**Conclusions.** Functional results of a well-made prosthesis allows the surgeon and the patient to monitor over time the wound, but the aesthetic results are very important for the social life of the patient, for that reason it is important to improve as much as possible the prognosis facilitating prosthetic rehabilitation the patient into society.



## FRACTURE RESISTANCE OF CAD/CAM VERSUS THERMOPRESSED LITHIUM DISILICATE CROWNS

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**Aim.** Lithium disilicate restorations are a common choice in modern prosthodontics; however, studies comparing the mechanical properties of lithium disilicate restorations produced via the four possible workflows are lacking.

The aim of this study was to investigate the fracture resistance of lithium disilicate crowns produced using either the CAD-CAM or thermopressing technique, with either a full contour design or a veneered core.

**Materials and methods.** Forty lithium disilicate crowns were produced using four different methods: full anatomic thermopressed crowns, full anatomic CAD/CAM crowns, veneered thermopressed crowns or veneered CAD/CAM crowns. The specimens were adhesively luted to composite tooth replicas and loaded to fracture in a universal testing machine.

**Results.** The mean fracture loads were  $3719.1 \pm 483.0$  N for monolithic CAD/CAM crowns,  $3626.4 \pm 283.0$  N for monolithic thermopressed crowns,  $3302.2 \pm 604.2$  N for veneered CAD/CAM crowns, and  $3754.3 \pm 484.9$  N for veneered thermopressed crowns. The fracture resistance of monolithic versus veneered specimens was compared by t-test; the data distribution was evaluated using the Kolmogorov-Smirnov test, while homogeneity of variance was verified with Levene's test. A two-way ANOVA was used to verify differences among the four subgroups. For all statistical analyses, the level of significance was set at 95%. No significant difference was detected in any test. The totality of the specimens showed a Type V fracture pattern, as every crown lost its marginal integrity and the roots were always involved; however, SEM observation revealed different fracture propagation between monolithic and veneered crowns. The comparable behaviour between veneered (i.e. CAD-CAM or pressed) and monolithic specimens could be explained by a less elastic core sustaining more of the load, and with a veneering ceramic that follows the deformation pattern until fracture.

**Conclusions.** Lithium disilicate single crowns exhibited adequate fracture resistance to withstand oral function, regardless of veneering/full contour modelling or CAD-CAM/thermopressing workflow.



## IMPLANT-SUPPORTED REHABILITATION IN A PATIENT WITH TARDIVE ORAL DYSKINESIA AND ORAL PARAFUNCTION: A CLINICAL REPORT

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**Aim.** Tardive dyskinesia (TD) is characterized by involuntary, repetitive and purposeless movements, which may involve chewing motions, cheek puffing, tongue protrusion and lip pursing. Most often TD represents a side effect of antipsychotic medications. Oral parafunctions (OP) include many activities occurring during the awake state, the commonest being prolonged steady mandibular postures and jaw clenching. They have been associated to psychiatric disorders as well as to psychosocial factors like stress and anxiety. Oral movement disorders may lead to prosthesis and implant failure due to excessive loading. We report on an edentulous patient suffering from drug-induced tardive dyskinesia (TD) and oral parafunction (OP) rehabilitated with implant-supported screw-retained prostheses.

**Materials and methods.** A 58-year-old Caucasian man complaining of unsatisfactory removable prostheses was admitted to the dental clinic. The anamnesis revealed history of alcohol abuse associated with psychiatric disorders. The patient was suffering from TD as a side effect of pharmacotherapy and was also suffering from OP. Six dental implants (NobelReplace, NobelBiocare, Göteborg, Sweden, as all the remaining implants) were placed in the maxilla (T0) and the patient was provided with a provisional complete denture to wear during a 24-week healing period. The mandible was rehabilitated with 6 dental implants and immediately restored with a provisional screw-retained acrylic bridge. A group function occlusal scheme was created, with accurate control of contacts in intercuspal position, lateral and protrusive movements. This occlusal scheme was maintained in both provisional and final prostheses. At 32 weeks, a complete mandibular implant-supported screw-retained prosthesis was finalized with composite teeth and milled titanium framework. At monthly follow-up visits, acrylic maxillary provisional prosthesis often showed breaks, thus it was repaired and relined. At 36 weeks, the implant in 1.1 position failed. It was therefore removed and substituted with a larger implant. At the same time point, the remaining maxillary implants were loaded with a provisional implant-supported screw-retained acrylic prosthesis. Four weeks later the implants in 2.2 and 2.6 positions failed, with no sign of infection. The implant in 2.2 site was replaced with a larger one. This was not possible for the 2.6 implant, thus an implant was inserted distally, in 2.7 position. An additional implant was placed in 1.7. A provisional acrylic bridge was then placed, using all the maxillary implants. At 44 weeks, the implant in 2.4 site showed severe marginal bone loss, which was managed by means of a deproteinized bovine bone granular graft. Despite this intervention, the implant failed at 48 weeks and was replaced with a longer implant. Another implant was positioned in the 2.3 area. At 60 weeks, the maxillary acrylic bridge broke in two pieces, and implants 2.4 and 2.7 were removed, due to their loss of osseointegration in the absence of infection signs. Implants were placed in 2.6 and 2.7 sites. A new acrylic full arch bridge was screwed to all the maxillary implants. At 72 weeks, the patient was provided with a maxillary screw-retained prosthesis with composite teeth and milled titanium framework. From this moment to the 96 weeks follow-up visit, no further maxillary implant was lost and the prosthesis performed satisfactorily.

**Results.** Over 24 months, implant success rate was 57% in the maxilla and 100% in the mandible. TD was a stable condition. Patient's compliance in controlling OAP was poor. Prosthetic complications as well as implant failures ceased once the patient worn the final prostheses, which was reinforced with a titanium bar.

**Conclusions.** Abnormal occlusal loads related to TD and OP played a key role in prosthetic breaks and implant failures. The use of a rigid prosthetic framework is advisable. Further studies to investigate the relation between movement disorders and implant-supported rehabilitations are needed.



### IN VITRO RETENTIVE STRENGTH OF LITHIUM DISILICATE CERAMIC CROWNS CEMENTED WITH DIFFERENT CEMENTATION SYSTEMS

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**Aim.** To measure the retentive strength of lithium disilicate ceramic crowns cemented on extracted human teeth using two different cementation systems.

**Materials and methods.** Twenty extracted restoration-free human premolars were stored in physiological solution until they were embedded in an autopolymerizing acrylic resin (ProBase Cold Ivoclar Vivadent). A standardized chamfer preparation was completed using a parallel milling machine to ensure standard preparation for each teeth. After preparation, an anatomic crown was waxed on each tooth and then hot pressed using lithium disilicate ceramic (IPS e.max PRESS, Ivoclar, LT A1). Therefore the specimens were randomly divided into two groups (n=10) according to different cementation system:

- Group A: adhesive resin cement (Multilink Automix, Ivoclar Vivadent),
- Group B: glass-ionomer cement (Vivaglass Cem, Ivoclar Vivadent).

The ceramic crowns of the group A were etched with 5% hydrofluoric acid (IPS Ceramic, Ivoclar Vivadent) for 20 second, then rinsed and cleaned in pure alcohol in ultrasonic bath. Therefore the crowns were treated with universal primer (Monobond Plus, Ivoclar Vivadent) and dried with hot air. The teeth were cleaned and dried, and then adhesive (Multilink Primer, Ivoclar Vivadent) was brushed on. The cement (Multilink Automix, Ivoclar Vivadent) was applied on the internal surface of the crowns and then these were seated on the prepared teeth until the end of polymerization. For the group B, the glass-ionomer cement (Vivaglass Cem, Ivoclar Vivadent) was mixed and applied on the internal surface of the crowns and then these were seated on the teeth. After cementation, all the crowns were embedded in an autopolymerizing acrylic resin block. Each specimen was connected to Instron 4467 Universal Testing Machine by a hook, and the crown was pulled off at a crosshead speed of 1 mm/min. Failure load in Newtons (N) and failure mode (decementation vs. fracture) were recorded for each specimen. The Kolmogorov-Smirnov test was used to verify the normality of data distribution. Failure load data were analyzed with one-way analysis of variance (ANOVA). Failure modes were compared using Pearson's Chi-square test.

**Results.** Group A specimens ceramic crowns cemented with adhesive resin cement showed mean failure load of 306,6 N. Group B specimens ceramic crowns cemented with glass-ionomer cement showed mean failure load of 94,6 N (table). Ninety per cent of specimens cemented with adhesive resin cement presented a tooth fracture apical to the cement-enamel-junction (Fig. 4), whereas 60% of specimens cemented with glass-ionomer cement were decemented from the prepared tooth (Fig. 5) (chart). The Analysis of Variance (ANOVA) showed a statistically significant difference between two cements for the fracture load ( $p=0.004$ ), and the Pearson's Chi-square test showed a statistically significant difference between the two groups for the type of failure mode ( $p=0.03$ ).

**Conclusions.** Within the limitations of this in-vitro study, lithium disilicate crowns cemented with adhesive resin cement have an higher retentive strength than those cemented with glass-ionomer cement.



## IN VITRO STUDY ON THE VOLUMETRIC VARIATION OF GLASS FIBRE ENDODONTIC POSTS AT DIFFERENT TEMPERATURES

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**Aim.** The use of endodontic posts as a retention tool of the coronal restoration enables the restoration of decoroned or structurally compromised teeth formerly destined to avulsion. Their use is therefore necessary when there is not a sufficient residual coronal structure which can ensure a suitable retention for prosthetic restoration or for the composite material used for the cosmetic and functional restoration of the dental element. According to the principle for which all bodies, once heated, face dimensional variations, the aim of the present study is first to quantify in vitro the dimensional variations happening in glass fiber posts at different temperatures; and then to assess if the potential deformation can compromise the lifespan of the prosthetic restoration in time.

**Materials and methods.** We used 10 posts of conical shape, conicity of 6°, length of 25 mm and diameter of 3.12 mm at the basis and 0.5 mm on top. Each post, before the tests were performed, was measured with a caliper as to confirm the dimensions declared by the producer. By means of an optical-computerized system, we obtained the image of the post at 18° C. then, other images were obtained after heating the posts up to 38°, 60° and 150° C. The comparison among all the different images through a computerized system enabled the measurement in micron of the dimensional variation, expressing it in terms of tip defluxion, axis elongation and minimum volumetric increase.

**Results.** Administering heat causes dimensional variations in glass fiber posts, both axial and transversal. These deformations progressively increase with a linear ratio along with the temperature increase. At temperature values usually present in the oral cavity, we observed, on the transversal plane, an average defluxion of 3 micron in the samples, whereas on the axial level the average defluxion was 25 micron.

**Conclusions.** The deformation observed in vitro may determine, once in vivo, tensile strain resulting in microfractures and therefore in a slow and insidious seepage of the restoration. It would also be necessary to evaluate in vivo the working of the post, taking into consideration its role in an integrated system where a key role is played by the cement.



## INFLUENCE OF CROWN IMPLANT RATIO ON MARGINAL BONE LOSS AROUND IMPLANTS: A PRELIMINARY STUDY

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**Aim.** The aim of this preliminary study was to investigate the influence of Crown/implant ratio on marginal bone loss around implant with a length of 7 and 8.5 mm.

**Materials and methods.** This clinical and radiological retrospective study was conducted at the Dentistry Clinic of the University of Padova (Italy).and involved with The implants were 7 or 8.5 mm in length and 3.75 or 4 mm in diameter. Patients were invited to attend a radiographic and clinical follow-up and their previous clinical files and x-rays were assessed. Radiographic measurements were taken on standardized periapical radiographs obtained by an experienced radiologist using the long-cone technique and the Rynn system (XCP Instruments, Rinn Corporation Elgin, IL, USA). A digital radiological system was used (Vario DG, Sirona Dental System, Bensheim, Germany). The landmarks were established twice, 1 week apart, by two examiners reaching a consensus. Linear distances between landmarks were measured in millimeters. The following linear measurements between landmarks were taken (1) anatomical crown length (perpendicular distance from the implant shoulder to the most coronal aspect of the crown); (2) anatomical implant length (perpendicular distance from the implant shoulder to the most apical aspect of the implant); and (3) crestal bone level (perpendicular distance from the implant shoulder to the first visible apical bone-to-implant contact in the mesial and distal aspects of the implant). Real measurements were calculated with the rule of three using the real implant length or the distance between threads as the reference values. The precision of the radiographic measurements was calculated by comparing the values of the first and second radiographic readings. The marginal bone loss was measured from radiographs using an image analysis software. The implant-prosthesis combinations were classified by crown-implant clinical ratio in two groups ( $C/I \leq 1.5$ ;  $C/I \geq 1.5$ ).The Wilcoxon signed rank test was used to compare the two groups.A multilevel regression model was built to analyze factors influencing marginal bone loss (MBL)with three levels:  $C/I \geq 1.5$ ;  $C/I \leq 1.5$  and implant lengths.

**Results.** A total of 290 supporting 283 prostheses, 119 patients (26 men and 93 women) 3i<sup>®</sup> implants (Biomet 3i Implant Innovations, Palm Beach Gardens, FL, USA), implanted between May 1992 and September 2003 were measured and included in the study. One hundred and forty six implants were 7 mm in length and one hundred forty four implants were 8.5 mm in length.The mean crown-to-implant ratio was 1.57 and 1.39 for 7 and 8.5mm short implants, respectively.No significant difference was calculated between the two groups ( $P=0.4$ ). There are no statistically significant differences between variables  $C/I \geq 1.5$ ;  $C/I \leq 1.5$  and implant lengths.

**Conclusions.** The  $C/I \geq 1.5$ ;  $C/I \leq 1.5$  and implant lengths have not a significant influence on marginal bone loss around the short implants.





## INFLUENCE OF FINISH LINE ON THE MARGINAL SEAL OF NANOHYBRID COMPOSITE CROWNS AFTER PERIODONTAL SCALING: A MICROLEAKAGE STUDY

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**Aim.** Although metal ceramic restorations are still the approach of choice for the fixed prosthetic rehabilitation of a single tooth, composite crowns are gaining popularity thanks to the recent evolution of both composite resins and adhesive systems. The lower price and shorter time needed for the fabrication of composite restorations represent a further advantage. Full coverage indirect composite restorations can thus be a viable and conservative—at least interim—treatment option, especially in presence of circumferential enamel. Mechanical periodontal maintenance has the potential to cause surface alterations on composite restorations and to compromise the integrity of the interface between tooth and restorative material. The aim of the present study was to assess the microleakage of indirect full coverage nanohybrid composite restorations prepared with two different finish lines exposed to mechanical periodontal treatment.

**Materials and methods.** Sample size calculation was performed referring to previously published data ( $\alpha=0.05$ ;  $\beta=0.20$ ;  $\delta=1.0$ ;  $\sigma=0.8$ ). Sixty extracted caries-free mandibular molars were randomly distributed to four groups ( $n=15$ ) based on finish line and periodontal treatment: G1, 90° shoulder; G2, beveled 90° shoulder; G3, 90° shoulder and periodontal scaling; G4, beveled 90° shoulder and periodontal scaling. Standardized preparations were performed with diamond burs and Arkansas stones positioning the margin 0.5 mm coronal to the cemento-enamel junction. Polyether impressions of teeth (Permadyne Perma L, 3M ESPE) were taken and master casts (Fuji Rock, GC Corp.) obtained. Crown buildup was carried out by a single experienced dental technician with a nanohybrid composite (Adonis, Sweden & Martina). A self-adhesive dual-cure resin (Biscem, Bisco) was used for cementation of crowns. Groups G3 and G4 were subjected to the equivalent of five years of semestral mechanical periodontal scaling with Gracey curettes used with controlled force (2 mm long strokes, 5 N). All specimens were covered with isolating varnish with the exception of the interface level and immersed into a methylene blue supersaturated solution at 25°C for 10 minutes. After double longitudinal sectioning, microleakage was assessed by stereomicroscopic observation and image software analysis. Four linear infiltration readings per tooth were made and the worst value was considered for the statistical analysis, which was carried out with by means of Kruskal Wallis and Mann Whitney tests ( $p<0.05$ ).

**Results.** Marginal microleakage of untreated control crowns was  $1.53\pm 1.27\%$  and  $17.60\pm 12.72\%$  of the length of the adhesive interface in G1 and G2, respectively. The simulated mechanical periodontal instrumentation significantly reduced the amount of dye penetration ( $p<0.001$ ) with G3 not leaking at all and G4 presenting infiltration along the  $5.58\pm 1.84\%$  of the adhesive interface. The bevel preparation significantly worsened the marginal seal both in control and treated crowns ( $p<0.001$ ).

**Conclusions.** Under the conditions of the present study adding a bevel to a 90° shoulder preparation significantly increased the linear microleakage, so that its preparation is not advisable. Conversely, the simulation of periodontal maintenance caused the microleakage to drop to zero (90° shoulder) or at least decrease (beveled 90° shoulder). The clinical relevance of this latter finding, possibly deriving from the compaction of amorphous debris at the marginal level, must be ascertained.



## INFLUENCE OF INCREASING THE NUMBER OF IMPLANTS AND INCORPORATING A TITANIUM FRAMEWORK ON OCCLUSAL STATIC LOAD TRANSMISSION IN A MAXILLARY FULL ARCH PROSTHESIS

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**Aim.** The aim of this study was to estimate the masticatory load distribution to the implants and the bone, on maxillary All-On-Four™ and All-on-six™ rehabilitations, using a finite element analysis. Particular attention was paid to the influence that increasing the number of implants from 4 to 6, and incorporating a titanium framework within the prosthesis, have on stress distribution.

**Materials and methods.** 3D models of a maxilla, including cortical and spongy bone, a resin prosthesis, titanium implants and a titanium framework were reconstructed from CBCT images. Four different configurations were considered by varying the number of implants and by modeling the presence or absence of a titanium reinforcement inside the denture. A structured analysis was carried out for these four configurations using the finite element method. Moreover, two loading conditions were taken into consideration: a vertical force of 500 N applied on the distal cantilever of the prosthesis, and a vertical force of 200 N applied in on one of the central incisors. A von Mises stress distribution and its maximum value were evaluated for each configuration and under these loading conditions.

**Results.** Increasing the number of implants leads to a stress decrease in all the components. The stiffening of a prosthetic structure by means of titanium framework leads to a significant reduction in the maximum stress values on both the prosthesis and bone, thereby potentially reducing the risk of prosthesis fracture and/or loss of osteointegration. On the other hand, the stress inside the implant increased in direct proportion to the stiffness of the prosthesis, which may depend on either the thickness of the resin or the presence of a titanium framework. This stress on the implants is anyway far from the fatigue fracture of the implant itself.

**Conclusions.** In a maxillary full arch on implants, increasing the number of implant always reduces the stress transmitted to the implants, the bone and the prosthesis. Stiffening of the prostheses by means of a titanium framework reduces the stress in the bone and the prosthesis itself, but increases the stress within the implants. Although the fixed rehabilitations on implants do have some statically indeterminate situations from a mechanical point of view, which can be well represented by mathematical calculations, the finite element analysis (FEA) has some limitations when applied to the investigation of biological and physiological phenomena that, at least in the human body, are subject to variability.



### MAXILLARY OVERDENTURE RETAINED WITH AN IMPLANT-SUPPORTED CAD-CAM BAR: A PRELIMINARY STUDY

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**Aim.** According to the Glossary of Prosthodontic Terms definition, 'overdenture' is a removable prosthesis, partial or total, supported by one or more residual natural teeth, roots or implants. The objective of the present study is the critical re-assessment of implant-prosthetic treatment plans in patients with total maxillary edentulism. The clinical success criteria of the study comprise:

- optimal aesthetic integration of the prosthetic rehabilitation in the smile exposure and the impact of the front group in the facial context;
- prosthetic retention and stability;
- restoration of masticatory function;
- easy access to home oral hygiene manoeuvres.

**Materials and methods.** Four patients with maxillary edentulism were selected. In the surgical phase Xive® S (Friadent GmbH, Mannheim - Germany) implants were used with minimum lengths of 9.5 mm and maximum lengths of 13 mm; diameters ranged between 3.4 and 3.8 mm, cylindrical geometry. In each patient were located, in only one surgical time and through guided surgery, four implants in location 1.5-1.2-2.2-2.5 as to achieve a support polygon eliminating all overdenture rotation axis. After waiting for the osteointegration to be completed, from the models we collected data with a specific scanner and a 3D virtual product was elaborated with the computer (CAD). Once the elaboration was completed, the files were sent through electronic transmission to the production plant for the following CAM milling of the product according to industrial quality standards. The next step is the intraoral test of the main connector in order to test the fitting with the bar.

**Results.** In the four patients selected for our study the implants survival was 100% after three years. After 2 years, only one peri-implantitis case occurred in two distal implants, temporarily solved with antibiotic treatment. Then, after 2 years since the beginning of the prosthetic load, a relapse in the same zones required surgery which definitely solved the peri-implantitis with a 50% bone loss on both distal implants. We always achieved a high comfort for patients thanks to the considerable stability of the overdenture and the lack of prosthetic palate.

**Conclusions.** Among the advantages given by a bar-supported overdenture as compared to the rehabilitation with fixed-type implant support, there are:

- 1) an easier and more predictable aesthetic management;
- 2) in presence of extended bone atrophy, it enables avoiding the GBR;
- 3) easy home hygiene, it can be removed at night and it is therefore the ideal solution for bruxistic patients;
- 4) the total implant support reduces bone crest resorption;
- 5) possibility to avoid resin palate in prosthetic design, ensuring more comfort and less emetic reflex.



## **MOLAR UPRIGHTING WITH ORTHODONTIC MINISCREWS FOR PROSTHODONTIC PURPOSE: A CLINICAL CASE REPORT FOR THE MONOCORTICAL ANCHORAGE**

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**Aim.** The purpose of this report is to present the efficiency of orthodontic miniscrews in the adjustment of a correct occlusion as a valuable option compared to the traditional orthodontic treatment.

**Materials and methods.** Periapical x-rays performed accordingly to the long cone paralleling technique and using both a Rinn positioning system and a 31x41mm copper plated grid have been used in order to evaluate and assess the amount of the movement between T0 and T1.

The case report is about a 37 years old non-smoker man in good health; following the loss of 4.6, the patient showed reduced prosthetic space and mesioinclination of 4.7. In order to obtain the orthodontic anchorage it has been inserted a 2mm radius x 11mm length, bracket-shaped miniscrew on the alveolar ridge distal to the 4.7, with a vertical inclination of about 30°. This kind of placement of the miniscrew allows the bracket-head of the screw to be as closest as possible to the centre of resistance of the tooth that needs to be relocated favouring its movement.

The miniscrew has been activated with elastic chain immediately after the placement of composite cleats on the vestibular and lingual surfaces of 4.7 with an initial force of 50 g per side. The force has been gradually increased to 150-200 g per side during the following appointments.

**Results.** Distalization of 4.7 has been obtained as a result of the treatment, creating therefore the adequate prosthetic space. The elastic chains have been replaced with coated ligatures three months after the beginning of the treatment in order to maintain the obtained space; a 4,5 x 8 mm, 3 mm neck (Bicon Dental Implant, Boston, MA, USA) has been inserted and will be loaded after three more months.

**Conclusions.** Most case reports found in literature present the insertion of orthodontic miniscrew trough attached gingiva; peri-implant inflammation is reported to be one of the principal causes of the mobility of the miniscrew, with many case reports suggesting that the insertion of the miniscrew trough the buccal mucosa could lead to peri-implant inflammation worsening. A study of the Iowa University confirmed that the vertical insertion of the miniscrew inside the alveolar ridge does not affect its anchorage, therefore considering favourable the insertion of the miniscrew within a vertical direction in order to pass through keratinized tissue. Many studies showed that traditional distalizing systems often cause unwanted movement of the anchorage teeth. In this case it has been possible to selectively upright the second lower-jaw molar with few collaboration from the patient obtaining optimal dento-alveolar alignment and recovering the lost space thanks to the usage of orthodontic miniscrew.



## OVERDENTURE: CLINICAL STATISTICAL CONTRIBUTION

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**Aim.** Evaluation of the results with immediate and delayed loading protocols for mandibular overdentures on two endosseous implants placed in the area interforaminal (Preiskel, 1996; Batenburg et al., 1998). This method has the advantage of allowing the prosthetic rehabilitation implantoprosthesis immediate/delayed chewing function with obvious positive psychological and functional implications for the patient.

**Materials and methods.** The study performed at the Department of Prosthodontics, Department of Neuroscience and Reproductive Sciences and Dentistry, University of Naples Federico II, on a sample of 96 patients (63 men, 33 women), aged between 55 and 70 years, for a total of 192 plants. All patients had an edentulous mandible and needed an implant-prosthetic rehabilitation "overdenture". The patients were randomly divided into two equal groups of 48 patients of which, the first group received the application of the prosthesis with immediate load unlike the second group to which was applied the prosthesis after 6 weeks after the insertion of the systems. In the first group, rehabilitation proceeded to the construction of the prosthesis, we evaluate the occlusal functionalization and controlling the length of the flanges of the denture base and then the implants are placed in the area biomechanically more favorable. In the second group only after six weeks of waiting for osseointegration we proceeded to the application of the overdenture.

**Results.** Appropriate controls (15 days, 30 days, 3 months, 6 months and 12 months) to assess the need for any relining of the prosthesis and proper hygiene maintenance peri-implant (Tawse -Smith et al., 2002) are essential for ensure, in this type of prosthetic rehabilitation, a favorable prognosis in the long term (Sanfilippo F., A. Bianchi, 2005; L. Malchiodi, 2003) and the restoration of orofacial motor performance (Fontijn - Tekamp et al., 2000, 2004). Our results as a result of clinical and statistical evaluation showed no statistically significant differences between the two groups for the results of implant survival (95% at 36 months) and comfort perceived by the patient's rehabilitation.

**Conclusions.** The simplicity (Jagger et al., 2001) and the economy (Mericske -Stern et al., 2000) of the treatments allows for optimal resolution prosthetic well accepted by the patient with good control of fonesi (Zitzmann and Marinello, 1999), the retention (Jagger et al., 2001) and stability (Davis and Packer, 1999) of the prosthesis. Also allow us to state that both protocols can provide good results compared to more complex and expensive methods and can be considered as a possible standard procedure in rehabilitations total edentulism. We reserve the right to supplement and complete later on, with the next note, a more in-depth analysis and failures.



## PATIENTS' SATISFACTION EVALUATION OF SHORT IMPLANT RETAINED RPDS BEFORE AND AFTER IMPLANT ANCHORAGE: PRELIMINARY RESULTS

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**Aim.** In partial distal edentulism, where the ridge bone is often severely reabsorbed and the use of conventional length implants is not possible, short implants could be a viable treatment option, to improve retention, function, the maintenance of the residual structures and the psychological comfort of the patient. The purpose of the study is to evaluate the psychological advantages and the satisfaction regarding the prosthetic rehabilitation of patients treated with short implant retained RPDs before and after implant anchorage.

**Materials and methods.** All RPD patients with a I or II Kennedy Class rehabilitated at the Prosthodontic Department of the Dental School of Turin between 2004 and 2011 were recruited. Patients who met clinical and radiological inclusion criteria were selected and eventually joined the project, given the informed consent. Patients' psychological state was checked by means of the Beck Depression Inventory test and the Rosenberg self esteem scale. Patients were then asked to fill in a prosthetic satisfaction form, regarding the level of comfort during function, the painfulness, the stability of the prosthesis and the amount of time spent wearing the prosthesis. The form was made of seven questions that patients had to answer using a visual analogue scale (VAS), from zero to ten. Functional tests were performed as well, to evaluate patients' masticatory cycles pattern and masticatory efficiency. Short implants were inserted according to the delayed loading protocol, and after the second surgical time was carried through, the prosthetic anchorage was performed using locator attachments. Following a clinical and radiological evaluation, the same tests done before, both the functional ones and the satisfaction form, were repeated again after the anchorage and at the follow up time.

**Results.** As far, 7 patients out of 12 completed the program. Preliminary psychological tests revealed no signs of depression and a medium-high level of self esteem, therefore the patients' type of edentulism doesn't seem to be related to depression or low self esteem. As it can be inferred comparing the results of the satisfaction forms before and after implant anchorage, patients' satisfaction increased significantly, showing a better adaptability and a more positive attitude towards the rehabilitation. The fundamental improvement revealed through the VAS score was the increase in the RPD stability, perceived by 7 out of 7 patients; similarly, 7 patients out of 7 scored an improved comfort with the implant anchored RPD; in 4 patients pain decreased, while the other 3 didn't have pain either with the old or the implant anchored prosthesis. 6 patients claimed an improved chewing ability, while for only one the perceived masticatory performance remained unvaried. 5 patients out of 7 decreased cheek biting with the implant anchored prosthesis, while 2 didn't bite their cheeks either with the old or the new prosthesis. In 4 patients the number of hours spent wearing the prosthesis increased, while in the other 3 remained unvaried. 3 patients improved their speaking ability, while for the other 4 it remained unvaried.

**Conclusions.** In the light of these preliminary data, short implant retained RPD allows to improve patients' psychological comfort and satisfaction, enhancing the prosthesis stability and function. Further investigations are needed to prove if this improvement is maintained throughout time.



## **P-CHECK (CHECKING PROSTHESIS): AN USEFUL DEVICE TO ACHIEVE A PROPER FUNCTION AND EXCELLENT AESTHETICS OF FIXED PROSTHESES**

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**Aim.** During the "full-arch" implant rehabilitations, often the temporary prosthesis does not show adequate informations about the final prosthesis. Incorrect evaluation of temporary prosthesis can lead to significant changes. Nowadays the main requirements for a prosthesis "Perfect" are: proper function and excellent aesthetics. Often, the proper planning of the temporary prosthesis can be the key to clinical success.

**Materials and methods.** Calabrodental has developed the P-check (checking Prosthesis): it is a device that reproduces the dental arches, and it must be used in intermediate stages of testing, the P-check allows us to verify and correct any defects on dental impressions that are sent to the laboratory. The cad-cam technology allows us to produce prototypes of P-check with different materials: P-Check Aluminium: a prototype built in aluminum allows us to verify the reliability of the master model and the position of the implant being played through the dental impression. The fit and passivity checked on the P-check will be replicated exactly on the final structure. Integral P-check: a prototype constructed of plastic material, this prototype reproduces the final size of the final prosthesis, in addition, it allows you to view before the aesthetic conformation and the dynamics of chewing, so this information will be reproduced on the final prosthesis.

**Results.** Clinical aspects: at the intermediate stage of testing, timely and targeted intervention of any discrepancies in the oral cavity allow to reformulate correctly the dental impression of the clinical case to be rehabilitated, reducing or completely eliminating additional remedial sessions

Innovative aspects: the rigidity of aluminum, used as a material mainly used in the construction of the P-check, guarantees a great precision in the control of suitable accommodation of the prosthesis.

**Conclusions.** The certainty that all clinical details will be transferred in a proper and reliable manner on the final prosthesis is the winning premise for an excellent result. This technique, the P-check, is a technique that combines the traditional technique of control over the temporary prosthesis, and the innovation introduced by the technology of CAD / CAM. This method allows to reduce both the errors of the technical evaluation, both aesthetic differences that often the patient detects between the provisional and final rehabilitation.



## **POLYMER FIBRE: SHOCK ABSORBING BIOMATERIALS. VISCOELASTIC MATERIALS FOR PROSTHETIC-IMPLANT REHABILITATION IN BRUXISM**

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**Aim.** Bruxism is the primary cause of prosthesis overloading which may result in biomechanical complications to implant abutments eventually leading to failure. However no shared guidelines are available yet. Therefore the problem is being approached with the introduction of new materials providing ameliorative biofunctional aesthetic and economical solutions thanks to their properties.

**Materials and methods.** Clinical analysis and rehabilitative prosthetic projects are supported by the choice of biofunctional materials. Their biomechanical characteristics represent an essential factor for a successful prosthetic implant. Polymer fibre materials overcome the system lack of resilience stimulating osseointegration and bone induction and promoting evident aesthetic qualities. More specifically biomaterials are employed in the realization of prosthetic abutments, both threaded and cementable with shock absorbing polymer fibres according to the Speedy Implant System. Their realization is carried out in laboratory or directly in the oral cavity. The chemical inertness of the marginal tissue physiology. Its mechanical properties are excellent. The material shows an elastic modulus equal to  $54 \pm 1$  GPa, resilience equal to  $300 \text{ KJ/m}^2$  and a remarkable fatigue load resistance: three-point bending test over 2,000,000 cycles without rupture (ISO 10477). Such properties make the bone-implant proprioceptive phenomenon atraumatic. Lithium disilicate crowns are sealed with composite resin cement.

**Results and conclusions.** The "mucous-abutment" seal control shows a better performing "epithelial attachment" compared to the metal-based ones resulting in a minimum trauma, patient comfort, high functionality and aesthetic qualities and remarkable operational cost-containment.





## POST- RHINECTOMY REHABILITATION BY MEANS OF AN EPITHESES

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**Aim.** Maxillo facial defects may be due to cancer surgical intervention or be secondary to traumas and congenital defects. Surgery for cancer leads often to extended tissues losses with major functional (speech, swallowing, eating) and aesthetical limitations, causing psychosocial difficulties. The rehabilitation must therefore be realized as soon as possible to bring the patient to a normal life. Those defects may be rehabilitated with plastic surgery or with prosthetic devices. In nasal defects in particular, especially in elders, (after total or partial rhinectomy) prosthetic rehabilitation is indicated. This paper aims to present a case report of a traditional rehabilitation with epithesis after total rhinectomy.

**Methods and results.** The patient has been visited by the dentist 10-15 day after the cancer surgery for a first impression. First impression has been realized after having blocked out undercuts with gauzes and vaseline. The impression has been taken with a polysulfide or an alginate. The nasal cavity has to be closed with gauze for blocking the flux of the impression material in the cavity itself. A sort of a handle of stone has been realized for taking out the impression. The impression has been poured, a stone cast obtained on which the waxing of the nose will be realized. A pre-surgical impression of the physiological shape of the nose is usually very useful for obtaining a more satisfying result. Furthermore a study of previous pictures of the patients can be also useful for capturing shape, dimensions, asymmetries, and colour particularities of the part to be realized. In realizing the epithesis the adaptation to the soft tissues of the contour of the defect is one of the most critical difficulties in shaping the prosthesis. The wax up is tried-in with the patient and then the final epithesis is realized in silicon. The shading is tried-in with the help of the patient. Finally the epithesis can be retained in the right position with just the help of adhesives or, when it is possible with osteointegrated implant placed in the residual bone around the defect.

**Conclusions.** The success of the rehabilitation depends on a meticulous study and planning of the rehabilitation, a good interdisciplinary collaboration with oncologists and surgeons, but also, and most of all, in some cases, to a good communication between patient and operator, sharing most of the clinical decisions.



## POSTERIOR CAD-CAM COBALT-CHROMIUM ALLOY SINGLE CROWNS: ONE-YEAR PROSPECTIVE CLINICAL STUDY

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**Aim.** Dental base metal alloys are worldwide increasingly utilized, because of their favourable mechanical properties, lower cost, compared to precious alloys, and good esthetic appearance. Nonetheless, in the past some drawbacks mainly due to the casting procedures have limited their use. Today the clinical application of these alloys has been widened, thanks to two innovative fabrication techniques: Computer- Aided Design/Computer-Assisted Manufacturing (CAD-CAM) and laser-sintering. The aim of the present prospective study was to evaluate the clinical outcomes of CAD-CAM cobalt-chromium (Co-Cr) based single crowns supported by natural teeth after 12 months of clinical function.

**Materials and methods.** Twenty-five CAD-CAM Co-Cr single crowns were fabricated and used in 25 consecutive patients, in the molar or premolar sites. Specific inclusion criteria were taken into account and the tooth preparations were standardized. CAD-CAM Co-Cr frameworks were fabricated and layered using veneering ceramic, according to the manufacturer's instructions. The restorations were luted using glass-ionomer cements. The patients were recalled at follow-up 1, 3, 6 and 12 months after cementation. The survival and success rates of the restorations were evaluated. The technical and aesthetic outcomes were examined using the United States Public Health Service criteria. Moreover, the biologic outcomes were analyzed at abutment teeth and at contralateral teeth as control, and descriptive statistics were performed.

**Results.** All of the 25 Co-Cr single crowns were examined during 12 months of clinical function. No patient was lost at follow-up or censored. As to technical complications, neither fractures of the frameworks nor chipping of the veneering ceramic were observed. The cumulative survival rate was 100% and the cumulative success rate was 100% after 12 months according to Kaplan–Meier. No losses of retention were recorded. Twenty-four restorations were rated Alpha in all the measured parameters. According to the Wilcoxon test, the periodontal parameters of the test and the control teeth were not significantly different. Furthermore, the single crowns had no effect on the periodontal parameters after 12 months of clinical function.

**Conclusions.** Within the limitations of the present study and its short observational period, the excellent survival rates of posterior CAD-CAM Co-Cr single crowns allow to address this kind of restoration as a valid treatment option and a viable alternative to noble metal-ceramic single crowns.



## PROSTHODONTIC REHABILITATION FOR TOTAL GLOSSECTOMY WITH AN IMPLANT-"O" RING ATTACHMENT ASSISTED TONGUE PROSTHESIS: A CLINICAL REPORT

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**Aim.** The purpose of this clinical report is to describe an approach to design and fabricate an implant-O ring attachment assisted tongue prosthesis for a patient with total glossectomy, after cancer surgery.

**Materials and methods.** A middle aged male patient has received a radical resection of the tongue, the floor of the mouth and the posterior mandibular alveolar ridge for squamous cell carcinoma of the alveolar ridge. He had totally edentulous maxilla. After the cancer surgery two implants were placed into the residual anterior mandibular alveolar ridge, in the symphyseal area between the mental foramina. The prosthetic rehabilitation was performed as follow. First, an altered maxillary complete denture with backward extended denture plate was processed, the extended portion was used to facilitate swallowing. Then, an altered mandibular complete denture was fabricated. The tongue area was covered with a resin plate (tongue plate), which was perforated by some small holes. Appropriate spaces were preserved between the tongue plate and maxillary denture base plate, between the tongue plate and the residual floor of the mouth. The two spaces were filled with soft, tongue-colored silicone. Two "O" ring attachments were employed to provide the retention for the tongue prosthesis to the two implants. With the maxillary and mandibular prostheses, the vertical occlusal dimension was restored to near but shorter than the physiological dimension.

**Results.** The maxillary and mandibular prostheses increased the patient's ability to produce intelligible sounds, and assist with a return to a near normal diet. Prosthetic rehabilitation can also improve the patient's appearance and psychosocial adjustment. The implants and "O" ring attachments provided sufficient retention for the tongue prosthesis, otherwise unsatisfactory because of the cancer surgery. The subjective quality of life of the patient was significantly improved.

**Conclusions.** Total glossectomy can result in significant functional impairments in mastication, swallowing, and speech. Oral rehabilitation through implant assisted prosthetic management can aid in alleviating these problems. Designs of the prosthesis should vary according to patient needs. In addition to these functional problems, severe psychological problems followed complete loss of the tongue may be significantly improved.



## REALIZATION OF THE BITE BLOCK FOR RADIOTHERAPY IN PATIENTS WITH ORAL CANCER

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**Aim.** We describe the construction of a custom made bite block to be used during radiotherapy sessions after the removal of oral cancers; bite allows the patients to maintain the tongue in a fixed position during the irradiation so that to reduce the damage to the oral tissues. Our bite block for radiotherapy is an ideal immobilization method excellent in terms of accuracy, during mask creation and radiotherapy treatment. You need a 'beam directional shell' or 'mask' made in the mould room before your planning begins, this mask is usually used when the face and neck area is treated and it is made just for you, the radiographers use the marks on it to give your treatment to exactly the same area each day.

**Materiala and methods.** A customised bite block is created through the impressions of both archs with alginate and polyvinylsiloxane keeping the tongue below the tray, after this fase is done a wax bite that establishes the height of the opening.

**Results.** Patient's mucosa undergoing radiation therapy are less affected by mucositis although the reduction of salivary flow are evident with oral dryness and increased risk of tooth cavities.

**Conclusions.** Ionizing radiation is commonly employed in the treatment of oral cancers, for many tumor, radiotherapy can be considered curative, but at the same time a lot of common side effect can appear, for this reason with the use of custom made bite block we can reduce scattering in other side of oral cavity or other oral tissues (tongue), we can recreate an oral custom made immobilization continually repeatable.



## REHABILITATION OF AMELOGENESIS IMPERFECTA AND VDO REDUCTION WITH DISILICATE VENEERS AND OVERLAYS: A CASE REPORT

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**Aim.** Amelogenesis imperfecta is an inherited enamel dysplasia involving both dentitions with no other systemic effects. Here is presented a case of hypomatured type III, according to Wiktop classification, in a 16 year old male successfully treated with disilicate veneers and overlays.

**Materials and methods.** A 16 year old male referred to the Prosthodontic department of Turin Dental School. He was dissatisfied with his poor dental appearance and concerned about his long-term condition of his own teeth. Chipped enamel discoloration and generalized tooth wear were detected and radiographic examination showed that the enamel layer of the entire dentition was generally thin. Treatment goals were to alleviate pain and sensitivity prevent further tooth destruction, improve esthetics, restore occlusal vertical dimension and oral function. The patient first received a full mouth disinfection regime, diet analysis well as oral hygiene instruction and scaling. A thermoplastic wax jig was used to determine the correct occlusal vertical dimension according to esthetic and interocclusal space parameters. A jaw relationship record followed. A diagnostic wax up was produced on the mounted study casts. Vacuum-formed transparent matrixes were fabricated over the wax up, to perform full mouth direct composite build-ups (PRO-TEMP 3M) in one clinical sitting. Build ups were performed at first from the posterior teeth to restore the occlusal vertical dimension at the previously determined centric relation. Afterwards, buildups on the anterior teeth were performed. A canine –guided occlusion was provided. Follow up visits were arranged at 2 week interval for 2 months with some minor adjustments made to optimize occlusion and appearance. The patient showed good adaptability to the new occlusion and was satisfied with the esthetic and functional outcome. New study casts were made from the provisionally restored dentition. Refined wax –ups were made on the casts and templates were then fabricated for inspection. Tooth preparations and construction of provisional crowns were performed in subsequent visits. Full ceramic crown and veneer preparations were made on Maxillary and mandibular teeth at the same time, to allow optimization of the occlusion. Working impressions were made and all definitive restorations were cemented with resin cement. (Relyx UNICEM 3EMME). A night-guard was provided to protect the teeth and restorations against parafunctional activity.

**Results.** Follow up sittings were scheduled once a month for six months. The patient showed good acceptance of the restorations was pleased with the esthetics. Oral hygiene was maintained at a high level and the gingival margin was stable with no inflammation or recession. All teeth showed perfect periodontal situation ever since the restorations were placed.

**Conclusions.** Full-mouth rehabilitation of patients with patients needs to be supported by a correct and extensive treatment plan. This case shows how to increase the vertical dimension with a system that verified the adaptability of the patient before any other restorative treatment.



## THE INFLUENCE OF SELF-ESTEEM, DEPRESSION, TEMPERAMENT AND CHARACTER IN THE AESTHETIC SATISFACTION OF THE PATIENTS WITH REMOVABLE COMPLETE DENTURE

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**Aims.** The partial or totally absence of teeth is not important only to chew, but above all for psychological aspects like as depression and self-esteem. The aim of this study is to evaluate the influence of some psychological aspects on aesthetic evaluation by a patient about his new complete denture, to understand if a psychological test before rehabilitation might be useful for the clinician to prevent dissatisfaction of some susceptible people.

**Materials and methods.** 51 totally edentulous patients have been involved in the study and they have been rehabilitated with maxillary and mandibular complete removable dentures. Patients have been treated by the students of the last year of the undergraduate curriculum of the University of Torino.

Psychological questionnaires Beck Depression Inventory [BDI], Temperament and Character Inventory [TCI], Rosenberg Self-Esteem Scale [RSES]) were administered at the first visit and an Aesthetic Questionnaire [AQ] at the delivery of the denture. The dentist evaluated the aesthetics of the dentures using the same Aesthetic Questionnaire. High scores of TCI test and SE test can be associated with a positive psychological self-evaluation and high levels of BDI imply a deep patient's depression. The study evaluated the difference between results of the aesthetic questionnaire filled by dentist and patients and then analyzed the relationships between these differences and the psychological profile of the patients. The elaboration of data was based on the use of some different statistical analyses: the ROC curve that means the test ability and the carefulness to distinguish within the group the person with and without the symptoms (absence of aesthetic satisfaction with new denture). The true positive rate and false positive rate is used to calculate the difference between men and women within the study group.

**Results.** according AQ test, 32 patients resulted positive (they were more satisfied than the dentist at the end of therapeutic treatment) and 19 patients negative (they were less satisfied than the dentist). In the positive group the TCI score and RSES score are highest than in negative group, and the BD score is lower than in the negative patients.

**Discussion.** Dental patients, because of the psychological importance of teeth and the associated trauma of the loss of teeth, can be affected by some psychological disorders. The possible effect of the psychological profile detected with BDI, TCI, RSES on the aesthetic satisfaction has been highlighted by this study results. The use of TCI, SE and BD tests in search scope is important, nevertheless, in the daily clinical activity the application of these psychological and psychiatric tests may be difficult to perform. More agile and simple instruments seem to be a more effective solution for evaluate the psychological profile and behavioral disorders.

**Conclusions.** This study shows a statistically significant influence of the psychological items as depression, temperament, character on the aesthetic judgment of patients rehabilitate with complete removable denture. Results of the questionnaires may be used to formulate an opening diagnosis of psychosomatic clinical situation in order to prevent psychological acceptance of a new complete denture rehabilitation.



#### **Z.I.L. ZIRCONIA INSIDE LAMINATE. AN INNOVATIVE FRAMEWORK DESIGN**

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The advent and the evolution of materials such as Zirconia Oxide enable the technician to project, design and build prosthetic rehabilitation every day more efficient from a functional and an esthetic stand point. It is infact possible to realize substaining structures for the feldspatic ceramic, taking advantage of the proper characteristics of the material and, at the same time, mimicking inside the layering, forming one body extremely resistant. This permits to the prosthetic rehabilitation to oppose successfully towards the occlusal strenght, decreasing the chipping percentage. This poster has the goal to describe the benefits of an innovative framework design, called by the authors (ZIL - Zirconia Inside Laminate) able to pro?t by the Zirconia properties to give a better ?nal strenght to the prosthetic rehabilitation.

