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CHIRURGIA MAXILLO FACCIALE

Surgical management of post-operative facial palsy: our experience

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BACKGROUND: Postoperative facial paralysis is not an uncommon occurrence in otolaryngology–head and neck surgery and is also seen with relative frequency following neurosurgical and oral and/or maxillofacial surgical procedures. For tumors located close to the facial nerve, this could also include facial nerve sacrifice. The subsequent facial palsy is severely disabling functionally, psychologically, and aesthetically. Treatment of these kind of lesions requires a comprehensive understanding of the cause of the palsy, patient's characteristics and the timing of the onset of the paralysis. In this paper the authors present their own experience in the management of patients with post – operative facial palsy.

METHODS: From 2008 to 2014, 34 patients suffering unilateral facial palsy were admitted to our Department. Retrospective review of clinical chart was conducted. Sex, etiology of the palsy, time elapse from the onset of the palsy and follow - up were analyzed. In order to obtain powerful data, we admitted in this study patients with 12 months of follow at least and with complete documentations. The outcome of the different surgical procedures administered were analyzed with Facegram. Facegram is a software developed at Massachussetts Ear and Eye Infirmary that automatically analyzes and compares key point in the opposite side of the face and face movements. In order to gain consistent patients samples, we subdivided facial palsies depending on the time elapsed from paralysis onset to the first surgical procedure administered and electrophysiological study results. We defined acute palsy the ones treated within 72 hours from the onset of the paralysis mainly caused by oncological resections. Other palsies arised from more than 4 months were defined chronic facial paralysis. We further divided this last group in two other classes based on the kind of the surgical procedures administered; mid - term paralysis in which "baby - sitter" procedure was performed (cross facial nerve graft with sural nerve graft and masseteric - facial nerve coaptation) and long - standing paralysis in which a functioning free of pedicled muscle flap was used.

RESULTS: All the patients treated for post – operative facial palsy were evaluated with FACEGRAM software in order to objectify the outcome of each surgical procedure. All the patients presented an improvement of facial movement with a progression from House - Brackmann class 6 or 5 to class 3 or 4.

CONCLUSIONS: Facial nerve reconstruction should be addressed routinely in every patient who undergoes facial nerve resection. Preoperative facial nerve weakness, postoperative irradiation, and advanced age are not contraindications to facial nerve repair.

Three-dimensional morphometric analysis of the mandible and airways in Pierre Robin sequence

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BACKGROUND: The triad of micrognathia, glossoptosis, and airway obstruction was first described by Pierre Robin in 1923. In some embryos, the tongue occupies a large part of the oronasal cavity, preventing fusion of the palatal shelves leading to a U-shaped cleft palate. Pierre Robin triad is a nonspecific symptom complex that could occur in various situations: 1) isolated, 2) as a component of a syndrome, and 3) associated with other developmental defects that, taken together, do not represent a specific syndrome. Pierre Robin sequence is associated with mandibular hypoplasia. The hypothesis was that mandibular hypoplasia in the developing fetus led to a cascade of effects, including U-shaped cleft palate, glossoptosis, and early respiratory problems. It has been hypothesized, however, that the mandible may be differentially affected. The purpose of this study was to therefore compare mandibular morphology in children with Pierre Robin sequence to normal children using three-dimensional analysis of computed tomography (CT) scans.

METHODS: A retrospective analysis of 23 children with Pierre Robin sequence receiving CT scans was performed. Three-dimensional reconstruction was performed and ramus height, mandibular body length, and gonial angle were measured. Three dimensional reconstruction of the airway was performed and was related to the grade of the disease and to the control group. All results were compared to control group of 21 children with normal mandibles and airway and to clinical norms corrected for age and sex.

RESULTS: Mandibular body length was found to be significantly shorter for children with Pierre Robin sequence while ramus height was not significantly shorter. This resulted in distinctly different ramus height/mandibular body length ratios. In addition, the gonial angle was more obtuse in the Pierre Robin sequence compared with the controls. Three-dimensional mandibular morphometric analysis in patients with Pierre Robin sequence revealed distinctly different patterns of mandibular hypoplasia relative to normal controls.

CONCLUSIONs: These findings underscore distinct considerations which must be made in surgical planning for reconstruction. The data in this study lea to subsequent and more detailed morphometric studies and highlight important potential pre-treatment considerations which must be made prior to consider distraction of mandibles for patients with Pierre Robin sequence.

Deglutition and speech rehabilitation before and after orthognatic surgery of dento-maxillo-mandibular malformations: preliminary study

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BACKGROUND: The treatment of dento-maxillo-mandibular malformations involves functional and aesthetic rehabilitation to rebalance the stomatognathic system. The aim of our study is to evaluate the role of post surgical treatment functional therapy protocol for preventing orthodontic relapse and improving breathing, deglutition, speech and temporomandibular disorders.
METHODS: A sample of 26 dysgnathic patients (11 before surgical treatment and 15 after surgery) was treated at the Department of Odontostomatology and Maxillofacial Surgery, Policlinico Umberto I, Sapienza University of Rome, Italy. Patients were evaluated by age, sex and clinical findings. A special form was created to evaluate functional and clinical parameters of the orofacial district to identify any pre and postoperative deglutition and speech dysfunctions.
RESULTS: After surgical treatment with post surgical myofunctional-logopedic rehabilitation breathing, deglutition, speech and temporomandibular disorder improved.
CONCLUSIONS: This study showed that the lingual dysfunction have a significant role in the pathogenesis of dento-maxillo-mandibular malformations. Interdisciplinary approach it is essential to intercept and re-educate all the functions that are not compliant with structural changes and to eliminate tendency to relapse of the dental-skeletal disorders. After surgical treatment masticatory performance usually improved myofunctional-logopedic rehabilitation is required in order to gain better deglutition and speech functions and long-standing outcomes.

Radiological assesment of upper airways in severe Pierre Robin sequence

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BACKGROUND: Robin sequence comprise mandibular hypoplasia, glossoptosis, upper airway obstruction and U shaped cleft palate. The incidence of PRS has been estimated to be between1:2000 and 1:30,000 live births. Airway obstruction could be severe and need early treatment. No international guide-lines exist. Severe cases could benefit from mandibular osteodistraction, which increases upper airways.
The study aims to carry out three dimensional radiological assesment of upper airways before and after mandibular osteodistraction.
METHODS: The assesment of patients affected by severe Pierre Robin Sequence and treated at Odontostomatologic and Maxillo Facial Sciences Department, (Universita' "Sapienza" Roma) has developed. The sample was composed by 5 patients, who answer to inclusion criteria. The sample was composed by 2 female and 3 male, who underwent to F.E.M.O.D at mean age of 11 days. All patients underwent low dose CT scan before mandibular osteodistraction and at mean 2 years after distraction. Qualitative and quantitative analysis were realized by Dolphin Imaging. These studies evaluated measurement of airway size and shape parameters on CT scan performed before and after mandibular osteodistraction.
Airway size parameters included: volume surface area (V), length (L), average cross-sectional area (avgCSA), minimum retropalatal area (RP), minimum retroglossal area (RG), minimum cross-sectional area (minCSA), lateral dimension of retroglossal airway (LAT), and anteroposterior dimension of the retroglossal airway (AP). The measures of airway shape included the lateral/ anteroposterior ratio in the retroglossal region (LAT/AP); the ratio of the retropalatal airway diameter to the retroglossal airway diameter (RG/RP).
RESULTS: The comparison of CT scan before and after mandibular osteodistraction showed an importament increament of volumetric parameters. Retroglossal volume average increase was of 346%, retropalatal volume average increase was 169%. Concerning airway shape values, it was recorded a light decrease of LAT/AP before distraction and a light increase of RP/RG ratio.
The data demonstrated mandibular osteodistraction restore airway patency, avoiding tracheostomy.
CONCLUSIONS: CT scan is a valid method to realize three dimensional volume rendering of This study can be considered a useful method to evaluate and quantify increment of upper airways. The results support that distraction of hypoplasic mandible increase the volume, the shape of upper airway and advances the hyoid bone. Moreover, the improvement in glossoptosis and airway obstruction eliminate symptoms of OSHAS and the need for the tracheostomy.

Analysis of teeth position in fast and early mandibular osteodistraction (FEMOD)

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BACKGROUND: Pierre Robin Sequence is characterized by mandibular ipoplasia, glossoptosis, upper airway obstruction and U shaped cleft palate. It could be isolated or syndromic. Newborn affected by Pierre Robin Sequence could have severe respiratory problems and could need early treatment. No international guidelines exist. The proposed treatments differ according to the severity of case. More severe cases need invasive treatment such as tongue lip adhesion, mandibular osteodistraction and tracheostomy. Authors' protocol provides Fast and Early Mandibular Osteodistraction (F.E.M.OD.). The authors analyzed the effect of FEMOD on deciduos dental development.
METHODS: The assesment of patients affected by severe Pierre Robin Sequence and treated at Odontostomatologic and Maxillo Facial Sciences Department, (Sapienza Universita' Roma) has developed. The research team was composed by paediatric dentists and maxillo facial surgeons. Inclusion criteria are: a dental and radiological assessment with computed tomography before surgery (T0); a dental and radiological assessment with computed tomography after surgery (T1) minimum 2 years follow up after distraction; patients underwent surgery before 30 days. 5 patients were involved in the study. Every patients underwent low dose CT scan. T0 CT scan were performed in sedation; T1 without sedation.

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Panorex reconstruction were elaborated by Dolphin imaging Inc. California.
RESULTS: Five patients were involved in the study. The sample was composed by 2 female and 3 male, they underwent F.E.M.O.D at mean age of 11 days. 4 patients were affected by isolated form and 1 patients by Larsen Syndrome. All patients had microgenia, glossoptosis, upper airways obstruction and U shaped cleft palate. All patients had severe respiratory insufficiency, needing endotracheal intubation.
The analysis of CT images and panorex reconstruction showed bone consolidation in the site of the distraction. 33 of 35 teeth analyzed before the distraction are present after distraction protocol, but 5 of them presented root deformities. The teeth more involved are primary second molars. The malformation involved the crowns as well the root. No other odontogenic complications such as dentigerous cysts formation were recognized. The missing teeth are one central incisor and one primary second molar. No morphologic or positional anomalies were pointed out on pemanent dental buds.
CONCLUSIONS: The dental complications identified involved dental element not connected unambiguously to mandibular osteodistraction. The F.E.M.O.D protocol is an efficient method to improve airways in patients affected by PRS, safeguarding tooth development.

Evaluation of satisfaction levels in those patients undergoing implant surgery and pre-prosthetic surgery: intraoral vs extraoral bone graft

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BACKGROUND: Nowadays, edentulism is a condition that covers many aspects of someone's life: it alters the ability to eat normally, to articulate words properly, it affects face and smile aesthetics. That cause many problems, both metabolics and, especially, of psicosocial nature.
Actual progresses in the implantology field allows us to deal with many of these problems. There are some kind of patients in which, for different reasons (first of all a long-time edentulism), the maxillary bone is atrophic, so insufficient for a direct implant surgery; is therefore necessary to proceed with pre-prosthetic regenerative surgery in order to restore the normal morphology of the mouth, allowing us to proceed with implant surgery which otherwise would be impossible. Actual surgery techniques of bone grafting provides the usage of autologous bone harvested from extraoral site (skullcap) or intraoral site (ramus or body of the mandible). Considering that edentulism condition has a great impact on patients quality of life, the present study has the purpose to evaluate the satisfaction level in those patients undergoing bone grafting treatment and to compare the data levels between two groups of patients interviewed (Calvarial *vs* Intraoral).
METHODS: 15 patients have been interviewed for each group and a question-based survey has been submitted. Patients were asked to give a score between 0 and 100 to indicate the level of general satisfaction, post-operative pain, pre-treatment anxiety, medical expenses, perceptions of complications and the quality of perioperative counselling.
RESULTS: Analysis shown no significant differences between the levels of satisfaction in the two groups. It has also emerged that, in the group of patients who underwent intraoral bone graft, a lower perception of the complications is linked to an higher level of satisfaction of expectations (β=0.685, $p<0.01$) and the availability of the surgeon to provide explanations and clarifications seems to be linked to the achievement of expectations (β=0.308, p=0.099); a reduced rate of post operative complications increase patient's compliance to undergo surgery again, if necessary (β=0.866, p=0.023).
CONCLUSIONS: We suggest that, despite the overall satisfaction level is due primarily to the lack of complications during the surgical procedures, the surgeon's availability to provide explanations plays a major role; is therefore mandatory to improve our knowledge of what may be done to raise our patient's quality of life, using both surgery and "bedside manners".

NAM treatment in cleft lip and palate. Our experience

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BACKGROUND: Correction of nasal deformity in babies with unilateral cleft lip and cleft palate UCLP and bilateral cleft lip and cleft palate BCLP is a challenge for all cleft surgeons. The primary reconstructive challenges could be about the asymmetric nostrils, the absence of the columella, deviated septum and a protruding premaxilla. Multiple nasal surgical revisions are often indicated to achieve a good nasal symmetry because existing guidelines for managing the nasal deformity are lacking. Taking advantages from the NasoAlveolar Molding NAM that we are using as a standard treatment, babies are treated before surgery during the first 4-6 months of life molding the shape of the nose and the alveolar ridge.
METHODS: 6 patients were evaluated, 3 UCLP and 3 BCLP pre and post NAM treatment. The NAM appliance consists of a removable alveolar molding plate made of orthodontic acrylic from a dental cast of the infant's maxilla. The nasal stent is bent at the end of a 0.032-in stainless steel wire that is embedded into the anterior portion of the alveolar molding plate. The nasal stent and the intraoral molding plate are adjusted weekly or biweekly to gradually correct the nasal and alveolar deformities, giving rise to the name nasoalveolar molding. The objectives of NAM are to provide symmetry to severely deformed nasal cartilages, achieve projection of the flattened nasal tip, provide nonsurgical elongation of the columella, improve alignment of the alveolar ridges, and reduce the distance between the cleft lip segments. The treatment starts from the second week of life for 4 to 6 months.
RESULTS: As a result, at the time of primary cleft repair we will have in front of us always the same kind of cleft patients with a reasonable good symmetry of alar cartilage, a good nose tip projection 9-10 mm, a symmetric columella with a physiologic length 4-5 mm, no more than 2 mm alveolar ridge gap and no protruding premaxilla.
CONCLUSIONS: All the babies who underwent NAM treatment have different advantages. At the time of primary surgery the clefts will be standardized in shape, with a better position of the hard and soft tissue that leads to a less severe clinical conditions and easier standard surgery approach with a reduced number of difficulties and complication, so the best outcome possible will be achieved.

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Pierre Robin Sequence: airway management and postoperative safety

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BACKGROUND: Pierre Robin Sequence (PRS) is a congenital abnormality characterized by the presence of the combination of mandibular hypoplasia (micrognathia or small jaw), glossoptosis (retrusion of the tongue in pharyngeal airway) leading to airway obstruction, and often, a posterior cleft of the secondary palate. Airway obstruction and respiratory distress are clinical hallmarks. Airway management in an uncorrected PRS patient can be a potentially difficult undertaking that should be performed in a centre that is comfortable with difficult paediatric airways. It is advisable to prepare these patients in a paediatric intensive care unit, where work associate and all devices for difficult intubation are present. it is recommended that the operations team is multidisciplinary, with certain paediatric expertise.
METHODS: The association of glossoptosis and mandibular hypoplasia results in a non-alignment larynx-pharynx axis causing an incorrect glottis's view during direct laryngoscopy. Alternative devices to laryngoscopy are Air Q mask, Laryngeal Mask Airway (LMA), Glide Scope, tube-exchangers, when possible, and fibre optic endoscopy. After intubation and any multiparametric stabilization in ICU the patient is transferred to the operating room. The postoperative management must provide a bed protected in paediatric intensive care unit in order that the estubation of these babies it may run slowly to retrieve the full respiratory function and re-education swallowing. From 2010 to February 2016 we enrolled 18 patients. All the patients were treated for palatal reconstruction. The postnatal age range is 6-8 months. No patients were needed re-intervention or tracheostomy.
RESULTS: In the 46% of patients early estubation were possible. In the other cases ICU postoperative estubation and monitoring were applied. It must remember that PRS is an heterogeneous group and this diversity among patients derives the degree of difficulty in the preoperative e postoperative airway management. Therefore was present severe anomalies it request more long estubation time to re-education swalling and increase.
CONCLUSIONS: In spite of absence of bleeding or surgical complications, non in every patients early estubation is possible. But in every patients is mandatory ensuring postoperative monitoring and therapy in ICU as well as obtain oedema reduction and rehabilitation of swalling. Preoperative respiratory distress syndrome may exacerbate in immediate postoperative hours. The nonsurgical management of prepalatal intervention results in a multidisciplinary approach within surgeons, anaesthesiologist and intensivist.

Pitfalls in orthognathic surgery

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BACKGROUND: To evaluate the main causes of failure, accident and complications that may occur during the combined orthodontic-surgical therapy for maxillo-mandibular malformations as well as the causes that lead to a lack of stability of the occlusion in the short, medium and long term.
METHODS: An accurate analysis of the scientific literature was performed. In particular, complications that may occur during orthodontic preparation and before, during and after the surgical procedure were highlighted.
RESULTS: In this work, the Authors try to provide an overview on the complications and pitfalls that may occur during the pre-surgical, surgical and post-surgical treatment. During the pre-surgical orthodontic treatment to straighten the dental arches may be not enough but is essential to coordinate the axis of the lower and upper incisors with the skeletal movements in order to have an efficient final result of the operation. On this phase again, the pre-surgical correction of the Spee's curve and the bandage of all the arches's elements has an impact on the occlusal stability during and after the operation. During the planning phase the kwoledge of the literature about the stability and the function of the temporomandibular joint are essential to obtain an aesthetic and functional resolution of the malformations. The final evaluation of asymmetrical patients has to be very accurate. During the surgical phase complications like bone fractures may happen. These often involve the condyle's area. Particular attention has to be implied into positioning the mandibular branch when the fragments are fixed. During the post-surgical phase the infections may arise (7%) giving problems like osteitis or pseudarthrosis. During the post-surgical phase may arise problems relating to V3 branch's (2-17% of pantients) too. Furthermore, during the post-surgical orthodontic phase, is essential the correct lingual and phonetic rehabilitation in order to maintain the occlusal stability.
CONCLUSIONS: In this paper, authors want to provide a 360° vision of this kind of procedure, carefully analyzing every aspect that can cause complications and worsen the outcome. Based on scientific evidence the authors suggest a protocol for prevention and management of possible pitfalls. Complications may occur at any stage of the proceedings, either as unexpected accidents and as lack of stability of the occlusion, both in the short and medium to long term. Combined orthodontic-surgical therapy is a procedure that provides reliable results but due to its lenght and complexity may have many pitfalls too.

Distraction techniques in maxillofacial surgery in relation with the new concept of facial beauty

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BACKGROUND: Since facial beauty standards have changed, the signs for maxillary expansion procedures are on the rise.
Symmetry is an important element of facial harmony, because it is linked to the expression of a correct genetic asset of each individual. In addition, a broad smile, no black corridors, small amounts of upper gingival exposure of the dental arch is accepted as beautiful youthful appearance.
Also a bi-protrusive cephalometric pattern with a good skin tension is important to get a young and pleasent appearance. Distraction techniques are the main facial skeleton expansion

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procedures gaining stable bone volume over time and patient native- like bone for histological features.
Also histiodistraction is obtained by distraction techniques to gain covering soft tissue, nerves during bone legthening and expansion.
The purpose of this paper is to review some orthognatic cases showing maxillary or mandible insufficiencyì treated by a new palatal distraction device and mandible distractor device to correct facial deformities in relation to the new concept of facial beauty.
METHODS: Four cases with maxillary constriction were treated byLe fort I distraction osteogenesis(LFI-DO) by bone-rigid distraction technique(Cortese), a new procedure to perform a Le Fort I osteotomy with down fracture, three-dimensional maxillary repositioning and distraction osteogenesis by a rigid bone borne device in one surgical step.
Palatal distractor had an intrisic rigidity by a jack-screw and 8 anchorage points on the horizontal plane: 4 on the hard palate in the paramedian area at the septum base and 4 other points on the teeth.
In the reported cases with madibular deficiency, mandibular distraction was performed by an intraoral three-dimensional distractor device.
RESULTS: By the LFI-Do by bone-rigid technique a bodily maxillary expansion is achieved with good comfort for patients who were fully satisfied of their functional and aesthetic results with complete acceptance of their new aesthetic identity of the face. Other advantages are no need of a second surgery for maxillary repositioning, improvement in orthodontic treatment by bone anchorage, possibility of further expansion in case of lower molars buccal torque.
Mandibular distraction with intraoral three-dimensional distractor device allowed large mandibular advancement (15 mm) preserving condilar safety and obtaining a nice lower border contour for impressive enhancement of facial beauty.

New technique for zygomatic fracture treatment without aesthetic decay in young patients

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BACKGROUND: Fractures of Zygomaticomaxillary complex are quite common becouse of its intrinsically prominent convexity. In fact, this is considered as a side protection of delicate structures of the facial bones. There are two different surgical approaches for the therapy of these fractures: closed reduction and open reduction. Two or three fixation points in dislocated fractures are usually necessary: osteosynthesis must be performed starting from zygomatic-frontal suture when dislocated at this site, followed by zygomatic body fixation on the anterior sinus wall, anterior orbital floor margin fixation and finally orbital floor reconstruction in case of eye globe dislocation with diplopia. This study wants to evaluate the combination of the transconjunctival (TC) approach without canthotomy in association with the trans oral (TO) maxillary approach and lateral rim skin incision (SI) without canthotomy for frontozygomatic dislocated fractures to achieve proper injury because of reduction and stabilization without any aesthetic decay. A less invasive and more aesthetic technique is shown for treating dislocated zygomaticomaxillary complex fractures with two or three fixation points and PRF use to promote tissue healing.
METHODS: Fifteen patients between the ages 19 and 60 were referred for dislocated zigomaticomaxillary complex fracture. Eight patients were treated by transconjunctival approach without canthotomy in association with the trans oral maxillary approach and lateral rim skin incision without canthotomy for frontozygomatic dislocated fractures (Group 1) and seven patients were treated by traditional subciliar incision at lower eyelid and vertical lateral incision for lateral margin of the orbit (Group 2). Two or three fixation points with autologous PRF use for orbital floor reconstruction were performed.
RESULTS: All cases were successful, there were no problems at surgery and post-operative time The follow-up period was 6 months long. Follow-up radiographs (TC) were routinely used to evaluate the adequacy of reduction. During the 6 months of follow up all patients showed satisfactory facial symmetry, no noticeable scar, no ectropion or lower eyelid drop and no functional impairment. Mean difference for lower eyelid drop between the two groups of patients was 1.6 mm at T1 and 1.4 mm at T2.
CONCLUSIONS: Aesthetic result is of priority importance in the treatment planning of orbito-zygomatic fractures because of the fundamental role of the eye and lid area in the aesthetic of the face. In our experience best aesthetic results will be achieved true a laterocantal skin incision combined to a vertical periosteal incision at the front-zygomatic rim without canthotomy thus performing a different double layer incision. In the cases with large orbital floor dislocation, reconstructive titanium mesh will be covered by authologous PRF membranes Moreover The effectiveness of PRF is shown in promoting the healing of surgical wounds These techniques are indicated in young patients with high aesthetic exigences an in elderly patients because of age related tissue laxity to prevent aesthetic decay and functional impairement in lower lid surgery. A more conservative and aesthetic technique avoiding many most common complications was performed age over 50 patients these techniques are indicated.

Orthognatic surgery: 3D aesthetic evaluation on TC

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BACKGROUND: The aim of our study is to provide a method of aesthetic evaluation in patients with dentofacial deformities.
Still today 2D computer-assisted imaging systems allow image fusion of photographs, tracings, and radiographs to create realistic images. These computer-assisted programs permit valid measurement and treatment planning. However, the validity and reliability of these systems are limited by their 2D nature if compared to a 3D virtual planning.
The development of cone-beam computed tomography (CBCT) and 3D surgical programs allows the creation of a virtual 3D patient giving the surgeon the chance, not only to perform the surgical osteotomies and skeletal movements, but also to perform previously an aesthetic evaluation of the patient predicting skeletal and tissue changes after orthognatic surgery.
METHODS: Ten patients with maxillo-mandibular deformations underwent CBCT before and after surgery. Cone-beam computed tomography (CBCT) is now widely considered as the 3D method of choice for maxillofacial imaging due to the

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lower cost of the equipment and test, the reduction in radiation level in comparison with multi-slice computed tomography, high resolution for bones and teeth, and the possibility of obtaining the whole set of traditional orthodontic images in only one exposure. Furthermore CBCT in generally performed with the patient standing on his feet and with natural head position so to reduce deformations on soft tissues. This makes this procedure more predictable and reliable for an aesthetic and cephalometric study.
The aesthetic analysis was considered before and after orthognatic surgery. Therefore for each patient eight to ten standardized distances which are significant for an aesthetic examination were measured on 3D Tc soft tissue images considering those landmarks points which are repeatable and simple to obtain on a 3D image. Once surgery was simulated using the 3D program, then same measurements were then performed and compared to the preoperative simulation.
RESULTS: Measurements performed on preoperative 3D soft tissue images allow the execution of a standardized and repeatable aesthetic evaluation of the patient which becomes necessary for a correct surgical planning. Postoperative measurements showed very little difference to the average of normal anthropometric facial values.
CONCLUSIONS: Nowadays a 3D virtual surgical planning for daily clinical routine is becoming mandatory. 3D computer-based simulation of the soft tissues of the face in orthognatic surgery provides the clinician the opportunity to perform an accurate aesthetic analysis predicting preoperatively the new facial outlook of the patient after surgery. More over this method seems to be either reliable and predictable increasing the chances for a successful outcome.

Orthognathic surgery as ancillary procedure to maximize microsurgical facial bone reconstruction outcomes

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BACKGROUND: The improvements of reconstructive surgery allow the treatment of very complex maxillomandibular defects, which may derive from injuries, malformations, or ablative surgery in neoplastic pathologies or radionecrosis. The objective of this study is to describe the results obtained by using original surgical orthognathic technique to improve occlusal and aesthetic outcomes in those patients who underwent complex maxillomandibular reconstruction with bony free flaps.
METHODS: A total of 11 patients who underwent previous reconstructive surgery of the mandible were scheduled for orthognathic surgical at the Department of Maxillo-Facial Surgery, "Umberto I" Polyclinic of Rome, from 2000 to 2015. We based our protocol on a careful observation of the specific features of bony free flap; in fact, surgical planning of the osteotomies must deal with the following issues: the existence of a vascular pedicle, the inner morphology of the graft, and previous osteotomies performed to harvest and remodel the flap interface. Our final goal was to obtain the widest contact surface between segments to guarantee the best bone healing and stability after fixation. For elder cases preoperative evaluation consisted of cephalometric x-rays in laterolateral and postero-anterior projections together with orthopantomography, three-dimensional computed tomography scan, all of these exams are now supplanted by the TC cone beam. Dental casts are also necessary to complete the treatment planning.
RESULTS: In 2 patient, reconstructed with single barrel fibula flap, osteodistraction was successfully gained and implantoprosthesis was accomplished. In 8 patients split osteotomy of the bony flap alone or in combination with standard orthognathic surgery leaded to complete correction of occlusal alterations. In 1 case microsurgery came after orthognathic surgery to stabilize occlusion. Fixation was performed with titanium plates and screws. Reconstructive plates were not needed because of the excellent vascularization and the adequate amount of bone surface.
CONCLUSIONS: Sometimes, reconstructive treatment may lead to unsatisfying aesthetical and functional outcomes; correction of the maxillary-skeletal relationship can be considered as a part of the programmatic protocol. Orthognathic surgery can become necessary to correct pre-existent or post reconstructive occlusal anomalies due to programming inaccurateness or unexpected postoperative bone assets or even post radiotherapy soft-tissue retractions. The particular challenge in this kind of surgery deals with the specific characteristics of the adopted flap. Nevertheless, we must consider the complications due to poor vascularization that might lead to bone instability, infections, or necrosis. In our opinion, these bone defects should be approached as malformations, and the programmatic algorithm is the same as that we adopt for traditional orthognathic procedure.

Changes in electric activity of masticatory muscles after orthodontic-surgical correction in class III patients

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BACKGROUND: Skeletal, occlusal and esthetic outcomes are predictable after orthognathic surgery, but the short and long-term functional effects of the surgical-orthodontic treatment on the masticatory muscles are still unclear. The aim of this study was to evaluate, through electromyographic (EMG) assessment, the electric activity of masseter (MM) and anterior temporalis (TA) muscles during clenching, before and after orthodontic treatment and mandibular setback for correction of mandibular excess in skeletal class III patients.
METHODS: Seventeen adult patients (10 males, 7 females, mean age: 22.5±2.4 years) were recruited for this longitudinal study. Inclusion criteria were:
— Skeletal and dental class III;
— Anterior and posterior bilateral crossbite;
— Presence of all teeth (with the exclusion of third molars);
— Absence of periodontal disease, craniofacial syndromes and/or any prosthesis.
Each patient received preoperative and postoperative orthodontic fixed treatment (36 ± 12 months). Nine patients received bilateral sagittal split osteotomy (BSSO) to reduce mandibular excess and eight patients received combined BSSO and Le Fort I osteotomy for maxillary advancement. EMG recordings of masseter and anterior temporalis muscles were obtained from 4 channels of the 8-channel electomyograph FREELY (DeGoetzen spa, Olgiate Olona, VA, Italy), interfaced with a

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computer for data storage and analysis, using duotrode silver/silver chloride electrodes with an interelectrode distance of 20 mm. Recording were obtained at baseline (T0) and 6-8 months (T1) after the surgical-orthodontic treatment. The EMG parameters (according to Ferrario *et al.*) considered were:
— Activity Index (range between -100% and +100%): positive values indicate an MM dominance and negative values a TA muscle dominance. The normal value during clenching is 15% ± 9%;
— Asymmetry Index (range between -100% and +100%): positive values indicate a stronger right side muscular activity and negative values indicate a stronger left side muscular activity. The normal value during clenching is 9.37±7.43%;
— Torque Index (range between -100% and +100%): positive values indicate a stronger right side resultant force and negative values indicate a stronger left side resultant force. The normal value during clenching is 9.47±7.19%.
Statistical analysis was performed with the t-Student test to compare data at T0 and T1.
RESULTS: Results showed:
— A significant difference ($p<.05$) in the value of activity index at T0 (33%) and T1 (1%);
— A significant difference ($p<.05$) in the value of asymmetry index at T0 (21%) and T1 (4%);
— A significant difference ($p<.05$) in the value of torque index at T0 (24%) and T1 (5%).
CONCLUSIONS: This study evaluated the EMG activity of MM and TA muscles before and after orthodontic-surgical correction in skeletal class III patients. Before therapy the activity index, the asymmetry index and the torque index were abnormal, while after therapy the EMG values were similar to reference values, suggesting a muscular activity improvement. This means that masticatory muscles maintain an adaptive capability in adults, and that the surgical correction of skeletal class III patients improves occlusion and masticatory muscles balance. Moreover, a balanced EMG activity during clenching could be considered a sign of good adaptation of the neuromuscular system to the new occlusal condition and a method for detecting non-responding patients who might require further treatment.

Optical nerve involvment in graves orbitopathy

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BACKGROUND: Visual loss from orbital compression and stretching of the optic nerve is an infrequent but well-recognized cause of dysthyroid optic neuropathy, occurring in less than 5% of thyroid eye disease cases.
Thyroid pathologies can cause alterations of the nerve fibres which make up the optic nerve causing a condition identified as optic neuropathy. The origin of optic neurophaty can be the result of combination of compression and stretching. Compression is the result of an increase of intraorbital pressure caused by the increase of the volume of fat and muscle; stretching is caused by the proptosis of the ocular bulb and by the ensuing traction forces affecting the ocular nervous fibres.
METHODS: This study was carried out on a sample of 85 patients affected by dysthyroid optic neuropathy.
Only 5% of the patients showed visual alterations directly proportional to the gravity of the pathology. At the beginning of the visual symptoms an alteration in the perception of colours was detected. A very important characteristic is the decrease in the intensity and contrast of the colours. Moreover, with the gradual increase of the esophtalmos a proportional and progressive loss of vision was observed.
RESULTS: All the patients were treated with immediate orbital decompression so as to reduce the forces at work on the optic nerve and which were the cause of the visual problems. After surgical treatment a marked improvement of visual function and a restored perception of colours was observed in all patients.
This result was obtained by decreasing the tension on the optic nerve, so as to physiologically restore the nervous and vascular component.
CONCLUSIONS: In our experience optic neuropathy is the result of combined compressive and stretch forces which can bring about partial or total loss of visual acuity with reduced perception of colour intensity and contrast. The increase in endo-orbital volume caused by exophtalmos generates an increase in pressure that in turn has an effect on the nerve, generating compression and to a variable extent pushing (and therefore stretching) the bulb outwards.
On the basis of this results we believe that orbital decompression in progressive exophtalmos must be carried out in all patients who present a degree of visual loss so that nervous damage may be limited. We also believe visual disturbances due to stretching and to compression to be equally important.

Endoscopic transoral approach for temporo-mandibular joint diseases and displaced third molars in to infratemporal fossa

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BACKGROUND: Dealing with temporo-mandibular joint pathologies is not always an easy thing. In literature there are various surgical options described for every pathological scenario. Starting from the easiest preauricular approach, retromandibular approach and facelift approach, witch are used for fractures, lesions of the lateral aspect of the condyle or condyle hyperplasia, and ending with the more invasive trans temporal approach and trans parotid approach, for lesions affected the medial side of the condyle, they all share the need of manipulate or dissect the facial nerve leading to its transitory or permanent impairment. This complication is unacceptable when the disease to be treated has a benign nature; so we started to consider the possibility of extend the use of endoscopic surgery from the traumatology to the orthognathic and oncological fields. The endoscopic approach was also used to remove displaced teeth in to the infratemporal fossa to avoid any damage at the vascular and nervous structures traversing this anatomical space.
METHODS: At the Department of Maxillo-Facial Surgery, "Umberto I" Polyclinic of Rome, from 2000 to 2015 23 patients were treated with the endoscopic transoral approach. 21 patients had condylar pathologies, 6 were benign bony lesion, 4 had condylar hyperplasia and 11 were affected by condylar fractures. Among the trauma group 5 had internal rigid fixation while 6 had condylar head removal. 2 patients had iatrogenic third molar displacement in to infratemporal fossa. Surgery was performed by using a 0- and a 45-degree angled 4-mm optics.

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RESULTS: Out of the total number of patients in one case we observed postoperative numbness of the alveolar nerve. In two cases, a seroma in the masseter space was manually drained with no other sequelae. No infections were reported. Mean hospitalization stay was 7 days (range 5–10 days). All the patients affected by condylar pathologies had physiotherapy rehabilitation to prevent distant limitation in mouth opening due to scarring.
CONCLUSIONS: In our series, we had no complications and immediate recovery time. We found this technique smooth, easily reproducible, and devoid of complications. Third molar removal was safe and easy to accomplish thanks to the direct control of local anatomy and displaced dental element. In cases of benign bony lesions of the condyle and glenoid fossa, this approach can be utilized to effectively replace both traditional open approaches and endoscopic transnasal approaches. There are many possibilities offered by this approach, and further studies are necessary to validate its usefulness in the event of other kind of benign lesions or malignant tumours. Furthermore endoscopic condylectomy shows the same efficacy in treating orthognathic patients with condyle hyperplasia than the open approaches. Despite having no control of condylar disc none of the patients developed a temporomandibular joint disease. In case of condylar fracture the endoscope allows perfect surgical control of the mandibular stamps. The rigid internal fixation is applied very precisely thanks to the direct view of the fracture line, because of that the condylar fragment is kept in the correct anatomical position and the original morphology is completely restored, this allows a faster functional recovery of the temporo-mandibular joint. Furthermore, regardless of the disease this approach is completely safe for the facial nerve.

Maxillary sinus pathology following Le Fort I osteotomy in orthognathic surgery: a retrospective anatomical and radiological evaluation

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BACKGROUND: The impact of orthognathic surgery on the anatomy and function of the upper airways has been studied extensively. The aim of the present study is to evaluate the post-operatory incidence of rhino-sinusal pathologies in patients undergoing orthognathic surgery for the correction of dentofacial deformities in order to better understand the relationship between orthognathic surgery and anatomical and radiological maxillary sinus modifications.
METHODS: A retrospective evaluation of a group of patient who underwent Le Fort I osteotomy in a single Oral and Maxillo-Facial Surgery unit was performed. The eligibility criteria were a Cone Beam Computed Tomography (CBCT) scan taken before and 12-24 months after the procedure was carried out. the exclusion criteria were unavailability of CBCTs, use of tobacco or having undergone previous orthognathic surgical procedures. The primary predictor variable was time (pre- *vs*. post-operative). The primary outcome variables were sinus volume, mucosal thickening and iatrogenic alterations in sinus anatomy. Mucosal thickening was evaluated by means of the Lund-Mackay CT score. Descriptive statistics were computed for each variable and paired analyses were used to compare pre- and post-operative values.
RESULTS: Sixty-four subjects [mean age 27; 59.4% female; median follow-up time - range 13 to 66 months, length 32.4 months)] were studied. Radiological evidence of post-operative inflammatory processes affecting the paranasal sinuses was found in 27.3% of the sinuses (9.4% preoperatively). The post-operative Lund-Mackay scores were signficantly higher (p=0.0005). There was a 19% decrease in the mean post-operative sinus volume and a 37% incidence of iatrogenic injury. A loss of continuity of the lateral nasal wall causing an iatrogenic communication between the nasal cavity and the maxillary sinus was detected in 13 patients (20.3%). Six patients (9.4%) showed incomplete healing of the nasal septum with osteocartilaginous deficits. Five patients (7.8%) showed marked deviated nasal septums not noted prior to surgery.
CONCLUSIONS: Study results indicate that Le Fort I osteotomies can have an important impact on sinus health. The post-operative radiological evidence of maxillary sinus inflammatory processes and incidence of iatrogenic damage in these patients lead us to conclude that the follow-up of patients who underwent orthognathic surgery should not neglect the impact that Le Fort I osteotomy can have on the paranasal sinuses system. Larger long-term studies are warranted to clarify post-operative outcomes/complications.

Evaluation of improvement of the quality life in patients undergoing maxillofacial rehabilitation with intra and extra-oral prothesis after oncological resection

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Istituto Clinico San Rocco (Ome -BS), Ambulatori di Odontostomatologia, Chirurgia Maxillo Facciale, Responsabile: Prof. Giorgio Gastaldi

BACKGROUND: The purpose of this study is to analyze retrospective cases of resected oncological patients undergoing maxillofacial rehabilitation with intra- and extra-oral prothesis within the San Donato Hospital Group and evaluate the patient's satisfaction through a questionnaire.
METHODS: In this study, we included 72 patients who underwent surgery due to neoplastic diseases; head and neck tumors were involved. 3 of them had post-traumatic results and 69 had resections of head and neck cancer. Of these, 43 had palatal obturators and 29 had extra-oral epithesis (18 nasal, 8 orbital and 3 auricular prothesis)
The group included patients affected by different cancer, respectively:
— 36% squamous cell carcinoma;
— 20% basal cell carcinoma;
— 16% adenocystic carcinoma;
— 11% mucoepidermoid carcinoma;
— 17% others.
In both rehabilitation, an alginate impression was acquired, using a wet gauze in order to avoid the material infiltration into the cavities. In many cases, a temporary prothesis was needed in order to improve patient's

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psychology. Patients were included in a strictly follow-up (every 7 days for 30-45 days).
RESULTS: An assessment questionnaire was developed in order to determine the satisfaction rate. The questionnaire for patients with an extra-oral epithesis include:
— difficulties in application and removal
— maintenance and different methods of sanitization
— acquire of an ordinary lifestyle
The questionnaire for patients with a palatal obturator include:
— maintenance and methods of sanitization
— improvement in speech
— difficulties in application and removal
— good seal and improvement in food and fluid assumption
The assessment questionnaire will be used nearby in all the structures of San Donato Hospital Group and records will be available with a follow-up of 1 year minimum.
CONCLUSIONS: Patients underwent maxillofacial prosthetic rehabilitation post-cancer treated within San Donato Hospital Group's centers, have shown good compliance with both intra- and extra-oral rehabilitations. After the use of obturator protheses, patients improve their quality life. The dentist follow-up has been evaluated to be fundamental for the good outcomes.

Application of CAD/CAM technology in mandibular reconstruction: indications, advantages and drawbacks. Pilot study

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BACKGROUND: Success rate of microvascular head and neck reconstrution is getting higher and higher due to technological breakthrough of recent years. In particular the application of CAD/CAM technologies (computer aided disegn/computer aide manufactoring) represents the main technological advances in head and neck recostruction. The Computed Aided Design allows the simulation of the whole surgical procedure. In particular it is possible to plan the site and the extension of the mandibulectomy, the pre-visualization of the flap osteotomies. Finally it is possible to evaluate the accordance of the reconstruction plan with the native mandible by the means of the superimposed images. Once the plan is approved, specific cutting guide for the flap harvesting and for mandibulectomy are realized with the application of Computer Aided Manufacturing technology. Moreover, a pre–bended patient's specific reconstructive plate may be obtained. With this study we aim to analyze the possible advantages, drawbacks and disadvantages of the application of CAD/CAM technology in mandibular microvascular reconstruction.
METHODS: In this study we retrospectively compared five diferrent cases of mandibular microvascular reconstruction CAD/CAM aided with five similar cases of mandibular microvascular reconstruction "hand – made". All the defect were classified according to a classification system developed in our Surgery Unit. Fibula free flap was used in all the cases. In particular we compared, total surgery time, flap ischemia time, flap modelling and insetting time. Morevorer we compared the accordance of the planned reconstruction with final results by pre and post – op CT scans comparison. Lenght of hospital stay, donor site morbidity were also compared.
RESULTS: Total surgery time, ischemia time, modelling and insetting times showed a high degree of reduction (about 20%) with the use of CAD/CAM technology. The accordance of the planned reconstruction with the final outcome showed comparable results with the application of the two different planning methods. Hospitalization and donor site morbidity appear to be similar in both groupes.
CONCLUSIONS: CAD/CAM technologies guarantees a significant reduction of time needed for accurate microvascular mandibular reconstruction, even for very complex cases. However CAD/CAM technology is still an expensive procedure and time needed for the realization of all the devices (about 2 weeks) makes it not feasible for high staged malignant oncological cases.

Use of absorbable Fu-HA/PLLA osteosynthesis screws for rehabilitation of jaw atrophy: a preliminary study

G. Jafari, G. Saponaro, R. Boniello

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BACKGROUND: Bone grafts are typically stabilized using titanium screws, which provide an excellent fixation but must be removed prior to implant placement. The use of absorbable screws avoid a second operation, which is extremely beneficial both for patient comfort and for preserving the receiving site. The purpose of our study is to evaluate the effectiveness of bioactive and absorbable screws made by Fu-Ha/poly L-lactic acid(PLLA) as an alternative method for fixing onlay grafts; the effect of these screws on the integration of the graft and its persistence before complete resorption.
METHODS: Eight patients presenting maxillary atrophy were enrolled in this study. All patients received autologous onlay graft fixed with 2.0 mm Fu-HA/PLLA screws between October 2014 and April 2015. The site of the bone graft was selected based on the severity of the atrophy. We carried out a total of 21 onlay autologous bone grafts: 11 directly on the alveolar bone and 10 preceded by sinus lift. All patients were clinically and radiologically evaluated at 1,3 and 6 months after surgery. Clinical evaluation included: inflammation, wound dehiscence, sequestration, the presence of infection or fistulas and the stability of the grafted bone during implant placement. Integration and survivability of the grafts, and bone integration of the screw, was assessed using CT Dentalscan at three and six months after surgery.Six months after surgery the screw-bone interface was evaluated histologically. The biopsies were processed in order to be examined by a light optical microscopic. Statistical analysis was performed using SPSS (v22.0,IBM,Chicago,IL,USA).
RESULTS: Clinically, four out of eight patients exhibited a slight mucous inflammation by the heads of the screws. On the first postoperative CT scan, all inserted screws (32) were bone-integrated; in 6 cases remodeling phenomena were evident. The second CT scan revealed remodeling phenomena for all of the screws.All of the grafts have been regulary engrafted at the end of the analysis time. The histological

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analysis shows that all F-u-HA/PLLA screws are partially surrounded by newly formed trabecular bone and there are signs of biomaterial reabsorption. Statistical analysis shows that 95% of screws and grafts were bone-integrated at 10.6 and 19.5 weeks after surgery, and remodelling phenomena were evident at 21.7 and 23.1 weeks, respectively.
CONCLUSIONS: We did not have any procedural failures or complications in our sample. All onlay grafts were integrated by the end of the analysis duration. This result may be due to the effectiveness and safety of the procedure, the small number of patients in our sample, and the long experience of the operators. The limitation of our pilot study was that our method has not been compared with the standard technique (grafts fixed with titanium screws). Similar studies with larger patient sample sizes will be necessary to confirm the efficacy and safety of this promising technique.

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TMJ total joint replacement: a possible solution for multioperated children

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ABSTRACT: Ankylosis of the temporomandibular joint (TMJ) involves fusion of the mandibular condyle to the base of the skull. When occurring in childhood, it can have devastating effects on the future growth and development of the jaws and teeth. Early diagnosis and treatment are crucial if the worst sequelae of this condition are to be avoided. Optimal results can be achieved only after a complete assessment and development of a long-term treatment plan. We present a case report of TMJ ankylosis as the result of inappropriate diagnosis and treatment made in another hospital and successfully treated by the authors with total TMJ total joint replacement in a 5 years old patient.
CASE REPORT: The patient was born on of a non-consanguinous marriage at 37 weeks by normal delivery following an uncomplicated pregnancy. The birth weight was 2400 grams. Mandibular hypoplasia and mild glossoptosis were noted at birth. Furthermore she suffered respiratory distress that necessitated a tracheal intubation and assisted ventilation for two days. Rx of the chest revealed a thoracic cage deformity and multiple rib gap defects. So the Cerebrocostomandibular syndrome was suspected. The patient was then addressed to a surgical protocol not taking into account the syndromic Robin sequence. She underwent mandibular distraction osteogenesis that resulted in poor elongation of mandible body and caused bilateral zygoma fracture. This lead to total bony bilateral ankylosis with complete limitation of mouth opening and retruded position of the mandible. She then needed tracheostomy and gastrostomy.In
When referred to our Department the correct diagnostic flowchart was addressed and she was scheduled for TMJ total joint replacement with custom made implants.
RESULTS: TMJ TJR allowed the patient to open the mouth again. Dealing with skeletal improvement we observed restoration of the sagittal projection of the mandible. The patient needed some phisiokinetic rehabilitation to learn back the use of masticatory muscles that was totally impaired from age of 2.
CONCLUSIONS: TMJ TJR is a viable option for those cases who underwent multiple procedures to restore the skeletal defect. More important than final treatment is initial proper diagnosis.

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A new device for the treatment of HFM: the l.A. Appliance

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BACKGROUND: Problem 1: The hemifacial microsomia (HFM) is a congenital disorder that affects the development of the lower half of the face, most commonly the ears, the mouth and mandible. Problem 2 : the current devices have a high patient compliance thus therapy may not start at a very early age.
METHOD: Solution:a new device for treatment of hemifacial microsomia named L.A.1 - L.A.2 : 1) rates more short of treatment 2) full restoration of the affected structures. 3) less disease perception by patient. This new device (L.A.1 - L.A.2) for treatment of hemifacial microsomia acts directly on the jaw: a) to stimulate the affected side to increase its lenght. b) to develop a proper joint function. Advantages: 1) easy to create and to wear so the therapy can start very early i.e before the age of school. 2) insert on the upper jaw. 3) direct stimulation of microsomal side during swallowing. 4) night use. 5) avoid maxillary and mandibular surgery.
RESULTS: market opportunity1/ 3500 incidence for year -30.000 patients in the world for year. The device may be used for: °) treatment of condylar joint trauma during birth and age of growth (7/1000) °) in 24000 rhematoid arthritis affected TMJ - °) treatment of TMJ trauma in adulthh- °) TMJ asymmetrical locking (10% of patient affected by TMJ Desorders) - °) functional asymmetries of mandibular motion. Barrier to competition:INTELLECTUAL PROPERTY : PCT: IB2015/000277 - WO: 2015132649 - Team experience: design and prototyping of the orthopaedic device and functional appliances : 5 yrs of developing
CONCLUSIONS: FINANCIAL : SALES PRICE 1. 000,00 EURO (2015) and COSTS. 100,00 EURO - 1.600,00 EURO (2019) and costs 50.00 euro. TOTAL CAPITAL NEED FOR 1 YEAR : 200.000,00 EUROS. manifacturing 30%, general operative expenses 10%, manpower 20%, marketing 40%

Adalimumab: another medication related to osteonecrosis of the jaws?

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BACKGROUND: The acronym MRONJ has been created in order to identify "Medication-Related Osteonecrosis of the Jaw", observed after the use of Bisphosphonates, RANK ligand inhibitor and antiangiogenetic medications. Only a case of osteonecrosis of the jaw in a Chron's disease patient following a course of Bisphosphonate and Adalimumab therapy has been recently described, so that it has been supposed that also this medication could promote manifestation of osteonecrosis. Adalimumab (Humira, Human Monoclonal Antibody in Rheumatoid Arthritis) is a human monoclonal TNF-α antibody used to threat rheumatoid arthritis, juvenile idiopathic arthritis, psoriatic arthritis, ankylosing spondylitis, plaque psoriasis, and Chron's disease in case of other drugs' failure. Adalimumab binds to tumor necrosis factor-alpha (TNF-α). TNF-α normally binds to TNF-α receptors, which leads to the inflammatory response of autoimmune diseases. By binding to TNF-α, Adalimumab reduces this inflammatory response.
METHODS: A 63-year-old female presented to our center on August 2014 referring pain in the right mandible. No history of smoking or alcohol abuse was referred. Comorbidities include obesity and idiopathic arthritis treated with medical treatment with Salazopyrin on 2009 and with Adalimumab (1 injection every two weeks) from 2010 to 2013: during this period, improvement of symptoms has been referred by the patient. Analyzing clinical history and radiological imaging, such as CT scan showing sequestrum, was suspected a diagnosis of MRONJ with nonexposed necrotic bone.
RESULTS: This patient presented with non exposed osteonecrosis of the jaw after placement, on September 2010, four titanium fixtures in the mandible. We considered the patient to be at Stage 0 (nonexposed bone variant) because she presented with no clinical evidence of necrotic bone but presented with nonspecific symptoms and clinical and radiographic findings.
CONCLUSIONS: Osteonecrosis of the jaw can be usually observed as an adverse reaction to some medications or to radiotherapy: histologically, it appears similar to osteomyelitis, and it is not clear whether infection is the cause or consequence of bone exposure. No cases related to the use of other drugs have been described, except one in which the use of Adalimumab has been hypothesized to improve necrosis caused by Bisphosphonates. The Authors suggest that the biologic therapy with an anti-TNF-α antibody might promote the manifestation of osteonecrosis and compromise oral healing capacity of the bone.

Condylar hyperplasia: condylar shape and clinical phenotype

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BACKGROUND: Condylar Hyperplasia is a bone disorder characterized by an excessive growth of one condyle. It may lead to facial asymmetry, malocclusion, speech, and masticatory problems. Identifying the specific type of condylar hyperplasia is crucial. The prof. D.W. Nitzan classification, considering the direction of mandibular growth, identifies three different phenotypes: type I vertical, type II trasversal and type III combined. The purpose of this work is to study the relationship between condylar shape and facial phenotype, evaluated radiologically and clinically respectively.
METHODS: The sample was composed of 36 patients with condylar hyperplasia. Was carried out a retrospective study collecting data related to a series of clinical and radiographic parameters. Through the analysis of nine clinical signs each patient was assigned to one of three types of asymmetry: Type I: Vertical (H.H); Type II: Transverse (H.E.); Type III: Combined, according to Dr. D. Nitzan classification. Through radiographic analysis was performed a morphological condylar evaluation, and each patient was assigned to one of three classes that we have thus identified: Class A: condylar hypoplasia with increased vertical height; Class B: tridimensional condylar hyperplasia; Class C: hyperplasia with increased vertical height. All recorded data were processed. Because of the nature of the sample was considered appropriate to make use of the chi-square test of Pearson.
RESULTS: Frequency distribution of the three types of asymmetry: 41.5% of the patients had type II, 39% of

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patients had type I and the remaining 19.5% had Type III. Frequency distribution of the different patterns of condylar morphology: 47.2% of patients had Class C, 36.1% of patients had Class A, and the remaining 16.7% had Class B. There was a clear correlation between Class A condylar morphotype and type II asymmetry (69.2%), the correlation drops to 23.1% in type III, and 7.7% in type I. Conversely, the Class B condylar hyperactivity correlates more with the type I of asymmetry (83.3%) and to a lesser extent with the type II (16.7%). Finally, in Class C of the condylar hyperactivity type I rappresented 47.1% of cases, type II is present in 29.4%, type III in 23.5% of cases (p-value=0.018). The results obtained prove an important element concerning the dependence between condylar morphotype, studied trough X-ray, and type of asymmetry, clinically evaluated (p-value=0.018). This correlation is particularly strong between the condylar morphotype Class A and type II asymmetry (69.2%) and between condylar morphotype Class B and type I asymmetry (83.3%). Finally, each variant of condylar hyperactivity seams to be associated to a particular shape of the neck and mandibular condyle.
CONCLUSIONS: The most relevant data that we can extrapolate from the present study indicates that the morphological appearance of the condyles suffering from hyperactivity is in connection with a specific variant of facial asymmetry, and vice versa. Studying this report contributes to a better classification of condylar hyperactivity. It also provides useful information for better treatment planning and for a better definition of the etiopathogenesis of this rare disorder.

TMJ internal derangement and condylar hyperplasia

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BACKGROUND: Temporomandibular joint (TMJ) condylar hyperplasia (CH) is an unilateral disorder in which thepathology occurs at the head of the condyle consequently affecting facial symmetry and occlusion and may be associated with pain and TMJ dysfunction.
The progressive increase of condyle volume results in facial asymmetry, malocclusion and deviation of chin. Nitzan classified the asymmetries by 3 types according to the clinical criteria as vertical (akin to hemimandibular hyperplasia), transverse (comparable to hemimandibular elongation), or combined.
The aim of this retrospective study is to assess the CH phenotype affecting the patient, to assess whether there is a TMJ internal derangement and the severity of this on the hyperplastic side. Then comparing this with the possible presence of a contralateral joint dysfunction.
Internal Derangement of TMJ is characterized by anterior displacement of the disc that causes the condyles to slip back over the disc thus resulting in TMJ discal damage and erosion of the condyle's bone. Internal derangements represent the basic pathological entity responsible for clinical manifestations of what has been known as the temporomandibular joint pain-dysfunction syndrome or similarly described conditions.
METHODS:The inclusion criteria of this retrospective study were: clinical documentation, positive SPECT scintigraphy, 3D TC and RMN.
26 patients suffering from CH that satisfied these criteria were included in the study: 18 females and 8 males.
The mean age of the sample was 19.7 ±7.79 (lowest value 10 – highest value 37).
Each patient was classified according to Nitzan.
Finally each patient was assigned a value, according to the Wilkes stage, both to the affected joint and to the contralateral.
RESULTS: The analysis of the results showed the existence of two groups of patients within the population suffering from condylar hyperplasia.
Group A: patients with a Wilkes stage more severe on the not hyperplastic side than on the affected side with a prevailing type 2 of Nitzan classification (56% of patients).
Group B: patients with a Wilkes stage on the not hyperplastic side equal to or lower than that of the affected side. All the patients of this group belong to type I. They are affected by vertical condylar hyperplasia.Data obtained show that there is a significant presence of TMJ Internal Deragement in the not hyperplastic joints. This result correlates with the hypothesis that traversal form condylar hyperplasia pathogenesis could be associated with a dysfunction of the not affected temporomandibular side.
CONCLUSIONS: These data support the hypothesis that there is a different etiology for vertical and traversal forms. Primitive forms, type I, derive from an anomaly of the condyle head. In the course of time this may lead to a degeneration of the joint hypoplasia. Conversely, in type II a condyle-disc unit functional alteration could be the cause of a contralateral joint overload, causing a secondary condylar hyperplasia, phenotypically associated with a transversal growth.
Data obtained shows the existence of a clear correlation between transverse form and radiological TMJ damage that demonstrate the presence of several TMJ internal derangement, and more advanced Wilkes Stage, in the hypoplasia joint than the other side suffering from CH.

Histological type in patients with internal derangement surgically treated

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BACKGROUND: Temporomandibular disorders (TMD) are a significant public health problem affecting approximately 5% to 12% of the population. In up to 70% of cases, TMD are accompanied by malpositioning of the temporomandibular joint (TMJ) disc, termed "internal derangement" ID. ID of TMJ is characterized by anterior displacement of the disc that causes the condyles to slip back over the disc thus resulting in TMJ discal damage and erosion of the condyle's bone. The aim of our study was to analyze histological features of the surgical specimens obtained from patients with ID, who underwent high condylectomy, and to assess the association with clinical findings and imaging.
METHODS: This retrospective study included 46 joints in 27 patients who underwent surgery with a diagnosis of ID,

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whose condyles slice were obtained by high condylectomy. In all cases diagnosis of ID was confirmed by pre-operative examination (MRI, CT scan) and clinical evaluatio. Patients were classified according the Wilkes Classification Stage. The study excluded patients belonging to Wilkes Classification Stage I and II because in these cases surgical treatment is not recommended. Patients were divided into three groups, according to Wilkes classification, group 1 - Stage III, group 2 - Stage IV and group 3-Stage V.
Histological examination has been performed on all surgical specimens removed from condyles. Two different pathologists evaluated the bone tissue according to five parameters. fibrocartilage focal bone reaction sclerosis synovial reaction inflammatory infiltration
RESULTS: Preliminary results show in Group 1, fibrocartilage is preserved and regular, there are isolated outbreaks of bone resorption and focal sclerosis. In Groups 2 and 3 fibrocartilage is irregular and thickness varies widely and sclerosis is more pronounced. Data shows a relationship between pathologic findings and Wilkes Classification Stage. The data shows that: all joints including those in Group 1, Stage III of Wilkes, had irreversible histological damage, and the histological damage worsened as the Wilkes Stage increased and patients showed more severe symptoms and radiological signs. Lastly, inflammatory infiltration was absent in all examined samples. In Group 3 severe sclerosis was highlighted in 30% of the sample and in Group 2 moderate sclerosis accounted for 50%. In conclusion, with the progression of the Wilkes Stage, the results show an increase in severity of clinical symptoms and radiological signs, such as disc damage and irreversible displacement that correlates to increased histological damage of the condyle head.
CONCLUSIONS: Preliminary results showed a worsening of bone reaction and fibrocartilage damage according to the severity of ID; this last component gets thinner and in some cases disappears, mainly in group 2 and 3. This study has concluded that irreversible histological damage was already present in Stage III Wilkes. The evidence of increased histological damage supports the physiopathological role of disc displacement in TMD. Early stage internal derangement might play a fundamental role in the etiopathogenesis of irreversible joint damage thus leading to a wide spectrum of articular symptoms and signs even Wilkes early stages. This study has concluded that irreversible histological damage was already present in Stage III Wilkes. These results have a mutual connection with the importance of intact disc that can prevent the articular cartilage from being degraded and bone tissue to be damaged.

Lip-splitting and mandibulotomy for total or subtotal glossectomy: is it really necessary?

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BACKGROUND: Lower lip-splitting incision associated with different types of mandibulotomy has been described in order to obtein wide access to total or subtotal glossectomy. In those cases, high rates of functional and aesthetic deficit and postoperative morbidity (more in cases of patients in which adjiuvant radiotherapy have been performed) are described.
We present our experience in the treatment of patients undergoing total or subtotal glossectomy and contemporary reconstruction with flaps without lip splitting incision and mandibulotomy.
METHODS: Data about patients affected by malignant tumors requiring total or subtotal (posterior third of the tongue) resection that were treated at our department from January 2004 to December 2014 were retrospectively reviewed. Data evaluated included : T and N stage, resection margins, operation time, post-operative complications such as fistula and flap necrosis. All patients were retrospectively staged according to AJCC. In the last 2 years, all cases were discussed at the Head and Neck Tumor Board.
RESULTS: 44 patients were identified: between them, 42 were affected by squamous cell carcinomas and 2 by adenoid cystic carcinomas. In 2 cases microscopic infiltration of one margin was found (R1); in 1 case a close margin was identified. In 29 cases reconstruction was performed using free flaps, and in remaining cases a pectoralis major flap was used. In 35 patients (79,5%) no recurrence was observed; most frequent neoplastic event was loco-regional recurrence (6/9 patients) that was observed from 4 to 18 months post-operatively; 3 patients presented distant metastases (lung in 2 cases and lung and liver in the last one).In 3 cases postoperative complications were observed.
CONCLUSIONS: In theory, lip-splitting and mandible discontinuity could allow for increased access and tumor visualization, and could facilitate flap positionning. At today "pull-through" operation is quite universally performed in those cases in which an antero-lateral buccopelvectomy is required, while in case of tumors involving the posterior third of the tongue or the base, most surgeons still prefer to perform removal through a lip-splitting transmandibular approach. Neverthless, in our experience, it is not necessary in case of total or subtotal glossectomy.

Multidisciplinary approach in Apert syndrome

I. Raponi, M. T. Fadda and Apert Group

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Group of Apert syndrome, "Sapienza" University of Rome, Policlinico Umberto I, Italy; Genetics (A. De Luca, V.Guida, A. Pizzuti); Prenatal diagnosis (A. Giancotti); TIP (C. Moretti, P. Papoff); Neuro-pediatrics (A. Spalice, F. Orsetti); Neurosurgery (R. Delfini, A. Santoro, A. Caporlingua, F. Caporlingua); ORL (M. De Vincentis, E. Savastano); Maxillo- Facial surgery (P. Cascone, V. Valentini, M.T. Fadda, C. Ungari); Ophthalmology (M. Gharbiya, M. Marenco); Pediatric dentistry and Orthodontics (A. Polimeni, E. Barbato, A. Silvestri, M. Bossù, G. Ierardo); Orthopedics and plastic surgery (B. Carlesimo, A. Spagnoli, V. Mazzone); Psichology (M. Amabili, L. Silvestrini)

BACKGROUND: Apert syndrome is a rare congenital disorder characterized by craniosynostosis, midface hypoplasia and symmetric syndactyly of hands and feet. Apert syndrome is estimated to affect 1 in 160,000 live births and is caused by a de novo mutation in the male gameter in the fibroblast growth factor receptor 2 (FGFR2) gene on chromosome 10.
Due to the complexity of the syndrome, a multidisciplinary (respiratory, cerebral, maxillo-mandibular, dental, ophthalmic and orthopedic) approach is necessary in treating the psychological, aesthetic and functional issues.
An integrated multidisciplinary approach, on the bases of the experience gained at the centers of cranio-facial surgery, allows the best functional and aesthetic results.
METHODS: The Group of Apert syndrome, Policlinico Umberto I, "Sapienza" University of Rome, founded in 2014:

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— Reviewed the literature about this rare syndrome
— Analyzed all the anatomical, functional, psychological and aesthetical features
— Studied different surgical timing worldwide
— Compared different results and surgical approach of the largest series\ clinical report of the syndrome
— Focused on the Apert patient in all his complexity at the rare disease ambulatory.
In order to:
— Obtain genetic and prenatal diagnosis
— Program combined clinical and radiological controls
— Plan an integrated and individualized surgical timing
— Reduce hospital recovery, hospital access number and general anesthesia
— Give psychological support to patients and families during all treatment pathway.
RESULTS: The group of Apert syndrome operating in the Policlinico Umberto I of Rome, has defined step by step an integrated surgical, clinical and radiological timing by dividing treatment plan in three periods:
— step 1: from birth to age 2
— step 2: growth period
— step 3: adult age.
In the first weeks cerebral, respiratory and ocular bulb emergencies should be taken into account. For these patients immediate surgical treatment is required in order to prevent or correct papilledema, corneal ulcers, severe respiratory distress and intercranial hypertension.
It is fundamental to start integrated counselling with all medical team involved in the diagnosis and treatment protocol: genetists, neuropediatricians, pediatricians, maxillo-facial surgeons, neurosurgeons, hand surgeons, ophthalmologists.
During growth both transversal dimension of the orbital region and retrusion of the middle third must be corrected.
In addition during this period must be performed:
— eye surgery, correction of strabismus
— hand and foot surgery
— dental and orthodontic therapies to monitor teeth eruptions, prevent caries, guide the eruption and allow dental alignment.
Other surgical procedures are planned at the end of growth and concern the lower third of the skeleton and the ancillary procedures. Orthodontist in the pre and post-surgical phase is essential in this age group.
CONCLUSIONS: Diagnostic and therapeutic planning in patients with Apert syndrome emphasizes the need to integrate various specialities. Establishing an integrated and tailored surgery timing, scheduling, combining and coordinating actions to be taken at different stages of the patient's age reduces the number of general anesthesia thus simplifying therapy for Apert patients.

New surgical approach of the hard and soft tissue in BRONJ treatment

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BACKGROUND: Bisphosphonate related osteonecrosis of the jaw (BRONJ) is an adverse drug reaction described as the progressive destruction and death of bone that affects the mandible or maxilla of patients exposed to the treatment with bisphosphonates, in the absence of a previous radiation treatment[1]. All bisphosphonates, in particular amino-bisphosphonates, have high affinity for bone mineral crystals and accumulate in the bone matrix; when was incorporated into the bone tissue, they can persist for up to 10 years. Recent studies have shown that bisphosphonates inhibits oral epithelial cell migration causing a delay of wound healing. Because epithelialization in an essential step in post-intervention wound healing, it has been hypothesized that the soft tissue of the oral mucosa could be a key factor in BRONJ development. The aim of the study was to establish a new treatment approach in STAGE I-II BRONJ to resolve symptomatology and prevent a progression to the STAGE III BRONJ.
METHODS: We retrospectively reviewed the data of 84 patients treated for stage I and stage II BRONJ, according to SICMF-SIPMO staging system, at the Department of Odontostomatology and Maxillofacial surgery, Policlinico Umberto I, "Sapienza" University of Rome, between January 2011 to June 2015. All the patients underwent a resection of necrotic bone with surgical drills or bone rongues until the appearance of bleeding bone. A smooth surface was obtained to avoid local traumatisms and to facilitate soft tissue healing over the surgical site. No wound closure was performed after surgical procedure and a medication with irrigation of Sodium Hypochlorite solution and positioning of gauze of ialuronic acid was made to obtain spontaneous healing. For three weeks after discharge, the patients performed a self-medication, three times a day, with Sodium Hypochlorite solution and positioning of gauze of ialuronic acid to protect the surgical site. During the post-operative follow-up each patient was visited weekly during the first month, twice a month for the two following months and once a month for the following six months.
RESULTS: 49 patients of the sample presents a Stage I BRONJ and 35 a Stage II BRONJ. 36 patients (42.8%) present maxillary localization of BRONJ while 48 patients (57.2%) had mandibular involvement. On 49 patients with Stage I BRONJ, 20 present maxillary localization (23.8% of the sample) and 29 mandibular localization (34.5% of the sample). On 35 patients with Stage II BRONJ, 16 present maxillary localization (19.1% of the sample) and 19 mandibular localization (22.6 % of the sample). After surgical treatment a coverage of the bone, by normal and trophic mucosa, was obtained on 73 patients (86.9%). 7 patients (8.3%), at the last follow-up visit, showed a delayed healing of the surgical site, 3 patients (3.5%) showed a new localization of BRONJ and one patient (1.1%) showed disease progression to Stage III with a pathological fracture of the jaw. All histopathological examination confirms BRONJ diagnosis.
CONCLUSIONS: BRONJ management is controversial; the position paper of AAOMS suggested to limiting surgical procedures to stage III BRONJ. However, surgical operations for Stage III of BRONJ are invasive and only few patients may undergo this type of surgery. An early diagnosis and surgical treatment followed by local medication to obtain a second intention wound healing may determine a higher control of lesions in the long term and prevent the evolution on advanced stages of BRONJ.

Maxillo-mandibular advancement in obstructive sleep apnea/hypopnea syndrome

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BACKGROUND: Surgical management of obstructive sleep apnea/hypopnea syndrome (OSAHS) typically consists of sev-

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eral phases based on the severity and location of the anatomical abnormalities. The last phase of surgical management consists of Maxillo-Mandibular Advancement (MMA) performed by a Le Fort I osteotomy and bilateral sagittal split ramus osteotomies of the mandible. Advancement osteotomies of both the maxilla and the mandible have been considered when non-surgical therapies and single-site surgeries have been unsuccessful. The purpose of this study was to examine the effects of maxilla-mandibular advancement surgery on the pharyngeal airway volume and determine if a relationship exists between the amount of advancement and airway volume change.
METHODS: Records of 8 patients affected by severe OSAHS who had undergone maxillo-mandibular advancement osteotomies, between December 2013 to December 2015, at Department of Odontostomatology and Maxillofacial Surgery, Policlinico Umberto I, "Sapienza" University of Rome, Italy, were collected and analyzed. According to standard protocols, pre-surgery evaluation included clinical examination, cephalometric evaluation and nocturnal polysomnography. On cephalometric analysis after and before surgical procedure was evaluated posterior airway space (PAS). Two polysomnographies were performed: the first before surgical treatment, the second after 6 months follow-up. The surgical procedure, on all the patients of study sample, was performed to produce a mandibular advancement at least 10 mm. Cone beam computed tomography scans were taken presurgery and at least six months post-surgery.
RESULTS: All patients had increased PAS volume and complete remission of objective and subjective OSAS symptoms evaluated by AHI. At cephalometric analysis before surgery, the posterior airways space (PAS) ranged from 3.7 mm to 8.9 mm (mean 6.1 mm). After surgery, a dramatic increase in PAS was seen, ranging from 12.2 mm to 16.1 mm (mean 14.1 mm). The number of oxygen desaturation events (AHI) decreased drastically in all patients, the mean value falling from 47.6 (SD 8.38) to 5.7 (SD 1.08) after surgery.
CONCLUSIONS: The increase in PAS after MMA is greater than that offered by other surgical techniques. The treatment of OSAS and the choice of MMA as primary treatment do not depend only on cephalometric measurements, but mainly on the severity of OSAS and restriction of PAS.. In conclusion, the indications for MMA in OSAS patients can be extended significantly to patients without skeletal anomalies, because this procedure constitutes an effective, reliable and versatile surgical solution and may be applied to a wide range of patients with severe or moderate OSAS.

Hemifacial microsomia treated by total joint reconstruction (TJR) and orthognathic surgery: all-in-one approach

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BACKGROUND: HFM patients' reconstruction has always been a challenge for maxillofacial surgeons and numerous reconstructive techniques have been described.
In the past, distraction osteogenesis has gained popularity as an alternative to conventional surgery, however the two primary methods to reconstruct the TMJs involve the use of autogenous (using free or microvascular bone grafts) and alloplastic graft, but there is no widely accepted method.
It must be considered that most of the patient reconstructed with an autogenous graft require at least one more maxillo-mandibular surgical procedure.
A case of female non-growing patients with HFM type IIb treated with a all-in-one protocol is presented.
METHODS: Computed tomographic scan data were acquired and a 3-dimensional plastic model of the patient's jaws, TMJs, and cranial base structures was produced. The mandible was repositioned on the 3-dimensional model to its predetermined new position and fixed in place with quick-cure acrylic.
A wax temporomandibular joint disc was recreated to reconstruct as much as possible the vertical dimension after the sagittal split osteotomy.
The sagittal split osteotomy was performed on the plastic model and the mandible was repositioned downward in the back, advanced in a counterclockwise direction, and transversely leveled.
Before surgery, dental models mounted on an anatomic articulator were used to replicate the mandibular repositioning performed on the 3-dimensional plastic model for the construction of the intermediate surgical occlusal splint necessary for precise positioning of the mandible at surgery.
The model was sent to TMJ Concepts, and the patient-fitted TJP was manufactured.
In operating room, the same timing of model surgery was followed.
RESULTS: Incisal opening was 21.4mm in the presurgical period and 32.2mm after all-in-one procedure, for an increase of 50,5%. Excursive movement to the right side was 2.2mm in the presurgical period and was 1.5mm after surgery, for a decrease of 31,8%. Left excursion movement changed from 5 mm to 6.1 mm, for an increase of 22,0%.
CONCLUSIONS: The TMJ Concepts patient-fitted TJP in conjunction with orthognathic surgery for TMJ and jaw reconstruction is a valid option for patients with HFM because 1) there is less morbidity because no bone graft donor site is required (except if the ramus is reconstructed with bone grafts); 2) it does not require bony reconstruction of the glenoid fossa; 3) it is a patient-fitted device to meet a patient's specific anatomic requirements for mandibular advancement, vertical lengthening, and TMJ reconstruction; and 4) treatment results are highly predictable and stable in relation to skeletal and occlusal stability, TMJ function, improved facial balance, and comfort. Potential risks and concerns using TJPs include 1) an unknown functional service life of the TMJ Concepts TJP; 2) surgical risks associated with TMJ reconstruction; 3) infection; and 4) development of hypersensitivity to the materials in the prostheses.

It is possible to decrease the use of X-rays in bone healing assessmente in cleft palate patients? Preliminary study

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BACKGROUND: Clefts palate are very important syndromes involving the cranio-facial region. The clefts palate treatment is very long and it must accompany the patient from birth until complete skeletal development. The most important moment of regenerative surgery and therefore of orthodontic rehabilitation is the secondary alveolar bone graft phase,

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performed between 9 and 12 years of age. Usually x-rays are carried out to evaluate bone graft healing, especially CT cone beam technology is preferred because it allows obtaining accurate and high quality images of the cleft palate region and often 3D reconstructions are performed. However x-rays implies high biological cost which become more remarkable in growing patients like cleft patients are.BACKGROUND: To test the feasibility of employing bio-impedance in bone healing assessment after secondary alveolar bone graft in order to reduce the use of invasive methods, like x-rays, in bone healing assessment before and after alveolar bone graft. METHODS: we carried out two experiments. We used Impedance Gain/Phase Analyzer 419A (Hewlett Packard, USA). The first experiment has been carried out to design an experimental model to use in the subsequent tests. We tested conditions to obtain steady and repeatable values of bio-impedance in surgically created defects in maxillary bone grafted with autologous bone in fifteen dead rabbits. In the second experiment we tested the possibility to obtain steady and repeatable values of bio-impedance in healed maxillary bone after autologous bone grafting in thirty live rabbits.
RESULTS: In both experiments it was possible to obtain steady and repeatable values of bio-impedance only keeping in place electrodes for a minimum time of 4 seconds. A time of 10 seconds is recommended to obtain still values. A lower calibre of electrodes (1mm) is recommended in performing measurements in narrow field of application like maxillary bone is.
CONCLUSIONS: Steady values of bio-impedance in measuring healed bone tissue maintaining electrodes in right position with constant pressure and for a minimum time of 4 seconds uninterruptedly can be obtained.In function to the narrowness of operating field it is necessary to choose and characterize lower calibre of electrodes. It is possible to achieve steady and repeatable values of electrical bio-impedance in surgical simulated defects healed after different surgical and grafting procedures.

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Severe complications after miniscrew placement in the anterior palatal area

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BACKGROUND: The use of miniscrews as a source of skeletal anchorage has become routine in day-to-day orthodontic practice, and success rate has been reported to be high. One of the safest areas in the upper arch is the anterior palate, which has the most suitable bone site for miniscrew placement because of its histomorphology and the ease of placing miniscrews in this area. There are no anatomic structures that could be harmed during miniscrews insertion but anatomic variability of the Naso Palatin Bundle (NPB) could complicate stability and success of TADs insertion, and the direct contact between miniscrews and nervous bundle could cause complications. By the way, only 4% of NPB anatomic variations were reported to be potentially detrimental during placement of dental implants in that area.
The aim of this study is to show a major failure and its following healing when inserting a miniscrew too close to the Naso Palatin Bundle area.
METHODS: The patient presented bilateral molar class II relationship and without space for the element 1.3, together with an upper midline right shifted. The soft tissue profile did not present any major convexity, and the skeletal relationships were a mild Class II.
It was decided to treat the case with upper molars distalization, followed by anterior teeth retraction.
A miniscrew supported distalizing device was planned together with fixed appliance on the upper arch. Finally an impression of the palate transferring the screw position was taken to allow the technician to build the distalizing device. The distalizing device was a re-adaptation of a distal-jet.
RESULTS: After one week the patient came back with palatal gingiva swelling around the head of the miniscrew. The patient did not experience any symptom, thus it was decided to practice an excision of the gingiva surrounding the head of the miniscrew.
Springs were fully charged to allow for distalization of the molars against the screw.
After 6 months, molar distalization was minimal while it was evident that the anterior part of the appliance was deepening in the palatal gingiva. While pulling out the palatal appliance, the miniscrew came out as connected to the appliance.
The patient was given chlorhexidine and antibiotics to exclude the possibility of a super infection.
A triangular area of bone was lost: the apex was located in the area of the naso-palatin nerve foramen and the base corresponded to the lingual surface of the two central incisors.
The histology could not identify any specific type of lesion as the small bone particles appeared with a burned-like aspect.
Orthodontic treatment was continued. The increased overjet due to anterior anchorage loss was treated with Forsus appliance left in place 6 months until overcorrection.
CONCLUSIONS: As literature shows there's a wide variability of the foramen that sometimes is very extended. It's better to completely avoid this area by inserting the screw more posteriorly. The bone support of the inserted screw may have been far from ideal.
Miniscrews insertion guide-lines in both vestibular and palatal areas have become very clear, and even if the palate presents less anatomical sensitive structures, a special care have to be taken in respecting the anterior limits of insertion, i.e. the third palatal ruga, to avoid injuries in the Naso Palatin Bundle area.

Medication-related osteonecrosis of the jaw (MRONJ): comparison of 5 treatment groups

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BACKGROUND: Identify a therapy, with high efficacy and a low morbidity to treat MRONJ, through an observational retrospective study. 5 groups of patients have been treated with different medical and/or surgical protocols and they have been compared to find any statistically significant difference.
METHODS: 40 patients (56 lesions) affected by MRONJ Stage 1, 2, 3 (American Association of Oral and Maxillofacial Surgery (AAOMS) classification), were treated at the Department of Maxillo-Facial Surgery and Dentistry of the San Gerardo Hospital and University in Monza between Jan 2011 and Jul 2015.
Every patient has been studied through a clinical and radiographic analysis according to the AAOMS classification.
Patients has been divided into 5 groups
1) Medical therapy with antibiotics and professional and home hygene (11 MRONJ)
2) Ozone therapy with ozone gel, added to the protocol applied to Group 1 (9 MRONJ)
3) Surgical debridement with rotary/piezoelectric instruments added to the protocol applied to Group 1. (13 MRONJ)
4) Surgical debridement with Er:YAG laser, added to the protocol intended to Group 1. (11 MRONJ)
5) Surgical debridement with Er:YAG laser and Ozone therapy, added to the protocol applied to Group 1. (7 MRONJ)
Wilcoxon signed-Rank test has been used to establish the statistical significance of the single groups.
Chi-squared test has been used to compare groups. A significance level of 0,05 has been set.
RESULTS: Through this statistical analysis, we can conclude that every protocol has been effective in term of improving the clinical stage of the osteonecrotic lesion. Nevertheless protocols have induced different results. Statistically significant

difference has been found between group 1 and 2, 3, 4, 5 and between group 2 and 4, 5. The first comparison shows that ozone therapy and surgical protocols used in this study lead to better results than simple medical therapy. The second comparison suggests that laser surgery may lead to better results compared to the ozone therapy.
On the contrary, no statistically significant difference has been found comparing groups 2 *vs* 3 (traditional surgery *vs* ozone therapy); 3 *vs* 4,5 (traditional *vs* laser surgery) and 4 *vs* 5 (laser surgery with or without ozone therapy).
CONCLUSIONS: Our experience shows that a conservative surgical protocol, limited to debridement of the necrotic bone is a better protocol compared to the classical medical therapy in terms of improving the clinical stage of the lesion. In our study, we have obtained better results with laser surgery protocol compared to traditional surgery, despite the fact that we did not reach results that were statistically significant; that is why, it is necessary to conduct other studies to assess the higher efficacy of laser surgery compared to traditional one. Regarding ozone therapy, it can be used in patients who are non eligible to any surgical protocol (due to clinical conditions) or to prepare the patient for a surgical debridement.

Esthetic outcome of implants placed in fresh extraction sockets by clinicians with or without experience: retrospective evaluation.

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BACKGROUND: The aim of this study was to evaluate clinical and esthetic outcomes of immediate implants placed by experienced senior surgeons and residents in implant dentistry. Immediate implants have demonstrated to be a reliable technique. Correct positioning in fresh extraction sockets and maintenance of peri-implant hard and soft tissue and aesthetics during time derive from considering several factors, which lead to a strict case selection. Several factors such as the socket location, the thickness of the buccal bone plate, the insertion torque value, the marginal gap between implant and alveolar bone wall, the implant collar design, the implant surface nanotopography, and the vertical location of the implant-abutment connection, play an important role in the buccal bone remodeling around immediate implants.
METHODS: Patients who received single tooth extraction and immediate implant placement between 2009 and 2011 were included in the retrospective chart review. Included sites were divided in 2 groups according to the operator's experience – Expert (E) *vs* Non-Expert(NE).Outcome variables [marginal bone height(MBL), facial soft tissue level(FST) and papilla index(PI)] were evaluated by a single clinician not involved in the surgical treatment, at baseline, 1 and 3 years after implant insertion. Patient's satisfaction (esthetics, capability to chew, capacity to speak, comfort, self-esteem and ease of cleaning) was assessed by visual analog scales(VAS) at 3 years. Proper pairwise comparison tests were applied with level of significance set at 0.05. 60patients were enrolled in the study,31 patients were allocated in E and 29 in NE.
RESULTS: 3 years after implant placement significant higher bone loss was registered in NE (1.74±0.59mm) than in E (1.34±0.45mm) P value of 0.0044. PI appeared stable in E, whereas it showed a significant loss in NE (PI = 2 at 1-year and PI = 1.5 at 3- years). Significant recessions at FST were registered for all groups at both check-ups; however, in E slight soft tissue recession was evident at 3 years (0.58±0.72 mm), while NE showed more evident soft tissue recession (1.52±0.74 mm). Patients reported higher overall satisfaction when treated by E (85.2%) than when treated by the NE (81.1%) with P-value <0.0001.
CONCLUSIONS: Patient's evaluation of aesthetic and functional parameters was better for E-group. Selection of the clinical case and control of surgical parameters is fundamental for satisfactory results, especially in aesthetic area, thus a greater experience is recommended in treating this area. The findings from this study suggested that the immediate implant procedures could be considered a successful and satisfying treatment strategy when a strict selection criteria and high level of surgical skills were applied.

Epithelioid hemangioendothelioma of the mandibular gingiva: report of a case and literature review

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BACKGROUND: Malignant epithelioid hemangioendothelioma, or high-risk epithelioid hemangioendothelioma, is a low- to intermediate-grade vascular malignancy originally described by Weiss and Enzinger in 1982 as a vascular neoplasm of endothelial origin. Epithelioid hemangioendotheliomas have been reported in numerous locations, particularly the lungs, liver, soft tissues, viscera, skin, and bone. The World Health Organisation describes MEH as an intermediate malignant neoplasm. MEHs are extremely rare in the oral cavity. Only eleven cases referred to MEH of the maxillary or mandibular gingiva.
CASE REPORT: A 33-year-old male was referred to our Oral and Maxillofacial Service in 2009 for the evaluation of a formation on the alveolar mucosa. A panoramic radiograph review showed a radiolucency between lateral incisor and second premolar roots. CT scans showed diffuse cortical bone loss. No signs of radiographic root resorption were detected. The patient denied any history of pain or swelling. A tissue punch biopsy was performed by removing two punches of tissue.
A microscopic evaluation revealed fragments composed of a proliferation of spindled, ovoid, and epithelioid cells arranged in nests, cords, and short strands. The neoplastic cells were large and polygonal with an abundant and granular cytoplasm, nuclear pleomorphism, and nuclear hyperchromatism. The lesion exhibited small vascular channels with a moderate cellular inflammatory infiltrate, composed mainly of lymphocytes, plasma cells, and eosinophils surrounding the vessels. Focal mitotic activity was identified, and the Ki-67 percentage score was 20%. After immunohistochemistry a diagnosis of MEH was made. No signs of metastasis were detected (cN0) by an investigation of the patient's neck nodes, computed tomography, and ultrasonography.
Anterior mandibular bone excision, including eight teeth and all related soft tissues, was performed under general anesthesia. A histologic examination of the lesion confirmed the

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diagnosis of MEH. The limits of resection were investigated to ensure clean and safe excision margins. No neck dissection was performed at this time.
The patient was followed up at 15 days, 1 month, 3 months, 6 months, and then every 6 months for 4 years with a clinical investigation of soft tissues, clinical and ultrasonographic evaluations of lymph nodes, and radiographic assessment of bone healing. The entire follow-up period was 46 months.
DISCUSSION: No consistent clinical or histologic criteria for predicting the biologic behavior of MEHs have been identified. A higher mortality rate is observed when epithelioid hemangioendotheliomas occur in bone, liver, or the lungs; therefore, the importance of immunohistochemical analyses to establish a definitive diagnosis should be emphasised. In this context, the majority of intraoral epithelioid hemangioendothelioma lesions were immunoreactive for CD34, CD31, factor VIII-Rag, and vimentin, which characterise the epithelioid endothelial origin of this entity.
It was not possible to identify common risk factors for MEH. The literature review indicated a mean age at diagnosis for MEH of 17±13.01 years, suggesting a predisposition to disease in young people.
Systemic metastases have been described in the literature at a rate of 21%, and a mortality rate of 17% has been described for cutaneous MEH, in accordance with the histological aspects of the malignancy. In gingival MEH no metastases has been described in literature before our report.
Due to the potential malignancy of epithelioid hemangioendotheliomas, wide local excision is the treatment of choice for oral cavity cases according to the literature.
The mean recurrence time was 21.33±23.44 months. Given the possibility of recurrence and metastasis several years after clean and safe excision, clinicians should apply at least 5 years of follow-up.

Oral health related quality of life in patients after impacted lower third molar surgery. A supportive multicenter care trial

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Impacted lower third molar surgery is today considered as a common daily dental practice. This surgical act is often associated with postoperative pain, swelling, and trismus. The aim of the present study was to evaluate the oral health related quality of life (OHRQoL) referred by a large sample of patients treated for impacted lower third molar surgery removal with three different post-operative drugs therapies. When impacted third molars are surgically removed by opening a full thickness flap, the post-surgery healing is characterized by limitation in the mouth opening, reduced masticatory capability and swelling of variable degree. This last clinical condition represents a serious problem as it influence the quality of life of the patients, especially during the next 48 hours following the surgery. OHRQoL was measured using the OHIP-14, which was filled out at baseline (T0), just prior to the surgery, at 48 hours post op (T1), after 1 week (T2) and on the last day at suture removal after 14 days post op (T3). Data were obtained from 180 patients enrolled from Messina and Foggia Universities. The mean OHIP-14 total score reduced significantly (mean difference = 5.63, 95% CI 3.76 – 7.51), t (128)=5.94, p <0.001 in the between T0 and T1 with lower value recorded on T1. Also between T2 and T3 a significant increasing in OHIP-14 total score (mean difference = 2.41, 95%CI 0.06-4.76) took place.

Different management of Schneiderian membrane perforation during maxillary sinus floor elevation

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BACKGROUND: Perforation of the Schneiderian membrane represents a major intraoperative complication in maxillary sinus augmentation that can occur whith a frequency of 58,3%. The reasions may be associated with surgical techniqu, septum, inadequate ridge height and membrane thickness. The laceration can bring to pathological consequence such as sinusitis, pseudocysts formation and bacterial graft contamination through the perforation. The international literature has proposed different classifications based on the localizzation and width of the membrane laceration as well as varius materials to restore it such as resorbable sutur, collagen membrane, lamellar bone, autologus bone graft and fibrin adhesiv. The aim of this paper is to show two different techniques and materials successfully used to deal with sinus membrane laceration
METHODS: the presented cases deal with two patient who need a maxillary sinus augmentation to increment the insufficine ridge height studied through a TC needed to allow the insertion of successfully integrated implants.
Inthe first case, after local anesthesia, a triangular flap extended from 1.6 to 1.3 was elevated and a lateral window was created using a Piezoeletric device in order to access the Schneiderian membrane which was lifted to introduce the graft. A 3 mm perforation was accidentally created due to the insufficient thickness of the membrane. a collagen membrane was applied on the laceration and then the bovine bone graft material was placed into lifted maxillary sinus. Contemporarely, two Nobel implants (4.3 mm X 10 mm - Nobel Biocare, Gotemborg, Sweden) were inserted. Then the graft was covered with another collagene membrane and the flap sutured.
In the second case, after local anesthesia a triangular flap from 2.4 to 2.7 was incised and elevated. The sinus was accessed through a bony trap-door and during its lifting a 6 mm perforation ofthe membrane occured. Because of the larger laceration width, it was decided to suture it with a 5-0 resorbable suture. The bone bovine graft was placed under the sutured Schuderian membrane and then two Nobel implants (4.3 mm X10 mm - Nobel Biocare, Gotemborg, Sweden) were inserted. GBR was performed buccaly to the distal implant, so that the entire graft was covered with a collagen membrane and finally the flap was sutured.
In both cases, no infective complication occured and the temporary crowns were placed 6 months after the surgery. Those

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ones were then replaced with definitive crowns a month later.
RESULTS: Inthe discussed cases, two methods to reapir a Schneiderian membrane perforation were presentated. Even if different techniques are proposed in literature, the application of a collagene membrane or a resorbable suture seem to be the easiest and most common methods to repair small perforation allowing to continue the operation.
However, the literature shows that the laceration doubles the risk for the occurrence of sinusitis or infection and, in addition, the survival rates of implants placed under reconstructed membrane correlate inversely wuth the size of the perforation.

The window approach for tooth root fragment extraction

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BACKGROUND: Different techniques have been proposed in the international literature for the removal of the apical portion of a fractured tooth BACKGROUNDed to preserve the bucco-crestal bone which is important if the extracted tooth has to be replaced both with a traditional prosthesis or with an implant supported prosthesis. In the closed technique, no flap is elevated, the bone is not removed and root extraction is performed through the alveolar cavity with different instruments. In the traditional approach, tip elevators are used but several other instruments have been suggested such as an hedstrom file or a particular expandable micromotor bur. The open technique involves the elevation of a buccal flap, the exposure of the root fragment by the buccal cortical bone removal, the luxation and extraction of the fragment through the bone opening or its displacement out of the socket, with a small elevator. In the classical open-window approach, a marginal triangular flap is elevated, only the bone overlying the fractured apex is removed and then the apex is pushed toward the alveolar crest. A different kind of soft tissue incision is here proposed to manage the window approach.
METHODS: After local anesthesia, using the already extracted part of the tooth as reference height, a 1 cm linear incision is performed at the root apex level, parallel to the marginal bone. The upper incision margin is then elevated to expose the underlying bone and a round bur is used to remove only the bone overlying the apical portion of the fractured fragment which is then cutted to remove its apical portion by means of a small elevator. The residual portion of the root is then pushed through the alveolar cavity and extracted. Soft tissues are finally sutured.
RESULTS: The proposed technique is a very conservative surgical approach which presents several advantages: only a small linear incision, without vertical incisions, is performed and this avoids un-esthetic scars. Bone removal is minimal so that patient discomfort after surgery is reduced. This approach is simple and versatile since it can be used also in difficult situations such in the case of curve apices. Finally, it allows to remove small apical fragments directly through the bone window.
CONCLUSIONS: The proposed surgical approach is a valid alternative for tooth root fragment extraction when the closed technique has not been successful. Actually, it is a slight invasive procedure which allows the surgeon to obtain a direct visual access to the apical fragment which can therefore be easily removed.

Carcinosarcoma (true malignant mixed tumor) arising in pleomorphic adenoma of the parotid gland

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BACKGROUND: Carcinosarcoma of salivary gland, also referred to as true malignant mixed tumor, is an extremely rare malignant neoplasm composed of carcinomatous and sarcomatous components, accounting for about 0.16 % of malignant salivary gland tumors. Based on the literature, the carcinoma component consists of squamous cell carcinoma or adenocarcinoma, and the sarcomatous component shows features of chondrosarcoma, fibrosarcoma, osteosarcoma, and, exceptionally, rhabdomyosarcoma. Two thirds of carcinosarcomas develop in the parotid gland, affecting elderly patients. Most tumors seem to develop de novo, but occasional cases associated with previously diagnosed pleomorphic adenoma (carcinosarcoma ex pleomorphic adenoma) have been described. The histogenesis of this rare malignancy is still under discussion, but some authors favor a derivation from modified myoepithelial cells or common ancestor cells.
METHODS: A 72-year-old male patient presented with a left parapharyngeal painful mass. The tumor, that at operation appeared widely invasive, was surgically resected. The tissue specimen, extensively sampled, was fixed in buffered formalin and routinely processed for paraffin embedding. Four micrometer sections were stained with hematoxylin and eosin, Masson's trichrome, Alcian blue and periodic-acid Schiff stains. Immunohistochemical studies were also performed.
RESULTS: Grossly, the mass, measuring about 4 cm in diameter, was poorly circumscribed and widely invasive, with foci of necrosis. Histological examination showed a tumor with biphasic appearance, composed by a poorly differentiated epithelial component with features of undifferentiated carcinoma, with focal areas of squamous cell carcinoma, admixed with sarcomatous areas showing osteosarcomatous and chondrosarcomatous differentiation. The malignant cells showed nuclear hypercromasia and pleomorphism, with frequent mitotic figures. Necrosis was abundantly present. In addition, peripheral areas of benign mixed tumor (pleomorphic adenoma), intimately admixed to the malignant tumor, were focally seen. At the periphery, a rim of normal parotid gland tissue was focally present. Based on the morphological and the immunohistochemical findings, a histopathological diagnosis of carcinosarcoma was made.
CONCLUSIONS: Here, we present a case of carcinosarcoma arising in the left parotid gland of a 72-year-old patient. Histological examination of the surgical specimen revealed a tumor composed of carcinoma and sarcoma components (true

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malignant mixed tumor) arising in a pleomorphic adenoma. It is well known that about 5-10% of pleomorphic adenomas show at first diagnosis or at recurrences a malignant transformation, usually with features of carcinoma. Carcinosarcoma is a very rare tumor of salivary gland, sometimes complicating – as in the present case - a pleomorphic adenoma. From literature data, these tumors have a very aggressive behaviour, with a rapidly letal outcome, marked by local recurrences and distant metastases.

Observational, prospective clinical study, on the healing of post-extraction sites and the incidence of complications in diabetic patients. Preliminary results.

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U.O.C Dental Clinic of the University of Padua

BACKGROUND: The aim of this study was to assess the soft tissue healing and the incidence of complications in the oral cavity after tooth extraction in patients with diabetes.
METHODS: 80 patients pertaining to the UOC of the dental clinic, University of Padua, undergoing non-surgical dental extractions were included in this study. Minimum age was 18 years old. 40 patients were diagnosed with type II diabetes (diabetic group) and 40 without it (control group).
Patients with acute infection, smoking, treated with bisphosphonate drugs, undergoing or with a history of chemotherapy and radiation therapy, immunosuppressive therapy, systemic immunodeficiency, anamnestic situations needing antibiotic prophylaxis (e.g. endocarditis), recent use of antibiotics or steroids, pregnancy, lactation and ASA 4 patients, were excluded for both groups.
After obtaining the informed consent, in the diabetic patients, preoperative blood glucose values (mg/dL) were detected using glucose sticks, and glycated hemoglobin (mmmol/mol) was obtained from blood chemistry analysis performed no later than 3 months prior to the intervention.
After the extraction of the compromised tooth, the size of the socket was measured with a periodontal probe with vestibular-lingual and mesial-distal orientation (T0) between the two edges of the epithelium-connective tissue; at the end of intervention sutures were applied.
One week after surgery, all patients were subjected to examination and suture removal, the size of the socket in the process of healing was measured in the same way (T1). The difference in millimeters between T0 and T1 was used as an index to assess the degree of epithelialization of post-extraction site. It was evaluated the presence of fibrin.
Any complications such as blood or purulent drainage, wound dehiscence, edema, abscess, hematoma, dry sockets, presence of exposed bone spicules, were evaluated.
RESULTS: There was no statistically significant difference in the degree of epithelialization between the group of patients affected by diabetes and the control group ($p = 0.2270$). It is noticed that there was a higher fibrin accumulation in the control group compared to the diabetes group, but this difference did not reach a statistical significance ($p = 0.1748$). No statistically significant difference in complications were detected between the two groups.
CONCLUSIONS: The presence of diabetes does not influence the degree of epithelialization of post-extraction sites nor the incidence of the complications investigated. The results are preliminary, new analysis will be performed at a reached number of 100 cases and 100 controls.

Third molar surgery: two methods of dexamethasone's administration to reduce postoperative discomforts.

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BACKGROUND: The extraction of third molar is a common clinical procedure performed to achieve important strategic or therapeutic goals. As direct consequence of surgical injury, the tissues result inflamed with symptoms such as pain, edema and trismus.
During the post-treatment procedure are used several drugs to prevent this complaint and, above all, corticosteroids. Among these latter, the authors of the present paper investigated the effects of two routes of Dexamethasone administration (submucosal and intraoral injection) after mandibular wisdom tooth uprooting to confront each other's advantages and disadvantages.
METHODS: This report was done using three scientific electronic databases (PUBMED, EBSCO library and SCOPUS) and about 340 studies were evaluated. The inclusion criteria were: both randomized and non-randomized clinical trials, both studies with parallel- or split mouth- design, researches which compare the submucosal and intramuscular injection of Dexamethasone after third molar extraction and studies with at least ten patients treated for each group.
Authors chose eligible trials and extracted all data according to PICOS:
— Participants: number of patients and teeth removed; mean age of participants;
— Intervention Characteristics: dose of dexamethasone administered, schedules of post-surgical medications, classification of third molar impaction, design of the flap;
— Comparisons: methods for evaluation of pain, swelling and trismus;
— Outcomes: evaluations at 1, 3 and 7 days for pain, swelling and trismus.
— Study Design: assessment of the number of arms.
Data extrapolated from studies were interpolated to establish differences on the effects estimated. The Heterogeneity was assessed using Higgins Index (I^2) and the Chi-squared test.
RESULTS: Initially 341 papers were consulted but only 11 of them were considered eligible for the full-text examination: among these latter only 4 studies were included in this review and all of them were prospective randomized clinical trials. According to PICOS: in all the studies the dose of dexamethasone administered was 4 mg; the number of people engaged was 10-12 for each group; all the studies had a parallel design whit 3-6 arms; it was used the Pell and Gregory Classification to evaluate the kind of impaction; to accomplish surgical access it was performed a triangular flap in three studies while a modified ward's flap was preferred in the other one; the Authors used VAS scale to evaluate pain, while trismus was defined as difference in maximum mouth open before and after tooth extraction and swelling was appreciated as distance between anthropometic points. Results were

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defined for each symptom at 1, 3 and 7 days after surgery and submucosal and intramuscular routes were compared as MD (Mean Difference).
CONCLUSIONS: Only 4 randomized clinical trials (RCTs) were in compliance with the eligibility criteria. To sum up, no statistical differences have been found comparing submucosal and intramuscular injection regarding pain, edema or trismus. Therefore, the clinical choice between the two routes of administration should be relied on the complaint during administration and it should not be related to the efficacy in reducing the postoperative sequelae.

Maxillary sinus lift in case of pseudocysts of the antral mucosa

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BACKGROUND: Bone reconstruction of the upper jaw in cases of moderate to severe atrophy is a step often required in order to restore adequate bone volume for a correct implant-prosthetic rehabilitation.
The presence of antral cysts often makes it unworkable to perform this surgical procedure. In this work it is presented implant rehabilitation with great upside of the maxillary sinus technical after treatment of a retention cyst to sinus location.
METHODS: The patient came to our attention with a functional and aesthetic deficits caused by the loss of teeth in the lateral right maxillary posterior region. To the X-ray was detected an area of severe bone resorption in correspondence of the edentulous area from 1.5to 1.7, with a 3.5-4 mm distance between the alveolar crest and the sinus floor.
The CT scan also shows a cystic aspect lesion protruding into the maxillary sinus lumen, radiopaque, dome-shaped, with a convex surface and contour blurring. It extends, with a wide base of plant, from the sinus floor towards the antral lumen (look "at the rising sun") with homogeneous density. These characteristics and the absence of symptoms allow us to make a diagnosis of interstitial pseudocysts in antral localization.
During the first surgical time was made the drainage by needle aspiration through the lateral window of serous contents of pseudocystic injury, upon execution of the great upside. In the second surgical phase will be putting the implant fixture. Was carried out plexus anesthesia, a full thickness crestal incision along the edentulous saddle, two vertical releasing incisions. A small bone operculum was made using a ball diamond bur of straight handpieces. It was then carried out the drainage through needle aspiration of yellow citrine serous content of pseudocyst using a sampling syringe. The "trap door" technique was applied practicing an overturning antrostomy for rotating the bone trapdoor inwards and upwards contextually to the detachment of the membrane.
Subsequently, the graft material was compacted using a 1:1mixture of autologous bone particles and heterologous bone (deproteinized bovine). Autologous bone was collected from the cortical bone of the mesiobuccal wall of the sinus through bone traper. The flaps were then closed and sutured.
RESULTS: The biochemical analysis of the cystic fluid, collected in amounts of about 5 mL during the lesion reduction, confirmed the diagnostic suspect, presenting cholesterin crystals, serum and mucosal residues.
The postoperative had an optimal course, with a limited morbidity and the absence of nasal fluid loss. The sinus graft appeared sufficiently integrated in order to allow a valid primary stability of the implant fixture with a higher input torque to 30Nm.
The x-ray analysis of the right sinus cavity shows a clear radiolucency of the maxillary sinus as evidence of the absence of recurrence of the injury.
Clinically, the patient did not report any symptoms of sinus stagnation, absence of painful symptoms of nasal mucus and proper functionality of the ostium.
CONCLUSIONS: A retention sinus cyst is not an absolute contraindication for the realization of a large maxillary sinus lift. The low frequency of the perforation of the sinus membrane and post surgical sinusitis makes the treatment safe. However, in patients with large lesions and where the diagnosis is unclear, a further in-depth assessment should be carried out.
If necessary, the simultaneous treatment of cystic lesion and carefully planned regenerative therapy results a viable therapy, reducing the time of implant-prosthetic rehabilitation and allowing the operator to interface with an intact membrane and not in post ENT surgery regeneration.

The coronectomy for the treatment of a high neurological risk third mandibular molar with a dentigerous cyst

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BACKGROUND: coronectomy is a surgical option for the treatment of mandibular third molars in close proximity to the mandibular canal. This technique is able to reduce the risk of iatrogenic nerve injury and seems to be associated with a low rate of postsurgical complications. However, the limit of the technique in the management of high risk teeth still remains unclear. In this case report, this technique was applied for the management of an high neurological risk third molar with a dentigerous cysts.
METHODS: A 44-year-old with a completely impacted, symptomatic, high-neurologic risk right mandibular third molar was referred at the Unit of Oral and Maxillofacial Surgery, University of Bologna for the treatment of the tooth. The panoramic x rays and CT-scans showed the presence of a deeply impacted right mandibular third molar with a dentigerous cysts in close proximity to the mandibular canal. The treatment planned was coronectomy and cyst enucleation. The patient was informed about the surgical technique and gave written informed consent before any surgical procedures were performed.
The patient underwent professional tooth cleaning to decrease the bacterial load and antibiotic prophylaxis 1 hour preoperatively. After local anesthesia with 2% mepivacaine and 1:100.000 epinephrine a triangular mucoperiosteal buccal flap was raised using a vertical releasing incision mesial to the first mandibular molar.
To expose the third molar crown, an ostectomy was performed with high-speed rotating instruments under constant water irrigation. The crown was sectioned fractured and removed and the dentigerous cysts was enucleated. The retained fragments were reduced at least 3 mm below the bone crest with a round bur on a high-speed surgical drill. No endodontic treatment was performed on the retained root fragments; the socket was

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simply irrigated with saline solution. A periapical radiograph was taken using the parallel technique and the flap was sutured with 4-0 silk to obtain primary tension-free closure.
RESULTS: The post-operative healing period was uneven.. One week after surgery the surgical wound was completely closed and the patient did not report any iatrogenic nerve damage. During the first 6 post-operative months the patient had not post-operative infections, dry socket or pulpitis. No second surgery was performed to remove retained roots. The mean pre-surgical probing pocket depth (PPD) distal to the second mandibular molar was 7±2 mm and the mean PPD six months after coronectomy was 4±1 mm. In addition, the retained roots were completely included and not detectable with a periodontal probe during PPD assessments.
The retained root, as observed radiographically, migrated away from the mandibular canal but remained completely impacted.
CONCLUSIONS: Coronectomy of a completely impacted high neurological risk third molar associated with a dentigerous cyst seems to be a valuable treatment for the reduction of iatrogenic nerve injuries rate. However, this option is new and further study are necessary for the evaluation of the long-term outcome.

Treatment of atrophic posterior mandible with inlay *vs*. onlay grafts. A retrospective clinical study

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BACKGROUND: To compare clinical outcomes and volumetric differences between xenograft inlay and autologous onlay bone grafts in posterior atrophic mandible, based on short-term Cone Beam Computerized Tomography(CBCT).
METHODS: 245 CBCT of bone augmentation in posterior jaw were screened(Jan 2012-Dec 2014).CBCT was used for 3D file acquisition at baseline and 4 months after surgery. CBCT data was inserted into a Matrix Laboratory to allow superimposition of axial images.Volume and density evaluations were performed in a standardized Volume of Interest including augmented area,extending to the most coronal portion of alveolar canal in cross-sectional view. Variables: sample description variables; anatomical variables: volume (V), surface (A), density (D), describing pristine bone [T0] and grafted site [T1], and alveolar crest height gain, registered after the grafting procedure (iH0), and at 4-month (iH1); outcome variables: volume of the graft compared to receiving site, obtaining %Augmentation (T0), %Conservation (T0-4-month) and %Gain (4-month). Statistical analyses were performed; the level of statistical significance was set at 0.05.
RESULTS: 33 augmentations were performed in 20 patients. 16 sites were allocated in the inlay group, 17 sites in the onlay group(10 patients per group). In onlay group success rate was 82.4%, in inlay group it was 87.5%. Receiving sites registered no significant differences between the groups. Onlay group(0.94±0.34cc) registered significantly higher(p =0.0140) bone volume gain compared to inlay group(0.60±0.18cc). Results were confirmed by %Augmentation, significantly higher(p=0.0376) in onlay(183±30%) than in inlay(162±22%). The alveolar crest height increased after surgery: 7.4±0.8 mm in onlay and 6.0±0.7 mm in inlay group. Significant vertical bone loss was found in both groups: -1.9±0.9 mm in onlay and -1.7±0.9 mm in inlay group with ps=0.0020 but no significance between the groups. In both groups,significant differences were registered between %Augmentation and %Gain. Outcome variables, except the %Conservation, were significantly related to 2D and 3D features of the graft.
CONCLUSIONS: Clinical success of inlay seemed higher than onlay. The bone grafts' volumetric shrinkage (~30%) and the slight crest height gain(<2 mm), suggested that native bone underwent negative remodeling after displacement in inlay similarly to the onlay group, even if bone graft showed minimal resorption.

A case report of bevacizumab osteonecrosis of the jaw

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INTRODUCTION: Bevacizumab is a recombinant humanized monoclonal antibody blocking angiogenesis. Only few cases of osteonecrosis of the jaw (ONJ) related to bevacizumab have been described in colorectal cancer patients.
CASE REPORT: A 79 years old male patient with a history of metastatic adenocarcinoma of colon was diagnosed and treated surgically on October 2008 (pT2N1G3, C1 stadium sec. Dukes); subsequently he underwent adjuvant chemotherapy with Xelox. On September, 2010, he underwent a surgical treatment for a lung hamartoma and lung metastases of adenocarcinoma. In April 2012 he started chemotherapy with CPT11 and Bevacizumab (7.5 mg/kg every 14 days) for 7 cycles (until June 2012). From October 2013 he underwent chemotherapy without Bebacizumab and stereotaxic radiation therapy for 2 lesions of the lungs. On October 2014, he started again CPT11 + Bevacizumab for 5 cycles, until December 2014, then other 4 cycles from January 2015, and subsequently other 8 cycles from April 2015. He continued only Bevacizumab until July 2015 for a summary of 17 cycles. On October 2015, the patient underwent to mandibular teeth extractions under antibiotic coverage (Amoxicilline plus Clavulanic Acid, 1gr every 12 hours for 6 days and Metronidazole 500 mg every 12 hours for 6 days) in combination with a chlorhexidine 0.12% oral rinse. On December 2015 he was sent to the Dental School of the Turin University for an evaluation in order to start endovenous bisphosphonate therapy, after that bone metastases were diagnosed. Intraoral examination showed an asymptomatic bone exposition of approximately 3 x 1mm in the left posterior mandible. The surrounding soft tissue appeared ulcerated and necrotic, with no evidence of infection. It was requested a cone-beam computer tomography (CBCT) in order to investigate the real dimensions of the necrosis and to exclude metastatic lesions. CBCT revealed a minor cortical sclerotic bone lesion and residual of post-extraction socket without images of bone sequestra. The patient underwent to 6 cycles of low level laser therapy (LLLT), twice weekly, and then he was re-evaluated. On January 2016, the patient underwent to a computer tomography with contrast medium. At that date, the lesion was still asymptomatic, but an oral fistula appeared in the 2nd left molar region. The diagnosis of MRONJ

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was confirmed. A new antibiotic therapy was prescribed (Amoxicilline plus Clavulanic Acid 1gr every 8 hours for 6 days and Metronidazole 500 mg every 8 hours for 6 days) in combination with a chlorhexidine 0.20% oral rinse. After one week, he expelled a bone sequestrum of approximately 4 x 2 mm, and intraoral examination showed re-epithelization of the bone exposure and disappearance of the oral fistula. On March 3, 2016 the patient was re-evaluated and both the bone exposure and the oral fistula were completely healed.
CONCLUSIONS: This case study is important in the understanding of this rare complication, emphasizing the gravity of Bev-associated ONJ. A preventive dental assessment could be suggested for patients scheduled for bevacizumab therapy.

Computerized local anesthesia (Wand System) *vs.* traditional injection: a comparison of pain and anxiety in pediatric patients.

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BACKGROUND: The computer-assisted injection system (Wand-STA System; Milestone Scientific) allows to deliver local anesthetic solution at constant pressure and volume, minimizing patients discomfort. The purpose of this study was to compare both pain sensation and patients anxiety using the Wand-STA System *versus* traditional local anesthesia in pediatric patients.
METHODS: A randomized controlled study in sixty six patients, aged 7-15 years, in healthy physical and mental state was performed. One operator carried out two blinded local anesthetic injection, using the Wand system and a conventional syringe at two separate appointments, respectively. The analgesia was finalized to realize pediatric oral surgical procedures (extractions of infra-occluded primary teeth, impacted canines exposures, extractions of supernumerary teeth).
Pain sensation during local anesthesia and patients anxiety were measured in each appointments using VAS score and modified Venham score, respectively. Heart rate and level of patient satisfaction (scale from 1 to 10) were also assessed.
Modified Venham score, Visual Analogue scale (VAS) and level of patient satisfaction were used as subjective evaluation of perceived comfort/discomfort, indeed heart rate can be considered a physiologic indicator of pain response.
RESULTS: Patients experienced less pain and anxiety during injection using computerized local anesthesia (Wand system). Based on the behavior and physical state displayed during the local anesthesia injection, the results were:
The Wand system caused an average increase of 8 points in heart rate, indeed the traditional anesthesia determined an average increase of 12 points.
Venham score 0 (relaxed patient) was obtained in 73% patients treated with the computer-assisted injection system, *versus* 52% patients treated with conventional injection.
The average score of Visual Analogue Scale (VAS) was 1.15 using the Wand system and 2.25 during traditional method.
The average score of patient satisfaction was 8.01 utilizing conventional local anesthesia and 8.60 using the Wand-STA system.
Both anesthetic techniques allowed to complete oral surgical procedures in all patients.
CONCLUSIONS: The computer-assisted injection system (Wand-STA System) may be recommended in pediatric dentistry because it allows to reduce pain perception, increasing patient collaboration. The anesthetic effect of the Wand system is suitable for pediatric oral surgical procedures, preventing patient discomfort.

Protocol for the evaluation of adherent gingiva formation after surgical exposure of labially impacted canines

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BACKGROUND: The aim of this study is to evaluate which surgical technique, between the two ones present in the Literature, leads to a better formation of adherent gingiva, in the orthodontic eruption of labially impacted maxillary canines. The two techniques compared are the apically positioned flap using the roll-flap technique and the laser-assisted gengivectomy.
METHODS: 18 patients, presenting a monolateral labially impacted maxillary canine, between the ages of 13 and 17 years old, able to tolerate conventional surgical procedures, are randomized to the roll-flap technique and to the laser-assisted gengivectomy, using the SAS 9.2 Software (SAS Institute Inc., Cary, NC, USA).
Laser gengivectomy: A diods-laser device (l=830nm, l=1,5-3W) in continuous mode is used. After regional anaesthesia, a circular excision of the mucosa overlying the crown is performed, exposing part of the impacted tooth crown. The orthodontic bracket is positioned during the same surgical procedure.
Roll-flap technique: After local anesthesia, using a scalpel, a paramarginal trapezoidal partial thickness flap is made, of a sufficient size to be able to expose the crown of the included canine. The follicle is preferably removed with hand tools, to prevent any damage of the element. At the end of the practice, the flap is apically positioned and sutured to the periosteum, leaving from half to two thirds of the crown uncovered. Finally, a dressing is placed on the enamel, to prevent overgrowth of adjacent tissue during the healing phase. The dressing is removed after a week. The orthodontist will proceed with the orthodontic bracket placement at the end of the surgery procedure or after a week.
3 and 5 months after surgery, measurements of probing, clinical crown length, width and thickness of adherent gingiva are performed and an eventual scar or gingival recession presence is verified. These parameters are evaluated also on the contralateral, physiologically erupted canine.
All the procedures are documented with photos, taken by the same person.
The data obtained are elaborated using the ImageJ Software, achieving the exact width of the adherent gingival.
Statistical analysis: The sample size was calculated referring to the endpoint. It was assessed that with 9 patients per treatment group (roll-flap technique *vs* laser-assisted gengivectomy) a mean difference of 1mm (SD±1.2mm) can be estimated in the dimension of the adherent gingiva, maintaining the contralateral canine as the control side. Statistical power 80% and significance level α=0,05.

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The data will be expressed in a descriptive way, explaining the mean and standard deviation, since a normal distribution of data is assumed.
RESULTS: At the present time 11 patients has been included in the study. 5 of them have undertaken the surgical procedure and the measurements needed. 2 of them are still waiting for the fifth month follow-up, not permitting to obtain the necessary data. 2 patients are waiting for the surgical procedure and 2 of them were considered drop-out.
The current study status does not allow to have any statistically significant data.
CONCLUSIONS: Given the low incidence of the disease and the complexity of the topic, a decision was made to carry out the research in two phases: the first one carefully programming the study and the second one collecting and processing data.
This work BACKGROUNDs to explain in detail the programming phase of the study, reserving the interpretation and the discussion of the data to the next stage of the research.

Er:YAG laser versus traditional bur in the extraction of impacted mandibular third molars: analysis of intra- and post-operative differences

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BACKGROUND: Removal of impacted third molars is the most common intervention performed in oral surgery. In the United States each year more than 11 million patients during the postoperative days, suffer from "standard discomfort or disability" including pain, swelling, trismus and haematoma.
Removal of impacted third molars can be performed through different surgical techniques. The possible complications can be very different, depending on the technique and instrument used.
Erbium yttrium-aluminium-garnet (Er:YAG) laser induces a significantly lower increase in bone temperature than conventional rotary tools and penetrates only very slightly (0.1 mm) in the hard tissue, providing a safe and minimally invasive action. Further advantages are the bactericidal and the biostimulating effects, which seem to accelerate the healing process.
The aim is to evaluate and compare the possible intra-operative and post-operative advantages achieved using Er:YAG laser for osteotomy taking into account, as a control group, cases of impacted mandibular third molar extracted using traditional burs for osteotomy.
METHODS: 76 extractions of mandibular impacted third molars were performed at the Centre of Oral Medicine and Laser Surgery of the University of Parma, Italy between September 2014 and November 2015.
Interventions were randomly sub-classified into 2 groups according to the instrument used for osteotomy: group 1 (G1) – Er:YAG laser (Fidelis Plus®, Fotona - Slovenia: 300 mJ, 30 Hz, fluence of 60 J/cm^2): 35 cases; group 2 (G2) – Lindemann tungsten carbide bur (H166A.104.021 Komet Italia,Milan,Italy): 33 cases.
Intra-operative variables included length of time for the whole intervention (t_{int}), number of stitches, and compliance of patients.
Post-operative variables were pain, health-related quality of life (HR-QoL), edema, trismus, and post-operative complications such as bleeding, paresthesia and subcutaneous emphysema.
Statistical analysis was performed through the IBM-SPSS statistical package v.20.
RESULTS: Mean t_{int} in G1 was 1069.44 s and in G2 it was 1913.55 s. The test highlighted that time in G1 was significantly lower than time in G2 ($p<0.0001$).
Mean number of stitches needed for patients in G1 was 3.72, in G2 was 3.65 (T-test; $p=0.773$). Compliance of patient was 9.69 in G1 and 9.07 in G2 (T-test; $p=0.063$).
Regarding pain, mean VAS and NRS scores were lower in G1 than G2. Statistically significant differences were highlighted at days 0, 1 and 3 with VAS scale and at days 0, 1, 3 and 7 with NRS scale.
HR-QoL scores resulted statistically lower in G1 than G2 ($p<0.0001$).
The facial swelling at day 2 resulted statistically lower in G1 than in G2 on all the analysed lines (X; $p=0.001$; Y: $p<0,0001$; Z: $p=0.002$ e T:$p=0.003$). The facial swelling at day 7 resulted statistically lower in G1 than in G2 on the lines X ($p=0.001$) and Z ($p=0.039$).
The trismus resulted statistically lower in G1 than G2 at day 2 (G1: 7.97; G2: 21.66; $p<0.0001$) and 7 (G1: 3.14; G2: 8.13; $p=0.004$).
Two cases (5.71%) of subcutaneous emphysema were recorded in G1 and 2 cases (4.88%) of lip paraesthesia in G2.
CONCLUSIONS: Our data confirm that the use of Er:YAG laser for osteotomy in impacted third molar extractions may provide several advantages both technical for the operator and biological for the patient.

Auto-fluorescence as indicator for detecting the surgical margins of medication-related osteonecrosis of the jaws: differences in histopathology and fluorescence among viable and non-vital bone

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BACKGROUND: The precise identification of necrotic bone margins during osteonecrosis removal is a major difficulty for surgeons and it is usually based on subjective parameters such as bleeding, colour and texture of the bone.
Ristow suggested that also in the absence of tetracycline labelling, vital bone could be highlighted on the basis of its strong Auto-Fluorescence (AF) whereas necrotic bone lost such an AF appearing very dark.
The normal AF of collagen, elastin and other fibers in human tissue was observed and described at the beginning of the last century. The molecular sources of this phenomenon are specific amino acids of the collagen molecules, showing AF when irradiated by ultraviolet/blue light.

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The use of AF as an intra-operative diagnostic tool is used from several years in other medical fields such as inter-vertebral disc surgery. Hoell *et al.* reported that healthy endplates could be clearly identified as hyper-fluorescent, whereas traumatized and degenerated disc appear very dark.
The aim of this work is to describe a new surgical approach for Medication Related Osteonecrosis of the Jaw (MRONJ) that couples the advantages of the Erbium (Er):YAG laser and the usefulness of the AF in highlighting surgical margins.
METHODS: Three patients affected with MRONJ were treated through this surgical approach.
Histopathological evaluation of non-fluorescent bone and hyper-fluorescent surrounding bone was also performed in order to establish a more accurate correlation between fluorescence and bone vitality.
Surgical treatment, consisting in the resection of necrotic bone, was performed under local anaesthesia and without preoperative tetracycline labelling. After bone exposure, VELscopeTM system (LED Medical Diagnostics Inc., Barnaby, Canada) was used to induce and visualize bone AF. Necrotic bone showed no or only pale AF. After removal of necrotic bone block AF was used to guide marginal osteoplasty. According to the AF image obtained after osteoplasy, Er:YAG laser (Fidelis Plus®, Fotona - Slovenia) (Parameters: 300 mJ, 30 Hz, fluence of 60 J/cm2) was used for evaporation of necrotic bone. It produces microspots stimulating vascularization and attachment of soft tissues. Er:YAG laser is very useful for further removal of bone after osteoplasty. Because of the very superficial penetration of this device, it is possible to act in the areas where non-fluorescence or hypofluorescence is displayed.
Further samples of hyper-fluorescent bone were taken in the adjacent areas.
Histopathological evaluation was carried out in order to investigate if a correlation between bone vitality and fluorescence exists.
RESULTS: Histopathological analysis revealed in all patients necrotic tissue in the bone block removed and normally structured bone tissue in the hyper-fluorescent specimens.
After 12 months follow-up no signs of osteonecrosis were detected in any patients.
CONCLUSIONS: Taking into account technical and biological advantages associated with the Er:YAG laser and the effectiveness of AF in highlighting surgical margins, this approach would probably allow to achieve excellent outcomes.

Non-vitamin K anticoagulants in oral surgery: from EHRA guidelines to clinical practice

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BACKGROUND: Novel non-vitamin K oral anticoagulants (rivaroxaban, apixaban, dabigatran, endoxaban) (NVKAs) have been developed in the last few years in order to treat many clinical conditions. Little is known about the dental management of patients taking these drugs, and specific clinical guidelines are not available. The European Society of Cardiology (EHRA) released guidelines, in which they advise not to discontinue therapy before oral surgery. The EHRA guidelines evaluate most dental procedures as interventions that carry "no clinically important bleeding risk" and/or in which adequate local haemostasis can be achieved. These procedures can be performed at trough concentration of the NVKAs, but should not be performed at peak concentration. For procedures with immediate and complete haemostasis, the NVKAs can be resumed 6 – 8 h after the intervention. Aim of this work is to compare EHRA guidelines to the current dental literature.
METHODS: The Web of Science database was searched to find articles, published in the English language between 2010 and 2016, about the use NVKAs in patients undergoing dental surgery using a comprehensive list of terms. A similar Medline (PubMed) search was performed for completeness, for both generic and brand drug names. Meta-analyses, systematic reviews, individual randomized control trials, cohort studies, case–control studies, cross-sectional studies, case series/case reports, and expert opinion were considered.
RESULTS: Literature review identified 18 articles which met the inclusion criteria. These articles analyse the dental management of patients taking these drugs and who are undergoing dental surgery. Type of publication consisted of 12 reviews, 4 case reports, one prospective case control and one retrospective case control study. The studies confirm previous findings on the effectiveness of NVKAs for the prevention of thrombosis, resulting as effective as VKAs. There is no literature agreement about the management during oral surgery of patients on NVKA therapy and about the need for suspension. 6 studies do not indicate the need for a drug suspension, while the rest consider that a suspension period is mandatory.
CONCLUSIONS: Clinical trials on dental patients taking NVKAs and requiring surgical procedures are needed in order to define appropriate management guidelines.

Multi-center randomized split-mouth study on post-operative complications after third mandibular molar extraction with rotary instruments and piezoelectric device

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BACKGROUND: The aim of the study was to evaluate post-operative complications after third mandibular molar (TMM) extraction performed with rotary instruments (RI) and piezoelectric device (PD).
METHODS: This study was a two-center randomized controlled of split-mouth design. A total of 41 patients were selected during orthodontic treatment for owercrowding and malocclusion II and III class in San Raffaele Milan and Hospital E. Profili Fabriano (An). All patients underwent bilateral extraction of TMM in the same appointment. The surgical extractions were randomly allocated to each site of extraction. Inclusion criteria were: bilateral similar TMM stage of development and inclusion, full root development of TMM, absence of oral and periodontal disease, good oral hygiene, absence of systemic diseases that might compromise coagulation and wound healing. In each center all interventions were performed by four surgeons. All patients were

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given a protocol of post-operative care, including antibiotic therapy with amoxicillina 1gr. for 7 days, analgesic therapy with ketoprofene 80 mg for 3 days and chlorhexidine 0.2% rinsing for 7 days. Measured main outcomes were pain as self-assessed by patients and swelling measured by several linear measurements on the skin surface. Other complications such as bleeding, trismus and nerve damage were also recorded. All skin measurements were performed by a clinician blinded regarding the intervention site. the reference scale for pain assessment was based on a self-assessment of the patient this mutable statistics were divided into dichotomous variable: 0 = absent or moderate pain, 1 = -severe. For the evaluation of the swelling were carried cutaneous measurements in millimeters, through a suture thread 00 stretched between two mosquito, the distance between the two points easily identifiable in the two sides of the face subjected to intervention with different techniques.
RESULTS: The mean pain evaluation reported by patients who underwent surgery with Piezosurgery technique was significantly lower than that reported after bur (conventional) removal. Postoperative swelling was present in both sites. However, the clinical measurements at day 7, were significantly lower in the site treated with Piezosurgery instrument. There was no incidence of alveolar osteitis (checked on post-operative day 3 onwards), paraesthesiae, or altered nerve sensation for any patient in either side postoperatively.
CONCLUSIONS: Following the overall outcome in the two simultaneous extraction sites, the Piezosurgery technique has been shown significantly less pain, trismus, and facial swelling. A better perception of the post operative period by the patients after third molar extraction using piezoelectric then rotary drill surgical tecnique. Despite the increased duration of operation and cost of equipment, the final outcome suggests that the Piezosurgery is a valuable alternative for extraction of third molars, compared with rotary technique. More large-scale and multicenter RCTs using a unified grading system and evaluation index are needed to validate our findings and provide guidance for clinical applications.

Autologous bone graft storage times affect the graft's biological properties

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BACKGROUND: The aim of this work was to study, with molecular biology, human cortical bone particles harvested from intraoral sites with a disposable bone scraper and preserved in sterile physiological solution for different periods of time.
METHODS: Autogenous bone is still considered the reference standard for bone regeneration in oral and maxillofacial surgery. Bone grafting is a common management option for treating bone defects and reconstructing alveolar bone before implant insertion. What distinguishes autogenous bone grafts from any other grafts is the presence of viable cells.
Ten bone samples were divided into 4 equal parts. Each part has been preserved in sterile physiological solution for 0, 30, 60 and 120 minutes. For each time interval MTT test for cell proliferation, molecular biology for osteogenic and apoptotic markers, and detection of protein content on Tumor Necrosis Factor (TNF) have been conducted. The osteoinductivity of bone samples collected was assessed evaluating gene expression values of the most important proteins related to bone healing.
One-way analysis of variance (ANOVA) was used for data analyses. The Leveneis test was used to demonstrate the equal variances of the variables. Repeated-measures ANOVA with a post-hoc analysis using Bonferroni's multiple comparison was performed. T-tests were used to determine significant differences (p,0.05). *p,0,05; **p,0,01; ***p,0,001. Repeatability was calculated as the standard deviation of the difference between measurements.
RESULTS: Conservation of the bone sample in physiological medium induce a progressive reduction in mitochondrial activity related to time. Bone Morphogenetic Protein (BMP2) and Tumor Growth Factor (TGF) are present in all the condition, there is no increase in osteoclastic condition. A well defined increase in value related to the time of conservation in ex vivo conditions has been observed for Vascoular Endothelial Growth Factor (VEGF) gene and a great increase on TNF production is related to the time of storage in sterile physiological solution.
CONCLUSIONS: Our results showed that a well-defined time related decrease on cell viability occurred, as MTT test revealed. On contrary, bone gene expression related to osteogenic protein was good preserved for all times. Interesting VEGF showed a time related increase. This could be due to the fact that during the conservation in physiological solution the samples are in a tissue ischemia like condition that induces expression of hypoxia-inducible factor-1 (HIF-1), which in turn activates VEGF production. The presence of VEGF during a regenerative process is of vital importance since a lack in vascularization leads to delayed or failed tissue regeneration. A detailed analyses of apoptotic markers expression revealed a well-defined increase on TNFα. TNFα is an inflammatory cytochines that could have an anti-regenerative effect.
Short duration of storage in the appropriate conditions of the harvested bone could greatly improve the quality of the graft in terms of cell viability and reduction of apoptotic signaling molecules. On the other hand, an increase in VEGF expression was found, and this could be interpreted as a further trigger for the graft healing and incorporation.

Comparative evaluation of osteogenic differentiation capability between adipose tissue-derived stem cells (ADSCs) and dental pulp stem cells (DPSCs)

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BACKGROUND: Stem cells derived from adipose tissue (ADSCs) and from dental pulp (DPSCs) are a type of mesenchymal stem cells with a multilinear differentiation potential (chondrocytes, myocytes, adipocytes, osteoblasts). While the properties of DPSCs have been extensively studied, little is known about the ADSCs. ADSCs are abundant and easy to obtain and can be grown without additional cytokines. ADSCs also exhibit similar properties to bone marrow derived stem cells (BMSCs). They also include a more homogeneous cell population and are easier to manage than BMSCs. Therefore, ADSCs are considered to be an ideal source of stem cells for tissue engineering and regenerative

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medicine. The aim of this study is to compare subcutaneous adipose tissue-derived stem cells (ADSCs) and dental pulp stem cells (DPSCs) in terms of their proliferation and osteogenic capacity *in vitro* and *in vivo*.
METHOD: 10 samples of the human dental pulp from third molars were selected and surgical removed for therapeutic reason in 7 patients of ISCCR San Raffaele Vita e Salute University Dental Clinic and D'Annunzio University of Chieti in orthodontic II & III malocclusion class treatment. 10 samples of adipocites stem cells were selected during liposuction aspirates fat removal procedures in human patients during obesity treatment. The samples were selected in homogeneous pool and subjected to citofluorimetric examination in order to evaluate and select an homogenous cluster of mesenchymal stem cells. Oil Red Oil and Alizarin Red staining in addition to real time PCR analysis of ALP and Runx2, was obtained in order to evaluate the proliferation and the osteogenic differentiation of the samples.
RESULT: The FACS analysis showed an homogeneous population of mesenchymal stem cells in all samples observed. The ADSCs showed an high proliferation rate than DPSCs. Alizarin red and Oil Red Oil staining revealed an qualitative higher number of cluster deposition than DPSCs. A larger number of cell colonies it was possibile to observed in ADSCs samples compared with DPSCs. The RT-PCR analysis showed an higher rate of ALP in ADSCs than DPSCs samples ($p < 0.05$).
CONCLUSIONS: The emerging evidence of our study suggests that the mesenchymal stem cells from subcutaneous tissue (ADSCs) could be a promising source of progenitor cells able to produce bone tissue in regenerative medicine and tissue engineering. However, several studies, will be particularly needed to confirm the opportunity to use ADSCs for dental tissue engineering, comparing their properties with other mesenchymal stem cells source.

Close of a fistula between the nose and the oral cavity using a new collagen matrix

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BACKGROUND: The aim of this study was to evaluate the use of a new collagen matrix (Mucograft®; Geistlich Pharma AG, Wolhusen, Switzerland) to improve the wound healing after bioptic excision. Often a bioptic excision of mucosal lesions is needed to perform an histological examination of the lesion. In some case after the surgery tissues can heal for secondary intention resulting in the presence of cicatrizations. It has been demonstrated that thanks to their compact structure, collagen matrices work as scaffold and they accelerate the migration of epithelial cells in the wound tissues. In fact reconstruction after rescission of mucosal biopsy requires the levy of a graft from the patients or healing by second- ary intention that often improve morbility. Nowadays, a new collagen matrix is available to avoid surgical grafts and improve the postoperatory confort.
METHODS: Mucograft® is a pure collagen type I and III matrix of porcine origin without further cross-linking. Up today, clinicians have been mainly focused on the use of Mucograft® in periodontal procedures, such as: treatment of recessions on teeth and implants and increment in the amount of keratinized gingiva. The effectiveness of this matrix for the use in the oral wound healing has already been validated by *in vitro* and *in vivo* studies. In fact, this porcine membrane stimulate an increased production of proinflammatory mediators in the mononuclear cells and a decreasement in cellular proliferation. In addition, a good proliferative activity of fibroblasts has also been seen, in both the layers of the matrix. In this work we report a case of a fistula between the nose and the oral cavity closed after the bioptical excision of the lesion and the positioning of the collagen matrix.
RESULTS: Histological examination stained with hematoxylin and eosin revealed that the lesion derived from a previous nasopalatine duct cyst. After 2 months from surgery a correct healing of the tissues was visible and a complete closure of the communication way was present.
CONCLUSIONS: We think this material should be well investigated for its use in oral mucosal surgery, due to its biological features that take it capable to improve both functional and aesthetic parameters.

Third mandibular molar coronectomy: the influence of the secondary wound healing

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BACKGROUND: Coronectomy is, an alternative surgical option to complete extraction for the treatment of high neurological risk third molars but some aspects of this technique require further investigation as the type of wound healing recommended to avoid or reduce post-operative infection. In fact, in literature there are no data describing the eventually complications related to a secondary healing or comparing the primary and secondary healing. The aim of this case series is to describe the post-operative morbidity related to a secondary healing after coronectomy.
METHODS: 5 patients on 100 treated with coronectomy developed a secondary intention healing due to a suture failure and included in this case series. These patients were screened for two years to evaluate the post-operative morbidity and complications related to this type of wound healing. Were considered as Post-operative complications: Iatrogenic Nerve Injuries (Any subjective post-operative sensory change); Second surgery, Dry Socket (severe pain, loss of the blood clot in the socket and wound breakdown) and Infection (swelling, pain, and pus).
RESULTS: On 100 high neurological risk mandibular third molars treated with coronectomy, 5 developed a secondary intention healing due to a sutures failure and were included in this study. Among these, 3 third molars were totally impacted and 2 were partially impacted.
No patients reported nerve damage. The complete closure of the alveolus of the 5 surgical sites with a secondary intention healing was observed 3 months after coronectomy. During the firt two post-operative years, No patients had post-operative infections, dry socket or pulpitis. In addition, all patients were asymptomatic, the retained roots were completely included and not detectable with a periodontal probe.
CONCLUSIONS: The importance of primary wound clo-

sure after coronectomy was stressed as a critical point to avoid postoperative root infection. In this study, a secondary wound healing after coronectomy was not related to a major incidence of post-operative infection rate during the firt two post-opertive years. However, further clinical randomized studies are necessary to confirm the necessity of a primary closure and its relationships to the long-term success of the coronectomy.

Surgical management of salivary calculi located in the anterior part of the Wharton duct

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BACKGROUND: Wharton duct is the excretory duct of the sub-mandibular gland and it represents the elective site of salivary calculi due to both anatomical and topographical reasons and to the particular composition of the submandibular gland saliva, which is mucinous and rich in calcium salts. Surgical removal is the treatment of choice of such calculi and it also aims to restore the normal glandular function.
METHODS: A 72 year old female patient came to observation because of a few months presence of "something under the tongue" and pain during meals. By physical examination, a 15 mm yellowish swelling was detectable, in the anterior part of the mouth floor, on the left of the frenum, near the midline. A slight painless swelling was also palpable in the submandibular region both at extra-oral and combined palpations. The ortopantomography showed a 2 cm disomogeneous radiopaque area located just under the lower left mandibular angle. The lesion was coated by normo-trophic mucosa, had hard consistency and was mobile on deep planes but not on the overlying mucosa. Both history and clinical examination as well as radiographic examination, were highly suggestive for the diagnosis of left Wharton duct's calculus, so that its surgical removal was planned with the aid of a Zeiss 4 x magnification system. Given the stable position of the calculus, after an infiltrative anesthesia with vasoconstrictor was performed, a longitudinal full-thickness incision was carried out at the top of the swelling, so as to involve both the oral mucosa and the upper wall of the duct. After surgical wound flaps were retracted, two little calculi were found, for a total length of 12 mm. To ensure patency and prevent scar stenosis, the duct wall was sutured to the oral mucosa, at the level of the surgical incision. After the normal flow of saliva from the duct was verified to finger pressure on the glandular body, a lower occlusal radiograph was taken to verify that no other calculi were present in the duct and a iodoform gauze fragment was inserted inside the ductal lumen and sutured to the mucosa.
RESULTS: After 5 days, at the moment of suture and gauze removal, the soft tissue healing was optimal, and no painful symptoms were present. Subsequent clinical follow-up allowed to check the normal flow of saliva from the neostoma.
CONCLUSIONS: Calculi of the anterior part of the Wharton duct can be removed by a minimally invasive surgical treatment. However, the intervention has to be preceded by the accurate definition of the site and number of calculi in order to avoid the persistence of any intra-ductal calcified fragments which can perpetuate the symptoms. Post-surgical clinical follow-up allows to evaluate the complete resolution of the disease and normal salivary flow from the neostoma.

Retromolar nerve: anatomical and clinical findings

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BACKGROUND: To investigate the presence of bifurcation of the inferior alveolar nerve during its infraosseous course, as described by many other authors, and its prevalence in the Caucasian population.
METHODS: 109 patients were investigated using CBCT in routine presurgical imaging exams. The CBCT exams were made by an only professional specialized operator, using CBCT VGI MARK 3, QR (Verona, Italy), setted at 110 kV by Safe Beam system. Dicom files were analyzed with 3Diagnosys (3diemme) dedicated software and studied by one single specialized operator.
RESULTS: The presence of bifid canals were found in 73,39 % of the 109 patients; furthermore in the 35,77% of the cases it was bilaterally present, in the 37,61 % it was present just on one side. The mean diameter of this canal, called RETROMOLAR FORAMEN, was 0.5 and 2 mm, so we can recognize in it the RETROMOLAR CANAL as described by others authors. Histological findings showed that the RETROMOLAR NERVE extended from the anterior border of the ramus, innervating the retromolar pad and continuing to the buccal gingiva of up to two teeth anteriorly. The RETROMOLAR NERVE is a bifurcation of the INFERIOR ALVEOLAR NERVE, branching from above the inferior alveolar nerve canal and travelling anterosuperiorly within the bone, exiting the RETROMOLAR FORAMEN into the retromolar fossa. Some authors reported that the mean distance of the RETROMOLAR FORAMEN from the distal edge of the third molar was 4.2 mm in their series.
CONCLUSIONS: The high prevalence of the presence of the RETROMOLAR CANAL suggests that this is not an anomaly but a frequent anatomical peculiarity of the Caucasian population. The RETROMOLAR FORAMEN is the aperture of the RETROMOLAR CANAL, and its clinical importance rests on the presence of the neurovascular bundle, which passes through it and it must be taken in account in surgical and anaesthetic procedures involving the retromolar region such as sagittal split osteotomy, removal of impacted third molars and implant placement. The diagnosis' accuracy and the searching method is really important to find the RETROMOLAR CANAL and avoid surgical complications such as bleeding and paresthesia. It has postulated that the nerve fibers branching from the INFERIOR ALVEOLAR NERVE and exiting through the RETROMOLAR FORAMEN may preclude obtaining complete anaesthesia in the buccal gingiva in the mandibular molar region. Analyzing the infraosseous course of the RETROMOLAR NERVE we have found some variations of his course wich implicate a good knowledge about his presence. About his course variations it will be necessary a new classification.

Split crest technique with immediate implant placement. Case report

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BACKGROUND: A thin alveolar ridge is a frequent obstacle to the immediate implant placement. Over a period between

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4 and 12 months after tooth avulsion, the vestibular-lingual dimension decreases by 3.1-5.9mm. For a predictable outcome a minimal bone width of 1-1.5 mm is required both on the vestibular and lingual side. If there is a great reduced bone thickness (<5 mm at the coronal and apical portion of the implant), is necessary to opt for surgical procedures that require a guided bone regeneration. So in cases where the ridge is very thin, a valid alternative to allow the insertion of osteointegrated implants is represented by the "split crest" or expansion of the alveolar ridge technique, with simultaneous insertion of implants. The aim of this study is to describe a clinical case of a young patient who wants to rehabilitate for aesthetics reasons the right maxillary side, solved by split crest technique with immediate implant placement.
METHODS: A full thickness flap with two release incisions was raised, later a sagittal osteotomy of the edentulous ridge was practiced parallel to the buccal wall, followed by two vertical osteotomies defining the margins of the bone segment to be distracted. Subsequently, the bone distraction was performed with a thin scalpel until reaching the desired expansion. Once the implant site was prepared, the implant was placed with a good primary stability. Surgery was completed with a silk suture 4/0 that will be removed after about 14 days.
RESULTS: After 6 months tissues appear healthy. We proceed to the recording of impressions and to the prosthetic rehabilitation with a single crown. Radiographically the regenerated bone appears sufficient in volume and mineralization. Clinical control one year after loading shows the optimal health of the peri-implant hard and soft tissues thanks to the correct home care hygienic maintenance of the patient.
CONCLUSIONS: The split crest technique is undoubtedly a convenient procedure to obtain a correct thickness in the reabsorbed alveolar ridges, avoiding bone grafts from donor sites, reducing morbidity of a second surgical area and decreasing the size of incisions in the first. The simultaneous insertion of dental implants has advantages such as reduced waiting time from surgery to prosthetic treatment, requires less amount of biomaterials and prevents the collapse of the buccal and lingual walls. In conclusion, the surgical technique for the split crest bone expansion is considered a safe and effective procedure for implant placement in patients with very thin bone ridges.

Effects of Laser Light 915 nm on proliferation and differentiation of human osteoblasts

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BACKGROUND: Laser Therapy (LT) is a non-invasive treatment that uses laser light irradiation of low intensity so that the effects are a response to the light and not due to heat. Currently LT is used in dentistry for several purposes including pain control after surgical/dental interventions and, often in combination with other treatments, to manage several conditions such as dentinal hypersensitivity, temporomandibular disorders, herpes infections, recurrent aphthous stomatitis, radio-chemio mucositis and medication-related osteonecrosis of the jaw. The mechanism underling LT is still not clear but many evidences support the hypothesis of a photochemical reaction between the photons and specific intracellular photoacceptors, a process well described in biology for the clorofillian photosynthesis. The aim of our study was to investigate *in vitro* the effects of 915 nm light supplied with a GaAs diode laser on human mandibular osteoblasts harvested by an healthy donor.
METHODS: Primary culture of human osteoblast was isolated from mandibular cortical bone of a young health donor who underwent extraction of an impacted third molar. Irradiations were performed using a 915 nm GaAs diode laser (LASEmaR 900, Eufoton, Trieste, Italy). In the different samples we somministred 5, 15, 45 J/cm^2 with a power output of 1.5 W in continuous wave using a power density of 0.12 W/cm^2 and a probe 4.5 cm of diameter. The probe was used directly upon the wells in sterile conditions. Irradiation time was of 41.7 s, 125 s, 375 s. Cell proliferation has been quantified by cell count and methylthiazoletetrazolium (MTT) colorometric assay. Cell differentiation was investigated by quantitatification of calcium deposition (Alizarin red-based assay) and bone nodules count.
RESULTS: Cell growth and quantification of calcium deposition did not show any differences comparing irradiated and not irradiated samples. Microscopic analysis showed more bone nodules in samples treated with 5 J/cm^2 compared to controls (56.00±10.44 *vs* 19.67± 7.64, P=0.0075). In treated samples a different pattern of calcium deposition was observed, with red areas better defined and with bone nodules of larger diameter
CONCLUSIONSS: At laser parameters used in this experimental setting, we did not find any difference in terms of proliferation, but we found a different pattern of bone nodule deposition in irradiated cells compared to controls, although a significant higher deposition of calcium was not observed. Proliferation and differentiation are two distinct biological processes that follow different pathways: in normal conditions highly specialized cells (such as neurons, striated muscle cells, suprabasal epithelial cells, osteoblasts) rarely or never duplicate, while less specialized ones such as cells in the bone marrow or in the basal layer of epidermis are in continuous replication. This phenomenon could explain why in our experiment a modulation of differentiation was not accompanied by a higher proliferation. In literature some concerns exist on the safety of LT on human tissues and some authors suggest to not irradiate neoplastic or pre-neoplastic tissue for the risk to give a proliferative stimulus to transformed cell. Our findings showed that LT at the parameters used does not have a mitogenic effect on healthy cells, nor we observed a toxic affect also using high doses (45 J/cm^2) confirming the safety of this treatment on normal tissues. An *in vitro* model to study LT is still not established and further researches to support these results and to investigate intracellular mechanisms of laser biostimulation are indicated.

Assessment of success/survival rates and marginal bone loss of 157 dental implants: a 5-year retrospective study

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BACKGROUND: To evaluate the success and survival rates of 157 dental implants with a 5-year follow-up and the radiographic marginal bone loss.

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METHODS: The retrospective observational study consisted of 58 patients (24 males and 34 females; mean age at surgery 53.93±9.76 years, range 33-72), consecutively treated between 2005 and 2009 in the Oral Surgery Unit at "Sapienza" University of Rome, Italy. Patients healthy and without local or systemic contraindications to oral surgery or implants placement were included. At the start of prosthetic loading probing depth at the mesial, distal, buccal and palatal/lingual aspects of each implant and the intra-oral periapical radiograph was taken (which provided a baseline for future evaluation) and annually thereafter. All radiographs were scanned (1200 dpi) and digitized (Expression 10000 XL, Epson America), and an appropriate software (DBSWIN 5, Durr Dental, Germany) properly calibrated, were used to estimate marginal bone level changes over time. Variations in marginal bone level were determined through the distance from the implant shoulder to the bottom of the marginal bony defect, both at mesial and distal aspects of each implant, and expressed in millimetres. The major outcome variable of this study was implant success/survival rate and marginal bone loss. The explanatory variables investigated were: implants location (anterior maxilla/mandible, posterior maxilla/mandible) and surgical procedures (standard procedures, horizontal guided bone regeneration, vertical guided bone regeneration, sinus floor elevation, split crest procedures). Descriptive statistics, including mean values and standard deviations, were used. A database was created using Excel (Microsoft, Redmond, WA, USA), with appropriate checks to identify errors. One-way ANOVA with Tukey's range test and Student's t-test were performed to assess the marginal bone loss around implants between different groups. The Kolmogorov–Smirnov test was used to define whether the data presented with a normal distribution or not. For each test Statistical significance was declared at $p \leq 0.05$
RESULTS: During the follow-up period: 1 implant failed and was removed; 150 implants did not show signs of pain, mobility, bleeding on probing, suppuration or bone loss < 2mm from initial surgery, with a cumulative success rate of 95.54%; 6 implants showed peri-implantitis, bleeding on probing and PPD > 5 mm, with a cumulative survival rate of 99.36 %. The mean radiographic marginal bone loss between baseline and 5- year of follow-up was 0.5±1.47mm. No differences were found in the marginal bone loss related to surgical procedures and implant location.
CONCLUSIONS: Within the relatively small sample size, the cumulative survival rate and the MBL reported in the present retrospective research are consistent with those observed in other studies. These findings may be related to the careful selection of patients, the prosthetic guided implant placement, the appropriate surgical protocol as well as the good level of compliance with the maintenance care.

A new and minimally invasive approach to treat odontogenic maxillary sinusitis

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OBJECTIVES: Odontogenic sinusitis is a relevant infection of the paranasal sinus that accounts for approximately 10% to 30% of all cases of maxillary sinusitis. Unlike most other forms of maxillary sinusitis, treating odontogenic sinusitis requires a combination of medical and surgical management. In literature many procedures have been descripted to approach the maxillary sinus. Most of them are invasive and required the hospitalization of the patient and a general anesthesia. We describe a new and minumum invasive procedure to empty the maxillary sinus for the resolution of the acute sinusitis by the use of an intraoral drainage.
METHODS: 9 patients, between the age of 32-66 were referred to our department, complaining drainage of a purulent discharge in the nose and oral cavity, nasal obstruction and congestion and swelling of the malar area. After the medical teraphy an intraoral approach consisting of the drainage of the purulent discharge from the oral-antral comunication was adopted. The drainage was left in the oro-antral comunication for 14 days and the patients were instructed to do sinus irrigation with fisiologic solution and hydrogen peroxid more times a day throught the cannula. After 3 months a Cone Beam Computed Tomography scan showed the complete remission of the maxillary sinusitis.
RESULTS: The results suggest that this procedure could be the surgical treatment option of choice for most patients with acute or chronic odontogenic maxillary sinusitis with purulent discharge, with an oroantral comunication and osteomeatal complex with obstruction. Instead when there are the conditions that predispose the onset of the sinusitis a classic FESS approach is recommended. More studies are needed to prove the real efficacy of this mini-invasive procedure.
DISCUSSION AND CONCLUSIONS: In literature the association of functional endoscopic sinus surgery (FESS) with an inta-oral approach can be considered the best option for the long-term resolution of these complications and for the restoration of a normal naso-sinusal homeostasis. Howewer this procedure requires patient's hospitalization, general anesthesia, both ENT and oral maxillo facial team, and sometimes relapsed because of the difficulty to obtain a complete emptying of the sinus.
The intraoral approach we tested leads to minimun invasiveness of the procedure, resolution of symptomatology, good result in the emptying of the sinus and less cost for the hospital.

Emergency oral bleeding after dental extraction: an epidemiological study

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BACKGROUND: The incidence is very high of patients that use antiplatelet agents or anticoagulants and seek hospital treatment for single or multiple tooth extractions. The analysis of the literature highlights that Warfarin prescribed for reducing thromboembolic risk, especially in patients with prosthetic heart valves or in patients with atrial fibrillation, makes it among the 100 most prescribed drugs in North America. The purpose of the present work is to analyze the incidence of post-extraction bleeding complications in a large population sample consisting of 1280 patients receiving oral anticoagulant therapy (OAT). In particular we analyzed 44 cases of post-extraction bleeding going to look for possible correlations between sex, age, INR value and number of extractions. In particular we analyzed the influence of INR value on post-extraction bleeding on the day of surgery and on the following days.

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METHODS: The present work analyzes a large population samples in which we study the incidence of post-extraction bleeding complications (44 out of 1280 patients) on oral anticoagulant therapy (OAT) for heart valve replacement or atrial fibrillation, who had undergone dental extractions in day surgery during 2012 at the Rome-based "George Eastman" hospital (GEH).
RESULTS: The incidence of bleeding in patients who had been subject to OAT suspension and were on heparin was low (3.4%), also in consideration of the fact that the surgical approach we follow at GEH is conservative, providing for an accurate surgical wound revision with removal of inflammatory tissue at the post-extraction site. As for the 44 OAT patients with post-extraction bleeding complications, we investigated the pairwise correlations between variables by means of Pearson's correlation coefficients. Simple Pearson's correlation highlights only one statistically significant pairwise correlation between deltaINR and Baseline INR (Pearson's coefficient $r = 0.985$; $p < 0.0001$). Such correlation points to the fact that the higher the INR baseline value, the strongest the reduction of INR induced by the drug as measured at the moment of surgery.
CONCLUSIONS: In any case, the risk of bleeding is not related to the INR value in a biunivocal manner; it is related to the number of dental extractions the patient needs, and to the degree of inflammation of the extraction sites. In agreement with international guidelines we deem it important to ensure that the patient receives adequate local haemostasis: gelatin sponge, and/or tisseel, meticulous curettage of the extraction site and sutures.

Post-operative pain management in impacted third molar surgery

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BACKGROUND: Pain is the most common reason why patients seek dental treatment. The aim of this work is to provide an overview on the topic reporting the current knowledge for management of pain in impacted third molar surgery, and identify the evidence-based guidelines to appropriate use of drugs and cold therapy.
METHODS: Standard textbooks of Oral and Maxillofacial Surgery were consulted and scientific manuscript were reviewed using the PubMed database, Medline and Scopus. The key words used are: dentistry AND pain AND analgesics OR non-steroidal AND ice. We collected 29 manuscript by 1986 at 2014 and we considered as search filters: English languages -Human species – to select 5 articles according to title, abstract and main manuscript.
RESULTS: The results of our review demonstrate that compression of ice after surgical removal of mandibular impacted third molars is a valuable method for preventing pain. Biologic modifications caused by cryotherapy determinate anti-inflammatory action, slowing down cell metabolism and decreasing production of inflammation chemical mediators. The anti-edema effect is related to vasoconstriction, minimizing blood extravasation and hemorrhage. Ice compression decreases the excitability of free nerve endings and peripheral nerve fibres, increasing the pain threshold. NSAIDs produce analgesic and anti-inflammatory actions by inhibition of cyclo-oxygenase, thereby reducing the synthesis of arachidonic acid and metabolites such as prostaglandins and thromboxanes. Paracetamol acts primarily in the central nervous system (CNS). It has analgesic and anti-pyretic effect. Within the CNS it works by inhibiting prostaglandin synthesis in the hypothalamus, preventing release of spinal prostaglandin and inhibiting nitric oxide synthesis in macrophages. The use of codeine and paracetamol associated has a synergistic analgesic effect and even reduced side effects due to the lower dose of each single drug. The opioids produce analgesia by activation of opioid receptors: mu, kappa and delta. Systemic administration of opioids produces analgesia by inhibiting pain transmission at multiple areas in the neuraxis. Glucocorticoids act to reduce inflammation by inhibiting the production of multiple cells involved in the inflammatory response. They decrease vasoactive and chemoattractive factors and extravasation of leukocytes to areas of tissue injury. Glucocorticoids also act against the immune response by inhibiting cytokine production.
CONCLUSIONS: This literature review provides evidence-based guidelines in the treatment of impacted third molar surgery postoperative pain. Cryotherapy is one of the most effective methods for reducing pain and discomfort after the surgical removal of third molars. Patients should be treated with NSAIDs or paracetamol (for those patients who cannot tolerate NSAIDs) as the first choice drugs at doses that are proven to be effective in the literature. Opioids should be considered adjunctive drugs that act to enhance overall analgesia at the cost of increased adverse effects. Corticosteroids can be used in specific situations where the pain is inflammatory in origin, where there is no infection and where there are no contraindications to the chosen drug being used.

Bacterial adhesion on polytetrafluoroethylene suture wires

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BACKGROUND: A good wound healing process is important to get better outcomes and reduce complications after oral surgery. For this reason, the control of surgical site infections is of particular importance. Proper suturing of the flap plays a crucial role in primary intention healing, however polifilament materials may represent a gateway for bacteria in the deep tissues because of their characteristic of presenting capillarity. The aim of this work was to compare the behavior of the silk and a monofilament material such as Gore-tex (expanded Polytetrafluoroethylene, e-PTFE, Deknatel 2007), very similar in mechanical characteristics in spite of its different composition and structure, but devoid of capillarity, in the control of surgical infections (Racey *et al.*1978; Tomita *et al.* 1993; Banche *et al.*2007).
METHODS: A total of 30 consecutive patients, age (mean±SD) 30.5±8.89 years old (range 21-45), with asymptomatic impacted mandibular third molars were enrolled and treated between January 1and June 30, 2015 at the Tuscan School of Dental Medicine, University of Siena, Oral Surgery Unit.
Each surgical wound was sutured with two sutures on the main incision, one in silk and the other in e-PTFE. After seven days the suture was removed and the wires sent to the Laboratory of Molecular Microbiology and Biotechnology Department of Medical Biotechnology – University of Siena for the bacteria count. The bacteria counts were reported on GraphPad Prism

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and transformed in their logarithm to the base 10. The values thus processed were analyzed by the nonparametric Wilcoxon test for paired data.
RESULTS: The difference in the amount of bacteria found on the two types of sutures analyzed in this study was significant. The results of the study show in fact a higher amount of bacteria on silk sutures compared to sutures e-PTFE ($p = 0.0020$ with non-parametric test of Wilcoxon).
CONCLUSIONS: Since the infection of the surgical wound represents one of the most common post-operative complications in oral surgery, using a suture material having in the post-operative period the least accumulation of bacteria could be the best choice.
Using silk and e-PTFE for the suture, the knot strength was excellent with both materials but the amount of bacteria found on the PTFE was significantly lower. Hence, being the efficacy of the sealing comparable, we considered preferable to use PTFE sutures in oral surgery, especially when the tissues must be preserved from infection, not only in case of dental extractions, but also in implantology.

Oral mucocele: a comparison of different techniques

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BACKGROUND: Oral mucocele is a common oral mucosal lesion that originates from the salivary glands, especially from the minor ones, due to mucus extravasation and retention. Although the lower lip is the most affected site of oral mucocele, it can be found also in the cheek, in the ventral surface of the tongue, in the palate and in the floor of the mouth, where it originates from the sub-lingual gland and is called ranula. Several therapeutic procedures have been described in literature such as conventional surgical techniques, micromarsupialization, ablation with CO2 or Er:YAG lasers and cryosurgery. Surgical techniques are here described, that are aspiration, marsupialization, excision and enucleation, with a brief description of advantages and disadvantage of each of them.
METHODS: Four different cases are reported to show all listed surgical techniques. Aspiration is the simple mucocele decompression by needle aspiration of the saliva. Marsupialization is a technique in which the cyst lining is everted and sutured to the adjacent mucosa forming a cavity that remains open to the oral environment. Excision is the removal of the pathologic tissue along with both the overlying and the surrounding tissues. It is performed by means of an elliptic incision few mm peripherally, all around the lesion. Enucleation is the simple removal of the lesion by means of its dissection from the surrounding tissues. It is performed with the incision of the overlying mucosa followed by the blunt dissection of the mucocele wall from both the overlying mucosa and the underlying tissues.
RESULTS: According to the literature, aspiration may be considered as a preliminary treatment, especially in not-cooperating patients, but it almost always needs to be followed by one of the other surgical treatments because of lesion recurrence. Marsupialization may be used when excision and enucleation are difficult to be performed or they could damage vital structures such as the labial branch of the mental nerve. Marsupialization can also be used in the case of wide lesions or lesions located on the palate. In moderate sized lesion, excision or enucleation is suggested as the choice treatment. Both these techniques heal by primary intention but enucleation involves a minor loss of tissues as well as a better aesthetic healing. Excision may be preferable when the overlying mucosa is thin or/and superficial adherences are visible, so that a cleavage plane cannot be found between the overlying mucosa and the mucocele wall. On the contrary, enucleation is certainly preferable if the lesion is located near vital structure, such as nerves or vases, which may be damaged during the excisional procedure.
CONCLUSIONS: Among surgical procedures for oral mucocele, the choice depends on the various features of the lesion, such as site and size. Each technique therefore presents specific indications but also advantages and disadvantages. The surgeon must know all features of the different techniques and should be able to choose the better one for each case, in order to obtain the best possible healing and the smallest post-surgical discomfort for the patient.

BMP2/RUNX2 genes mediated differentiation of DPSCS on reduced graphene oxide coated collagenous membranes

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BACKGROUND: Graphene is a flat monolayer of carbon atoms tightly packed into a two-dimensional (2D) honeycomb lattice and is a basic building block for graphitic materials with unique physical, chemical, and mechanical properties. Graphene oxide (GO), has been actively investigated in the development of electrochemical devices or energy storage. However, GO has especially great potential in bioengineering, due to the presence of functional groups such as carbonyl, carboxy and epoxy moieties that confers to graphene a high solubility in water. The potential applications of GO in biological systems are numerous and include its use in catalysis, adsorption of enzyme, cell imaging and drug delivery, as well as biosensors. Several reports have shown that, when grown on GO paper, there is an increase of adhesion and proliferation of different cells, such as osteoblasts. Not only does it increase proliferation of cells, GO is shown to influence the differentiation of stem cells into certain cell lines. It has been shown that graphene provides a promising biocompatible scaffold that supports the proliferation of human mesenchymal stem cells (hMSCs) and accelerates their specific differentiation into bone cells.
Collagen membranes are used in oral surgical procedures for the treatment of bone defects. To improve biocompatibility and promote the desired effect on the surrounding tissues, collagen membranes were coated with graphene oxide (GO). The aim of this study was to investigate the biocompatibility of newly synthetized collagen membranes coated with GO on a primary cell line of human DPSCs. We investigated the effect of the collagen membranes coated with GO, on the viability and metabolic activity of DPSCs, along with the cytotoxic effect, the induction of an inflammatory response of these

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membranes on DPSCs, as well as the osteoinductive properties of the membranes.
METHODS: Synthetic Graphite ~ 200 mesh, 99.9995% powder was purchased from Alfa Aesar. Collagen membrane (Osteobiol Derma (Tecnoss), derived from porcine dermis after removal of the epithelial layer, were a gift of Tecnoss dental s.r.l. Pianezza (TO), Italy.
DPSCs, obtained from third molars extracted during orthodontic treatments, were cultured on both 2 and 10μg/mL GO coated membranes for 3, 7, 14 and 28 days with differentiation medium. At each experimental point Alamar blue and LDH cytotocicity assay were performed, along with PGE2 ELISA assay and real time RT-PCR for RUNX2 and BMP2 expression.
RESULTS: Cellular proliferation was higher on GO coated membranes especially on 10μg/ml GO coated one at day 28. LDH assay evidences no cytotoxic effect, in particular LDH leakage was lower from 10μg/ml GO coated membrane at day 14 and 28. BMP2 gene expression was higher in both coated membranes; whereas RUNX2 gene expression level did not show differences. PGE2 secretion levels were lower from GO coated membranes at days 14 and 28.
CONCLUSIONS: The newly synthetized collagen membranes coated with GO are not only nontoxic for a primary cell line of human DPSCs, but demonstrate a GO concentration dependent enhanced cell metabolic activity. They allow cells to attach to the surface of the membranes, representing true barriers. The GO coated membranes induce faster differentiation of DPSCs into osteoblasts, compared to conventional GBR membranes.

Analgesic and anti-inflammatory effect of SLLLT after bilateral surgical extraction of impacted third molar: a split-mouth study

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BACKGROUND: The purpose of this investigation is to evaluate the efficacy of SLLLT in the clinical treatment of pain after surgical extraction of third molar impacted tooth, and his anti-inflammatory effect.
METHODS: This is a clinical trial, case-control study; 30 patients were subjected to surgical extraction of bilateral impacted third mandibular molar. The inclusion criteria of the study were patients with indication to extraction of mandibular third molar, simmetrical and with same difficult degree according with Pell and Gregory classification; germectomy was preferred criterion. The exclusion criteria were sistematic syndromes wich interferred with bone and mucosa healing process, such as diabetes, AIDS, leukemias; another exclusion criterion was the use of drugs wich interferred with the surgical wond healing and inflammatory process, such as cortisone. Both teeth were extracted in the same session by the same operatory. One of the sites has been chosen random to be sunjected of SLLLT. The laser sessions have been done immediately after the extraction, after 24 and 48 hours. The follow-up was 5, 7 and 14 days after the surgery. During each session pain and swelling were evaluated by a visual analog scale (VAS) by patients and, simultaneously, the objective edema was recorded measuring anatomical landmarks by same operator. For each appointment the same operator evaluated also clinical status and healing of surgical wound, documenting sites with pictures. The antibiotic use was pre-surgery, with single dose of 3 gr. of amoxicillin plus clavulanate, wich could have been replaced from ampicillin in case of allergy. Painkiller therapy was 600 mgr. of ibuprofen if needed.
RESULTS: The results of ours evaluations indicates good pain control by SLLLT in treated site. There is a statistically significant difference between treated site and control site in favour of treated one on the first and second day (p24=0.01, p48=0,008); constant decrease of pain is observed in both site, starting with a lower level of pain in the treated site. Patients also refer subjective swelling reduction in favour of the treated site statistically significant on second and fifth day after surgery (p48=0,02, p5gg=0,04). As expected constant decrease of edema perception has been observed but, beacuse of the subjective nature of the data, there has been an large range among the values of data themselves.
About cefalometric measures, statistically significant difference in favour of treated site has been observed on GONION-SPINON line on 2 and 5 day (p_{48}=0,02, p_{5gg}=0,03) with delta percentage treared site / control site equal to -1.73 % and -2.05 %. As concern measures on Gonion - Pogonion points, the data detected on the treated site have reduced by 3.32% compared to the control site; the difference is statistically significant with p = 0.003.
Our results indicate an importan reduction of painkiller use compared to literature average. The dose of ibruprofen taken on the first day after surgery is the largest detected within 7 days, as expected; it amounted to a average value of 920 mg taken, lower than that reported in the literature. No side effects occurred and all our patients were very satisfied by SLLLT treatment.
CONCLUSIONS: According to the results obtained, the intraoral application of SLLLT with the parameters used induces a reduction of symptoms, of traumatic/inflammatory manifestations, and of the post operative discomfort resulting from surgical extractions.

Giant cell granuloma of the jaws: epidemiological and clinical analysis of 30 cases

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BACKGROUND: The central giant cell granuloma (CGCG) is a benign localized, sometimes aggressive, bone disease that consists of a stroma of fibrous tissue in which it is possible to find the presence of giant osteoclast like cells, hemorrhagic foci, hemosiderin deposits and reactive bone deposition. CGCG is clinically asymptomatic and the most common sign is the appearance of a painless swelling in correspondence of the face or the mouth.
The peripheral giant cell granuloma (PGCG) can be defined as an exophytic reactive lesion that originates from the periosteum or periodontal ligament. The etiology is unclear, although local irritative factors or chronic trauma can be the main causes. Histologically the PGCG is indistinguishable from CGCG.
The purpose of this study is to carry out an epidemiological and clinical analysis on thirty cases of giant cell granuloma of the jaws.
METHODS: A descriptive and retrospective epidemiological

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survey was conducted on thirty patients referred to the unit of Oral Pathology and Oral Medicine of Parma University between 2005 and 2015 with a histopathological diagnosis of giant cell lesion of the jaws. Out of 30 cases there were selected 5 with clinical and radiological features (greater involvement of the bone compartment than the mucous one) to be classified as CGCG.
RESULTS: Regarding the genre it was observed a predominance of the male sex. The average age at diagnosis was 53.15 years and the majority of patients had an age at diagnosis between the third and the ninth decade of life. The most frequently affected site it was represented by the mandible. Only 22% of patients complained pain, while 33% reported annoyance. The 32% of patients have hypertension and 18% have diabetes. But there isn't any correlation with CGCG / PGCG and hypertension or diabetes because these diseases are common and very frequent over the fifth decade of life.
CONCLUSIONS: CGCG and PGCG are lesions with a low incidence especially when compared to other oral disorders such as oral lichen planus. Since CGCG and PGCG are indistinguishable from histopathological analysis, the differentiation is based mainly on clinical and radiological features. This study showed a higher prevalence of giant cell lesions in the male sex, and this data is different from that reported by literature (prevalence of female sex). Concerning the central forms, in our study it was detected an average age at diagnosis of 63 years; in the literature it was reported that CGCG is a disease mainly diagnosed in the first three decades of life.
It was also considered the relapse occurred after surgical excision (removal of the lesion and the presumably surrounding healthy tissue). Only two lesions of thirty have relapsed. Relapsed lesions are PGCG and their recurrence is substantially due to errors that occurred in the surgery (incomplete excision).
For the treatment of CGCG/PGCG it is essential a correct surgical planning, based on the incisional biopsy, on radiological surveys (to assess the bone involvement) and blood chemistry tests (in the case of central forms to rule out systemic diseases). Last but not least it is important, especially for the peripheral forms, the elimination of the presumed causal factors, such as plaque, calculus and dental elements periodontally compromised.

Mini-implants for second molars uprighting: a case report

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BACKGROUND: Impacted second molars can create problems with esthetics, masticatory function and dental arch stability. The most probable causes of impaction of second molars seem to be related to the excessive size of these teeth, deficient mandibular growth, inadequate length of the mandibular arch or only due to an abnormal eruption pathway. Treatment options include surgical extraction, surgical uncovering with orthodontic-assisted eruption and surgical uprighting. The utilization of temporary implants for orthodontic anchorage allowed a new perspective in the orthodontic treatment, especially in the permanent dentition. The authors present a case in which the procedure was performed successfully to treat an impacted second molar in a young male patient.

METHODS: A 19-year-old boy sought treatment for a semi-impacted mandibular second molar. During the eruption process, the mandibular second molars presented a marked mesial eruption pathway, leading to impaction on the first molars. Surgical removal of third molars was indicated to enhance the uprighting of second molars. The same procedure comprised surgical exposure and bonding of a bracket on the cusp of these teeth and placement of mini-implants (Mini-implant, 2.0 x 9.0, medium transmucous profile) for anchorage on the retromolar region, distal and occlusal to the second molars, using a mucoperiosteal flap. This site was selected to allow support for orthodontic eruption of the impacted second molars in distal and occlusal direction. The affected teeth were gradually moved using chain elastics, improving their positioning. The period required for uprighting was 10 months.
RESULTS: After 10 months of treatment, correct second molar alignment and angulation was achieved. After orthodontic finishing and improvement of occlusion, the appliance was removed and a wraparound removable orthodontic retainer was placed in the maxillary arch. The intraoral analysis revealed Class I molar and canine relationship, adequate overjet and overbite, coincident midlines and adequate intercuspation between the dental arches, including the second molars. The panoramic radiograph evidenced correct parallelism between the roots, and the cephalometric tracing and superimposition on the cephalogram revealed the dental and skeletal changes achieved at treatment completion.
CONCLUSIONS: Surgical molar uprighting has been shown to be a predictable and reliable procedure. When a molar tooth is severely impacted, surgical uprighting provides a viable option when other treatment modalities are contraindicated. These treatments require minimum patient compliance and a good oral hygiene can be more easily maintained. Even in patients who do not need prosthetic rehabilitation, recent studies have used the retromolar, palatal and alveolar regions for the placement of implants only for orthodontic purposes, for induced movement of teeth or segments.

L-PRF in oral surgery: state of art and literature review

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BACKGROUND: platelet concentrates are autologous products that contain high level of several protein growth factors, such as platelet-derived growth factor-AB (PDGF-AB), transforming growth factor-β1 (TGF-β1), vascular endothelial growth factor (VEGF) and coagulation and matrix proteins, such as thrombospondin 1 (TSP1), fibronectin and vitronectin. Platelet concentrates are classified into four main families depending on their leukocyte and fibrin content: pure platelet-rich plasma (P-PRP), leukocyte- and platelet-rich plasma (L-PRP), pure platelet-rich fibrin (P-PRF), and leukocyte- and platelet-rich fibrin (L-PRF). Each family presents peculiar biological properties and potential applications. L-PRF is a newly developed platelet concentrate that contains leukocytes within a high-density fibrin network and is produced by centrifugation of patient's blood. L-PRF presents as a gel and cannot be injected or used like traditional fibrin glues. The purpose of the present research was to provide a general over-

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view about leukocyte- and platelet-rich fibrin and its actual and potential applications in oral surgery.
METHODS: electronic and manual search was performed through MEDLINE (Pubmed). Keywords used for research were: "L-PRF", "leukocyte- and platelet-rich fibrin", "platelet", "fibrin". These terms were combined with AND or OR to perform the electronic search. Considering the relatively poor data available in literature on this matter, different study designs have been taken into account, including case reports, case series, RCTs and *in vitro* studies.
RESULTS: different clinical and *in vitro* studies indicate that L-PRF can improve wound healing and provide a scaffold for bone formation. L-PRF is currently used in several surgical procedures, alone or combined with graft materials, including alveolar ridge preservation techniques, treatment of gingival recessions, mucogingival surgery, guided tissue regeneration, filling of periodontal intrabony defects, bisphosphonate-related osteonecrosis of the jaw, peri-implant bone defects, during implant placement (particularly as surface treatment to stimulate osseointegration) and sinus lift procedures. The use of L-PRF requires minimal cost and reduces the need for graft material. Moreover, as an autologous product, it does not involve the risk of disease transmission and graft rejection. Other advantages include the ease of use, sample handling and possibility to suture the material to the wound bed.
CONCLUSIONS: the reported results suggest that L-PRF is an efficient and useful material to enhance soft and hard tissues healing process and to manage the postoperative pain by reducing the early adverse effects of the inflammation.

Delayed infections after mandibular third molar extractions: a prospective observational cohort study.

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OBJECTIVES: Delayed-onset infections are a rare complication that usually occurs approximately 1 month after tooth extraction, with a published incidence of 0.5% - 1.8%. Clinical features of this complication are discharge of pus from the wound, swelling, and pain. This complication is usually managed by surgeons with antibiotic therapy (generally amoxicillin and clavulanate), and, if necessary, with surgical debridement of the post-extractive socket. Aims of the present study were to detect the incidence of delayed-onset infections after mandibular third molar removal and to identify the main factors associated with this complication.
METHODS: An observational prospective cohort study was carried out involving outpatients who underwent to at least one surgical third mandibular molar extraction between January 2013 and December 2015 at the Oral Surgery Department of the University of Padova.
Patients developing postoperative infections within fifteen days after surgery were excluded. Clinical data were collected at the time of surgery (patient variables: gender, age, systemic diseases, smoking habit; tooth variables: degree of root growth, tilt, type of impaction, proximity to the alveolar nerve, previous pericoronitis, ongoing infection; data related to the surgical procedure: duration, surgeon's experience, design of the flap, ostectomy and tooth sectioning, if performed). One week after the extraction at suture removal the presence of alveolitis, pus, swelling, dehisce, pain on palpation were assessed. Thirty days after surgery the patients received phone calls and were asked about the healing after tooth extraction). Fischer's test ($p<0.05$) and also Student's test was used for data analysis.
RESULTS: The study sample included 179 subjects (mean age: 21, SD: ±7.2) who had 217 mandibular third molars extracted under the same surgical conditions. 8 delayed-onset infections were recorded, with an incidence of 3.7% (extraction based). The average time elapsed from lower mandibular molar extraction to delayed-onset infection was 35 days (SD= ±7.8). The age of the patient and the duration of the surgery were associated with the development of this complication (respectively $p=0.06$ and $p=0.04$).The majority of the patients who developed a delayed onset infection had systemic diseases and were not smokers. The other variables were not significantly associated with delayed-onset infection occurrence.
CONCLUSIONS: Delayed onset infection after mandibular third molar surgery is a rare postoperative complication. Younger patients and a prolonged surgery seem to be risk factors. Data are consistent with the existing literature. Considering the low incidence, a larger cohort study may be useful to better understand the relationship between this postoperative complication and various risk factors.

Dental management of cherubism: a case report

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BACKGROUND: Cherubism is an uncommon fibro-osseous disorder of the jaws that presents with varying degree of involvement and tendency toward spontaneous remission. It is classified as quiescent, non-aggressive and aggressive on the basis of clinical behavior and radiographic findings. Quiescent cherubic lesions are usually seen in older patients and do not demonstrate progressive growth. Non-aggressive lesions are most frequently present in teenagers. Lesions in the aggressive form of cherubism occur in young children and are large, rapidly growing and may cause tooth displacement, root resorption, thinning and perforation of cortical bone. It is characterized by bilateral and symmetric fibro-osseous lesions limited to the mandible and maxilla. Affected children appear normal at birth. Swelling of the jaws usually appears between 2 years and 7 years of age, after which, lesions proliferate and increase in size until puberty. The lesions subsequently begin to regress, fill with bone and remodel until age 30, when they are frequently not detectable.
The incidences of males getting affected are more than female in 2:1 ratio.
Although the condition is known to be hereditary, in some cases there has been no detectable family history. In such cases, it results from new dominant mutations in the SH3-binding protein 2 (SH3BP2) gene on chromosome 4p16.3
METHODS: A 7-year-old female child of non-consanguineous parents, reported to our department by genetist, with a complaint of painless, progressive and bilateral enlargement of lower face and jaws.
Radiographically, the bones, which are involved, show a

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multilocular radiolucency with thin and expanded cortices, including the inferior border. The condyle and the condylar neck appear normal. Unerupted and displaced teeth are common. Cases show symmetric involvement both radiographically and clinically. Computerized tomography (CT) showed honeycomb-like lesions of the mandibular cortical bone. In the years between 2004 and 2016, the patient has been monitored and subjected to surgical-orthodontic treatments to optimize their clinical condition. The primary teeth were surgically removed in order to allow a correct orthodontic therapy. The cystic lesions have been treated through marsupialization. One such lesion caused the dislocation of the 3.7 element which had to be extracted and the aforementioned lesion treated through cystectomy. Afterwards the patient underwent gengivoplasty in the affected zone (3.7).
The orthodontic treatment has been split in two phases. The first phase was the interceptive phase were a palatal expander was placed on the upper dention and a lingual arch on the lower one in order to keep the correct distance between teeth. The second phase consisted of a dental brace as fixed orthodontic appliance.The patient is put on a rigorous follow-up to monitor the possible recurrences lesions and restore a poper occlusion.
RESULTS: Through regular checkups the patient was able to maintain a relatively normal lifestyle, limiting bone deformities and loss of teeth. The general clinical approach is to defer surgery until after puberty and allow natural involution of disorder. If osseous contouring is required, it is done with the knowledge that the operated bone will re-expand again.
CONCLUSIONS: It is very important that these patients are monitored by a differentiated team of specialists to control every aspect of the disease by coordinating the necessary operations. The genetic basis of the disease gives hope for a possible genetic therapy which may play a decisive role in future treatment.

Conservative management of osteoradionecrosis with PRGF-ENDORET®

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BACKGROUND: Osteoradionecrosis (ORN) is the most serious long-term complication caused by radiotherapy and is an area of exposed necrotic bone in oral bone, and healing does not take place for at least 90 days. In most cases, ORN involves oral surgery to the jaw bone. The aim of this study was to the evaluation of a safe biological approach for ORN treatment.
METHODS: 10 patients with ORN underwent ultrasound device debridement of necrotic bone and then application of plasma rich in growth factors PGRF-ENDORET® so that soft-tissue healing would be improved and accelerated.
Clinical and radiographic follow-up lasted up to 12 months. A visual analogue scale (VAS) was used for pain assessment in the first week post-surgery.
A modified healing index was used in the assessment of maturation and quality of tissue healing.
Examination of patients focused on the clinical signs of necrosis: pain, swelling, absence of healing, exposed necrotic bone, and/or fistulas connected to the bone. Treatment was deemed successful when no clinical or radiographic signs were present.
RESULTS: No intraoperative or postoperative complications were observed. All patients reported reduced pain and trismus, and from the third day after surgery analgesics were no longer necessary.
Fourteen days after surgery each site treated showed a Healing Index of Masse score between 4 and 6, with complete closure of the wound. Treatment in all 10 ORN patients proved successful and this was defined mucosal closure was maintained without clinical and radiographic signs of residual infection nor exposed bone at the latest evaluation (12 months).
All cases were successfully treated without intraoperative nor postoperative complications.
CONCLUSIONS: PRGF-ENDORET® may be used successfully as a support to surgery in patients with medical pathologies. In this case, despite a limited sample size, the use of a preparation rich in growth factors showed positive results regarding the conservative surgical treatment of ORN.
PRGF-ENDORET® can enhance vascularization and epithelialization in patients with a history of head and neck radiotherapy.

Dental implants combined with Plasma Rich in Growth Factor-ENDORET in osteoporotic women undergoing bisphosphonate therapy: failure risk assessment

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BACKGROUND: the risk of developing bisphosphonate related osteonecrosis of the jaws (BRONJ) has caused some disagreement as to whether it is safe to place implants in patients treated with bisphosphonates (BPs) therapy. The American Association of Oral and Maxillofacial Surgeons (AAOMS) advises that dental implants be avoided in cancer patients treated with intravenous bisphosphonates (IV BPs). In contrast, for patients under oral BPs placement of dental implants is not expressly contraindicated even though a very careful approach is recommended. Plasma Rich in Growth factors (PRGF-Endoret®) has been widely described and offered as a treatment of patients suffering from systemic disorders, and the results have been encouraging. The purpose of this study was to evaluate the level of risk in relation to adverse events such as implant failure and BRONJ in a large number of osteoporotic patients undergoing implant placement combined with the application of PRGF-Endoret®.
METHODS: The group of people who took part in this study was selected from a population of osteoporotic women who had received dental implants from February 2004 to December 2011.
A review of the clinical charts of 235 middle-aged women on oral BPs therapy for osteoporosis, who underwent positioning of 1267 dental implants was carried out. Implants were always positioned in combination with PRGF-ENDORET®. The results were implant failure and bisphosphonate related osteonecrosis of the jaws (BRONJ). A model based on distribution of personal risk factors (PRF) was used for risk evaluation.

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RESULTS: A clinical chart was compiled for each patient, recording the baseline conditions and the implant-related features.
Sixteen implants were lost in 16 patients in a 120-month follow-up, with a survival of 98.7% and 93.2% on implant basis and patient basis, respectively. No cases of BRONJ were observed throughout the monitoring period. According to Personal Risk Factor models, patients showing at least two risk factors have a higher risk of implant failure.
CONCLUSIONS: In conformity with the current literature, the data show that the risk of developing BRONJ associated to dental implant surgery is low for patients undergoing oral bisphosphonate therapy. Therefore, this treatment should not be avoided simply because the patient is on oral BPs therapy. All those procedures which can improve and help healing, such as platelet concentrates, should be recommended.

Inflammatory fibrous hyperplasia surgically treated with plasma rich in Growth Factors (PRGF)

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BACKGROUND: This study aims to assess how PRGF-ENDORET® influences secondary re-epithelialization in vestibuloplasty after excision of denture irritation fibrous hyperplasia (DIFH), with an explorative randomized case control trial with 10 patients, 5 patients treated with PRGF and 5 patients with traditional hemostasis, and to analyze differences with simple surgery, considering postoperative rapidity of re-epithelialization, comfort, and discomfort of patients, pain, swelling, and infections.
METHODS: The study population was made up of patients affected by DIFH who were referred to the SIOM Oral Surgery and Implantology Center, Turin, Italy, from January 2010 to December 2010.
After surgery, each patient underwent a precise follow-up program at 3, 7, 14, and 21 days or until complete healing.
RESULTS: Distribution of Patients and Lesions. 6 patients were women and 4 men. The average age was 51 years, with a range from 47 to 72 years. Of the 10 fibrous hyperplasias excised, 5 were located on the buccal mucosa of the maxilla and 5 on the buccal mucosa of the jaw.
All wounds were re-epithelialized after 4 weeks, and there were no negative healing events. In some cases, a hyperemic mucosa is still present in the control group.
CONCLUSIONS: Denture-induced fibrous hyperplasia is a fibrous connective tissue lesion that commonly occurs in oral mucosa in patients showing important alveolar ridge atrophy. In this study, Plasma Rich in Growth Factors (PRGF) is proposed to go beyond the limits of traditional surgical treatment. It has been demonstrated that PRGF represents an autologous source of growth factors leading to a reduction in the healing time of the alveolar mucosa and the discomfort of patients. This is due to the biological characteristics of PRGF that result in the following: reduced duration and intensity of postsurgical pain, acceleration of re-epithelialization of the wound, and reduced bleeding and edema. In conclusion, the use of PRGF on patients affected by denture-induced fibrous hyperplasia is shown to decrease healing times and consequently reduce complications and lead to a general improvement in quality of life.

And neurosensory recovery in patients suffering from inferior alveolar nerve injury

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BACKGROUND: The purpose of this study was to assess the therapeutic effect of Superpulsed Low-Level Laser Therapy (SLLLT) on patients suffering from neurosensory impairment of the Inferior Alveolar Nerve (IAN) following oral surgical injury. Previous literature shows lack of certainty regarding outcomes for the surgical management of IAN injury and the efficacy of Low-Level Laser Therapy (LLLT) in the treatment of IAN injury.
Our aim was to propose a standardised method for the evaluation of IAN injury and to assess the efficacy of SLLLT.
METHODS: This study focuses on the results of Superpulsed Low-Level Laser Therapy in 57 patients who developed paraesthesia of the lip, chin, gingival and buccal areas. Each patient underwent 10 laser treatments, administered once a week, with a GaAs diode laser. Clinical neurosensory testing (soft touch, 2-point discrimination, pin prick, thermal test) and a visual analogue scale (VAS) were used before every treatment in order to assess the extent of neurosensory recovery.
RESULTS: 83.3% of the patients showed significant neurosensory recovery, as very clear in the objective and subjective tests. Clinically we observed a recovery in sensitivity from the 6th session onwards.
We divided the patients into two groups: one group in which the duration of paraesthesia was for less than 6 months and another group in which the duration of paraesthesia was greater than 6 months and an important outcome of our study was that recovery in sensitivity in patients with permanent paraesthesia (>6 months) was similar in both groups
CONCLUSIONS: The results reported in this study suggest that Superpulsed Low-Level Laser Therapy (SLLLT) has the potential to improve neurosensory recovery in patients with IAN paraesthesia.
Furthermore SLLLT appears to be a beneficial and advantageous procedure as it is non-invasive and well tolerated by patients thanks to its lack of adverse effects.

Assessment of MRONJ impact on patient's quality of life: what improvement after surgical treatment?

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BACKGROUND: Several treatment options have been proposed for MRONJ, most of which focus primarily on con-

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servative management with local irrigation and long-term antibiotic therapy. Aim of this study was to determine the outcomes of osseous resective surgery as a possible option for MRONJ treatment as evaluated by health-related quality of life instruments.
METHODS: A clinical observational prospective cohort study design was used. 47 cancer and dysmetabolic patients with an established diagnosis and staging of MRONJ were included. Indication to surgical treatment was evaluated in a multidisciplinary, iterative process. Surgery was performed under local anestesia and conservative bone resections were performed using a piezoelectric device. The MRONJ related QoL was determined by the use of two well-validated and self-reported health related quality of life instrument: a) EORTC QLQ-HN35 appendix; b)VAS scale. Pain, eating discomfort, self-consciousness, unsatisfactory diet, interrupted meals, irritability, and decreased life satisfaction were evaluated before and one month after surgery, and QoL changes were assessed.
RESULTS: As ONJ worsened, oral health quality of life significantly decreased. Pain/discomfort and anxiety/depression contributed most to declining QoL. Overall, in treated patients surgery offered greater improvement. At follow up one month after surgery patients showed healing without complications. Surgical treatment was found to be effective in terms of improvement in oral health related quality of life dimensions, with the occasional exception of the social dimension. When improvement was found to be modest, the role of ONJ stage was highlighted.
CONCLUSIONS: Health-related quality-of-life data are valuable, can provide relevant health-status information to health professionals, and should be used as a rationale for decision-making looking forward to the implementation of the most adequate standard of care. EORTC QLQ-HN35 in conjunction with VAS Scale is a valid and informative tool in assessing QoL in ONJ patients. Administration of the instrument to patients with ONJ is feasible. Results of treatment have been associated with QoL improvement. Our experience indicates that with appropriate technique, surgical treatment may offer benefit to selected patients with ONJ.

Dentistry and maxillofacial surgery: applications of Cone-beam computed tomography (CBCT)

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BACKGROUND: In recent years Cone-beam computed tomography (CBCT) has gained a high approval by the clinicians for dental and maxillofacial imaging and has often replaced conventional tomography (CT) in most diagnostic tasks over head and neck anatomical structures. Since the introduction of CBCT, several novel systems with different technical specifications and settings have become commercially obtainable and this technology is becoming more readily available for everyday practice in dental and maxillofacial fields. The aim of this work is to show the possibility of application of one kind of CBCT device of the commerce in different dental and maxillofacial fields such as implantology, image-guided surgical procedures, orthodontics, periodontics, endodontics, oral and maxillofacial surgery through the presentation of clinical cases.
METHODS: Six patients with various dental needs were examined for diagnostic purposes by the same CBCT device (ProMax 3D, Planmeca, Finland). By means of a dedicated software (Romexis Viewer) it has been possible to get tridimensional images of anatomical and/or pathological structures from different points of view and to plan an implant supported rehabilitation through the use of virtual implant models.
RESULTS: The illustrated clinical cases show that CBCT provides better image quality of teeth and their surrounding structures, in comparison with conventional CT. It allows a reduction of the radiation dose exposition of the patient as compared with conventional CT and it also offers a high spatial resolution of the obtained images. The use of CBCT in clinical practice implies several potential advantages over conventional CT such as an easier image acquisition, a greater image accuracy, lower effective radiation dose, faster scan time and greater cost-effectiveness. On the other hand disadvantages associated to CBCT include scatter radiation, minimal soft tissue detail, limited dynamic range and beam-hardening artifacts caused by dental-care materials and implants.
CONCLUSIONS: Nowadays clinical dental practice requires and increasing availability of information and details in order to perform the correct diagnosis and to establish, program and support every treatment according to the patients' need and, than, to obtain the best possible result in the cheapest and simpliest way. In this sense, technology such as cone-beam computed tomography, thanks to its practical advantages and biological saving, allows to improve quality, possibilities and benefits of radiologic imaging in many fields of dentistry and medicine.

Extractive surgery of the inferior third molar. Precautions used during diagnostic and operative procedures in the prevention of inferior alveolar nerve lesions. Clinical case presentation

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BACKGROUND: While, on the one hand, increased knowledge and improvement of techniques have reduced the limits of ambulatory oral surgery, on the other hand, they have led to an increased number of complications and failures and, in the same way, to professional lawsuits. Oral surgery represents 10% of all lawsuits; almost all of them can be attributed to exodontic surgery. Almost one third are due to the alveolar inferior nerve lesion due to the extraction of the inferior wisdom tooth.The aim of this work is to suggest, through the close examination of clinical cases, operatory technique arrangements for a correct and precise clinical and diagnostic procedure in order to prevent neurological complications of the inferior alveolar nerve during extractive surgeries of the inferior third molar tooth.
METHOD: The method includes these diagnostic and surgical precautions.

Diagnostic Precautions TC dentascan

Compared to endo-oral dimension, RX, Panoramic Tomography and multi-planar transversal mandibular sec-

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tions, obtained secondarily (panoramic rx, pan axial or cross sections) without volume discrepancies in a 1:1 ratio show the exact shape and spatial positioning of the anatomic structures. The widening of interspaces between paraxial and panoramic rx sections, which shouldn't be over 1mm in length, must be indicated on the diagnostic prescription. Otherwise there is a chance that anatomical details might be missed by the examiner's eye because they are sliced out of the tissue.

Technical Surgery precautions

An intrasulcular bayonet incision must be made in order to achieve a good and clear view of the operatory field. The bone breach must be sufficiently wide to allow maneuvers of dislocation. Odontotomy is used to reduce the number of these maneuvers. It must never be a complete odontotomy for the surgeon to maintain a safe nervous structure. The use of piezoelectric surgery is recommended for making the bone branch and the odontotomy.

It would be appropriate to select properly the clinical cases and intervene surgically only when there is a real need.

CONCLUSIONS: The patient must be well informed of the risks, modality and the possible outcome of the treatment. These are fundamental preconditions in order to have a correct recommendation to undergo treatment. A clear and linear diagnostic process is required as well a good communication level between patient and surgeon.

A compound odontoma associated with an unerupted maxillary permanent canine: mini invasive surgical removal. A case report

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BACKGROUND: 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 occuring 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.

METHODS: A 23 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 anestesia. 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, antibioticsystemic 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 23 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, istead of a single large one, granting a more conservative surgical approach to the pathology.

ENF and lower third molar surgery outcome. Randomized clinical trial

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BACKGROUND: The surgical extraction of impacted third molars is usually followed by pain, swelling, and functional limitation of mandibular movements. Purpose of this study is to evaluate the influence of electro-neurofeedback therapy on the clinical outcome and biochemical inflammatory markers in patients undergoing surgical removal of impacted lower third molars.

METHODS: A randomized, split-mouth, single-blind study is conducted on 25 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.

Exclusion criteria comprehend smoking habit, pregnancy, peacemaker implantation, and any systemic condition impairing general health status.

All patients undergo bilateral surgical removal, the first extraction representing the control group and the second one being the test group. As per the test group, a 20' local ENF treatment is performed immediately after, 3, 5 and 7 days after the surgical procedure, while the control group is subjected to a placebo treatment scheme using the same medical apparatus (ENF Physio 1.4.4 - Fast Therapies - Via E. De

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Amicis, 33/3 25013 Carpenedolo (BS)). 1 gram amoxicillin is administered orally every 12 hours for 7 days following the surgical procedure.
For both groups, clinical parameters, such as pain (through VAS scale), cheek edema (estimated using four linear measurements: tragus - labial commissure, tragus - pogonion, gonion - labial commissure, gonion - pogonion), and mouth opening (assessed with a caliber) are registered at each time point; similarly, blood samples are taken immediately before and 7 days after the surgery and processed to observe the modifications in the following inflammatory indexes: interleukin-1-beta, interleukin-6, tumor necrosis factor-alpha, VES, PCR, alpha-1 acid glycoprotein. The data obtained are processed using ANOVA and Spearman correlation. Significance is set at $p<0.05$.

RESULTS: The clinical outcome parameters (pain, cheek edema, mouth opening) show a moderate improvement between the control and the ENF treated group at defined time points. Inflammatory markers (such as interleukin-1-beta, interleukin-6, and tumor necrosis factor-alpha) values are significantly lower for the test group after the surgery.
CONCLUSIONS: The electro-neurofeedback therapy seems to play a role in improving the clinical course of the lower third molars surgery, reducing the post-op discomfort and the inflammatory response, thus auspiciously leading to a better and faster healing process.
Further investigations may focus on impact of electro-neurofeedback therapy in the healing process of different oral surgical procedures likewise in cases of dental implant placement.

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Non-invasive quantification of composite adaptation in cervical margin with optical coherence tomography

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BACKGROUND: Composite adaptation and marginal sealing of class II cavities with cervical margins located beneath the cement-enamel junction (CEJ) still represents a clinical challenge. It has been widely reported that restorations with cervical margins in dentine and cementum are more susceptible to marginal staining, postoperative sensitivity and secondary caries formation. To date, a specific technique that completely eliminates marginal microleakage on dentin has not been yet proposed. Cavity microleakege is generally correlated to imperfect bonding quality at the dentin-composite interface, which could be the consequence of the composite polymerization shrinkage, different thermal expansion between composite and tooth (8) or imperfect composite adaptation. The current laboratory study utilized OCT to evaluate the marginal adaptation and interfacial gaps of conventional and flowable composites on class II margins placed under the CEJ. The null hypotheses is that OCT is not a reliable method to evaluate marginal adaptation and interfacial gaps (1) and that flowable composites do not provide a better sealing in class II margins placed under the CEJ.
METHODS: 16 intact upper premolars, extracted for periodontal reasons, were selected. A mesio-occluso-distal cavity with cervical margins placed 1mm below the CEJ was performed on each tooth. Samples were then all treated with Scotchbond Universal in etch-and-dry technique. Restoration was performed as follow: a 1mm horizontal layer of bulk-fill composite (Venus Bulk-Fill, Heraeus) was placed over only the mesio-cervical cavity floor and cured for 20sec. Then composite restoration of the cavity was performed with oblique layering of nanohybrid resin composite (Clearfill ES-2, Kuraray). OCT ('Spectralis', Heidelberg-Engineering, Germany) imaging was performed after 24h and 2000 thermocycles. Selected samples were sectioned for interfacial observation by confocal laser scanning microscope (CLSM). Marginal adaptation (percentage) was analyzed on 20 B-scans through each sample. Images were analyzed with the software ImageJ to assess the percentage of marginal gap between composite and cervical margin. Data were statistically analyzed with ANOVA test and significance was set for $p<0.05$.
RESULTS: Analysis of variance showed that the material (composite or flowable) and the interaction between materials and thermocycling significantly affected the interfacial gaps between dentin and restoration (Table II). CLSM closely confirmed OCT findings in all samples.
CONCLUSIONS: The first null hypothesis is rejected since OCT seems a reliable method to evaluate marginal adaptation of resin composite. Moreover, the results of the present study led to partially reject the second null hypothesis, since flowable composites provided better seal on dentin only before thermocycling.

Bond strength of universal adhesives to dentin: *in vitro* evaluation

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BACKGROUND: Manufacturers have recently launched universal or multimode one-bottle adhesives that can be used as self-etch or as etch-and-rinse adhesives. These universal or multi-mode adhesives thereby offer the dentist versatility during restoration placement by the inclusion of monomeric constituents capable of producing chemical adhesion to sound natural dentition. These materials are novel, hence, only immediate ultra-morphological and bond strength studies have been published. Thus, the effects of dentin pre-treatment, both with acid etching and with air-power polishers remain unclear. The purpose of this study was to compare bond strength of different all-in-one self-etch universal adhesives when no pre-treatment was applied opposed to when one of two pre-treatment was applied: glycine or 37% phosphoric acid etching for 15 seconds. The null hypothesis of the study was that pre-treatment of dentin had no significant effect on the shear bond strength of all universal adhesives tested.
METHODS: 150 bovine permanent mandibular incisors were used as a substitute for human teeth. The materials tested in this study included five universal adhesives: Futurabond M+, Scotchbond Universal, Clearfil Universal Bond, G-Premio BOND, Peak Universal Bond. The adhesive systems were applied to the defined bonding area, following each manufacturer's instructions. The bonding interface was limited to 2 mm^2. The teeth were randomly assigned into three groups according to different dentin surface pre-treatments. In the first group no pre-treatment agent was applied. In the second group etching was performed using 37% phosphoric acid while in the third group glycine pre-treatment was applied. The specimens were placed in a universal testing machine (Model 3343, Instron Corp., Canton, Mass., USA) in order to define bond strength values.
RESULTS: Kruskal-Wallis analysis of variance and Mann-Whitney test were performed to determine the statistical significance in the differences between debond strength values of the treatment and the control groups. ANOVA highlighting the presence of statistically significant differences among the various groups ($P<0.0001$). Post-hoc Mann-Whitney testing showed no significant differences in shear bond strength values among the five different adhesives tested when no dentine pre-treatment was performed ($P>0.05$). Acid etching

pre-treatment significantly reduced the shear bond strength for Futurabond M+ and Peak Universal Bond (P<0.05) when compared with no pre-treatment group. When ortophosphoric acid was applied, the lowest shear bond strength values (P<0.01) were recorded using Peak adhesive system, whereas no significant differences were reported among the other adhesives (P>0.05).
When glycine was applied, the highest strength values (P<0.05) were reported with G-Premio BOND adhesive system, and no significant differences were reported among the other adhesives (P>0.05). For each adhesive tested, glycine pre-treatment did not influenced bond strength values except for Scotchbond Universal and G-Premio BOND (P<0.05). Based on our results, when universal adhesives were used, dentin pre-treatment did not provide significantly higher bond strength values, except for G-Premio BOND adhesive system that after glycine application incremented bond strength. Futurabond M+ and Peak Universal Bond showed lower values when acid etching was applied and rinsed thus confirming the high efficacy of these types of adhesives in dentin substrate. Universal adhesives require different modes of application and pre-treatment should be localized to enamel. These concepts should be applied routinely in restorative dentistry.
CONCLUSIONS: Although adhesive systems have become simpler, careful management is still required, especially regarding the influence of substrate pre-treatment on bonding performance. Acceptable bond strength values could be obtained with no dentin pre-treatment regardless the adhesive system used in reduced sensitivity technique conditions.

Evaluation of color stability of a new resin infiltrant for non-cavitated caries lesions

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BACKGROUND: The purpose of this *in vitro* study was to evaluate the color stability of one resin infiltrant (Icon) upon exposure to two stage staining process which involved firstly an immersion in acidic drink and subsequently immersions in coffee or in wine. In-vitro comparisons were developed with one nano-hybrid sealant (Grandio Seal), one transparent fissure sealant with fluoride (Control Seal) and one nanofilled composite (Filtek Supreme XTE) at different times.
METHODS: All materials were polymerized according to manufacturers' instructions into silicon rings (height 1 mm; internal diameter 6 mm; external diameter 8 mm) to obtain 40 specimens identical in size for each material. A colorimetric evaluation according to the CIE L*a*b* system was performed by a blind trained operator just after 24 hours immersion in acidic drink and in physiological solution, and after 7, 14, 21, 28 days of the staining process for both groups. Shapiro Wilk test and Kruskal Wallis ANOVA were applied to assess significant differences among different materials. Means were compared with Scheffe's multiple-comparison test at the 0.05 level of significance.
RESULTS: In the case of all materials, immersion in acidic drink solution resulted in clinically perceivable color changes (ΔE > 3.3). Lowest CIE L* variation was registered for Control Seal and Grandio Seal both after 1 week and after 1 month, while Icon showed significantly higher variation (P<0.05). Color coordinate CIE a* varied significantly more for Icon samples (P>0.05). Color coordinate CIE b* varied similarly for all materials tested (P>0.05). The specimens immersed in acidic drink showed higher color variation in subsequent immersion in coffee and wine when compared with specimens firstly immersed in physiological solution (P<0.05).
CONCLUSIONS: Immersion in acidic drink caused a moderately higher discoloration of the disks if compared with specimens firstly immersed in physiological solution (P<0.05). Coffee and red wine caused similar discoloration in each material tested. Icon showed the highest color variations both after 1 week and 1 month. Icon can fix the initial esthetic problem associated with white spot lesions, but the resin may become more discolored than other materials over time. The nano-hybrid sealant (Grandio Seal) and nanofilled composite (Filtek Supreme XTE) showed the lowest ΔE variation after 1 month.

Influence of different shade of luting cements on feldspatic and lithium-disilicate veneers of varying thicknesses

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OBJECTIVES: The color matching when ceramic veneers are employed to rehabilitate anterior teeth is fundamental. In recent years, several luting cements with different shades have been introduced, but poor informations are available concerning the impact of different shades on final color of translucent ceramics, such as feldspatic and lithium disilicate. Thus, the aim of this *in vitro* study was to assess the influence of different luting cement shade on color predictability of feldspatic and lithium-disilicate ceramics. The null hypothesis tested is that the luting cement do not influence the final shade of ceramic, independently from the thickness and the ceramic employed.
METHODS: 120 composite (Adonis, Sweden and Martina) discs, shade 4, of 2 mm thickness were prepared and used as background to simulate natural tooth. 120 ceramic discs (shade A2 HT) were prepared and divided into 2 groups (n=60) according to the material used: A) lithium-disilicate (E-Max, Ivoclar) B) feldspatic ceramic (Noritake, Kuraray). Samples of each group were than divided into three subgroups (n=20 per group) according to the ceramic thickness: 0.6mm; 1.0mm; 1.5mm. Each sample was then applied on the composite background using luting material with different shade: a) no cement; b) Yellow cement (NX3, Kerr); c) Clear cement (NX3); d) Milky Bright Cement (Choice2, Bisco); e) A2 cement (Choice2). The resulting sample shade was assessed using a spectrophotometer (Spectroshade, MHT) on white and black background. Analysis of variance (p<0.05) was performed to evaluate the effect of different luting material shade (1), ceramic type (2) ceramic thickness (3) and their interaction on final shade.
RESULTS: ANOVA test showed that, only with samples analyzed on white background, ceramic thickness influenced the final sample shade. Luting material A2 and Milky Bright color seems to statistically influence ceramic shade only when its thickness is 0.6mm, independently of the ceramic employed.

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No differences were found between the 2 different ceramics tested.
CONCLUSIONS: Based on the results of this *in vitro* study, the null hypothesis was rejected since the ceramic thickness with some opaque color of luting cement (A2 an Milky Bright) influenced the final shade of lithium disilicate and feldspatic ceramics. Further *in vitro* and *in vivo* studies are necessary to confirm these findings.

Non-invasive evaluation of adhesive interfaces with optical coherence tomography

E. Coda

BACKGROUND: Adhesive interface integrity and continuity is fundamental for indirect ceramic restorations prognosis in order to avoid fractures, bacterial invasion with secondary caries formation and endodontic treatment failure. The aim of this *in vitro* study was to evaluate the quality of adhesive interface of lithium disilicate and zirconia using a non-invasive evaluation: Optical Coherence Tomography (OCT) . The adhesive interface will be compared using three different types of luting resinous material: heated composite, composite at room temperature and dual resin cement. The null hypothesis is that there is no difference in adhesive interfacial quality using different types of cement or restorative materials.
METHODS: 24 intact molars, extracted for periodontal reasons, were selected, debrided with ultrasonic device and cut in order to obtain dentin discs of 1 mm. Then, they were randomly divided into 3 groups (n=8 per group) according to the material used for luting the ceramic material: G1) heated composite to 45°C (Clearfil Majestic ES-2, Kuraray), G2) composite (Clearfil Majestic ES-2) at room temperature, G3) dual-curing resin adhesive cement (iCEM self-adhesive, Heraeus Kultzer). Each group was further divided into two subgroups considering the restorative ceramic material employed: cubic zirconia (Katana Noritake, Kuraray) and lithium disilicate (E-Max, Ivoclar), both of 1 mm thick, A2 shade. After 7 days of storage, dhesive interfaces were assessed with the Optical Coherence Tomography (Spectralis, Heidelberg Engineering, Germany) and images were analyzed with the software ImageJ to assess the percentage of marginal gap. Confocal Laser Microscopy was assessed to confirm OCT findings. Collected data were statistically analyzed with ANOVA test and Tukey post-hoc test, significance was set for $p<0.05$.
RESULTS: Heated composite and dual-curing cement showed a significantly lower presence of internal gaps and voids when employed to lute lithium disilicate and zirconia($p=0,001$). Moreover, the adhesive interface quality was not affected by the ceramic material chosen. Heated composite and dual-curing resin adhesive cements showed the same behavior in terms of gap percentage. The results obtained with confocal laser microscopy were similar in term of gap percentage to those obtained with OCT images.
CONCLUSIONS: Based on this *in vitro* study, the null hypothesis could be rejected since different cements showed variable interfacial gaps. Thus, within the limitations of an *in vitro* study we can affirm that less viscous adhesive cements better adapt to dentinal surface and subsequently. produced less risk of bacterial invasion, secondary caries and fracture of lithium disilicate and zirconia indirect restorations.

Effect of immediate or delayed dentinal sealing on coronal bond strength: µTBS test

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BACKGROUND: Immediate dentinal sealing is fundamental to obtain better bond strength to coronal dentin, when etch-and-rinse adhesives are employed. Recently, self-etch approach has been widely studied and these adhesive systems showed promising results on bond strength to coronal dentin. Thus, the aim of this in-vitro study was to evaluate the influence of immediate or delayed adhesive system application on coronal dentin bond-strength. The null hypothesis is that immediate dentinal sealing (IDS) do not provide higher bond strength than delayed dentinal sealing (DDS), independently of the adhesive technique.
METHODS: 30 molars crowns, extracted for periodontal reasons, were selected. Coronal enamel was removed with a diamond sawand the surface were flattened with grit papers in order to expose coronal dentin. A standardized smear layer was created with 600grit paper for 30 sec. Then, samples were randomly divided in 6 groups according to adhesive treatment:
— G1: Immediate dentinal sealing with 3step etch-and-rinse adhesive system (Optibond FL, Kerr)
— G2: Immediate dentinal sealing with EDTA10% for 1min, TeethMate Desensitizer (Kuraray), water rinse for 10sec, 2step self-etch adhesive application (Clearfil SE Bond 2, Kuraray).
— G3: Immediate dentinal sealing with 2step self-etch adhesive application (Clearfil SE Bond 2).
— G4: Delayed dentinal sealing (after 8weeks of storage in artificial saliva at 37°C) with G1 procedure
— G5: Delayed dentinal sealing with G2 procedure
— G6: Delayed dentinal sealing with G3 procedure
Then, a 4mm resin composite was layered and cured with LED lamp at 1200mW. After 24 hours of storage, specimens were serially sectioned to obtain 1-mm-thick beams in accordance with the µTBS test technique. Beams were stressed to failure after 24hand fracture analysis was performed with an optical microscope. Two-way Anova was performed to evaluate the effects of immediate/delayed sealing and adhesive procedure on coronalbond strength ($p<0.05$)
RESULTS: Two-way Anova showed that adhesive technique did not influenced immediate bond strength, while delayed bond strength was significantly worst ($p=0.0001$) independently of the adhesive procedure employed.
CONCLUSIONS: Null hypothesis are partially refused since the immediate dentinal sealing provide higher bond strength, independently of the adhesive technique. The use of synthetic hydroxyapatite did not contribute to increase neither immediate neither delayed bond strength with 2-steop self-etch adhesive. Further *in vitro* studies are necessary to confirm these results.

Bond strength stability of different adhesives to Er:Yag and bur prepared coronal dentin

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BACKGROUND: For many years, the employment of conventional mechanical drilling system has been considered the

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gold standard to remove carious tissue. In the recent years, Er:YAG laser was introduced as an alternative to drills and burs for cavity preparation. Er:YAG was claimed to be more comfortable for the patients and often eliminate the need for anesthesia.
Thanks to the affinity of the Er:YAG laser wavelength (2940 nm) to water (absorption peak=3000 nm) and hydroxyapatite (absorption peak 2800 nm), laser technology allows for efficient ablation of hard dental tissues without direct side effects being imposed to the pulp and the surrounding tissues.
Thus, the aim of this *in vitro* study was to evaluate the microtensile bond strength of different adhesive and protocols on dentine prepared with bur and Er:YAG laser.
METHODS: 40 molar crowns were flattened and standardized smear layer was created. Samples were divided in two groups according to the dentin cutting technique A) Er-YAG laser and B) bur. Every group was then divided in subgroups according to the adhesive technique:
— SG1: Dentin etching for 15sec followed by Universal adhesive application (AllBond Universal, Bisco)
— SG2: Universal adhesive application (AllBond Universal, Bisco)
— SG3: 2-step self-etch adhesive application (Clearfil SEBond 2, Kuraray)
— SG4: Etching followed by 3-step etch-and-rinse adhesive application (Optibond FL, Kerr)
Adhesives were all cured for 60sec at 1400mW with a multiLed lamp and 4mm of resin composite was applied on the dentin substrate. Specimens were serially sectioned to obtain 1-mm-thick beams in accordance with μTBS test technique. Beams were stressed to failure after 7 days and 6 months of storage in artificial buffer. Further, 3 more samples for each subgroup were prepared for nano-leakage analyses.
Data were statistically analyzed with a three-way ANOVA and Tukey's post hoc test ($p<0.05$).
RESULTS: Three-way ANOVA detected a significant difference for the treatment, adhesive protocol and aging variables ($p<0.05$).
CONCLUSIONS: Bond strength obtained for samples prepared with bur was generally higher when compared with that obtained after Er:YAG treatment. Total-etch systems demonstrated better performance when used in combination with bur. However, the results of the study suggest that self-etch adhesives reached similar μTBS values in laser and bur treated dentin. Regardless of surface treatment and adhesive system application aging affected μTBS results, showing a decrease over time.
Further studies are needed to clarify the influence of dentin treatment in combination with different adhesive protocols.

Influence of synthetic hydroxyapatite application on fiber posts bond strength and durability

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BACKGROUND: Nowadays, adhesive systems that exploit chemical adhesion to bind with tooth have been introduced. These adhesive systems, so called self-etch, creates micromechanical interlocking along with a chemical interaction of functional monomers with calcium. A recent study conducted by Yoshihara *et al*. (2011a,b) showed that self-etch adhesive systems which contain the phosphoric-acid ester functional monomer 10-MDP (10-methacryloyloxi-decyl-dihydrogen-phosphate) create a nano-layered structure at the adhesive-dentin interface based on 10-MDP – calcium salts binding, having been associated with outstanding bond integrity and clinical longevity. Recently, a calcium-phosphate containing material composed by tetracalcium phosphate [TTCP; Ca4(PO4)2O] and dicalcium phosphate anhydrous (DCPA; CaHPO4) has been introduced for dental hypersensitivity treatment. Because of the well known difficulties in smear layer removal along post-space walls during fiber post luting procedures, the aim of this *in vitro* study was evaluate the effect of Calcium-Phosphate minerals application on fiber post bond strength and durability.
METHODS: 64 single root teeth, extracted for periodontal reasons, were endodontically treated and a 10 mm post space was prepared in each sample. Specimens were randomly assigned to four groups (n=16) according to the fiber post luting procedures. Group 1: EDTA10% + self-adhesive cement (Panavia SA, Kuraray); Group 2: EDTA 10% + TeethMate Desensitiser (Kuraray, Japan) + self-adhesive cement (Panavia SA, Kuraray) Group 3: All Bond Universal (Bisco, USA) + Core-X Flow (Dentsply, Germany); Group 4: All Bond Universal (Bisco) + TeethMate Desensitiser (Kuraray) + Core-X Flow (Dentsply). Teeth were cut in 1 mm thick slices; sample were pushed until failure with a Universal Machine after 24 hours and 12 months of storage in artificial buffer at 37°C. Results were statistically analyzed with one-way ANOVA test ($p<0.05$).
RESULTS: Statistical analysis showed a significant difference in bond strength between Group 1 and Group 2 (p=0,0001) and between Group 3 and Group 4 (p=0,001). Hydroxyapatite application significantly helps to prevent bond strength decrease overtime (p=0.0001), independently of the adhesive system employed to lute the fiber post
CONCLUSIONS: Within the limitations of an *in vitro* study, we can affirm that the creation of calcium-phosphate precipitation over dentinal walls could improve and stabilize bond strength of fiber post luted with 10 MDP-containing adhesive systems to radicular dentine. Further *in vitro* and *in vivo* studies are necessary to confirm these findings.

Influence of curing time on conversion degree, microhardness and bond strength of dual-cement polymerized through zirconia

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BACKGROUND: Nowadays monolithic zirconia restorations are becoming increasingly common. Dual-polymerizing cements have been recommended for cementation because they combine the light-activated polymerization with the chemical curing mode. The self-curing components can compensate the problem of the light attenuation that results by curing through an indirect restoration. Anyway the light attenuation through a restorative material may affects the degree of conversion (DC) and the hardness of dual-cured cements. A proper DC of the resin cement is essential to reach sufficient mechanical and adhesive properties and, therefore, to ensure a long-lasting restoration. Moreover, a reduced DC of the resin cement can lead to a lower bond strength to dentin and even to a reduced bond strength between resin cement and

ceramic material, which can compromise the longevity of an indirect restoration.
The aim of this *in vitro* study was to assess the conversion degree (DC), the micro-hardness (MH) and the bond strength of two dual-curing resin cements employed under zirconia irradiated with three different time protocols.
METHODS: 48 zirconia samples were prepared and divided into two groups (n=24) according to the cement employed: 1) Rely-X Ultimate (3M, USA); 2) Panavia SA (Kuraray, Japan). Each group was further divided into 3 subgroups (n=8) according to the irradiation time: a) no light; b) 20 sec; c) 120 sec. Light curing was performed 60 sec after the sample was placed on the diamond support of a FT-IR spectrophotometer of new generation (Thermo Scientific Nicolet IS10) with a high power multiLED lamp (Valo-Ultradent). Final DC% were calculated after 10 minutes. Once the conversion degree has been established, a Vickers Test with a micro-indentometer was performed. The same protocol was used to cement 36 composite cylinders on 18 zirconia blocks in order to subject them to the shear bond strength test with an Universal machine. ANOVA and Bonferroni tests were performed to find differences between DC%, MH and bond strength to zirconia of the two cements.
RESULTS: One-way Anova showed that the two cements reached higher DC% in subgroup b) and c) ($p<0.05$). Further, Rely-X showed higher DC% than Panavia 2.0 only after 20sec curing ($p<0.05$). As concern MH, Anova test showed that an increase in curing time is able to improve MH significantly both for Rely-X and Panavia2.0. The bond strength was not affected by the irradiation time for Panavia 2.0. On the contrary, Rely-X showed greater values when no light curing was performed.
CONCLUSIONS: Light-curing protocol affect the DC% and the MH of dual cements polymerized through zirconia. The bond strength was influenced by the curing time protocol only for Rely-X.

Stamp technique. A direct restorative procedure in ICDAS-4 carious lesions

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BACKGROUND: In non cavitated caries, extended to enamel and dentine, with almost intact occlusal surface, and VistaCam iX (Durr Dental, Bietigheim-Bissingen, Germany) fluorescence diagnostic evidence, it's possible to achieve the original occlusal topography reproduction, capturing the anatomy with a custom stamp.
METHODS: The Vista Cam iX fluorescence camera is a novel dental diagnostic tool for quantitative assessment of dental caries with high specificity for carious lesions detection. ICDAS-II code 4 (non-cavitated lesion extending into dentine detected as an undermining shadow) corresponding to VistaCam measurements specific values for enamel and/or dentin caries. A step-by-step sequence of operative treatment is presented in a case of ICDAS 4 caries on a permanent molar.
RESULTS: This technique uses disposable material as index material (i.e temporary resin, flow composite, light Curing Dental Dam, transparent siliconic material), microbrush and teflon tape to recreate the original occlusal topography.
CONCLUSIONS: If a non cavitated ICDAS 4 occlusal cavity is present, a perfect anatomy reconstruction is easily achieved, with time saving and optimized functional outcome, using a replica procedure of the original tooth surface.

Vibrational and physical properties of bulk-fill composites: *in vitro* evaluations

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BACKGROUND: The objectives of this study were to measure degree of conversion (DC) and micromechanical properties (Vickers Hardness, VH) of five bulk-fill composites polymerized by two different light-curing lamps.
METHODS: Filtek™ Bulk Fill Posterior Restorative (3M, ESPE), Fill Up™ (Coltène), Sonic Fill™ (Kerr Corporation), Sonic Fill 2 ™ (Kerr Corporation) and SureFil® SDR® (Dentsplay) were investigated.
Two specimens for each composite (0,4 cm x 1 cm) were prepared using Teflon molds and Mylar strips, and then polymerized by different light-curing lamps: Demi Ultra (Kerr Corporation) and Elipar (3M ESPE), in standard power conditions.
DC and VH were evaluated by Raman spectroscopy and by micro-hardness tester, respectively.
DC and VH measurements of the bulk-fill composites were performed on top and bottom of specimens at t0 (immediately after curing), and, after 24h, only on the bottom sides. Similarly, measurements of VH were achieved immediately after curing (t0) and after 24h on the irradiated surface of the specimens.
RESULTS: In specimens cured by Elipar lamp, top t0 DC values ranged between 85,86% and 70,40% and DC values at 0,4 cm ranged between 84,64% and 65,03%: SureFil® SDR® had greater top t0 DC and bottom t0 DC than other materials; SonicFill™ had lowest top t0 DC and Fill Up™ had the lowest bottom t0 DC.
In specimens cured by Demi Ultra lamp, top t0 DC values ranged between 90,54% and 82,30% and DCs values at 0,4 cm ranged between 81,52% and 65,45%: Fill Up™ and Sonic Fill 2™ had greater top t0 DC than other materials; Filtek™ Bulk Fill Posterior Restorative and SonicFill™ had greatest bottom t0 DC.
All bottom t0 DC values increased after 24h. SureFil® SDR® and Fill Up™ recorded lower VHs than other materials and all VHs values increased after 24h.
CONCLUSIONS: The light-curing lamps induced higher top DC values of the bulk-fill composites with respect to bottom values. Demi Ultra seemed to be more effective on top than Elipar. Fill Up™ and SonicFill™ cured by Demi Ultra had the highest top t0 DC of all the specimens, while SureFil® SDR®, cured by Elipar and Filtek™ Bulk Fill Posterior Restorative cured by Demi Ultra, had the highest bottom t0 DC. SureFil® SDR® cured by Elipar demonstrated similar uniform curing through the bulk increment.
All values of DC and VH increased over time, until 24h. Sonic Fill™ and Sonic Fill 2 ™ had the highest VH values than other materials.
The limited DC values of bulk-fill composites at 0,4 cm suggest that more attention needs to be paid to ensure proper curing in deep cavities and to select the appropriate curing lamp for the clinical practice.

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The fragment reattachment technique in coronal tooth fracture. A retrospective analysis

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BACKGROUND: The aim of this research is analyse a minimal invasive no preparation direct fragment reattachment technique for coronal tooth fracture.A three year follow up was performed to evaluate the long term results. This technique, combining the minimal invasivity of a no preparation technique to the good esthetical outcome of the direct reattachment technique, mix aesthetic and function along with a reduced operational time.
METHODS: The 3-years follow-up included 9 patients (5 males, 4 females) that referred to our Department for coronal fracture. For all patients the fragment was available and intact. The Authors illustrate all the technical steps along with adhesive procedure used. The fractured portion, evaluated under magnification as sufficiently intact and with adequate margins and structure, was disinfected with 0,2% chlorhexidine and temporarily stored in physiologic solution to obtain the hydration. Vitality and mobility tests were performed. A local anaesthesia was performed and after the rubber dam positioning, both the tooth and the fragment surface were etched with 37% phosphoric acid gel, rinsed after 30 seconds and infiltrated by the adhesive system, composed by a separate application of priming and bonding agents (Scotchbond MP, 3M ESPE). Under magnification (4X) the fragment was positioned in it's own tooth site, and photo-polymerized both the vestibular and lingual aspects using a LED light (T-LED dna Anthos) with increasing light intensity. Then the restored tooth was finished and polished.
RESULTS: In the group analysed the dental trauma was related in 22% of case to a maxilla-facial trauma. The coronal fractured tooth sample was composed by incisor (Superior: 6 centrals, 2 laterals; Inferior: 1 lateral). In 55.5% of the patients, dentinal sensibility was referred, associated, in one case, with slight pulp exposure. The 33.3% of trauma was totally asymptomatic. Within one year from the trauma only one case of fragment detachment was reported; in the same case (11,1%) dentinal sensibility was present, with other teeth totally asymptomatic. At 1-year follow-up, a new case of fragment detachment was recorded but detachment occurred after a new trauma.In 11.1% of cases marginal leakage with infiltration, associated to marginal discoloration was recorded. All teeth responded normally to vitality tests and no endodontic lesion was recorded. The statistical analysis underlined the good performances of the no prep direct fragment reattachment technique. After 36 months in 22% of cases was observed the detachment of the bonded fragment and in 11% of patients were recorded compliances.
CONCLUSIONS: The no prep direct fragment reattachment technique compared to the direct restoration technique, besides its aesthetic qualities, is faster to perform and when compared to the prosthetic techniques appears to be more conservative, can produce immediate results without the need of various laboratory procedures and generate better patient compliance. Our research shows how a small pulp exposure is compatible with direct fragment reattachment technique that can preserve the tooth vitality eliminating the necessity of an endodontic therapy. Our clinical experience shows how the ultra-conservative procedure used is fast, easy and offers a long term predictability; it also allows good functional and aesthetic outcomes.

Degree of cure of different bulk fill composites cured by polywave or monowave led light-curing units

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BACKGROUND: To determine and compare the degree of conversion (DC), of different bulk-fill resin composites cured by polywave or monowave LED light-curing units.
One of the main problem connected with photo-polymerized resin composites is the depth of cure limitation and the possibility of insufficient monomer conversion at depth. Since photo-polymerized resin composites were introduced, the degree of conversion was acknowledged as vital to the clinical success of these materials. Photo-cured resin composites polymerize only to a certain depth. This depends on the penetration of visible light through the bulk of the material. It has been shown that the insufficient polymerization may lead to a decrease in the physical/mechanical and biological properties of resin composites. When the cavity is large, incremental layering can be used. This technique is used to avoid the depth of cure limitation and to reduce polymerization shrinkage effects. Insufficient polymerization may result in the degradation of the resin composite, poor physical properties and adverse biological reactions owing to the leaching of the monomeric components of the unset resin composite. There are various disadvantages associated with incremental techniques, such as incorporating voids or contamination between composite layers, failures in bonding between layers, placement difficulty owing to limited access in small cavities and an extended treatment time for placement of layers and their polymerization. To overcome these disadvantages "bulk-fill" composites have been introduced. They have shown reduced cuspal deflection when compared with a conventional resin composite filled in an oblique incremental layering technique. Also, when marginal integrity was evaluated, bulk-fill composites performed well. As a result of reduced light irradiance passing through resin composites, the degree of conversion decreases with increasing depth. The aim of this study was to compare different composite resins in terms of DC using a monowave or polywave light curing units.
METHODS: Two different bulk-fill composite materials, in particular Tetric Evo Ceram Bulk-Fill in shade A3 (Ivoclar Vivadent) and Filtek Bulk-Fill in shade A3 (3M Espe) were examined. Six specimens for each bulk-fill composite material were prepared in stainless steel molds and divided in 4 groups. Half of the samples were cured using a polywave LED (bluephase, Ivoclar Vivadent) and the other half using a monowave LED (Valo, Ultradent, cordless power standard 1,000 mW/cm²). The stainless steel molds contained a slot of dimensions of 4 mm high molds and 3mm diameter and a top plate. The mold was overfilled with composite, and a Mylarstrip was placed on top of the material with the top plate sub-sequently pressed into position, followed by the scraping of the excess material from the entrance of the mold. The mold will be held together in a clamp. The molds will be

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irradiated from one end applying the visible light curing unit for 20 sec. All specimens were be stored dry at 37 °C for 24 h prior to measurement. The DC was determined using an FTIR spectrometer.
RESULTS: Independently of the composite bulk-fill resin used, samples cured with the polywave LED (bluephase, Ivoclar Vivadent) showed a significant increase ($p<0.05$) in DC. No significant difference in terms of DC was found between Tetric Evo Ceram Bulk-Fill and Filtek Bulk-Fill when cured with the same light curing unit.
CONCLUSIONS: The use of polywave LED significantly improves the DC of the tested materials improving monomer to polymer conversion.

Clinical solutions of unaesthetic anterior teeth with different restoration techniques: a review

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BACKGROUND: the goal of this manuscript is to review the existing literature in regards to esthetics options to restore anterior teeth.
The field of esthetic dentistry has expanded considerably in the last two decades. Various restorative materials and application techniques have been developed to achieve optimal aesthetics. The aesthetics of anterior restorations and the health of the surrounding tissues are primary determinants of the successful outcome of a clinical procedure. A variety of treatment options are available to restore fractured, misaligned and malformed or hypoplastic anterior teeth. For many years, full-coverage crowns were indicated in this situation, but the minimal invasive treatment is undoubtedly the most valuable approach to increasing the longevity of natural teeth in esthetic restorations and also in the overall satisfaction of the people. Today, the tendency is to keep any tooth, even if only a small piece remains. Owing to difficulty in obtaining good retention, there were few attempts to reattach fractured fragments of the teeth and reconstructing the broken down dentition, bleaching, bonding, and veneering have opened the doors to a wide variety of elective dental treatments to enhance appearance, often reversing the visual signs of aging.
Study design: A pubmed literature search has been performed and all relevant studies were assessed from 2006 and 2016, respectively were searched electronically with key words.
RESULTS: this review shows that all treatment modalities presented very good esthetic and functional results of direct or indirect restoration that can withstand the adverse conditions of the oral environment.
DISCUSSION: The objectives of esthetic rehabilitation must be to provide the maximum improvements in esthetics with the minimum trauma to the dentition. Dentists and patients are fortunate at this particular time of interest in esthetic dentistry, since there are many materials and procedures available to patients and more are being developed all the time. If there are esthetic concerns, with mild pitting or defect in the structure, microabrasion, direct or indirect composite or ceramic veneers, may be bonded to the affected tooth. For permanent anterior teeth, composite or porcelain veneers or porcelain crowns may be used.
CONCLUSIONS: Fortunately, the Progress in adhesive technologies has made possible a variety of more conservative restoration techniques. Nowadays, composite resins are considered as an economical and aesthetic alternative to other direct and indirect restorative materials. With new composite systems that equal or better than most porcelain systems, great optical properties and esthetics can be achieved with natural tooth structures.

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ENDODONZIA

Apical surgery *vs.* apical surgery with simultaneous orthograde retreatment: a prospective cohort clinical study

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BACKGROUND: This prospective clinical study analyzed 2-year outcome of apical surgery filled with MTA Root-end filling material by means of clinical and radiographic criteria. Conventional apical surgery *versus* apical surgery with simultaneous orthograde retreatment in teeth affected by periapical lesions were compared. As a control group orthograde retreatment in previously treated teeth with periapical lesions was established.

METHODS: The study included 72 teeth (patients N=60): 21 cases with Apical Surgery (Group AS), 13 cases with Apical Surgery with simultaneous orthograde retreatment (Group ASOR) and 38 cases with orthograde retreatment (Group OR) as control group. Teeth were surgically prepared with retrotips and filled with a calcium silicate MTA cement. The inclusion criteria were previous root canal treatment, periodontal lesion of strictly endodontic origine with or without clinical signs or symptoms such as fistula, swelling or sinus tract, compliant patients without any compromised medical history and use of bisphosphonates. The exclusion criteria were class II mobility or greater, horizontal or vertical fractures, perforations, apical cracks, local anatomical limits and inadequate periodontal support. The teeth were examined every 6 months for 2 years and classified as complete (without any symptoms and PAI≤ 2), incomplete (without any symptoms and PAI= 3 or functional) and unsatisfactory (with symtomps or PAI≥4 and not functional) healing on the basis of radiographic and clinical criteria. The statistical analysis was made.

RESULTS: After 6-9 months, 4 teeth (2 from Group AS, 1 from Group ASOR and 1 from Group OR) were extracted for root fracture and excluded from the study. At 2 years the overall rate of complete healing in Group AS was 79% (N=15), incomplete 16% (N=3) and unsatisfactory 5% (N=1). In Group ASOR complete healing was 75% (N=9), incomplete 17% (N=2) and unsatisfactory 8% (N=1). The control group presented 65% (N=24) complete, 16% (N=6) incomplete and 19% (N=7) unsatisfactory healing.

CONCLUSIONS: Both surgical techniques revealed a high percentage of healing similar to that reported by previous studies. After both apical surgery techniques, teeth were associated to a higher risk of root fracture compared to teeth underwent orthograde retreatment.

Dentinal cracks formation during shaping of root canals with HyFlex EDM instruments, Reciproc, WaveOne, One Shape and F6 Skytaper

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BACKGROUND: Endodontic instruments can generate the formation of dentinal cracks during the root canal shaping procedures. To date, few data exist on the formation of cracks after instrumentation with single-file techniques. The aim of this study, was to compare the incidence of dentinal cracks in teeth instrumented with five different single-file techniques that allows the root canals to be shaped with a unique endodontic instrument.

METHODS: Seventy-two mandibular incisors with mature apex and straight root canals (curvature<5 °) (n= 12 per group) were selected. The teeth were decoronated. Sixty of these were instrumented using different types of single-file systems: Reciproc R25 (VDW, Munich, Germany), WaveOne Primary (Dentsply Maillefer, Ballaigues, Switzerland), OneShape (OS, Micro Mega, Besançon, France), HyFlex EDM OneFile (Coltene/Whaledent AG, Altstatten, Switzerland) and F6 Skytaper (Brasseler USA, Savannah, GA). The remaining twelve, have formed the control group. To ensure a good standardization of the study and homogeneity of the groups, periapical radiographs were performed, with the vestibular-lingual and mesial-distal projections in order to include teeth with only one canal. Moreover, dimensions of teeth at 9 mm from the apex were recorded and used to allocate the teeth in homogeneous test groups. All roots were sectioned horizontally at 3, 6 and 9 mm from the apex. The cracks of the sections have been investigated with a stereomicroscope. A chi-square test was performed to analyze the data obtained.

RESULTS: The control group did not presents cracks and the difference between this group and the experimental one was significant (P<0.001). The number of cracks were in the apical third of the root canal was higher than in the middle and coronal thirds (P<0.05). The HyFlex EDM OneFile produced fewer cracks than other file systems (P<0.01). There was no significant difference in the formation of microcracks, among instruments in conventional Nickel-Titanium used in continuous rotation or M-wire activated by reciprocating motion (P>0.05).

CONCLUSIONS: All file systems tested created dentinal microfractures. The incidence of cracks was significantly less in the root prepared with the HyFlex EDM files in continuous rotation. The increased flexibility of nickel-titanium HyFlex EDM, produces a lower number of microcracks may have promoted the results of this research. Until now, no study has investigated the incidence of microcraks after instrumentation

with CM or HyFlex EDM files. Other studies, in agreement with ours, have reported a similar incidence of microcracks (P>0.05) for several rotating or reciprocating NiTi conventional techniques or M-wire.

Micro-computed tomography evaluation of shaping ability of three nickel titanium instrument systems on root canal geometry

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BACKGROUND: The aim of this study is to compare and evaluate the shaping ability of three different nickel titanium instrument systems with different motions: Reciproc-Dentsply, WaveOne-Dentsply and BT-Race-FKG using micro-computed tomography.
METHODS: A total of thirty-six mandibular molars with two separate mesial canals and severe angles of curvature were selected. Canals were randomly assigned to one of three experimental groups: group 1, reciprocating instrumentation with Reciproc, group 2, reciprocating with the WaveOne and group 3 with BT-Race. Canals were scanned before and after root canal preparation, using a micro-computed tomography system with a resolution of 20 μm. The following parameters were assessed: changes in dentine volume, percentage of unshaped canal walls, degree of canal transportation and centering ability. Data were analysed using analysis of variance to explore a significant difference in mean dentine removal, mean percentage of non-instrumented canals, mean degree of canal transportation and centering ratio between groups in the apical third and along the entire root canal. The level of significance was set at $\alpha = 0.05$.
RESULTS: Preoperatively, there were no differences regarding root canal curvature and volume between experimental groups (P>0.05). Overall instrumentation led to enlarged canal shapes with no evidence of preparation errors. None of the three groups was able to shape completely the root canal system. Mean dentine removal along the entire canal and in the apical third was significantly higher with Reciproc when compared with BT-Race and WaveOne (P = 0.013).
CONCLUSIONS: There were no differences in the apical third. None of the NiTi systems was able to instrument completely the entire root canal.

Confocal scanner laser evaluation of bactericidal effect of chitosan nanodroplets loaded with benzalkonium chloride.

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BACKGROUND: Experimental nanodroplets (NDs) with chitosan shell have been recently proposed. The objective of this study was to evaluate the antibacterial efficacy and depth of penetration into dentinal tubules of a solution of NDs loaded with Benzalkonium Chloride (BAK).
METHODS: Seventy-two human single-root teeth with fully formed apex were used. Cylindrical root dentin blocks were longitudinally sectioned and enlarged to a size #110 with a Gates Glidden drill #4. After ethylene oxide sterilization, root canals were infected with a culture of Enterococcus faecalis to match the turbidity of 3 x 10^7 colony forming units/mL (CFU/mL) and further incubated for three weeks to allow penetration into dentinal tubules. Specimens were randomly assigned to 3 experimental groups (n=20) plus positive (n=6) and negative (n=6) controls. In group NDs-BAK-3 irrigation was performed with 2mL of NDs solution loaded with BAK for 3 minutes, in groups NaOCl-3 with 2 mL of 5% NaOCl for 3 minutes, in group CHX-3 with 2 mL of 2% chlorhexidine (CHX) for 3 minutes. Specimens were rinsed and vertically fractured. Confocal laser scanning microscopy (CLSM) and viability staining (Live/Dead BacLight Viability Stain - Molecular Probes, Eugene, OR) were used to quantitatively analyze the proportions of dead and live bacteria. The volume ratio of red fluorescence (Dead) was calculated in three-dimensional reconstructions and superimposition of images (merge) (imagej NIH, Bethesda, MD). Differences among groups were analyzed with Kruskall-Wallis and post-hoc Dunn's test ($p<0.05$). Mean penetration depth was recorded and differences were analyzed with normality test Kolmogorov-Smirnov ($p<0.05$)
RESULTS: Ratio of red fluorescence over the whole green/red fluorescence In NDs-BAK-3, NaClO-3 and CHX-3 groups, was 68,78%, 91,23% and 65,14% respectively. Statistically significance was reported for NaClO group ($p<0.05$). The mean depth of efficacy was respectively: NDs-BAK 325,25 μm ±134,52, NaOCl 273,36 μm ± 181,49 and CHX 246,78μm ±75,88.
CONCLUSIONS: There is no statistical difference among the groups concerning penetration, anyways there is more penetration in BAK group on the limit of statistical significance. NaOCl is more effective in antimicrobial effect but nanodroplets with BAK have similar effect of CHX.
Therefore Nanodroplets charged with BAK,although they aren't at the same level of NaOCl regarding the antimicrobial efficiency, are similar to CHX and, moreover they have a long lasting action that we are further investigating.

Permanence of smear layer and debris on the canal walls of roots treated with two shaping systems and irrigation protocols: a scanning electron microscopy study

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BACKGROUND: Mtwo rotary files have been present on the market for more than ten years and their cutting efficiency is well documented in literature. Conversely, Alphakite rotary files have been introduced more recently and are characterized by a rhomboid-like cross-section with negative rake angles. To the best of our knowledge, there are no studies assessing the cutting action of these latter instruments, which is likely to be less effective than that of systems with positive rake angles. It can be hypothesized that Mtwo and Alphakite instruments

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may produce different amounts of smear layer and debris. Moreover, the influence of the irrigation protocol is known to play a major role in the removal of smear layer and debris. The aim of the present work is to assess the permanence of smear layer and debris on the walls of canals instrumented with two Ni-Ti rotary systems associated with two irrigation protocols.
METHODS: Forty single-rooted teeth were selected from a pool of freshly extracted teeth. Making use of a cutting disc, the crowns were removed in order to obtain 12 mm long roots. Subsequently, two grooves were cut parallel to the long axis of the root on its buccal and lingual faces keeping sufficient distance from the root canal. Specimens were randomly assigned to four groups of ten elements each according to the shaping and irrigation protocols: G1, Mtwo instrumentation with 2.4% sodium hypochlorite; G2, the same as in G1 with a final rinse with 17% EDTA solution; G3, Alphakite instrumentation with 2.4% sodium hypochlorite; G4, the same as in G3 with a final rinse with 17% EDTA solution. The roots were split, sputter-coated with gold and observed with a scanning electron microscope. Smear layer and debris were scored according to a previously described scale by taking ten microphotographs in the coronal, middle and apical thirds of the canal. For each canal third, the median of the scores given to the relative microphotographs constituted the statistical unit. Data underwent statistical analysis with a Kruskal-Wallis test and Mann-Whitney U test with Bonferroni correction for pairwise comparisons.
RESULTS: In all groups, the apical third of the canal was found to be poorly cleaned. The statistical analysis pointed out significant differences in smear layer and debris scores among groups in the middle and coronal thirds. Both shaping with Mtwo instruments and performing a final irrigation with EDTA were generally associated with better removal of smear layer. As a general trend, small amounts of debris were observed in all groups.
CONCLUSIONS: Under the condition of the present study, the combination of instrumentation with Mtwo rotary files, rinses with 2.4% sodium hypochlorite and a final irrigation with EDTA led to the lowest amounts of smear layer in the coronal and middle third of the canal. The presence of debris was similarly scarce in all tested groups. Even if the clinical relevance of the production and permanence of smear layer and debris inside the root canal system has not been fully understood, it seems reasonable to speculate that the greater their amounts, the higher is the risk of reinfection. In light of the above, the findings of the present study warrant further investigation in the clinical setting.

One-year randomized clinical trial on the effectiveness of two integrated systems for the treatment of maxillary central incisors with periapical lesion

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BACKGROUND: The aim of the present study is to assess the one-year success rate of root canal treatments performed with two integrated shaping and filling systems of untreated maxillary central incisors with chronic periapical pathosis.

METHODS: The present randomised trial enrolled 60 adult patients needing a primary endodontic treatment on a maxillary central incisor with a chronic periapical lesion smaller than 5 mm in diameter. By following a computer-generated simple randomisation schedule, the patients were allocated to two treatment groups: G1 (n=30), Revo-S/One Step Obturator; G2 (n=30) GTX/GTX Obturator. A single experienced operator performed in a single session all root canal treatments. Tenderness to palpation of the buccal sulcus and percussion of the tooth was registered before the treatment, after six and twelve months. At the recalls, two blind examiners scored the radiographic healing according to a previously described scale. A Mann-Whitney test and χ^2 test served to verify the absence of statistically significant differences in terms of baseline clinical parameters between the two groups (age, apical gauging, tenderness to percussion and palpation). The radiographic healing scores were compared between groups with a Mann-Whitney test and between time points with a Wilcoxon test. The clinical data gathered at the re-evaluation visits in the two groups were compared with a χ^2 test, while the comparison between time points was carried out with a Mc Nemar test ($p<0.05$).
RESULTS: All the enrolled patients attended recalls. There were no differences in baseline parameters between the groups, which were regarded comparable. At the six-month recall, approximately one half of the patients were classified as radiographically healed irrespective of the treatment group. After one year, significant improvements were detected, since the assessment revealed total healing, partial healing and failure in 80.0%, 16.7% and 3.3% of cases in G1 and in 73.3%, 20.0% and 6.7% of cases in G2. The difference in radiographic scores between the groups was not statistically significant at the two assessment time points ($p>0.05$). Patients reporting symptoms after the treatment were a minority, ranging from 3.3% to 10%. On average, the prevalence of tenderness to percussion and palpation symptoms did not change between the baseline and re-evaluations and was similar in the two groups ($p>0.05$).
CONCLUSIONS: The two tested integrated endodontic systems allowed for high and comparable one-year success rate for the treatment of central incisors with periapical pathosis. About a fifth of the enrolled patients were still scored as incompletely healed and should be further followed-up to monitor the possible symptoms onset or radiological complications.

Comparision of two different shaping technique: ProTaper Next and WaveOne System in simuled J-shape canals

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BACKGROUND: The aim of this study was to highlights possible differences in the shaping centering abilities of ProTaper Next (PTN; Dentsply Maillefer, Ballaigues, Switzerland), and WaveOne systems (Dentsply Maillefer) on J-shape endo training blocks.
METHODS: Forty ISO 15, 0.02 taper J-shape canals in endo training blocks were assigned in two groups (n=20 for each group). For each block the initial working length (WL) was evaluated with a 10 K-files (Dentsply Maillefer), so the glide

path was created with PathFile 1, 2 and 3 (Dentsply Maillefer) at the WL After that, simulated canals in the group 1 were shaped with X1and X2 at WL; while in group 2 it was used single-file WaveOne primary in reciprocating motion. Each block was photographed before and after the shaping and subsequently the images were superimposed with Gimp 2.8, the images thus obtained were loaded on Autocad 2013 (Autodesk Inc, San Rafael, USA), so the centering and shaping abilities were recorded at 9 different points levels from the apex. Data were analyzed using GraphPad Prism software 6.00 (GraphPad Prism Software, San Diego, CA,USA) by an expert in statistical analysis. Presence of normal distribution was assessed by Kolmogorov-Smirnoff test and probability plot graph. Statistical significance between different groups was determined with unpaired T test, a level of $P<0,05$ as statistically significant.
RESULTS: The results showed a lower amount of resin removed in shaped blocks with ProTaper next to each level. In addition, the shaped blocks with the Next were most centered in the levels 8 and 9.
CONCLUSIONS: The results showed that there is a reduction in the volume of shaping almost every level using the ProTaper next who use a movement defined alternante compared to WaveOne method, that use a reciprocating movement. The reduction in the shaping ability may be explained by a reduction of the taper of the ProTaper Next X2 instrument, that is manufacturer with a taper of 6% at tip level compared with WaveOne Primary which has a taper 8% in tip. the centering ability are also comparable for movements alternante and reciprocating. Looking at this preliminary results, it is possible to conclude that the shaping procedures with ProTaper Next X2 are more conservative in preparing the canal, and are slightly more centering if compared to the shaping procedures with WaveOne Primary.

Efficacy of three different irrigation systems on calcium hydroxide removal from round and oval canals: a scanning electron microscopy study

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BACKGROUND: To evaluate by means of scanning electron microscopy the effectiveness of different irrigation systems in the removal of calcium hydroxide from round and oval canals.
METHODS: 76 extracted single-rooted teeth were selected. Criteria for tooth selection included one single root canal; no visible root caries, fractures, or cracks; and a completely formed apex under light microscope examination (10x). Radiographs in bucco-lingual and mesio-distal direction were taken to calculate the ratio between canal diameters measured in the two projections. If ratio was less than or equal to 2.5, the canal was considered round, otherwise was considered oval. According to ratio and root length teeth were divided into 8 groups, with 2 control samples. After access cavity preparation, working length was determined 1 mm short of the length where the file extruded the apical foramen. To simulate clinical conditions the apex was sealed with glue. Glide path and canal instrumentation were performed with Path File size 13, 16, 19 and ProTaper Universal rotary system in a crown-down sequence to size 40 at the WL. A size 25 lentulo spiral was used to fill teeth with calcium hydroxide. Radiographs were taken to confirm the complete filling of the canals. Samples were kept in an incubator at 37° C for a week. Canals were cleaned with Irrisafe, Endovac, Xp Endo Finisher and conventional endodontic needle irrigation. Teeth were split along their long axis in a bucco-lingual direction into 2 halves. For scanning electron microscopic analysis, tooth halves were fixed on aluminum stubs, gold sputter coated and observed with a scanning electron microscope. Apical, middle, and coronal thirds were established by dividing the roots according to their length. The center of each third was examined at 500x magnification. Images were taken using backscattered mode and analyzed with a digital processing software (ImageJ v. 1.49, National Institutes of Health, NIH, USA) for a quantitative analysis. The efficacy of the irrigation system was evaluated calculating the amount of calcium hydroxide left inside the canal, expressed as percentage of the total area of the image. To compare the 8 groups, the results were statistically analyzed using the analysis of variance test (ANOVA) with Bonferroni test or T-test ($P<0.05$).
RESULTS: No statistically significant differences were observed among different thirds for each group. Comparing canal shape for each instrument, significant differences were found only for Endovac, where coronal and middle thirds of oval canals were cleaner than round ones.
Analyzing the whole canal, significant difference can be found between irrigation systems and conventional irrigation in the oval ones. In round canals Irrisafe and Xp Endo Finisher are more effective compared to conventional irrigation, but only Irrisafe is more effective compared to Endovac. No statistically significant differences can be observed between Endovac and conventional irrigation.
CONCLUSIONS: None of the investigated techniques removed the calcium hydroxide completely. However, the results demonstrate greater removal of calcium hydroxide if the irrigant solutions are activated, compared with conventional endodontic irrigation. Therefore, it is recommended to activate the irrigant solutions to enhance chemical debridement of the root canal system.

Confocal scanner laser evaluation of bactericidal effect of different antibiotic mixtures used for dental pulp regeneration

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BACKGROUND: The objective was to evaluate the antibacterial efficacy and depth of action into dentinal tubules of TRICLARITRO mixture compared with TRIMIX mixture, used now for dental pulp regeneration procedures, in an ex-vivo experiment.
METHODS: Seventy-two human teeth with fully formed apex were used. Cylindrical root dentine blocks were sectioned and enlarged to a size #110 with a Gates Glidden drill #4. After ethylene oxide sterilization, root canals were infected with Enterococcus faecalis to match the turbidity of 3 x 10^7 colony (CFU/mL) and incubated for 3 weeks to allow penetration

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into dentinal tubules. Specimens were randomly assigned to 3 experimental groups (n=20) plus positive (n=6) and negative (n=6) controls. In group A specimes were exposed to TRIMIX (ciprofloxacine, metronidazole and minocycline), in group B to BIMIX (ciprofloxacine and metronidazole) and in group C to TRICLARITRO (ciprofloxacine, metronidazole and clarithromycin) antibiotic pastes. Exposure was prolonged for 3 weeks. Each experimental group was divided in two subgroups of different antibiotic paste formulations added to macrogol or ialuronic acid. In group D (positive control group) infected specimens were not exposed to antibiotic pastes while in group E (negative control group) specimens were not infected after sterilization. After 3 weeks all specimens were vertically fractured. Confocal laser scanning microscopy (CLSM) and viability staining (Live/Dead BacLight Viability Stain - Molecular Probes, Eugene, OR) were used to quantitatively analyze the ratio of dead/live bacteria into dentine tubules. Volume ratio of red fluorescence (Dead) was calculated in three-dimensional reconstructions. Differences among groups were analyzed with Kruskall-Wallis and post-hoc Dunn's test ($p<0.05$). Mean penetration depth of action was recorded and differences were analyzed with one-way ANOVA and post-hoc Bonferroni's test ($p<0.05$).
RESULTS: Ratio of red fluorescence over total green/red signal was:
— in TRICLARITRO group 57%±6, respectively 64% for TRICLARITRO with IALURONIC ACID (HA) and 51% for TRICLARITRO with macrogol(MG);
— In TRIMIX group 55% ± 4, respectively 59% for TRMIX HA and 51% for TRIMIX MG;
— In BIMIX group 47%, respectively 45% for BIMIX HA and 48% for BIMIX MG.
A statistically significant difference was evidenced only for BIMIX group ($p<0.05$).
The mean depth of action was:
— In TRICLARITRO group 255 μm ±56, respectively 268 μm for TRICLARITRO HA and 246 μm for TRICLARITRO MG;
— In TRIMIX group 571 μm ±86, respectively 424 μm for TRIMIX HA and 766μm for TRIMIX MG;
— In BIMIX group 186 μm ±53, respectively 202,79 μm for BIMIX HA and 169μm for BIMIX MG.
A statistically significant difference was evidenced for TRIMIX group ($p<0.05$).
About the difference between ialuronic acid and macrogol used to vehicle the antibiotic mixtures, no difference were evidenced in mean depth of action but a significant difference was evidenced in dead ratio for the groups with ialuronic acid.
CONCLUSIONS: TRICLARITRO antibiotic mixture showed an effective antibacterial action deep into dentinal tubules.

Prediction of contact points and pressures against canal walls of NiTi rotary files by virtual modeling and finite elements analysis

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BACKGROUND: The objective of this study was to predict contact points and pressure distribution against canal walls of NiTi rotary instruments by Finite Element Method (FEM).
METHODS: The movement of a rotary endodontic instrument in a curved canal was replicated by means of the FEM. ProTaper Next (PTN) X1 and ProTaper Universal (PTU) S2 files were taken into consideration. File geometries were computer-replicated with a Computer Aided Design (CAD) software starting from 2D drawings. The canal geometry was created with the same software according to the geometry of the Endo Training Blocks where the canal was shaped up to apical size #20 and taper.06 (Profile ISO 20, 0.06 taper). CAD geometries were discretized into finite element models by using a Finite Element software.
The main body of each file was modeled with brick elements according to the formulation of the FE solver. More than 8000 brick elements were used for instrument files, with an average element size equal to 0.1 mm. The material model for the shape memory alloy behavior proposed by Auricchio at all. was adopted and material parameters were set-up in agreement with the results of the experimental tensile tests carried out by the file manufacturer. The virtual canal was modeled with brick elements. Starting from the interior surface of the canal, four layers of brick elements were used. An isotropic elastic linear model with the mechanical properties of the dentin was adopted. The contact between the files and the virtual canal was taken into account through a penalty algorithm implemented in the software. Files were partially inserted into the canal in rest configuration without introducing any deformation, then they were put into rotation at 300 rpm and, finally, they were pushed inside the canal at a constant longitudinal velocity of 1 mm/s. Files were constrained to bend by the virtual canal wall geometry. FEA was performed also modifying the material parameters associated to the material models of the files: in particular, simulations were carried out by associating the material parameters of the PTN X1 material model to the PTU S2 material model and vice versa.The contact points between the files and the virtual canal walls were identified in correspondence of the maximum values of the Von Mises stress on the canal elements.
RESULTS: The pressure distribution against canal walls is mainly influenced by the geometry of the file used. The material of the file does not affect significantly the results. The PTN X1 made a pressure against canal walls 80% lower than PTU S2.
CONCLUSIONS: FEA allows to predict contact point and pressure distribution against canal walls. Virtual design and virtual testing on file geometries could save considerable time and costs during the development of new instruments.

Torsional and cyclic fatigue resistance of Reciproc R25 after multiple uses

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BACKGROUND: Endodontic instruments can fracture for torsion or cyclic fatigue. Even if these mechanical properties for many endodontic instruments have already been evaluated, no data were reported on the torsional and cyclic fatigue resistance of Reciproc R25 comparing new and reused instruments. Aim of this study was to assess the influence of multiple uses on the torsional resistance and cyclic flexural fatigue of Reciproc R25 instruments.

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METHODS: Ninety molars were selected from a pool of extracted teeth for periodontal or orthodontic reasons. One hundred and eighty canals (2 for each tooth - mesial canals of the mandibular molars and buccal canals of the maxillary molars) were prepared by Reciproc R25 instruments. A total of 60 25-mm-long Reciproc R25 instruments were divided in 3 groups (n=20) on the basis of different number of canal shaped during their use: new instruments (group 1 - control); 3 canals shaped (group 2) and 6 canals shaped (group 3). Thirty instruments (10 files for everyone of the 3 groups) were used for torsional test, the residual ones (10 files for each of the 3 groups) were used for cyclic fatigue test.
Root canals were prepared by Reciproc R25 as recommended by manufacturers using reciprocating motion "Reciproc ALL". Then, instruments of each group were tested for: cyclic fatigue in an artificial canal with 60° angle of curvature and 5mm of radius of curvature; torsional resistance using a custom-made device produced following the ISO 3630-1. Number of cycles to failure (NCF) for cyclic fatigue and ultimate torsional strength and angle of rotation to fracture for torsional resistance were recorded. The fracture surfaces were examined under a Scanning Electron Microscope (SEM). Data were statistically evaluated by the analysis of variance (ANOVA) with the significance level established at 5% ($P<.05$).
RESULTS: Maximum torque and angular deflection at fracture of groups 2 and 3 were not statistically significant different than the ones of group 1 (new instruments) ($P>0.05$). Number of cycles to failure (NCF) was not statistically significant different between new R25 and instruments used three canals ($P>0.05$). Instead, Reciproc used to shape 6 canals (group 3) showed a lower cyclic fatigue than the ones new (group 1) or used to shape 3 canals (group 2) ($P<0.05$).
CONCLUSIONS: Multiple uses did not affect the torsional resistance parameters, but reduced cylic fatigue of Refiproc R25 instruments.

Use of a single file rotational system with or without the Glide Path

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BACKGROUND: The aim of this study was to evaluate and compare the shaping and centering ability of F6 SkyTaper (Komet Dental – Gebr. Brasseler GmbH & Co. Kg Trophagener Weg 25 – 32657 Lemgo - Germany) in simulated root canals with or without the glide path.
Recently, single file rotational or reciprocating systems are replacing older multi-instrument systems in order to reduce the time of shaping and make easier the endodontic procedures. This new approach to endodontics also brings some advantages and comfort to patients who see reducing their time on dental chair.
METHODS: Forty J-shaped simulated root canals in resin blocks were assigned to two groups (n=20 for each group). After the use of K-File n°10 to determine the working length, 20 resin blocks were treated only with F6 SkyTaper, the other 20 J-shaped simulated root canals were instrumented with PathGlider first, then with F6 SkyTaper.
The PathGlider (Komet Dental – Gebr. Brasseler GmbH & Co. Kg Trophagener Weg 25 – 32657 Lemgo - Germany) is an instrument sized 15 used to perform the glide path.
A single operator performed all the shaping procedures in order to reduce operative errors possibly due to different manual ability of different operators.
Photographic method was used to record pre- and post-instrumentations images. After superimposition, centering and shaping ability were recorded at 9 different levels from the apex using the software Autocad 2013 (Autodesk Inc, San Rafael, USA).
RESULTS: Comparing the two groups of J-shaped simulated root canals treated with different methods of shaping, no many differences result between the shaping ability and centering of the two procedures at each reference point level.
CONCLUSIONS: This study demonstrates that the shaping ability and centering of the two different shaping procedures have no differences at the end. The preparation of J-shaped simulated root canals in resin blocks with PathGlider to perform the glide path doesn't produce so many advantages to shaping procedures with F6 SkyTaper.
By the way, we have to consider the limitations of this study: the shaping procedures are performed on simulated root canals instead of natural teeth, so the single rotational file is used on different materials, resin and natural dentin; the J-shaped simulated root canals in resin blocks were not irrigated; the possible distortion of images due to photographic method.

Sealing ability of a novel polydimethylsiloxane-guttapercha calcium silicate-containing endodontic sealer for "wet" wide apex

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BACKGROUND: A compelling issue of root end-filling is moisture management, especially when dealing with wide apices where sealing represents a critical operation. The objective of this study was to evaluate the sealing ability of a novel polydimethylsiloxane calcium silicate-containing endodontic sealer on wide wet apices.
METHODS: Human caries free single-rooted extracted teeth (N=60) with oval root canals were cleaned and shaped using nickel-titanium rotary instrument (HyFlex CM) to obtain a wide apex of diameter 40.
A customised wet chamber device with a silicon support was designed in order to reproduce the clinical conditions of a wet environment. A simulated body fluid (0.02 mL of Hank's Balanced Salt Solution, HBSS) was added at the bottom of the support, filling 1/3 of the alveolus, and simulate the presence of periapical fluid. Each root was placed inside the artificial alveolus so the periapical space and the entire root canal was filled by HBSS.
Three different sealers (n=6 per group) were used for obturation: GuttaFlow bioseal (Coltène/Whaledent Inc., Ohio, USA) containing gutta-percha powder, polydimethylsiloxane, platinum catalyst, zirconium dioxide, silver (preservative), colouring, bioactive glass ceramic; and two polydimethylsiloxane-based sealers, GuttaFlow 2 (Coltène/Whaledent Inc.) containing gutta-percha powder, polydimethylsiloxane, platinum catalyst, zirconium dioxide, micro-silver (preservative), and colouring; RoekoSeal Automix (Coltène/Whaledent Inc.) containing polydimethylsiloxane, silicone oil, paraffin-base oil, platinum catalyst, zirconium dioxide. In all cases the obturation was followed by the insertion of gutta-percha

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points (Hygienic, Coltène/Whaledent Inc.) using single cone technique, after apical sit establishment.
A high-precision device (digital fluid flow meter) able to detect micrometric fluid movements through the apical system was used for the fluid flow measurements. The micrometric forward movement of an air bubble inside the micro capillary corresponded to fluid flow measurement through the filled root. Each sample was connected to the device working at a hydraulic pressure of 6.9 KPa (1psi) and contained deionised water with chlorhexidine 0.03% to prevent bacterial contamination inside the system. The results obtained as micrometers per minute were converted to µl/min.
All samples were stored in HBSS at 37°C inside their artificial alveolus and examined for fluid filtration rate at 1, 14 and 28 days. Three measurements, of 4 minutes each, were made for individual samples, and the mean was calculated. Data were analyzed with ANOVA test ($p<0.05$).
RESULTS: Fluid filtration at 24 hours ranged from a maximum of 0.016±0.010 µl/min (GuttaFlow 2) to a minimum of 0.019±0.016 µl/min (RoekoSeal Automix). At 28 days a maximum filtration of 0.009±0.002 µl/min (GuttaFlow 2) and a minimum of 0.021±0.023 µl/min (GuttaFlow bioseal) was observed. No statistically significant difference was observed among the materials at any time, and for each material over time.
CONCLUSIONS: The endodontic root canal filling with GuttaFlow bioseal performed similarly to polydimethylsiloxane-based sealers. It was hypothesized GuttaFlow bioseal, in virtue of hydrophilic characteristics, which is ensured by a composition of particles that tend to set when in contact with moisture, could result in a better sealing performance if used in wide and wet open apices. Based on this data, further study is needed to evaluate long term sealing behaviour of the materials.

Microtomographic assessment of filling quality in roots with curved canals after simplified shaping and filling and post restoration

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BACKGROUND: The aim of the present study is to evaluate quantitatively and qualitatively the filling in curved canals shaped with a reciprocating single file, obturated either with the continuous wave of condensation technique or a single point technique and restored with a quartz fibre post.
METHODS: Sample size was determined according to published data ($\alpha=0.05$; $\beta=0.20$; $\delta=3.0$; $\sigma=3.2$). After canal curvature measurement on standardized radiographs with Pruett's technique, thirty-eight single-rooted teeth with curved roots were selected for the analysis. The teeth were cross-sectioned at the cervical level with a cutting disc. After canal scouting and working length determination with stainless steel manual files, root canals were shaped with 40/.06 Reciproc instruments. Canal irrigation was performed with 5.25% sodium hypochlorite. The experimental groups differed in filling technique and were determined by randomly allocating the specimens to a control group (continuous wave of condensation technique, n=19) and a test group (single point, n=19). Immediately after canal filling, a 7 mm-deep post space was prepared with a dedicated bur and a quartz fibre post (No. 2 DT Light Post Illusion X-RO) was luted with RelyX Unicem self-adhesive cement. The restored specimens underwent microtomographic scanning to acquire volumetric data of the filling volume and of internal, external, and combined voids. A Student's t-test served to compare the means of considered volumetric parameters between the groups. In addition, three-dimensional reconstructions of the scanned specimens was performed to qualitatively assess the filling.
RESULTS: The mean percentage of canal filling was 96.69±2.52% in the continuous wave of condensation control group and 97.00±1.47% in the single point test group. Among the different void types, the combined form was the most prevalent, ranging around 2-3%. Internal and external voids were detected only in minimal amounts. The majority of canal filling defects was distributed in the middle and apical thirds of the root, whilst the volumes occupied by the fibre post and luting cement were nearly free of voids. The difference between the control and test group was not significant in terms of any volumetric parameter ($p<0.05$).
CONCLUSIONS: After canal shaping with Reciproc files, neither the continuous wave of condensation technique nor the single point technique were able to produce void-free fillings; the filling quality in the two groups was similar. On the other hand, the formation of voids was limited and the voids were mainly observed in portions of the canal where a hypothetical endodontic residual infection process has scarcely relevant clinical implications. The combination of either the two tested filling techniques with immediate DT Light Post Illusion X-RO cementation was effective in filling curved canals.

Fracture resistance of endodontically treated teeth with two different access cavity designs

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BACKGROUND: One of the most important steps for a successful endodontic treatment is the access cavity preparation. Traditional endodontic cavity (TEC) design for different tooth types has remained unchanged for decades. Several studies have shown that extended preparation of endodontic access cavities compromises the strength of the teeth. Recently, it were reported in literature a conservative endodontic cavity (CEC) and a "Ninja" preparation in order to minimize tooth structure removal. Aim of this study was to compare *in vitro* fracture strength of root-filled and restored teeth with conservative endodontic cavity (CEC) or ultra-conservative "ninja" endodontic cavity (NEC) access.
METHODS: Extracted human intact maxillary and mandibular premolars and molars (n = 10/type) were selected and assigned to control (intact teeth), CEC or NEC groups (n = 10/group/type). Minimal CECs and NECs were plotted on cone beam computed tomography images. Root canals were prepared with Mtwo instruments (Sweden & Martina, Padova, Italy) using 5.25% sodium hypochlorite, filled with gutta-percha and sealer and the coronal accesses were restored with resin composite. The 80 instrumented and 40 intact teeth were loaded to fracture in their central fossa at a 30° angle to the long axis of the tooth by a universal load-testing machine

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(LR30K; Lloyd Instruments Ltd, Fareham, UK). The continuous compressive force at a cross-head speed of 0.5 mm/min was applied with a 6 mm diameter ball-ended steel compressive head and the load at which the teeth fractured indicated by the software of the load testing machine was recorded in Newton (N). The fractured specimens were examined under stereomicroscope (SZR- 10; Optika, Bergamo, Italy) to determine the fracture levels. Fracture patterns were classified as "Restorable", when the failures were above the level of bone simulation (site of fracture above the acrylic resin) and as "Unrestorable", when the failures were extending below the level of bone simulation (site of fracture below the acrylic resin). Data were analyzed with analysis of variance test and Student-Newman-Keuls test for multiple comparisons.
RESULTS: The mean load at fracture for NEC was not significantly different than the one for CEC or control groups for all teeth type (P>.05). The unfavorable fractures were significantly more frequent in the NEC and CEC than in the control groups in each tooth type (P<.05).
CONCLUSIONS: Fracture resistance of teeth prepared by ultra-conservative "ninja" endodontic cavity access was not different from that of intact or prepared by conservative endodontic cavity teeth. All prepared teeth showed more unfavorable fracture patterns than intact ones.

Experimental evaluations on cyclic fatigue of new alloys of endodontic instruments

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BACKGROUND: The purpose of this study was to evaluate and compare the resistance to cyclic fatigue of three types of new instruments which are made of three different types of NiTi alloys: traditional NiTi alloy (Mtwo), M-Wire alloy (ProTaper Next) and CM alloy made by EDM process (HyFlex EDM).
METHODS: We have tested the resistance to cyclic fatigue of five intruments for each of the following nine devices' types. The instruments were divided into three groups according to the apical diameter:
— Group 1: Mtwo 10.04, PTN X1 e HyFlex EDM 10.05
— Group 2: Mtwo 25.06, PTN X2 e HyFlex EDM 25.08
— Group 3: Mtwo 40.04, PTN X4 e HyFlex EDM 40.04
(Mtwo are produced by Sweden & Martina, Due Carrare (PD) - Italy.
ProTaper Next are produced by Dentsply-Maillefer, Ballaigues - Switzerland.
HyFlex EDM are produced by Coltene-Whaledent AG, Altstätten - Switzerland.)
The instruments were placed on the endodontic engine, they worked freely on a steel sled inclined at 45° with a steel drum in order to obtain a curvature of 8 mm from the tip of the instrument. Each instrument worked at 300 rpm with a torque of 5.2 N-cm. We have recorded the time each instrument undercurred fracture using a stopwatch: the measurements were recorded in seconds. The average yields of each group were statistically analyzed using test T.
RESULTS: In each group, HyFlex EDM were found to be more resistant to cyclic fatigue than PTN. In each group PTN had recorded higher resistance values compared to Mtwo.
In group 1, HyFlex EDM fractured after 683,4 seconds on average and they showed a resistance to cyclic fatigue of 180% more than PTN and of 244% more than Mtwo.
In group 2, HyFlex EDM fractured after 399,8 seconds on average and they showed a resistance to cyclic fatigue of 189% more than PTN and of 363% more than Mtwo.
In group 3, HyFlex EDM fractured after 1033,6 seconds on average and they showed a resistance to cyclic fatigue of 605% more than PTN and of 781% more than Mtwo.
CONCLUSIONS: With the limitations of this study, it can be stated that M-Wire and CM-Wire treatments increase the resistance to cyclic fatigue of NiTi rotary instruments. Furthermore we can affirm that the new HyFlex EDM showed a higher resistance to cyclic fatigue compared to the other types of NiTi rotary instruments.

Fracture resistance of two single-taper bonded posts luted with self-adhesive cement

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BACKGROUND: Nickel-titanium rotary files can impart a specific taper to the shape of the prepared root canal. In the cases where there is the need to place an endodontic post, further enlargement of the root canal is avoidable in order to spare the maximum amount of sound dentine. In fact, a fibre posts that matches the shape of the prepared canal can be placed ideally without additional post space preparation. The aim of the present study was to evaluate the resistance to fracture of two single-taper bonded fibre posts.
METHODS: The number of specimens needed for the experimentation was calculated according to data gathered via preliminary testing (α=0.05; β=0.20; δ=20.0; σ=20.3). Thirty-six single-rooted freshly-extracted teeth were sectioned 1 mm above the cementoenamel junction with a cutting disc under copious water irrigation. After checking apical patency and determining working length, a single endodontist performed root canal shaping with Mtwo rotary files up to size 40/.06. During instrumentation, canals were rinsed with 5.25% sodium hypochlorite and filled with the continuous wave of condensation technique, leaving the coronal 9 mm of the canal unfilled. No further canal preparation was made, the unfilled space was cleaned with a rotary endodontic brush and served as post space. The specimens were randomly assigned to two experimental groups according to the post system: group 1 (G1, n=18), SurgiPost Multiconical; group 2 (G2, n=18), Tech ES Endoshape. By following a standardized protocol, 6% tapered posts were trimmed to fit inside the prepared canals and then cut on top to protrude 5 mm from the root surface. A self-adhesive cement (RelyX Unicem) was poured into the post space, the posts seated, the cement excess removed and the cement light-cured. An universal testing machine was used to load the specimens to fracture applying a continuous compressive force (45°, 0.75 mm/min) with a stylus on the top of the post. The comparisons between groups in terms of maximum breaking loads were performed with a Student's t-test (p<0.05). The fractures were assessed also qualitatively by an independent examiner.
RESULTS: The means of the maximum breaking loads (N) were: G1, 135.31±17.17; G2, 153.46±14.05. The difference in resistance to fracture between the groups was statistically

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significant ($p<0.005$). The loaded posts always bent at the level of canal orifice and did not cause any root fracture.
CONCLUSIONS: The findings of the present preliminary study attest that the two tested single-taper post systems are capable of providing high values of resistance to load and avoiding catastrophic root fractures. Even if both the tested post systems exhibited satisfactory resistance to fracture in comparison to already published data, Tech ES Endoshape offered greater resistance than SurgiPost Multiconical. Further studies are needed to assess the performance of these post systems with post and core restoration.

Effect of hypochlorite heating on temperature profiles of radicular tissues

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BACKGROUND: Removing organic and bacterial residues, through root canals shaping and cleaning, is among the goals of contemporary endodontic. Shaping is performed through manual and mechanical instruments and with different techniques, cleaning through irrigants. Lately, several techniques attempted to enhance the cleaning power of irrigants, also through increasing heating temperature. According to many studies, heated hypochlorite a very reactive oxidizing agent, seems to increase its bactericidal and organic degradation power (Thé 1979, Cunningham & Balekjian 1980, Abou-Rass, Oglesby 1981, Kamburis *et al.* 2003). This (*in vitro*) study aims to show the effects of hypochlorite heat activation on extracted teeth, furthermore it provides an example of heat distribution, finally possible future periodontal complications *in vivo* are evaluated, comparing two techniques, extra-oral heating and intracanal heating with System B™ Sybron Endo.
METHODS: Four monoradicular teeth are extracted, disinfected and shaped with standard method (K-file/ Proglider™Protaper next™). After that, five Thermocouples K-type are included in every single tooth, three through holes made with a ball cutter from the root surface to root canal, one made widening apical foramen for one mm (Tapical), another one on apical third at five mm from apex (T5mm), and last one on average third at ten mm from apex(T10mm), one on the radicular external surface at three mm to anatomic apex (Text) and last inside the canal(Tcanal). Teeth are thus included in aluminum cylinder and each tooth filled in with resin. Hypochlorite was heated with two methods, extra-oral heating with a kettle (not more than 100°) and intracanal heating with System B™ using three different SybronEndo metal tips (up to 100°). Several temperature were tested in order to evaluate the heat transmission from hypochlorite to each part of the tooth. Every tips were controlled through a thermocamera to verify the heating temperature carrier.
RESULTS: In the first method (extra-oral heating), depending on the detection system of temperature, the temperature of hypochlorite at 80° in the kettle, was registrered as 57° in Tcanal and T10mm, while in T5mm a temperature of 55°, Text 45° and Tapical 40°, each temperature lasts for a couple of seconds. On the other hand, with heating system (second method), with a tips F06 at 100°, the temp recorded are 55° at Tcanal, 70° for T10mm, more than 55° at T5mm, about 43° at Tapical and about 47° at Text, each recorded temp lasts for about 20 seconds.
CONCLUSIONS: The temperature recorded seems to be too low in the apex in the first method, due to the fast cooling of irrigant during the transition from kettle to root canal. Instead the heat carrier seems to carry more temperature to the apex and on the external surface of the root for a few seconds more. This study demonstrates that the temperatures reached with the two methods cannot be considered harmful to periodontal tissues because they not reach up 47 degrees (Study conducted by Eriksson A.R., Albrektsson T 1983 demonstrates that periodontal ligament issues' risk is real whenever the temperature exceeds 47 degrees up to one minute), while could increase the power bactericidal and the degradation of organic residues.

The evaluation of clinical outcome of root-canal treatments performed with nickel-titanium rotary instruments: a prospective cohort preliminary study

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BACKGROUND: This study was designed to assess the outcome of Root Canal Treatments (RCT) of teeth performed with rotary nickel-titanium (Ni-Ti) instruments and to evaluate the factors influencing the success rate. The present pilot study aimed to define sample size and to evaluate the inter and intra observer agreement.
METHODS: This prospective cohort preliminary study was conducted in the Endodontic Clinical Section, University of Bologna, Italy. The operators enrolled were postgraduate master's students supervised by specialist tutors. The RCT (primary and secondary treatments) were performed between June 2013 and December 2015 across multiple visits. Anaesthesia was provided with mepivacaine (OGNA, Muggiò, Italy). Once the rubber dam was placed, cavity access was prepared with diamond burs. Orifices were enlarged with Gates-Glidden burs #2, 3 and 4 and the canals scouted with stainless steel files. Apical foramen was negotiated with the aid of apex locator (Root ZX, J Morita, Kyoto, Japan) and the WL was confirmed with periapical radiographs using the long cone paralleling technique. Glide path was assured by manual K-files up to #20. Canals were cleaned and shaped with rotary instruments mounted on an endodontic motor (XSmart Plus, Dentsply, Maillefer) and irrigated with 5 ml of 5% sodium hypochlorite (Niclor 5, OGNA, Muggiò, Italy) and 10% EDTA (Tubuliclean, OGNA, Muggiò, Italy) each. Based on the Periapical Index (PAI), the 6-month outcome was blindly evaluated by two calibrated examiners comparing the pre-operative and follow-up radiographs, and classified as healed (absence of periapical lesion), healing (reduction in size of the periapical lesion) or not healing (no change or increase in size of the periapical lesion, development of a new one, development of clinical signs or symptoms).
RESULTS: Preliminary data pertain to a total of 29 teeth (n=29 patients). The overall success rate, represented by the healed group, was 62%, while the healing and the not healing

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groups corresponded respectively to 24% and 14% of the total. The success rate of primary treatments was 60% and that of secondary treatments was 67%. The incomplete healing rate (healing and not healing) of the predictive variables, primary or secondary treatments, was 40% and 33% respectively. The not healing rate of teeth with a PAI score of ≤2 was 23% while that of teeth with a PAI score of ≥3 was 50%. The sample size was calculated for the primary outcome measures (incomplete healing). A two group continuity corrected chi-square test with a 0.050 two-sided significance level will have 80% power to detect the difference between a proportion of 0.100 and a proportion of 0.300 for patients experiencing at least an incomplete healing (odds ratio: 3.857) when the sample size in each group is 72. Inter and intra observer variations measured by means of kappa statistic were respectively 0.937±0.062 (p=0.0001) and 1.00.
CONCLUSIONS: An excellent inter and intra observer agreement was obtained, guaranteeing the reliability of the results. RCT performed with mechanical instrumentation techniques during endodontic masters' studies exhibit similar results. Recruitment of at least 72 patients in each treatment group is suggested in order to obtain a power of 80%.

Evaluation of endodontic irrigation techniques in critical conditions

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BACKGROUND: Irrigation has a great importance in the endodontic therapy. One of the most used solution is sodium hypochlorite thanking to its antimicrobial and protheolytic activity. Furthermore it has the unique ability to dissolve necrotic tissues as well as the organic components of the smear layer. However this irrigant solution has one negative feature : it's cytotoxic for peri-radicular cells. Sodium hypochlorite's extrusion in periapical tissues causes inflammation, ecchymoses, hematoma, and sometimes even necrosis and paresthesia. In more recent study it has been reported that traditional irrigation techniques aren't able to avoid periapical extrusion of fluids during endodontic debridement in presence of critical clinical conditions. The aim of this study was to test the effectivness of Self Adjusting File and EndoVac System techniques, used in presence of big apical foramen.
METHODS: In this study we used three samples of maxillary central incisor, reproduced in transparent resin (TrueTooth Replica 8-001 Maxillary central incisor, Delendo educational laboratories USA). A traditional access preparation was performed in all the samples: the canals were shaped by a crown-down technique with Protaper Next X1, X2, X3, X4, X5 (Dentsply Maillefer, Ballaigues, Switzerland) used in sequence, and their apexes were brought to #70, #120 and #150/100 of millimetres by the use of traditional manual K-files (Dentsply Maillefer, Ballaigues, Switzerland). We used Self Adjusting File and EndoVac System to irrigate this canals with a particular solution which changes the colour of NaOCl and we filmed the experiment using Leica M320 Microscope at a fixed distance.
RESULTS: In our experiment Self Adjusting File System wasn't able to avoid apical extrusion of sodium hypochlorite in any of the sample prepared with our instrumentation. The irrigant's extrusion quantity was directly proportional to the apical dimension. The EndoVac microcannula had easily prevent the extrusion of the irrigant in the first two samples which had #70 and #120 apexes. However, in the third sample a small irrigant spillage occured even using this last technique.In conclusion we can say that the EndoVac macrocannula technique recorded the best results for all the samples used in this experimentation.
CONCLUSIONS: The results of this study are significant and consonant with the ones of Fukumoto et al, Desai and Himel, and Neilsen and Baumgartner. All these studies concluded that negative pressure EndoVac irrigation. This techinique is an effective method of delivering irrigants into the apical third of the canal system and drastically reduce periapical fluid's extrusion, even in presence of important apicals resorptions and big apexes.

Cyclic fatigue resistance of heat-treated nickel-titanium instruments after immersion in sodium hypochlorite and/or sterilization

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BACKGROUND: NiTi instruments have a high risk of fracture during their use and manufacturers have continued efforts to improve their properties and fracture resistance by torsion or cyclic fatigue. Many factors can influence the fatigue of NiTi instruments including the operational speed, angle and radius of root canal curvature, diameter and design of the instrument, type of kinematics (continuous or reciprocating) as well as raw materials and manufacturing processes. The Twisted file (TF) and Hyclex CM (HF) are NiTi rotary systems manufactured with R-phase alloy using a twisting method or CM-wire alloy using a grinding method respectively. Several studies have reported the effects of immersion in sodium hypochlorite or autoclaving process on the cyclic fatigue performance of different NiTi rotary files with no common agreement. However, no studies have investigated the influence of autoclave sterilization and immersion in NaClO of instruments made different heat-treated alloy such as Twisted file (R-phase) and Hyflex CM (CM wire). Thus, the purpose of this study was to investigate the effect of both NaClO contact and repeated autoclave cycles on the cyclic fatigue characteristics of R-phase and CM wire files.
METHODS: A total of 140 new 25/.06 Twisted Files and Hyflex CM were selected for the test. Instruments were randomly assigned into 7 groups (n = 10) for each brand. Group 1 (the control group) included new instruments that were not immersed in NaOCl neither subjected to autoclave sterilization. Groups 2 and 3 was composed of instruments immersed for 3 minutes in 5% NaOCl solution at 37°C for, 1 and 3 times respectively. Groups 4 and 5 consisted of instruments only autoclaved 1 and 3 times respectively. The remaining groups (6 and 7) recruited instruments that received a cycle of both

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immersion in NaOCl and sterilization, 1 and 3 times respectively. Immersion was performed placing the file in small separate glass containers for 16 mm from the tip; each cycle of sterilization in autoclave was performed at a temperature of 134°C for 17 minutes. Instruments of all groups were subsequently subjected to fatigue test in an artificial canal with a 60 degree angle and 5 mm radius of curvature. All instruments were rotated until fracture occurred and the number of cycles to failure (NCF) was recorded. Data were statistically analyzed by using the Two-Way ANOVA and Tukey's multiple comparison post-hoc test to assess significant differences between groups (P<.05).
RESULTS: Immersion in 5% NaOCl both for 1 or 3 times did not exert any significant overall effect on file performance for any of the instrument systems tested. Cyclic fatigue of Twisted Files autoclaved 3 times with or without immersion in NaOCl was significantly lower than the one of the same instruments new or autoclaved 1 time with or without immersion in NaOCl.
No cyclic fatigue difference was found between the control and all test groups of Hyflex CM (P>.05).
CONCLUSIONS: Static immersion in NaOCl did not reduce significantly the cyclic fatigue resistance of TF and HF. Sterilization in autoclave for 3 times reduced cyclic fatigue of TF independently from immersion in NaOCl.

Experimental evaluation of the effectivness of the mechanical removal techniques in endodontic orthograde retreatment

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BACKGROUND: The final aim of an Endodontic retreatment is to reach a new seal of the apical third of the root. In order to do so it's necessary to shape and irrigate the apical third to reduce the bacterial amount which is the cause of the periapical lesion. For this reason it's mandatory to remove the entire amount of the previous materials (guttapercha,sealer etc..) by the use of mechanical or manual instrumentantion. The aim of this study is to evaluate the effectivness of three mechanical removal techinques in endodontic orthograde retreatment. We decided to test Protaper Next (Dentsply Maillefer, Ballaigues,Switzerland), Self Adjusting Files SAF (ReDent-Nova, Ra'anana, Israel), XP Endo Finisher (FKG Dentaire SA,La Chaux-de-Fonds, Switzerland).
METHODS: Fifteen artificial elements (FKG Dentaire SA,La Chaux-de-Fonds, Switzerland)with known length and anatomy, have been endodontically treated and sealed by the use of gutta-percha and sealer. After that, the samples were reprocessed and divided into three groups.The samples of Group 1 were retreated by using retreatment rotating instruments (Protaper Retreatment) and rotating instruments for shaping (Protaper Next) until the apical foramen. The samples of Group 2 were instrumented through the use of retreatment rotary instruments (Protaper Retreatment) and SAF (Self - Adjusting File). The samples of Group 3 were retreated through the use of retreatment rotary instruments (Protaper Retreatment) and XP Endo Finisher. The retreated samples were analyzed using X-ray scans through cone-beam technology and photographed by optical microscope at 40X magnification, in order to assess the amount of residual material in the three different sections of the root (coronal, middle and apical third).
RESULTS: The samples of Group 3 recorded the least residual material, especially in the apical third. Furthermore the operatory technique used in this gruop was the easiest to perform: in fact using this instrumentation guttapercha and sealer resulted complitly disattached from the canal walls. The average residual material in Group 3 is less then 10 % compared to Group 1 that recorded an average residual between 10-20% and to Group 2, that had an average residual around 30%.
CONCLUSIONS: Within the limits of this study it can be said that none of the three removal techniques reached the total elimination of the filling material. Nevertheless, the technique that involves the use of XP Endo finisher is better than the other techniques tested.

Post-operative quality of life following root canal preparation performed by rotary, swaggering or reciprocating instrumentation: a randomized clinical trial

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BACKGROUND: Endodontic treatment may be associated with pain and discomfort, which can affect an individual's quality of life (QoL). Reciprocating instruments are suspected to extrude debris beyond the apex, with occurrence of post-operative discomfort. This randomized controlled clinical trial compared the impact of rotary and reciprocating instrumentation on post-operative QoL (POQoL).
METHODS: One hundred and twenty patients with a single tooth requiring primary endodontic treatment were recruited and randomized between three different groups following access cavity, endodontic pretreatment and glide path.
A total of 92 patients were analyzed: 30 teeth were shaped with NiTi rotary ProTaper Universal S1-S2-F1-F2 at working length (WL) (rotary group), 30 teeth were shaped with WaveOne Primary (reciprocating group) and 32 teeth were shaped using ProTaper Next™ X1-X2 at WL. Irrigation was performed with 5% NaOCl and 10% EDTA. Root canal obturation was performed with continuous wave or Thermafil techniques in single or multiple visits. POQoL indicators evaluated through a 10 levels Likert-like scale and post-operative pain assessed through a Visual Analogue Scale (VAS) were evaluated for 7 days post-treatment. As secondary outcomes, the number of days to complete pain resolution after treatment and analgesic tablets intake were evaluated. The variation of each indicator over time was compared using ANOVA for repeated measures (P<0.05). The impact of each variable on POQoL was analyzed with a multivariate logistic regression model (P<0.05).
RESULTS: Pain curves demonstrated a more favorable time-trend in the rotary and swaggering group (mean, P = 0.028; maximum, P = 0.042). Patients' perception of the impact

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of treatment on POQoL did not differ between groups (P = 0.094). Single visit approach and the presence of pre-existing peri-radicular inflammation were associated with a moderate decrease in POQoL.
CONCLUSIONS: Eventhough this study is limited by the differences between groups in term of tooth type at baseline, our findings suggest that reciprocating instrumentation may adversely affect POQoL to a greater extent than rotary or swaggering instrumentation.

Antimicrobial efficacy of different irrigation ultrasonic techniques: microbiological and microscopic evaluations

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BACKGROUND: Bacteria and their metabolites play a fundamental role in pulpal and periapical pathology. (1)(2). Sodium hypoclorite (NaOCl) is widely used like an irrigant, due to its high antimicrobial efficacy. (2)(3). There are different techniques that can improve the efficacy of NaoCl, including ultrasounds (4) (5).
This study evaluates NaOCl antibacterical effects and debris presence on root canal walls with SEM analysis.(6)
METHODS: 128 human extracted teeth with a single canal were shaped with K-flexofiles up to #20 and with ProTaper Universal up to F3 at working length. Irrigation was performed interchanging 33 ml of NaOCl (5%) with 10 ml of EDTA (10%). After sterilization at 121°C canals were infected with 30µL of Enterococcus faecalis (7) for 3 weeks and were assigned to 3 groups (n=40), plus positive controls (n=4) and negative controls (n=4). Irrigation was performed with 2ml of NaOCl (5%). In NaOCl-30 group the irrigant was left in canals for 30 seconds; in EC-30 and EU-30 NaOCl was ultrasonically activated for 30 seconds respectively with EndoCHuckEMS steel tip #15.02 and EndoUltraTM NiTi tip #15.02. The bacterial load after the irrigation was evaluated on Agar plates. Roots were longitudinally sectioned and analized with SEM at 500x magnification for debris evaluation at the coronal, medial and apical third of each canal with a value scale from 1 to 5.(8) Differences for microbial load were analized with one-way ANOVA test and post-hoc Bonferroni ($p<0,05$). Debris differences were evaluated with Kruskall Wallis and post-hoc Dunn tests $p<0,05$).
RESULTS: A statistically significant difference was underlined among post irrigation microbial load (10^5CFUs) and bacterial count reduction ($p<0,05$). SEM analysis shows a statistically significant difference for traditional and ultrasonic techniques, but no differences among ultrasonic techniques ($p<0,0025$ at coronal level; $p<0,0023$ at medial level, $p<0,0023$ at apical level). Kruskall Wallis StatisticKW resulted 11,986 for debris at coronal level, 12,116 at medial level and 8,343 at apical level, all correct at the extremes.
CONCLUSIONS: 30 Seconds ultrasonic NaOCl activation resulted more effective in reducing bacterial count compared to standard irrigation. However neither swinging frequency nor tip material seem to influence in a significant way the efficacy or the debris removal.

Influence of different irrigation techniques on sealer penetration into dentinal tubules: a confocal laser scanning microscope analysis

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BACKGROUND: The instrumentation of roots canals produces smear layer, which consists of organic and inorganic material and may also contain bacteria and they by-products. This layer covers the root canal walls, could obliterate dentinal tubules and consequently can inhibit the penetration of irrigants and endodontic sealers. To obtain a good seal is necessary to use an endodontic sealer in association with a core filling material in order to fill any voids, morphological irregularities, apical deltas and dentinal tubules and to create an obturation as much as possible impervious. The aim of the study was to compare the effect of conventional endodontic needle irrigation and different irrigation systems on sealer penetration into dentinal tubules.
METHODS: 40 single round root canals were selected and divided into four groups (n=10) before root canal preparation according to the final irrigation protocol: group 1 (conventional endodontic needle irrigation), group 2 (EndoActivator) group 3 (Irrisafe) group 4 (EndoVac). The root canal were shaped using Path File and ProTaper Universal rotary system in a crown-down sequence to size #40 at the WL. Obturation of the teeth was done with Thermafil Obturators size 40 with TopSeal sealer labeled with 0,1% wt Rhodamin B dye. Transverse section at 2-, 5- and 7-mm from the apex were analyzed by means of confocal laser scanning microscopy. Percentage of penetration around the root canal and the mean penetration into dentinal tubules at eight standardized points were calculated.
RESULTS: No significant differences in percentage of penetration around the root canal and mean penetration depth into dentinal tubules were observed among groups when same levels were compared. Within each group both variables are significantly higher at the coronal and middle level with respect to the apical one.
CONCLUSIONS: The use of the techniques employed in the present study did not significantly improve the sealer penetration into dentinal tubules compared with conventional endodontic needle irrigation.

Experimental study on root canal filling: comparison between a carrier-based technique guttacore and guttaflow obturation system (pilot study)

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BACKGROUND: Tocompare,by SEM, the sealing ability andpresence of voids using two different obturationtechniques: gutta-core and guttaflow.
METHODS: 40 extractedteeth were selected. Thecoronal third

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of teethwere flared using alargo drill (Dentsply, St Quentin en Yvelines, France) sizes 4, 3, 2 and 1. Root canals were shaped by using hyflex CM (NiTi) files (Coltene-Whaledent, Allstetten, Switzerland)and irrigated with 5 % NaOCl. The apical portion of canals were enlarged to maximum of size 0,35 mm or 0,40 mm according to gauging. The teeth were divided into 2groups (n=12).GroupI:GuttaCore technique (Dentsply Tulsa Dental Specialties): theobturator that matched the verifier size was chosen (size 35 or 40),heated and inserted into the canal to the WL with a thin layer of argosealsealer.Group II:GuttaFlow technique (Coltene / Whaledent, Altstatten, Switzerland):amount of GuttaFlow was dispensed into the canal thenmaster cone was slowly inserted into the canal, pulled and twisted back.Periapicalradiographs weretaken. Theteeth werefixed on a polycarbonate block then, a 0.3 mm diamond blade (Micromet SECOTRON 200) at 1500 rpm was used to make a notch on the teeth surface, and final sectionswere obtained by causing fragile fracture at 3, 6, 9 and 12 mm from the apex. Each surface was polished with a 4000 grit SiC paper, and treated with a 18 min application of 17% (EDTA) under ultrasound, the surface was rinsed with deionized water, finally the specimens have been mounted on metallic stubs and chromium sputtered.The specimens were examined under SEM (Zeiss, Auriga Germany). Observations were performed at the dentin-sealer-gutta-percha interface. Digital images were processed with ImageJ program (Rasband WS, ImageJ; US National Institute of Health, Bethesda, MD) to measure the sealer and void areas.The minimum dimension considered is 0.7 micron^2 as it can be considered with a good approximation the minimum space in which biofilm formation can occur. The values of area, height and length are used to compare the voids linear dimensions with the perimeter of the dentin-sealer interface to obtain a percentage of voids.
RESULTS: Even the differences are not significant (p value<0.05) due to insufficient number of samples used,GuttaCore system present less voidsin apical third than in the middle and the coronal; GuttaFlow system present major voids in apical third, whereas in the medium and coronal third allows a more complete and efficient filling.
CONCLUSIONS: The focus of interest was on three-dimensional filling of the root canals for preventing bacteria leakageor reinfection caused by necrotic tissues and bacteria residing in the lateral canals that are very difficult to remove by mechanical and chemical cleaning.The presence ofmore voids inapical third in GuttaFlowsystem could be caused by difficulties of cement to reach in apex with smaller diameter; also single cone technique does not include a vertical compaction of GP, in the middle and coronal thirdGuttaFlow cement seems to flow in an optimum manner.Guttacore system seems to seal better apical portion due to the obturator that being more rigid, manages to bring the gutta-percha to WL. The more voids in the coronal and middle portion could be due a substantial circular cross-section of the carrier while root canal are more oval.

An *in vitro* study of cutting efficiency and surface topography alterations of reciprocating files after multiple simulated operative procedures: a SEM analysis.

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BACKGROUND: The aim of this study was to assess morphological changes of Reciproc files surface before and after 1,2,3,4,5 and 6 uses by scanning electronic microscopy and to evaluate if there were any variations in cutting efficiency by recording the speed of each instrumentation.
METHODS: 30 endo-training-blocks (1cmx1cmx3cm) in resin standard (Dentsply, Maillefer, Switzerland) with the same canal length, taper, anatomy, apical diameter, angle and radius of the curve, were used for this study. 5 Reciproc files R25 were used in the preparation of the artificial canals. Each file was a control (before its use in the resin blocks) and a test after each instrumentation.
All the resin blocks were prepared by the same operator using Reciproc System (Dentsply-VDW, USA) using R#25 to the working length for all canals. Irrigation was performed by 2,5 mL of NaOCl 5,25% for 20 seconds at each entrance of the instrument. The speed of preparaion for each resin block was timed with a digital stopwatch by a second operator.
Before the instruments were photographed they were marked in the coronal part with a permanent marker to ensure they were photographed always in the same position.After 1,2,3,4,5 and 6 uses the instruments were cleaned in an ultrasonic bath for 5 minutes, dried, repeatedly repositioned in SEM chamber and observed microscopically. Photomicrographs were taken for all instruments after each use to see the wear and tear and to compare their aspect with the new instruments. 9 SEM photomicrographs were taken at 120X, 750X and 1500X magnification for each sample, three micrographs at the coronal, middle and apical third of each specimen. This procedure was conducted identically until 6 artificial canals had been prepared with each instrument.
The evaluation was made by one blinded external operator according to modified Christine Eggert, Ove Peters *et al.* criteria (1999): visible defects, microscopic defects like blunt cutting edges, disruption of the cutting edge, pitting, fretting, metal flash, fatigue cracks, microfractures, complete fracture, manufacturing defects and smear debris remains. All SEM images were evaluated not only for the presence/absence of the defects but in a semi-quantitative way, by giving, when possible, a score from 0 to 3 (0: none, 1: low, 2:moderate, 3:heavy).
RESULTS: Wear analisys showed that the middle third of all instruments obtained highest values for fatigue microcracks, metal flash, pitting and fretting compared to the apical and coronal third. Scores data showed that the wear for all the thirds was progressive, for the middle third mild sign of wear occurred just after the first instrumentation becoming clearer after each use; in the coronal and apical third the wear appeared on average after the third instrumentation; the coronal third showed lowest values for wear parameters in general, but highest values for smear debris remains.
From the first to the last instrumentation visible defects (120X magnification) had not been recorded in any third of all instruments except for two Reciproc files which completely fractured during the last instrumentation.
For each file the instrumentation speed did not decrease with the increase of the number of uses. No relevant differences were observed between the files for the instrumentation time.
CONCLUSIONS: Within the limits of this *in vitro* study it can be concluded that Reciproc files wear out progressively mainly because of fatigue microcracks expecially in the portion working in the canal curvature. Despite the wear cutting efficiency is not reduced.

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In vitro experimental evaluation of the sealing ability of traditional and innovative materials in endodontic surgery

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BACKGROUND: Endodontic surgery has to be reserved for all those cases where the orthograde therapy is impossible from the beginning or when all retreatment attempts have failed and the periapical infection is still present. In the last thirty years many researches focused on finding the ideal obturating material to reach the best sealing of the apex. Two of the most common used materials in endodontic surgery, according to the literature are IRM (Dentsplay International, York Pennsylvania USA) and MTA (MTA Angelus, Angelus Indùstria de Produtos odontològico-Brasil). The aim of this study was to compare the correspondence between gap formation and apical micro leakage in root canals filled with IRM, MTA and a new formulation of MTA prototype. The new formilation of MTA has been realized in 2008 by professor Romano Mongiorgi and his team at Biominerolgy, Cristallografy and Biomaterials Department of the University of Blogne.
METHODS: Fifty upper single-rooted human teeth were collected at the Endodontic Department of the University of Padua and submitted to x-rays control in order to avoid any root canal anatomical variation (isthmus, collater canals etc). Twenty speciments with a single root canal were selected and submitted to orthograde therapy using standard NiTi instrumentation. In particular Protaper Next (Dentsplay Maillefer, Ballaigues, Switzerland) were used in sequence in the following order: X1-17.04, X2-25.06, X3-30.07, X4-40.07. All the samples were lately filled with the termocondensation technique using gutta-percha (Roeko-Gutta Cones 40.04), endodontic sealer (Argoseal-Ogna)and Revo'S Condensor (Micro Mega, Besacon, France). The samples were then divided into four groups of five elements each. Fifteen elements undergone a standardized retrograde therapy and were filled with IRM, MTA Angelus and the MTA prototype.Five specimens filled only with gutta-percha, were used as control group. All the specimens were immersed in a 50-wt% aqueous silver nitrate solution at 37°C for 24 hours. After longitudinal sectioning, the specimens were prepared for environmental scanning electron microscopy (ESEM). The gaps were observed and apical micro leakage was detected in the specimens using SEM/ BSE technique.
RESULTS: The sealing ability and the percentage of infiltration were calculated with average values. They were reported in tables and graphics and statistically analyzed.
CONCLUSIONS: All the materials analyzed in this study have shown good sealing abilities.None of the values recorded in this study is clinically relevant in terms of amount of infiltration: in fact the maximum value of infiltration recorded was around 300 µm. Furthermore both MTA Angelus and prototype have recorded the lowest values of infiltration, in addition to that we can say that choosing MTA angelus and prototype over IRM is the most advisable choice because of their biological and bioactive proprieties. In terms of clinical maneuverability the new formulation of MTA (MTA prototype) was the easiest and practical to use if compeared to MTA angelus. In conclusion, considering the limitation of this study, we can affirm that both MTA Angelus and prototype have recorded the lowest values of infiltration but MTA prototype seams to be more bioactive and more manageble than MTA Angelus.

Preparation of the glide-path in curved canals: a comparative analysis between two mechanical NiTi instruments

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Dipartimento di Odontoiatria Conservatrice e di Endodonzia, Milano

BACKGROUND: The purpose of this study was to evaluate *ex vivo* the ability of penetration of a radiopaque irrigating solution into the root canal system during and after preflaring and glide-path carried out with stainless steel K-File and NiTi PathFiles.
METHODS: 60 extracted molars were selected for this study. After the access cavity preparation, each tooth was negotiated with a K-file #08 and the working length was determined under the microscope and confirmed with a radiograph. Then, the pulp chamber of each tooth was filled with a solution of Histopaque 1077. This solution has been used in several studies on root canal irrigation since it shows physical properties very similar to sodium hypochlorite.The 60 teeth were divided into 2 groups of 30 elements each for a total of 180 root canals. In the two groups the preflaring was carried out with K-files # 10, # 15, # 20 (Group I) and rotary NiTi PathFiles # 13,16 and 19 (Group II) respectively. After the use of each instrument, the penetration of the solution into the coronal, middle and apical third of the root canal system was evaluated with a radiograph. In data collection, the teeth of each group were divided into two subgroups: Group of "Narrow Canals" and Group of "Wide Canals". Finally a statistical analysis was performed using the Chi-squared test.
RESULTS: The teeth instrumented with PathFiles showed a significant greater and deeper penetration of the radiopaque solution in comparison with the teeth instrumented with hand K-Files. The difference was relevant in the apical third of the subgroup with narrow canals for the three PathFiles whereas for the wide canals the difference was significant only when comparing PathFile #13 with K-File #10 but not for the PathFiles # 16 and 19 when compared with K-Files # 15 and 20.
CONCLUSIONS: The results of this study demonstrated that Preflaring carried out using rotary instruments allows an earlier and deeper penetration of the irrigating solution into o the apical third of the narrow canals. This will help to prevent the accumulation of debris in the last mm of the root canal, often responsible of canal blockade.

Ex-vivo" study on the penetration capability of a radiopaque solution into the root canal system after manual and mechanical pre-flaring

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Quantitative *in vitro* analysis of extruded debris beyond the apex in samples instrumented with WaveOne Primary and Reciproc 25 without and with glyde preflaring

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BACKGROUND: The purpose of this study was to evaluate *in vitro* the amount of debris extruded beyond the apex in extracted teeth instrumented with reciprocating files (WaveOne Primary and Reciproc25) used directly after negotiation or after preflaring and glide-path carried out with NiTi mechanical rotary instruments.
METHODS: 70 extracted maxillary and mandibular molars and premolars were used for this study. After the access cavity preparation, each tooth was negotiated with a K-file 08 and the working length was determined under the microscope and confirmed with a radiograph. Finally 108 channels were selected, with curvature angles comprised between 15° and 30° and divided into 2 groups of 54 channels each.
The root canals of Group 1 were instrumented for half (subgroup 1a) with the WaveOne Primary file used directly after the negotiation with the K-files 10 and for the other half (subgroup 1b) with the WaveOne Primary file used after preflaring and glyde-path carried out with PathFile 13,16 and 19. The root canals of Group 2 were instrumented for half (subgroup 2a) using the reciprocating file Reciproc 25 directly after the negotiation with the K-files 10 and for the other half (subgroup 2b) with the file Reciproc 25 used after preflaring and glyde-path carried out with PathFile 13,16 and 19. The amount of debris extruded beyond the apical foramen, for each subgroup, was collected in four separate sterile Petri dishes previously calibrated with an electronic scale for mg (Giberti Europe500). At the end of the instrumentation the capsules were weighed again individually after the collection of debris. The data collected were subjected to statistical analysis (t-test).
RESULTS: The amount of debris extruded beyond the apex in the subgroups of samples instrumented with reciprocating files used directly after the initial negotiation with K-File 10 (subgroup 1a and 2a), resulted to be significantly greater ($p<0.01$), than the amount of debris measured in the subgroups of the root canals in which the use of the reciprocating files was anticipated by the preflaring and glyde-path carried out with the PathFiles. No significant differences were recorded between WaveOne Primary and Reciproc 25 as to their tendency to extrude debris.
CONCLUSIONS: When usig reciprocating files to shape the root canals, it should be advisable to start the shaping procedures after preflaring the root canals and creating a continuous glide-path preferably with rotary NiTi files. Indeed the preflaring of the root canals will facilitate the penetration of the reciprocating files reducing the production of debris and the pressure needed to reach the working length.

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Early detection of condylar asymmetry in juvenile idiopathic arthritis by means of orthopantomographies

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BACKGROUND: To evaluate the condylar and ramal asymmetry of the mandible in patients with Juvenile Idiopathic Arthritis (JIA) by means of Orthopantomographies (OPTs), in order to consider OPT a valuable indicator of temporomandibular joint (TMJ) involvement.
METHODS: Thirty patients (23 females, 12.8±4.8 years) with confirmed diagnosis of JIA (according to the ILAR 2003 criteria), free of signs and symptoms of temporomandibular joint disorders, and 30 matched healthy subjects (23 females, 13.6±4.8 years) were selected for this study. All patients had a panoramic radiograph. The method of Habets et al. was used to compare the vertical heights of the condyles and rami of both sides in OPT. The ramus tangent (A) was drawn between the most lateral point of the condyle (O1) and of the ascending ramus (O2).The condylar height (CH) was measured as the distance on the ramus tangent between the B line (perpendicular to the ramus tangent from the most superior point of the condyle) and O1. The ramus height (RH) was measured as the distance between O1 and O2. To evaluate the symmetry between the condyles and the rami, the following formula was used: (R – L) / (R±L) x 100%. According to Habets et al., a 6% difference between the condylar vertical sizes in OPT is an acceptable limit for diagnosing a condylar asymmetry. For statistical analysis, data were expressed as mean±SD and the significance of between-group differences were assessed using Mann-Whitney test. Statistical significance was set at $p<0.05$.
RESULTS: Results showed a significant difference regarding the condylar asymmetry (expressed in percentage from 0 to 100%), being the condylar asymmetry index in the JIA group of 15.58%±10.98 and in the control group 1.72%±1.21 ($p<0.0001$). No differences were found in the range of asymmetry of the ramus between groups ($p = 0.47$), being the ramal asymmetry index in JIA group of 2.97%±2.42 and in the control group of 2.33%±1.7. The intra-group comparison between males and females showed a significant difference in the range of asymmetry of the condyle in the JIA group ($p<0.05$), being the females more asymmetric. No differences were found in the range of asymmetry of the ramus in both groups ($p>0.05$).
CONCLUSIONS: This study evaluated the condylar and ramal asymmetry of patients with JIA compared with normal subjects. The condyles of the patients group resulted highly asymmetric with respect to the control group and the range of condylar asymmetry resulted greater in females than in males. Even if, CBCT and MRI have to be considered the gold standard to precisely diagnose TMJ alterations in presence of inflammatory conditions like JIA, the results of our study confirm that OPT seems to be a reliable tool to show TMJ involvement. For this reason, knowing that: the TMJ is highly susceptible to inflammatory alterations during growth, even in absence of symptomatology; OPT is a cost-benefit favorable imaging tool, routinely used in the dental field, also at an early stage in development; it is reasonable to consider OPT a first-screening examination in JIA patients, in order to help clinicians in addressing patients that should undergo a more detailed TMJ imaging and setting up a target therapy of the related cranial growth alterations.

Facial asymmetry in the pediatric population: gnatological and neuro-orthopedic analysis

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BACKGROUND: Facial asymmetry is the result of variations in bilateral symmetry of the face. This can involve not only aesthetic implications but also functional ones. Changes in the cranio-mandibular system could affect not only temporomandibular articulation and masticatory muscles but also body posture. Literature has controversial results. The aim of the study is to investigate the relationship between facial asymmetry and body posture in children and to allow the orthodontists to face clinical cases of facial asymmetry through well-defined guidelines and a scientific protocol.
METHODS: 18 children, males and females, 7 to 17 years old with anomalies in facial symmetry, have been evaluated through clinical and radiological exams. Inclusion criteria: range of mandibular asymmetry between 4mm and 10 mm (measured on P-A teleradiography and OPT); no syndromes; no temporomandibular joint dysfunctions; no previous orthodontic treatment. Tests carried out: Electromiography (with BTS tmjoint software), T-Scan III (8.0 for Windows PC); Stabilometric platform; FORMETRIC 4D. Clinical qualitative evaluation and statistical quantitative analysis were conducted. - cx2 to compare group A (ASIM index < 90 on EMG) and group B (ASIM index > 90) in relation to plantar load on the stabilometric platform and T-Student in relation to skeletal parameters observed with the Formetric evaluation were the statistics method used.
RESULTS: Prevalence of TA (temporal muscle) leads to an anterior head's centre of gravity while prevalence of MS (masseter muscle) to a posterior one. 50% children have a significant ASIM index on Electromiography. No statistically significant results emerged from x2 and T-Student tests. By relating side of mandibular deviation and postural anomalies, it was found out that active muscles are: trapezius, sternocleidomastoideus and dorsal muscle contralateral, elevator

of the scapula and scalenes omolateral; pelvis rotation and inclination on the contralateral side; scolios is omolateral to the mandibular deviated side.
CONCLUSIONS: The relationship is controversial. There aren't results statistically significant but qualitative analysis leads to interesting clinical considerations. Child's adaptability is wider than the adult's one, so it's difficult to appreciate significant dysfunctions. Compensations on body posture and Temporomandibular joint could become symptomatic under disturbing factors, during growth. Clinician has to pay attention when there are risk factors. Multifactorial approach is recommended. The sample should be extended and medium to long –term observations are requested.

TMD and fibromyalgia: preliminary report

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BACKGROUND: Fibromyalgia is a syndrome characterized by chronic widespread, musculoskeletal pain, stiffness, not restored sleep, fatigue, cognitive dysfunction and, consequently, impaired daily activities.
Frequently in patients with fibromyalgia can be found other associated disorders such as temporomandibular disorders, primary headaches, interstitial cystitis, chronic pain, lower back pain, chronic fatigue syndrome, primary dysmenorrheal, psychiatric disorders such as anxiety and depression with painful physical symptoms and many other.
Fibromyalgia and TMD are two different painful disorders whose clinical conditions often overlap.
Clinical studies revealed that the 68% to the 97% of fibromyalgia patients have TMD signs and symptoms but few of them analyze the prevalence of fibromyalgia in patients with chronic painful disorders as TMD, headache and cervicalgia.
The aim of this study was to analyze the prevalence of fibromyalgia in a large sample of patients with chronic painful TMD in order to find an effective method to screen this condition and to address to a neurological detailed visit.
METHODS: Among all patients archived in the Gnathologic Service of the Head Neck Department of the Umberto I Hospital of Rome during the period 2015-2010, 354 patients with chronic painful conditions (presence of pain from more than 6 months and with a high intensity VAS> 50, raised to the masticatory muscle, TMJ, headache, neck region) were selected. All the patients were submitted to a clinical and/or phone interview based on 11 questions (widespread pain and continuous, fatigue, anxiety and mood disorders, sleep disorders, memory loss, and difficulty concentrating), anyone answered yes to at least seven of these, was considered at risk of fibromyalgia. 251 patients, who were positive to the telephone interview, composed the first study sample, others 50 patients (14,1%) were excluded because the pain was localized. 201 patients (56,8%) were sent to a specific neurological screening to confirm the presence of fibromyalgia using the Fibromyalgia Classification Criteria published by the American College of Rheumatology (ACR) in 1990.
RESULTS: Of the 201 positive patients,118 patients (58,7%) with chronic pain in the head and neck region and positivity telephone interview underwent a neurological examination while 83 patients (41,3%) have decided not to undergo neurological examination for lack of time and interest, notice of termination and / or failing to neurological examination.
Of the 118 patients who underwent neurological evaluation 82 patients (69,5%) found to be positive to the presence of fibromyalgia but 36 (30.5%) negative.
To all the patients with fibromyalgia has been proposed a specific pharmacological treatment (60 mg per day of duloxetine for 2 months) and with periodic inspections to assess the pattern of symptoms. They are currently in drug treatment 43 patients.
CONCLUSIONS: This study highlights that the possible risk of a presence of fibromyalgia in patients with chronic TMD pain is very high. About 70% of patients affected by chronic and pain temporomandibular disorders, both articular then muscular, with simultaneous widespread painful conditions, resulted positive to the fibromyalgia diagnostic test. Clinicians who identify these characteristics in their patients should immediately refer patients to a specialist neurological examination to reduce the possibilities of an incomplete diagnosis and a treatment failure. This research stresses the need for a multidisciplinary approach.

Cephalometric evaluation of cranio-cervical posture in patient with class II malocclusion. Comparative study of dysfunctional patients and control sample

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BACKGROUND: the Stomatognathic System (S.S.) is a structural and functional unit that performs basic functions such as swallowing, chewing and talking: this system interacts with the contiguous anatomical structures and systems, participating to other functions such as respiration, digestion, body posture control and balance. This system correlates with the cervical spine and hyoid bone, forming a functional cranio-cervical-mandibular unit. This system correlates with the cervical spine and hyoid bone, forming a functional cranio-cervical-mandibular unit. For anatomical and functional reasons, the principles of biomechanics of the head and neck are of great interest in dental (particularly, in the orthognatodontic field) and rehabilitation fields because an altered dento-maxillary condition may involve the cranio-cervical area and vice-versa. The aim of this study was to evaluate changes in the physiological curve of the cervical spine, head and hyoid bone position in patients with a specific dental alteration as the Class II malocclusion. To strengthen the research field, data were collected on two groups of patients, with and without TMJ dysfunctions (healthy subjects), having in common a dental Class II.
METHODS: patients covered by the research were recruited among those who spontaneously contacted the Gnathology Service of Oral and Maxillo Facial Sciences Department of Sapienza University of Rome, and the Orthodontics and TMJ unit of the George Eastman Hospital of Rome, in the period from September to December 2011. Included in the study were patients with presence of dental Class II who were at least 15-year old and agreed to take part in the study. Excluded from the

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work were patients with the following features in the studied areas: no teeth in the posterior and lateral area, a history of trauma, previous orthognatodontic and surgical therapies, structural malformations, systemic diseases. To these basic criteria was added, for the dysfunctional group, the presence of a TMJ disorder. The dysfunctional pathology was diagnosed with the integrated RDC/TMD methodology and the dysfunctions encountered in groups Ia, IIa were considered. The data were subjected to Spearman and Pearson correlation analyses.
RESULTS: the only statistically significant finding was the reduction in the cranio-cervical angle (Pearson R 0.004), this data was significantly greater in the group with TDM.
CONCLUSIONS: our results seem to indicate modest correlation between Class II occlusion and abnormalities of the cervical spine. The analysis appears to be more consistent in the TMD group emphasizing the possibility that back rotation of the head on the neck might be related to joint dysfunction.

An innovative way to treat gnathologic disorders: progressive aligners with gnathologic attachments

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BACKGROUND: Conservative treatment of temporomandibular joint disorders includes different approaches, such as occlusion treatment with gnatological splints.
During a gnatological treatment with splint, it cannot make dental displacements, while, with our attachment provided in the aligners, we can eliminate interference and precontacts presented in certain sectors.
The splints can be performed either to release or to reposition the mandible and have the purpose of removing or "bypassing" etiological occlusal factors, such as precontacts and interferences, which often cause, facilitate or mantain the articular pathology.
The advantage of this method is to find, at the end gnathological therapy, an occlusion with improved function and the elimination of precontacts that might lead to a relapse.
METHODS: The aim of our work was to project a series of progressive customized aligners, characterized by the addition of some accessories with gnatologic purposes. Actually, with the digital set up, it is possible to add attachments with several designs, complete clearance plans or repositioning plans. Such devices allow to a controlled, progressive treatment of the occlusal component in the disfuntional patient in a safe and an effective mode.
RESULTS: The "gnathological" attachments need to be produced and tested and further reaserch is needed on this topic. Anyway, a preliminary survey on patients affering to the departments "ATM", Umberto I Policlinic, George Eastman Hospital, Rome, and "Oral Pathology", Department MESVA, University of L'Aquila, showed that patients seem more compliant, thanks to the possibility to align teeth while solving the temporomandibular joint desease and decreasing pain. In fact, the aligners are easily accepted by the patients, especially by the adult ones who work in public, because they are much more wearable compared to the classic splints.
CONCLUSIONS: Further studies are needed on this topic. The attachments need to be produced and tested on a sufficient number of patients. Anyway, the aim of our study was to prove that it is possible to solve a temporomandibular problem, decreasing the pain, which is the most important matter to the patient, while aligning the teeth. That leads to a mayor satisfaction of the patient and thus to more compliance of the patient itself.

Efficacy and effect induced by functional orthodontic appliance in a cohort of patients with juvenile idiopathic arthritis with a temporomandibular joint involvement

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BACKGROUND: Juvenile Idiopathic Arthritis (JIA) is one of the most common chronic diseases in childhood. In these patients, the temporomandibular joint (TMJ) involvement is a frequent, with a prevalence that varies between 38% and 72% depending on the JIA subtype, the diagnostic method used and the population studied. The aim of this study was to assess possible correlations between the clinical parameters of temporomandibular joint arthritis and pathologic MRI findings of the TMJ in patients affected by JIA, and the effect of a functional orthodontic therapy with a Class II activator.
METHODS: Fifty-three patients (41 girls and 12 boys, age ranging from 7 to 17 years) were selected for this study. Each patient had JIA based on the ILAR criteria with a median age of 5.5 years at disease onset and a median disease duration of 2 years. Clinical examination included facial evaluation and dynamic examination of the TMJ. A questionnaire was devised to evaluate the presence orofacial pain considering pain characteristics and location. Each patient with TMJ involvement was treated for 24 months with an Andresen activator, with a central screw and a vestibular arch. Magnetic resonance imaging included T1 (pre-treatment) and T2 (post-treatment) sequences in order to assess the TMJ involvement.
RESULTS: In the sample selected for the study, only 15 patients (10 girls, 2 boys) showed TMJ involvement; 7 patients were affected by oligoarthritis JIA, 8 patients by a polyarthritis JIA. Among the 15 patients with TMJ involvement the pathologic findings observed were: bilateral TMJ click (25); bilateral functional limitation (12); monolateral TMJ click (7); monolateral chewing pain (7); monolateral chewing pain + monolateral TMJ click (7); bilateral chewing pain + monolateral functional limitation (7); bilateral functional limitation + monolateral click (7); monolateral swelling + bilateral click + deviation (6); bilateral functional limitation + deviation (7); bilateral chewing pain + functional limitation + deviation (7); deviation (7). Comparing pretreatment and post-treatment with Andresen activator for 24 months, clinical signs, a significant improvement of TMJ symptoms

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was observed; TMJ pain, jaw deviation and mouth opening limitation were considerably improved in almost all patients. An improvement in facial profile with a reduced skeletal discrepancy and an increased function was observed, as the signicant regression of orofacial pain.
CONCLUSIONS: The results of this study showed that a Class II activator could prevent severe problems of the TMJ in JIA patients with TMJ involvement. Moreover, an early treatment of patients with TMJ involvement with a Class II activator could prevent severe TMJ disorders caused by hypoplasic condyles and growth alterations of the mandible. Increasing of posterior vertical facial height and the consequent mandibular counterclockwise rotation can improve occlusion, masticatory function and facial profile. A regular clinical examination, together with progressive monitoring of the craniofacial development, in cooperation with paediatric rheumatologists, should be trained to early recognize TMJ disorders in patients affected by JIA.

CDM therapy by fixed bite plate in disfunctional adult patients

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BACKGROUND: we present 3 cases report of treatment of DCM in adulth patient affected of II class 2 div.
METHOD: We select 3 adulth patients affected by II class 2div with signs and symptoms of DCM (i.e.pain at head and shoulders , at back, locking and clicking on opening and closing motion of mandible). we treated thoose patients by a mechanical of II class without extraction, and we introduce a fixed byte plate on lower arch for 8 months.
RESULT: At the end of treatment of maloclusion, we had a resolution of signs and symptoms of DCM and a cervical correction onposition of column
CONCLUSIONS: the fixed byte plate on lower arch reduce the time of treatment and allows a stable correction of DCM in adulth patients affected by II class malocclusio

Statistical analysis of the distribution frequency of signs and symptoms in temporo-mandibular disorders

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BACKGROUND: Temporo-mandibular disorders (TMD) are a pathological condition affecting temporo-mandibular joint (TMJ), masticatory muscles and other structures involved in stomatognathic system. The symptomatic clinical manifestation of TMD is varied and complex. The aim of the study is to evaluate statistically the distribution frequency of main signs and symptoms of TMD analyzing a sample of affected patients.
METHODS: Between 2011 and 2014, at the UOSD Diagnosis, Prevention and Oral Hygiene with Day Hospital Medical-Surgical General and Special for vulnerable patients of Polyclinic of Rome Tor Vergata, it was diagnosed TMD in 626 patients according to the guidelines of the American Academy of Orofacial Pain (2008). It was asked to each patient to compile a clinical folder where there were questions about medical history and the main symptoms experienced. The gnathological examination included: TMJ palpation; masticatory muscles palpation; examination of mandibular lateral deviation during opening and closing; evaluation of presence of open bite, deep bite, lack of teeth and molar dental class according to Angle classification. It was performed a statistical evaluation of collected data distinguishing the sample into two groups: female (F) and male (M).
RESULTS: The sample was composed of 471 females and 175 males with F/M ratio of 2,78:1. The average age for women was 37,4 years with a peak frequency between 40 and 50, while in men the average age was 39,1 years with a peak between 30 and 40. The symptoms were so distributed: TMJ pain 85,2%F and 73,7%M; joint sounds 78,4%F and 61,7%M; facial muscle tension 74,1%F and 52,6%M; headache 76,7%F and 56,1%M; difficulty finding exact mating between teeth 48,2%F and 54,8%M; bruxism/clenching 75,4%F and 52%M; cervical pain 78,8%F and 65,5%M; postural disorders 41%F and 32,4%M; ear pain 38,7%F and 34,9%M; sense of ear fullness 58,3%F and 51,4%M, dizziness 41,5%F and 35,3%M.
The frequency of muscle tenderness to palpation was so distributed: masseter 29,0%F and 59,3%M; temporal 30,8%F and 59,3%M; lateral pterygoid 56,1%F and 80,6%M; medial pterygoid 2,9%F and 69,2%M; mouth floor 0,6%F and 20,4%M; digastric 1,2%F and 23,8%M; sternocleidomastoid 3,4%F and 69,2%M; cervical 2,9%F and 25,0%M; trapezius 0,6%F and 23,1%M.
The mandibular lateral deviation during opening and closing was found in 55,4%F and 67,2%M.
Occlusal alteration were so distributed: deep bite 6,4%F and 19,3%M; open bite 1,7%F and 4,8%M; cross bite 9,3%F and 23,9%M; absence of molars 25,4%F and 60,5%M.
Dental molar classes were so distributed: right first molar class 54,3%F and 64,0%M; left first molar class 57,7%F and 62,3%M; right second molar class 34,9%F and 21,7%M; left second molar class 29,1%F and 21,7%M; right third molar class 10,9%F and 12,6%M; left third molar class 10,9%F and 14,3%M.
CONCLUSIONS: TMD symptomatology is varied and complex and it manifests differently in male and female. The most frequent symptoms are TMJ pain, join sounds, facial muscle tension, para-functions such as bruxism and clenching and neck pain. The most common factor of TMD is tenderness to palpation of the external pterygoid muscle. Mandible lateral deviation during opening and closing is present in the majority of patients, while the presence of open bite, deep bite and cross bite and absence of molar teeth are found in a low percentage of patients. The first molar class is the most frequent.

Severe obstructive sleep apnea therapy with oral appliances

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BACKGROUND: Obstructive Sleep Apnea Syndrome (OSAS) is a sleep-related breathing disorder characterized by

repetitive obstructions of the upper airways during sleep and disrupted snoring. Sleep apnea may be related to many severe medical conditions such as arterial hypertension, heart failure, daytime sleepiness and stroke. In clinical practice Mandibular advancement devices (MAD) are primarily used for severe obstructive sleep apnea patients who do not respond to CPAP (continuous positive airway pressure) therapy or when the apnea-hypopnea index (AHI) is lower than 30 respiratory events per hour. In this study we investigated the efficacy and the compliance of a CAD/CAM oral appliance in patients with severe sleep apnea who did not tolerate CPAP therapy.
METHODS: In our study we included 22 consecutive patients with severe sleep apnea (AHI>30) as determined by polysomnography (PSG) performed in a sleep laboratory. All patients received the same therapy with custom made CAD/CAM MAD (Narval CC, Resmed, San Diego, US) and underwent a second full PSG 2 to 3 months after the end of the titration period. The therapeutic position obtained in all patients after the titration was between 70% and 80% of their maximum protrusion.
RESULTS: No patients dropped the study. Mean baseline AHI was 44.2 (SD 15.7 range 74-30). Mean BMI of patients was 27 Kg/m2. The mean AHI after treatment was 12.1 (SD 5.2, range 0.1-19). Patients had a mean decrease of respiratory events of 73%. At Wilcoxon test, p value of AHI between baseline and after therapy resulted <0.0001.
CONCLUSIONS: It can be concluded that mandibular advancement devices are a viable treatment option even in cases of severe OSA, when patients do not want to continue CPAP therapy.

Temporomandibular disorders in patients affected by systemic sclerosis: a pilot study.

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BACKGROUND: Systemic Sclerosis (SSc) is a rare systemic autoimmune disease characterized by fibrosis, alteration of microcirculation and presence of autoantibodies. This disorder can affect the oral mucosa both in its cutaneous form (Morphea) and its systemic form (Systemic sclerosis). Oral manifestations include microstomia, xerostomia, periodontal damage with loss of attached gingiva and multiple foci of gingival recession. Tongue can also become rigid because of fibrosis, making speech and swallowing difficult. The soft tissues around the temporomandibular joint were also affected, thus being responsible for pseudoankylosis.
Temporomandibular disorders (TMD) is a generic term referred to clinical conditions involving the jaw muscles and temporomandibular joint (TMJ), like locking or disc derangement, tenderness to palpation and pain on movement of the mandible. The aim of this study was to assess the prevalence of symptoms and signs of temporomandibular disorders of in SSc patients as compared with a healthy control group .
METHODS: The study group included 40 patients (5 men, 35 women) with Systemic Sclerosis. A group of 40 subjects without Systemic Sclerosis (5 men, 35 woman) served as control. TMD signs (TMJ sounds, bruxism, opening derangement and restricted jaw movements) and symptoms (patient's complaints and myofascial pain) were evaluated according to the standardized Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).
Statistically analysis: the prevalence of signs and symptoms was analyzed in all the groups. Categorical data were expressed as number and percentage and compared using chi-squared ($\chi 2$) test with Yates' correction. In all comparisons a p value of ≤0.05 was considered statistically significant.
RESULTS: Patients with Systemic Sclerosis complained symptoms like tenderness or pain in the joint area (arthralgia), difficulty in opening the mouth, feeling that the jaw was stuck or locked: SSc group was more affected than controls (p<0,05). The width of jaw movement was measured: opening, lateral excursion and mandibular protrusion were sensibly reduced in sclerodermic patients than controls with a statistically significant difference. Myofascial pain, TMJ sounds, signs of bruxism and opening derangement did not show statistically significant differences between the two groups.
CONCLUSIONS: Systemic sclerosis seems to play a role in TMD, with a higher frequency of patients' complaints and a reduction of jaw movements. The results obtained were carried out from little samples: further investigations should be performed in bigger and wider samples.

Evaluation of the efficacy of mandibular advancement device for the treatment of obstructive sleep apnea

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BACKGROUND: Obstructive sleep apnoea-hypopnoea is a syndrome characterized by recurrent episodes of partial or complete upper airway obstruction during sleep that are usually terminated by an arousal. Nasal continuous positive airway pressure is the primary treatment for obstructive sleep apnoea-hypopnoea, but many patients are unable or unwilling to comply with this treatment. Oral appliances are an alternative treatment for sleep apnoea.
The purpose of the present prospective study was to evaluate the long-term efficacy of oral appliances (OAs) in early treated patients with obstructive sleep apnea (OSA).
METHODS: During 2013-2016, 71 patients with OSA were referred for dental management with an individually adjusted OA at a specialist sleep clinic. Twenty-four patients were considered unsuitable for treatment, remaining 47 patients started treatment with OAs (41 men/6 women, mean age 53,5±13,5 year, body mass index 27,13±5,47, Apnea–Hypopnea Index (AHI) 24,1±14). In this study were employed two different type of OA: one was a custom and titratable OA (SomnoDent®), second was a non-custom and titratable OA (MyTap®).
Five patients were lost to follow-up, two were unresponsive at treatment and five weren't accepting CPAP as first-line therapy, choosing OAs as second-line therapy.
Nocturnal respiratory polygraphic recordings were performed at baseline (T0) and various follow-up visits (T1, T2). Average time between baseline polygraphy and first follow-up visit was 12 months.
RESULTS: OA has very significantly improved values of AHI from T0 to T1 (p = 0,000000015) also for values from T0

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to T2 downward trend for AHI was highly significant keeps (p=0,001).
Instead a statistically significant difference between T1 and T2 (p <0.01) wasn't detected, in reflecting the fact that the therapy remained constantly effective at a distance of time.
As regards the ODI (Oxygen Desaturation Index), OA improves very significantly the values between T0 and T1 (p = 0.005) and also between T0 and T2 decreasing trend of ODI values remained significant (p = 0.02). Instead a statistically significant difference between T1 and T2 (p <0.05) wasn't detected, in reflecting the fact that the therapy remains constantly effective at a distance of time.
As regards the minimum oxygen saturation, OA improved significantly the values between T0 and T1 (p = 0.04), however, this improvement trend of the values of the minimum oxygen saturation wasn't retained statistically significant between T0 and T2 (p <0.05).
Instead, as regards the average oxygen saturation appeared to be no significant changes due to the use of the AO.
CONCLUSIONS: A mandibular advancement device reduces apneas especially in those with mild and moderate disease. A short-term follow-up is valuable in the selection of patients who will benefit from long-term treatment with a mandibular advancement device.

Lingual ring ripara device in the treatment of TMD: preliminary study

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BACKGROUND: Tongue is one of most important unit for the development of oral functions. An alteration in tongue coordination can be associated with some problems involved occlusion, skeletal bases, TMJ and masticatory muscles. Despite of these considerations, a rehabilitation of tongue functionality in the treatment of Temporomandibular Disorders (TMD), is still little or not considered. The aim of this study was to analyze the application of a new occlusal device, called "Lingual Ring Ri.P.A.Ra.", whose purpose is to actively re-educate the tongue and mandibular position through a specific functional ring.
METHODS: Among all patients referred to the Gnathologic Service of the Head Neck Department of the Umberto I Hospital of Rome during the period February – December 2015, 80 patients with disc displacement with reduction and/or articular and muscular pain(≥20according to VNS)were selected. The sample was randomly divided in two different groups, a study group (SG: 40 patients) and a control group (CG: 40 patients). The patients reported in the SG, applied"Ri.P.A.Ra" device for a maximum period of three months. GC patients have not been underwent to any treatment during the same period. All the patients were controlled in two time: T0 (baseline) and T1 (after 3 months) in order to assess the differences of pain, the ROM and the TMJ clicking. Segmentation statistical analysis to compare quantitative and qualitative data was performed on the two groups.
RESULTS: At T0 patients of SG recorded: joint pain 80% (32 patients), myalgia 75% (30 patients), TMJ clicking 100% (40 patients).The same sample at T1 recorded: : joint pain 22% (7 patients), myalgia 33% (13 patients), TMJ clicking 5% (2 patients). At T0 patients of CG recorded: joint pain 65% (26 patients), myalgia 60% (24 patients), TMJ clicking 100% (40 patients).The same sample at T1 recorded: joint pain 65% (26 patients), myalgia 60% (24 patients), TMJ clicking 98% (39 patients).
CONCLUSIONS: The preliminary results and the comparison between the two groups, confirmed that the rehabilitation model therapy with conservative methods are indicated to cure the TMD patients. The results obtained with the application of the Ri.P.A.Ra immediate splint, indicate that a rehabilitative action through the control of the tongue functionality, it is a valid treatment option for the improvement of the patient with TMD. Further investigations are needed to confirm these results.

Temporomandibular disorders in patients affected by systemic lupus erythematosus and discoid lupus erythematosus: a pilot study.

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BACKGROUND: Systemic lupus erythematosus (SLE) is a systemic autoimmune disease that may involve an organ or system, presenting a great heterogeneity of clinical and laboratory manifestations that result in varying degrees of severity. This chronic, often life-long disease can affect the oral mucosa both in its cutaneous form (Discoid LE) and its systemic form (SLE). It is well known that a great proportion of these patients present arthritis of any joint, and temporomandibular joint's impairments in SLE are not uncommon. Temporomandibular disorders (TMD) is a generic term referred to clinical conditions involving the jaw muscles and temporomandibular joint (TMJ), like locking or dislocation, tenderness to palpation, and pain on movement of the mandible. The aim of this study was to assess symptoms and signs of TMD in SLE and in DLE patients as compared with a healthy control group.
METHODS: The study group included 32 patients (5 men, 27 women; median age 41,97±26,29 years) with SLE or DLE (28 are affected by SLE and 4 by DLE). A group of 32 subjects without LES or DLE (5 men, 27 women; median age 47,25±15,77 years) served as control. Signs and symptoms of TMD were evaluated according to the standardized Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). SLE patients were subgrouped by gender and divided in 2 subgrouped (patients with SLE and DLE), to assess the prevalence of traditional TMD symptoms and signs. Statistically analysis: the prevalence of signs and symptoms was analyzed in all the groups. Categorical data were expressed as number and percentage and compared using chi-squared ($\chi 2$) test with Yates' correction. In all comparisons a p value of ≤0.05 was considered statistically significant.
RESULTS: Patients with SLE, both in the cutaneous form and in the systemic one, were affected by TMD symptoms and signs in the same proportion of the control group. The only exception was a statistically significant increase of restricted jaw movements detected in patients with SLE as compared with controls.
CONCLUSIONS: SLE seems to play a role in TMJ disorders, causing a reduction of jaw movements. The results obtained were carried out from little samples: further investigations should be performed in bigger and wider samples.

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Temporomandibular disorders and neck pain: review of literature

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BACKGROUND: The aim of this study was to assess a possible reciprocal risk of occurrence between Temporomandibular Disorders and neck pain. These two pathologies are often present together so it would be appropriate to lead the specialists to examine in the same time these two districts. To deepen the knowledge on this subject a literature review was conducted.
METHODS: An analytical review of the scientific literature published in the period from January 2000 to November 2015 was performed. Using the keywords: "TMD and neck pain", "TMJ and neck pain", "TMD and cervical spine", "TMJ and cervical spine" 1150 articles were found. Applying two series of exclusion criteria 28 articles were selected. For the analysis of the significance of the results, the PICO method was used. To evaluate the validity using specific scientific criteria, a score for any item considered was assigned.
RESULTS: By using the PICO method the 28 articles selected were summarized evaluating in particular the population, the study design, the presence of control groups and the results obtained from the study. Subsequently a score for each item considered was assigned considering certain parameters: sample size, type of study, methodology used for the diagnosis of the TMD, methodology used for the diagnosis of the cervical spine status, statistical analysis. Assigning each parameter a score from a minimum of 0 to a maximum of 4, from a minimum of 7 to a maximum of 14 points were obtained. The sum of the scores defines the scientific validity of the research, 15 scientific works with a score higher than 12 were considered to be useful for review.
CONCLUSIONS: Almost all the works have used the RDC system for the diagnosis of TMD. The most critical issues encountered regard the assessment of the cervical district and analysis used for the diagnosis of neck pain. All work considered have used a different methods, this has not allowed a valid comparison of the data. Despite these difficulties, some final considerations can be made. A proportionality between the painful issues exist, for example greater the temporomandibular pain is, greater the pain in the cervical area seems to be, regardless the evaluation used. Connections and directions about who produces what cannot be done, whether they are separate or connected painful entities. The largest flaw of all studies was the absolute absence of a guide in the definition and evaluation of cervical problems, both from a functional and symptomatic point of view. These evaluations justifies the current difficulty to introduce the neck pain in a classification system. All researchers should strive to standardize the evaluation of cervical problems in order to address better the possible relationships.

Use of T-Scan device for the occlusal balancing of Michigan splint

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BACKGROUND: Therapy of cranio mandibular disorders (CMDs) may include occlusal splints, physiotherapy, relaxing appliances and pharmacological interventions. In this study, we tested the use of T-Scan device to improve the occlusal balancing of a centric relation appliance. Equilibration of stabilization splint is a key factor in restoring temporary the occlusion. The stabilization splint is a type of occlusal splint and is also known as: the centric relation appliance or the Michigan splint.
METHODS: Clinicians usually use qualitative methods as a paper or plastic inked ribbon to perform occlusion adjustment of stabilization splints. However, some researches have shown that these media are inaccurate to describe the intensity of occlusal contacts.
Quantitative method (Tscan 3; Tekscan, Boston, Mass) in combination with articulating paper is suggested to improve occlusal equilibration following the center of the force concept. The center of force illustrates the "balance" of the occlusion and its marker pinpoints the location of the sum of the total force of the occlusal contacts, it is determined by calculating the sum of the medio-lateral force moment of the tooth contacts about the mid-sagittal axis, and the mean of the left and right leverage arms in relation to the incisive plane. In this study, a single examiner undertook the evaluation of the T-Scan readings before and after the occlusal balancing. The same sensor was used for all the three (pre-operative, after qualitative evaluation and after quantitative balancing) readings and positioned in a standardised manner with initial tempering of the sensor.
RESULTS: Analysis with T-Scan system showed different intensity for each contact and the pinpoint marker of the center of force not in the target area. After the quantitative equilibration procedures, improvements for load percentage distribution at each contact with a center of force pinpoint directed toward the target and an even bilateral occlusal contact trough articulating paper marking dots, were seen.
CONCLUSIONS: Computerized occlusal analysis and center of force provided previously unavailable information improving stabilization splint evaluation of load distribution and occlusal adjustment. Occlusal balancing with T-scan system could represent a valid and reliable method for the equilibration of stabilization splint, however further studies needs to confirm the clinical use of this technique.

Perception of orofacial pain and symptoms of temporomandibular joint disorders in a population of Northern Italy

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BACKGROUND: To assess whether orofacial pain and symptoms of TMJ disorders are differently perceived in population as a function of age and gender.
METHODS: We recruited 180 subjects, 90 female and 90 male, aged 18 to 65 years from the Dental Clinic of University of Brescia. All participants involved in the study were interviewed by a validated e-mailed survey. They answered a questionnaire about age, gender and lifestyle (smoker/non smoker, diet habits and perceived stress). TMJ disorders were investigated by questions, according to the American Academy of Orofacial Pain recommendations. Temporomandibular joint sounds (click, clock, roar), pain in temporomandibular joint (ear region), muscle pain and

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masticatory muscle pain were investigated. The questionnaire was anonymous and all personal data indicated were about age and gender. Prevalence of symptoms was calculated.
RESULTS: We collected data according to results in literature about perception of orofacial pain and temporomandibular joint disorders. 42.6% of population interviewed reported TMJ symptoms, the most reported symptom was the pain in TMJ region (29.3%). Masticatory muscle pain was mentioned in 28% of sample and the muscle pain was reported in 25.8% of the interviewed subjects. Occasional TMJ sounds were cited in 43% of population. The prevalence of all symptoms was higher in women than in men, especially women aged 25 to 45 years. The most reported symptom in women was the muscle pain (25% in women, 18% in men). Smokers subjects, independent of gender, presented a greater prevalence of orofacial pain conditions (muscle pain, masticatory muscle pain in 34% of smokers subjects). Diet habits did not influenced the results.
CONCLUSIONS: orofacial pain and TMJ disorders symptoms are more frequent in women than in men. The smoker condition seems to influence negatively the perception of TMJ disorders symptoms, independent of gender. Young women (25 to 45 years of age) seem to more suffer from TMJ disorders and especially form muscle pain, independent of chewing. We believe this topic needs to be more assessed and investigated because it might be possible that the perception of orofacial pain and TMJ symptoms could be influenced by geographic and social provenience as well as by lifestyle habits (smokers, alcohol consumption, drugs use...). It is of course necessary to more investigate the impact of this perception on the suffering subjects.

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Evaluation of osseointegration of oral titanium implants positioned adding fibronectin or BMP7: a pilot study in minipigs

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BACKGROUND: Different materials have been studied about their capacity to improve the level of osseointegration on oral dental implants.
The aim of this present study is to evaluate the effects of fibronectin, Bone Morphogenetic Prtein-7 (BMP7) and collagene type 1 added to bone implant sites prepared in animals.
METHODS: Using traditional drill technique, twenty-four porous titanium implants (TiUnite MKIII 3.75 x 10 mm) were inserted into six minipig tibias. Six implants were inserted as such (control), six implants after addition in the sites of fibronectin, other six with BMP7 and the last six adding type 1 collagen. Collagen was used since BMP7 was carried by type 1 collagen.
Tibial bone specimens were collected before the implant surgery stage to determine baseline (time 0) values.
After 7, 14 and 56 days post-implant, animals were euthanized by pre-anaesthesia with 2% xylazine (2.2 mg/kg) and tiletamine/zolazepam (6.6 mg/Kg) and an intracardiac injection of embutramide, mebezonium iodide and tetracaine hydrochloride (70 mg/kg). The tibias were exposed and dissected into slices, so as to evaluate the peri-implant osseous healing corresponding to the various implant sites.
Histomorphological analysis were performed.
Using Biomolecular Analys and the Real-time PCR techniques, the levels of bone morphogenetic protein-4 (BMP-4) and -7 (BMP-7), transforming growth factor-β2 (TGF-β2), osteocalcin, tumor necrosis factor-α (TNF-α), and interleukines-1β (IL-1β) and -10 (IL-10) were evaluated in the peri-implant bone samples.
All data are expressed as means±S.D. The significance of differences between group means was assessed by variance analysis, followed by the Newman-Keuls test.
RESULTS: The sites prepared with fibronectin or BMP7 showed the inflammatory infiltration in the same degree of control, whereas the sites in the presence of collagen showed a great increase of inflammatory cells than those control, fibronectin and BMP7. The neo-osteogenesis was quantified considering the absolute number of osteoblasts in osteogenetic areas and was observed to be consistently more active in sites prepared with fibronectin or BMP7, compared to control sites.
An early increase in the BMP-4 and 7 level was observed in the sites that had been prepared with BMP-7, whilst in drilled sites prepared with fibronectin no changes were observed in comparison with control.
During the early phases of testing, an increase in the TGF-β2 level was observed in sites prepared with BMP7 and fibronectin compared to control. An increase in the IL-1β level was observed only in the sites treated with collagen at 14 days.
With regard TNF-α expression, it was less than control with exception for fibronectin at 7 days.
IL-10 expression was less than control with exception for collagen at 7 days.
Osteocalcin was for all experimental times higher only in fibronectin treated sites in comparison with control.
CONCLUSIONS: On the basis of data, we believe that the presence of fibronectin and BMP7 is more efficient in the healing bone than surgical treatment without them, as it was observed to: induce an increase in bone morphogenetic proteins, control inflammatory process better and stimulate bone remodelling as early as 56 days post treatment.

Lateral approach for sinus floor elevation: large *versus* small bone window. A split-mouth randomized clinical trial. Small *vs.* large bone window for lateral sinus elevation

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BACKGROUND: to test whether a reduction of bone window dimension, in a split-mouth randomized study design, focused on lateral sinus floor elevations, can achieve better results than a wider window in terms of augmented bone height and a reduction of patient discomfort and surgical complications.
METHODS: Of the sixteen subjects enrolled in the study each underwent a bilateral sinus lift procedure based on two different access flaps to maxillary sinus.
Test side: small access window (6x6mm) + bone filling using a special device.
Control side: large access window (10x8mm) + manual bone filling.
Alveolar bone height and width were measured at pre-op and 6-month post-op CT scans; repeatable measurements were obtained using radiographic stents. Surgical intervention duration was also recorded.
Patients' evaluation of surgical discomfort was assessed using a VAS diagram at 7-day, 14-day and 30-day follow up.
RESULTS: Every surgical procedure was successful and healed uneventfully. No major complications affected the patients, although some minor adverse events were reported as follows: in the test group the presence of bone septa were found in two cases, membrane perforations during sinus elevation were reported in three cases and moderate hemorrhages

affected two surgical interventions. In the control group, membrane perforation was reported in four cases and bone septa in three patients.
A total number of 31 implant sites were considered for Test group and 30 for Control group.
In the test group the mean dimensions for bone window length and height were 5.75±0.6 mm and 5.38±0.5 mm while in the control group they were respectively 10.06±0.93 mm and 7.31±0.6 mm. Window area dimensions were respectively 30.9±4.4 mm^2 and 73.7±10.1 mm^2.
A significant bone augmentation in height and width of alveolar crest was obtained in both Test and Control side, although no significant differences were found between the two groups. Neither any significant differences emerged in data concerning the duration of the intervention.
Patients'opinion relating to surgical discomfort showed a preference for Test procedure at 7-day, 14-day and 30-day follow up.
CONCLUSIONS: 1. A reduction of bone window dimensions did not affect the safety of the surgical procedure: similar results were found in terms of height of augmented bone measured on 6-month post-op CT scans. 2. The two techniques tested showed no statistically significant differences in surgical intervention duration, although bone window preparation and bone graft filling of the sinus cavity were found to be quicker in Test procedure. 3. Patients' overall opinion at 7–day, 14-day and 30-day post-op showed a preference for Test procedure.

Are these complications or mistakes?

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BACKGROUND: Failure of dental implants is due not only to biological factors, such as unsuccessful ossteointegration or the presence of perimplantitis, but it also results from technical complications. In oral implantology, the most serious complications and those most frequently described in the literature occur during surgery.
This complication often occurs in the early postoperative period. Many studies indicated an increasing incidence of complications like implant migration into the sinus, perforation of the mandibular lingual cortical plate and sensory Ian injuries over the years.
The aim of this study is to report 22 cases of implant failure, iatrogenic related, referred to the Department of Dentistry, University of Padua.
METHODS: We observed 11 patients for a total number of 22 implant complications iatrogenic related.
Seven were Ian injuries like paresthesia and dysesthesia, four cases were implant migrations into the maxillary sinus, eight were osteomyelitis complications, three of them were a perforation of the mandibular lingual cortical plate, one case of tooth root drilled during site preparation and implant placement.
The displacement into the sinus occurred during or after implant insertion in the posterior upper jaw. Two of these patients sought medical care because of sinusitis symptoms, while the remaining 2 patients were asymptomatic.
Prior to the surgical treatment a CT or CBCT examination was performed.
We used both piezo-surgical devices and ordinary surgical drill to remove misplaced implants. The implant sinus migrations patients were treated under local anesthesia by removing the displaced implants through an antrostomy in the lateral sinus wall region.
RESULTS: A total of 22 implant complications were diagnosed and surgically removed. We achieved a major intra and post-surgical results with the correct diagnosis and the correct use of pre-operative radiologic exams. In one of these cases we proceeded with endodontic treatment of the tooth erroneously drilled. In four cases the paresthesia least even after implants placed into the inferior alveolar nerve were surgical removal. Healing was uneventful for all patients, and no recurrence of sinusitis was observed.
CONCLUSIONS: Indications for implant-based restorations have rapidly increased in recent years. As a result, there has also been a rapid increase in the number of practitioners with different levels of expertise involved in implant surgery.
The implant surgery is technique- and operator-sensitive, depending on proper patient selection, preoperative planning, and operative procedure. It is reasonable to affirm that the major cause of implant complications is mostly related to incorrect treatment planning and/or a poorly performed surgical procedure. The surgeon should be prepared for such possible complications and have a rehearsed plan of action for their treatment

Efficacy of transcrestal maxillary sinus lift in elevating Schneiderian membrane from bony walls and related influence on new bone formation

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BACKGROUND: The lifting of the Schneiderian membrane from sinusal walls allows a close contact between graft and bone, representing a crucial factor for a fast and predictable colonisation of the biomaterial by mesenchymal osteoprogenitor cells, which is one of the main biological bases for new bone formation after sinus floor elevation procedures.
Aim of this study is to evaluate the efficacy of transcrestal sinus augmentation in detaching and elevating Schneiderian membrane from maxillary sinus bone walls, correlating clinical, radiological and histologic outcomes to sinus cavity morphology.
METHODS: All the clinical procedures were performed in full accordance with the Declaration of Helsinki as revised in Seoul (2008) and the study protocol was approved by Regional Ethical Committee. Patients with a residual crestal height on the maxillary sinus<5 mm, in which sinus floor elevation was indicated to allow a single implant placement, were enrolled in this study. A transcrestal access to the sinus was performed with a calibrated drills system (Mica, Megagen, South Korea) and, after checking the integrity of the Schneiderian membrane with Valsalva maneuver, the sinus was grafted with a xenogeneic biomaterial (SmartBone, IBI, Switzerland). CBCT scans were performed ten days and six months after the surgery. After six months of healing, bone-core biopsies were retrieved using trephine drills and dental implants (Anyone, Megagen, South Korea) were inserted

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in the biopsy sites. Specimens were fixed, dehydrated and stained with Weigert hematoxylin A+B solutions and Ladewig stain for histological analysis. Digital photomicrographs and a software package with image capturing capabilities (Image-Pro Plus 6.0, Media Cybernetics, USA) were used for histomorphometry. Relations between continuous and ordinal variables were analysed with Spearman's rank correlation coefficient, while Pearson's correlation coefficient was used to compare continuous variables.
RESULTS: Twenty-two consecutive patients were enrolled and treated from July 2014 to March 2015 (11M, 11F; 58.0±10.7 years). Two drop-outs occurred, one for a large perforation of the Schneiderian membrane during the antrostomy (graft was not inserted) and another one for the deterioration of the bone-core biopsy. Twenty bone samples in conjunction with early and late post-operative CBCT scans were then analysed. Crestal height measured 3.2±1.3 mm at baseline and 14.2±2.5 mm after six months (mean height increase 10.0±1.5 mm). Histomorphometric analysis showed a mean percentage of newly-formed bone of 27.7% (±9.0%), a mean percentage of residual bone graft particles of 16.3% (±7.2%), with the rest of the specimens occupied by marrow spaces (57.2±10.8%). A moderate inverse correlation was found between sinus bucco- lingual width and number of bony walls exposed during the augmentation procedure (ρs=-0.57) and between sinus bucco-lingual width and new bone formation (ρ=-0.62). A strong direct correlation resulted between newly formed bone and number of bony walls exposed during the augmentation procedure (ρs=0.77).
CONCLUSIONS: Within the limitations of this preliminary proof-of-concept study, in which a scarce number of patients was analysed, the number of exposed bone walls during transcrestal sinus floor elevation seems directly related to sinus bucco- lingual width. Hence, transcrestal approach appears to be more predictable in narrow than in large sinuses, both in terms of new bone formation and in terms of membrane elevation from the bone walls.

Clinical and radiographic evaluation of 52 implants placed at the oral and implant-prosthetic surgery department of A. Gemelli Hospital, Rome

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BACKGROUND: Evaluation of oral implant systems is of primary importance for the assessment of long-term survival and complication rates of each system, for the determination of factors affecting the success of therapy, and for the identification of specific problems.
The aim of this retrospective study is to find out the rates of survival and success of implants placed and loaded at the A.Gemelli hospital and the influence of many risk factors on the medium and long term prognosis. Patient satisfaction was also analyzed.
METHODS: 25 patients (8 males and 17 females), treated with 52 implants of different implant systems placed and loaded by the same team, received a clinical and radiographic assessment of implants and prostheses.
For each subject, probing pocket depth (PPD) at six sites around the implants, bleeding on probing (BoP) and placque build-up at four sites around the implants, the mobility of the fixtures and the presence/absence of technical complications were recorded.
The radiographic evaluation was based on the analysis of bone levels on the mesial and distal ridges around the fixtures, as shown by intraoral radiographs taken with Rinn's film holders. A survey on the patient satisfaction was taken. The average follow up was 4,4 years, ranging from 1,5 to 7,8 years.
RESULTS: All 52 implants originally placed survived. The 96.5% of the prostheses survived. The rate of success ranged between 90,3% and 86,5% for the single implant and between 84% and 80% for the single patients.
The sample showed an average radiographic bone resorption of 1,09mm. The average PPD for all the sites was 2,72mm, with 2% of sites showing a PPD>5mm.
Bleeding on probing was found in 17,8% of all sites and 59,6% of implants showed BoP in at least one site.
The most common complication was mucositis around implants: almost 90% of the patients showed bleeding on probing in at least one site around implants.
The most negative prognostic factors were found to be placque accumulation around implants, cigarette smoking and maxillary location of the fixtures.
The patients reported a complete satisfaction in 92% of the cases. 8% of the patients were partially satisfied: all of them were rehabilitated with an overdenture on two implants.
CONCLUSIONS: The rates of success and survival showed once again the reliability of implant therapy. Placque accumulation and smoking were very detrimental for both medium and long term prognosis. Also maxillary implants showed a less favourable prognosis when compared to the mandibular ones. Nevertheless, a larger sample is required to confirm this trend.

Effects of different implant surface treatments on cell biology and gene expression

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BACKGROUND: It is not yet clear which biological activity is influenced by surface micro/macrostructure and chemical composition. (Conserva *et al*, Int J Oral Maxillofacial Implants 2010;25:1099-1107) The aim of this study was an *in vitro* comparison of osteoblast cell adhesion, proliferation, differentiation, and gene expression related to two different surface treatments applied to two implant designs to determine whether and how the interaction between cells and implant is influenced by macro/ micro structure (micro design and roughness) and the surface chemical composition of the implant.
METHODS: Fifty-two implants were used=26 EZ-Plus Internal (Megagen Implant Co, Ltd, Korea) Ø5mm x 13mm (n=13 with HA grit sandblasted RBM surface; n=13 with a Ca2+ incorporated in titanium XPEED surface) and n=26 Anyridge (Megagen Implant Co, Ltd, Korea) with same dimensions and surface treatments of the previous implants. The implant roughness and macro and microstructures were analyzed by Stereo-SEM and SEM, and the surface chemical

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composition by XPS analysis. SaOS-2 osteoblasts were used for both the biological tests and the RT-PCR. Twelve titanium disks with RBM and XPEED surface treatment were used for the immunofluorescence analysis.
RESULTS: The Xpeed and RBM surfaces have different chemical composition. The Xpeed surfaces of EZ Plus and Anyridge show different chemical composition (their macrostructure may have affected the surface treatment).The Xpeed surfaces show the <Ti (from 6.2% to 12.9%) and >Ca (from 8.5% to 12.7%) A great C peak (58.9%) on the Xpeed surface of EZ Plus. The Xpeed and RBM surfaces have similar values of Ra and Rq (2D linear roughness), Rz and RSm (3D quality of roughness). Both surfaces are SB and the nanometric Ca^{++} layer of the Xpeed surface does not modify the roughness. Cells on the Xpeed surface have a greater increase in proliferation and spread more rapidly (SEM BSE and Immunofluorescence data) Data from Anyridge PCR analysis show that SaOS2 cells grown in 24h on the Xpeed surface have an overexpression of some genes that regulate the processes of bone regeneration compared to those grown on the RBM surface. After 72h gene expression is similar between the two surfaces. After 8 days gene expression is much more evident on the RBM surface indicating that the osteogenetic processes start earlier on the Xpeed surface. Data from EZ Plus PCR analysis show that SaOS2 cells grown in 24h, 72h and 8 days on the Xpeed and RBM surfaces have similar gene expression.
CONCLUSIONS: The XPEED surface showed less contaminant. A low percentage of Carbonium did not decrease the surface wettability and well promoted a cell to implant contact. The macro-micro pore structured design and the chemical composition of the XPEED surface allowed a better and faster cell adhesion and proliferation but did not play an obvious role in *in vitro* cellular differentiation. It can assumed that differences in gene expression, even within the same surface treatment, may be due to macrostructure characteristics (fixture design and geometry), as follows: affecting the surface treatment and consequently the surface chemical composition or by self-induction of bone formation (biomimetic geometry).

Tissue changes of implants immediately loaded for full arch restorations. A 10-year single arm cohort prospective study

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BACKGROUND: The complete osseointegration before the implants' loading was considered mandatory in the classic protocol. Nowadays, immediate loading procedure has demonstrated to be a reliable technique, allowing implant treatment time and surgical steps reduction as well as patients' comfort increase. The aim of this study was to evaluate the long-term clinical outcomes and hard tissue changes around full arch rehabilitation with immediately loaded implants.
METHODS: Patients requiring dental implants for a full-arch implant-supported rehabilitation, who were 18 years old or older and able to sign an informed consent form were considered eligible for inclusion in this study. Patients with partially edentulous jaws and residual hopeless natural teeth were included in the study. All implants were placed with an Insertion Torque ≤40 Ncm. A minimum of 6 implants per arch were inserted; when insertion torque in post-extractive sites was<35 Ncm or less than 4 implants could be inserted, the patient was excluded from the study. The integrity of the buccal bone plate was mandatory, but peri-implant bone graft was allowed. The cumulative implant survival rate of the 10-year period was registered. Moreover, the Marginal Bone Level (MBL), measured through x-rays, was evaluated at baseline and 1, 3, 5, 7 and 10 years after the immediate loading procedure.
RESULTS: 43 patients were considered eligible, but 8 patients were excluded; 35 patients were included in the study and 42 full-arch prostheses were placed. 252 implants were placed at baseline, 215 implants could be followed after 10 years due to dropouts. MBL values were divided in post-extractive and healed sites, and evaluated also in all sites. MBL at baseline was -1.71±0.50 mm in post-ex, -0.03±0.25 mm in healed sites and -0.87±0.93 mm in overall sites. After 10 years MBL was -3.43±0.88 mm in post-ex sites, -2.60±0.72 mm in healed sites and -3.02±0.90 mm in overall evaluation. The implant cumulative survival rate after 10 years was 93.6% for all the implants, 95.5% in post-ex sites and 92.4% in healed sites.
CONCLUSIONS: Immediate implants in full-arch rehabilitation could be considered a reliable technique, when strict selection criteria are applied. The achievement of clinical ideal condition during the surgical step and the fabrication of adequate prosthesis and occlusion are key factors in immediate loading success. Establishing a strict hygiene personally tailored program is of utter importance in the long-term implant maintenance.

Implant-retained removable partial dentures: a 13-year retrospective study

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OBJECTIVES: The purpose of this 13-year retrospective study is to evaluate the long-term outcomes of removable partial dentures (RPDs) retained, but not supported, by dental implants.
METHODS: We retrospectively evaluated 32 consecutive patients who received implant-retained RPDs. Each patient received one to four endosseus implants; the sample included a total of 64 implants. Follow-up was conducted for a minimum of 13 years, during which satisfaction, implant survival rates, and prosthetic complications were recorded.
RESULTS: Patient satisfaction systematically increased after combined surgical and prosthetic therapy. The implant survival rate was 93.75%. The substitution of resilient components has been made routinely every year and the patients followed appropriate relining schedules (one relining every two years). 8 loose abutments were found in 6 patients. Teeth replacement has been performed 39 times in 28 patients. 18 adjunctive relinings were needed in 10 patients. These data are in line with the average values reported by the literature.

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CONCLUSIONS: Implant-retained RPDs are a reliable intermediate solution that can reduce biological and economic costs while maintaining implant treatment benefits and the ease of RPD procedures.

New prospects in the implant surfaces treatment for the purpose of enhancing biocompatibility: a literature review

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The most significant factors playing a role in osteointegration are the primary (mechanical) stability and the secondary (biological) stability; the risk of an implant not achieving a satisfactory osteointegration reaches its peak during the transition from the primary to the secondary stability, i.e. between the second and the fourth week from implant placement. The speed of the osteointegration process is directly linked to the features of the implant surface, which may or may not prove attractive to the osteoblast cells. As a matter of fact, according to recent studies, rough surfaces enhance the process considerably, whilst an even surface is less favorable to osteointegration. Since the interaction between the tri-dimensional structure produced by the osteoclasts and the so-called cement line is of paramount importance and depends mainly on the sub-micronic surface topography of the extracellular matrix, a close reproduction of the structural characteristics of the ECM is required in the implant surfaces: nanostructuring the surfaces ensures that such characteristics are actually imitated to the maximum extent possible. In view of the above, the use of Titanium nanotubes on the implant surfaces in order to obtain specific rough topographies seems to be an extremely promising line of research. Wang *et al*., 2014, have shown that by decorating mixed micrometric – nanometric surfaces with Titanium nanotubes excellent results are obtained in terms of biocompatibility and that proliferation and adhesion of osteoblasts-like cells is significantly fostered. A different technique has been applied by Sasani *et al*., 2014: Titanium implants have been coated through a simple sol-gel method with fluorapatite and TiO_2 and decorated with multi-walled carbon nanotubes, coated in turn with Copper for antibacterial purposes; the results indicate that such complex coating has the morphological features and nanomechanical properties which were sought. Similarly, ZnO nano-sized particles were incorporated by Liu *et al*., 2015, using a hydrothermal method, into TiO_2 nanotubes, with the aim of both optimizing the mesenchimal stem-cells differentiation and enhancing the antibacterial properties of Titanium: the experimental results (as well as those of a dedicated surface response mathematical model) confirmed that Titanium incorporated with appropriate concentrations of ZnO has an exceptional osteogenic effectiveness together with strong antibacterial effects; in particular the osterix, collagen-I, and osteocalcin gene expressions were substantially improved when compared to control samples. A further study (Lan *et al*., 2013) pursued an enhanced biocompatibility and antibacterial activity through modifications of the topography of anodized TiO_2 nanotubes of different diameters, which modifications were implemented by decorating the nanotubes with electronic-beam evaporated Ag; the results suggest that not only, due to the highly irregular topography on a nanometric scale of the Ag-decorated nanotube surfaces, was the adhesion and proliferation of human fibroblasts significantly enhanced, but also the growth of Staphylococcus aureus was greatly inhibited. Finally, Wang *et al*., 2015, have fabricated, via anodization combined with a hydrotermal process, a layer of TiO_2 nanotubes, which was then decorated with a layer of $SrTiO_3$ nanoparticles: the results show that an appropriate volume fraction of $SrTiO_3$ particles in the heterostructures so produced stimulated the secretion of cell filopodia, leading to enhanced biocompatibility in terms of cell attachment, anchoring, and proliferation on the heterostructure surface. In summary: nanotubes on implant surfaces have proven effective in enhancing biocompatibility, osteogenesis, and antibacterial properties (it should be noted that they may also be used as a channel for quick delivery of anti-inflammatory drugs, minimizing citotoxicity risks). It may therefore be safely stated that the nanometric technologies provide the most interesting prospects for the future of implantology.

Physico-chemical characterization and pre-osteoblastic cell response of a new calcium-modified implant surface: *in vitro* study

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BACKGROUND: It is common knowoledge that topographic and chemical properties of dental implants can affect bone response as well as implant long-term success rate. This has led to the development and marketing of new implant surfaces through the years. The purpose of this *in vitro* study was to evaluate psychochemical features and preosteoblastic cell morphology and differentiation parameters of a new calcium-incorporated implant surface, against other commercially available implant surfaces. To this end, hydrothermal treatment has been used as a method for calcium-ion in corporation on implant surface.
METHODS: Four different titanium surface surfaces were analyzed in this study: machined (MC), resorbable blast media (RBM), sand-blasted/large-grit/acid-etched (SLA) and calcium-incorporated SLA (Ca-SLA). Surface morphology and roughness were first characterized by scanning electron microscope (SEM) and white light interferometer, respectively. Surface chemical composition was analyzed using energy-dispersive x-ray spectroscopy (EDS) system. Pre-osteoblastic MC3T3-E1 cells were then cultured on the titanium surfaces. Cell morphology was observed at 24 hours, 48 hours, 7 days and 15 days by SEM; cell differentiation was assessed at 7, 11 and 15 days by assaying alkaline phosphatase (ALP) activity and osteocalcin (OCN) levels.
RESULTS: Surface microscopic and roughness analysis revealed differences between Ca-SLA and SLA implant surfaces solely at nanometer dimensions, presenting similar roughness values. The EDS analysis indicated titanium as the main element of each sample and confirmed the presence of calcium and a wider oxide layer on the Ca-SLA surface. Preosteoblastic cell morphology and differentiation did not vary significantly between the surfaces that were regarded. Data obtained showed that OCN levels produced by cell cultured on Ca-SLA or SLA surface tend to increase over time in a comparable manner and with higher efficiency in respect to other surfaces. Only at 15 days significant differences in

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cell differentiation parameters were found between the SLA (both Ca-incorporated and nonincorporated) and MC implant surfaces.
CONCLUSIONS: This study has demonstrated that hydrothermal treatment in alkaline calcium solution determined the formation of a modified oxide layer with nanoscale topographic without altering the surface microtopography. Preosteoblastic cells did not show major differences in morphologic and differentiation parameters at short-long term culturing on the surface analyzed.

Complex aesthetic rehabilitations: case report

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BACKGROUND: Regarding to oral health research, there is little evidence about whether perceived or normative oral problems influence on the quality of life generally. Most studies have addressed oral health related-quality of life as a multidimensional phenomenon represented by the combination of functional limitation, pain perceptions and aesthetics mouthparts and its relationship to disease and poor oral function. Evidence from these studies have also indicated that the number of teeth represents a major role as a determinant of subjective oral health
METHODS: We report the case of a patient of 50 years in which you run a prosthetic implant- supported fixed and a fixed prosthetic rehabilitation on natural teeth in upper jaw.
Dental ceramics present excellent ability to reproduce the natural teeth regarding esthetic and biomechanics.
The treatment plan was established to provide functional and aesthetic rehabilitation of the stomatognathic system and improvement of the quality of life. In a rehabilitation procedure, all alternatives should always be explained to the patient, including the cost differences, the levels of tooth tissue removal, the expected clinical longevity, the time to conclude the treatment, and the predictability of the aesthetic result. Based on these factors, the patient was informed about the possible treatments options.
RESULTS AND CONCLUSIONS: The case presented demonstrates how fundamental a multidisciplinary approach in the complex rehabilitation ; compliance with the common knowledge in the field implant - prostheses, in combination with some special precautions such as raising specific trans - crestal sinus, the use of prosthetic implant materials and the latest generation, now allow the clinician to obtain aesthetic results and functional excellent.

The use of new digital technologies in implant dentistry: a full-arch rehabilitation

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BACKGROUND: In modern implant dentistry, clinicians should treat patients regarding both functional and aesthetical features of oral rehabilitations. Accurate diagnostic and therapeutic protocols are necessary to achieve an optimal integration and long-term stability of the prosthetic treatments. Prosthesis design requires the assessment of tissues surrounding implants to score good outcomes, maintaining stable bone and gingival margin. Pre-surgical planning is fundamental for correct implant loading and crowns emergence profiles. The state-of-the-art of clinical research in implant dentistry are main focused on the development of less invasive procedures that can provide a faster healing of the soft and hard tissue whit a minimal loss of structure and a better aesthetic, and functional result, in short and long time. Guided implant positioning allows the operator to ensure the patient with all the best that technology and clinical expertise can provide.
METHODS: The report describes an implant planning system and the relative therapeutic approach aimed to facilitate and enhance quality of implant-supported rehabilitation of dental arches. The treatment consists of guided and prosthetic driven approach to implant planning, based on 3D radiographic and optical data, followed by surgical template manufacture and fixtures flapless placement. Flapless implant positioning procedure is facilitated and secured by means of accurate planning based on high quality 3D images and its correct transfer in surgical field.
RESULTS: The protocol results in minimally invasive and accurate surgical and prosthetic technique for implant rehabilitations. The technique's precision gives predictable outcomes using flapless surgery and enhances the feasibility of a functional and aesthetical final prosthesis.
CONCLUSIONS: Guided implant positioning allows surgical and prosthetic approaches with minimal trauma by reducing treatment time and decreasing patient's discomfort. Presented procedure improves significantly patient care; it reduces the likelihood of undesirable outcomes. Flapless implant positioning appears to be a useful and a safe procedure when based on accurate and reliable 3D image data and a dedicated implant planning software. Prosthetically direct implant placement based on digital planning ensures precise fixture placement and predictable prosthetic outcomes.

Prosthetic rehabilitation of maxillary lateral incisors agenesis using dental mini-implants: a ten year follow-up

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BACKGROUND: Mini implants consist of fixtures whose diameter is between 13/16 and 53/64 inches made up of 5th grade, extra-strong, titanium, sandblasted and acid etched, with an insertion torque greater than 95 ncm. At the beginning they have been used as main fixtures in full-arch implant or prosthetic rehabilitation. In 1999, the Food and Drug Administration (FDA) approved mini dental implants as a safe and permanent option for tooth replacement and they have been used for single-tooth restoration and in cases of transversal bone deficit. So, they may provide solutions in patients with severe osseous atrophy when there is small interdental space (such as in cases with lateral agenesis)

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or they may function as a reliable and economical solution in restoration of existing prosthesis. The purpose of this study is to evaluate the efficacy of mini-implants in cases of maxillary lateral incisor agenesis with patients affected by severe osseous atrophy (Type B: breadth 7/64-13/64 in, 25/64-31/64 height, length 7/64-13/64, bone density according to Misch D-3, 350-850 uH) in long term (ten-year follow-up).
METHODS: 30 mini-implants have been examined (diameter between 13/16 and 53/64 inches, model Milo, Intra lock) which were inserted in 21 patients affected by lateral incisors agenesis (12 single and 9 multible agenesis) of which 12 males and 15 females between the ages of 17 and 23. After necessary clinical (patient's age and/or cooperation) aesthetic (facial types, profile and smile features), cephalometric, occlusal ((molar class, OVB, OVJ, dental-basal disharmony, degree of crowding, position, size, shape, color of the canines, the presence of the third molars) evaluations, all patients underwent orthodontic space opening of 1.2-2.2 regions. After the insertion of the implants, the immediate, non functional loading, positioning of porcelain fused to metal (e.g. gold) crowns, presence of pain during percussion and mini-implant function, horizontal and vertical movement when a force of 5N was applied, ridge loss and plaque index (Silness & Loe 1964) have been evaluated every 3 months in the first year and every 6 months in the following ten years.
RESULTS: A ten year follow-up shows very good implant stability, absence of clinical or radiographic signs of progressive peri-implantitis and implant mobility) and satisfactory aesthetical results in time (no signs of infraocclusion).
CONCLUSIONS: Prosthetic rehabilitation of maxillary lateral incisors agenesis with severe bone atrophy using dental mini-implants has been proved to be minimally invasive, atraumatic and reliable. It offers several advantages such as reduction in ridge width and height, necessary to insert the device (< 19/32 inch), minor incidence of complications, minor recovering time, affordability, time saving for both doctor and patient and minor resorting to techniques of ridge augmentation (Guided Bone Regeneration) with re-absorbable membrane, bone grafting, ridge expansion using split-crest, E.R.E. (Edentulous Ridge Expansion) and R.R.O. (Ridge Expansion Osteotomy).

Temperatures generated during implant site preparation with conventional drilling versus the single-drill method: a human cadaver mandible study

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BACKGROUND: Bone overheating during osteotomy for an implant site preparation can lead to bone necrosis and consequent decrease of implant stability, due to the impairment of osseointegration process. The aim of the present study is to identify the differences between conventional osteotomy (multiple drilling steps) and the use of a single bur in terms of the temperature increase in the bone during implant site preparation. Another purpose of this comparison was to establish whether there is any correlation between the quantity of bone removed by each drill and the entity of bone heating.
METHODS: The tests were conducted on edentulous areas of suitably skeletonized anatomical preparations of human mandibular alveolar processes in Cawood and Howell classes II and III. The room temperature at the time of the test was 25°C. Thirty-eight implant sites were prepared by the same operator, 19 sites were prepared using the conventional method with drills of increasing diameter (group A) and 19 using a single-drill method (group B). Both procedures were performed without irrigation of the site.
For group A, the LEONEâ kit of drills was used. It consists of one round bur (1.9 mm in diameter) and three twist drills of increasing drilling surface diameter (2.2 mm, 2.8 mm, and 3.5 mm). The rate of rotation adopted was 800 rpm for the first and second drills, 600 rpm for the third, and 500 rpm for the fourth. For group B, the Zero1 LEONEâ drill, with a drilling surface 3.1 mm in diameter, was used at a rate of 500 rpm.
All implants measured 4.1 mm in diameter and 13 mm in length, and each drill was used no more than 10 times.
An infrared thermometer (kept at a constant distance of 13cm from the bone) was used to measure the temperature difference (DT°) induced by the drills at each site, with a temperature measuring area 13 mm in diameter. Student's T-test (with $p<0.05$) was used to compare the temperatures reached by the last drill in group A, and by the single drill in group B. The precision of the infrared thermometer was first validated by comparing the DT° with that of a thermocouple.
RESULTS: At 30 of the 38 implant sites, the bone density was judged to correspond to a Misch class D2, while in eight cases it was within class D1. The mean $\Delta T°$ for group A was 0.64°C, while for group B it was 1.47°C. The 95% CI excluded zero (95%CI in the range of -1.41 to -0.24), so the difference between the values obtained in the two groups was statistically significant, as confirmed by a p value of 0.0073.
CONCLUSIONS: In statistical terms, the two methods differ significantly in the temperature increase induced by the drilling procedure, but from the clinical point of view, this difference is negligible. This finding is important because it supports the hypothesis that, in computer-guided surgical procedures, the single-drill system and a turning speed of 500 rpm can be used, even without any irrigation, to prepare an implant site without risk of heat-induced bone necrosis. The present study also supports the possibility of not using irrigation during implant sites preparation: the absence of any irrigation did not produce an increase in temperature sufficient to cause bone necrosis, regardless of the method used for osteotomy.

Clinical and radiographic evaluation of single tooth implants placed in the posterior jaws: a 1-year follow-up.

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BACKGROUND: There is no doubt that the short term success, the osteointegration, of dental implants depends on the stability. The dual aim of this work was to measure the stability of dental implants prior to loading them, using a resonance frequency analysis (RFA) based device by Osstell® ISQ and to assess radiographically the marginal bone level at 6 and 12

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months after load in order to predict the long term success.
METHODS: Nine healthy and nonsmoker adult patients with at least six months of monoedentulism received ten screw type platform switched single tooth implants with double acid etched surface and microthreads in the neck (Prime®, Prodent) by a 2-stage procedure. RFA measurements, expressed in ISQ values, were obtained at surgery and at 3 and 6 months after surgery in the lower and upper jaws respectively. As agreed with Brånemark's protocol, the prosthodontic phase started 4-6 weeks after the second surgical stage and single gold ceramic crowns were cemented bypassing the provisional ones. X-ray explorations were taken for marginal bone level at the minute the last cementing of the prosthesis, as baseline, and at 6 and 12 months postloading using a paralleling technique and a waxed customized template. ImageJ® software was used to digitally process and manipulate the radiographic images and perform the measurements.
RESULTS: At placement, the mean ISQ obtained with the magnetic device was 68,6±4,7 and at the second measurement the mean implant stability significantly increased and recorded higher values to 75,3±5 ($p<0,01$). Mean of bone loss at 6 months postloading was 0,143±0,067 mm and at 12 months was 0,304±0,166 ($p<0,05$).
CONCLUSIONS: To know the timing of loading is one of the most interesting challenges in modern implantology and it can be easily achieved through the use of RFA-based devices, as Osstell® ISQ, attesting objectively a sufficient primary stability or a successfull osteointegration able to support a prosthetic load. Moreover the use of implants with some features in the macro- and microstructure, as platform switching, rough surface and microthreads, can avoid the harmful resorption of marginal bone. Furthermore a follow-up based on standardized and repeatable periapical radiographs and their process and measurements performed by software can faithfully attest the marginal bone level and prevent its potential loss due to overload or perimplantitis in order to achieve a long term success.

Vertical ridge augmentation and trabecular metal implant placement: a retrospective study

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BACKGROUND: Guided bone regeneration is a technique used to obtain new bone formation in several situation: periodontally compromised teeth, edentulous ridge augmentation, implant placement's sites, dehisced or fenestrated implants, peri-implantitis. In this study, the guided bone regeneration technique has been applied to gain bone regeneration and enlargement in edentulous ridges for the subsequent placement of osseointegrated implants.
The aim of this retrospective study was to evaluate the predictability of obtaining an efficient osseointegration and osseoincorporation of Trabecular Metal dental implants placed in bone which underwent a vertical ridge augmentation.
METHODS: The surgical technique adopted for all patients has been widely described in several articles (Simion *et al*. 1994, 1998, 2004; Tinti *et al*. 1996; Tinti & Parma-Benfenati 1998). The vertical augmentation procedure was performed using non-resorbable titanium-reinforced e-PTFE membranes and heterologous bone graft. Osteosynthesis screws were used to fix the membranes to the bone. The membranes were covered with tension-free flaps.
After a healing period of 6 months, all patients underwent a new surgery procedure in order to remove the membranes and place the determined implants, where the bone growth resulted adequate.
Ten patients were included in this study. All of them showed vertical ridge defects in the mandibular bone.
For three patients, the treatment involved the anterior area of the mandible; for seven patients, it involved the posterior area of the mandible. Overall, 33 Trabecular Metal (Zimmer) dental implants were placed.
RESULTS: At the membranes removal, a regenerated hard tissue clinically similar to the bone was observed. Two biopsies were collected in order to evaluate the histologic properties of the regenerated bone. The results demonstrated mineralized bone with different degrees of maturation and mineralization: one result reported completely grown bone, the other result showed a still-growing tissue.
Each implant was classified either success or failure according to clinical and radiographic parameters: subjective complaints (pain, foreign body sensation, dysesthesia), peri-implant infection with suppuration, implant mobility, continuous radiolucency around the implant, vertical bone loss were adopted for the success/failure evaluation.
None of the mentioned criteria was observed.
The healing period was uneventful in every surgical sites. No tissue defect was found during the follow-up period nor membranes' exposure was observed. At the abutment connection, all implants appeared clinically stable and submerged by a hard regenerated tissue. The implants were prosthetically loaded with temporary device first and with a definitive restoration afterwards.
No evidence of serious local or systemic side effects was observed in any patient throughout the whole study. All patients referred satisfactory function of the implant supported prostheses, without foreign body reactions or pain or dysaesthesia.
CONCLUSIONS: The findings from the present clinical study support the use of Trabecular Metal dental implants - together with titanium-reinforced e-PTFE membrane and heterologous bone graft - to obtain accurately osseointegrated implants in bone with vertical ridge augmentation and to guarantee an optimal tissues' healing.
However, more long-term clinical studies are needed to confirm the complete effectiveness of the adopted technique.

Clinical efficacy of using plasma-argon treated versus steam-cleaned or chlorexidine-disinfected abutments: intermediate results from a triple-blind randomized trial

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BACKGROUND: Previous studies suggested the inflammatory response at the implant-abutment interface as a possible cause of bone remodeling around implants.
Some authors focused on the importance of abutment sterilization because its surface touches hard and soft tissues.
Different methods can be used to clean and sterilize abut-

ments, such as autoclaves, chlorexidine and plasma treatment. Our study aimed to evaluate if the placement of Argon-Plasma treated abutments can influence bone remodeling or peri-implant clinical parameters compared to the placement of autoclaved or chlorexidine-disinfected abutments.
METHODS: This is a single-center (IRCCS San Raffaele Hospital, Milan, Italy), triple-blind, randomized, controlled study.
It included patients needed an implant-prosthetic rehabilitation of one or more elements in the mandible or maxilla, on which it was possible to make a bridge with at least one intermediate element between two abutments.
All patients were older than 18 years, not affected by systemic diseases, without pathological periodontal pockets.
They didn't smoke, or smoked less than 10 cigarettes per day.
Their alveolar bone volume allowed the insertion of one implant with a minimum diameter of 3.3 mm and a minimum length of 8.5 mm.
Patients pregnant or breast-feeding, taking biphosphonates, with acute infections in progress or requiring bone regeneration were all excluded.
For each patient, in an edentulous site (at least 3 months from extraction) one or more implants separated by an intermediate element were placed and a biphasic protocol was applied. In this protocol we considered three groups of patients.
After the reopening (which toke place at 3 months), the abutments were placed: in the first group were autoclaved, in the second one disinfected with chlorexidine, while in the last one were treated with Argon Plasma system.
A blind operator, after the placement of the abutment, estimated radiologically the peri-implant bone remodeling and clinically the following periodontal parameters: Keratinized Mucosa height (KM), modified Bleeding Index (mBI), modified Plaque Index (mPI), Probing Depth (PD).
RESULTS: Till to date 28 patients were included to our study. A total of 42 dental implants were inserted. No implant failed and no complications occurred. 11 implants were definitely loaded and 12 were provisionally prothesized. No significant differences in radiographic bone remodeling and peri-implant tissues between the three groups of patients were found from these results.
CONCLUSIONS: Our clinical and radiographical results suggest no significant differences among the three groups of patients. However, the small sample size and the short follow-up considered didn't allow a valid examination of the relationship between abutments' different treatments, bone remodeling and peri-implant tissues' health.

Treatment of mild peri-implantitis using a novel chitosan device

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BACKGROUND: The aim of the study is to verify the efficacy of a new chitosan instrument called BioClean™ in treating patients affected by mild peri-implantitis. The efficacy is measured by the improvement of two majors signs of inflammation: pocket depth and bleeding on probing.
The brush bristles of the test device (BioClean™, LABRDA AS, Oslo Norway) are made of the biopolymer chitosan. So far there is no device specifically developed for cleaning dental implants neither with mucositis nor with mild peri-implantitis and it is of utmost importance to develop methods optimized for therapy with the aim to prolong the life span of ailing dental implants. The primary objective of this study is to assess the clinical efficacy of the BioClean™ biodegradable brush used as mechanical debridement device for treatment of peri-implant mucositis. Primary end-point is reduction in peri-implant mucositis as measured clinically. Afterwards the study aims to assess: the therapist satisfaction and clinical functionality of BioClean™ ; the patient subjective appraisal of morbidity (i.e., pain) at use of BioClean (VAS scale); the safety of BioClean™ by evaluating the occurrence of adverse events. There study is structured on two hypotheses H_0: There will be no significant difference in reduction in parameters of peri-implant inflammation after debridement with BioClean™ neither 2 weeks, 4 weeks, 12 weeks and 24 weeks post therapy as compared with baseline. H_A: There will be a significant difference in reduction in parameters of peri-implant inflammation after debridement with BioClean™ at 2 weeks, 4 weeks, 12 weeks and 24 weeks post therapy as compared with baseline.
METHODS: For this study 15 patients have been selected, both men and women. They all had to present 1-2 mm of bone loss, a probing pocket depth (PPD) of ≥4 mm and they had to present mucositis, as demonstrated by the bleeding on probing (BoP). Among the main exclusion criteria there are: peri-implantitis, radiotherapy, chemotherapy, systemic long-term corticosteroid treatment, pregnancy or nursing, anatomical abnormalities, prosthetic factors making access to clinical measurements impossible, current smokers. The patients are selected and afterwards treated at the baseline date. Later they are treated again after 3 months. Therefore they are controlled at 2 weeks, 4 weeks, 12 weeks and at 24 weeks. The treatment is carried by immersing the chitosan brush in sterile saline solution for two minutes, afterwards the implant pockets will either be debrided with the BioClean™ biodegradable brush for 3 minutes and with the brush seated in an oscillating dental handpiece (NSK) and thereafter irrigated with sterile saline. The initial debridement is performed with local anesthesia as needed, the second debridement at 3 months but without anesthesia.
RESULTS: The two most important sings that are controlled during this study are the PPD and the BoP. The medium PPD improves from 3,435 mm at Baseline to 2,977 at 24 weeks (13.334%). In this case it has been used a T student test to find a p=0,0037. The frequency at which the implants do not present BoP raises of almost the 50% from the Baseline to 24 weeks. In this case it has been executed a Chi square test to find a p<0,00001.
CONCLUSIONS: With an improvement in both the main outcome measures and no adverse event happened during the study, the BioClean™ brush is proven to have a significant efficacy and security in its use.

Peri-implant soft tissue stability after single implant restorations using either guided bone regeneration or a connective tissue graft. A randomized clinical trial

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BACKGROUND: The purpose of the present study was to compare two different surgical procedures: the connective

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tissue graft and the guided bone regeneration technique, when applied in conjunction with implant placement. Probing pocket depth (PPD) and the recession depth (REC) were recorded at implant site after crown placement (t1) and at 1-year follow-up (t2), while the keratinized tissue height (KT) and the buccal mucosa thickness were recorded at 3 different time points : at implant surgery (t0), after crown placement and at 1-year follow-up. No statistically significant differences in peri-implant mucosa thickness and recession or in other periodontal parameters were recorded at adjacent teeth.

METHODS: A total of 32 patients with 32 single-tooth implants in the anterior maxilla were included in the study. The main outcome of this study was to evaluate peri-implant soft tissue stability during the first year after implant loading. One clinician not involved in patient treatment was trained and calibrated prior to the beginning of the study to record all outcome measurements. At implant site the following clinical parameters were recorded before surgery:the keratinized tissue height (KT); the mucosa thickness, recorded at the top of the crest, after local anesthesia, using a calibrated endodontic file; the buccal mucosa thickness (measurements were assessed, after local anesthesia, with a calibrated endodontic instrument #15, at the center of the edentulous buccal area, that was the mid distance between the two adjacent teeth, 2 mm apical to the bone crest).During the surgical procedure the following measurements were recorded:the width of the alveolar ridge (using a caliper 1mm below crestal level); the buccal bone thickness after implant insertion (measurements were taken as the horizontal distance from buccal wall to implant shoulder using a periodontal probe).All surgical procedures were performed by the same surgeon.The implant was inserted with one-stage technique;in the test group, guided bone regeneration procedure GBR was performed on the buccal side of the crest. A graft of de-proteinized bovine bone (Geistlich Bio-Oss®), mixed in a container with blood or saline solution, was positioned in situ at the facial aspect of implant site and modeled. The graft was covered by a collagen membrane (Geistlich Bio-Gide®).In the control group, a connective tissue graft CTG, harvested from palate and trimmed to remove all visible epithelium, was positioned at implant site on the buccal side of the crest. The graft was sutured and stabilized to the papillae and to the periosteal bed apical to the flap.In both the treated groups the buccal flap was advanced coronally, taking care to stabilize each surgical papilla over the interdental tissue bed, allowing for a precise adaptation around implant healing abutment, and secured in position using sling sutures.

RESULTS: In both groups treated, a significant intra-group increase in buccal mucosa thickness and in keratinized tissue was demonstrated between t0 and t1 (p=0.021), although no statistically significant intergroup differences were demonstrated (p=0.669). A significant increase in KT and mucosa thickness was expected for control group where an amount of connective tissue was positioned on the buccal aspect of the implant (p<0.001); nevertheless, the test group, where a GBR procedure was performed, also showed similar results.

CONCLUSIONS: Within the limitations of this clinical study, it can be concluded that CTG was shown to be beneficial in maintaining facial gingival level when performed in conjunction with implant placement, showing no statistically significant differences in term of mucosa shrinkage with GBR procedure.

Microarray analysis of peri-implant tissue behavior next to different titanium implant surfaces

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BACKGROUND: The aim of this split-mouth study was to evaluate the behaviour of soft and hard tissue around implants with different surface treatments.

METHODS: Each patient of the sample (5 men, 5 women) was treated with fixed partial dentures supported by implants and received at least 2 implants (1 control, 1 test) into an edentulous quadrant. The control implants (Osseotite, OSS) had a dual acid-etched (DAE) surface in the apical portion and a machined coronal part, test implants (Full Osseotite, FOSS) had a completely DAE surface. Machined healing abutments were placed on control implants and DAE abutments on test ones. After 3 months from surgery, a mini-invasive sample of soft tissue was collected from the first 7 patients recruited for the study (4 women, 3 men). The samples were analyzed by microRNA (miRNA) microarray. Standardized periapical radiographs were taken to investigate interproximal bone levels at baseline (immediately after implant insertion), 2 months, 6 months, 1 year post-implant placement. Plaque index (PI), bleeding on probing (BOP) and periodontal depth (PD) were recorded at 3, 6 weeks, at 2, 3, 6, 12 months post-implant placement. Differences in bone resorption over time were evaluated with Friedman test followed by post-hoc Wilcoxon signed ranks tests. Differences in bone resorption, PI, BOP and PD between the two types of implants over time were assessed by repeated measures ANOVA test for ranked data. A $p \leq 0.05$ was statistically significant. Microarray data have been processed by GeneSpring® software and their overall variability has been examined by box-plot analysis, scatter-plot analysis, hierarchical cluster analysis (HC), and principal component analysis (PCA). Individual miRNAs modulated by the experimental treatments and measured clinical parametres have been identified by volcano-plot (thresholds 2-fold and P<0.05), support vector machine, and k-nearest neighbor analyses.

RESULTS: Control implants showed greater bone resorption and lower PI, however the difference was not statistically significant. No statistically significant differences in BOP and PD were found. miRNA microarray analysis lead to the following findings:

— Implant sites with low PI and absence of BOP had a miRNA expression profile similar to those with plaque and absence of BOP; sites with high PI and high BOP had a different profile.

— Implant sites with BOP presented similar expression profiles independently from implant surface.

— Implant sites with high PI and normal bone resorption had a different expression profile from the other experimental conditions.

— Implant sites with normal bone resorption despite high BOP differed from the other experimental conditions. This

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gene expression profile resembled that of FOSS implants.
— Implant surface affected bone resorption: groups having similar bone resorption characteristics clusterized differently according to the implant type.
CONCLUSIONS: DAE surfaces induced lower bone resorption and showed more plaque accumulation than machined ones: this did not affect the health of soft peri-implant tissue. In fact, BOP values did not differ between test and control implants. miRNA analysis suggested that soft tissue inflammation is more related to a specific host characteristic (gene expression profile) rather than to the presence of plaque or to an implant surface. Some specific miRNA profile might be able to protect implant sites from bleeding and bone resorption irrespective of plaque. Possible future applications of the present findings include the use of the identified biomarkers for diagnosis and as drugs or coatings for implant surfaces, in order to improve the health of peri-implant tissues.

Bleeding on probing around dental implants: a retrospective analysis of associated factors

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BACKGROUND: The present study was performed to evaluate the association between the probability for a peri-implant sulcus/pocket to be BoP+ and the patient- and site-related characteristics..
METHODS: Data related to 1722 peri-implant sites (deriving from 287 dental implants) were retrospectively obtained from the clinical record charts of 122 adult, partially edentulous patients (53 males; mean age: 58.0±11.3 years). Also, data from 167 contralateral teeth were obtained. BoP had been assessed at 6 sites per each implant/tooth during the assessment of probing depth (PD) at the most recent visit among those performed at least 3 months following implant loading, and had been recorded as positive (BoP+) when bleeding had been detected at the site level. To analyze the influence of patient-, implant- and site related factors on the probability for a site to be BoP+, a logistic, 3-level model was built with BoP around implants and BoP around teeth as the binary outcome variables (±).
RESULTS: The prevalence of BoP at peri-implant sites was 27.9%. Gender and PD showed a significant association with BoP around either implants or teeth. In particular, females showed significantly higher BoP+ probability compared to males, and the log odds for BoP+ significantly increased for each 1-mm increment in PD at either implant or tooth sites. When controlling for gender and PD, the probability to be BoP+ was significantly lower at peri-implant sites compared to tooth sites. No significant association was observed between BoP+ probability and the other patient- (age, smoking), implant/tooth- (dental arch, position) and site-related (implant/tooth aspect) factors.
CONCLUSIONS: The results of the present study indicate that the probability of a peri-implant site to bleed upon probing is (i) associated with site-specific (i.e. PD) and patient-related factors (i.e. gender), and (ii) significantly lower compared to that observed at contralateral tooth sites when controlling for PD. Due to the retrospective nature of the study, prospective clinical trials should be conducted to better define the role of those factors which were shown to influence peri-implant BoP in the present analysis.

Paranasal sinuses complications after zygomatic implants placement in extreme upper jaw atrophy rehabilitation: a retrospective anatomical and radiological evaluation

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BACKGROUND: The aim of the present study is to evaluate the post-operatory incidence of rhino-sinusal pathologies in patients undergoing zygomatic implant insertion for the rehabilitation of extreme upper jaw atrophy in order to better understand the relationship between the presence of the implant in the sinusal context and anatomical and radiological maxillary sinus modifications.
METHODS: a retrospective analysis of maxillary sinus modifications and sinus disorders in 47 patients who underwent zygomatic implant placement for the rehabilitation of extreme upper jaw atrophy was performed. The zygomatic implants placed amounted to 151 fixtures. Inclusion criteria were having undergone rehabilitation with osseointegrated zygomatic implants for severe atrophy of the upper jaw and being in possession of a Cone Beam Computed Tomography (CBCT) scan taken before the operation and another taken at least 12 months later. Exclusion criteria were rehabilitation with osseointegrated zygomatic implants for reasons other than atrophy, positive history for allergic rhinitis, previous sinus surgery or tabagism. Time was used as the predictive variable. The extent of mucosal thickening, the presence of maxillary sinus walls osteitis and the incidence of sinusitis was analyzed. In one patient presenting with symptomatic and radiological evidence of sinusitis, functional endoscopic sinus surgery and histological evaluation of sinusal content was performed.
RESULTS: although a general mild increase in sinusitis symptoms could be observed, no patient eventually developed a severe symptomatic condition. About 65% of the patients presented with radiological evidence of mucosal thickening or sinusal obliteration, compared to a preoperative rate of 21%. Patients who underwent implant placement without violation of the Schneiderian membrane in general reported a lower rate of mucosal thickening. The patient who underwent secondary endoscopic sinus surgery was eventually found to be affected by Gincott and PAS positive aspergillosis.
DISCUSSION AND CONCLUSIONS: the findings of the present study indicate that the placement of zygomatic implants may have a deep although still unclear impact of sinusal function. The technique adopted in implant placement may play a role in the onset of mucosal thickening. The incidence of post-operative rhinosinusal pathologies and the evidence of cause-effect relation between the two justify the need for the follow-up not to neglect the possible alterations of paranasal sinuses system health also in the long term.

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Peri-implant bone response in human clinically stable, successful, and functioning dental implants retrieved after a long term loading period (up to 18 years): a histological and histomorphometrical report of 12 cases.

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BACKGROUND: The present study was aimed at a histologic and histomorphometric analysis of the peri-implant tissues and bone-titanium interface reactions in successfully osseointegrated, clinically stable, and not mobile human titanium dental implants retrieved after a long loading period (up to 18 years).

METHODS: 12 root-form implants were evaluated in the present study. All these implants had been retrieved after an insertion time ranging from 7 to 18 years. The implants and the surrounding tissues were immediately stored in 10% buffered formalin and processed to obtain thin ground sections with the Precise 1 Automated System. The specimens were dehydrated in an ascending series of alcohol rinses and embedded in a glycolmethacrylate resin. After polymerization the specimens were sectioned longitudinally along the major axis of the implants with a high-precision diamond disc at about 150 mm and ground down to about 30 mm. Three slides were obtained for each implant. The slides were stained with basic fuchsin and toluidine blue. Histomorphometry of bone-implant contact percentage was carried out using a light microscope connected to a high resolution video camera and interfaced to a monitor and PC. This optical system was associated with a digitizing pad and a histometry software package with image capturing capabilities.

RESULTS: Histological results were similar for all implants. Around the majority of the implants, mature, compact bone with few marrow spaces was found. Trabecular bone, constituted by a few thin bone trabeculae, was in a peri-implant location around only a few implants. In most implants, many remodelling areas were present in the most coronal portion of the implants, near the line of fracture of titanium, in the cases when the implant fracture had caused the retrieval of the implant. A high percentage of bone-implant contact (BIC) (comprised between 32+/-4.1% and 83+/-2.9%) was present. In almost all implants the space within the threads was almost completely filled by compact, lamellar bone or by a thin layer of bone. No inflammatory cell infiltrate was present at the interface or in the marrow spaces. No epithelial cell migration was present in any of the implants. Some primary osteons were observed near the implant surface. In the peri-implant bone around a few implants, a few resorption cones were found. Some hemiosteons were located on the implant surface. Close and tight contact between bone and implant surface was observed in all specimens with no gaps or connective tissue at the interface.

CONCLUSIONS: All implants appeared to be well integrated in the surrounding mineralized bone and all of them showed adequate bone-to-implant contact percentages. In the present series, the amount of BIC varied widely, from 32% to 83%, but even the implants with the lowest amount of BIC were clinically stable, healthy, and not mobile, before retrieval. This fact could mean that implants were able to function in a satisfactory way even when the quantity of mineralized bone at the interface was relatively low. It was possible to observe that a high BIC was present even when the peri-implant bone had a trabecular structure. The presence of areas of new bone formation with wide osteocyte lacunae in a peri-implant location attested to the fact that, even after a long loading period, bone was still undergoing resorption and formation.

Sealing ability to Staphylococcus Aureus of 4 different implant-abutment connections

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BACKGROUND: The present *in vitro* study aimed at comparing sealing ability to Staphylococcus aureus of 4 different implant –abutment connections.

The null hypotheses stated that there was no difference on sealing ability among the four implant-abutment connections tested.

METHODS: Four diverse commercially available dental implants were used to investigate the degree of microleakage at the implant-abutment junction (IAJ): Group 1: Torque Type conical implant with double conic connection – TTc (Winsix, BioSAFin, Ancona, Italy); Group 2: Torque Type conical implant with cone morse connection – TTcm (Winsix, BioSAFin); Group 3: K type implant (Winsix, BioSAFin); Group 4: OsseoSpeed (Astra Tech, Molndal, Sweden). Ten implants were tested in each group. The abutments were connected to implants according to manufacturers' recommendations. All procedures involving connection and disconnection of implants were performed in sterile conditions in a laminar flow biological safety cabinet.

Staphylococcus aureus ATCC 6538, a methicillin susceptible reference strain, was chosen for the experiments to test the degree of microleakage. Statistical analysis was performed in order to find significant differences among the four groups about sealing capability of implant-abutment connections tested.

RESULTS: One implant from Astra Tech was exclude form the study because of the growth of a contaminant after 48 hours of incubation in all the three wells (i.e. Paenibacillus pabuli, environmental Gram-positive bacteria) (Table 1). Wells A and B (i.e. wells where the samples were passed before being located in the final well C) of all other samples (n=35) remained sterile over the 72 hours of incubation, indicating the lack of external contamination during implant-abutment connection (Table 1). Similarly, no bacterial growth was observed in the four negative controls (i.e. one implant for each type), which had been inoculated with sterile saline and processed as the others.

Bacterial microleakage was demonstrated with three samples (i.e. 3 out of 35, 9%), including two TTc and one K, which showed growth of S. aureus in wells C after 48 hours of incubation (Table 1). No statistically significant differences between groups were evidenced ($p>0.05$).

CONCLUSIONS: The 4 tested groups showed a high level of sealing capability and in a acceptable clinical range.

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An innovative method for treating an uncompleted augmented sinus: the palatal approach

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BACKGROUND: The purpose of this case report is to present the palatal approach technique to lift the sinus membrane. This approach allowed re-grafting and placing an implant in a previously uncompleted grafted posterior maxillary region. The detailed step-by-step diagnostic and surgical procedure will be described, and advantages and limitations of this technique will be discussed.
METHODS: A 68 year-old male patient was referred to the Department of Periodontology and Implant Dentistry of New York University College of Dentistry to replace missing teeth #24, 25 and 26. The patient reported to have received sinus augmentation through lateral window two years earlier in a different clinic. The CT scan, however, revealed that the sinus was grafted unsuccessfully during this attempt, in fact, only the buccal part of the membrane was elevated while the medial portion of the cavity was not reached. The CT scan also revealed the need for horizontal GBR on area #24. Considering the favorable anatomy of the palate, it was decided to access the sinus through a palatal approach to preserve the bone regenerated during the first surgery. A palatal full thickness flap was elevated and a round diamond bur with high speed was used to create an access window. The attempt to raise the sinus membrane resulted in a perforation, so an absorbable collagen sponge was placed inside the sinus and the flap was sutured. After 3 weeks the site was re-entered and the sinus membrane was lifted successfully. Implant sites preparation were completed and bovine derived xenograft was inserted into the sinus both from the palatal window and from implant site #26. After implants insertion additional bone graft was placed from the palatal window and horizontal GBR buccal to implant #24 was completed. The flap was released and tension-free primary closure was achieved.
RESULTS: After 6 months a CT scan showed complete bone coverage of implant #24 and #26 and a 3-unit implant-supported fixed restoration was delivered. Complete patient satisfaction was achieved.
CONCLUSIONS: Sinus lift augmentation has been proved to be a valuable technique to increase the amount of bone in the posterior maxillary region. During elevation of the membrane, to achieve an adequate amount of bone and stability of the graft, it is crucial to reach the medial bone wall of the cavity. When this is not the case re-enter the sinus can be challenging. The technique presented in this study permits to access the sinus cavity from the palate without damaging the bone previously regenerated and to complete successfully the membrane elevation.

Patient reported outcomes of implant placement performed concomitantly with transcrestal sinus floor elevation or entirely in native bone

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BACKGROUND: Based on the hypothesis that maxillary sinus floor elevation with a transcrestal approach (tSFE) does not increase the morbidity of implant surgery, the study evaluated the patient-reported outcomes as well as the type and incidence of complications when implants are placed either concomitantly with tSFE (performed according to Trombelli *et al*. 2009) or entirely in native bone.
METHODS: The study was designed as a multicenter retrospective case series. The study protocol was approved by the Local Ethical Committee of Ferrara, Italy. Data from the record charts of patients undergone implant placement for single-tooth rehabilitation in the posterior maxilla were retrospectively obtained from 4 clinical centers. Cases for tSFE group were included if they showed an extent of sinus lift $\geq$ 4 mm concomitantly to implant placement. Cases for N group were included when implant placement was performed entirely in native bone in maxillary posterior sextants. Patient-reported outcomes had been assessed using 100-mm visual analogue scales (postoperative pain, VASpain) and visual rating scales (level of discomfort, VRSdiscomfort; willingness to undergo the same surgery, VRSwillingness). The dose of analgesics had been self-recorded.
RESULTS: A convenience sample of 14 patients and 17 patients (contributing with one implant site each) treated with tSFE and N, respectively, was obtained for the present study. Membrane perforation was detected at Valsalva maneuver only in 1 case in tSFE group after graft placement. No statistically significant difference in the incidence of membrane perforation was observed between treatment groups. Membrane perforation was treated with the insertion of a collagen matrix (Mucograft; Geistlich Pharma AG, Wolhusen, Switzerland) through the crestal access, and systemic antibiotics (amoxicillin + clavulanic acid, 1 g t.i.d. for 6 days) was administered post-operatively. The grafting procedure was completed, the implant was inserted and the case included for analysis.. On day +1, VASpain was low in both treatment groups. During the following postoperative days, a tendency of VASpain to decrease was observed in both groups. The Area Under the Curve for VASpain (AUCpain), indicating the level of pain experience through the first week following surgery, was 18.0 (IR: 8.5-85.0) and 11.5 (IR: 4.5-18.5) in tSFE and N groups, respectively, with no significant inter-group differences (p= 0.084). The total number of rescue anti-inflammatory drug used from the 2nd to the 7th postoperative day was 0 (IR: 0-1.8; min-max: 0-9) in tSFE group and 1 (IR: 0-1.0; min-max: 0 - 6) in N group (p= 0.860). No significant difference in either the prevalence of subjects using analgesics or the dose of rescue anti-inflammatory drug was observed between groups at each postoperative day. No significant inter-group difference in VRSdiscomfort and VRSwillingness was observed. The duration of the procedure was significantly longer in tSFE group (25 min, IR: 20.8-34.8) compared to N group (10 min, IR: 9.0-11.0) (p<0.001).
CONCLUSIONS: Implant placement performed either concomitantly with tSFE (according to Trombelli *et al*. 2009) or entirely in native bone are associated with limited incidence of complications, low postoperative pain and medication and are both well tolerated.

Rehabilitation of edentulous jaws according to the "all on four" protocol in HIV-positive patients

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BACKGROUND: This prospective study aims to evaluate the survival rate of "All on four" rehabilitations in controlled HIV-positive patients.

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METHODS: Patients completely edentulous or with a severely compromised natural dentition, as a consequence of deep caries, gingivitis and periodontitis, requiring an implant prosthetic restoration of one or both the jaws were included in the present study. Each patient received at least one fixed full-arch maxillary rehabilitation. Four implants were placed in each jaw according to the "All on four" treatment concept (2 mesial implants placed axially, 2 distal tilted implants to shorten cantilever). Immediate loading protocol was achieved in order to obtain immediate function and aesthetic on the same day of the surgery. Follow-up visits were performed at 6 (T1) and 12 (T2) months after implant insertion and included both radiographic assessments of bone level around the implants and clinical parameters evaluation (plaque accumulation and bleeding index). Survival criteria for implants were presence of implant stability, absence of radiolucent zone around the implants, no mucosal suppuration and no pain. One year follow-up after implant insertion was considered.
RESULTS: Implants were placed in 11 patients and the overall number of complete-arch immediately loaded prostheses resulted 15 (60 implants). Four patients received rehabilitation of both jaws, four patients received a maxillary rehabilitation and three received a mandibular rehabilitation. Low incidence of complications and high long-term survival rates with excellent Marginal Bone Level (MBL) outcome were recorded after one year follow-up. Mean marginal bone levels were 0.98±0.34 mm for axial implants and 1.02±0.22 mm for tilted implants. Not statistically significant differences were found between axial and tilted implants (P>0.05). Implant failure occurred in 1 patient (3 fixtures out of 60), and the implant survival rate was 95% (93,3% for axially positioned implants and 96,6% for tilted implants). In all cases an absence of fractures of the acrylic resin superstructure was found.
CONCLUSIONS: Within its limitations, this report shows as the "All on four" treatment concept represents a predictable procedure for the rehabilitation of completely edentulous jaws, in immunocompromised but immunologically stable patients, showing the advantages of both the immediate loading, which allows immediate function and aesthetic, and the full-arch fixed prosthetic restoration, with a higher degree of patient satisfaction compared to removal prostheses. However there is a lack of long-term data in the literature and there is no doubt that more studies are needed to reach definitive results and clinical based evidence.

Postoperative pain and surgical time comparison using piezoelectric or conventional implant site preparation systems

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BACKGROUND: Since its introduction, piezoelectric bone surgery has established an important role in oral surgery and dental implantology.
Piezoelectric surgery is efficient at preparing implant site osteotomies due to its selective cut, micro-streaming and cavitational effects, which preserve and maintain the soft tissue.
Several advantages have been outlined in patient's symptoms, both in terms of improved intraoperative comfort and postoperative course.
The aim of this study was to compare implant insertion procedures using piezoelectric surgery or conventional drilling. Intra- and postoperative pain, implant site preparation time and learning curve were evaluated.
METHODS: A total of 13 (7 women/6 men, aged between 45 and 75 years) partially edentulous patients were rehabilitated with 40 titanium implants (n=20). Implant therapy consisted in the inclusion of at least two conical implants between 3.8 and 4.5 mm diameter with a maximum torque of 35 Ncm in randomised bilateral edentulous areas. First sites were prepared with piezodevice (test sites) and the contralateral ones with conventional drilling (control sites).
Surgery was always performed by the same operator. Implant site preparation timing was measured from flap elevation until implant inclusion. Patients recorded their subjective intraoperative and postoperative pain daily for 7 days and at 15th day after surgery using a Visual Analog Scale (VAS). Data were statistically analysed.
RESULTS: Patients treated with piezoelectric technique presented a lower VAS, minor swelling and less recovery time compared to the conventional technique. No operative complications were reported and the implant survival rate at 1 year was 100% for both the techniques.
VAS significant differences were found for the test sites as intraoperative symptoms (p=0.009), after 1 day (p=0.010), 2 days (p=0.016), 3 days (p=0.017), 5 days (p=0.015), 6 days (p=0.018) and 7 days (p=0.039).
The average surgical times of implant sites preparation were: 10 (± 1.4) minutes for the test sites, and 7.00 (± 1.7) minutes for the control sites.
In 69.2% of cases (9 of 13 patients) the operator has found advantages in terms of better access to the posterior sites, enhanced intraoperative visibility and insertion axis maintenance using the piezoelectric technique.
The learning curve with piezodevice has seen a decrease in timing (rho=-0827, p=0.001) from the first to the last intervention; whereas no significant difference was evaluated with the traditional method.
CONCLUSIONS: Compared to traditional methods, piezoelectric technique enables optimal healing because it reduces the postsurgery swelling and discomfort.
The average time necessary for the piezoelectric implant site osteotomy was approximately 3 minutes more than conventional technique.

Biological response of amorphous silicon based thin film coatings: an in-vitro study

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OBJECTIVES: The surface of biomaterials may be modified by introducing suitable thin film coatings on it, in order to ameliorate its properties such as the antibacterial effects, barrier properties against the diffusion of potentially harmful elements from the bulk materials, or the resistance to chemical agents. This work focused on the osteogenic proprieties of hydrogenated amorphous silicon coatings on titanium samples.
METHODS: A human osteoblastic cell line Saos-2 (ATCC) was employed. Cells were kept in McCoy medium (Life technologies) supplemented with 15% FBS and 1% penicillin –

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streptomycin. Saos-2 were seeded on the samples and images were acquired using a SEM microscope in order to examine the cellular adhesion and morphology. Viability was evaluated using the colorimetric MTT assay, at 24, 48 and 72 hours. Osteocalcin protein level was assessed through ELISA assay. Hydrogenated a- SiOx films of about 2 μm thickness were grown on the dental materials by a radio frequency-plasma enhanced chemical vapor deposition (RF-PECVD) reactor, using silane (SiH4) and nitrous oxide (N2O) as silicon and oxygen precursors, respectively. The reactor and the growth conditions were described elsewhere (Mandracci *et al*. 2008). Data were analyzed with GraphPad Prism6. 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 significant.
RESULTS: We evaluated the morphology of human osteoblastic cells seeded on hydrogenated a- SiOx coatings and on titanium samples: Saos-2 cells showed higher spread when seeded on unmodified titanium than on titanium with coatings. No cytotoxic effect of the thin film coatings was detected through viability assay, nevertheless these surface modification decreased cell proliferation rate more than titanium surfaces. To assess the ability of osteoblasts to differentiate on tested surfaces, we evaluated the production of osteocalcin. Notably, Saos-2 cells released more protein when seeded on the coated surfaces.
CONCLUSIONS: This formulation of thin films as surface modifications showed a great potential on improving the biological response of implant surfaces. In particular, we demonstrated that hydrogenated amorphous silicon coatings are able to promote the release of osteocalcin by osteoblasts but reduce their proliferation rate, thus having a moderate osteoinductive capacity.

An *in vitro* study of Silicon Nitride-Titanium Nitride as bone interface material

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BACKGROUND: The mechanical features of the Silicon Nitride- Titanium Nitride (Si_3N_4TiN), along with its excellent biocompatibility, make this ceramic material suitable for industrial applications. In this preliminary study, we tried to compare the effects of two different surface modifications of silicon nitride-titanium nitride on the osteogenic response.
METHODS: Si_3N_4TiN was prepared and shaped as 10 mm diameter discs. We modulated the roughness of surfaces through electrochemical erosion so that a smooth surface and a rough surface were produced.
To characterize *in vitro* the biological response, a pre-osteoblastic murine cell line MC3T3-E1 (ECACC) was used. Cells were kept in Alpha MEM supplemented with 10% FBS, 50 μg/mL gentamicin. MC3T3 were seeded on the different surfaces and stained with Rodamine-Phalloidin/Dapi in order to examine the cellular adhesion and morphology. Quantification of the cell spreading was performed with ImagJ software. MC3T3 cells were differentiated by supplementing the culture medium with 10mM ß-glycerophosphate and 50ng/ml Ascorbic Acid. The calcification of the extracellular matrix deposed on surfaces was quantified colorimetrically through the Alizarin Red Stain. Data were analysed by GraphPad Prism6. Each experiment was repeated at least three times. Statistical analysis was performed by using the nonparametric unpaired Wilcoxon-Mann-Whitney test. A p value of <0.05 was considered significant.
RESULTS: In the present work, we demonstrated that MC3T3 cells display normal growth on Si_3N_4TiN surfaces and show a significantly higher spreading level if compared to the control condition. Results show that Si_3N_4-TiN induced a more complex morphology with more tapered shape with higher density of focal adhesions.
Deposition of bone matrix on ceramic structures was evaluated in order to measure the osteogenic differentiation level. In this study, we found that MC3T3 produces a greater amount of bone matrix on the ceramic Si3N4-TiN compared to control condition. Furthermore, MC3T3 cells, which were grown on rough Si3N4-TiN surfaces, produce more bone matrix respect to the smooth surface conditions.
CONCLUSIONS: This work highlights the promising properties of silicon nitride as a dental implant material, thanks to its high biocompatibility and pro-osteogenic features. Notably, the rough surface topography reveals to be particularly suitable to elicit a favorable osteoblastic response.

Plasma of Argon improves the biological response of titanium surfaces in vitro

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BACKGROUND: The importance of surface topography, roughness and chemistry is nowadays widely recognized. Indeed the unique features that characterized a particular surface significantly modulate several cell functions. Lately, great efforts have been made by research groups to enhance the implants' osseointegration, often by increasing the osteoblast biological response. The aim of this study is to evaluate the early cell response triggered by the plasma of Argon treatment of different titanium surfaces. Plasma is an electrically neutral, ionized gas. Appropriate plasma processes could ameliorate the healing course.
METHODS: Three different surface topographies (machined, plasma sprayed, and zirconia-blasted and acid etched) of sterile grade 4 titanium disks (4 mm diameter) was used for this study. Scanning Electron Microscope (Zeiss EVO 50, Carl Zeiss AG, Oberkochen, Germany) was used to study the surface topography. A non-contact 3D surface profiler (Talysurf CCI 3000, Taylor Hobson Limited, Leicester, England) was used to measure the surface roughness
Argon plasma treatment was performed using the following parameters: 10 W, 1 bar for 12 minutes while the control group underwent no treatment.
To quantify the amount of protein adsorbed onto the samples an incubation with 10% and 2% of Fetal Bovine Serum (FBS) in Phosphate Buffered Saline was perfomed. Total protein amount was quantified using Pierce™ BCA Protein Assay Kit (Life Technologies, Carlsbad, California, USA)
To characterize *in vitro* the biological response, a pre-osteoblastic murine cell line MC3T3-E1 (ECACC, code 99072810) was used. MC3T3-E1 maintained in Alpha MEM (Gibco Life Technologies, Milan, Italy) supplemented with 10% fetal bovine serum (Gibco Life Technologies, Milan, Italy), 100 U/ml penicillin, 100 μg/ml streptomycin.

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Cell adhesion was evaluated on titanium disks using a 96 well plate. Cells were seeded at 3 x 103 cells/disk in 100µl of growth medium. The 96-well plates were kept at 37°C, 0.5% CO2 for 10 min. cells were fixed in 4% Paraformaldehyde in PBS for 15 min and then stained with 1µM DAPI (Molecular Probes, California, USA) to visualize cells' nucleus. Images were acquired using a Nikon Eclipse T-E microscope.
RESULTS: The analysis of surfaces revealed that the evaluated specimens met the standard parameters.
These data clearly demonstrated that, the test groups showed a significantly higher number of osteoblasts which adhere to the surfaces after 10 minutes from seeding. Furthermore, the pre-treatment of different surfaces with Plasma of Argon could increase the amount of adsorbed proteins if compared to the untreated surfaces.
CONCLUSIONS: In the present study we considered different surface types - treated or not with plasma of argon - and we evaluated their ability to improve cell-surface interaction. Our data suggest that the activation of the implant surface has a pivotal role in enhancing the osseointegration process. Moreover, the positive effect of non thermal plasma of Argon in terms of protein adsorption and biological response (i.e. osteoblast adhesion), was reported.
In conclusion, this preliminary *in vitro* study highlights the potential biological benefits of implants treatment with plasma of argon (irrespective of the titanium surface type).

Evaluation of biological properties of four different ceramic implants surface for dental applications

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BACKGROUND: The aim of this work is to assess the in-vitro biocompatibility of different ceramic dental implant surfaces (Zirconia toughened Alumina and Alumina toughened Zirconia) studying the biological response of an osteoblast precursor cell line.
METHODS: We used high purity powders to produce planar Zirconia toughened Alumina (ZTA) and Alumina toughened Zirconia (ATZ) samples respectively: Taimei Al2O3–16 wt%ZrO2 (Taimicron) and Tosoh ZrO2–20 wt%Al2O3 (TZ-3Y20AB), in form of "ready to press" powders. Green samples were obtained by linear pressuring at 80 MPa followed by Cold Isostatic Pressing under 200 MPa. We used the optimized sintering conditions previously described (Faga MG *et al*. 2012). All the specimens were mirror polished and ultrasonically washed in acetone, ethanol and deionized water. A patented hydrothermal treatment was applied to half of ATZ and ZTA samples. Hence, we could obtain four types of surfaces: treated ATZ, untreated ATZ, treated ZTA, untreated ZTA. A mouse pre-osteoblastic cell line, MC3T3-E1, was purchased from ECACC. Cells were cultured in Alpha MEM supplemented with 10% FBS, 50 µg/mL gentamicin. To examine the cellular adhesion and morphology, MC3T3-E1 cells were seeded on the different samples and stained with Rodamine-Phalloidin/Dapi, at different time points (3;5;24h). We used ImagJ software to quantify the cell spreading. Viability and proliferation rate of MC3T3-E1 cells were evaluated using the colorimetric MTS assay, at 24, 48 and 72 hours. We supplemented the culture medium with 10mM ß-glycerophosphate and 50ng/ml Ascorbic Acid to differentiate MC3T3 cells. The calcification of the extracellular matrix deposed on surfaces was quantified colorimetrically through the Alizarin Red Stain.
Data were analysed by GraphPad Prism6. Each experiment was repeated at least three times. Statistical analysis was performed by using the nonparametric unpaired Wilcoxon-Mann-Whitney test. A p value of <0.05 was considered significant.
RESULTS: MC3T3-E1 cells were able to properly spread without significant difference in all the experimental conditions tested. The proliferation rate was similar in considered conditions and consistent with the trend of biocompatible materials. Hydrothermally treated ATZ treated sample were able to induce an high level of bone matrix deposition increasing the osteogenesis *in vitro*.
CONCLUSIONS: In this study, we highlighted the behavior of MC3T3 cultured on ATZ and ZTA after a patented hydrothermal treatment. We showed that these ceramic materials, treated or not with orto-phosphoric acid, proprely sustain cell growth and proliferation, displaying high biocompatibility.

Piezo-electric extraction of maxillary impacted canine and immediate implant-prosthetic rehabilitation associated to guided bone regeneration (GBR) of the canine eminence. A case report

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BACKGROUND: The aim of this report is to show results of an elective treatment for the surgical piezoelectric extraction of an impacted maxillary canine, followed by immediate post-extraction implant and aesthetic reconstruction of canine eminence with guided bone regeneration (GBR) technique.
METHODS: A 50-year-old female patient was referred to authors for fixed rehabilitation of her first quadrant, which had been already treated by means of a fixed partial bridge. The canine (1.3) was not present in dental arch. Radiographic exams revealed upper right canine impaction and TC showed its palatal position. The non-contributory anamnestic data, good oral hygiene and high aesthetic desires of the patient led the authors to choose for a surgical and prosthetic protocol consisting in: removal of previous fixed prosthesis, impacted canine extraction, post-extraction implant, GBR to recreate atrophic canine eminence and prosthetic finalization with zirconia-ceramic single crowns. After removal of existing bridge, under local anaesthesia, a full thickness flap was raised, involving both vestibular and palatal side to consent an adequate visibility and access to the impacted tooth and to the canine eminence region, without modifying periodontal attachment in aesthetic region. Palatal access cavity was obtained by mean of a piezoelectric device, in order to be minimally invasive; the tooth needed to be separated during extraction. Implant site preparation was performed with rotating drills for the first 2-mm, and with alternate osteotomic technique for the remnant length. The use of progressively wider and longer osteotomes permitted to not lose bone by expanding the atrophic ridge, thus recreating the canine eminence and guaranteeing an adequate bone condensation and under-preparation for implant stability. A 4x11,5mm implant

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(3i Nanotite, internal connection) was inserted. Palatal gaps were filled with scraped autologous bone mixed with particulate heterologous bone. GBR of the canine eminence was performed with the same materials, associated to a resorbable collagen membrane. Flaps were repositioned and sutured with a 4/0 silk suture. An acrylic resin-based provisory fixed prosthesis was directly rebased in the mouth and delivered to the patient the day of the intervention. After an uneventful period of 4 months, the patient underwent re-entry surgery and a zirconia abutment was positioned in order to finalize the case with cement-retained zirconia-ceramic crowns. After adequate tissue conditioning with provisional crowns, definitive ones were delivered.
RESULTS: During the three-year follow-up period, no complications occurred. Both clinical and radiographic examinations showed bone-tissue healing and good soft-tissue contours with no significant changes, and stable peri-implant bone levels. Control TC shows good corticalization of buccal bone plate as result of GBR technique.
CONCLUSIONS: In the previously described case, surgical extraction and implant-prosthetic rehabilitation permitted to rehabilitate functionally and aesthetically the patient, obtaining a symmetric labial support by means of GBR of the canine eminence. The osteotomic technique was indispensable to expand the ridge in order to save bone and re-create the canine eminence that did not set up because of the anomalous position of the canine. Thus, the insertion of an implant in canine position combined to canine eminence GBR can be a solution for both functional and aesthetic rehabilitation, limiting discomfort for the patient, not harvesting an autogenous bone block graft. Furthermore, the protocol described in this report permits to avoid an orthodontic therapy, thus reducing treatment time and providing a real reconstruction of atrophic bone structures.

Osseoperception and embodiment of implant-supported prosthesis: a new neurophysiological approach for dental implants

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BACKGROUND: By distorting the periodontal ligament neuroanatomy and its associated receptors, the extraction of teeth causes an inevitable deficit of stomatognathic somatosensory functions. Replacement of lost teeth with osseointegrated dental implants has significant physiological effects. Osseoperception, osseointegration and neuroplasticity represent the premises for hypothesizing the mechanism of peri-implant biological and functional reinnervation, as well as the clinical involvement of peripheral nerve regeneration subsequent to extraction and implantation.
The aim of this review of the literature investigate a novel approach which considers the neuro- physiological embodiment of the prosthesis as the primary goal of every implants-supported rehabilitation, via an evaluation osseoperception and neurophysiological mechanoreceptors in relation to dental implants.
METHODS: An electronic research of available literature is performed on PubMed/MEDLINE, using as keywords "(dental implant AND osseoperception) OR (osseointegration AND osseoperception) OR (osseointegration AND tactile sensibility) OR (osseoperception AND tactile sensibility) OR (tactile sensibility AND dental implants)". Aut of the 46 resulting articles we included only 42 in English; 10 more papers were excluded due to not pertinent title or unappropriate abstract. Of the residual 32 articles we were able to acquire 24 full text thanks to the UniMoRe subscription.
RESULTS: Even if the capability of osseointegrated implants to transmit a certain amount of sensitivity is still unclear, there are current histological, morphometric, hymmune-histochemical, and clinical evidences of regenerated nerve fibers in the soft peri-implant tissues. All papers reported a sensory innervation around osseointegrated implants either in the bone-implant interface or peri-implant epithelium. These data suggest that a peripheral sensory feedback pathway can be restored with osseointegrated implants - hypothesis which is confirmed by the higher density of nerve fibres around loaded dental implants than around unloaded or extraction sites without implantation. This implant-mediated sensory-motor control may have important clinical implications in the development of a special sensory ability, the restoration of peripheral sensory feedback mechanism and the rehabilitation with implant supported prosthesis in totally or partially edentulous patient.
CONCLUSIONS: To date, the published literature agree with the hypothesis that replacement of lost teeth with ossteointegrated dental implants seems to improve peri-implant innervation pattern, including higher nerve density, larger fibers diameter, and more axonal myelination. Clinical observations on edentulous patients with implant-supported prosthesis have also confirmed a special sensory perception skill, an improved tactile discriminative capabilities and motor function. Inducing osseoperception in early stages could allow the implants to replace the natural teeth in modulating cortical sensibility and motor neurons activity, leading to a more efficient prosthetic integration, but further investigations are needed. The phenomenon of osseoperception remains a matter of debate. The ability to identify kinesthetic sensation is generated from the temporomandibular joint, masticatory muscle, mucosa and periosteum, and provides sensory and motor information related to mandible movements and occlusion. It could be interesting to study the association between peri-implant reinnervation and various timing protocol: post-extraction implant placement and immediate loading seems to enhance nerve regeneration.
These evidence should be considered as necessary factors in order to accomplish the success in implant rehabilitation with neuro-physiological approach.

Bone augmentation procedures in the implant-prosthetic rehabilitation of maxillary central incisor: a clinical report

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BACKGROUND: In the anterior zone, special aesthetic concerns require the presence of adequate three-dimensional (3D) osseous volume of the alveolar ridge, so increasing hard tissue often becomes a critical part of the implant rehabilitation.
The aim of this report is to describe the protocol used in

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implant rehabilitation of an upper central incisor extracted for vertical root fracture in a female 38 year- old patient.
METHODS: The atraumatic non-surgical extraction of the right maxillary central incisor and the alveolar ridge preservation were performed to prevent alveolar bone resorption and to maintain adequate ridge contour, in order to facilitate implant placement in prosthetically driven positions. After surgery, a provisional removable partial prosthesis was inserted, with the acrylic resin support modified to avoid pressure on the extraction site. After 4 months the second surgical step was made in order to improve the bone morphology of the implant site: ridge expansion with split-crest technique and simultaneous implant insertion using a surgical guide were carried out. A partial-thickness flap was dissected and the periosteum was preserved to provide blood supply to the greenstick splitted ridge; longitudinal osteotomy and vertical bone-releasing osteotomies, mesially and distally at 2 mm from the adjacent teeth, were outlined; 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 one NobelActive® 4.3x10mm implants (Nobel Biocare, Göteborg, Sweden) was gently tapped into position. The flap was re-approximated and sutured on the surgical site. Four months following surgery, a provisional restoration was performed to preserve and remodel the soft tissue around implant, and 4-month later a definitive crown was completed.
RESULTS: At 2- year follow-up the implant was in function, showing an good aesthetic integration; clinical examination showed absence of gingival recession, no probing pocket depths, and no bleeding on probing. Periapical radiograph demonstrated a normal vertical osseous height and excellent osseointegration of the implants.
CONCLUSIONS: In order to achieve a functional and aesthetic rehabilitation delayed treatment approach appears to be appropriate following tooth extraction in the aesthetic zone when the specific conditions are not fulfilled.

Decision tree for a predictable sinus augmentation

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BACKGROUND: Edentulous posterior maxilla is often challenging due to reduced residual crestal bone height and poor bone density. Nevertheless, to overcome those limitations, Lateral Approach Sinus Floor Elevation (LASFE) has been introduced by Tatum in 1977 and constantly developed since then.
Lateral Approach Sinus Floor Elevation has been associated to survival rate above 90% and so has become routinely performed. However complications such as Schneiderian membrane perforation, bleeding, sinus infection, bruise and implant migration, have been reported. For that reason this procedure may still be widely considered difficult whether the implants are placed simultaneously or not.
In Implant Dentistry as in any specialty, a succession of poor decisions leads to a poor treatment prognosis. Hence the purpose of this poster presentation is to introduce a decision tree analyzing the critical factors that should be reviewed in order to achieve a predictable sinus augmentation.
METHODS: A literature review was made and combined with the results of 25 years of clinical documentation on LASFE from the Ashman Department of Periodontology And Implant Dentistry to generate a new decision tree.
Seven factors were determined as critical for a predictable result: the presence of Sinus Pathology, the presence of the Artery in the lateral wall and its thickness, the Palatal wall Thickness, the Membrane Thickness, the remaining Crestal Bone Height and the Sinus Floor Cortication.
RESULTS: The First step is to assess the presence of sinus pathology, if so the patient should be referred to the ENT.
The Second step is the assessment of the diameter of the Sinus Artery (>1mm) combined with the use of blood thinner by the patient. These two condition combined are a contraindication for the LASFE technique.
The Third step is the assessment of the lateral wall thickness, if it is <3mm is possible to proceed with the LASFE protocol.
The Fourth step is the assessment of the membrane thickness, to predict the ease of elevation.
The Fifth step is to assess the remaining ridge bone height, if it is >6mm is possible to achieve a sufficient initial stability for a simultaneous implant placement.
CONCLUSIONS: The purpose of this poster presentation was to describe a new decision tree in order to guide the clinician to achieve a more predictable Lateral Wall Sinus Augmentation.

In vitro evaluation of osteoblastic differentiating potential of a chemically modified microrough titanium surface

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BACKGROUND: Titanium implants surface is treated to increase the biocompatibility and to promote osseointegration. In fact, the microstructure and nanostructure of the titanium surface influenced the behavior of mesenchymal precursors of bone cells, modulating their proliferation, and differentiation towards the osteoblastic phenotype. Mesenchymal stem cells are capable of self-renewal and, when appropriately induced, of differentiating into many cellular lineages. Undifferentiated and highly clonogenic cells may be isolated from the dental pulp, from both exfoliated deciduous or permanent teeth, the periodontal ligament and the dental papilla. The purpose of this research was to determine the influence of two titanium surfaces on Dental Pulp Stem Cells (DPSCs) viability and differentiation.
METHODS: For this *in vitro* study, a total of 40 (5mm diameter and 2 mm thick) experimental titanium discs (Implacil De Bortoli-Dental Product, São Paulo, Brazil) were used. Discs were divided into two experimental groups according to the type of treatment: 20 experimental titanium discs sandblasted with microparticles of titanium oxide (TiO_2), with an average particle size of approximately 180μm and acid-etched with glacial acetic acid (Control Group); 20 experimental titanium discs sandblasted and acid-etched as above and then immersed

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in a CaP solution, to allow deposition of calcium and phosphorus ions on the titanium surface. DPSCs were cultured up to 28 days. MTT, ELISA for IL-6 and PGE2, real-time RT-PCR for BMP2 and RUNX2 gene expression and alizarin-red S, which recognizes calcified extracellular matrix, were performed.
RESULTS: MTT assay and ELISA assay for IL-6 secretion didn't show significant differences when DPSCs were cultured on test discs, respect to control, after both 21 and 28 days. An increase in PGE2 secretion level in test compared to control, after both 21 and 28 days, was recorded. RT-PCR results showed that BMP2 mRNA expression was significantly higher after 3 days of culture in the test compared to control. Alizarin-red S assay revealed significantly higher production of calcified extracellular matrix after 28 days of culture in the test group respect to control.
CONCLUSIONS: These results suggested that the test surface could guarantee a good cell viability along with a low inflammatory response and, at the same time, promote the osteoblastic differentiation leading to a better osseointegration process.

Osteogenic behavior of dental pulp stem cells (DPSCs) compared to adipose tissue-derived stem cells (ADSCs) on titanium scaffolds.

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BACKGROUND: Recent researches have shown that adipose liposuction aspirates from human sources contain pluripotent adipose tissue-derived stem cells from subcutaneous tissue (ASCs). This source could be differentiate into different numerous cell types. DPSCs have a high proliferative rate and are able to perform a multilinear differentiation. While the properties of DPSCs have been extensively studied, little is known about the ADSCs. The differentiation and growth of adult stem cells within engineered tissue constructs are hypothesized to be influenced by cell-biomaterial interactions. The aim of the study, was to compare the *in vitro* osteogenic differentiation of human adipose (ADPSCs) and dental pulp stem cells (DPSCs) on sandblasted and etched titanium scaffold.
METHOD: 10 samples of the human dental pulp from third molars were selected and surgical removed for therapeutic reasons in 7 patients of ISCCR San Raffaele Vita e Salute University Dental Clinic, D'Annunzio university, University of Aquila and University of Insubria in orthodontic II & III malocclusion class treatment. 10 samples of adipocites stem cells were selected during liposuction aspirates fat removal procedures in human patients treated for overweight desease. The samples were selected in homogeneous pool with citofluorimetric analysis in order to evaluate the presence and select an homogenous cluster of mesenchymal stem cells. Oil Red Oil and Alizarin Red Assay in addition to real time PCR analysis of ALP and Runx2, with MTS Assay were used to evaluate the different behavior of the ADSCs and DPSCs during proliferation and differentiation phases. After Osteogenic differentiation the samples were seeded onto three-dimensional sandblasted and etched titanium scaffolds and evaluated with SEM analysis.
RESULT: Adipose tissue-derived stem cells, seeds in titanium scaffold, shown a better behavior in quantity and morphostructural terms compared to dental pulp stem cells, also showing a good biocompatibility. Indeed, if seeded in 3-D scaffold, ADSCs shown an higher proliferation rate associated with an higher differentiation toward the osteoblastic line. Following the FACS analysis, both samples showed mesenchymal standard markings. Through Alizarin Red analysis it was observed that both samples showed a positivity, with a higher rate for the ADSCs compared to DPSCs. The Runx2 analysis showed a faster decrease in ADSCs compared to DPSCs. These results were then confirmed by MTS assay. Through SEM analysis it was possible to evaluate a greater aggregation of osteoblastic cells derived from DPSCs on titanium scaffold compared to DPSCs.
CONCLUSIONS: Emerging evidence suggests adipose tissue stem cells (ADSCs) as a promising source of progenitor cells in regenerative medicine and bone tissue engineering. ADSCs represent a reliable source of MSC for the generation of osteoblastic like cells. Furthermore if seed in biocompatible 3D titanium scaffold, ADSCs show a greater affinity and a better differentiation potential than the DPSCs. Considered such evidence is possible to affirm that this new engineering could represent a new frontier in implant surgery and in regenerative medicine.

Post-extractive socket preservation and immediate implant placement for prosthetic rehabilitation in the aesthetic area of the upper arch

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Severely fractured incisors in young adults are very common problem. Soon after tooth extraction the bone resorption takes place reducing the height and width of alveolar ridge. This produces an altered morphology of the bone unfavorable for implant placement that becomes impossible without surgical correction. Socket grafting maintains and preserves the alveolar ridge for implant placement. Ridge preservation is any procedure that takes place at the time, or shortly after an extraction, to minimise resorption of the ridge and maximise bone formation within the socket, improving the aesthetic result due to the preservation of the volume and contour of the hard and soft tissue.
BACKGROUND: The aim of this study was to investigate the outcome of immediate implant placement following the post-extraction socket preservation using of a composite material deproteinized bovine bone mineral (DBBM) Bio-Oss® for the aesthetic rehabilitation after fracture of the upper central incisor.
METHODS: Minimally invasive extraction of fractured upper central incisor was performed as described by Shakibaie-MB. to spare the socket walls and the peri-alveolar keratinized mucosa, with debridement of inflammatory tissue. Only a completely intact sockets was included in this case report. The patient had unremarkable medical histories and were

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nonsmokers. It has been possible an immediate placement of implant. The gap between implant and vestibular and palatal crestal bone was filled with deproteinized bovine bone mineral (DBBM) Bio-Oss®.
RESULTS AND CONCLUSIONS: The immediate implant insertion does not prevent the bone resorption, the use of a filler biomaterial allows compensating good part of bone loss and preserving the contour of the alveolar ridge. One purpose of placing a graft of biomaterial in a self-contained hard-tissue is to offer stability for coagulum and hence avoid volume reduction and surface invagination that otherwise will occur when the wound contracts. In this case report this objective was satisfied. The reduced replacement rate with Bio-Oss® helped to maintain over time the volume of the alveolar ridge, necessary for the long-term aesthetic results with minimal marginal bone loss and low risk of mucosal recession. Ridge preservation technique using a composite material deproteinized bovine bone mineral (DBBM) Bio-Oss® resulted in greater stability in the horizontal and vertical dimension after 24 months after the treatment. The volume of the hard and soft tissue can be preserved better with DBBM compared to spontaneous healing.

Immediate loading by a new implant: preliminary report

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BACKGROUND: The present study aims to evaluate the rate of survival of immediate loading rehabilitations with a new implant characterized by an internal connection with a double taper principle.
METHODS: A total of 37 patients, aged between 27 and 78 years, of which 22 female and 15 male, were enrolled onto this study at the Department of Dentistry, IRCCS San Raffaele hospital in Milan. Each patient required and immediate loading implant-prosthetic rehabilitation for partial or total edentulism. The following exclusion criteria were applied: the absence of any active infection or severe inflammation in the areas intended for implant placement, presence of chronic system disease, smoking more than 15 cigarettes per day, a bruxism habit, and poor oral hygiene.
The implant used is characterized by an internal connection with a double taper principle. The first taper is an internal cone used to support and close the prosthesis combined with an internal hexagon. The second taper is an interaction surface between the prosthetic abutment and the head of the tightening screw, which is conical itself. This implant was designed to be used in complex rehabilitation.
Implants were positioned in postextraction sockets or healed bone, and were both considered single rehabilitations, then fixed partial rehabilitations on 2 implants, followed by full arch rehabilitations according to the "all on four" procedures. Radiographical and clinical follow-up was performed before surgery, and at 1, 3 and 6 months after implant placement.
RESULTS: In total, 28 single implants, 12 implants in fixed partial rehabilitations and 12 in "all on four" rehabilitations were placed. 2 edentulous upper maxillary and one edentulous jaw were rehabilitated with the "all on four" technicque. With regard to the 40 single or partial rehabilitation implants, 23 were positioned in the lower arch and 17 in the upper arch. In each case, immediate loading protocol was performed. At 6 months follow-up, no complications were observed and the survival rate of implants was 100%. No fractures on temporary prosthetic handwork, nor mobility of the provisionals were observed, due to the unscrewing of the prosthetic screws. Radiographic examinations, made with intraoral radiographs and, only for "all on four" rehabilitations, by orthopanoramics, showed stable bone levels over time.
CONCLUSIONS: Within the limits of this study, the new implant showed a high success rate when applied in immediate loading.

Digital workflow of immediate implant loading with screw retained porcelain single crown in the posterior mandible: a proof of concept study

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BACKGROUND: Immediate implant temporization has been documented in full arch restorations and single implants, even immediately after extraction. Our aim is to show the feasibility of immediate (i.e. within 48 hours from implant insertion) delivery of a porcelain (lithium disilicate) screw-retained single crown using CAD/CAM chair-side technology in the posterior mandible.
METHODS: An otherwise healthy 50 year old female patient presented at our clinic with a missing tooth (first right lower molar). The patient was administered 2 g amoxicillin 1 hour before surgery, which was carried out under local anesthesia. A mucoperiostal flap was raised and the implant site was prepared by drilling under abundant saline solution irrigation following the manufacturer's instructions. A Way Milano implant with 3.8 mm of diameter and 11 mm length (Geass Srl, Pozzuolo del Friuli (UD), Italy) was inserted and soft tissues were then sutured. Insertion torque exceed 35 N/cm and it was decided to immediately load the implant with a lithium disilicate (Ivoclar Vivadent AG, Schaan, Liechtenstein) single crown. After insertion of the ad-hoc scan body a digital impression of both dental arches was taken with Cerec Bluecam (Dentsply Sirona, Wals bei Salzburg, Österreich). The restoration was digitally designed and then milled with Cerec MC X (Dentsply Sirona, Wals bei Salzburg, Österreich). An occlusal scheme allowing for the establishment of correct occlusal cusp-fosse contacts and with no guide was chosen. After cementation to a titanium base, 48 hours after implant insertion, the final lithium disilicate restoration was positioned with full centric occlusal load and without contact during excursive mandibular movements.
RESULTS: Recall visits were scheduled at 2 weeks, 1 month, 3 months, 6 months and 1 year after surgery. After 1 year of function the restoration and the implant did not show any clinical sign of failure. No BOP or recession occurred during the first year of function. Pink esthetic score and white esthetic score were 7 at the 1 year recall visit.
CONCLUSIONS: With all the limits of a case-report the present data supports the hypothesis that it is possible to deliver

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a final screwed restoration 48 hours after implant placement. Digital chair side workflow can enhance and speed up all the prostethic procedures.

Clinical and histological evaluation of a flapless socket preservation procedure: a prospective single cohort study

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OBJECTIVE: The aim of the current study was to evaluate the clinical outcomes of a ridge preservation technique with a flapless approach in the posterior area of the jaw. Dimensional changes to the hard and soft tissues at fresh extraction sites treated with the use of cortico-cancellous porcine bone and a resorbable collagen membrane were evaluated over the observation period. Bone cores were also harvested at the time of implant placement for histological analysis.
METHODS: Patients requiring tooth extraction and subsequent implant restoration were considered eligible for the study. Cortico-cancellous porcine bone and a resorbable collagen membrane were used to graft fresh extraction sockets and sutures were used to stabilize the membrane, which was left intentionally exposed during the healing phase. Four months after the ridge preservation procedure, all of the sites were re-entered, bone cores were harvested for histological analysis, and implants were placed. The width of keratinized gingiva, the thickness of the buccal bone wall and the horizontal and vertical bone dimensional variation were measured at baseline and after four months. In addition, bone biopsies were collected during the second stage surgery.
RESULTS: Thirty-seven patients were enrolled in the study. After four months, the amount of vertical bone loss was 0.2 ±0.7 mm for mesial sites, 1.1 ±0.9 mm for buccal sites, 0.2 ±0.8 mm for distal sites and 0.9 ±0.9 mm for palatal/lingual sites. At baseline, the mean width of keratinized gingiva was 2.8±0.9 mm (range of 1.0–5.0 mm). After four months, it was 4.6±0.8 mm, showing an increase of 1.8±0.7 mm, which was statistically significant (P=0.0001). The mean width of the alveolar crest at baseline was 9.2±1.3 mm, and after four months, it was 7.6±1.2 mm. The keratinized gingiva showed a mean increase in the occlusal direction of 1.8 ±0.7 mm. The histological analysis performed on the retrieved bone cores found that new trabecular bone could be observed in all of the specimens, even though some granules of grafted bone were still present. Vascular growth close to the newly formed bone was also evident, and no inflammatory cells or foreign body reaction around the biomaterial granules was observed.
CONCLUSIONS: Within the limits of this prospective cohort study, ridge preservation showed adequate regeneration of the bone and stability of the facial soft-tissue level. The flapless ridge preservation procedure maintained the horizontal and vertical bone dimensions, improving the amount of keratinized tissue. The exposure of the resorbable collagen membrane to the oral cavity seemed not to jeopardize the healing process or the quality of the newly formed bone.

In vitro and *in vivo* evaluation of the effect of demineralized bone matrix and hydroxyapatite- β-tricalcium phosphate as scaffolds for bone regeneration with or without human mesenchymal stem cells: preliminary results

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BACKGROUND: Evaluation of the effectiveness of Demineralized Bone Matrix (DBM) and Hydroxyapatite-β-Tricalcium Phosphate (30/70 HA-β-TCP) used as scaffolds, to modulate bone regeneration and human mesenchymal stem cells (MSCs) homeostasis *in vitro* and *in vivo*.
METHODS: The *in vitro* analysis was performed to assess the ability of DBM and 30/70 HA-β-TCP to induce osteogenic differentiation of MSCs (PT-2501, Lonza) and to modulate Osteoblast homeostasis (SAOS-2). MSCs and SAOS-2 were cultured in specific culture medium. To evaluate each scaffold, MSCs were seeded in plates coated with two different biopolymers, with and without osteogenic medium, or with control medium. Similar experiments were performed using osteoblastic SAOS-2 cells to evaluate homeostasis modulation of these cells. RT- PCR analysis of osteoblasts markers expression was carried out.
In vivo study was performed to evaluate bone regenerative potential of DBM and 30/70 HA-β-TCP when grafted in sinus lift procedures, by performing histological and histomorphometric analysis of specimens retrieved after an healing period of 6 months.
RESULTS: *In vitro*: After 14 days, MSCs seeded on DBM and 30/70 HA-beta-TCP, with and without osteogenic medium, showed a slower growth as compared to control cells, suggesting an initial differentiation. SAOS-2 cells, seeded on biopolymers, showed lower vitality compared to control cells. After 21 days, MSCs seeded onto DBM and on 30/70 HA-β-TCP reported a slight distress and an high mortality respectively, when compared to control cells both with and without osteogenic medium. In regards to SAOS-2 the DBM scaffold revealed incompatibility with cells survival while SAOS-2 seeded onto 30/70 HA-β-TCP appeared vital but showed a high distress.Interestingly, after 14 days, the MSCs cultured on DBM and osteogenic medium showed initial signs of differentiation, as demonstrated by the increased expression of specific differentiation genes such as ALP, COLL and IBSP. This effect was transient since the increase of markers expression appeared to be minimal after 21 days. The results regarding gene expression modulation of SAOS-2 in the presence of DBM and 30/70 HA-β-TCP showed that the scaffolds increased the expression of the osteoblastic differentiation markers ALP, COLL and IBSP.
In vivo: The histological and histomorphometric analysis of DBM scaffold showed trabecular bone with large marrow spaces and few particles with irregularly shaped margins, probably due to a resorption process, whereas a large amount of grafted biomaterial, completely surrounded by newly formed bone was seen in 30/70 HA-β-TCP.
Histomorphometry showed for DBM and 30/70 HA-β-TCP

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respectively newly formed bone 32% and 30.2 %, marrow spaces 48% and 40.7%, residual biomaterial 20% and 29.1%.
CONCLUSIONS: Our results indicate that the two tested materials have shown the feasibility to be used as a scaffolds *in vivo* for bone regeneration with or without mesenchymal stem cells, although additional researches are needed to fully characterize the events.

Computer aided implantology, CAD-CAM technologies, immediate loading: 6 years follow-up case report in aged patient

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BACKGROUND: Modern technologies allow today to solve cases with ease, less stress and morbility for our patients. It is presented a case report of a ultra nonagenarian patient with immediate loading in superior front teeth group.
METODS: The ultra nonagenarian patient presents to our attention with the request to solve a problem on the upper front teeth group. Anamnesis, reveal hypertension, angina pectoris, Hypercholesterolemia. The patient is treated with Cardioaspirin. On examination, it shows signs of avulsion of 12 (lost spontaneously a few weeks before), mobility of 11 22 22. There are gold ceramic bridges in posterior with a few recessions, but stable and maintainable. There is Localised severe periodontitis in frontal upper teeth, gingivitis in sextant 1 and 4. After careful ananmestic and medical investigation data, considering patient's refusal to accept a removable prosthesis, has been developed a surgical and prosthetic treatment plan. Preliminary treatment was full mouth debridement, hygiene motivation and probing revaluation. Definitive treatment plan was: Extraction of 11 22 22 non-maintainable teeth, extraction of the canine 13 included, replacement of lost elements 12-22 with a CAD-CAM bridge on implants. Treatment plan was developed after wax-up analysis and Computer Guided Surgery software plan. Performed under local anesthesia, surgery was with flapless insertion, prosthetic driven through surgical mask, and immediate loading implants, (full-guided). Thanks to the computer guided technique, the provisional was prepared before the surgery and immediately loaded same surgery day in November 2009, 6 months after the extractions. Time surgery, flapless, was 25 minutes, delivery temporaries, 45 minutes. Post operative was planned with Fans therapy, and mouth washes by clorexidine 0,12%. Patient didn't use Fans therapy after first day.
RESULTS: The patient, 90 years, was treated by guided surgery, implants 12 and 22 were positioned. Fixture 3.5x 13, were immediately loaded with provisional screwed abutments MUA. 4 months after it was delivered a fixed permanent screwed prosthesis Zr-ceramic. The patient was placed in a control system and maintaining hygienic every 4-6 months. 6 years after surgery, it does not detect soft and hard tissue recession. The prosthesis has no chipping and discoloration of any kind. The patient declares herself fully satisfied by the therapy.
CONCLUSIONS: Today we have many improvement in Dental technology. Computer guided surgery and a careful surgical and prosthetic evaluation, anagogic and digitally planned, allowed clinical success to six years in a patient over ninety years old. Modern technologies reduce morbidity, (flapless), time surgery, allowing to satisfy even the aged patients with no optimal clinical condition, linked to age ailments.

Real-time PCR analysis of bacterial species around zygomatic implants

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BACKGROUND: To assess the prevalence of colonization by four periodontal pathongens in a population of edentulous patients rehabilitated with zygomatic implants, using the Real-time PCR analysis. Furthermore, history of periodontal disease and the kind of prosthetic restoration will be evaluated as possible factors affecting bacterial colonization.
METHODS: The present study is a microbiological study. The sample was composed of patients whom edentoulism was rehabilitated with the use of zygomatic implants at the University of Verona, Section of Dentistry and MaxilloFacial Surgery. Only patients with at least one year of follow up were included in the sample. Only one sample for each patient was collected. These submucosal plaque samples were collected choosing the deepest aspect characterized by bleeding on probing by means of sterile endodontic paper points. The paper point was transferred into 0,4 mL buffer of Tris/EDTA and stored at -20°C at the Applicated Biology Laboratory of University of Verona for Real-time PCR analysis. The following periodontal pathogens were investigated: P. gingivalis, T. denticola, T. forsythia, and A. actinomycetemcomitans. The cause of atrophy was recorded, along with the history of periodontitis (perio/non-perio), and the kind of prothetic restoration (fixed prosthesis/overdenture).
RESULTS: Colonization by periodontal pathogens was found in 9 peri-implant sites which corresponded to 9 patients. P.gingivalis was found in 8 patients, T. denticola in 4 patients and T. forsithya in 6 samples. A.actinomycetemcomitans was not detected in any samples.
P.gingivalis was found in 46.2% of periodontal sites (analyzed in laboratory) and in 28.6% of non periodontal sites. T. denticola was found in 30.8% of perio sites and it was not detected in patients without history of periodontitis. T. forsithya was found in similar percentages between perio (30.8%)and non perio patients (28.6%).
Moreover, the higher bacterial load of red complex pathogens were found in three patients with history of periodontitis.
Furthermore, the microbiological outcomes showed significant differences between patients rehabilitated with an overdenture and patients with a fixed prosthesis only regarding the presence of P.gingivalis (p=0.004).
CONCLUSIONS: History of periodontitis seems to be relevant for bacterial colonization also around zygomatic implants.
The more colonized sites were found in these patients and in subjects rehabilitated with an overdenture. As a result, we

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recommend a particular attention for these patients through more frequent professional oral hygiene sessions.
However, given the small sample size and the short follow-up time, caution must be taken in interpreting these results and further studies are necessary to validate the current findings.

Posterior jaws rehabilitated with partial prostheses supported by 4.0 X 4.0 Mm or by longer implants: one-year post-loading results from a multicenter randomised controlled trial

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BACKGROUND: To evaluate whether 4.0 x 4.0 mm dental implants could be an alternative to implants at least 8.5 mm long, which were placed in posterior jaws, in the presence of adequate bone volumes.
METHODS: One hundred and fifty patients with posterior (premolar and molar areas) jaws having at least 12.5 mm bone height above the mandibular canal or 11.5 mm below the maxillary sinus, were randomised according to a parallel group design, in order to receive one to three 4.0 mm-long implants or one to three implants which were at least 8.5 mm-long, at three centres. All implants had a diameter of 4.0 mm. Implants were loaded after 4 months with definitive screw-retained prostheses. Patients were followed to 1-year post-loading and outcome measures were prosthesis and implant failures, any complications and peri-implant marginal bone level changes.
RESULTS: Seventy-five patients were randomly allocated to each group. One patient dropped out after the 4-month post-loading evaluation from the long implant group. Up to 1-year post-loading, 3 patients lost one 4.0 mm-long implant each in comparison to 2 patients who lost one long implant each (difference in proportion=0.013; 95% CI: -0.058 to 0.087; P=0.506). All failures occurred before loading, the failed implants were replaced and the delivery of two prostheses in each group was delayed for several months (difference in proportion=0.0004; 95% CI: -0.068 to 0.069; P=0.685). Three short implant patients experienced three complications *versus* 2 long implant patients (difference in proportion=0.013; 95% CI: -0.058 to 0.087; P=0.506). There were no statistically significant differences in prosthesis failures, implant failures and complications. Patients with short implants lost on average 0.53 mm of peri-implant bone and patients with longer implants lost 0.57 mm. There were no statistically significant differences in bone level changes up to 1 year between short and long implants (mean difference=0.038 mm; 95% CI: -0.068 to 0.138; P=0.198).
CONCLUSIONS: One year after loading 4.0 mm-long implants achieved similar results as 8.5 mm-long or longer implants in posterior jaws, however 5- to 10-year post-loading data are necessary before reliable recommendations can be made.

Biological orientated immediate loading (BOIL) implants: a 5-years prospective study

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BACKGROUND: Several factors can contribute to the crestal bone resorption observed around immediate-loading implants. Subcrestal positioning of dental implants has been proposed to decrease the risk of exposure of the metal of the top of the implant or of the abutment margin. However, the optimal implant position has to be yet established. The aim of this prospective study was to evaluate if the apico-coronal implant position respect the alveolar ridge level may affect peri-implant marginal bone loss after immediate implant loading.
METHODS: A prospective clinical study was carried on providing the insertion of conical implants with a minimum length equal to 10 millimeters. Implants were placed under the ridge bone level according to the thickness of the soft tissues: the sum between the soft tissues thickness and the position of the implant under bone level has to be at least 3 millimeters (ie. with a soft tissues thickness of 1 mm, the implant should be placed 2 mm apical to crestal bone level). Soft tissues thickness was established with a millimeter probe pre-operatively. Marginal peri-implant bone loss was evaluated measuring mesial and distal bone height from implant edge using digital radiography on the day following implant placement (baseline) and every 6 months. The loading protocol was designed as follow: implants were immediately loaded if RFA was major or equal to 60 (Osstell) and Torque insertion value was major or equal to 30 Ncm (registered at the time of insertion with the implant engine). Subsequent steps were use of low-profile MUA and immediate impression with transference pick up. Then, the delivery of a screw-retained temporary reinforced composite prosthesis was performed within 24 hours. Data were analyzed using GraphPad Prism software version 5.00 for Windows (GraphPad Software, San Diego, CA, USA). Significant differences between groups were determined using Kruskal–Wallis test, followed by Dunn's post-hoc test. The level of significance was set at $p<0.05$.
RESULTS: A total of 37 patients met the inclusion criteria and were enrolled in the study. 21 patients received a single implant; 16 patients received 6 or 8 implants for a upper or lower full-arch prosthesis; a total of 96 implants were placed. The average time of observation was of 38 months (range from 12 to 60). Peri-implant marginal bone loss considered from implant edge was observed only in 4 implants. No implants failed, resulting in a cumulative survival rate of 100%. The average of marginal bone loss observed amounted to 0.3±0.1 mm. Nor loosening of the prosthetic retention screws nor fractures of the prosthesis were recorded. One case experienced the loss of the incisal edge of 1.3; however, it was repaired with composite material without removing the prosthesis. The quality of the soft keratinized tissue improved after the first 6 months and remained stable over time for almost all cases.
CONCLUSIONS: Today the insertion of implants immediately after teeth extraction and prosthesis delivery within 24 hours represents a valid and predictable clinical option. Taking into account the thickness of the soft tissues, and positioning the implant accordingly, may be possible to prevent the peri-implant tissue re-absorption even in patients with thin soft tissue. The stability of the soft tissues obtained by the simultaneous insertion of the Multi-Unit Abutment (MUA) and the screw-retained prosthesis ensure stability of the epithelial system around the stump that represent the fundamental biological seal for the long term survival of both implant and prosthesis.

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Clinical outcome of multiple unit fixed dental prosthesis supported by narrow diameter implants. 3 to 8 years follow up

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BACKGROUND: Narrow diameter implants are mainly used to support single unit restorations when reduced mesio-distal dimensions are present. Aim of this study was to evaluate the clinical effectiveness of narrow diameter implants in supporting multiple unit fixed dental prostheses (FDPs). The aim of the study was also to evaluate the global satisfaction of the patients, both from an esthetic and comfortness point of view.
METHODS: A retrospective evaluation of the patients treated with narrow diameter implants and restored with a fixed dental prosthesis from 2008 to 2013 has been performed. A review of the medical and dental records was performed and patients were recalled for a follow up visit, during which they examined from a clinical point of view. During this study both the prosthetic and the biological aspects were investigated: the manufacture status and the health of the peri-implant tissues. The patients' satisfaction was also investigated. Inclusion criteria: Patients treated with at least one narrow diameter implants and restored with a fixed dental prosthesis of more than 1 unit (2 to 12 units). Clinical and radiological examination was performed.
RESULTS: 21 prostheses could be included with a mean of 4,6 years of follow up. 45 narrow diameter implants (of a total of 47 implants) supported 86 prosthetic units with a mean of 2.35 implants supporting 4,3 units. 30 % of the implants were placed at the time of teeth extraction (Type 1) and 16% were treated with a simultaneous guided bone regeneration technique. All implants were inserted in a prosthetically driven position and alveolar ridge augmentation was performed when needed. All prostheses survived. All implants survived. Implant success rate according to Buser criteria was 96 %. Prosthetic complications included porcelain chipping (2 cases) cement loosening (3 cases). No biological complications were reported or could be detected at the follow up visit. All patients were satisfied with the overall result of the restoration.
CONCLUSIONS: Narrow diameter implants may be safely used to support multiple unit restorations. The utilization of literature-based surgical protocols enhances deeply the outcome of this therapy. It is necessary to plan the prosthetic rehabilitation in advance: to carry out a so called prosthetic-driven implant placement. The outcomes following ridge augmentation with this kind of implants don't vary. Nevertheless the whole procedure results more complicated, thus the results may depend from the clinician's expertise.
Long term follow up evaluation is needed.

Short-implants and the transcrestal sinus lifting without graft: follow-up to 24 months

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Insufficient bone volume is a common problem encountered in the rehabilitation of the edentulous posterior maxillae with implant-supported prostheses.

BACKGROUND: the purpose of this study was to evaluate the clinical and radiological outcomes and postoperative morbidity of crestal sinus floor augmentation technique without graft and short-implant. The patient's satisfaction was been considered too. All patients were followed up to 3, 6, 12 and 24 month after loading.
METHODS: 22 patients (mean age 49,6, 14 women and 8 men) were mainly enrolled for a residual upper jaw crest thickness SA3 class of Misch (5 <Thickness<8 mm), for which there is provided a lateral approach to the sinus, but we used the crestal approach without graft. All patients signed an informed consent form detailing the study procedures. Other inclusion criteria were good state of health, absence of disease that affects wound healing or bone metabolism.
The patients smoker more 10 cigarettes per day were excluded. CBCT scans were performed before surgery. Under local anesthesia a full-thickness flap was elevated; two vertical releasing incisions were made if necessary. For the sinus lifting we used the osteotomes Bicon of diameter 3,5, 4 and 4,5mm, after the pilot drill and the calibrated burs. Twenty-nine implants (Bicon Dental Implant, Boston, MA, USA) of which twenty-six 4,5x6, one 4x5 and one 5x5 have been placed, seventeen in the first molar position, ten in the second molar position and one in the second premolar position; all implants were placed with sinus abutment. Intraoral X-ray was performed postoperatively. After 5 months the implants were exposed with transmucosal healing abutments and functionally loaded after 3 weeks with twenty-six IAC and two FPDs. The follow-up appointments was at 3, 6, 12, 24 months. The follow-up examination included cumulative survival rate of implants and peri-implant marginal bone loss.
RESULTS: In four cases we had a small perforation of the Schneiderian membrane to the passage of the pilot drill. One implant did not osteointegrated and was removed at the exposure, other two implants were lost respectively after four and twenty-four months load; the latter in a patient subjected to prolonged corticosteroid therapy and high doses for autoimmune disease. No other adverse effects were observed. The marginal bone loss of each implant was measured both mesially and distally; the range of loss was from 0,21 to 0,90 mm, showing and average value of 0.15 mm (±0.72 mm) mesially and 0.20 mm (±0.85 mm) distally. In conclusion, despite the limitations of this study, it suggests that the crestal approach for the sinus augmentation without graft and the short-implants for the rehabilitation of partially atrophic edentulous ridges is a minimally invasive surgery and offers a high probability of success in the medium term, but their long-term prognosis is unknown.

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Implant-supported restorations following horizontal ridge reconstructions by means of autologous or homologous bone block grafts: 5-year clinical results of a multi centric RCT

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BACKGROUND: The aim of this study was to evaluate the clinical performance of fresh-frozen bone allografts (FFB) derived from tibial hemiplateau of cadaver donors when compared to intraoral autologous bone grafts (AB) for the treatment of maxillary horizontal atrophies (Cawood and Howell IV) after 5 years of follow-up. In order to reach this goal, a series of implant-related biometric parameters were recorded during follow-up program relative to each patient.
METHODS Twenty-one out of 24 originally treated patients were considered as three patients dropped out because they refused to participate to the entire follow-up period. Two of them belonged to the control group whereas 1 belonged to the test group. Initially all patients were examined monthly for the first sixth months after provisional prostheses were delivered. From that moment on, the follow-up program continued with visits every 6 months in subsequent years. The following biometric parameters were evaluated and recorded at each recall appointment: peri-implant probing pocket depth (PPD), bleeding on probing (BOP), amount of keratinized tissue (KT) and peri-implant mucosal recession (PMR) at the mid-buccal side. At the end, a total of 72 implants were taken into consideration for the statistical analysis. Forty were relative to the test group and 32 to the control group.
RESULTS: Unexpectedly, at the time of implant exposure 16 peri-implant defects >3mm were revealed in the FFB group. The management of these complications accounted for a surgical treatment by means of guided bone regeneration (GBR). As it was assumed that the presence of biomaterials (e.g. DBBM, collagen) would have influenced the medium-long term data upon implant-related biometric parameters, a third group relative to homologous bone which needed regrafting (FBR) was introduced for further statistical analyses. Otherwise, the cumulative implant survival rate after 5 years of follow-up was 82% in the FBR group, 96% in the FFB group and 100% in the AB group. When considering the original homologous group (FFB+FBR) the survival rate was 90%. Every implant failure was encountered before the provisional loading. Regarding implant-related biometric parameters, no statistically significant differences were found as regards bleeding on probing, peri-implant mucosal recession and keratinized tissue. Instead, probing pocket depth was significantly lower in the FBR group. However, the interpretation of this finding remains unclear at the present day.
CONCLUSIONS: On the basis of the reported data and within the limits of this study, it can be concluded that fresh-frozen bone allografts should not be considered as a feasible alternative when compared to intraoral autologous bone grafts after 5 years of follow-up. The higher resorption rate, necessity for regrafting and implant failures are shortcomings that might prevent their application for alveolar ridge augmentation in the next future. Further studies are warranted to confirm these results and the reliability of FFB block allografts in horizontal alveolar ridge reconstruction.

Relation between oral hygiene, periodontal inflammation status and secondary implant failures: a retrospective longitudinal study

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BACKGROUND: The present study evaluated the relationship among plaque/periodontal and peri–implant status and secondary implant failure due to peri implantitis in patient who joined the maintenance programme after implant insertion and were rehabilitated with cemented prosthesis.
METHODS: Patients who had undergone implant-prosthetic rehabilitation at the UOC of Dentistry I.R.C.C.S. San Raffaele Hospital, Milan, Italy, joined themaintenance programme of the same Hospital. Complete data about implant failures with at least one year and half follow-up were included. Patient records and data recorded in the database Dental Management System(D.M.S.) in use at C.I.O.P. (Centre of Oral Health and Prevention, I.R.C.C.S. San Raffaele Hospital in Milan) were analyzed. Patients with full-arch rehabilitations and/or with at least one tilted implant and/or with implants shorter than 9 mm and/or with screw-retained rehabilitations were excluded. The number, the time, the reasons of implant failure and the surgical protocol adopted for the insertion were recorded for each patient: implant failures, number of months between implant insertion, implant loading and implant failure, surgical protocol, Bleeding Index, Probing Depth and Plaque Index were recorded and related to implant failure at patient level.
RESULTS: A total of 1427 patients (2673 implants) were included. The follow-up ranged from 1.5 to 9-years (mean 5.3 years±1.3). The cumulative survival rate was 98.01%. Thirty-two patients (36 implants, 1.36% of all implants) had implant failure. Eleven patients (12 implants) experienced secondary implant failure, all for peri implantitis. Ten of these 11 subjects were females.In patients suffering secondary implant failure, mean PI (O'Leary)/mPI was 28.4%±14.8% (range: 11% - 58.5%) (5 patients among 11 showed a mean PI (O'Leary)/mPI>25%; OR: 3.82; p=0.028).Mean BOP/mBOP was 13.4%±12.7% (range: 2% - 33%) (3 patients showed a mean BOP/mBOP>30%; OR: 5.86; p=0.01). PD>4mm was observed in 34%±26.1% (range: 3% - 73% of sites); 5 patients showed a mean PD>4 mm during the follow-up in more than 25% of sites; OR: 4.60; p<0.012).
CONCLUSIONS: Within the limitation of this study, secondary implant failure due to peri implantitis seems to be systematically related to relatively poor oral hygiene and signs of infections (presence of bleeding on probing and probing pocket depth).

Implant failure for primary infection in healthy patient with no systemic contraindications to implant-prosthetic therapy

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BACKGROUND: This retrospective case-control study evaluated Implant Failure for primary infection in healthy patient with no systemic contraindications to implant-prosthetic therapy.
METHODS: The sample for this case-control study

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includes all the patients with no systemic disease who had undergone implant-prosthetic rehabilitation at the UOC of Dentistry IRCCS San Raffaele Hospital, Milan (Italy) between March 2006 and March 2015 and joined the maintenance programme at the same Hospital. Complete data about implant failures were included. The number, the time and the reasons of implant failure, and the surgical protocol adopted for the insertion of fixtures were recorded for each patient. In addition, data about smoking habits, diabetes and taking bisphosphonates were also recorded at patient level. Then the mean Bleeding Index (BOP), Probing Depth (PD) and Plaque Index (PI O'Leary), recorded during the entire period of follow-up at the same Hospital were analyzed.Conical implants with rough surface (Micro Rough Surface - MRS®) and internal hexagon connection have been used (K implants, WinSix®, BioSAFin. S.r.l. - Ancona, Italy).
RESULTS: A total of 1427 patients (2673 implants) aged between 18 and 75 years old, who had received an implant-prosthetic rehabilitation, were eligible for the study. The follow-up ranged from 1.5 to 9-years. The cumulative survival rate was 98.01%. Implant failure for primary infection was observed in 20 patients (24 implants). In this group of 20 patients, implant failure occurred after 3.4±2.5 months at mean (range: 1 - 10 months) from implant insertion. In 14 patients out of 20, implant failure occurred less than or about 3 months after surgical insertion (early implant failure). Among subjects who experienced implant failure for primary infection, 5 patients out of 20 (5 implants) had received post-extraction implant with immediate loading; these 5 fixtures were placed mostly on bicuspid areas (3 failed fixtures out of 5 failed fixtures).Three patients (out of 20) (6 implants) had received immediate loading implants (no post-extractions); these 6 fixtures were placed mostly on incisive areas (second lower incisives) (5 failed fixtures out of 6 failed fixtures).12 patients (13 implants) failed after procedures with delayed loading. Among these 13 implants, the maiority of fixtures have been inserted in bicuspid/molar areas (6 failures were observed in bicuspid areas, and 5 failures in molar areas). Implant failure for primary infection was not associated with smoking habits, or diabete, anticoagulant therapy and bisphosphonates.
CONCLUSIONS: Within the limitation of this study, early implant failure is not associated with smoking habits, or diabete, anticoagulant therapy and bisphosphonates. Clinicians must pay attention to local and surgical factors, mostly in bicuspid and molar area, or when they adopt post-extraction procedure with immediate loading.

In vitro evaluation of the antibacterial efficacy of two commonly used diode lasers and a novel experimental diode laser, on machined implant surfaces: a pilot study.

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BACKGROUND: The aim of this in-vitro study was to evaluate the efficacy of three different diode lasers, two commonly used wavelength (810nm and 980nm) and a novel experimental diode wavelength (1064nm), in reducing colonization of S.sanguis on machined dental implant surfaces.
METHODS: Twelve smooth sterile 4.8x10mm implants (i-Fix Uniqo, FMD Medical Device, Rome, Italy) were placed into screwcap glasses that were then filled with 3½ cc of sterile agar in order to leave the last 2mm of the apical portion of the implant exposed. The samples were divided into 4, equally divided groups according to treatment modality: non treated control group and one test group per wavelength. A diode laser with a wavelength of 1064nm is, to date, not available on the market and has been used in our lab only for experimental purposes.
After agar gelification, the exposed portion of the implant was inoculated with 10 microliters of S. sanguinis transported in tryptic soy broth. The glasses were then placed in an incubator with the atmosphere of 5% CO2 at 37 Celsius degrees for 24 hours to allow the bacteria to grow. After 24 hours, the test groups were then subjected to different treatment protocols: 810nm, 980nm or 1064nm lasers. The laser fiber optic tip was kept 5mm away from the exposed surface of the implant, for 60 seconds set at 1.0W continuous. We used an "up-and-down, left-and-right motion" to apply the laser light on the implant surface. All the implants were then took off from the screwcap glasses and placed in microtubes containing 600 cc of tryptic soy broth and vortexed to allow the bacteria to detach from the surface. The samples were then diluted 1:1000 and plated on agar plates. The plates were placed in an incubator with the atmosphere of 5% CO2 at 37 Celsius degrees for 48 hours. After incubation, the colony forming units were eye-counted and recorded.
RESULTS: Our study shows that all the three different wavelengths minimize CFU counts, with the reduction being more marked in the 810 and 980nm groups. Anyway, a trend of reduction in the bacterial colonies is also evident in the 1064nm group.
CONCLUSIONS: The use of diode lasers at 810, 980 and 1064nm for implant surface decontamination was efficacious in this in-vitro study. Therapy with diode lasers is a viable option in the management of peri-implantitis and peri-implant mucositis considering its efficacy in reducing bacterial colonization. Further studies with larger samples size should be carried out to validate and strengthen the conclusions of our pilot study.

Nobelguide® implant surgery and immediate function in FFHB grafted patients: a retrospective cohort study with 5 years of follow-up

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BACKGROUND: The behavior of fresh frozen homologous bone (FFHB) when used in combination with computer guided implant surgery has not been investigated yet and there is a lack of clinical evidence in the literature.
The purpose of this retrospective study is to assess the benefit of computer-aided technology (NobelGuide®) to rehabilitate FFHB grafted patients with an implant-supported fixed full arch prostheses.
All patients were treated with a flapless surgical procedure and immediate function protocol. Implants survival was evaluated 4 to 6 year follow-up.

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METHODS: 65 patients with atrophic edentulous jaw were reconstructed with FFHB grafts.
According to the Lekholm and Zarb's classification, patients with atrophie of class A and class B were treated with socket preservation; class C and D were treated with sinus lift in maxilla and with veneer grafts in premaxilla whereas ridge preservation was performed in the jaw; patient with maxilla class E received inlay grafts in combination with Le Fort I and in the only case of class E of the jaw it was performed a fibula free flap.
NobelGuide® flapless surgical protocol was performed for implant placement and all the patients received an immediate loaded fixed prostheses.
Implants Torque values were recorded at implant insertion (t1) and at 5 years (t2).
Bone levels were assessed radiographically.
Soft tissue was examined with a periodontal probe. PPD (Pocket Probing Depth), mBI (Modified Bleeding Index), KT (Keratinized Tissue), mPI (Modified Plaque Index), MPS (Mucosal Plaque Score) values were recorded.
Prostheses survival was evaluated.
RESULTS: 65 patients (14 males and 51 females) operated between 2009 and 2011 are included in the study.
Of 65 operated patients, 5 years follow-up of 59 (91,7%) are available (mean: 62.37 months, range: 4-6 years).
Patients received a total of 345 implants (252 Speedy Groovy and 85 MKIII). 321 implants and 72 full-arch prostheses (26 mandibular and 46 maxillary) were analyzed at the follow-up.
Survival of implants and prothesis was high reaching respectively 95,09% and 93,23%.
The implant and the prosthesis failures occurred mainly in the first year. Factors significantly related to failure of the implants were: smoking, position of the implant as last distal abutment and fracture of basal maxillary bone.
An higher torque level at implant insertion did not correspond to a lower risk of implant failure.
Prosthesis survival was influenced by bruxism and implant failure.
CONCLUSIONS: This retrospective study demonstrates that computer-guided implant placement in FFHB grafted patients is a predictable treatment modality allowing the clinician to achieve good primary implant stability and resulting in high survival rates.

Flapless computer-aided virtual surgery planning in immediate loading of maxillary edentulies

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BACKGROUND: The use of technologies that merge computerized tomography X-ray imaging and 3- dimensional (3D) planning software allow the surgeon to digitally elaborate on the computer position, length, and diameter of every implant to be placed. Following this approach, the placement is guided in a 3D digital model, and the implants are placed in the final position avoiding eventual anatomic structures. The aim of study was to evaluate the virtual computer assisted planning to riabilitate upper maxilla by flapless post-extractive fresh sockets technique and immediate load implants.
METHODS: Fifteen adult patient were recruited from five centeres for this study, all patient needed a full immediate riabilitation of the upper maxilla. In all patients was insert a number of 8 implants to rehabilitation of the maxillary bone. After clinical and anamnestic evaluation the patients showed a good general and oral health condition, after the informed consent they allowed to be treated. All subjects submitted to a complete CBCT radiographic examination with and without the surgical template with gutta-percha radiopaque markers. Data were analized with Nemotech software for the 3d previsualization of upper maxilla. The 3D scan allows the biomedical engineer to design the final prosthesis within the aesthetic envelope. The treatment denture was made so that it satisfied the aesthetic requirements, and the patient approved it as being representative of the final appliance. The scans were used to produce a virtual model to planning the treatment. The virtual models of the denture and basal bone were then matched up in the software to begin the implant design process. After, the data were processed and sent to Dentaurum for the making the surgical guide template. The patients were subjected to surgical extractive procedure, and after, 8 Dentaurum implant fixtures were placed using the surgery guide template and provisional prosthesis was immediate loaded.
RESULTS: All patients showed an excellent recovery from surgery. There was no intra-operative problems like edema, trismus, ecchymosis, pain or other post-operative complications. Surgical times have been reduced compared to the normal procedure. After 1 years of follow-up all patients showed a good osseointegration of the upper maxilla 120 implants. No implant was failed. No patients showed clinical evidence of peri-implantitis or bone loss after radiological analysis.
CONCLUSIONS: The use of surgical computer-guided planning could change the implant surgery approach. The Computer software implant planning reduced surgery timing and also it increased safety to avoiding eventual anatomic structures.
Whereas before the use of conventional implant surgery 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. In conclusion flapless surgery with guides makes immediate placement of the implants more predictable and safe.

Argon plasma treatment of contaminated titanium implant surfaces: an *in vitro* study

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BACKGROUND: In this study the effects of argon plasma treatment on different titanium implant surfaces previously exposed *in vitro* to bacterial contamination was assessed.
METHODS: Sterile c.p. titanium implant discs with turned (T), sandblasted/acid-etched (SAE) and titanium plasma sprayed (TPS) surface were used. The average roughness (Sa) of these surfaces was 0.8 μm, 1.3 μm and 3.0 μm for T, SAE and TPS discs, respectively. A strain of Aggregatibacter actinomycetemcomitans ATCC3718 was grown at 37°C under anaerobic conditions for 24 h and then transferred on six discs for each of the three surface types. To enhance biofilm for-

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mation, discs were previously coated for 1 hour with human saliva. An unstimulated saliva sample was obtained from a healthy male donor, who had not assumed any medication for 3 months prior to the study. After 24 hours, a half of the contaminated discs (control group) were directly used to evaluate the colony forming units (CFUs). The other half of the contaminated discs (test group) was treated in an argon plasma chamber for 12 minutes at room temperature prior to be analyzed for CFU counting. All assays were performed using triplicate samples of each material in 3 different experiments.
RESULTS: When the CFU counting was carried out on control discs, a total of $1.50x10^6 \pm 1.4x10^5$, $1.55x10^6 \pm 7.07x10^4$ and $3.15x10^6 \pm 2.12x10^5$ CFU was respectively assessed for T, SAE and TPS discs, without statistically significant differences among the three surfaces. On the contrary, any trace of bacterial contamination was assessed for titanium discs treated in the argon plasma chamber prior to be analyzed, irrespectively to the implant surface tested.
CONCLUSIONS: The argon plasma treatment showed to efficiently decontaminate previously infected titanium implant surfaces. These preliminary results need to be confirmed also in more complex conditions, such as the formation of a bacterial biofilm. The possibility of using this technology in the daily clinical practice with a chair-side device is particularly fascinating and need to be further investigated.

5 Millimiter-long, plateau-design implants used to support single crown restorations in posterior severely resorbed jaws: a 3-years retrospective clinical and radiographic study

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BACKGROUND: To evaluate the outcomes of 5 mm-long locking-taper implants supporting single crown restorations in severely resorbed posterior maxillae and mandibles.
METHODS: The study was designed as a retrospective clinical and radiographic evaluation. The sample was composed of patients affected by partial posterior edentulism, treated between January 2009 and December 2013 with at least one 5 mm-long, locking-taper, plateau-design implant (Bicon LLC, Boston, MA, USA) in the posterior areas of the jaws. Only implants supporting single crown restoration were included in the sample. Crown-to-implant ratio was measured using a software program (ImageJ, NIH) measuring tool in conjunction with a magnification tool. Each crown was measured from the bottom of the implant to the crown base and then to its highest point. Peri-implant crestal bone levels (CBL) and first bone-to-implant contact (FBIC) were measured on mesial and distal sides using the implant-abutment interface (IAI) as fixed reference. CBL and FBIC variations were calculated using the radiograph performed at loading time and the one performed at the last follow-up examination. Clinical parameters such as keratinized gingival width, modified bleeding index, modified plaque index and probing depths measured at the last follow-up were also reported.
RESULTS: Forty-one subjects who received 80 locking-taper implants were included in the sample. The mean follow-up period was 34±12 months. Forty-two implants were placed in the posterior mandible, whereas thirty-eight implants were placed in the posterior maxilla (of these, 20 implants were placed along with transcrestal sinus lift procedure). Two implants failed in the posterior mandible during the first six months of loading. After that, no further failures were recorded, giving a CSR of 97.5% (mandible: 95.2%; maxilla: 100%). At the follow-up examination, two implants in the posterior mandible presented signs of peri-implantitis. The mean measured crown-to-implant ratio was 2.6±0.52 :1. Average crestal bone loss measured between prosthetic loading and recall visit was 0.18±0.79 mm, whereas FBIC variation in the same period was on average 0.18±0.52 mm. The crown to implant ratio was significantly higher in the posterior mandible than the posterior maxilla, but no differences were found between this two groups for what regards the peri-implant bone levels. About peri-implant soft tissues, the sample was found in good clinical conditions, with a mean PD of 3.29 mm, mean mBI of 0.55 (BoP: 36%), and a mean mPI of 0.38 (PI: 23%). The peri-implant keratinized tissue width was on average 1.92 mm, with a significant wider KT around implants placed in the maxilla. Despite this, no statistical differences were found between these groups about probing depth, bleeding on probing and plaque accumulation.
CONCLUSIONS: Five mm-long implants seems to be a good choice for the restoration of partial edentulisms when alveolar resorption does not allow for the insertion of a longer implants, and the results obtained from this sample suggest that ultrashort implants should make possible to avoid augmentation procedures, and that they should be safely used to bear single crown restorations which facilitate home oral hygiene procedures. Despite the good size of the sample, this is a retrospective study, whom finding need to be confirmed by longer and prospective clinical studies.

Therapeutic evaluation in posterior mandibular atrophy treatment: standard length implants in augmented bone with inlay graft technique versus short implants

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BACKGROUND: To evaluate and to compare retrospectively reliability, survival rate and marginal bone level changes in posterior mandible. Results were achieved by means of short implants on one side and by Standard length Implants in augmented bone with Inlay Graft Technique without mini-screws and mini-plates, on the other side.
METHODS: Through a medical records review 80 patients (51 men and 29 women, aged between 26 and 60 years, mean 53 years) with preoperative posterior mandibular atrophies having 6 to 8 mm of residual crestal height and at least 5.5 mm thickness were enrolled in this study. They were treated with Short Implants or with Standard length Implants in augmented bone with Inlay Graft Technique without mini-screws and mini-plates, between January 2009 and June 2013 (follow-up ranges from 2 to 6 years, mean 57 months). Among 80 patients selected, 60 of them were rehabilitated with Short Implants, making a total of 63, while each of 20 patients treated with

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Sandwich Technique received two Standard length Implants in augmented site. Clinical and radiographic parameters evaluated are: intra- and post-operative complications, peri-implant bone loss, implant survival, failure and success.
RESULTS: About complications, 18 of 20 patients exposed to Inlay Bone Graft Technique showed good post-operative course while only 2 patients complained of a temporary neurosensory disturbance for 2 weeks. No dehiscences of the mucosa were recorded at the marginal ridge of the mobilized fragments. No intra- and post-operative complications in patients treated with Short Implants were observed. Among 40 Standard length Implants inserted only 1 early implant failure (SRR=97,5%) is recorded. After his replacement no more late failure were registered, with a SRR of 100% at last follow-up. Among 63 Short Implants only 2 failed in the first 6 months follow-up (SRR=96,8%). Standard length Implants in augmented bone showed a mean peri-implant bone loss of 2.22 mm (SCR=100%). About 10% of Short Implants evaluated (6 out of 63) lost an average of 3.28 mm peri-implant bone. This value, even considering the maximum follow-up, is higher than the upper limit fixed for implant success criteria. Rather the remaining 90% showed value below 2.4 mm, according to the implant success criteria (SCR=90,5%). In any case the difference between the 2 groups, with regard to the survival and success, is not statistically significant.
CONCLUSIONS: In the presence of posterior mandibular atrophy with a residual bone height between 6 mm and 8 mm, both types of treatment compared prove valid. Although no statistically significant differences were found in the 2 groups that were compared, it is to emphasize that the resorption of 3 mm registered in 10% of Short Implants, in relation to the length of the same (5.5 mm) is high, corresponding to more half the length of the implant. So despite the placement of Short Implants showing a faster treatment, with less morbidity and lower costs, it is necessary to always consider the possibility, not remote, of a high ridge resorption that affects the permanence of rehabilitation in the long term.

Regenerative therapy of peri-implantitis lesions using mineralized dehydrated bone allograft: case series

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BACKGROUND: To evaluate the outcome of surgical regeneration therapy of peri-implantitis bone defects using mineralized dehydrated bone allograft in combination with resorbable membrane.
METHODS: Ten consecutive consenting patients with at least one osseointegrated implant with peri-implantitis, for a total of 24 sites, were enrolled for surgical regenerative treatment. In agreement with the Consensus Report of the 7th European Workshop on Periodontology (Lang & Berglundh 2011), the implants included had radiographic progressive bone loss following the first year of healing, crater-like lesions ≥2 mm, and bleeding on gentle probing, with or without suppuration. At the time of enrolment all patients underwent oral hygiene protocol. No surgery was performed before full-mouth plaque score ≤20% and full-mouth bleeding score ≤20%. Under local anaesthesia and following the removal of prosthesis, oral and buccal mucoperiosteal flaps were raised and granulomatous tissue was removed using hand curettes. The implant surfaces were debrided and decontaminated using ultrasonic instrument, rotating titanium brush, air polishing with glycine and bicarbonate powders, chlorhexidine solution (2%) and minocycline microspheres. The osseous defects were filled with mineralized dehydrated bone allograft (Puros®, Zimmer Dental Italy srl) and covered with resorbable membrane (Bio-Gide®, Geistlich Biomaterials Italy srl). Finally the flaps were repositioned coronally, fixed with resorbable suture and the prosthesis was remounted. The post-surgery protocol included administration of prophylactic antibiotics for 1 week (1 g amoxicillin + clavulanic acid 2 times daily and 250 mg metronidazole 3 times daily), and analgesic and antiphlogistic therapy (400 mg ibuprofen max 3 times daily) as needed. Patients were advised to discontinue tooth brushing and to avoid trauma at the site of surgery for 3 weeks. They were also instructed to use 0.12% chlorhexidine digluconate rinse for 1 minute 3 times a day for the same period, and then placed on an individually tailored maintenance care programme. Immediately before surgery and every 12 month post-operatively probing depth at the mesial, distal, buccal and palatal/lingual aspects of each implant and radiographic periapical radiographs with the parallel long-cone technique, using a standardized film holder were performed. All radiographs were scanned and digitized, and an appropriate software calibrated against the space between two threads to the nearest 0.1 mm were used to estimate bone-level variations over time. Changes in marginal bone level were determined through the distance from the implant shoulder to the bottom of the marginal bony defect, both at mesial and distal aspects of each implant, and expressed in millimetres. Descriptive statistics, including mean values and standard deviations, were used for analyses of the data.
RESULTS: In all patients, surgery and healing proceeded without complications and with minimal post-operative discomfort. No patients drop out and no implant removal were registered during the 3-year-period. Probing depth was reduced by 3.1±1.6 and bleeding on probing was decreased by 66.7±28.4%. The radiographic evidence of defect fill between baseline and year 3 was a mean gain of 0.5±1.47mm
CONCLUSIONS: Within the relatively small sample size, surgical therapy of peri-implantitis using mineralized dehydrated bone allograft in combination with resorbable membrane, at 3-year follow-up, demonstrated that the clinical conditions of the treated implants had improved, whereas the bone defect filling seemed not to be predictable.

Which is the best antibiotic prophylaxis protocol to prevent early failures at dental implant placement? A systematic review and Bayesian Network meta-analysis

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BACKGROUND. Even if there is a moderate quality of evidence supporting the use of antibiotics at dental implant placement to prevent early failures (Cochrane 2013), it remains

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unclear which is the best antibiotic prophylaxis protocol among those proposed.
This systematic review of RCTs with Bayesian Network Meta-analysis aims to answer to the following question: "In patients undergoing dental implant placement, which is the best antibiotic prophylaxis protocol to prevent implant failures?"
METHODS. This abstract is reported according to the "PRISMA for Abstracts" guidelines.
Inclusion criteria:
— (P) Any type of patients undergoing dental implant placement;
— (I) Any type of antibiotic, pre-, intra- or post-operatively administered, or combination of these, in any dose and for any duration;
— (C) Any possible comparison among the included antibiotic types and posologies, including placebo and no treatment;
— (O) Early Implant failures;
— (S) Only RCTs of at least 3 months follow-up and including at least 20 patients for each arm were considered for the inclusion in this systematic review. No studies have been excluded on the basis of language, date of publication or publication status.
The MEDLINE, SCOPUS, CENTRAL and Web of Knowledge electronic databases were searched in duplicate for RCTs on this topic up to and including 19th February 2015. The following journals were also hand-searched in duplicate: JCP, COIR, CIDRR, JOP, EJOI, JOMI. Additional relevant literature was identified using both hand- searching on reference lists within published systematic reviews and included studies, and screenings of ClinicalTrials, OpenSIGLE and NTIS.
The screening of eligible studies and their inclusion, the assessment of the risk of bias of the trials (with ROB tool from the Cochrane Collaboration) and the data extraction were all conducted in duplicate and independently by two review authors.
We conducted a Bayesian Network Meta-Analyses to compare all antibiotic prophylaxis protocols simultaneously for the primary outcome (early implant failures), using the Markov chain Monte Carlo method with WinBUGS 14, as per the guidance from the NICE DSU. We calculated the odds ratios (OR) with 95% credible intervals (CrI) using a random-effects model. The probability that each of the antibiotic prophylaxis protocol included in the analysis was the Best was estimated.
RESULTS. Seven studies were included in the network meta-analysis, with a total of 1.242 participants. The antibiotic type used in every trial was only amoxicillin: there were no trial looking at alternative antibiotics. Doses and timing of doses varied, although most protocols used a single dose taken just before the implant placement.
The antibiotic prophylaxis protocol with the highest probability of being the Best to prevent implant failures was the one which provides a single dose of 3 g of amoxicillin administered 1-h pre-operatively (Pr=49%).
Even if the single dose of 2 g of amoxicillin administered 1-h pre-operatively is the most commonly used, it achieved only a probability of 3% to be the Best prophylaxis protocol.
CONCLUSIONS. Basing on current available RCTs, the use of 3 g of amoxicillin administered 1-h pre-operatively might be considered the gold standard antibiotic prophylaxis protocol at dental implant placement. However, the quality of evidence is still very low, and further studies with direct comparisons, with higher statistical power and testing also other antibiotic types are required to verify these results.

Immediate load post-extractive implant in aesthetic area: case report

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BACKGROUND: The aim of this paper is to describe a clinical case of maxillary lateral incisor removed due to fracture.
METHODS. This case was treated with a technique of post exctractive and immeadiate loading. After the extraction, a residual bone ridge was evidenced.
So, during the implant placement, a fenestration in the vestibular bone was done. The augmentation of the buccal plate was obtained with the GBR tecnique using a resorbable membrane fixed to the bone with pins and stitch to periostium. Immediately after surgery, the provvisional restoration was made using the implant mounter and was put out of occlusal function.
RESULTS: The technique proposed was found to satisfy the high aesthetic demands of this patient. Our decision was to keep the provisional restoration for a year both to obtain a perfect osseointegration both to condition the soft tissues.
CONCLUSIONS: A partially missing buccal plate was not a critical factor for implant success and bone regeneration of immediate implants.

7-years follow-up of an ultra-short SPS implant with 3.0 Crown-to-implant ratio: a case report

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BACKGROUND: In the past, several authors empirically established that to avoid overloading the maximum crown–implant ratio should be equal to or less than 1:1. Today, many authors have demonstrated that it is possible to have a crown–implant ratio of more than 2:1 without compromising the short- and long-term outcome of implant prosthetic rehabilitation.
The aim of this case report is to show the successful long-term follow-up of an implant with 3.0 crown-implant ratio and a sintered porous surface, used for the rehabilitation of a single edentulism of an upper first molar.
METHODS: The patient was a 70 years-old man, without any pathology that contraindicated surgery. In November 2008 the upper right first molar (element 1.6) was extracted for periodontal problems and, two months later, it was replaced with an implant. After local anaesthesia, a muco-periosteal flap was elevated. Since the residual bone height was 2,5 mm, a sinus lift with osteotomic technique was performed, in order to place a 5x5 mm sintered porous surface implant with a tapered truncated cone shape, in the same position of the extraction site.
Submerged primary healing period of 6 months was adopted to ensure osseointegration, then a second surgery was performed and a healing screw was manually tightened. At the same time, an impression was taken. One week later, the definitive abutment and the provisional crown were cemented. In order to avoid complications at the implant-abutment connection, the definitive abutment was not removed anymore

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and the fixed final restoration was finalized on its duplication on the master cast.
In order to favour perfect marginal tissue healing, the provisional prosthesis was adopted for 3 months, then the definitive crown was positioned.
The patient was recalled every 3 months for oral hygiene in the first 3 years, than every 6 months for the other years of follow-up. Periodontal parameters were recorded and periapical x-ray was obtained once a year for a period of 7 years after the surgery, from 2008 to 2015.
RESULTS: During the follow-up, no complications were observed and the implant met the success criteria proposed by Albrektsson and Zarb in 1998. As shown by periodontal evaluation, no clinical signs of mucositis or peri-implantitis were detected during the period of follow-up. The measured clinical crown-implant ratio at the last radiographic control was 3,40 while a mean of 0,44 mm peri-implant bone loss (PBL) was recorded after seven years of functional load.
CONCLUSIONS: This case report shows that, if the conditions of peri-implant tissues are good and a primary stability is obtained, ultra-short implants with a 3.0 crown-implant ratio may be considered a solution for the rehabilitation of single edentulism. The high crown-to-implant ratio, that could be considered unfavourable for other types of implants, does not seem to be detrimental with 5x5 mm SPS implants, because of the nature and strength of the bone-to-implant interface. Furthermore, the use of ultra-short implants permits to avoid other invasive surgical procedures that are necessary in case of bone atrophy.
Although the positive results highlighted in this long-term follow-up case report, further studies with a wider sample are necessary to confirm the predictability of this type of rehabilitation.

Maxillary sinus floor lifting in the presence of antral pseudocyst: a case report.

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BACKGROUND The maxillary sinus augmentation procedure has been routinely performed with predictable results and it is an acceptable, safe modality for bone augmentation, providing a base for endosseous implant placement.
The antral pseudocyst is a common pathologic condition of the maxillary sinus.
Whether the presence of a maxillary sinus cyst represents a relative contraindication for sinus augmentation is still controversial.
In this case report a 69-year-old caucasic male presenting an asymptomatic maxillary antral pseudocyst underwent maxillary sinus grafting with lateral access.
METHODS The patient was referred for implant placement in left maxillary posterior region. Treatment plan included an implant-supported rehabilitation with 2 implants placed in position 2.4-2.6. The rehabilitation plan was based on a a fixed prosthetic device of 3 elements supported by 2 implants in 2.4 and 2.6 region.
Residual bone height at position 2.6 and 2.7 amounted to 2 mm and 1 mm, respectively.
The Cone Beam Computed Tomography (CBCT) scan evaluation revealed an intrasinus radiopaque dome-shaped mass, approximately 10mm of diameter, involving the posterior edentulous region.
We planned the removal of the lesion by suction as well as the sinus lift with graft biomaterial in the same surgical session.
The patient's medical history did not reveal any contraindication to oral surgery, the patient never smoked.
The surgery was undertaken with local anesthesia and conscious sedation. One hour prior to surgery the patient was premedicated with 2gr of amoxicillin and clavulanic acid, 1gr of acetaminofene and 20mg of pantoprazole..
Flap design included a releasing incision mesial to 2.3 and an horizontal incision on the alveolar crest up to 2.7.
A lateral bone window 15mm in length and 6mm in height was performed with a diamond bur.
The pseudocyst appeared as a mass filled with yellow fluid, and it was completely aspirated.
After the elevation of the maxillary sinus membrane, the space between the maxillary alveolar process and the Schneiderian membrane was grafted with deproteinized bovine bone mineral (Bio-Oss, Geistlich, Wolhusen, Switzerland).
A crosslinked membrane (OsseoGuard, BIOMET 3i, Palm Beach Gardens, Florida,USA) was positioned on the lateral bone window in order to protect the graft. The flap was sutured with 5-0 resorbable suture (Novosyn, B/Braun Aesculap, Tuttlingen, Germany).
Postoperative management included systemic antibiotics (1000mg amoxicillin+clavulanate, 2/die, for 6 days), application of decongestant nasal spray (mometasone furoate monohydrate, two puffs twice a day, for 7 days), chlorexidine 0.12% mouthwash (3/die for 10 days) and analgesics (ibuprofene 600mg, one tablet in case of need). The patient was asked not to wear any maxillary removable prosthesis.
RESULTS. Neither intraoperative nor postoperative complications were observed. The patient reported moderate pain for the first three days after surgery and was taking two tablets of ibuprofen the day after surgery and one tablet a day for the following two days.
Six month after surgery a new CBCT was made.
At region 2.6 and 2.7 the vertical bone height amounted to 11mm.
No evidence of the antral pseudocyst was present.
CONCLUSIONS: The present case report seems to indicate that sinus bone-grafting procedure may be compatible with the removal of antral pseudocyst when performed in the same surgical session.
Self-reported pain and discomfort as well as the post analgesic consumption also indicates that the procedure may be well tolerated by the patient.

Comparative evaluation about the cleaning efficacy and abrasion degree of titanium surfaces treated by PEEK, carbon and steel ultrasonic tips: *in vitro* study

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BACKGROUND: Determining the effects caused on a titanium surface by the elements examined and pointing out

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their degree of cleaning success on the samples' surfaces. In order to affirm which is the most effective ultrasonic tip without increasing the roughness parameters of the surface and consequently without altering the characteristics and the morphology of the samples.
METHODS: It was been esamined 16 implant healing abutment (5 for each group and 1 as reference sample). In order to have a support during instrumentation, the samples were screwed on a block of resin. Later, the whole surface of the sample has been painted with black ink to emulate the artificial debris. After that mechanical treatment was carried away using three different ultrasonic tips: steel, carbon and PEEK. The samples were equally treated for 60 seconds by the same investigator. The abrasion degree of this surface has been calculated through the profilometer with the following parameters Ra, Rz and Rmax; while the cleaning effectiveness by the spettromicroscopio; and in the end the samples have been observed by SEM.
RESULTS: This study shows the difference of Ra between the three ultrasonic tips taken into account; while the steel has a very high value of Ra, the roughness index between the other groups isn't significantly different compared to the reference sample. Furthermore, the Rz and Rmax values of the tip PEEK are lower compared to the other tips and also to the untreated sample, thus indicating a lower overall roughness of the sample even compared to the untreated one. The SEM images show how the surface of the healing abutment treated with the steel tip has been altered and while on the other hand, it remains almost unaltered after being instrumented with the other two tips. From the analysis through the spettromicroscopio it is clear that the steel tip, in equal time, removes more than half of artificial debris present in the surface; in opposition to the case of the tip in carbon and PEEK.
CONCLUSIONS: The steel tip has an higher degree of cleaning effectiveness compared to the other tips (carbon and PEEK). But it changes considerably the titanium surface; while the other two tips have a lower degree of roughness that is very similar to the reference sample. Data proved also by SEM images.

Superior maxilla with insufficient width rehabilitation: split-crest technique with V-Block bone graft

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BACKGROUND: After teeth lose maxillary bone in lateral-posterior regions is affected by vertically and horizontally resorption: complete restoring of masticatory function with standard diameter implants is often difficult unless using complex regenerative techniques. The aim of this radiographic and clinical prospective study is to evaluate bone horizontal width gained by split crest technique in association with the placement of non-resorbable equine bone graft, commercially known as V-Block (Tecnoss©, Torino, Italia). Clinical measurements have been recorded intraoperative during performing of expansion technique and graft positioning. A second measure has been taken during second surgery stage. Radiographic evaluations were obtained with pre-operative and second-surgery stage using CBCT (Vatech Ipax 3D PCH-6500, Fort Lee, NJ, USA) and it property software (EZ3D Plus, VATECH Global Fort Lee, NJ, USA).
METHODS: 32 patients (13 men and 19 women; average age 56 years) were exposed to split crest procedure with V-Block graft and contextual insertion of 64 implants. The patient presented a minimal crestal height of 10 mm and a minimal width, vestibular-palatal, of 2.5 mm with a medullary bone observed with preoperative CBCT. A mid crestal full-thickness and two mesial and distal incisions were completed (trapezoidal flap), and a full-thickness flap was dissected. Piezosurgery was used to cut cortical bone tissue and separation through medullary bone was achieved with increasing dimension manual chisels. Site was measured with a periodontal probe, so V-Block was cut to adapt it to the site, then inserted in. Implant sites were executed using normal sequence of spiral drills and implants were placed in contact with the only palatal cortical, eviting any kind of pressure on the buccal plate kept more vestibular by the V-Block. All Implants inserted were 3,5 and 4 mm of diameter and lengths were differentiated, according to the crestal height, in 8.2, 10, 12, 13.5 mm.
RESULTS: Radiographic evaluations showed initial mean split width of 2.45±0.31 mm (range from 2.3 mm to 2.9 mm); after 4 months, at second surgery stage, mean bone width was 8.01± 0.49 mm (range from 7.1 mm to 10.2mm) with a mean gain bone of 4.44±0,5 mm. No failures occurred, neither V-Block exposure or flap dehiscence. At second surgery stage V-block material was clearly distinguishable from new formation bone; a notable result is the preservation of vestibular cortical width.
CONCLUSIONS: regeneration using bone graft simplifies surgical procedures through the maintenance of osteotomy space and vestibular cortex stabilization in order to avoid its fracture. V-block is adaptable to the surgical site and custom size can be cut at needs. It is non-resorbable and moreover, vestibular cortex is stabilized further away from implant neck so physiologic resorption of bone did not occurred obtain a thicker vestibular cortex in a horizontally augmented crest.

Effects of titanium brushes on different implant surfaces: an *in vivo* investigation

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BACKGROUND: Recently, rotating brushes with titanium bristles have been introduced for the debridement of implant surfaces when peri implant problems occur. This study investigated the effects induced by titanium brushes on different implant surfaces previously contaminated *in vivo*
METHODS: n°9 disks, going sterilized directly from manufacturer, (Megagen Implant Co, Ltd, Korea) (n=3 with HA grit sandblasted RBM surface; n=3 with a Ca2+ incorporated in titanium XPEED surface and n=3 with machined surface) Ø 8mm x 3mm were used for this investigation. N°1 disk for each surface treatment (tot. n°3 disks) were characterized at time 0 by SEM to study the surface morphology and by AFM to study the surface roughness. The other six disks were mounted on an acrylic bite embedded in a buccal lateral position (three for each side) worn for 48 hours by a student from Dental School, for biofilm accumulation. After 48 hours each disk was removed and randomly assigned to the control group (to study only plaque accumulation) and to the test group (to

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investigate the effects of the cleaning procedure using titanium brushes). All disks were treated by the same operator. The Nickel-Titanium brushes (I.C.T. De Ore, Verona, Italy) were used (one for each disk treated) mounted on a handpiece at 500 rpm speed and 100 N torque for 60 sec time with a calibrated pressure of 25 gr and a continue irrigation of NaCl 0.9%. All disks were then analyzed by SEM at 40x, 500x and 2000x, also in backscattering, and by AFM for the Ra (medium value of roughness) and Rp-v (max peak-max depth value) measurement. All Ni-Ti brushes used were analyzed by SEM and compared to a no used one.
RESULTS: The MACHINED surface, after instrumentation, appeared well cleansed. However, the SEM images, revealed considerable surface alterations following treatment. The roughness values increased. The RBM surface showed a minimum percentage of residual material and after cleaning had some morphological changes. The typical RBM sandblasted structure appear flattened. The roughness values confirm this change by the reduction in value of R p-v. The cleaning efficacy of the brush on the XPEED surface was excellent but the surface morphology changed. The SEM images showed the presence of grooves and flattening caused by the use of brush that have eliminated most of the irregularities and of the peaks, confirmed by the roughness values measured. The EDX spectroscopy provided the evidence that part of the Ca ++ ions coating remains on the surface even after treatment. The statistical analysis shows that the Ra difference was statistically significant. ($p<0.5$) The brush used for Xpeed surface is the only one, among those used, that appeared more compromised after its use. The bristles are very twisted.
CONCLUSIONS: In conclusion we can say that the trial of toothbrushes NiTi has shown a good efficacy of cleansing on rough and smooth surfaces. The efficiency of the treatment was, however, accompanied by a visible change in the surface characteristics. While the machined surface at the end of treatment showed an increase of roughness values, the rough surfaces undergo a flattening process with consequent decrease of the roughness measurements. Further studies will be needed to verify if and how these morphological changes will affect biological processes of healing.

Replacement of a short implant with an immediate loaded ultrashort implant in a full-arch maxillary prosthesis (All-on-4®)

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BACKGROUND: The aim of this case report is to illustrate the replacement of a short implant in site 23 with an ultrashort implant after osteointegration loss caused by overloading. This implant is part of a fixed maxillary rehabilitation, which supports a full arch prothesis (All-on-4®). The ultrashort implant was immediately loaded and the full arch prosthesis was maintained and adapted.
METHODS: B.M., 65 years old, was referred to the Authors for rehabilitation of edentulous maxilla in November 2010. The patient was evaluated clinically and radiographically to choose the correct treatment plan. It was proposed an All-on-4 prosthetic solution with implants in sites 15 (Nobel Speedy Groovy 4x13 mm), 25 (Nobel Speedy Groovy 4x11,5 mm), 13 and 23 (both Nobel Shorty of 4x7mm). On February 2011 implants were positioned considering the limited bone width: when the final depth was reached with the first and the second twist drills, the site was gradually expanded with appropriately sized implant osteotomes and then osteotomic implants with slightly tapered body and conical apex were inserted. After 6 hours the implants were functionally loaded with a reinforced resin full-arch. The patient was inserted in an oral hygiene maintenance program.
In August 2015 the patient referred mobility of the manufacture. After three month, she showed up to the clinic and an abutment screw loosening in site 25 and a screw fracture in site 23 were found. This technical complication led to osteointegration loss and luxation of the 23 implant associated with peri-implant radiotransparency. The 25 screw was tightened and the full-arch prosthesis was maintained with 23 abutment disconnection. In November 2015 the 23 implant was removed and a surgical toilette of the implant site was performed. It was prepared again with an appropriate size implant bur, in order to achieve bleeding. A 6-mm implant (Winsix TTx, 6x5.2 mm) was positioned with bicortical anchorage, engaging the nasal floor, and the mucoperiosteal flap was sutured. A 17° angulated abutment was screwed to the implant which was immediately loaded by adapting the full-arch prosthesis relining with resin after repositioning of the abutment.
RESULTS: After implants placement, during the regular follow-up controls every 6 months, no signs and symptoms of infection or overloading were detected and x-ray examination showed implants osteointegration. Four years later, the 25 implant screw loosening implied a cantilever from 23 to 26 and the lever arm caused overloading on 23 which led to a fibrous metaplasia of the bone surrounding this implant. During the implant site re-preparation bleeding and clot formation, necessary for the osteintegration, were obtained. This permitted an immediate loading and the former full-arch prosthesis was adaptated. After 5 months the implant was perfectly osteointegrated and the soft tissues were completely healed.
CONCLUSIONS: The combined use of the osteotome technique and an osteotomic design of the implants allows to achieve an adequate bone width to obtain and maintain a long-term implant osteointegration. This case report shows how the use of short implants supporting a full-arch maxillary prosthesis permits a long-term maintenance of the rehabilitation in presence of a sufficient cortical bone thickness surrounding the fixtures, as long as the reinforced resin manufacture is replaced with a stable metal framework prosthesis. The immediate load of a replaced implant gives optimal outcomes if an implant bleeding site persists and the primary stability is reached with a mobility less than 100mm.

Influence of implant tilting in immediate fixed rehabilitation of the edentulous maxilla: a three-dimensional finite element analysis

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BACKGROUND: The aim of this work was to evaluate the biomechanical behavior of a "All-on-four" implant supported prosthesis through a finite element analysis comparing different tilt degrees of the distal implants.

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METHODS: The three-dimensional (3D) geometry of the edentulous maxilla was reconstructed from computerized tomography (CT) scans. Modeling software was used to transform the planar CT scans into a solid model of the maxilla. Three-dimensional finite element models of an edentulous maxilla restored with a prosthesis supported by four implants were reconstructed to carry out the analysis. The two mesial implants were modeled and positioned bilaterally and vertically in the lateral incisor regions. The two distal implants were placed in the second premolar regions, tilted distally. The apex of the distal implants was brought mesially to incline the implant to 15˚, 30˚, and 45˚, according to anatomical needs (anterior sinus wall) and achieve three different configurations of "All-on-four", in order to carry out a comparative analysis. Four loadings conditions (full-mouth biting, anterior load, lateral load and posterior load) were simulated in each of the three models, using load values similar to those of functional bite movements from patients with "All-on-four " rehabilitation. The von Mises stresses generated around the implants were localized and quantified for comparison.
RESULTS: The locations and amounts of peak stress within all four loading situations in the three models have been evaluated. In each test, the highest von Mises value in the peri-implant bone was used for comparison. In all the loading conditions for the three configurations analyzed the highest stress values were located distally at the bone-implant interface of the tilted implants. Moreover, the stress in the distal implants increases in the apical direction as the tilt degree increases. No significant differences in von Mises stress values were found in the comparison of 15° and 30° models. The 45° model was revealed to be the most critical one, from a stress level viewpoint, for peri-implant bone. The results of this FEA studies and its values should not be taken as absolute but should rather be used as a comparison of the possible magnitudes of stress bone and implant components undergo during function.
CONCLUSIONS: The stress location and distribution patterns were very similar between the evaluated models. The increase in the tilt degree of the distal implants is proportional to the increase in stress concentration. The 45° model induces higher stress values at the bone-implant interface, especially in the distal aspect, than the other two models analyzed.

The role of abutment material and detersion protocol on bacterial adhesion: an *in vitro* study

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BACKGROUND: In the recent years, peri-implantitis has been extensively studied as bone loss has been observed in many different types of implants. As a result of multiple factors, prosthetic components were included among the possible causes of peri-implant bone loss. In particular, different materials might have a different effect on peri-implant tissues and on different patterns of bacterial plaque accumulation. The purpose of this laboratory research was to assess 1) the bacterial colonization on different abutments and 2) which disinfection treatment was more effective in reducing the bacterial colonization. At present no previous studies were found in the literature about anodized abutment decontamination.
METHODS: Four kind of pre-fabricated abutment were analyzed: 1) machined pure titanium abutment without anodization, 2) machined pure titanium abutment gold hue (anodized), 3) machined pure titanium abutment pink hue (anodized) and 4) zirconia abutment with titanium connector (Sweden & Martina, Due Carrare – PD). Initially, sterile abutments were immersed for 5 minutes into separate bacterial suspension (Staphylococcous haemolyticus, Streptococcus pyogenes and Escherichia coli). All 4 abutments were contaminated with $3x10^8$ colony forming units (CFU)/ml of each bacterial species suspension and compared under the following conditions: 1) no treatment, 2)10 minutes washes with water, 3) 10 minutes of incubation with chlorhexidine 0.05%. The microbial abatement was determined by swab collection of abutment attached microbes and swab streaking on blood McConkey and chocolate-agar plates (Becton Dickinson) in a semi-quantitative manner. Microbial growth was determined after 24-48 hours after inoculation. All tests were repeated 3 times and data were statistically analyzed according to ANOVA and student t-test.
RESULTS: Contaminated abutments without cleaning treatment displayed the worst possible microbial growth (up to the third quadrant of the culture plate). Water washing reduced bacterial contamination to the second quadrant, showing a statistically significant difference with the the first group ($p<0,05$). Chlorhexidine washing effectively eradicated bacterial contamination. No statistically significant differences were found in terms of bacteria adhesion and growth between the different types of abutments employed.
CONCLUSIONS: All the abutments considered in the study displayed similar characteristics with regards to bacterial adhesion and growth. Low concentration of chlorhexidine for a short time effectively prevented any bacterial growth, regardless of the type of abutment considered.

Aesthetic outcome of implant-supported restoration of bilateral missing maxillary central incisors: a case report

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BACKGROUND: Single-unit dental implants are considered a valid therapeutic option to replace teeth in the aesthetic zone. Aim of this paper is to describe a case of bilateral missing maxillary central incisors treated with two-stage dental implants. The definitive rehabilitation was realized using customized titanium CAD/CAM abutments.
METHODS: A 56-year-old smoker male patient, with no systemic disease and with medium thick-flat gingival biotype, presented bilateral missing maxillary central incisors lost due to periodontal disease. He was temporally restored with a two-unit removable partial denture and referred to our Department for a fixed restoration. The patient desired to maintain maxillary anterior midline diastema as before tooth extractions, and so fixed partial denture was excluded as alternative to single-unit dental implant-supported restorations. Therefore, after clinical and CT-scan examinations, an aesthetic planning was considered and the surgery was performed with the help of a template. A full thickness flap was elevated and two-stage cylindrical implants of 3,6 mm diameter and 11 mm length (OsseoSpeed™ EV, ASTRA TECH™, Dentsply, Mölndal, Sweden) were positioned, showing good primary stability. A tension-free wound closure was sutured with 4-0

polytetrafluoroethylene sutures (GORE-TEX®, W.L. Gore & Associates INC, Flagstaff, AZ, USA). Four months after surgery, the healing abutments were positioned. One month later, an implant level impression was taken and CAD/CAM titanium patient-specific abutments (ATLANTIS™, Dentsply, Mölndal, Sweden) were virtually designed, and subsequently milled to exact clinical specification (no soft tissue compression). The case was then finished with screw-retained porcelain fused to metal single crowns secured to the abutments through palatal mini-screws.
RESULTS: The technique proposed was found to satisfy the aesthetic demands of the patient, who preferred to maintain midline space between the incisors and avoid space closure. The use of CAD/CAM abutments enhanced the aesthetic outcome.
After 1-year follow-up from prosthesis delivery, both the implants are still osseointegrated. There is no evidence of clinical signs of inflammation of marginal soft tissues. Radiographic assessment is consistent with good clinical conditions, and no marginal peri-implant bone loss has occurred. No prosthodontic complication has been detected.
CONCLUSIONS: The protocol described for replacing bilateral missing central incisors allows the clinician to achieve successful results in the aesthetic zone. Screw-retained frameworks secured to customized abutments allowed the prosthodontist to obtain an aesthetic location of the screw access holes, eliminating the disadvantages related to cement retained restorations, including difficult retrievability and the lack of potentially retained sub-gingival cement fragments.

Erbium laser surgery for the decontamination of infected surgical sites and the preparation of the implant hole for an immediate insertion

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BACKGROUND: Use of Erbium laser to support the preparation of the implant site during surgical procedures in infected and non-infected sites. Preparation of the implant hole with Er, Cr: YSGG / Er: YAG for the insertion of implants to be prosthetic restored and the decontamination of the site to be treated. To complete the process, bio-stimulation with 810 nm laser diode.
METHODS: Examined cases showed the claim of implant rehabilitation in dental gaps and post-extraction sites, as a result of root fractures, endodontic failures to untreatable relapses and internal resorption.
For the implant tunnel preparation, it is used a Er, Cr: YSGG Waterlase MD (Biolase 2780nm) or AquaStar Er: YAG (2940 nm).
In dental gaps for the mucous membrane preparation it is provided a setting at 1.5/3 Watts, 20/40 water/air, 30 Hz. For the bone tunnel preparation it is provided a setting at 3.5/8 W of power, 50/80 water/air, 20/30 Hz. An appropriate tip was used on the target tissue with constant movement, contactless and under the magnifying systems control. The depth of the tunnel had to be evaluated with a periodontal probe. Twenty-one implants were simultaneously inserted.
In infected sites, just after tooth extraction,the dental sockets are cleared by granulation tissue and exudates, and decontaminated with Erbium laser. In the post-extraction sockets, the erbium laser is setted to 1.5/3 Watts, 20/40 water/air, 30 Hz. The apical portion, able to accommodate the implant in a stable manner, is prepared with the setting for the bone 3.5/8 W of power, 50/80 water/air, 20/30 Hz with a appropriated tip as described above. Fifteen implants were simultaneously inserted into the infected sites.
A diode laser has been used at the end of intervention to stimulate osseointegration, the healing of the tissue around the implant and to prevent the contraction. The photomodulation (Gardalaser diode) has been performed in pulsed mode for 30 seconds with 1.5 Watts/week for 4 weeks. It is rated the degree of satisfaction of the intervention. It is valuated the VAS pain scale at the end of the surgical procedure and after 6 - 12 - 24 hours.
RESULTS: The laser is able to significantly reduce contamination of the infected area. The hydrophotonic effect of the laser energy has allowed an accurate mucotomy and osteotomy of the surgical site under-dimensioned for the insertion of conical implants with a high torque. All implants inserted (for a total of 36) were osseointegrated 3 months after the surgery. The survival rate at 3 years was 100%. The clinical and radiographic variables tested were performing.
The degree of satisfaction of the intervention was always high and postoperative VAS scale has produced very low levels.
CONCLUSIONS: The erbium laser allows appropriate preoperative procedures in decontaminating surgical sites. It allows to accurately define the way of the implant tunnel for immediate implant placement in tooth gaps as post-extraction infected sockets. In this case it can be considered the first option of predictable treatment for the restoration.

Laser surgical treatment of peri-implantitis: motion as a therapeutic protocol

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BACKGROUND: Use of two types of lasers in the implants affected by deep peri-implantitis treatment. The purpose of this study was to exploit the effects of erbium laser for the removal of contaminated fibrous tissue around the implants and the detoxification of the titanium surface of the implants. The decontamination was effectively completed with PhotoLase system using a diode 810 nm laser.
METHODS: Eight patients have been treated (for a total of 15 implants) suffering from peri-implantitis. The process involved the use of erbium laser for surgical debridement associated with decontamination and regeneration by PhotoLase system. The treatment was performed under local anesthesia and at the end laser bio-stimulation in a single session. The patients enter into a laser-assisted follow-up of professional hygiene every 4 months.
The presented clinical cases illustrate the method. Clinical and instrumental evaluation with peri-implant probing and radiological investigations. Images of vertical osteolysis for likely traumatic etiology, osteolysis bowl-shaped images for likely bacterial etiology. After occlusal analysis, in the first surgical time it was employed an irradiation with a laser Er, Cr: YSGG (2,780 nm BIOLASE Technologies) and sprays water setted for the removal of the fibrous tissue and detoxifi-

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cation of the implant surface. The tip was kept in non-contact mode and with angle of about 30-45 ° with the implant and the bone surface in continuous movement with hydrophotonic energy delivered at a density of about 10 J / cm2 / pulse and at a frequency of 20 Hz.
The Erbium laser opened the mucosal flap and removed the fibrous and granulation tissues. The implant surface and the mineralized tissues were detoxified using the erbium laser at different settings. The erbium laser hydroacoustic effect, obtained with the micro-explosions of water bubbles, obtained the purifying effect, the bone and the rough surface of titanium oxide of the implant decontaminant, without causing a detrimental increase in temperature. The deep decontamination of the mucous membranes was obtained with PhotoLase system using a diode 810 nm laser.
It was rated the degree of satisfaction of the intervention. It was evaluated the VAS pain scale at the end of the surgical procedure and after 6 - 12 - 24 hours.
RESULTS: Eleven implants received clinical and radiological healing in 12-18 months. Four were removed. The surviving implants were monitored with a very strict follow-up every 4 month. They were monitored with periodontal and prosthetic clinical parameters, such as the depth and bleeding on probing and the loss of attack, during long-term support therapy in professional hygiene sessions.
The degree of satisfaction of the interventions was always high and postoperative VAS scale has produced very low levels.
CONCLUSIONS: There is very little reliable evidence suggesting which could be the most effective interventions for treating perimplantitis. This method has allowed the biological and functional recovery of the implants affected by peri-implantitis thanks to the decontaminant and bio-stimulating activities of two different laser wavelengths. Preliminary clinical data indicate that the laser treatment procedures can positively influence the peri-implant healing. The results achieved are maintained long. It is critical to the success of the treatment an adequate plaque control by the patient. Because if it is unable to obtain an adequate level of oral hygiene, probably it will recur mucositis and later deep peri-implantitis.

Diode Laser therapy with 810 nm, enzymes and liquid ozone: complementary therapeutic methods in periodontal and implant therapy

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BACKGROUND: Comparison between the use of technologies with Diode Laser and natural biomaterials. We want to enhance the physiological cellular activity and promote kinetic catabolic phenomena and production (enzymes) of natural antioxidant systems (ozone and PGT Peptide glutathione). This is to achieve therapeutic goals for the rapid healing and the maintaining of alkaline physiological balance, favoring the health of the periodontal and peri-implant oral tissues. Clinical experiences presented provide an indication to the choice of techniques and natural materials for therapies which facilitate and accelerate the cure and healing in periodontal disease and peri-implantitis post debridement.
METHODS: Three types of therapeutic treatment were evaluated for clinical use related to periodontology and implantology, comparing or combining the different techniques and materials: diode 810 nm Laser, natural #Speedyimplant Gelenzime® and Speedyimplant LiquidOzone® according to the memory water principle. It is also exploited the synergistic application of the three treatments to consider the timing and size of recovery and healing of periodontal and peri-implant tissues. Peculiar, the possibility to have the properties of a gas, the ozone, in liquid form. In surgical methods of application until now known, mostly ozone in gaseous form is dispersed greatly, reducing its benefits. The liquid ozone was applied washing the treated site, immediately after grooming and bio-stimulation with diode laser to benefit from the biodynamic properties of the PGT (peptide powerful natural antioxidant glutathione), immediately stimulated. The healing is reinforced with the application of enzymes with cicatrizing properties and causing the kinetic cell that in a few seconds determines the reproduction thousands of new cells. It is rated the degree of satisfaction of the intervention. It is valuated the VAS pain scale at the end of the surgical procedure and after 6 - 12 - 24 hours.
RESULTS: Clinical cases, objects of study and comparison, have shown that the use of the diode 810 nm laser has achieved the goal of a disinfection and rapid healing processes resulting in tissue appearance improvement. Decontamination of periodontal and peri-implant tissue also took place thanks to the spread of ozone, which penetrates deep by perfusion among tissue cells, allowed us to achieve the goal. Applying GelEnzime and LiquidOzone has parallel produced a early healing influencing a postoperative analgesic activity with a re-epithelialization and a dimensional tissue maintenance. The synergy of the different combined systems is certainly indicated if we will pursue a simultaneous achievement of immediate hemostasis with analgesic effect and a faster cicatrizing with important dimensional tissue healing and regrowth. It has avoided the use of local chemotherapy such as chlorhexidine and has drastically reduced the intake of drugs systemically. The degree of satisfaction of the intervention was always high and postoperative VAS scale has produced very low levels.
CONCLUSIONS: The remote evaluation of clinical cases can provide guidance in the selection of biomaterials and techniques used to achieve the setted objectives. It is also a fundamental choice to replace the culture based solely on the experience of successes/failures, with a culture focused on the science of biomaterials and minimally invasive surgical techniques and on the stimulation of energy and biological potential. The application of these methods has proved innovative, free from risks and minimally invasive. It met the primary therapeutic target which is to complete the resolution of an infectious complication, keep the tissue architecture involved and reducing the contraction.

Long time results of implant placed in tuber area: efficient alternative of sinus graft

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BACKGROUND: Implant placement in the maxillary tuberosity area is one way to overcome the problem of insufficient bone volume in patients with severely resorbed maxilla. However, little is known about the long-term results.

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The aim of the present study is to report on the survival rate and marginal bone resorption of implant placed in the tuber area after ten years of function.
METHODS: A total of 13 patients (6 males and 7 females) treated with fixtures 3i Implant Innovation with active surface, surgically placed in the tuber region were included in our study. The patients were radiographed after 10 years for evaluation of marginal bone levels. Fifteen fixtures were placed in this area in lengths of 11.5-15 mm and in diameters of 3.75 or 4mm. Abutment connection with standard abutments was performed after 4 months. The marginal bone level was measured at mesial and distal fixture surfaces calculating the distance between the edge of the implant and the most coronal point of contact between the bone and the implant during radiographic follow-up. The measurements were performed using ImageJ (MacOs). The integration and survival of the implants have been evaluated using the success/failure criteria defined by Albrektsson in 1986.
The implant success is defined by a marginal peri-implant bone resorption up to 2 mm after 12 months and a bone loss, which must be less than 0.2 mm annually after the implant's first year of service. Both the mesial and distal bone resorptions were measured in this study.
RESULTS: None of fifteen tuber fixtures were diagnosed as failures after ten years of follow up. At 10 years, the mean mesial and distal bone resorptions were respectively 1,77 mm and 1,95. After 10-year, the periimplant bone resorption was significantly lower. So the cumulative survival rate and the implant survival rate were 100% according to Albrektsson criteria.
CONCLUSIONS: This retrospective study showed excellent radiographic and clinical results with implants placed in the maxillary tuberosity in patients with atrophic maxilla and enlarged sinus. The fixtures were placed in soft bone (grade IV) and no failures were encountered. Careful handling of the bone tissue and the fact that the shortest implant was 15 mm probably influenced the possibility of reaching stability. This study confirms that fixtures placed in the maxillary tuberosity region can be used as an alternative to more extensive surgery, leading to time of loading redaction. However, prospective comparative studies are needed in order to evaluate the efficacy of the described technique for this purpose.

Survival rate of cone morse connection single tooth implants: a 24 months follow-up

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BACKGROUND: The problem of the microgap between implant and abutment is both biological and mechanical. The biological problem relates to the bacterial colonization that could interfere with the long-term prognosis of the implant; the mechanical problem relates to micromovement and possible loosening or fracturing of screw-retained abutments. The Cone Morse taper internal connection has been designed to overcome both the problems of the microgap between implant and abutment and of screw loosening. The purpose of this study was to evaluate the survival rate and marginal bone loss (MBL) of Cone Morse connection immediately or delayed loaded titanium implants and to study the morpho-chemical characteristics of the implant surface.
METHODS: Two hundred and twenty sand-blasted and acid-etched single tooth implants, (Implacil De Bortoli, Sao Paulo, Brasil) with internal conical connection,were consecutively placed subcrestally (2-3 mm below the alveolar crest) by one operator (G.T.) in 85 healthy patients, not affected by systemic disease and/or periodontal disease. The implants were placed using either a flap or a flapless technique. One hundred and sixteen implants were loaded immediately after placement, using a provisional resin crown free from occlusal stress. One hundred and four were loaded approximately after 3-4 months from placement. Both groups were restored with definitive metal-ceramic crowns after 3-4 months. Survival rate and marginal bone level (MBL) were evaluated after 12 months and after 24 months. MBL was also analyzed in relation to implant diameter, location, gender and smoker/non-smoker. In addition, the morpho-chemical analyse of the surface were performed using an environmental scanning electron microscope using ESEM-EDS.
RESULTS: Overall survival rate of the implants was 99,1% at the 24 months follow up. Two implants were lost in the first 6 months. No statistically significant differences were observed between both groups (flap and flapless) at 12 and 24 months. MBL was significantly higher in maxilla *versus* mandible and in smokers *versus* non smokers. A higher MBL in both groups was found for smaller diameter (4 mm) *versus* larger diameter (4,5 mm). The surface showed an uniform nanotexture.
CONCLUSIONS: Single tooth Cone Morse connection implants showed a high survival rate both at 12 and 24 months. Both flap and flapless techniques demonstrated similar results, and no differences were found in the remodeling of marginal bone. Implant diameter, mandibular/maxilla location, and smokers/non-smokers affected MBL more than type of surgery after both short and medium term follow-up.

Conventional drills versus piezosurgery preparation for placement of quadruple immediately loaded zygomatic implants in edentulous patients: a multicenter randomised controlled trial

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BACKGROUND: To compare the outcome of preparation of zygomatic implant sites using a conventional preparation with rotary drills or piezosurgery for placing 2 zygomatic implants per zygoma according to a split-mouth design.
METHODS: This study was performed at two centres. Each centre recruited 10 patients with atrophic fully edentulous maxilla not having sufficient bone volumes (≤ 4 mm of subantrally bone) for placing dental implants. The patients had their right side of the mouth randomised to receive either 2 zygomatic implants following conventional site preparation with rotary instruments or piezosurgery. All implants had a diameter of 4.3 mm. Implants were immediately loaded with provisional prostheses which, 6 moths later, were replaced with definitive screw-retained prostheses. Patients were followed to 4 months post-loading and preliminary outcome measures were prosthesis and implant failures, complications,

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presence or absence of haematoma, time of site preparation.
RESULTS: ten patients were randomly allocated to each centre. One patient dropped out after surgery. Up to 4 months post-loading, 2 implants failed on the drill side while none of the implants failed on the other side (p= 0,317). One complication occurred on the piezo side while two complication occured on the drill side (p= 0,414). There were no statistically significant differences in prosthesis failures, implant failures and complications. Post operative haematoma looks larger at the drill side in 13 patients, it looks similar in extension at both side in 7 patients (p= 0,180). Tunnel preparation through piezoelectric inserts was 23.50±2.26 minutes while it was 14.35±1.76 minutes through traditional osteotomic rotary drills (p= 0,000).
CONCLUSIONS: Zygomatic implants tunnel preparation with piezoelectric inserts and with drills produces comparable clinical results. Piezoelectric inserts allow for smaller haematoma at surgical sites even if with a longer preparation site.

Osteogenic differentiation of mesenchymal stem cells on titanium ionised surfaces

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BACKGROUND: Titanium (Ti) and its alloys are widely used as materials to produce dental implants thanks to their excellent mechanical properties and superior.The integration of dental implant with bone depends on reactions of cells towards the biomaterial: cell attachment, adhesion, and spreading are the first phases of the interactions between the host cells and the implant, that subsequently will lead to bone tissue formation around the implant. These reactions not only depend on topography and roughness of implant surface but also by surface biocompatibility. The surface charge of the implant regulates the wettability and the orientation of adsorbed molecules, thus influencing osteoblasts and fibroblasts adhesion and then, the final result. In this view Human mesenchymal stem cells from gingiva (hMSCg) were used in order to test the osteogenic properties of Titanium ionized surfacesby mean the analyses of changes in hMSCg morphology, proliferation, protein production and gene expression.
METHODS: hMSCg, isolated from adult human gingiva, were isolated and cultured on titanium discs (Implacil De Bortoli, Sao Paulo, Brasil). The discs (5 mm wide and 2 mm thick) were divided into 2 experimental groups: twenty discs were blasted with titanium oxide particles and acid-etched with glacial acetic acid (Control group), twenty discs were blasted with titanium oxide, acid-etched with glacial acetic acid and then immersed in a CaP solution to allow deposition of calcium and phosphorus ions on the titanium surface. Both surfaces were evaluated under Atomic Force Microscopy, and cell morphology was evaluated under Scanning Electron Microscopy and immunofluorescence. Cell proliferation was evaluated by means of population double time rate, while Collagen, Alkaline phosphatase (ALP) and Lactate Dehydrogenase (LDH) activity was determined by an ELISA test. Changes in gene expression for bone commitment by reverse-transcriptase polymerase chain reaction, after 28 days of *in vitro* culture with no differentiative medium, were evaluated.
RESULTS: Morphologic characteristics observed by Scanning Electron Microscopy shown that hMSCg cultured on the Test surfaces spread more and were flatter than cells cultured on the Control surfaces. Immufluorescence analyses direct to collagen type I show that cells were able to colonize all the surface and to product active extracellular matric components able to organized in 3D feature. Expression of the three main osteogenic factors (BMP-2, Runx2, and Osx), that induced the progressive differentiation of multipotent mesenchymal cells into osteoblasts, were expressed more on the Test surfaces. The same trend was observed also for Collagen and ALP assays. These data confirmed that the highest level of mRNA transcripts correlated with increases in these proteins.
CONCLUSIONS: These findings demonstrated that, even in absence of exogenous osteogenic factors, titanium surfaces coated with ions could induce and sustain an osteogenic differentiation of hMSCg stem cells.

Human stable and functioning dental implants retrieved for fracture after 14 and 17 years: a histological and histomorphometrical report of 4 cases.

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BACKGROUND: Osseointegration can only be diagnosed using a histological evaluation of dental implants. Retrieved clinically osseointegrated and stable human dental implants can help in a significant way the understanding of the peri-implant bone response and the biological reactions from the host, and to help shed some light on the process of osseointegration. Only a few data were available on stable dental implants retrieved after being in situ for many years. The present study was aimed at a histological and histomorphometrical analysis of the peri-implant tissues reactions and of the bone-titanium interface in successfully osseointegrated, clinically stable, and not mobile retrieved human titanium dental implants after a long loading period.
METHODS: Four successfully osseointegrated and stable implants (Astra Tech, Molndal, Sweden), with a sandblasted surface (Tioblast TM), were retrieved from man for an implant fracture, respectively 2 after a 14 years loading history, and 2 after a 17 loading period. Processing of specimens: The implants and the surrounding tissues were immediately stored in 10% buffered formalin and processed to obtain thin ground sections with the Precise 1 Automated System (Assing, Rome, Italy). The specimens were dehydrated in an ascending series of alcohol rinses and embedded in a glycolmethacrylate resin (Technovit 7200 VLC, Kulzer, Wehrheim, Germany). After polymerization the specimens were sectioned longitudinally along the major axis of the implants with a high-precision diamond disc at about 150 mm and ground down to about 30 mm. Three slides were obtained for each implant. The slides were stained with basic fuchsin and toluidine blue. Histomorphometry of bone-implant contact percentage was carried out using a light microscope (Laborlux S, Leitz, Wetzlar, Germany) connected to a high resolution video camera (3CCD, JVC KY-F55B) and interfaced to a monitor and PC (Intel Pentium III 1200 MMX). This optical system was associated with a digitizing pad (Matrix Vision GmbH) and a histometry software package with image capturing capabili-

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ties (Image-Pro Plus 4.5, Media Cybernetics Inc., Immagini & Computer Snc Milano, Italy).
RESULTS: Mature, compact bone with a few marrow spaces was observed around all 4 implants. At low power magnification, a high percentage of bone-implant contact (BIC) was present at the interface of almost all implants. BIC percentage for all 4 implants was comprised between 41±1.5% and 75.10±2.9%. In almost all implants the space within the threads was almost completely filled by compact bone. Most threads were filled by compact, mature bone. Many remodelling areas were present in the most coronal portion of the implants, near the line of fracture of titanium. In one implant, the remodelling areas were present around all the perimeter of the implant. The newly formed bone appeared to present a darker staining and wide osteocyte lacunae. Many cement lines separated the different areas of bone maturation. Close and tight contact between bone and implant surface was observed in all specimens, and no gaps, connective, fibrous tissue, or epithelial downgrowth was found at the bone-implant interface.
CONCLUSIONS: In conclusion, all implants appeared to be well integrated in the surrounding mineralized bone and all of them showed adequate bone-to-implant contact percentages after a long loading history. The implants were surrounded by compact, mature bone, with few marrow spaces, in close contact with the implant surface.

Clinical and radiological outcome of a novel transmucosal implant with hyperbolic neck profile inserted in the aesthetic zone: a case series

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BACKGROUND: Anterior maxilla is a critical area where a good aesthetic outcome is fundamental, specifically when large bone cortical buccal plate destructions may be expected after a severe endodontic apical lesion.
A new transmucosal implant has been recently developed. The implant has a machined neck with hyperbolic profile that allows a biological corrected prosthetic form for ceramic crown, inspired to the BOPT (Biologically Oriented Preparation Technique).
The aim of this clinical case series was to evaluate the marginal bone loss (MBL) and Pink Estethic Score (PES) of implants replacing endodontic compromised teeth in the anterior maxillary area.
METHODS: A total of 9 consecutive healthy non-smoker patients (6 females and 3 males; 59 ±12 years) with severely compromised teeth (5 central incisors, 4 lateral incisors) considered hopeless, were enrolled in the study after a written informed consent. Tooth was extracted atraumatically, in order to preserve the alveolar socket. A Maryland Bridge was applied with adhesive technique (Relyx, 3M, St Paul, MN, USA) immediately after surgery. Implants (PRAMA, Sweden & Martina, Due Carrare, Padova, Italy) were inserted with flapless technique.
After 3 months an impression was taken and after approximately 2 weeks a provisional crown was cemented (Temp Bond, Kerr, Scafati, Italy) to shape the gingival profile. A definitive metal-ceramic crown was cemented (Heraeus Kulzer GmbH, Hanau, Germany) 2 weeks later. Papilla was left free from contact and only buccal/palatal gingival zone was gently compressed for esthetic reasons.
Periapical radiographs were taken pre-operatively, at implant insertion (baseline), at 1 and 3 months (pre-loading period) and at 6 months (post-loading period), and then evaluated by two blind calibrated examiners. MBL (mm expressed as mean± SD) was assessed at mesial and distal sites between the implant shoulder and the first bone-to-implant contact. PES was assessed by one calibrated operator using a 0-1-2 scoring system, 0 being the lowest, 2 being the highest value. Seven variables were evaluated *vs*. a natural reference tooth: mesial papilla, distal papilla, soft-tissue level, soft-tissue contour, alveolar process deficiency, soft-tissue colour and texture; the maximum achievable PES was 14.
RESULTS: After 6 months all the implants resulted osseointegrated and free from complications. MBL at pre-loading period (1 and 3 months) was -0.10±0.30 and 0.10±0.51 respectively. MBL at post-loading period (6 months after insertion) was 0.23±0.16. Aesthetic contour resulted adequate in all the implants. Papilla and gingival contour were adequate. PES was 10.5± 2.8.
CONCLUSIONS: Prama implant allows to control the stress zone at gingival margin and bone level. The BOPT technique permits the preparation of the gingival zone to obtain a fast rehabilitation without any invasive surgical approach. Long term follow-up are in progress in order to evaluate the ability of keeping a stable marginal bone level around this novel implant in the long term.

Role of implant crest module design in preservation of marginal bone

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BACKGROUND: The primary goal of implant-prosthetic rehabilitation is the preservation of perimplant bone. However a small portion of bone loss is accepted as compatible with success criteria. Latest improvements led clincians to talk about implant success and no more about implant surviving. For this reason attention was focused on preserving marginal bone. The implant design is considered involved in bone preservation. Crest module is the part of implant where fixture joins the abutment and its characteristics are proposed to influence bone. The connection, toghether with the implant shoulder and the abutment emergence profile are the three parts of crest module. The aim of this study was to evaluate the performance of a particular kind of crest module design with sloping shoulder, emispherical base and locking taper.
METHODS: Retrospective study. A total of 20 implant-prosthetic restoration was evaluated in 20 patients. Only single implant rehabilitation was analized. Radiographical and a clinical investigation was performed. Mesial and distal radiographic bone level was measured on periapical X-ray. Clinical recording of periodontal indices (PD; BOP; PI) was carried on.
RESULTS: After 3 years of function the mean value of marginal bone level was -0,35 mm (SD 0,55). The average

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pocket depth (PD) was 1.26 mm (SD 0.62) The mean value of Bleeding on Probing (BOP) was 12%. The mean value of Plaque Index (PI) was 10%.
CONCLUSIONS: Considering implant success criteria, after three year of function a bone loss of 1,40 mm could be expected. The value observed in our study was 0,35 mm and periodontal indices' scores demonstrate a good health of implant rehabilitation thus talking of success. Crestal module characterized by sloping shoulder, emispherical base and locking taper could positively influence the bone preservation. The design's aim is to create a marginal bone tissue that could be stimulated by components, in accordance with the Wolff law. For this reason subcrestal placement of fixture is required. Locking taper connection helps to create a perfect fit with a biological seal that is essential to avoid mechanical and biological complication. This condition could help also to maintain soft tissue allowing better aesthetic performance. Hard and soft tissue health is the key of long term success of implant-supported prosthetic rehabilitation.

Temperature rise in piezoelectric implant site preparation: influence of bone characteristics.

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BACKGROUND: Thermal trauma has been recognized as one potential cause of osteonecrosis following bone surgical procedures. Several factors can contribute to temperature rise during implant site preparation but little is known about the specific contribution of each factor. During the last decade, use of piezoelectric devices has been proposed for implant site preparation. As in rotating techniques, a number of factors contribute to temperature elevation including technique-related factors (e.g. tip geometry and surface, internal or external irrigation), operator-related factors (applied load and motion pattern), and bone-related factors. The aim of this study is to investigate the influence of bone-related factors by evaluating local temperature values in cortical and cortico-cancellous bovine bone during early stages of piezoelectric implant site preparation.
METHODS: 20 osteotomies were performed using a diamond tip (IM1s, Mectron Medical Technology, Carasco, Italy) on two different types of bovine bone samples, cortical and cortico-cancellous respectively. A novel mechanical device was used to guarantee constant working conditions. Test duration and temperatures were considered for data analysis. Temperatures were measured in real time at a fixed position (0.5 mm from the tip surface) by a fiber optic thermometer. A load cell equipped with display showed the real-time load applied on bone, which was maintained under 150 gr. Working cycles of 4 sec were adopted. In order to investigate the temperature rise in the two different bone samples, mean, standard deviation and median of the variables were elaborated. The Mann-Whitney non-parametric U test for independent samples was performed so as to compare the variables between the groups.
RESULTS: Significantly higher drilling time (154.90 sec *vs* 99.00 sec; $p<0.0001$) and temperatures (39.26°C *vs* 34.73°C; $p=0.043$) were observed in the cortical group compared to the cortico-cancellous group. A remarkable variability of results characterized the cortico-cancellous blocks as compared to the blocks of pure cortical bone. As reflected by standard deviations, the temperature values resulted less dispersed in the cortical group.
CONCLUSIONS: Temperature rise during bone drilling is a very complex phenomenon affected by many variables. In this study, pure cortical bone samples were characterized by lower temperature variability, however they do not represent actual clinical conditions. Differently, cortico-cancellous samples provide a better simulation of *in vivo* conditions, but were affected by greater variability of results. Cortical samples also showed longer osteotomies duration and higher mean temperatures. Given the difficulty in controlling some of the bone-related variables that are likely to be important factors in heat generation, the lack of standardization of technique- and operator-related factors may lead to increased variability in temperatures and risk of overheating.

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Surface roughness analysis of a nanofilled flowable composite polished with abrasive pastes

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BACKGROUND: Flowable composite resins usually exhibit inferior physical and mechanical properties than universal packable composites. However, some characteristics of these materials, such as the handling characteristics and capability to adapt to irregular surfaces, make them a useful option for minimally invasive conservative interventions. The constant evolution of filler technology has improved the performance of resin composites, so that nanofilled and nanohybrid composites are considered nowadays the state of the art of filler formulation. Rigid and semi-rigid rotating instruments cannot be easily used to polish small occlusal cavities located in pits and fissures; contrariwise, this task can be easily done by using abrasive pastes. The aim of the present study was to evaluate the effectiveness of four polishing protocols with pastes on a nanofilled flowable resin.

METHODS: A nanofilled flowable composite resin (AP+ flow) was poured into silicon moulds that were 2 mm high and 4 mm wide in order to obtain 150 disc-shaped specimens. The uncured resin was compressed on top with a glass slide interposing a Mylar strip and then light-cured for one minute with a halogen lamp at 600 mW/cm^2. Thirty specimens did not receive any further treatment and served as controls. The remaining 120 specimens were finished with 1200 grit sandpaper and randomly allocated to four experimental groups of 30 specimens each: G1, one-step aluminium oxide paste (Nupro Shimmer); G2, two-step aluminium oxide paste (Prisma Gloss); G3, one-step diamond paste (Unigloss); G4, two-step diamond paste (Diamond Polishing Mint). The surface roughness was assessed by a profilometric analysis (linear rugosimetric parameter R_a). Three readings on randomly selected areas of the top surface of the specimens were made and the arithmetic mean of the registered values was considered the statistical unit. Data underwent statistical comparison with one-way ANOVA and Scheffé post hoc test ($p<0.05$). The surface of representative polished specimens was also qualitatively evaluated via a scanning electron microscopy observation.

RESULTS: Neither control nor experimental groups exceeded the 0.20-µm R_a threshold to inhibit bacterial adhesion. The lowest mean surface roughness was registered in the control group (0.027±0.014 µm), whilst the one-step aluminium oxide paste protocol led to the worst surface smoothness (0.072±0.013 µm). Group 2, 3 and 4 exhibited intermediate roughness values. The statistical analysis pointed out significant differences among groups: controls<G2=G3=G4<G1 ($p<0.05$). The scanning electron microscopy observation did not reveal major surface irregularities, with the exception of sporadic grooves.

CONCLUSIONS: The nanofilled resin AP+ flow could be satisfactorily polished with all the tested one- and two-step polishing systems; however, none of the tested protocols could reach the surface smoothness of the control group. When choosing among the different polishing protocols, the clinician should consider that the one-step aluminium oxide paste system produced the roughest surface. On the contrary, two-step systems performed better, but the one-step diamond paste appears to be the best option to spare operative time without renouncing to surface quality.

Evaluation of chemical/physical properties and biocompatibility *in vitro* of TheraCal LC as pulp-capping material

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BACKGROUND: One of the objectives of operative dentistry is to maintain the pulp health in compromised teeth, thus reducing the need for endodontic treatment or tooth extraction. One method used for this purpose is the pulp- capping technique. Calcium hydroxide is generally used for direct and indirect pulp capping. However, calcium hydroxide has several defects. Mineral Trioxide Aggregate cements have the potential to be used as pulp-capping materials. Significant disadvantages of self-cure MTA for the restorative dentistry include the slow-setting times from several minutes to hours. The incorporation of light-curable resins has been proposed to reduce setting time. TheraCal LC (Bisco Inc., Schaumburg, IL, USA) is a light-cured, resin-modified, calcium silicate-filled base/liner material designed for direct and indirect pulp-capping. In this study the result of the evaluation in vitro of the biocompatibility and chemical-physical properties of TheraCal LC are reported.

METHODS: TheraCal LC cylindrical specimens (4mm in diameter, 2mm thick and ~3g of weight) were prepared in strict compliance with the manufacturers' instructions under aseptic conditions and sterilized, in according to ISO 10993-5, with an exposition to ultraviolet light for 20 minutes on each surface, before being added to cell cultures. Osteoblast-like cells (MG63) were used. For different time point were evaluated: 1) solubility in ddH2O and in DMEM+FBS (1, 7, 14, 28 days); 2) water uptake (1, 6, 24, 48 hours); 3) alkalinizing activity (pH measurement at 3hours, 1, 3, 7, 14, 28 days) 4) cytotoxicity tests at different time points (1, 2, 3 and 7 days) in the Transwell insert (Sigma-Aldrich) methodology with MTT (3-(4, 5-dimethylthiazolyl-2)-2,5-diphenyltetrazolium bromide) assay; 6) morphology of cells using Fluorescence Microscopy (EVOS, Thermo Fisher). Then, the eluates of

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TheraCal LC samples were prepared separately and were incubated in DMEM-F12 at 37°C in a 5% CO2 for 1, 2, 3 and 7 days. MG63 cells were incubated with the supernatant of each sample, used as medium for xCellIgence Tests and MTT assay.
RESULTS: In ddH20 and in DMEM+FBS, TheraCal LC showed a loss of material increasing simultaneously with the absorption capacity. At each time of incubation a lower weight loss in deionized water than in DMEM+FBS was recorded. An increase of water uptake (WU%) was observed from 1h to 24h. After 24h, the WU% resulted not significant. The pH values for water absorption after immersion of the disks ranged between 8 and 9 at each times of evaluation. Cytotoxicity was not observed in MG63 cells treated with TheraCal LC, and after 5 days the cells were organized to form a confluent monolayer as demonstrated by fluorescence microscopy observation. CONCLUSIONS: TheraCal LC showed an high biocompatibility on MG63 cells allowing a physiologic cell growth and differentiation. The chemical-physical properties and biocompatibility of TheraCal LC observed in vitro in the present study, allows to consider this cement as an innovative pulp-capping material for the vital pulp therapy. The increase of water uptake of the material promoting the solubilization of mineral ions in medium is a requisite for a bioactive material. The alkalinizing activity is correlated to antimicrobial/bacteriostatic activity and to the ability to favors the formation of apatite deposits.

Translucent zirconia for metal-free restorations: a flexural strength test.

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BACKGROUND: Tetragonal zirconia polycrystals (TZP) can be used via CAD/CAM technique as substructure for fixed partial dentures. However, its intense white color and high opacity may represents an aesthetic limit. New TZP with a claimed higher degree of translucency were recently introduced on the market. The aim of this study was to measure the flexural strength (σ), the Weibull characteristic strength (σ0), the Weibull modulus (m) of this new materials in comparison with standard Zirconia.
METHODS: Three TZP were selected: Aadva ST (Standard Translucency), Aadva EI (Enamel Intensive – intermediate translucency) and GC Aadva NT (Natural Translucent – higher translucency) (GC Tech, Leuven, BE). For flexural strength testing ISO 6872:2008 was followed. Specimens (n=15/group) were cut out from pre-sintered disks with a low speed and water cooled saw. After dense-sintering, refining and polishing were performed in a grinder polisher machine with wet increasing-grit silicone-carbide papers until the desired dimension was reached (length=15 mm, width=4,0±0,2 mm, height=2,0±0,1 mm). Samples were tested in universal testing machine in a three-point bending test (span=13 mm, speed=1 mm/min) and the critical fracture load was recorded in N. Flexural strength (σ in MPa), Weibull modulus (m) and Weibull characteristic strength (σ0 in MPa) were than calculated.
Flexural strength data were statistically analyzed with a One-Way ANOVA followed by Tukey Test.
RESULTS: Statistical significant differences were found among the tested materials (different superscript letters indicate statistical significant differences. Aadva ST^{A} (σ=1215±190 MPa, m=7,45, **σ0 =1291 MPa) result in a statistically significant higer flexural strenght than Aadva EI^{B}** (σ=983±182 MPa, m=6,54, σ0 =1056 MPa). Aadva NT^{C} (σ=539±66 MPa, m=9,68, σ0 =566 MPa) report a statically significant lower strenth compared to the other tested materials.
CONCLUSIONS: The tested zirconia exhibited different mechanical proprieties and this fact should be taken into account during material selection. The higher the translucency the lower resulted to be the flexural strength. Following the recommended clinical indications (ISO 6872:2008) the use of Aadva NT should be limited to three unit bridge in molar region (ISO Class 5). No prosthetic limitation are indicated for the other tested materials (ISO Class 6).

Antibacterial and antibiofilm effects of quaternary ammonium methacrylate incorporated into dental resin

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BACKGROUND: Nowadays, the research field on antibacterial restoratives has been expanding, mainly targeting development of antibacterial resins.To date, commercial resins loaded inorganic ions having anticariogenic and antimicrobial properties. However, as one of the most complex biofilm systems in nature, human dental plaque causes a variety oforal infections including dental caries, pulp and periapical diseases.In addition, bacterial biofilm is involved in the aetiology of secondary caries following dental restoration.In this contest, the development of composites that can fight biofilms has become increasingly necessary. Here we reported the incorporation of quaternary ammonium methacrylateinto dental resins to obtain a new composite material with antibiofilm activity.
MATERIALS: Quaternary ammonium-containing resins were synthetizedmixing bisphenol A glycidyldi-methacrylate (BisGMA), triethylene glycol dimetha-crylate (TEGDMA), and ethoxylated bisphenol A di-methacrylate (EBPADMA) with different mass ratio of [2-(Methacryloyloxy)ethyl] trimethylammonium chlori-de (METAC). Camphorquinone was added as UV-photo initiator. The resinswere then mixed with either layered double hydroxide (LDH) or commercial glass filler (GF). All systems were well blended to obtain a homogenous mixture, and stored in darkness before use. Commercial light-activated restorative material (RM) was used as control. The resins (RQM-LDH and RQM-GF) were characterized by dynamic-mechanical analysis using a dynamic mechanical thermo-analyzer. The anti-biofilm activity of synthetized resins on biofilm formation by 18–20 h-old cultures of S. mutans was determined byCongo Red Agar method.Biofilm metabolic activity was measured by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and lactic acid production.
RESULTS: The incorporation of METAC into resins (RQM-LDH and RQM-GF) up to mass fraction of 10%did not significantly influence the mechanical properties of composites. In particular, the elastic moduli were similar to RMused as control. Quaternary ammonium

compounds have beenpostulated to be especially effective due to their ability to insert intothe bacterial membrane, which results in physical disruption and bacteriadeath. Our results on S. mutansbiofilm showed that the presence of METAC inhibited biofilm formation in a concentration dependent manner. Moreover, the incubation of S. mutansbiofilmwith both RQM-LDH and RQM-GFsignificantly decreased the metabolic activity of biofilm respect RM.
CONCLUSIONS: The new antibacterial and antibiofilm resin exhibited mechanical properties matching those of a commercial composite control that lacked antibacterial and antibiofilm capabilities. Hence, the new material is a promising material for tooth cavity restorations that inhibit caries. The incorporation of a bioactive molecule having remineralizingcapacity could further improve the resin properties.

Fluoride release kinetic from dental restorative materials affects dental pulp stem cells behavior

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BACKGROUND: Fluoride-releasing restorative dental materials can be beneficial to remineralize dentin and help prevent secondary caries. However, the effects of fluoride release from dental materials on the activity of dental pulp stem cells are not known. Here we investigate whether different fluoride release kinetics from dental resins supplemented with modified-hydrotalcite (RK-F10) or fluoride-glass filler (RK-FG10) could influence the behavior of a human dental pulp stem cell subpopulation (STRO-1 positive cells) known for its ability to differentiate towards an odontoblast-like phenotype. The two resins, characterized by similar physicochemical properties and fluoride content, exhibited different long-term fluoride-release kinetics.
METHODS: The modified hydrotalcite intercalated with fluoride ions (LDH-F), was prepared via ion exchange procedure, characterized by X-ray diffraction and FT-IR spectroscopyand used as filler in a commercial resin. RK-F10 and RK-FG10 were prepared adding an amount of either LDH-F or fluoride-glass filler in a commercial light-activated restorative material (RK), provided by Kerr s.r.l. (Italy). RK-F10 and RK-FG10 showed a final fluoride concentration of about 0.9% by weight in RK.The release of fluoride ions in artificial saliva medium was determined using a ionometer. The cell migration assay was performed in presence of transforming growth factor β1 (TGF-β1) and stromal cell-derived factor-1 (SDF-1)using a modified Boyden Chamber method on STRO-1$^+$ cells cultured for 7 days on RK, RK-F10 and RK-FG10 materials. The expression patterns of dentin sialoprotein (dspp), dentin matrix protein 1 (dmp1), osteocalcin (ocn), and matrix extracellular phosphoglycoprotein (mepe) was assessed by quantitative RT-PCR.
RESULTS: Incorporation of the fluoride LDH in commercial-dental resin significantly improved the mechanical properties of the pristine resin, in particular at 37°C. Long-term exposure of STRO-1$^+$ cells to a continuous release of low amount of fluoride by RK-F10 increases their migratory response to TGF-β1 and SDF-1, both important promoters of pulp stem cell recruitment. Moreover, the expression patterns of dspp, dmp1, ocn, and mepe indicate a complete odontoblast-like cell differentiation only when STRO-1$^+$ cells were cultured on RK-F10. On the contrary, RK-FG10, characterized by an initial fluoride-release burst and reduced lifetime of the delivery, did not elicit any significant effect both on STRO-1$^+$ cell migration and differentiation.
CONCLUSIONS: Taken together our results demonstrated that STRO-1$^+$ cell migration and differentiation into odontoblast-like cells was enhanced by the slower fluoride-releasing material (RK-F10) compared to RK-FG10, which showed a more rapid fluoride release, thus making LDH-F a promising filler for evaluation in clinical trials of minimally invasive dentistry.

Electrospun membranes loading osteogenic-bioactive molecules for guided bone regeneration after dental implantation

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BACKGROUND: Guided bone regeneration (GBR) is a surgical procedure that uses barrier membranes to allow new hard tissue growth on an alveolar ridge permitting stable placement of dental implants.Osseous regeneration by GBR depends on the migration of pluripotential and osteogenic cells to the bone defect site and on the exclusion of cells impeding bone formation (e.g. epithelial cells and fibroblasts). Here we investigate the capacity of new electrospun membranes to release specific bioactive molecules (e.g. resveratrol) able to induce mesenchymal stem cells (MSCs) differentiation.
METHODS: Fibrous membranes of poly(ε-caprolactone) [PCL], poly(lactic acid) [PLA] and their blends were prepared by electrospinning at room temperature and constant voltage (30 kV). Electrospinning conditions were setup to produce nano fibrous mats composed of individual fibers 0.75μm in diameter and without bead formation. The electrospinning parameters were optimized to successfully encapsulated layered double hydroxide nanoparticles (LDH) loading bioactive molecules (e.g. resveratrol). Synthetized membranes were characterized in terms of morphology and in vitro release. The ability of bioactive molecules to to induce MSCs differentiation into osteoblast-like cells was assessed by quantitative RT-PCR.The gene expression of runt-related transcription factor 2 (RUNX2),osterix (OSX), osteocalcin (OCN), osteonectin (ONN), osteopontin (OPN), and bone sialoprotein (BSP) was evaluated. In addition, alizarin red was used to assess resveratrol capability to induce mineralization.
RESULTS: The technical parameters for electrospinning solutions of biodegradable polymers and their composites with LDH/Resveratrol were defined and set up to obtain uni-

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form defect-free fibers.The scanning electron microscope (SEM) and X-ray analyses suggest that LDH/Resveratrol is well dispersed into membrane, resulting in electrospun nanofibers with average diameter around 0.8-1.2 micron. Fiber dimensions resulted very similar or slightly higher to pure polymers. Resveratrol release was obtained in a controlled and tunable manner. Electrospun membranes, combined with LDH/Resveratrol, upregulated the gene expression of several osteogenic markers and showed higher alkaline phosphatase activity and alizarin red staining, suggesting increased differentiation and mineralization of MSCs cells.
CONCLUSIONS: Our results provide evidence that the encapsulation of LDH/Resveratrol into electrospun fibers generates bioactive membranes able to promote the osteogenic differentiation of mesenchymal stem cells. The new membrane could be useful to improve GBR surgical procedure.

Complications of endodontically treated teeth restored with fiber posts and different prosthetic systems. A systematic review

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BACKGROUMD: The present systematic review aimed at assessing data from the literature on endodontic and prosthetic complications in endodontically treated teeth restored with fiber posts.
METHODS: Available randomized controlled clinical trials evaluating endodontic and prosthetic complications in teeth treated with fiber posts and restored with different prosthetic systems. Pubmed, Evidence-Based Dentistry, BMJ Clinical Evidence, Embase and Dynamed restricted to scientific literature. Also manual researches were performed. English language and time filters (from 1990 to 2015) were used.
RESULTS: The database search produced 4230 records, many of which were duplicates. The manual research did not produce any other relevant article. After duplications removed, all the selected databases produced 3670 records. Reading titles and abstracts, 2 indipendent reviewers excluded 3664 reports. The full-texts of the remaining 6 reports were read. Only 4 studies met the inclusion criteria and were included in this systematic review. Two indipendent reviewers evaluated the adequacy of records using a specific quality assessment protocol and high risk of bias was reported mainly due to a lack of information, sample calculation and intention-to-treat analysis. The most frequently reported failures in the available studies were: fiber post debonding, loss of retention of single crowns (SCs) and marginal gaps. Less frequently, chippings and fractures were recorded in SCs. No studies about complications related to fixed dental prostheses (FDPs) were found. The interaction between residual coronal structure and type of prosthetic restoration was found to be not statistically significant.
CONCLUSIONS: A correlation between the failure rates of fiber posts and the type of prosthetic restorations just like SCs and FDPs can not be found to date. Further randomized controlled clinical studies are required to achieve evidence-based conclusions, particularly about the use of fiber posts with FDPs.

In vitro analysis of the fracture resistance of CAD-CAM monolithic zirconia molar crowns with different occlusal thickness

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BACKGROUND: to compare the fracture resistance and mode of failure of CAD-CAM monolithic zirconia single crowns (SCs) with different occlusal thickness cemented onto human molars. The null hypotheses stated that there was no association between the occlusal thickness and either the fracture resistance and the mode of failure of CAD-CAM monolithic zirconia SCs.
METHODS: Forty extracted human maxillary third molars were used for the study. Each tooth was embedded in a block of self-curing acrylic resin surrounded by a stainless steel cylinder with the long axis perpendicular to the base of the block, leaving 1 mm of the root exposed. Each tooth was covered with a powder for digital scanning three-dimensionally (3D) scanned by means of a laboratory optical digital scanner. The 3D shape of each tooth was digitized, so as to use it for the fabrication of CAD-CAM monolithic crowns. Standardized tooth preparations were performed with high-speed diamond rotary cutting burs under constant water cooling, according to the following geometry: 1 mm axial reduction, 0.7 peripheral rounded minichamfer shoulder placed 0.5 mm above the cemento-enamel junction, 12° of total occlusal convergence. The 40 molars were randomly divided into 4 groups of 10 specimens each and different occlusal thickness preparation were performed as follows: 2.0 mm (group 1), 1.5 mm (group 2), 1.0 mm (group 3) and 0.5 mm (group 4). Each abutment tooth was scanned and digitized and 40 monolithic zirconia SCs were designed by means of a dedicated CAD software (Exocad) according to the original shape of each tooth. The monolithic zirconia restorations of group 1, 2, 3 and 4 presented with an occlusal thickness of 2.0, 1.5, 1.0 and 0.5 mm respectively. A dual-cure self-adhesive universal resin cement was used to lute the restorations. A universal loading machine was used to statically load the specimens. Load to fracture was performed using a 1.0 mm stainless steel hemispherical tip placed in the occlusal fossa, in a direction parallel to the longitudinal axis of the tooth. All samples were loaded until fracture and the maximum breaking loads were recorded in Newtons (N) by a computer connected to the loading machine. The failure mode was visually evaluated using a stereomicroscope at 10x magnification and in case of fracture, the fracture pattern was examined using a scanning electron microscope. The Kolmogorov-Smirnov test was used to verify the normality of data distribution. The fracture values were analyzed with the one-way ANOVA followed by the Kruskal-Wallis on ranks test for multiple comparisons. The level of significance was set at p=0.05.
RESULTS: The highest fracture resistance values were reported in group 1 while the lowest were noticed in group 4.

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All the crowns showed cohesive microcracks of the zirconia core in the occlusal region, particularly at level of the load application area; only 1 crown in group 4 was interested by a complete fracture. No statistically significant differences between groups were evidenced either for the fracture strength ($p>0.05$) and the failure mode ($p>0.05$).
CONCLUSIONS: The occlusal thickness of CAD-CAM monolithic zirconia crowns did not influence either the fracture resistance and the mode of failure of the restorations; the occlusal thickness of CAD-CAM monolithic zirconia crowns can be reduced up to a lower bound of 0.5 mm keeping a sufficient strength to withstand occlusal loads;
CAD-CAM monolithic zirconia crowns showed sufficient fracture resistance to be used in molar regions, even in a thin configuration (0.5 mm).

Scanning electron microscope (SEM) evaluation of different dental bonding agents. A gap comparison of the different adhesives capability

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BACKGROUND: The improvement of conservative therapies and the increased attention to the oral health conditions give the patients the opportunity of maintaining their natural teeth for long time.
This result has been achieved with a reduction of tooth extraction and an increase of endodontic treatment. An ideal pulp covering material should guarantee the healthy radicular pulp tissue, should be highly biocompatible, should prevent bacterial microleakage and should preserve a perfect adhesion between the tooth surface and the reconstructive materials. Mineral trioxide aggregate (MTA) can be actually considered the new gold standard. The MTA can be classified as an extremely biocompatible cement, able to stimulate healing and osteogenesis. Dental cavity moisture can be definitely an important factor for its potential effects on the physical properties and sealing ability of the endodontic materials[1] [2]. The materials used to repair perforations or to protect the pulp tissue in the direct pulp capping are usually in contact with the blood or other tissue fluids.
The MTA is the only material not affected by moisture or by the blood contamination1. The purpose of this research is to compare the efficiency of different adhesive systems interposed between the MTA and the restorative material considering which is more reliable from the point of view of clinical microscope through the analysis of any micro-leakage between the various interfaces analyzed.
METHODS: The research was carried out on 14 molars extracted for periodontal reasons. Each dental element has been stored in saline solution for one month. Each tooth was sectioned making a cut in the sagittal half later was made up of pulp floor covering with the MTA cement. The examined interfaces were divided into 2 groups:
— Group A was prepared with MTA-component adhesive.
— Group B was prepared with MTA and composite dual etching.
In both groups, the observations were carried out with a S.E.M mode S.E.I. (Scanning electron direct). The samples were analyzed at low magnification along the interface in order to detect the presence of possible marginal cracks.
RESULTS: The preliminary analysis of the data shows in Group A that there is a gap between the interface Mta - adhesive - composite of the examined cases, probably due to the interposition of the adhesive enamel dentine. In the Group B, in which the seal has been obtained exclusively with dual -etching system, do not appear significant gap.
CONCLUSIONS: The microscopic observations, performed in group A with interposition of adhesive and flow between the chamber floor and MTA demonstrates the presence of a marginal gap of considerable amplitude in the 100% of the samples.
The adopted technique in the study seems to be useful for the use of dental adhesives and it has proved to be very efficient. The presence of adhesive in the intermediate layer between the resin and MTA, probably increases shrinkage stress decreasing the effectiveness adhesive also the presence of water in the MTA could inhibit the adhesion due to the high hydrophobicity of the resin materials, therefore, the use of the adhesive It seems to be discouraged.

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Focused Ion Beam Microscopy reveals that osteoblastic cells preferentially adhere to peaks on micro-structured titanium

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Engineering devices with surfaces capable to promote the integration of the implant in bone is a desirable goal, which however requires a deep knowledge of the surface factors affecting cell behaviour and controlling cell fate. It is well known that micro-patterned surfaces can affect cell shape, orientation and even cell fate. Numerous experimental observations have revealed that osteoblastic cells growing on rough surfaces express higher levels of differentiation markers. Focused Ion Beam Microscopy (FIB) offers unprecedented possibilities to investigate the relation of cells with the underlying substrate by creating sections of samples along desired planes and allowing for high resolution imaging of the interface. The present study aimed at investigating how osteoblasts adhered to commercially available titanium surfaces by FIB analysis. Murine calvaria osteoblastic MC3T3 cells were cultured on smooth (P) or sand-blasted/acid-etched (SLA) commercially pure titanium discs and were observed at Scanning Electronic Microscope (SEM) after 1, 3, 6 or 24 hours of culture in complete medium. FIB sections were created perpendicular to the surface plane to expose cell-titanium interface and observe cell-titanium contact points. Myosin II and actin microfilaments, two main components of the cytoskeleton and responsible for cell contractility and the maintenance

of cell shape, were also labelled with fluorescent antibodies or fluorescent phalloidin and observed at epifluorescence microscopy after fixation. Myosin contractility was also hampered by addition of Blebbistatin, an inhibitor of Myosin Light Chain Kinase, the enzyme that activates myosin. FIB sections revealed that cell adhesion initiated centrally at early time points and expanded to the periphery of the cell as time proceeded but even after reaching stability, cells attached on the substrate by bridging over the titanium irregularities and adhering mostly on the surface peaks. Gaps were visible between concave surface areas and the tensed cell cytoplasm. Even at higher magnification, areas around titanium ridges represented preferred attachment points for cells. A different Myosin distribution was observed between smooth and rough titanium surfaces, with reinforced signal along stretched edges on SLA and inhibition of contractility affected cell growth, abolishing differences between P and SLA titanium.

Osteoblast adhesion on hyperhydrophilic micro-structured titanium surfaces: a Focused Ion Beam study

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Surface roughness has long been known as a potent factor affecting cell attachment, orientation, growth and even fate. Rough surfaces have been shown to increase the osteoblastic phenotype of bone cells and most commercially available implant systems present with micro patterned surfaces. However, more recently, it has been shown that surface hydrophilicity can also regulate cell activity. The aim of the present study was to investigate the response of human osteoblastic cells to microstructured titanium surfaces with normal or increased hydrophilicity. This study focused on the evaluation of cell morphology and adhesion on commercially pure titanium surfaces using Scanning Electron Microscopy (SEM) with Focused Ion Beam (FIB) capabilities. Sandblasted and acid-etched titanium discs with normal or enhanced wettability were investigated by Raman spectroscopy, to better understand their surface chemical composition. Protein adsorption on surfaces was studied through a Bradford assay using Bovine Serum Albumine as a reference. Subsequently, human osteoblastic cells (hOB) were seeded on the samples, and their growth was monitored through a chemiluminescence-based assay. Cell adhesion and morphology were also investigated by scanning electron microscopy (SEM), and the specimens were sectioned with a gallium focused ions beam (FIB) to gain further insight into the cell-biomaterial interface.
A significant increase in cell proliferation and a different pattern of cell adhesion was observed on hyperhydrophilic surfaces. FIB analysis revealed that cells on microstructured surfaces with normal wettability adhere preferentially to the surface peaks and their cell body stretches over the irregularities of the substrate, bringing from peak to peak. However, a closer adhesion of the entire cell body to the peaks and valleys was visible on hyperhydrophilic surfaces. Cells seemed to be thinner and spread on the entire surface of the sample.
In conclusion, these data show that the hyperhydrophilic surface influences osteoblasts behavior, in particular by eliciting a higher cell adhesion and a consequentely a different cell morphology.

Resistance against bacterial micro leakage of a new conical implant-abutment connection: an *in vitro* study

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BACKGROUND: The aim of the present study was to test bacterial micro leakage of a new design of internal conical connection from the inside to the outside of the implant-abutment assembly. In fact microbial accumulation around dental implants may cause infections of peri-implant tissues known as peri-implant mucositis, when limited to soft tissues, and peri-implantitis when bone loss occurs around implant.
METHODS: This new internal connection is characterized by a double taper principle. The first taper is an internal cone that supports and closes the prosthesis combined with an internal hexagon. This is used for the implant screwing and the prosthesis repositioning. The second taper is an interaction surface between the prosthetic abutment and the head of the tightening screw, which is conical itself. The angles and working depths in the interaction between implant, abutment and screw help should enhance the mechanical resistance and minimize the process of bacterial leakage through the double seal achieved in the interaction of the two conical surfaces.
All implants, abutments and instruments to be used to handle the test materials were sterilized at least 4h at 250°C in a dry oven.
First step was pipetted broth of Escherichia Coli in 3 µl of Luria-Bertani (LB) in the internal lumen of each implant and a single implant was inoculated only with 3 µl of LB and was used as negative control. After this preparation, the abutment were connected using a calibrated torque controller, following manufacturers' instructions. Then external superficies of implants were cleaned with sterile alcohol gauzes and sterile saline and then were passaged in two sterility control tube and were immersed in a tube containing approximately 200 ul of LB, covering completely the implant-abutment connection. All tubes, including sterility control, were finally incubated at 37°C.
The check-points were at 1 h, 3 h, 6h, 16h, 24h, 48h, 72h and 96h. Sterility control tubes were also checked for lack of growth, in order to confirm that possible growth in test tubes is due to micro leakages from the implant-abutment connections. In particular the broths were clear and showed no bacterial cloudiness (turbidity), proving an absence of external contamination of implants.
RESULTS: No contamination was found in the first 6 hours, while 7 of 10 implants showed no contamination at 96h time point; 2 implants resulted contaminated at 24h with a low quantity of bacterial colonies (about 300 CFU/ µl) and 1 implant at 48h.

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CONCLUSIONS: Within the limits of the present study, the new connection presented significant less bacterial leakage at 96 h in comparison with the other connections and different studies.

Assessment of *in vitro* citotoxicity of non-noble metal alloy for dental use.

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BACKGROUND: The use of adequate target cells for cytotoxicity testing of dental materials has often been experimentally assessed with respect to the clinical relevance of the test
RESULTS: There is evidence from literature that test substances cause the same level of cytotoxic response in human primary cells originating from target tissues. The purpose of this study is to evaluate the biological reactivity of a fibroblast cell line (L-929 mouse fibroblasts) in response to an extract of the test item of a non-noble metal alloy for dental use, specially produced for removable prosthesis.
METHODS: The study was made on the measurement of the viability of cells via mitochondrial dehydrogenase according with test system recommended in the ISI 10993-5 and according to OECD guidelines. The number of viable cells correlates to the optical density by photometric measurements using inverted optical microscope (Diaphot-TMD, Nikon. Objective 10X), for 2 days observation.
RESULTS: A decrease in number of living cells results in a decrease in the overall activity of mitochondrial dehydrogenase in the sample. 89% viability was observed for the L929 fibroblast cells exposed to the test item at 2 days observation. The test item of non-noble metal alloy is considered non-cytotoxic and meets requirements of ISO 10993-5.
CONCLUSIONS: Biocompatibility of dental materials is basic to understand the interactions between a material and an organic environment as well as having more and more importance for all end-consumers, both for manufacturers, dentists and for patients. The oral cavity is a very special environment, where the normal response to healing is a dynamic phenomenon, mainly because of the rapid cell turnover, the immunological reactivity of the microbial contamination of the steep climate and application of cyclic loading. Corrosion of a dental alloy is an extremely complex phenomenon and depends on a variety of physical and chemical factors, as, e.g., the combination of two different alloys/welding or the presence of pits and crevices in a single alloy. Corrosion has basic importance for biocompatibility as the release of the alloy elements can cause adverse biological effects such as toxicity, allergies or mutagenicity or impairment of strength of dental alloys up to brittle fracture. In dentistry, the evaluation of biocompatibility of medical devices is regulated by International Standards and International Guidelines that direct manufacturers/sponsors and investigators in the correct choice of procedures to be applied to ensure the safety of the medical devices, the effectiveness of performance and protection of the environment. The pre-market biocompatibility evaluations are therefore to beconsidered as essential requirements for the placing on the market of a new medical device.

Densitometric evaluation of different pulp capping materials using the prodigy DXA system

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BACKGROUND: Radiopacity of materials used in endodontics is listed as one of the basic requirements for accurate diagnosis and follow-up because it allows the identification of the material and its distinction from dental structures. Other studies reported different methods to rank the radiopacity of conventional and experimental materials. The objective of the present study was to compare the radiopacity of different pulp capping materials using an experimental densitometric evaluation (Prodigy DXA system). The null hypothesis is that all materials present similar values of density to that obtained with dentin tissue.
METHODS: Thirty specimens were prepared for each material tested in this study (Dycal Ivory - Dentsply, Dycal Dentin - Dentsply, Calcimol LC - Voco, MTA Angelus - Angelus, Proroot MTA-Dentsply, Biodentine – Septodont) following manufacturer's instructions; these materials were mixed and placed into silicon molds (1x4mm). 30 dentin slices (1mm in thickness and 4mm in diameter) were obtained from freshly extracted noncarious premolar teeth by using slow-speed diamond disks and they were then stored in a 0.1% timol solution until used. All materials were scanned on a GE Healthcare Lunar Prodigy and iDXA in routine clinical manner: this Prodigy DXA system provides densitometric analyses on the basis of a dual energy X-ray absorptiometry (DXA), that is the absorption and the interaction between incident photons and the material. As the traditional radiology, the Prodigy DXA system provides bidimensional images of the irradiated surfaces overlapping the changes in density inside the material; however the inclusion of collimation filters, which allow the emission of a single beam through the material, reduces the missing radiations and improve the resolution of the measurements. The assessment of normality was developed by the Shapiro-Wilk test ($P < 0.05$); the Krustal-Wallis test, and its multiple comparisons, was applied to compare the materials.
RESULTS: Significant differences were registered between the materials and the dentinal tissue;all the materials showed a mean densitometric value significantly higher than dentinal tissue ($P < 0.05$). In particular MTA Angelus and Proroot MTA showed the highest values of density when compared with the other materials. Significant differences were collected also between Calcimol LC and Dycal Ivory ($P < 0.05$) and between Calcimol LC and Dycal Dentin ($P < 0.05$). The null-hypotesis that the distributions in groups were modeled as a Gaussian random variable was not confirmed by the Shapiro-Wilk test at a level of significance of $\alpha=0.05$.
CONCLUSIONS: The null-hypothesis that all materials present similar values of density to that obtained with dentinal tissue has been rejected because of the significant differences the materials showed when evaluated with the experimental method based on a GE Healthcare Lunar Prodigy and iDXA. Materials containing bismuth oxide (which represents the 20% of MTA) showed high densitometric values when compared with resin-based materials (Calcimol) and with materials containing zirconium oxide (Biodentine) and zinc oxide (Dycal Dentine and Dycal Ivory). Thanks to this method the values obtained could be directly analyzed without dealing with the aluminum stepwedge, thus reducing the risk of errors.

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Effect of occlusal-loading of implant abutment connection

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BACKGROUND: Failures of implant-abutment connections are a relatively frequent clinical problem. A literature review of Goodacre in 1999 of clinical complications of osseointegrated implants showed that screw loosening or screw fracture varied between 2% and 45% of the implant restorations, with the highest amount in single crown. A recently published meta-analysis of Pjetursson in 2004 on implant-related complications calculated a cumulative incidence of connection-related complications (screw loosening or fracture) of 7.3% after 5 years of clinical service. The formation of a marginal gap between the implant and abutment might lead to increased loss of a marginal bone because of the penetration of bacteria into the implant-abutment interface.

Penetration of oral microorganisms through gaps between these components may add to risk of soft tissue inflammation or be responsible for the failure of peri-implantitis treatment. During chewing and biting, the prosthetic restoration and the implant abutment connection is affected by various physiological forces, e.g on a single molar implant this might be about 120 N in the axial direction.

Purpose of the study is to valuate the marginal adaptation of different implant-abutment systems, before and after mechanical loading (Chewing simulator CS4, Mechatronik, Feldkirchen-Westerham Germany).

Methods: Two implant systems were tested (Anyone Megagen, 3I T3 Biomet). Six implant for each implant system were embedded perpendicularly in an acrylic resin (Palapress, Heraeus Kulzer, Armonk, NY, USA) with custom-made stainless teflon ring form. The implants were mounted in the resin to mimic oral conditions, where the bone may absorb some forces transmitted to the implant-abutment screw connection. All standard abutments were restored with identical single molar crowns. The crowns were casted in a metal alloy and luted to the abutments with a self-adhesive cement (RelyX Unicem, 3M ESPE, St Paul, MN, USA) to minimize the risk of losing crown retention as comparing to conventional cement. After the implant were embedded, the abutment-crown combination were assembled to the implant with an abutment screw according to the manufacturer's protocol. A calibrated electronic implant torque controller (Intrasurg, KAVO, Biberach, Germany) was used to ensure proper seating torque for all abutments. Occlusal loading and thermocycling of specimens were performed in a CS-4.4 equipment (SD Mechatronik GmbH, Germany) using a stainless steel antagonist (6 mm diameter), 3.5 mm away from the crown's occlusal center on the tapered occlusal area, for 1.200.000 cycles at 50 N at a frequency of 1 HZ. This dynamic loading contained an additional horizontal sliding motion 2mm rectangular to the implant axis to induce bending moments at the implant-abutment interface. Because of various occurrences of unexpected abutment-screw loosening during the dynamic loading test, the implant-abutment connections were controlled for mechanical integrity at intervals 10.000 chewing cycles.

Before and after dynamic loading the abutment-implant connections were analysed with SEM (Quanta 250; FEI, Hillsboro, OR, USA).

RESULTS: A loss of retention between abutment-implant and fracture was assed as a failure. In particular, in all cases the failures were caused by abutment screw loosing and later fracture, but not due to destruction of the implant neck or shoulder. Two of six implant-abutment for each system implant connections failed during dynamic loading. The microgap of the implant-abutment connection before and after mechanical loading were found similar under Scanning Electron Microscopy.

CONCLUSIONS: The marginal quality of implant-abutment before and after mechanical cycling showed no significant differences. Further clinical research is essential to evaluate if different implant-abutment connection designs exhibited significant differences in survival under dynamic loading.

Effects of fiber-glass-reinforced composite restorations on fracture resistance and failure mode of endodontically treated molars

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BACKGROUND: The purpose of this in vitro study was to evaluate the fracture resistance and fracture pattern of endodontically treated mandibular first molars restored with glass-fiber reinforced direct composite restorations.

METHODS: 60 extracted non carious first mandibular first molars were selected. After endodontical treatment, an MOD cavity were prepared. The teeth were assigned randomly to six groups (n=10 each) according to the post-endodontic restoration: sound teeth (G1); no restoration (G2); direct composite restoration (G3), fiber-post-supported direct composite restoration (G4); direct composite reinforced with horizontal mesio-distal glass-fibers (G5) or buccal-oral glass-fibers (G6). Specimens were subjected to 5000 thermocycles, 20,000 cycles of 45° oblique loading force at 1.3 Hz and 50N and then loaded until fracture. The maximum breaking loads were recorded in Newton (N) and data were analyzed with one-way ANOVA and post-hoc Tukey tests ($p<0,05$). Fractured specimens were analyzed with SEM.

RESULTS: the mean static loads in Newton were: G1: 831.83; G2: 282.86; G3: 364.18; G4: 502.93 G5: 499.26; G6: 582.22. The fracture resistance of G4, G5 and G6 did not significantly differ, but was significantly higher than G3 ($p=0.001$). All specimens fractured in a catastrophic way. In G6 glass-fibers inducted a partial deflection of the fracture, even if they were not able to stop the crack propagation.

CONCLUSIONS: Within the limitations of this in vitro study, it was possible to conclude that:

— None of the direct restoration techniques tested was able to restore the fracture resistance of sound molars.

— The insertion of a fiber post or glass fibers into direct composite restoration was able to guarantee a significant increase in the fracture resistance of endodontically treated molars.

— Glass fibers with a buccal-oral orientation showed a partial deviation of the fracture pattern, even if it did not prevent catastrophic fracture of the specimen.

Clinical significance: The fracture resistance of endodontically treated molars restored with direct composite restorations seems to be increased by the reinforcement of fibers, even if it is not sufficient to give back the sound molar fracture resistance and it cannot avoid vertical fractures.

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Influence of glycine powder on surfaces of titanium dental implants

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BACKGROUND: The titanium surface of implants contaminated with perimplantary infections can be treated, as described in literature, with either mechanical and ultrasonic cleaning or the additional use of chemical agents as well as with the use of air flow polishing. Both methods appear to be able to remove bacterial deposits causing, in turn, alterations to the surface of the implant.
Recently, a new powder has been developed for this type of application: amino acid glycine. The aim of this study is to evaluate the effect of the usage of this powder on two different types of implant surfaces.
METHODS: We used 4 grade 5 titanium dental implants (Ti 6Al-4V) of 2 different types (Implants A and B Straumann with SLA surface, implants C and D Dental Planet with TiRough surface):
— The implants were embedded in resin and divided into two groups:
— Group I consists of samples A and C. Group II consists of samples B and D.
Glycine powder of less than 63 μm in particle size was applied on all implants, using the Turbodent by Mectron from a distance of 1 mm and with a 30° angle, for 20 seconds per treatment, moving the nozzle from the center to the periphery in 4 circular movements.
The only difference is that the Group I received 2 consecutive treatments while the Group II received 3 consecutive treatments.
The samples were analyzed through x-ray microtomography both before and after treatment for a comparison between the reconstructions of the samples in order to verify the structural integrity.
Observations were made with the SEM only at the end of the treatments to observe the superficial distribution of glycine powder.
RESULTS: From the 3D microtomographic analysis of the samples, before and after treatment, there were no particular variations on the surface and internal structure of the fixtures of the treated samples.
The results that were obtained from SEM observations, have shown numerous areas with deposits of glycine powder alternated with areas free of powder. Next to areas where powder does not seem to have settled at all or only minimally, there are areas where the deposits are more widespread and regular.
It can also be observed that such scattered areas of glycine are greater in the Group II samples (B and D) compared to those of Group I (A, C).
CONCLUSION: In the light of the microCT analysis and SEM observations we can say that from this study it was possible to highlight that, where a sufficient amount of powder of glycine was deposited, there were areas in which it was possible to observe an adhesion to the surface titanium implant.
The results therefore seem to indicate that a superficial ablation of glycine powder may enhance cell growth on titanium implants that normally become biologically contaminated with peri-implantitis.
A proposition for improvement and standardization of procedures for the treatment of peri-implantitis could be to do at least 3 applications of glycine powder (20 seconds each) from a distance of 1 mm and with a 30 degree angle.

Curing of dental restorative materials assisted by CAD/CAM system: a novel approach

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BACKGROUND: The aim of this research is to evaluate temperature profiles occurring during polymerization and to directly measure mechanical properties through bending tests of a variety of dental composites cured through LED and solid state Laser. The hypotheses that Laser curing produces lower temperature rise during polymerization and higher mechanical properties were tested.
METHODS: Four restorative composites (Enamel Plus Hri-Micerium, Clearfil Majesty Esthetic-Kuraray, DEI-DEI Italia, Smart Dentine Replacement-Dentsply) based on CQ photoinitiator system were used. Different light sources (Blue LASER-Sothiclasers, Blue LED-Mectron/Enfis Uno) have been adopted to photo-polymerise the dental restorative materials.
RESULTS: For each mechanical property and for each composite no statistical difference was observed after 7 seven days of conditioning. Thus suggesting that the energy dose is the main parameter affecting the quality of polymerization. Instead, significant differences were recorded among the different materials. In particular, regardless of the curing modality, the elastic modulus of Enamel Plus Hri was statistically higher than DEI, Clearfil Majesty Esthetic and Smart Dentine Replacement ($p<0.05$). Instead, the maximum strain of Smart Dentine Replacement was higher ($p<0.05$) than Enamel Plus Hri, DEI and Clearfil Majesty Esthetic, regardless of the curing modality. Interestingly, a weak significant difference ($p<0.1$) was observed between the maximum stress of Enamel Plus Hri and Smart Dentine Replacement specimens cured through the blue Laser.
CONCLUSIONS: Results suggest that this type of Laser is suitable for curing dental composites. However, no significant difference in temperature rise was recorded for Laser or LED curing. Also, bending properties of Laser and LED cured composites after 7 days of conditioning were similar.

New technologies in dentistry: the regenerative effects of LEDS devices

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BACKGROUND: Low level laser therapy (LLLT), phototherapy or photobiomodulation refers to the use of photons at a non-thermal irradiance to alter biological activity. LLLT

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uses either coherent light sources (lasers) or non-coherent light sources consisting of filtered lamps or light-emitting diodes (LED) or, on occasion, a combination of both. It is known that cellular exposure to low energy light activates a set of biochemical pathways, which modulates the activity of many cellular organelles, influencing cellular homeostasis and functionality of several organs. Although LLLT is now used to treat a wide variety of ailments, there are still uncertainties about the fundamental mechanisms responsible for the biological effects and there are significant variations in terms of dosimetry parameters.
The aim of the study is to evaluate the effect of light irradiation through a 880 nm LED device on cell degranulation, β-galactosidases activity and interleukin modulation.
METHODS: A NIR-LED device, characterized by 880 nm wavelength and frequencies between 30-60 Hz, has been used as a light source (PhaseTech, Bergamo, Italy). Monocyte/macrophage established tumor cell line U937 cells (ATCC; Manassas, VA, USA) were grown in RPMI 1640 supplemented with 10% heat-inactivated fetal bovine serum (FBS), 2 mM L-glutamine and 1% Pen-Strep at 37 °C in 5% CO_2. The concentration of several cytokines was detected using a cytofluorimetry FITC-labelled assay and the level of expression of p65 NF-kB and cleaved Caspase-3 were also examined by western blot analysis.
RESULTS: This study shows that 880 nm LED wavelengths activates cell degranulation, β-galactosidases activity and promotes a statistically significant modulation of IL-8 and IL-1β. In all experiments the IL-8 induction was 10 times higher than the basal level. When we tested the LED exposure on U937 cells, in the presence or absence of LPS, surprisingly we observed a slight increase on the release of cytokines in particular regarding IL-8. Additionally, evidences were raised that the well-known pro-inflammatory NF-kB transcription factor and the apoptotic marker, cleaved Caspase-3, were upregulated in response to a proinflammatory biochemical pathway.
CONCLUSIONS: These data, suggest that LED irradiation at these specific parameters is able to promote cellular regeneration on target organs. and remodeling process on target cells, including neo-angiogenesis, wound healing and tissue repair mechanisms.

Fissure sealants: fluoride release and uptake abilities

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BACKGROUND: Since 1960s, sealing the pits and fissures of molars and premolars is considered a highly effective method for the prevention of dental caries. Fluoride-releasing sealants were introduced in the 1970s, in order to increase the caries-preventing effect and to inhibit the demineralization of the adjacent tooth structure. Other studies reported that the regular use of fluoride toothpastes can result in the absorption of fluoride into the glass ionomer and that this fluoride can subsequently be released into the adjacent tooth structure. The objective of the present study was to assess the fluoride release/uptake capacities of different fissure sealants.
METHODS: Three different fissure sealants (Fuji Triage/GC, Fissurit FX/Voco and Grandio Seal/Voco) were examined. The cements were divided into 3 test groups, consisted of 10 specimens. Each disc was incubated with distilled water at 37 °C for different days. Then, each water sample was diluted V/V with buffer solution TISAB III and measured for fluoride concentration, in ppm, under stirring condition, using a combination of fluoride electrode connected to an expandable ion analyzer. Standard curves between 1 and 100 ppm F^- were used to calibrate the electrode. Standard curves between 1 and 100 ppm F^-were used to calibrate the electrode. Cumulative fluoride release was measured on days 1, 2, 3, 5, 7, 21, 35 and 49. After 7 weeks the specimens were individually rinsed with 1 mL deionized water and allowed to air dry for 1 min. Then, two different fluoride varnishes/pastes (Profluorid Varnish/Voco, MI Paste Plus/GC) were applied to the sealants tested. Fluoride measurements were carried out at 56, 70 and 84 days. Statistical analysis was performed with Stata 12.0 Software (Stata Corp., College Station, TX). Descriptive statistics were calculated for each of the 3 groups. Shapiro Wilk test was applied to test the normality of the distributions ($P < 0.05$). Kruskal Wallis was applied to determine whether significant differences existed in fluoride release among the groups ($P < 0.001$). Wilcoxon test for paired data was applied to assess release after fluoride exposure (uptake) ($P < 0.05$).
RESULTS: Kruskal Wallis test and statistical analysis confirmed significant differences in fluoride release between the three sealants tested: Fuji Triage/GC, Fissurit FX/Voco and Grandio Seal/Voco from day 1 ($P < 0.001$). Significant differences emerged between Fissurit FX/Voco and Grandio Seal/Voco after 21 days ($P < 0.05$); Fissurit FX/Voco showed significantly higher fluoride release than Grandio Seal/Voco till day 49. The ability of a restorative material to act as a fluoride reservoir is mainly dependent on the type and permeability of filling material, on the frequency of fluoride exposure and on the kind and concentration of the fluoridating agent. Furthermore, materials with higher initial fluoride release have higher recharge capability. In the present study, after the exposure to fluoridated varnish/paste, fluoride release increased significantly. In particular, the application of Profluorid Varnish enhanced the fluoride release for all sealants ($P<0.05$). Contrariwise MI Paste Plus enhanced the fluoride release for all sealants except for Fuji Triage/GC ($P>0.05$) and the quantity of fluoride release was significantly lower if compared with Profluorid Varnish ($P<0.001$).
CONCLUSIONS: The glass ionomer based sealant released significantly more fluoride than the other tested resin sealants during the whole experimentation period. Furthermore, after the exposure to fluoridated varnish/paste, fluoride release increased significantly. In particular, the preventive treatment with fluoride varnishes significantly recharged all the sealants tested more than fluoridated toothpaste.

A material engineering approach for testing natural collagen membranes

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BACKGROUND: The aim of this study is understanding if mechanical tests for materials routinely used in engineering practice could be of use in the test of natural collagen membranes for dentistry. This simple experimentation allowed

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focusing some methodological issues potentially relevant for an optimization of future applications in the field of collagen membranes.
METHODS: As case study, a natural collagen membrane, namely Biogide®, was considered also to have a comparison with other results reported in literature. A physical characterization of the collagen membrane was carried out through the measurement of weight, surface density and thickness. Quasi-static (tensile tests) and time-dependent (stress relaxation test) mechanical tests together with a functional test (tear test) were performed to determine the responses of collagen membranes under different loading conditions.
RESULTS: Results, in terms of physical and mechanical data, are summarized as follows: surface thickness 0.44±0.04 mm; density 0.0140±0.0001 g/cm^2; elastic modulus 15.72±0.80 MPa; maximum tensile stress 4.81±0.58 MPa; maximum tensile strain 46.84±5.73%; tear load 1.84±0.06 N ;stress relaxation 26.4±1.6%. Repeatability of results is acceptable, above all by considering the inhomogeneous nature of this kind of materials. Only two studies have thoroughly characterized Bio-Gide® membranes from a mechanical behavior point of view. One is by Coïc et al. (2010), the other by Ortolani et al. (2015). In the former study, only tensile tests are discussed by using samples with similar size of the present study. A low testing rate was preferred (0.2 mm/min). On average, an elastic modulus of 105±20 MPa was found for Bio-Gide® membranes, as well as a maximum tensile stress of 15.0±0.8 MPa, and a maximum tensile strain of 31.4%. The anisotropy of the membranes was also evaluated by using the ratio between the elastic modulus along two orthogonal directions: a value of 1.5 was found. All the samples were tested in dry conditions, i.e. in conditions of maximum resistance. Results from the current study are consistent with those from the study of Ortolani et al. (2015). By comparison, it emerges that elastic modulus and maximum tensile stress are quite lower whereas the maximum tensile strain is higher. The comparison suggests that materials under testing are different even if they were both tested in dry conditions, being stiffer in the study of Coïc et al. (2010). It is not a case that a decrease in elastic modulus and tensile strength is associated with an increase in elongation. Tensile tests represent an effective way to characterize membranes but it is evident that further tests, such as tear and relaxation tests, provide a better description of the material behavior under load. Moreover, results from other tests can be used to confirm results from tensile tests. In fact, in the present study, tear load value and stress relaxation percentage confirm that membranes under testing are quite soft according to tensile test.
CONCLUSIONS: Mechanical tests could be an important tool for the analysis of collagen membranes in order to optimize their performances. However, mechanical tests are costly and time expensive whereas size measurements can be cheap and fast. A correlation may exist between mechanical properties and size parameters such as thickness and that could be used for qualification.

Micro shear bond strength of biodentine bonded to resin composite and dentin.

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BACKGROUND: Biodentine may be a good candidate for a bioactive dentin substitute in sandwich restorations and is recommended for use as both an endodontic repair material and a dentin substitute under resin composite restorations. Thus, the aim of this in-vitro study was to evaluate the bond strength of Biodentin to dentin and to resin composite.
METHODS: Twenty-four disks of Biodentine (Septodont) of about 15 mm in diameter and 1 mm in thickness were constructed. All substrates were aged in 0.9% NaCl solution for 7 days and then randomly divided into 3 groups (n=8) according to the intermediate layer employed: OptiBond All-In-One Unidose (Kerr), Scotchbond 1 (3M ESPE) or Heliobond (Ivoclar Vivadent). Meanwhile six human molars were sectioned to obtain a 1 mm-thick slab of midcoronal dentin. Using a custom made device, nine conical frustum-shaped resin composite (Premise Flowable; Kerr) build-ups were constructed on Biodentine substrate, and nine conical frustum-shaped Biodentine build-ups were constructed on the occlusal surface of each dentin slab. The built up specimens were stored for 7 days in 0.9 % NaCl solution in a light-proof container, at 37° C, and were then observed under a stereomicroscope (40x magnification), in order to verify integrity at the build-up/substrate interface. The micro shear bond strength test was carried out at a crosshead speed of 1 mm/min until failure occurred. Failure modes were assessed by means of SEM observations. Bond strength data were statistically analysed using the One-Way Analysis of Variance (ANOVA). Between-group differences, in the distribution of failure modes, were statistically assessed using Chi-square tests. In all the analyses, the level of significance was set at $p<0.05$.
RESULTS: Of all the resin composite build-ups that were constructed on Biodentine, none failed prematurely or detached accidentally from their base after opening the device. Measured bond strengths were 13.9±4.4 MPa for Group 1, 12.8±4.8 MPa for Group 2, 12.3±4.3 MPa for Group 3. The groups did not differ statistically ($p=0.0934$). SEM observation showed that failures were mostly cohesive in all groups. The differences in failure mode distribution were not statistically significant among the groups ($p=0.056$). All the Biodentine build-ups constructed on the dentin substrate prematurely adhesively detached, thus preventing the execution of the adhesion mechanical test.
CONCLUSIONS: Biodentine showed bond strength to the resin composite regardless of the adhesive material employed as an intermediate layer. There was low bond strength between Biodentine and dentin; therefore, the use of the Biodentine should be restricted to cavities that are well supported by surrounding tooth structures, such as small Class I and Class II restorations.

Osteoconductive scaffolds engineered with mesenchymal stem cells from dental pulp for bone regeneration in oral surgery

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BACKGROUND: The aim of this study was the development and characterization of a combined biomaterial/cells system with potential applications in oral surgery as bone substitute. In particular, the main goal was the optimization of a 3D mesenchymal stem cells culture system formed of dental pulp cells seeded and grown onto an Alginate/Hydroxyapatite (Alg/HAp) scaffolds.

METHODS: Alg/Hap scaffolds were produced by means of a custom freeze-drying protocol. Human dental pulp stem cells (hDPSCs) were isolated from freshly extracted, non-carious, human third molars collected from surgical patients (13-25 years of age). Immunophenotyping characterization of hDPSCs was assessed by means of flow cytometry analysis. The growth rate of cells on Alg/Hap scaffolds was assessed as a function of time using MTS assay. Alg/HAp scaffolds were structurally characterized in wet conditions with Micro-Computed Tomography reconstructions using a cone beam microfocus X-ray source (TOMOLAB station - ELETTRA, Trieste). Mechanical properties of Alg/HAp scaffolds were investigated by means of compression tests with an Uniaxial Universal Testing Device (Galdabini Sun 500).
RESULTS: After isolation and characterization, hDPSCs were investigated in order to elucidate their regenerative and differentiation abilities. Flow cell cytometry confirmed the presence of the typical MSCs markers and the absence of the hematopoietic ones. hDPSCs were cultured in osteogenic medium and exhibited the expression of osteoblast specific markers like alkaline phosphatase. Mineralized matrix deposition was also observed. Mechanical properties of Alg/HAp scaffolds were found to be a function of their aging in Simulated Body Fluid (SBF). X-ray micro-Computed Tomography, in association with a segmentation and image analysis protocol developed by researchers of the Engineering and Architecture Department of The University of Trieste, clarified the bioerosion process and the mechanical and morphological stability of the construct under physiological conditions over time. This protocol allowed obtaining quantitative data of morphological and micro-structural features of the scaffold like porosity, trabecular thickness and pore connection, to name some. These features were integrated with the data from the mechanical stability measurement on the material (axial compression test).
CONCLUSIONS: The scaffolds here investigated revealed promising features to be exploited in the dental bone regenerative field. Alg/HAp scaffolds showed paramount bioactivity and allowed to culture and differentiate hDPSCs. Further experiments will be performed to further investigate the regenerative ability of hDPSCs when seeded on the scaffolds.

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A novel digital protocol to replicate the peri implant soft tissue and emergence profile

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BACKGROUND: Preservation of the surrounding hard and soft tissues, especially associated with an immediate postextraction socket implant to replace a non-restorable tooth in the esthetic zone, is one of the greatest challenges facing the dental team. Several studies have documented the biologic and esthetic benefits of bone and connective tissue graft containment with either a custom healing abutment or a properly shaped provisional restoration. Once the soft tissue healing is occurred and the osseointegration obtained, the great challenge is to transfer the peri implant soft tissue and emergence profile to the lab technician, capturing both the three dimensional position of the implant platform and the coronal and gingival parts of the provisional retained restoration. With the traditional impression protocol, it is possible to customize the impression coping: this has to be done since the gingival tissue, once the provisional restoration is unscrewed, immediately tends to shrink. Anyhow, this procedure is time consuming if compared to what Digital Dentistry can offer. In fact, by using of a Digital Optical Scanner, that copy the peri-implant soft tissue and emergence profile by scanning the provisional restoration critical and subcritical contour, can help achieve guided tissue preservation and sustainable esthetic outcomes in an easy, simple, consistent, and less time- consuming way.
METHODS: The following Poster is a case report of a hopeless maxillary left central incisor in a female patient possessing adjacent teeth with a thin periodontal phenotype illustrates this new treatment device, method and concept. A first intraoral digital impression, which generates a standard triangulation language file (STL1), is taken using the provisional restoration *in situ*. A second digital impression (STL2), with a standardized implant scan-body to detect the position of the implant is taken; the provisional restoration is then unscrewed, and the sub-gingival part of the restoration is scanned directly out of the mouth to determine its sub-gingival shape (STL 3) STL1, STL2 and STL 3 are then imported into imaging software and superimposed using the "best fit" algorithm to achieve a new merged file (STL4) with the 3D implant position, the peri-implant mucosa, and emergence profile. The merged file was used to realize a Nylon P6 laser sintered model and to design the final restoration.
CONCLUSIONS: The STL superimposition of digital impressions of the implant position and the provisional retained restoration constitute a novel technique to obtain a single STL file with the implant position and its peri-implant mucosal architecture, being then a rapid digital approach that helps the Dental Technician to achieve a consistent esthetic outcome in a more predictable way.

Personal identification in forensic odontology: a proposal for the creation of an Italian database

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BACKGROUND: The proper identification of a decedent is not only important for moral and ethical reasons, but also for legal and administrative purposes. Dental methods are very important to identify missing persons, especially in case of mass disasters. However, the success rate depends on the availability of ante mortem dental documentation. During the reconstructive identification process, all necessary information is gathered from the unknown body so to reconstruct a biological profile. Our aim is to standardize an easy and fast identification method to be applied on the Italian population.
METHODS: We present Italian unknown corpses data and we propose a forensic identification method to be applied on this population. The authors propose the creation of a software, which could be used by teams dealing with the identification of unknown cadavers nationwide. In particular, beside the traditional dental data collection, we suggest the use of intraoral scanners for an accurate 3D digital dental reconstruction to be compared with the dental arches of unknown bodies.
RESULTS: Forensic identification of an unknown body is based on the comparison of physical evidence from the unknown body with missing persons ante mortem data. Dental evidences, to be used in forensic identification, are usually easy to be achieved from cadavers because of the good postmortem preservation of the human dentition as the hardest mineralized tissue of the human skeleton covers teeth. Even dental restorations and prostheses are extremely resistant to physical and chemical deterioration. In addition, the unique morphology of human teeth and dental restorations have great individuality, whereby the availability of routine dental treatment records (especially radiographs and models) provides precious evidence for a comparison.
CONCLUSIONS: An easy collection of dental data ante mortem is proposed. Simple software-that collects the clinical dental data of the Italian population-would permit to decrease the number of unidentified corpses matching missing person ante mortem data with post mortem data from unknown cadavers.

Digital planning and surgery with the realguide workflow: a seamless procedure between the doctor and the laboratory for a successfull mini-invasive prosthetic rehabilitation

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BACKGROUND: Digital implant planning and computer guided surgery procedures are becoming very popular among the studies. Computer-assisted implanto-prosthetic planning is the morphological, functional and aesthetic study of teeth and maxillofacial bones, with the aim of planning an implant-supported dentoalveolar prosthesis.
Most of the digital prosthetics planning 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, relying on the latest CAD/CAM and Rapid Prototying technologies.
METHODS: The RealGUIDE procedure (3DIEMME, Italy), applied to a lower jaw complex rehabilitation involving osteotomy and implants immediate loading, can be summarized according to the following steps:
1) Patient diagnosis and prosthetic planning: starting from conventional 2D cephalometric images and taking into account the final output of the rehabilitation, the ideal position of the teeth is calculated.
2) Radiologic guide set up: the ideal teeth position resulting from the previous step is transferred to a radiologic guide that the patient wears during the radiologic exam.
3) Optical scanning: the models and prosthesis optical scanning is performed in the laboratory with a standard optical scanner.
4) CT/CBCT exam: the Patient is scanned wearing the radiologic guide.
5) Data fusion: the DICOM dataset, the anatomy and prosthetic STL files (resulting from the lab optical scan) are imported in the software where, thanks to a dedicated "best-fit" algorithm, they're superimposed in a user-independent way.
6) Implants and osteotomy planning: after the "virtual patient" is finally set up it is possible to add the virtual implants for a "prosthetic-driven" surgery.
7) Surgical guide modelling: the project files are used to digitally model the bone cutting guide, upon which the implants placement guide is connected, after removing the bone excess.
8) Prosthesis modelling: the implants and abutments virtual files exported from the planning are imported in the laboratory prosthesis modelling software in order to convert the virtual wax-up into a provisional prosthesis file and manufacture the immediate loading temporary prosthesis.
9) Manufacturing: all the objects modelled in the previous steps are manufactured with the same rapid prototyping machine. The provisional prosthesis is milled in PMMA material and manually painted by the dental technician to fit with the patient's natural denture colors.
10) Surgery: the guides are fixed in the patient mouth in two stages: the first to reduce the bone crest and the second to prepare the implants sites with calibrated drills, as well as to drive the implants through the guide using dedicated implant mounts. After the guide removal the provisional prosthesis is fixed and refined directly into the patient's mouth for the implants immediate loading.
RESULTS: The proposed method demonstrates how the digital workflow in dentistry can be employed in a seamless procedure between the surgery and the laboratory environments, each one in its field of responsibility and competence. The post-op CBCT shows the high precision of the implants placement in respect of the planning.
CONCLUSIONS: The use of an open system enables the project exchange between different software packages and the resulting objects manufacturing with any CAD/CAM or RP machine, granting a high precision and treatment reproducibility.

Evaluation of maxillary arch morphology in children with unilaterally impacted incisors via three-dimensional analysis of digital dental casts: a controlled study

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BACKGROUND: Aim of the study was to analyze the variations in maxillary arch dimensions in subjects presenting unilaterally impacted maxillary permanent central incisors compared with a control group of subjects without eruption anomalies.
METHODS: 23 Caucasian children (8 females and 15 males, mean age 9.7 years SD 1.6 years) displaying unilaterally impacted maxillary permanent central incisors (IIG) were selected according to the following criteria: Caucasian ancestry, eruption of the contralateral incisor at least six months earlier or deviation from the normal sequence of eruption (lateral incisor erupted prior to the central incisor); no posterior or anterior crossbite; normal overjet and overbite values; intermediate mixed dentition with a Class I or edge-to-edge molar relationship; absence of previous orthodontic treatment or tooth extraction; and the absence of sucking habits, craniofacial syndromes, cysts, cleft lip and/ or palate, or multiple and/or advanced caries. The IIG was compared with a control group (CG) of 23 prepubertal subjects (9 females; 14 males, mean age 8.8 years SD 1.9 years) with no eruption disorders in the permanent incisors. They were all in intermediate mixed dentition with a Class I or end-to-end molar relationship. Pretreatment dental casts were taken from each subject and the upper arch was scanned using a three-dimensional scanner (D800, 3Shape A/S, Copenhagen K Denmark). Each cast was scanned from 10 or more views that were then combined and rendered into three dimensions using a specific software (3shape-ScanItOrthodonticsTM 2010 -2p3, 3Shape A/S, Copenhagen K, Denmark). The virtual 3D models were measured and analyzed with a specific software (3Shape-OrthoAnalyzerTM 2010, 3Shape A/S, Copenhagen K, Denmark). Linear measurements were taken on each digital model to analyze maxillary arch dimensions. To determine metho reliability, a signle trained examiner took all the measurements on the digital models and repeated them after an interval of approximately 2 weeks. Significant between-group differences were tested with the Student's t-test ($p<0.05$).
Results: No systematic error was observed between the repeated measurements. No significant between-group differences were found in gender distribution or in the distribution in

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molar relationships. The transverse and sagittal upper-arch measurements were significantly smaller in the IIG subjects than in the CG. In particular, the IIG's anterior arch was 1.35 mm shorter, while intercanine width was decreased by 2.51 mm on the impacted side.
CONCLUSIONS: Children revealing unilaterally impacted maxillary central incisors demonstrated a significantly constricted maxillary transverse width and shorter arch on the impacted side compared with subjects with no eruption disorders.

Composite orthodontic virtual models accuracy: an *in vivo* study

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BACKGROUND: The aim of this study was to evaluate the accuracy of a protocol for the realization of virtual orthodontic set-up steps, necessary for the manufacturing of invisible aligners, using "composite" models realized sticking dental crowns images, obtained by mean of dental impressions, with their roots, extracted from patient's CBCT.
METHODS: 15 adult orthodontic patients, scheduled for a CBCT exams and the extraction of at least one fully erupted tooth, were recruited for this study. DICOM file obtained by the CBCT exam was imported in Mimics Medical 17.0 software and an automatic segmentation with a manual finishing was realized in order to separate all the teeth from surrounding structures and later to export them in STL format.
High quality images of dental crowns in STL format, obtained scanning plaster models, was then imported into the Geomagic Studio 2014 software and stuck to full teeth in STL format, in order to obtain "composite" virtual models constituted by dental roots extracted from the CBCT exam and dental crowns acquired from intra-oral impressions.
"Composite" models accuracy was measured with the Geomagic Studio 2014 software that was used to superimpose optical scans of extracted teeth to their 3D reconstruction obtained by the tested protocol.
RESULTS: The mean difference between optical scans of extracted teeth and their "composite" reconstruction was 0,09 mm (DS 0,05 mm), which is a not significant difference from a clinical point of view and therefore demonstrate the accuracy of these reconstructions. Furthermore, "composite" models STL files could be utilized in order to realize an orthodontic set-up directly into the pre-treatment CBCT exam thanks to Geomagic software, that allows the orthodontist to verify dental roots position with regard to the alveolar bone boundaries in multi-planar view in sagittal, coronal and horizontal sections. This is a key aspect because these sections are the only that could be considered reliable in evaluating a thin bone like the alveolar one. Effectively 3D reconstructions of the alveolar bone obtained by surface rendering are not as reliable and accurate as CBCT sections and consequently it is not possible to obtain precise information when using these images in evaluating planned final teeth position.
CONCLUSIONS: "composite" models obtained using the protocol tested in this study are an accurate reproduction of real anatomy of reconstructed teeth and they allow to plan dental elements position at the end of the orthodontic treatment within the alveolar bone anatomical borders.

Comparison of three different scanning techniques in full-arch digital impression using intraoral scanners

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BACKGROUND: Despite excellent accuracy in single-unit scans having been demonstrated, little is known about the accuracy of intraoral digital impression systems in full-arch scans. Nowadays, intraoral scanners cannot be used for definitive full-arch rehabilitation. The purpose of this study is to evaluate the accuracy of a digital impression system in full-arch scans using different scanning techniques.
METHODS: A dentate model of a maxillary dental-arch was measured with a Reference Scanner (digital reference model). Additionally, digital impressions of the master model were made using an intraoral scanner, with three different scanning techniques (A, B, C). Datasets obtained from the scans were loaded into 3D evaluation software, superimposed by a best fit algorithm with the reference dataset, and divergences were analysed.
RESULTS: These mean discrepancies values were obtained: a) 301,35 μm for Technique A; b) 180,05 μm for Technique B; c) 146,52 μm for Technique C. Data analyses revealed statistically significant differences for the mean values between the three groups ($p<0,05$).
CONCLUSIONS: Different scanning techniques showed different levels of accuracy for full-arch scans obtained with an intraoral scanner.

Influence of buccolingual inclination on panoramic mesiodistal angulation of first and second premolars

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BACKGROUND: Clinicians need to assess teeth mesiodistal angulation before, during and after orthodontic treatment in order to obtain proper root position. Panoramic imaging is routinely used in this evaluation, especially in guiding bracket repositioning to correct roots before bracket replacement phase in straight-wire technique. Nevertheless panoramic radiography presents several distortion limits. . Cone-beam

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computed tomography (CBCT) might allow to overcome by performing a real 3-dimensional visualization of the roots position and compare them with traditional 2-dimensional images. The aim of the present retrospective study was to compare mesiodistal angulation of pretreatment panoramic images with mesiodistal and buccolingual angulation obtained by CBCT scans.
METHODS: 15 orthodontic patients who had panoramic radiograph and CBCT scan before treatment due to impacted canines were selected. Mesiodistal root angulations from panoramic images were was measured by using the occlusal plane as the reference line. Then CBCT scans were used to measure mesiodistal and buccolingual inclination of the same teeth for every patient by one trained operator. Pearson rho correlation coefficient was employed to determine the correlation between panoramic mesiodistal angulation and CBCT mesiodistal angulation and buccolingual inclination respectively for upper first and second premolars right and left.
RESULTS: Correlation analysis indicated that panoramic mesiodistal angulation of the first premolars was more correlated with CBCT buccolingual inclination than mesiodistal angulation. Furthermore panoramic mesiodistal angulation of the second premolars showed very low correlation coefficient when compared to CBCT mesiodistal angulation and buccolingual inclination both.
CONCLUSIONS: The assessment of mesiodistal angulation on first and second premolars with panoramic radiography should be approached with caution and reinforced by a thorough clinical examination of the dentition. First premolars mesiodistal angulation on panoramic radiography might change significantly according to the buccolingual inclination of the tooth.

Interproximal and occlusal caries detection whit Diagnocam®: preliminary study.

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BACKGROUND: Caries lesions remain a significant health problem and have a high incidence among population. Different age groups and populations exhibit distinct caries prevalence rates. The disease is not usually self-limiting and without treatment lesions can worsen until the tooth is destroyed. Hence, early caries detection is a very important goal for dentists and patients. For this reason, there is an increasing interest in methods for the early diagnosis of caries at a non-cavitated stage of the disease process.
Bitewing X-ray is one of the most important methods for early caries diagnosis. However many patients prefer to avoid irradiations with X-rays, especially if the diagnostic process involve children or pregnant women. Moreover, even if patients are not concerned about irradiation with X-rays, alternative diagnostic methods would be preferable, since they would make it possible to repeat the diagnosis at regular and short time intervals while avoiding excessive exposition to ionizing radiations.
The purpose of this study is to investigate the reliability and the effectiveness of a Digital Imaging Fiber-Optic TransIllumination (DIFOTI) technology in the diagnosis of caries at early stages. To this purpose, digital images obtained by DIFOTI (Diagnocam®, KaVo, Italy) were compared with respect to images generated by a digital bitewing and to results of clinical examination carried out by a professional dentist.
METHODS:The study involved 50 patients whit permanent dentition (aged at least 15). All patients were in good oral and general health and underwent a regular dental check up every six months.
All patients underwent professional clinical examination, bilateral bitewing digital radiographs and screening whit Diagnocam® between October 2015 and February 2016 in a private dental clinic based in Modena.
RESULTS: 18 patients were caries free, while 32 patients had at least one carious lesion (interproximal or occlusal). The study shown that diagnosis of interproximal caries based on digital images produced by Diagnocam® correspond to those based on digital bitewing in 97% of the cases. For occlusal lesions, Diagnocam® is more effective than digital bitewing in detecting early occlusal demineralization. Finally, both Diagnocam® and digital bitewing are more effective than professional clinical examination, especially for the diagnosis of interproximal caries.
CONCLUSIONS :Diagnocam® is an effective and reliable instrument for screening and early detection of occlusal and interproximal caries. The preliminary results suggest that Diagnocam® can be used as a "routine" instrument in clinical practice. Moreover, Diagnocam® may help to avoid bitewing radiographs for diagnosis of caries. Patients that cannot be exposed to X-rays (pregnant women, children) have great advantages by the use of Diagnocam®.

A new radiologic protocol and a new occlusal radiographic index (Sandwich Index) for computer guided implant surgery (NobelGuide™): preliminary clinical report of 3 cases

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BACKGROUND: NobelGuide™ protocol introduces the maximum opening of the mouth as criteria for inclusion, which should be equal to or more than 40 mm. Currently, there are no techniques to tranfer the maximum opening position of the patient to the virtual plan, resulting in some patients being excluded from the treatment with NobelGuide method or some others being included without sufficient interarch space. The aim of this paper is to describe a new method which gives the clinician the possibility to identify patients with limited interarch space, which cannot be rehabilitated with the "All-on-Four" and NobelGuide™ technique, and in some cases, to overcome this limitation by modifying the axes of the implant before implant placement.
METHODS: Three patients undergoing NobelGuide treatment of the edentulous upper jaw with the "All-on-Four" technique were selected for this study. In the first patient, the radiographic occlusal index was built using an addition silicone material to occupy the space between the two arches forced into the maximum opening position. As for other two patients different silicone materials were used and two interpositional wadges were placed in between two silicone bites to ensure maximum mouth opening.

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RESULTS: In all three patients a perfect adaption of the radiographic guide was evident. However the bite of the first patient resulted in distinct noise on CT because of the radiopacity of the addition silicone used and the patient was not forced to achieve his maximum opening position. Converting the CT data with a different iso value in the second patient, the mandibular addition-cured silicone was still quite visible, whereas the condensation silicone was invisible in the third patient, and the quality of the image was excellent with the possibility to accurately measure the distance between the alveolar ridges in maximum opening position and to virtually predict interferences with the opposite arch.
CONCLUSIONS: The variation of the radiological protocol with the new radiological occlusal index (Sandwich Index) and the change of the NobelClinician™ references iso value, proved to be effective in producing complete three-dimensional models of the maxilla and of the mandible in maximum opening position during the initial planning phase. This new protocol can be of great aid to the clinician preventing mistakes in the inclusion or exclusion of patients for NobelGuide™ treatment.

Digital dentistry in orthodontics: three-dimensional assessment of treatment outcomes

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BACKGROUND: Cone-beam Computed Tomography (CBCT) has recently become an important source of three-dimensional (3D) data allowing the development of Digital Dentistry in Orthodontics. 3D investigation presents many advantages respect to conventional diagnostic tool. It is possible to improve diagnosis, treatment planning and assessment of treatment outcomes by means of accurate volumetric images. The objective of this study was to highlight the current understanding of the clinical use of CBCT and of superimposition techniques in orthodontics by showing the 3D evaluation of two clinical cases.
METHODS: CBCT scans of two growing subjects with a mean age of 8.5 y presenting with a Class II maloclussion, were taken before (T1) and at the end (T2) of treatment with functional appliance (about 2 years of follow up). 3D virtual models were built up from the DICOM files using the New Tom 3G (Aperio Services, Sarasota, Fla). Voxel-based registrations were performed before and after treatment using the anterior cranial fossa as a reference region. Boundaries for the anterior cranial base registration were defined anteriorly by the inner cortical layer of the frontal bone, posteriorly by the anterior wall of the Sella, laterally including the lesser wings of the sphenoid bone, and superiorly including the frontal bone. Landmarks were labeled in all T1 and T2 models of the maxilla and the mandible. The differences between the registration regions were measured by comparing the distances between corresponding landmarks in the registered models and comparing the corresponding x, y, and z coordinates from corresponding landmarks. Transparency overlays of the registered 3D model surfaces were made using CMF-Slicer Software. Finally the models registered and superimposed were analyzed using Color Maps and point-to-point measurements.
RESULTS: The Color Maps indicated inward or outward displacement between overlayed structures (T2-T1). Both patients presented downward and forward maxillary and mandibular growth respectively at A and Pog points. The mandibular growth observed was remarkably variable and predominantly vertical. The two patients presented great vertical growth of the ramus. In these two cases, visualization of treatment outcomes demonstrated a superior and posterior growth of the condyles and a forward and downward mandibular displacement after treatment with functional appliances. Regarding the dentoalveolar effects, in both patients the appliances adequately controlled labial inclination of lower incisors. These findings suggest that there was no dentoalveolar compensation in the skeletal correction of Class II malocclusion.
CONCLUSIONS: The 3D overlays of registered and superimposed surfaces model and color-coded displacement maps allowed visual and quantitative assessment of treatment changes. The realization of the 3D surface models improved diagnostic capabilities for a detailed evaluation of maxillomandibular surfaces. The 3D analysis provided a significant representation of the treatment results by examining maxillary and mandibular adaptive and positional changes relative to the anterior cranial base. Therefore, 3D imaging and superimposition techniques are considered a valid and helpful method to assess treatment outcomes in orthodontic patients. This method can be also used to highlight the dentofacial growth changes, to analyze the periodontal structures by means of linear measurements and finally for surgery planning.

Evaluating research on imaging technologies for dental science with the collaboration spotting system

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BACKGROUND: 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 and the relations among the technologies (Technogram). In 2014 our group successfully used a prototypal version of the Collaboration Spotting system to study the evolution of research related to the use of porous hydroxyapatite in Dental Science. A new version of the system, based on the Thomson Reuters' "Web of Knowledge" publications database and on the European Patent Office's "PatSat" patent database, was recently released for the High Energy Physics community. The new system is now fully interactive, can be applied to any kind of data, and allows the creation of a full set of visualization graphs (by organization, by keyword, etc.). We will

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report the results on the use of the new Collaboration Spotting system for a set of research fields related to imaging technologies for dental science.
METHODS: in order to insert a new technology in the Collaboration Spotting system, we create a logical filter based on a set of keywords related to the technology under study. This filter is inserted in the system using a formalism based on the "Web of Knowledge" search format and is used to select from the database an exhaustive list of publications and patents related to the technology. This set of publications is automatically processed by the system itself to create the corresponding graphs and to insert the technology in the general Technogram, where the technology under study is related to the other technologies already present in the system. The final maps can then be dynamically visualized from any standard web browser.
RESULTS: we selected a set of technologies related to the most recent development in medical imaging applied to dental science, namely the use of intraoral scan systems and the application of CAD/CAM technologies and digital cast, also in association to the use of 3D printing systems, for dental science. For each technology we created a specific filter, which was then inserted into the Collaboration Spotting system. The resulting maps are now accessible on-line and allowed us to evaluate the development of these technologies in recent years, in the form of trends and collaboration networks.
CONCLUSIONS: the Collaboration Spotting system allows the automatic creation of interactive maps to show the current and historical state of research on a specific technology, highlighting the participating institutions, their collaboration relations, and the status of the technology in relation to the rest of research field. 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.

Accuracy of seven laboratory scanners tested at a micrometric level: a 3D analysis

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BACKGROUND: The aim of this study was to compare the accuracy of seven laboratory scanners using a calibrated coordinate measuring machine capable of an accuracy of (1.4 + 6L/1000) μm.
METHODS: A titanium reference model (RM) was milled (grade 5 Ti 6Al4V) and sandblasted. It was scanned ten times with an industrial 3D scanner in order to obtain a reference digital model (dRM) that was saved in the standard tessellation format (.stl). RM was scanned ten times with each one of the tested scanners (GC Europe Aadva, Zfx Evolution, 3Shape D640, 3Shape D700, NobilMetal Sinergia, EGS DScan3, Open Technologies Concept Scan Top); before exporting the files in .stl format for the comparison, each scan was visually inspected searching for clearly visible flaws and, if present, the file was discarded and the scan was repeated. All .stls were imported in an engeneering software (Geomagic Qualify 2013): in order to obtain a better comparison, each file was trimmed discarding unnecessary parts; it was then aligned firstly with a manual, three-points-matching procedure and secondly with a fine-adjusted automatic procedure. The aligned models were trimmed altogether intersecting orthogonal planes to discard unnecessary parts. The lower part was intentionally left open. The following parameters were recorded: maximum positive and negative discrepancies (max+, max-); average positive and negative discrepancies (aver+, aver-); mean standard deviation of each comparison (SD), mean root of mean squares (RMS). Trueness was evaluated as the mean RMS of the ten scans from the dRM; Precision was evaluated as the mean SD of the datasets from the same digitizer. Means, standard deviations, 95% confidence intervals were calculated on studied parameters with a dedicated statistical software (IBM SPSS v.21). One-way analysis of variance (ANOVA) was conducted to assess the overall statistical significance of the differences among the groups (α=.05).
RESULTS: Trueness values (mm, [95% confidence interval]) were: Aadva 0,0077, 95% [0,0068-0,0085]; Zfx Evolution 0,0092, [0,0086-0,0098]; D640 0,0181, 95% [0,0122-0,0240]; D700 0,0128, [0,0124-0,0133]; Sinergia 0,0311, [0,0263-0,0359]; DScan3 0,0156, [0,0115-0,0197]; Concept Scan Top 0,0286, [0,0256-0,0316]. Differences between scanners were statistically significant (p<.0005). Precision values (mm, 95% (CI) were: Aadva 0,0040, [0,0038-0,0042]; Zfx Evolution 0,0051, [0,0044-0,0059]; D640 0,0127, [0,0124-0,0131]; D700 0,0110, [0,0107-0,0113]; Sinergia 0,0163, [0,0150-0,0175]; DScan3 0,0095, [0,0083-0,0106]; Concept Scan Top 0,0195, [0,0191-0,0198]. Differences between scanners were statistically significant (p<.0005).
CONCLUSIONS: The use of a reference scanner capable of measurements close to one micron of error is important to compare machines that have a nominal accuracy of about fifteen microns. The use a standardized scanning procedure by the fabrication of a titanium reference model is very useful to compare trueness and precision of different laboratory scanners. Two laboratory scanners (Aadva, Zfx Evolution) were significantly better than the others.

Digital workflow of immediate implant loading with screw retained porcelain single crown in the posterior mandible: a proof of concept study

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BACKGROUND: Immediate implant temporization has been documented in full arch restorations and single implants, even immediately after extraction. Our aim is to show the feasibility of immediate (i.e. within 48 hours from implant insertion) delivery of a porcelain (lithium disilicate) screw-retained single crown using CAD/CAM chair-side technology in the posterior mandible.
METHODS: A healthy 50 years old famale patient presented at our clinic with a missing tooth (first right lower molar). The patient signed an informed consent and then underwent implant surgery. We gave the patient 2 g amoxicillin 1 hour before surgery and, after local anesthetic injection, we started

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surgery. A mucoperiostal flap was raised and implant site was prepared by drilling under abundant saline solution irrigation following the producer instruction. A Way Extra implant of 3.8 mm of diameter and 11 mm length (Geass Srl, Pozzuolo del Friuli (UD), Italy) was inserted and then sutures were placed. Insertion torque exceed 35 N/cm and we decided to immediately load the implant with a lithium disilicate (Ivoclar Vivadent AG, Schaan, Liechtenstein) single crown. After insertion of the ad-hoc scan body we took a digital impression of both dental arches with Cerec Bluecam (Dentsply Sirona, Wals bei Salzburg, Österreich). We digitally designed the restoration and then milled it with Cerec MC X (Dentsply Sirona, Wals bei Salzburg, Österreich). We chose an occlusal scheme allowing for the establishment of correct occlusal cusp-fosse contacts and with no guide. After cementation to a titanium base we eventually screwed, after 48 hours from implant insertion, the final lithium disilicate restoration with full centric occlusal load and without contact during excursive mandibular movements.
RESULTS: Recall visit were scheduled at 2 weeks, 1 month, 3 months, 6 months and 1 year. After 1 year of function the restoration and the implant do not show any clinical sign of failure. No BOP or recession occurred during the first year of function. Pink esthetic score and white esthetic score measured 7 points during the 1 year recall visit.
CONCLUSIONS: With all the limits of a case-report we can argue that it's possible to deliver a final screwed restoration after 48 hours from implant placement. Digital chair side workflow can enhance and speed up all the prostethic activities.

Digital impression in aesthetic and functional rehabilitations of anterior teeth: a case report

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BACKGROUND: The aim of this work is to verify the quality level of digital dentistry. Through the digital technology it is possible to enhance diagnostics and treatments precision, that in turn allows to increase comfort for the patient and reduce procedure time.
In particular, we want to evaluate the digital work flow using the intraoral scanner and CAD/CAM technologies in the rehabilitation of anterior teeth.
Clearly, for this kind of prosthesis both the aesthetic value and the functionality are very important elements, especially for the restoration of the canine and incisor guides
Methods: The patient, a 47 year old female, requires to undergo a rehabilitation procedure of the anterior sector between 1.3 and 2.3.
1.3, 2.1 and 2.3 have been selected as prosthetic dies and prepared by chamfer.
A digital impression of the arches is then acquired with the Carestream CS3500 scanner equipped with the software CS3500 Acquisition.
By coupling the images captured by the scanner, the software reproduces the arches three-dimensionally and places them in occlusion, registering the lateral, protrusive and retrusive movements.
The prosthodontics lab processes the files and designs the prostheses through the ExoCad Dentalâ software. A six-element bridge in monolithic zirconium is then developed. A 0,8 mm gap is left on the vestibular surface in order to allow the clay to stratify and thus improve the aesthetic outcomes. Lastly, the prosthesis is fixed with dual cement.
RESULTS: The results demonstrate the validity of the digital workflow, as it guarantees high precision and an excellent aesthetic and functional performance.
The working time is reduced and, consequently, the risk of errors as well.
The patient reported to prefer the digital methodology of dental impression over the traditional technique.
CONCLUSIONS: Digital technology represents the future in the dentistry field.
The case study presented demonstrates the remarkable simplification of the clinical practice thanks to digitization, which guarantees extremely high qualitative levels.
The newness of this technique also entails beneficial effects in terms of patient cooperation.
To date, a standardized protocol for intraoral scanning is lacking, although the UOD of Implantoprotesi of Department of Oral and Maxillo-Facial Science at Rome's Sapienza University is concentrating its efforts to develop and promote some guidelines on this matter.

Accuracy of full-arch implant frameworks obtained through digital impression

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BACKGROUND: The purpose of this *in vitro* study is to assess the passive fit of prosthetic metal frameworks obtained through a novel digital impression system, for full-arch rehabilitations on multiple implants.
METHODS: 5 master casts, reproducing edentulous jaws with 4 tilted implants, were poured (Groups: MC #1, MC #2, MC #3, MC #4, MC #5).
An intraoral scanner system [True Definition Scanner, 3M ESPE, St. Paul, MN, USA] was used to perform 5 digital impressions (DI) of each master cast (n=25).
Implant position was detected with 4 special scan bodies [Toothless, Simbiosi srl, Empoli Firenze, Italy].
A single DI, presenting mean values compared to the others, was selected from each group in order to fabricate a metal framework with CAD-CAM technology (n=5).
Passive fit was assessed with Sheffield Test, screwing each framework on the corresponding master cast.
A stereomicroscope [Wild M3Z, Wild Heerbrugg, Heerbrugg, Switzerland] (40x magnification) was used to record maximum values of gap at framework-implant analog interface.
RESULTS: Sheffield test reported the following mean values of gap <50µm:
MC #1 = 0.024 ± 0.019 mm (range: 0.003-0.044 mm),
MC #2 = 0.022 ± 0.014 mm (range: 0.003-0.047 mm),
MC #3 = 0.027 ± 0.015 mm (range: 0.003-0.045 mm),
MC #4 = 0.021 ± 0.012 mm (range: 0.003-0.037 mm),
MC #5 = 0.021 ± 0.016 mm (range: 0.002-0.046 mm).
No significant differences were found among the groups.
CONCLUSION: Within the limits of this study, digital impression seems a reliable method to fabricate full-arch implant frameworks provided with passive fit.

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Three-dimensional assessment of maxillary arches in patients with unilateral cleft lip and palate treated with different orthopedic pre-surgical procedures: case series

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BACKGROUND: The management of unilateral complete cleft lip and palate patients (UCCLP) requires a combination of orthopedics and surgery.
Depending to the forces involved, pre-surgical orthopedic appliances are classified into active or passive.
An active approach employs controlled forces to move maxillary segments in the direction of where alveolar bone apposition is desired, while passive devices act as an obturator that covers the palate and maintains the distance between the two maxillary segments.
Nowadays, increasing number of cleft centres uses 3D model imaging and landmark digitization in order both to obtain repeated measurements of all casts (minimizing interoperator and intraoperator error) and improve accuracy of data analysis, sharing and storage for documentation and research purposes.
Aim of the cast study is a three dimensional analysis of subsequent changes to maxillary arches following different orthopedic procedures in the treatment of patients with UCCLP.
METHODS: Two male patients with congenital non-syndromic unilateral complete cleft lip and palate (III Veau class) on the left side are considered to enter the study. The inclusion criteria are the absence of syndromic or medically compromised conditions. The exclusion criteria is the presence of prior surgical or orthopedic treatments. The study reports the results achieved at the last month of the therapy.
A putty-wash procedure was adopted: patients underwent an initial impression taken by a silicone putty-dough of heavy consistency with a light-cured acrylic custom-made impression tray and then a light-consistency polyvinyl elastomeric fast-setting material was placed exclusively in the tray above the heavy stage for the final impression. After an ADA Type III plaster cast was poured, an hard self-cured acrylic resin plate was realized. All the orthopedic devices were fabricated by the same laboratory technician.
In patient A, the stone cast was duplicated and then discarded 1 mm in the midsagittal plane before plate realization in order to reduce the transversal discrepancy between maxillary segments prior to surgery. The cast replica was used to realize a custom tray.
In patient B, after alveolar segments had achieved a proper alignment, clinicians decided to realize a final passive plate in order to avoid recurrence.
The current study considers stone casts obtained 1 month before the try-in and delivery of the orthopedic appliance and 1 month later. The models were digitized using a 3-axis scanner (Zenotec S50, Wieland) that captures all data by means of laser triangulation.
All measurements were carried out blindly to the patient group. The authors identified landmarks on all palates and superimposed the pre-treatment and post-treatment models using a three-dimensional (3D) software (Geomagic Control, 3D Systems Inc, Cary, NC), thus assessing the qualitative and quantitative changes of presurgical infant orthopedics.
RESULTS: Larger segment of the cleft increased in length more than lesser segment in both patients. The analysis of these two cases of UCCLP confirms that maxillary segments have the potential to respond to the growth stimulus provided by infant orthopedic therapy.
CONCLUSIONS: The use of new 3D technologies allows clinicians to study very accurately the growth and the effects of treatment in newborns with malformation problems. The difference between active and passive devices also suggests the need to evaluate their ability of reducing the alveolar cleft in long-term studies.

Clinical and instrumental diagnosis of caries lesions: learning curve for near-infrared light transillumination device

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BACKGROUND: To assess the learning curve of a diagnostic device (DIAGNO-cam, KaVo) based on near-infrared (NIR) light for transillumination of the tooth by different groups of operators with different experience levels in clinical and instrumental diagnosis of carious lesions.
METHODS: Students from Oral Hygiene (24) and Dental School (32) courses were gathered then divided in groups depending on their training level and clinical experience. All students received the same training process:
— Oral lesson about the correct use of the diagnostic device (2hrs);
— practice lesson of the diagnostic device (1hr);
— leaflet of the diagnostic device (sent by e-mail 2 weeks before examination).
Within 2 months from the oral lesson, each student was given a 20 minutes session to clinically and instrumentally diagnose the patient. In each session the same operator, with blind method about students' experience and patient's clinical situation, collected clinical data, such as number of carious lesions, time for clinical exam, patient's discomfort and operator's difficulty. The patient examined was the same for all students. The presence/absence of caries diagnosed by students was compared with the data collected by an expert operator (at least 10 years of clinical experience and 3 years using DIAGNOcam experience) and 4 bite wings radiographs.
RESULTS: The average session duration was 7 minutes (from 4 to 6 minutes for the 92% of total population). The difficulty rate expressed by the operator was "none" in 28,6%, "intermediate" in 62,5% and "elevated" in 8,9% of the cases. Discomfort rate expressed by the patient was "none" in 12,5%, "intermediate" in 69,4% and "elevated" in 17,9% of the cases. Data collected collected by "unexpert" operators (first years students) was compared with data collected by the "expert" operators (last year students). Significant statics were spotted regarding the total caries procceses and the intermproximal ones diagnosed by a clinical examination and by DIAGNOcam. In contrast

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there were no differences regarding the difficulty of using the instrument neither the session timing nor the patient's discomfort. As for the "expert operators" (students) observation, it was noticed that the total number of cavities actually present was overstimated while interproximal lesions were understimated, In contrast when using DIAGNOcam students understimated the present total number of caries while the number of the interproximal ones was closer to the actual real number of lesions previously found by the expert dentist.

CONCLUSIONS: The NIR transillumination device:
— It's easy and confortable when used by different operators with different experience;
— It allows oral exam in short time without bothering the patient, independently from operator's experience;
— It allows all operators to improve their performance eventhough it was not always confirmed by the static analysis.
The device could represent a useful support to caries diagnosis, improving the operator's accuracy in confirming and monitoring suspected carious lesions.

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Prevention of oral health in children

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BACKGROUND: To achieve these objectives requires the cooperation of all health care professionals who are directly involved in treatment of children from the earliest hours of life. The protocol must be accessible and available to pediatricians, otolaryngologists, dermatologists, surgeons, dentists and hygienists so that the parent does not receive conflicting or contradictory information that may cause confusion or a sense of inadequacy.
Reviewing professional and home oral hygiene protocol to educate and help parents of patients in childhood, treated to the Department of Orthodontics of the Dental Clinic of Brescia, to prevent the beginning of common diseases found in the oral cavity.
METHODS: Our work covered the selection of the most recent and up to date publications about the first aid in the newborn, the prevention of oral health in the infant/child, oral diseases that happens more frequently in childhood, the SID (sudden infant death syndrome), bottle and breast-feeding, pacifier use, non-nutritive sucking and sterilization of the medical device used.
We did critical review of the literature by using the Pubmed database, using the keywords "pregnancy, caries prevention, oral hygiene, SIDS, tooth erosion, fluoride, non-nutritive sucking", individually and associated with each other and compared with the recent "National Guidelines for the Promotion of Oral Health and Welfare".
RESULTS: The awareness of the effectiveness of prevention in children has led to increased national and international sensitiveness to the need to have therapeutic protocol on prevention, to reduce the risk factors and top promote early diagnosis and prevention of complications. We have been updated protocols for home and professional oral hygiene used in the orthodontics department of the Dental Clinic of Brescia and was made an information pamphlet for parents/guardian.
CONCLUSIONS: The analysis of the literature and clinical experience highlight the need for the dental hygienist, the dentist and pediatrician, as a team, put forward a proposal of a customized oral care protocol, but in compliance with ''evidence based dentistry ".
From birth, therefore, proper oral hygiene is necessary. It is therefore a priority objective to bring up the child to have healthy and effective oral hygiene procedures because good and healthy habits that are learned by children, persist throughout life and help to establish the best conditions to protect and maintain healthy mouth for future.

Early diagnosis of maxillary permanent canine inclusion: a screening protocol

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BACKGROUND: The aim of the study is to provide a diagnostic tool concerning palatal displaced canine (PDC). According to what reported in literature, the evaluation of the position of the permanent maxillary canine is important to prevent malposition and interference with the position of the adjacent teeth in order to prevent further complex surgical orthodontic and / or periodontal treatment.
METHODS: A cross –sectional observational study was conducted on a sample of 62 permanent canines in 31 subjects (17 males and 14 females, mean age 9 years, 5 months) in mixed dentition. All the patients had both the upper deciduous canines regularly erupted in the mouth and none of them underwent previous orthodontic treatment. All the patients were evaluated clinically by means of a questionnaire and a radiologically with an ortopantomography. In all cases the α and β angles, S sector, the permanent maxillary canine intraosseous position and root development were considered.
RESULTS: Unilateral permanent canine inclusion was observed In 3 cases and bilateral one in 13. In 2 cases the lateral incisors were missing, and in one of them the inclusion of the permanent canine was observed. In 25 cases the lateral incisor was not inclined distally, and 4 of these cases resulted in the inclusion of the permanent canine. From a radiological point an angular values of α higher than 26°, and of β higher than 37° resulted at risk of canine inclusion. Female sex, a positive family history for inclusion of the maxillary canine, dental anomalies (in number and/or shape) resulted to be predisposing factors to permanent maxillary canine inclusion; on the other hand, the distal inclination of the lateral incisor is not always associated with it.
CONCLUSIONS: The data of our investigation can be compared to those reported in literature according to which α and β angles values should always be assessed in relation to canine root development, cusp orientation and intraosseous position relative to incisors cemento-enamel junction. For all these reasons the role played by pediatric dentists in early

detection of PDC conditions is strategic in preventing late orthodontic problems.

Resin infiltration on white spot lesions after debonding orthodontic brackets: a one-year follow-up case report.

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BACKGROUND: White spot lesions (WSLs) are incipient carious lesions caused by the decalcification of the enamel underlying an apparently intact surface of the tooth. Their appearance is an optical phenomenon: as demineralization progresses, pore space increases and the refractive index of the enamel changes because of air and water entrapments in the tooth that have a refractive index lower than that of an intact tooth structure. They may frequently be seen after removal of orthodontic bands and brackets (50% of incidence) due to low compliance of the patient regarding to oral hygiene, resting salivary flow rating and composition changes, enamel susceptibility and modified dietary practices (higher sugar or acid content). While in the early stages WSLs appear sound and are reversible, if not adequately treated, they may lead to the development of full-blown carious lesions.
Conventional approach for treating white spot lesions consists in topical fluoride application using fluoride rinses or fluoride varnishes with Tri-Calcium Phosphate (TCP), casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) pastes, enamel microabrasion with a mixture of 18% hydrochloric acid and pumice, application of various types of veneers, caries infiltration of fluid resins. Fluid resins penetrate into the enamel by capillarity blocking the diffusion paths of cariogenic acids. This process promotes the early arrest of caries and improves the hardness of the enamel.
The aim of this study is to evaluate at 3, 6 and 12 months the clinical outcomes and aesthetic results of the treatment with infiltrating resin (ICON, DMG, Hamburg, Germany) in a patient affected by numerous WSLs caused by orthodontic treatment with fixed appliances.
METHODS: A 13 year-old male, orthodontically treated, with fixed appliances for 2 and one half years was brought to our attention. On examination of the oral cavity, the patient showed healthy gums, fair oral hygiene, ICDAS 2-3 WSLs on the following teeth: 1.1, 1.2, 1.3,1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.5, 4.2, 4.3, 4.4, 4.5.
DMG Icon Caries Infiltration vestibular resin was used considering the high number of lesions and the poor compliance to oral hygiene. Icon-Etch (Hydrochloric acid based) was applied on teeth in the absence of local anesthesia (2 minutes for two times). Icon-dry (ethanol based) and Icon Infiltrant resin was also applied. The latter was left to act for 3 minutes, then light cured for 40 seconds. The treated surfaces were polished using silicone tips for composites.
RESULTS: The WSLS were no longer visible since the resin is characterized by a refractive index of the light (1,46) similar to sound enamel and the fillings showed mechanical characteristics and hardness identical to those of the surrounding tissue. Follow up at 3, 6 and 12 months showed clinical and aesthetic stability.
CONCLUSIONS: Infiltration using fluid resin proved to be a valid micro-invasive alternative compared to traditional conservative therapy of the ICDAS 2-3 WSLs. This has allowed treatment without any trauma (no use of local aenesthesia and cavity preparation) of numerous lesions in only one session with stable clinical(mechanical stability, enamel hardness, conservation of sound tissue) and aesthetic results (disappearance of lesions) at 3, 6 and 12 months.

Incidence of tooth decay in pediatric age: study on migrant population

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BACKGROUND: The purpose of this research was to evaluate the incidence of caries pathology of deciduous and permanent teeth of non italian children, immigrants or children of immigrants, aged between 0 and 14 years, in order to assess the need of a possible prevention protocol to limit the impact of the pathology on public health spending (SSN).
METHODS: A retrospective statistic study was conducted on patients we cared from 2013 to 2016.
The patients were divided in four groups according to their origin (Africa, East Europe, Asia, South America), and it has been recorded the number of cavities per child that has been diagnosed in first visit.
RESULTS: The highest number of caries was recorded in East Europe group, with an average number of 4,67 cavities per children.
The lowest number of caries was recorded in South America group with 3,62 cavities per children.
Later we considered the distribution of values according to the frequency, the Africa group has a modal value of 3 while the other groups have 0. This result shows that there is an higher frequency of tooth decay in the Africa group than the other groups, although the East European group present a greater number of diagnosed caries.
This discrepancy between the results we obtained, indicates that in Eastern Europe group there are children with the highest number of cavities, but they are lower compared to healthy children belonging to the same group, meanwhile in the group Africa there is a prevalence of children with caries compared to healthy children of the group, despite the number of cavities is not the highest.
If we to consider to divide the patients by gender (the number of children divided by gender is almost the same in each group), the statistics shows that females have an higher incidence of caries in Asian group and South America, while the percentages in the males groups are slightly different.
The only group in which males are more affected than females is East Europe group, while the percentages are the same in Africa group.
Finally the Africa group remains the most homogeneous group as distribution of the disease.
CONCLUSIONS: Consequently to the results we have obtained, this research could be considered as a preliminary study to identify new fields of investigation: it may be interesting to evaluate the importance of a culture of a certain ethnic group to study the epidemiology associated with it, or the existence of certain pollutants factors that affect the progression of carious disease.
In addition, this study opens new perspectives in management for a better evaluation of public spending.

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Intrusive luxation of primary upper incisor: a case report

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BACKGROUND: Intrusive luxation is the displacement of the tooth into the alveolar bone, accompanied by comminution of the alveolar socket. This highly traumatic condition is caused by an axial impact in apical direction which results in damage to the pulp and periodontium, with the risk of impacting the permanent tooth germ. Prognosis and treatment of such injury depend on many factors: the severity of the trauma, the age of the patient, stage of root development and type of dentition (primary or secondary). An optimal treatment for the many clinical presentations of this local pathological condition has not yet been determined.
The aim of this study is to describe the management of a complete intrusive dislocation in primary dentition.
METHODS: A two year old female patient with an intrusive dislocation on her primary right central incisor came to our observation. A complete clinical and radiological evaluation was carried out. Her upper gingiva was swollen and the incisor was not observable during the clinical examination. An intraoral radiographic examination allowed us to diagnose the complete intrusion of the element into the upper maxilla with no evidence of subsequent involvement of the permanent successor. Since the incisor was intruded in its whole in the maxilla, we excluded the possibility of its penetration within the nasal cavity. If the dental element is displaced axially into the alveolar bone without involvement of the permanent tooth germ, one should wait and see if spontaneous repositioning occurs. In this case careful clinical and radiographic examination along with regular follow-up is essential. The patient did not attend any of the follow ups given.
Nearly two years following the trauma, the patient rushed into emergency room after detecting a foreign body in the right nasal cavity, which turned out to be the displaced element. A CT scan was prescribed to asses the tridimensional position of the dental element. The removal of such element under general anaesthesia was therefore programmed. The operation consisted in the removal of the incisor using an extraoral approach from the nasal cavity. The procedure was carried out without any intraoperative or postoperative complications.
RESULTS: Difficulty in gaining compliance from a very young child, the risk of damaging the permanent tooth germ or removing bone tissue without a real benefit for the patient, makes the management of these injuries challenging. This study emphasizes the special attention required for children who suffered such dental trauma at an early age. The appropriate therapeutic approach should always be decided on the basis of anatomical and clinical features, the pathological condition as well as on the compliance of patient. The ideal treatment option is the one with the lowest probability of developing complications.
CONCLUSIONS: Guidelines for treatment are currently not based on strong evidence.
The main objectives of diagnosis and treatment of traumatic injuries, affecting children with primary dentition, are pain management and prevention of possible damage to the developing dental germs. To date, the best treatment is evaluated on a case by case basis in full respect of the bony structure and dental germs. Other approaches for completely intruded elements are surgical repositioning or surgical removal of the element, both requiring extensive bone removal in proximity of dental germs. The age of the patient acts as a deterrent into opting for a surgical method, as a result of the extensive trauma linked to the aforementioned approaches.

Peripheral and central giant cell granuloma in a pediatric patient: a case report

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BACKGROUND: The main purpose of this work is to discuss a Central Giant Cell Granuloma (CGCG) case on a pediatric patient with a past peripheral giant cell granuloma (PGCG) removed from the same area three years before. The CGCG was permanently excised through surgical procedure in Sapienza Pediatric Dentistry Division.
The CGCG is a rare, benign lesion of the jaws with an unclear etiology: it may be due to chronic irritations or injuries producing tiny hemorrhages. CGCG is frequently diagnosed in children and young adults before the age of 30 with a higher prevalence in females. The majority of cases shows a non-aggressive behavior with slow development in the bone, producing asymptomatic swelling. The radiological image of CGCG is typically represented as a unique, well-defined multilocular radiolucency. It may cause root resorption, intraosseous enlargement and erosion of the cortical plates. These features are common in different lesions of the jaws, therefore definitive diagnosis is to be histologically evaluated: CGCG microscopic appearance consists of a highly vascularized connective stroma containing fibroblasts and many multinuclear giant cells near to hemorrhagic areas. Surgical enucleation is the conventional treatment. Recurrence odds are low, with an increased probability in aggressive forms.
The PGCG is the most common giant cell lesion in the oral region. It represents an abnormal reactive process exclusive of the gingival mucosa. The lesion originates from periosteum or periodontal ligament and appears as a purple-red nodule with a large support base. PGCG presents itself with the same histological characteristics of CGCG. The richness of capillary vessels gives the lesion the tendency to bleed. Clinical differential diagnosis has to be made with pyogenic granuloma. Surgical removal is usually a resolving choice.
METHODS: On February 2015 a five year old male patient came to our division with a panoramic radiograph in which a circular radiolucent lesion located was observed in the anterior mandible, spreading from elements 4.1 to 3.3. Sclerotic limits were recognizable. The patient's mother reported how the child, at the age of 2, was surgically treated in the same area but in a different hospital. Following the procedure, results from biopsy identified the presence of a PGCG. The medical history was negative for both traumas and bad oral habits.
The medical examination revealed a discontinuity on the gum surface at the midline, i.e. the scar of the previous operation. No pain, neither spontaneous nor provoked, was observed. When touching the area there was evidence of cortical bone expansion on vestibular side and the vitality of the incisors was preserved.
A CT-DENTASCAN examination was carried out to analyze the extension of the lesion and plan the surgical treatment. Due to the age and the treatment general anesthesia was required. The lesion was completely excised from its site and later histologically examined.

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RESULTS: the histological examination revealed a Central Giant Cell Granuloma. The young patient was periodically checked with clinical and x-ray tests. Bone regeneration, teeth vitality and no relapse were observed.
CONCLUSIONS: at the age of two the patient was treated to remove the PGCG and at the age of five he underwent a CGCG enucleation. A follow-up was necessary to detect possible new lesions and avoid invasive surgical treatments. We strongly suggest the priority of periodical check-ups, especially when a pediatric patient is involved.

Stabilization of the dental elements 21 and 22, dislocated after fracture of the alveolar wall

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BACKGROUND. On 26 th October 2015, the patient K. S., 11 years old, comes to our attention, at the children's dental department of the San Paolo hospital in Milan, for a dental post-trauma assessment.
The patient is hospitalised at the San Carlo hospital of Milan and the trauma happened on 23rd October 2015.
From a clinical examination is detected a major fracture of the alveolar wall by the vestibular mesial margin of 21 to the distal margin of 22 as a result of an accidental fall. The elements 21 and 22 are dislocated on palatal side with complete root exposure and mobility of grade III. The mucosa appears bruised and torn.
Our goal is s to reduce the fracture of the vestibular alveolar wall with an effort of stabilization in the arch of the elements 21 and 22, through the use of a rigid splint, although the teeth appear rather compromise.
METHODS. On 29th October 2015, in general anesthesia the patient undergoes surgery, after antibiotic prophylaxis. After local infiltration with Mepivacaine it has been done:
— Cleansing of oropharyngeal cavity and clots' removal.
— Surgical revision of the alveolar cavity.
— Washing with NaCl 0,9%.
— Manual reduction of the alveolar process' fracture.
— Repositioning of 21 and 22, dislocated.
— Rigid splint from 13 to 23.
— Removal of occlusal interferences.
At discharge it is prescribed to continue the antibiotic and antiseptic therapy, Clorexidina applications on the injured mucosa and pain medications as needed.
RESULTS. After 7 days, an initial healing of soft tissue and a progressive reduction of teeth's mobility, are observed.
After 14 days, the mucosa is completely heal and we decide to remove the splint.
A month from the trauma, the elements 21 and 22 present a physiological mobility of grade I and mucosal lesions are completely healed.
As provided, the elements 21 and 22 don't have a significant response to the vitality test.
The patient does not cooperate to the instructions of oral hygiene at home, therefore he needs periodic visits (every 90 days) to our dental department to perform professional oral hygiene sessions.
CONCLUSIONS: The operation's timeless allows the correct positioning of the dental elements 21 and 22. In spite of the strong indication of OMS for the extraction of teeth if they are not implanted within two hours, the decision to try their stabilization inside the fractured socket results a valid therapeutic option. The prognosis of these teeth remains uncertain and they will have to undergo to root canal therapy. The patient doesn't maintain a correct oral hygiene and this could compromise the stability of the long-term outcome.

Ehlers-Danlos syndrome: review of literature and the need for othodontic treatment in childhood

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BACKGROUND: Ehlers-Danlos syndrome (EDS) is a heritable, heterogeneous group of rare connective tissue disorders. The incidence of EDS swings between 1 in 5.000 and 1 in 10.000, although the epidemiology of its specific types remains largely unknown. There are six types of EDS, generally characterized by a number of clinical symptoms, such as skin hyper extensibility, delayed wound healing with atrophic scarring, joint hypermobility, easy bruising, and generalized connective tissue fragility. From an analysis of the core literature on the subject, it emerges that the EDS has a polymorphic nature, followed by a wide variety of clinical symptoms. At odontostomatologic level, the syndrome can impair the temporal mandibular joint, hard tissues, the mucosa, the tongue, the fraenum and the periodontal tissues. The aim of this work is to conduct a systematic analysis in order to assess the impact of malocclusion on patients affected by EDS. The relationship with the syndrome will be examined, evaluating the reaction to medical treatments by periodics follow-ups. On the basis of periodical follow-ups, the objective is to construct a diagnostic and therapeutic protocol. All the patients undergo an initial screening by the Department of Pediatrics of Policlinico Umberto I and later sent for specialistic visit in the U.O.C. Pediatric Dentistry of Department of Oral and Maxillofacial Science.
METHODS: 10 patients - 5 males and 5 females between 7 and 13 years old – affected by EDS, have been examined. In every patient the following were examined: the skeletal class, dimensional problems (sagittal, vertical, transversal) and tempo-mandibular disorders of the joint (TMDJ).
RESULTS: All the patients showed malocclusion. Eight of them belong to the second skeletal class, while the other two belong to the third class. To date, 4 patients in the first phase have been treated to solve the transversal problems trought the positioning of rapid maxillary expander. All the patients showed good compliance and high range of expansions. Only 2 patients showed TMDJ.
CONCLUSIONS: Because of the scarce number of patients who have gained benefit from the treatment, it is not yet possible to establish a clear therapeutic and diagnostic protocol. Guidelines to assist these young patients are not available yet. This is why we intend to increase the number of patients, following their growth and confronting the outcome with the results of the control group.

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Minor recurrent aphthous stomatitis (RAS), lifestyle, home attitudes towards oral hygiene, and oral health. An observational case-control study

S. Germani

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BACKGROUND: Recurrent aphthous stomatitis (RAS) is a disease of the oral cavity, very difficult to prevent. This case-control study aimed to investigate associations among minor RAS, lifestyle, attitudes towards home oral hygiene, and oral health in children. The ultimate goal of the study is to enable dental hygienists to better understand and prevent this disorder, both from a clinical and a broader psychosocial point of view.
METHODS: The study was conducted with a sample of 401 school-children (5-10 years old), Milan (Italy). After informed consent by parents, children were visited by dentists and submitted to an intra-oral examination. The following clinical indices were noted: RAS; enamel hypoplasia of incisors and/or molars; decayed/missing/filled teeth Index (DMFT index); fissures sealings. The children were also administered a psychosocial questionnaire/interview about their general attitude towards oral hygiene (coded, in terms of a low vs. medium vs. high attitude favorability), their lifestyles (e.g., customary consumption of snacks at school, practicing sports, or the customary use of a tablet), and systemic diseases (food intolerance, celiac disease). Data were analyzed, at patient level, with the SPSS software. Odds Ratios, 95% confidence intervals, and chi-square tests were computed. The threshold for statistical significance was set at $p = 0.05$ for each analysis.
RESULTS: Statistically significant associations were observed between minor RAS and decayed teeth (Odds Ratio: 3.15; confidence interval 95%: lower limit 1.06; upper limit: 9.36; z-test: 2.07 p=0.039; chi-square 4.71; p=0.030), and between minor RAS and DMFT (Odds Ratio: 3.30; confidence interval 95%: lower limit 1.13; upper limit: 9.67; z-test=2.18 p=0.029; chi-square: 5.27; p= 0.022).
CONCLUSIONS: With the limitations of the present study, the observed association between minor RAS and teeth decay suggests that, in the presence of recurrent aphthous in pediatric patients, the dental hygienist should pay particular attention to the evaluation of potential carious lesions, and also implement protocols of prevention to control RAS disease in children affected by caries.

Regenerative endodontic treatment of an immature necrotic permanent molar: 24 months follow-up.

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BACKGROUND: Endodontic treatment of an immature permanent tooth is a unique challenge in dentistry because of the open apex, the unfavourable crown/root ratio and the weakness of the thin radicular walls Traditional treatment consists in long term canal medication with CaOH to induce apexification or an MTA apical plug. Both of this treatments show some disadvantages predisposing the tooth to radicular fracture.
A new approach is to sterilize the canal space, to induce a revascularization by the staminal cells of the apical papilla and a regeneration of a functional pulp-dentin complex in order to obtain a further physiologic root development.
The aim of this "case report" is to describe the success of this regenerative endodontic treatment in a necrotic permanent first molar with immature apices proposing some changes to terapeutic protocols described in literature.
METHODS: A 7-year-old girl was referred to the Pediatric Dental Department of the Dental School of Turin reporting an abscess on the first right permanent molar affected from a deep carious lesion. The tooth was not sensitive to vitality test and the vestibular gum was swollen. Intraoral radiographic examination showed that this tooth presented a periapical radiolucency and both of the mesial and distal roots were short with open apices.
A very shallow manual instrumentation of the coronal third of the mesial and distal canals was made in order to remove the necrotic tissue. After that some canal irrigations with 5,25% NaOCl alternated to physiologic solution was performed and it was positioned a medication of a mix of three antibiotics (clarithromycin, ciprofloxacin, metronidazole) and a temporary coronal sealing. In 3 weeks the gum swelling was completely disappeared and after a canal irrigation with 17% EDTA alternated to physiologic solution it was performed an apical bleeding with a manual canal instrument and it was positionded a collagen matrix over the blod clot on which it was placed a 4 mm layer of MTA whith a temporary sealing. After a week it was performed a coronal seal in composite resin.
RESULTS: At the recall appointments (3-6-12-18-24 months) the tooth was always clinically asymptomatic, vital and not dyschromic. Intraoral radiographs taken at each appointments showed a progressive healing of the periapical radiolucency and the continued development and closure of the roots apices.
CONCLUSIONS: These clinical and radiographic results show that regenerative endodontic treatment can be considered a valid alternative treatment to conventional apexification treatment.

Digital technologies: from diagnosis to the realization of orthodontic devices in PEEK polymer

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BACKGROUND: production of orthodontic space maintainers in PEEK polymer through a digital workflow.
METHODS: The study started with the choice of patients who needed space maintainers such as lingual arches, bands and loops or removable plates. The digital workflow was split into several steps: the acquisition of 3D images(used for the diagnosis and to formulate the treatment plan)the designing of the devices using dedicated software (CAD) and the realization of the devices by milling (CAM). Radiographic images acquisition methods allowed to obtain 3D digital models of the anatomical area of interest. X-ray systems such as CBCT through a cone beam sensitize a large area detector and allow the acquisition of a large amount of images through a single scan with a reduction of time and absorbed radiations. For the case study was also used 3D scans of models. The scanned object was hit from all sides by light beams and filmed with micro cameras and, thanks to the huge number of scans, the

result was a cloud of points connected by the software.This software reconstructed a pattern of tiny polygons creating the virtual model, stored in STL files. The CAD software allowed to view the model in all the screenings and design the devices through virtual design. The design of the device, in the form of STL files, was sent to a CAM milling software which, through the movements of a milling machine equipped with 5 moving axes and an automatic exchange of cutters, milled the block of the chosen material to obtain the forms designed by CAD in one hour. The material used was the Peek polymer, a crystalline thermoplastic organic polymer with excellent mechanical strength properties even at high temperatures, excellent dimensional stability and excellent biocompatibility. Thanks to its biocompatibility, that is the ability to minimize possible adverse reactions of the body, and thanks to the mechanical properties similar to skeletal bone's, PEEK polymer is used in orthopedic surgery for hip joint, finger, and intervertebral discs prostheses. The devices were positioned in patient's oral cavity with glass ionomer cements.
RESULTS: According to a three months follow-up, the devices were found suitable to maintain space.The patients found the devices confortable and esthetic. The material was excellent to build space maintainers for its dimensional stability, mechanical strength, biocompatibility. The substitution of manual procedures with a digital system partly reduced the systematic errors occurring in the various steps and production times, saved space by creating a virtual gipsoteca and allowed a simulation of the treatment plan with better collaboration and acceptance of the patient.
CONCLUSIONS: In view of the results it's hoped that, as digital world is in constant evolution, in the future more complex devices will be created with this method and material, thanks to their characteristics. It should be emphasized that the devices are prototypes, so they require a further clinical validation to permanently replace traditional devices. Furthermore it's needed to consolidate the milling technique with even more precise milling machines to further improve the mechanical characteristics of the devices. Other techniques, such as 3D printing, may be alternative options, and they will be studied.

Conservative surgical treatment, bone regeneration and dental implant rehabilitation in paediatric patients affected by odontogenic tumours

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BACKGROUND. Odontogenic Tumours (OT) are a group of mainly benign tumours originated from cells and tissues that initiate the odontogenic process. They represent one-third of the tumours seen in the maxillofacial region in paediatric age. Histologically, odontogenic tumours are divided into 3 categories: epithelial, mesenchymal, and mixed epithelial and mesenchymal odontogenic tumours.
These tumours can be varied in their presenting symptoms, overall growth rate and magnitude, and degree of tissue destruction. Many OT present with minimal symptoms, and are discovered only incidentally on radiographic examination. If the lesion is symptomatic, patients typically present with rapid growth and expansion of their jaws.
In the paediatric patients the most common OT are odontoma, ameloblastoma, and keratocistic odontogenic tumour (KCOT). The aim of this study is to describe the surgical management of the OT in childhood and adolescence and the dental implant rehabilitation once reached adulthood.
METHODS. Thirty-four patients, 14 females and 20 males, with an average of 13,5 years (range 3-20 years) referred to the Complex Operating Unit of Odontostomatology, Policlinic of Bari, presenting 54 OT. Nine patients, affected by Naevoid basal cells carcinoma syndrome (NBCCS), showed 29 Keratocystic Odontogenic Tumours (KOT); three patients exhibit 3 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. Conventional radiography and CT were performed. 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) and autologous bone was used. Surgical samples were sent for histological examination. At the age of 18, eleven patients underwent dental implant rehabilitation inserted in the regenerated bone.
RESULTS. Odontoma was the most common odontogenic tumour (53% of cases) 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 and the bone regeneration procedures, we noticed the healing of all the lesions and an optimal bone regeneration in less then one year; recurrences occurred only in 4 patients affected by NBCCS. All the implants were osteointegrated and underwent prosthetic rehabilitation.
CONCLUSION. Conservative surgical treatment of OT in paediatric patients associated with bone regeneration procedures allows to replace in adulthood the agenesic or removed teeth applying dental implants.

Defects of enamel formation in permanent dentition and perinatal factors: our experience

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BACKGROUND: Is to assess and define the possible etiology of the Developmental defects of enamel (DDE), as well as the prevalence of the developmental defects of enamel in children aged from 6 to 8 years old.
METHODS: 153 healthy children were clinically visited, while their medical history was collected through a specifically designed questionnaire. The final sample was formed by 139 subjects, 66 male and 73 female.
RESULTS: Breastfeeding over six months may cause DDE. The week of delivery and positive medical history for chicken pox, measles, rubella, scarlet fever, erythema infectiosum, roseola infantum, mumps, high fever and respiratory diseases do not result associated to DDE. The subjects treated with amoxicillin during the first years of life, combined with clavulanic acid or not, presented almost two times higher incidence of DDE than those who had not been treated with amoxicillin; the results, though were not statistically significant. Treatment with other antibiotics (cephalosporins or macrolides) and respiratory or asthma drugs also result non correlated to DDE. The exposure to

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cigarette smoke and smoking during pregnancy result irrelevant.
CONCLUSIONS: Breastfeeding over six months may cause DDE, probably as a result of dioxins and furans (PCDD/PCDF) transmitted to the infant via mother's milk.

Education and dentistry: advanced synergy in the dental treatment of children with autism.

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BACKGROUND. From the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), autism is considered a pervasive developmental disorder. It manifests as a behavioral syndrome characterized by impairment in social interaction and communication, restricted interests and activities, as well as repetitive and stereotyped patterns. Such profile renders prevention measures and dental care seriously compromised so that usually autistic children are treated and cared following general anesthesia.
We aimed at developing a target-specific educational approach allowing to avoid general anesthesia in autistic patients subjected to dental care treatments (e.g. sealing, plaque ablation, minimal carious lesions etc.); such protocol should also facilitate the implementation of prevention measures.
Design. It is proposed a target-specific educational research protocol adopting individual strategies and methodologies, including Augmentative and Alternative Communication (AAC) for patients with speech and language impairments. The dentists are trained by the educator, who acts as a filter between the patient and the medical team. The team is required until a relationship of trust with the patient is built and the dentist is able to continue independently
RESULTS: We present a case report in which out of 60 patients between 6 and 18 years old showed a positive response to the application of the protocol, allowing the execution of dental therapies together with a long-term prevention program and in 49 of them the general anesthesia was avoided. Negative results regarded two patients who had not undergone any behavioral, psychomotor or speech rehabilitation therapy
CONCLUSIONS: Though the results should be considered as preliminary, the application of the method with the synergistic action of the people in the team allowed the execution of dental therapies. Given the positive outcomes, the Pediatric Dentistry Unit of the Umberto I Hospital (Rome) decided to continue the trials following such methodological approach, in order to improve patient compliance in autistic children and to avoid the operating room.

Cephalometric assessment in young children with primary snoring

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BACKGROUND: Sleep-disordered breathing (SDB) is among the most common diseases and includes a group of pathological conditions that form a severity continuum from primary snoring (PS) to obstructive sleep apnea (OSA). SDB presents a multifactorial etiology and in children it is often linked to adeno-tonsillar hypertrophy, which may lead to an alteration of the breathing pattern. Therefore, several studies hinted at the existence of a correlation between SDB and the alteration of craniofacial growth. However these studies concentrated on the most severe forms of SDB and little evidence still exists for the mildest form of SDB, i.e. PS. This preliminary study investigates the association between nasal airflow, measured through rhinomanometry, and cephalometric parameters in a sample of young children with PS.
METHODS: A sample of 30 children with habitual snoring aged between 5 and 8 years was selected by a SDB validated questionnaire at the Pediatric Allergology and Immunology Center of "Sapienza" University of Rome, Italy. To assess the degree of nasal obstruction, all children underwent anterior active rhinomanometry while nocturnal pulse oximetry and polysomnography were used to characterize the SDB. Cephalometric analysis was used to evaluate relevant orthodontic parameters associated to the sagittal and vertical craniofacial development, to the position of the hyoid bone.
RESULTS: Our study showed the existence of a statistically significant correlation between the gravity of the nasal obstruction, expressed in terms of the Zapletal's classification criteria, and the Frankfurt mandibular angle (FMA), which measures the total facial vertical divergence.
CONCLUSIONS: Our result suggests that the mandibular rotation plays an important role in the physiopathology of the upper airway patency. Cephalometric analysis can therefore provide to the pediatric dentist an easily accessible early warning sign of the possible presence or future development of SDB problems, suggesting the referral to an otolaryngology specialist. It would then be useful to make medical and dental practitioners aware about the importance of orthodontic issues in subjects with SDB, in order to identify risks at an early stage and insert the orthodontic evaluation into a multidisciplinary clinical approach to these syndromes.

Prevalence of caries disease of School Children in Nosy Be, Madagascar

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BACKGROUND: The present study was to describe the caries status on childhood school of Nosy Be, an island of about 320.000Km^2 and about 73.000ab. (2013) in the northern part of Madagascar, during the period July-September 2015. The study was designed to describe the caries prevalence disease through ICDAS method. The latest epidemiological survey of the Madagascar population dates back to 1999.
METHODS: The calibration of the examiner was performed at the Dental Clinic of the University of Sassari on 30 subjects. The visits have been carried out in the schools in the Nosy Be Island using disposable mirror and LED light bulb. 568 children have been recruited, (males n=270 47.5% and females n=298 52.5%), aged between 2 and 17 years. The population comprised the following age groups: 2-5years (n=258 45.4%); 6-11years (n=266 46.8%); 12-17years (n=44 7.8%). Eating behaviours and oral hygiene, including also an analysis on the hands hygiene as a proxy of personal hygiene were investigated. Information regarding medical history of the subjects

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was also collected. Caries was diagnosed using the ICDAS index (with the merge of 1-2 type lesions), severity of caries were calculated by ICDAS=0 sound; ICDAS=2 early stage decay; ICDAS=3 localised enamel breakdown; ICDAS=4 underlying dentine shadow; ICDAS=5 distinct cavity with visible dentine; ICDAS=6 extensive cavity within visible dentine. The data were processed and analysed using Microsoft Excel®, frequency distributions and associations were used to describe the data.
RESULTS: The study found that only 94 children caries free (16.55% with M 13.33% and F 19.46%), a distribution of early stage of 9.33% (M 10.37% and F 8.39%), enamel breakdown was present in 13.03% of the sample (M 14.82% and F 11.41%), underlying dentine shadow prevalence was 4.23% (M 3.70% and F 4.70%), distinct cavity with visible dentine was observed in 27.64% (M 27.68% and F 27.52%) and finally extensive cavity within visible dentine in 29.22% (M 30.00% and F 28.52%). Of a total of 15895 of teeth analysed 13121 (82.54%) no had a carious disease, 761 ICDAS=2, 681 ICDAS=3, 186 ICDAS=4, 749 ICDAS=5 e 399 ICDAS=6. Regarding the behaviour habits 74% (421) of children do not brush their teeth regularly, the totality of the sample reports to consume foods containing refined sugars (sweets, candies, etc...) both during school hours and at home.
CONCLUSIONS: Madagascar is one of the world poorest countries with the gross domestic product based essentially on purchasing-power-parity and a per capita income of GDP $1,477.778 per year, and where the health care system is private based. The results of this survey underline the high prevalence of caries disease and the data might be useful to promote an awareness campaign on prevention, starting from the schools trying to avoid the consumption of highly cariogenic foods and motivating the children to the use of daily fluoride toothpaste.

Immunohistochemical study of dental hard tissue in pediatric illnesses with odontostomatological signs: example of celiac disease and the osteogenesis imperfecta

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BACKGROUND: The present study is aimed on focusing the immunohistochemical analysis of dental hard tissue of patients with celiac disease and osteogenesis imperfecta, two pathologies very different from the point of view epidemiologic, eziopathologic and clinical, but jointed by the possible odontostomatological interest. The purpose was to detect the possible immunohistochemical expression of inflammatory molecules at the level of dentinal tissue of dental elements of these patients, compared with control groups of healthy patients. The research was focused on proinflammatory cytokines as IL-1β and TNF-α, among primary protagonists in the start up of flogistic process, and growing factor TGF-β.
METHODS: The study was made on the dentine of primary teeth extracted for orthodontic aim: or therapeutic reasons, in patients under care at Department of Oral Science and Maxillo-Facial Surgery, Unit of Pediatric Dentistry, Sapienza University of Rome. Once extracted were immediately saved in 10% formalin to assure the complete biological integrity. The tissue after taken were decalcified for 30 day period in order to make histochemical and immunohistochemical colorings. Afterwards they were dehydrated with increasing scale of alcohols to eliminate the watery component, followed by the diaphanization, inclusion into paraffin and microtomic cutting into sections of 2-3mm thickness. The coloring was made by using hematoxylin and eosin able to link to the cellular structures, thus making them visible. On the sections thus obtained the immunohistochemical analysis is carried out letting them react with mono and polyclonal antigens specific for the substance to be searched.
RESULTS: The analysis made has shown an overexpression of the three flogistic mediators in both the pathologies compared to the control groups. In the patients with osteogenesis imperfecta, who often show dentinogenesis imperfecta, alterations at dentinal level might be expected. On the other side in the patients with celiac disease, no study till now had shown any dentin anomaly.
CONCLUSIONS: The results of the present study ahow the presence of an inflammatory status at the level of the dentinal tissue of the examined dental elements. The examined samples did not show carious lesions, thus a defensive answer to the bacterial attack, nor signs of pulpal suffering of different nature in offer to suppose a flogistic event. Future studies will be aimed in order to understand which is the most likely cause responsible for the overexpression of molecules examined in the dentin of these patients. Furthermore we should understand wich could be the possible biological answer of the complex pulp-dentinal because the presence of such factors and the possible therapeutic iter.

Choosing Wisely in therapeutic approach to the pediatric patients in deciduous dental trauma

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BACKGROUND: The purpose of our presentation is to illustrate our method to approach pediatric patients with deciduous dental trauma and their parents in a public practice such as the Dental School of Verona. Due to the wide number of patients and their heterogeneity we used some adaptation to the follow-up protocol suggested by the International Guidelines that could not be adaptable to our space and time availability. Our aim, according to the Choosing Wisely concept, was to establish the correct treatment for all types of trauma, making parents more responsible about the importance of oral hygiene first and a careful observation of signs and symptoms that can occur in the area of trauma and giving them instructions about the interception of complications. The parents are involved in a planning check up, considering both the individuals and the public practice needs, in terms of logistics and organization.
METHODS: During 2015 in the Service of Pediatric Dentistry of the Dental School of Verona we observed 120 patients for deciduous dental trauma. We examined information available in literature, focusing on the prognosis of deciduous dental trauma. Finally we have analyzed the information about dental trauma using keywords “deciduous dental trauma” for easy reference searched on internet browser, evaluating notions in order to guide and direct parents to distinguish correct from incorrect ones.

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RESULTS: The teeth most frequently affected by trauma were the central incisors, followed by the lateral incisors, the lower incisors and canines. The most frequently type of injury involved periodontal tissues.
Quite almost 80% of patients had a badly oral hygiene and parents had no any professional information about it.
From the literature the data related to deciduous dental trauma was very limited, especially about prognosis.
Patients required an individual approach that is appropriate to every type of injury (intrusion, extrusion and avulsion) and to the compliance of the individuals. Each patient was examined and the follow-up was planned in a careful way, holding parents responsible, who were involved in the planning of subsequent check up and control any discoloration, swelling or fistulas which can occur. This seems to be the most effective method for the follow up of deciduous dental trauma and the patients have demonstrated their satisfaction. This kind of approach seems to be clinically useful.
CONCLUSIONS: The way we follow deciduous dental trauma allowed us to hold parents responsible. Indeed they become able to control clinical signs of trauma complications and the instructions we gave allowed them to gain a better observation and to intervene more promptly. We think that this way of managing trauma affecting deciduous teeth is the method to ensure the best treatment, which is more appropriate for children and permits the avoidance of check-ups, a better management of the appointments, and to contain costs. Moreover in this way we can ensure a better assistance despite of the wide catchment.
It's increasingly clear the complete lack of information regarding both oral hygiene and simple ways to prevent dental trauma.

Application of nanotechnology in pediatric dentistry

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BACKGROUND: The aim of this work was to study and produce a dental adhesive with antibacterial properties through the use of micro and nanometric fillers based on graphene.
METHODS: Graphene is the name given to a flat monolayer of carbon atoms tightly packed into a two-dimensional (2D) honeycomb lattice, and is a basic building block for graphitic materials of all other dimensionalities.
It is extremely durable and hard (100 times more than steel), transparent and flexible. In addition, it present, at room temperature, an electrical conductivity superior to any other substance and in recent years he has shown raised interest also in the biomedical field.
In the present study it was developed and produced an dentin/enamel adhesive with antibacterial properties thanks to the introduction of the graphene nanoplatelets (GNP) used as filler, starting from a common commercial adhesive used in dentistry and its widely-known properties.
The GNP have been made from expanded graphite (EG), which in turn was produced from graphite intercalation compounds via rapid evaporation of the intercalant at elevated temperatures.
The GNP thus obtained, have been incorporated into the commercial adhesive with the technique of solution processing.
Antibacterial tests were carried out treating our experimental adhesive with bacterial strains of Streptococcus mutans. The antimicrobic effects of the adhesive were analyzed at both zero time 0 and after aging (1 week). Furthermore, tests of resistance to microtensile were carried out.
RESULTS: Tests have shown that GNP present toxicity on microorganisms, thanks to mechanic interaction by wrapping and trapping bacteria. Furthermore, they show also an antibiofilm effect causing fractures in the structure of the same biofilm. The produced material shows a high efficacy the first days of application in which the bacteria mortality was detected by 100% and then the stoppage of biofilm growth. After the aging of the material concordant results were obtained, with a slight decrease of bacteria mortality as the hours passed. The mechanical tests analysis, in order to study the binding strength in the adhesive by GNP introduction, has shown a value by 29,1 MPa, slightly inferior to the value shown by the corresponding commercial adhesive. The given testing value is anyway included within the average of values referred to dental adhesives currently on the market.
CONCLUSIONS: The undertook study permitted to develop an enamel dentinal adhesive with innovative antimicrobic properties. The main component of such properties is GNP, which has shown also a high biocompatibility on both human and animal cells. By analyzing bacterial cells in suspension by the method of Colony Forming Units (CFU), it was observed that GNP not only have toxicity on single cells, but also an antibiofilm effect interfering with the vital cycle of the same, thus inhibiting its development. Mechanical tests have shown excellent characteristics of the experimental adhesive so much that it can be considered virtually competitive.

A conservative treatment of a sub-gingival complicated crown-fracture. A case report

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BACKGROUND: Apply the more conservative treatment in a dental trauma of a young patient to postpone prosthetics rehabilitation.
A 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.
METHODS: We describe the case of 19 years old male patient who presented a complicated crown fracture with subgingival margin of 1.1 occurred at school.
The patient came to our attention few hours after the trauma with the dental fragment congruous. After the radiographic examination, urgency treatment with pulpectomy and $Ca(OH)_2$ temporary medication was performed. One week later we proceeded with the final endodontic therapy of the tooth and with the reattachment of the fragment. Altough the fragment extended subgingivally the fragment reattachment

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was performed after the isolation with rubber dam of the tooth.
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. However, as thought this case report describes, a more conservative approach is possible through an fragment reattachment. Trough this periodontal compromise we obtain a positive functional, biological and aesthetic result, saving for the future the prosthetic rehabilitation.

Restorative treatment of complicated coronal fracture with reattachment of the original fragment in a pediatric patient: a clinical case.

A. Riccitiello, R. Valentino, R. Matarasso, F. Riccitiello

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BACKGROUND. Dental crown fractures are common traumatic injuries, especially among pediatric subjects and in children with an increased OVJ. These fractures can affect whether or not the pulp tissue so we can distinguish a complicated or not complicated fracture. The main objective in the first case is certainly the preservation of pulp vitality. It is extremely important, however, to restore the coronal integrity for both aesthetic and functional reasons. Compared with other restorative techniques (composite restorations, laminate veneers, etc.), reattachment of fractured fragments can offer several advantages comprising improved esthetics and function.
The aim of this paper was to explain a clinical procedure of fragment reattachment made by accurate bonding procedures.
METHODS: A 7- years older patient came to our observation after a dental injury which caused a complicated crown fracture to his maxillary right incisor. The tooth fragment was recovered from the site of injury and placed into the water. Clinical and radiographic examination revealed a complicated oblique crown fracture. After endodontic therapy, the tooth surfaces were recontoured to obtain a smooth surface. We isolated the operative field with a rubber dam so the tooth surfaces were etchet with a 37% phosphoric acid gel, rinsed and coated with an ethanol based adhesive system. Also the coronal fragment was treated with 37% phosphoric acid gel and then rinsed. The adhesive system was then applied on the etched surface.
Composite resin was applied both on tooth surface and coronal fragment which was at the end accurately placed on the tooth surface paying attention to the correct fit between the surfaces. After this procedure, we removed excess resin and each surface was light-cured for 40 seconds. At the end we finished the margins with diamond burs and abrasive disks and checked the occlusion carefully. After some recommendations such us to avoid exerting heavy functions, the patient was dismissed.
RESULTS: The patient returned for 1-, 6-, and 12-month follow-ups and than for 10 year- follow up and it was observed that endodontic and restorative treatments remained clinically acceptable.
CONCLUSIONS: The described technique is relatively simple but it is essential to keep dry and clean the operative field and use an appropriate protocol of adhesion in order to obtain a valid both aesthetic and functional results. Reports and clinical experience indicate that the reattachment of fractured coronal fragments results in successful short- and medium-term outcomes.

Indirect pulp treatment with Mineral Trioxide Aggregate (MTA) in young teeth: a case report.

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BACKGROUND: Vital pulp therapy is a conservative treatment procedure which preserve the vitality of the most coronal or of the remaining radicular pulp tissue in vital permanent teeth. Among all, the indirect pulp treatment is recommended for pulp preservation in a tooth with a deep carious lesion adjacent to the pulp. However the tooth must be asymptomatic. For this treatment, we can use some different materials such as resin-modified glass-ionomer cements, tricalcium phosphates, hydrophilic resins, zinc oxide-eugenol (ZOE), $Ca(OH)_2$ and the Mineral Trioxide Aggregate (MTA). The aim of this paper was to explain a clinical procedure of indirect pulp treatment on a young tooth.
METHODS: A 14-years old patient come to our observation. A clinical and radiographic examination revealed a cavity on the occluso-distal surface of a mandibular second molar with an incomplete root formation. At first we isolated the operative field with rubber dam. We removed the more coronal decayed dentin by rotary instruments then we used the manual ones. A thin layer of Mineral Trioxide Aggregate (MTA) was placed over the carious dentin to stimulate and encourage pulp healing. The tooth was restored with a composite resin using the incremental technique, and each increment was polymerized for 40 seconds. Standard techniques for finishing and polishing composite resins were then employed. The rubber dam was removed and the occlusion checked. The patient returned for 1-, 6-, and 12-month follow-ups and than for 5 year- follow up.
RESULTS: After 6 months at the clinical examination the tooth was asymptomatic and positive to the pulp vitality tests. The radiographic evaluation have showed an apexogenesis.
CONCLUSIONS: Indirect pulp treatment is recommended for pulp preservation in asymptomatic teeth with a deep carious lesion adjacent to the pulp, as well as in teeth with a diagnosis of reversible pulpitis. A medicament is placed over the carious dentin to stimulate and encourage pulp healing. The placement of a restorative material with adequate seal against the microorganisms is necessary and more important to success than the type of medicament. A minimum indirect pulp postoperative time period of 6-8 weeks is essential to produce sufficient re-mineralization of the cavity floor. This favorable outcome is fundamentally dependent on the preservation of a hermetic seal against micro-leakage by the provisional and final restorations.
There is a controversy regarding the vitality pulp treatment procedures outcomes, with many methodological variations between the different studies. Although various studies have different research approach, most studies noted a favorable treatment outcome. The type of coronal restoration and clinical status of the pulp tissue have a significant influence on the results.

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Comparison between Mineral Trioxide Aggregate (MTA) and Calcium Hydroxide in direct pulp capping of young teeth: a clinical and radiographic analysis

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BACKGROUND: Calcium Hydroxyde has for many decades been the most used material in treating a variety of pulpal complications, especially the pulp exposure in young teeth. In 1993 a new endodontic material, mineral trioxide aggregate (MTA) was developed to overcome some limitations of the Calcium Hydroxide use such as the length of time for induction of coronal or apical hard tissue barriers, the induction of initial zones of sterile pulp necrosis, the incomplete coronal and apical hard tissue barriers because of vascular inclusions and the Calcium Hydroxide-related changes in the physical structure of dentin. The aim of this study was to evaluate the clinical and radiographic differences in the response of dental pulp of young teeth with incomplete root formation, capped with a mineral trioxide aggregate (MTA) and Calcium Hydroxide, $Ca(OH)_2$.
METHODS: The sample included 15 teeth needed pulp capping. After rubber dam isolation, cavities were prepared and the pulps exposed. After hemostasis the pulps were capped with $Ca(OH)_2$ in a group of 7 teeth and with mineral trioxide aggregate (MTA) in 8 teeth. All teeth were then restored with resin composite. After 30 days and 60 days we made a clinical and radiographic follow up.
RESULTS: All teeth preserved their pulp vitality. At first follow up (after 30 days), we observed at the radiographic analysis a more evident dentinal bridge formation in the Calcium Hydroxide group compared to Mineral trioxide aggregate group. There were no differences at the radiographic analysis at the latter follow up between Mineral trioxide aggregate (MTA) group and the Calcium Hydroxide one.
CONCLUSIONS: According to other studies, after 30 days, $Ca(OH)_2$ showed faster hard tissue bridge formation compared to MTA. After 60 days, $Ca(OH)_2$ or MTA materials had a similar radiographic image.
As to pulp capping, some studies have showed that MTA can form a thicker dentinal bridge compared to traditional gold standard pulp capping material as Calcium Hydroxide. However long time observations showed no statistical differences in the dentine thicketness between MTA and Calcium Hydroxide. There were also many confounding factors such as the site of pulp exposure and tooth localization or the type of pulp exposure that can influence the treatment out come. For all these reasons the question whether Mineral trioxide aggregate (MTA) is better than calcium hydroxide clinically and hystologically is still open to doubt so further studies, specially long term clinical studies, needed to be carried out to compare calcium hydroxide and MTA.

Comparison of VistaCam new technology *vs.* traditional rotating instruments for caries removal assessment in the primary dentition

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BACKGROUND Numerous conventional caries excavation methods and techniques are available, and the extent of the excavation is determined by the hardness and colour of the dentine (Banerjee A 2000).
In pediatric dentistry, both clinical reliability and patient compliance have a great interest in carious removal, since:
the decidous tooth show a thinner structure in enamel and dentine layers, and the pulp can be easily exposed during caries excavation;
According to the ART (Atraumatic Restorative Treatment) approach, a specific attention should be applied in minimal invasive techniques in order to limit tissue removal to the infected and unremineralizable dentine and to leave the secondary or reparative dentine, thus preserving the pulp integrity.
Preservation of natural tooth structure requires accurate detection of the carious lesion extention and is associated to comprehensive patient dental care. Processes aiming to assess decayed dental tissues are essentially focused on the initial caries stages. Available technologies are currently magnifying loupes, FOTI, light and laser fluorescence (QLF®, DIAGNOdent®) and autofluorescence (Soprolife®, VistaCam®), electric current/impedance (CarieScan®), tomographic imaging and image processing.
The aim of this study was to evaluate the performance of intraoral fluorescence camera device VistaCam iX (Durr Dental, Bietigheim-Bissingen, Germany) compared to a a visual-tactile examination (currently used method) for detecting residual dentinal caries after bur/hand excavation; validate the VistaCam as a new diagnostic tool to be applicable during. operative phase of dentine caries removal.
METHODS: The study was performed at the Sapienza University, Rome, Italy. Lesions with caries extending in the dentine layer in patients in good general health were included. Exclusion criteria was clinically evidence of irreversible pulpitis.. The occlusal surfaces were visually classified according to International Caries Detection and Assessment System (ICDAS II) criteria. All caries were excavated by one experienced operator. VistaCam measurements were performed by another one blind and trained operator.
The following clinical procedure was used:
1) Visual and tactile evaluation
2) Fluorescence VistaCam evaluation:
— stage 1 ("before excavation")
— stage 2 ("during excavation") at the centre of the lesion
— stage 3 after excavation.
RESULTS: Vistacam prooved to be a reliable diagnostic technological aid also in operative phase of caries removal. In fact, fluorescence Vistacam evaluation resulted consistent to conventional visual and tactile evaluation. Vistacam use enhanced topographical intra-operative detection of infected dentine, thus allowing a better preservation of pulp and demineralized dentine.
CONCLUSIONS: Intra and inter-examiner reproducibility of the findings with the VistaProof are ranked as high in *in vitro* studies (S. H. Jablonski-Momeni A 2011) (Rodrigues JA 2008). JABLONSKI-MOMENI *et al*. showed a significant positive correlation between the visual detection ICDAS II and the fluorescence measurements related to VistaCam (0–1.2 = sound; 1.3–1.5 = enamel caries; >1.5 = dentine caries) values and ICDAS-II (0-1-2 score) (L. F.-G. Jablonski-Momeni A 2013) Both methods showed a high correlation with histology (S. V.-G. Jablonski-Momeni A 2008) (Rodrigues JA 2008) The ability of the VistaCam iX for the control of caries excavation has been assessed *in vivo* in only one clinical study, but never on primary dentition. (Stoll R 2015) Further studies are needed to sustantiate the present finding and to correlate them to histological and microstructural analyses.

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Association of osteogenesis imperfecta and dental malocclusion: retrospective study

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BACKGROUND: The purpose of this study was to describe and quantify the type and characteristics of malocclusion in patients with osteogenesis imperfecta.

METHODS: Osteogenesis imperfecta (OI) is a connective tissue disorder characterized mainly by brittle bones. The clinical spectrum of OI is extremely varied. In 95% of cases, OI is caused by mutations in the COL1A1 and COL1A2 genes encoding the alpha 1 and alpha 2 procollagen chains of type I collagen.

OI is a predominantly autosomal dominant transmission disorder that appears in all ethnic and racial groups. The prevalence of Osteogenesis Imperfecta is reported approximately at 6 or 7 per 100,000 births.

Osteogenesis Imperfecta is a heritable disorder affecting bone and tooth development. Malocclusion is frequent in those affected by osteogenesis imperfecta, but this was not studied in detail.

Typical oral and craniofacial characteristics involve the dentist in the multidisciplinary team that treat these patients. OI has several dental and serious occlusal problems. Dentinogenesis Imperfecta (DI) type I is the most common oral problem in OI patients. In addition, dental malocclusions are marked in many OI individuals and include a high incidence of class III occlusal relationship (70-80% in types III and IV of OI), anterior and/or posterior cross-bite, and posterior open bite.

The study was conducted on a total of 83 patients (53% female and 47% male) aged between 4 and 26 years old, with a mean age of 11 years ± 5.1. In particular, 67.5% of the sample are represented by children under 12 years, while the remaining 32.5% of patients are aged 13 to 26. According to the exposure to risk factor considered, the group of exposed (patients with OI includes 41 people, while the unexposed group (i.e. people not suffering from this disease) includes 42 patients.

For this study, we analyzed the following types of malocclusion: class I, II and III, overjet and overbite, cross-bite (unilateral/bilateral), overcrowding (mild/severe), and finally median line deviation (mild/severe).

RESULTS: Amid patients included in the study, 41 (49.4%) have osteogenesis imperfecta (OI). Among them, 51.2% undergo therapy with bisphosphonates and 87.8% have type I osteogenesis.

Among patients with OI, the 65.9% have dental malocclusion if compared with patients without OI, and they have occlusal problems on a lower percentage, specifically in 40.5% of cases.

According to the right-left molar ratio, the majority of patients with OI are affected by class III of malocclusion, which means 51.2% of patients; 7.3% of patients have a class II of malocclusion, 34.1% have a first-class occlusion. Among patients not affected with OI, 59.5% have I dental class, II class of malocclusion in 21.4% and 16.7% III class of malocclusion.

The association of exposure to the risk factor and the development of dental malocclusion was calculated using the chi-squared test, with a result of 5.36, a statistically significant value.

CONCLUSIONS: Considering the OI and dental malocclusion, relative risk is of 1.63 with 95% confidence interval. Patients with osteogenesis imperfecta have an increased risk of malocclusion of 63% compared to patients without OI. These results are statistically significant.

To sum-up, people with osteogenesis imperfecta may be regarded as a potential high-risk group for development of malocclusion.

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ORTOGNATODONZIA

New mid sagittal plane in 3D cephalometrics: intraoperator reliability

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Recently the development of 3D cephalometrics has led to the research of anatomical reference planes useful to the assessment of orthodontic-surgical patient. The aim of the study is to propose an anatomical three-dimensional reference, based on a median sagittal plane built on three median and uneven anatomical landmarks that show no variations during growth.
Materials and methods: landmarks have been examined on CBCT and reliability, reproducibility and ease of identification of the three craniometric landmarks was assessed.
RESULTS AND CONCLUSIONS: The characteristics of the craniometric median landmarks for the detection of a mid-sagittal reference plane consist in their stability during growth and in their reliability. The plane we propose, being an anatomically median plane based on median and uneven structures could represent a valuable aid in the study of asymmetries of the maxillo-facial complex.

Fast and no: compliance orthodontic treatment with herbst miniscope in adults in class II division I

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BACKGROUND: The purpose of this study is to evaluate the effects of the Herbst appliance on adult patients (age > 20 years).
METHODS: The equipment of Herbst miniscope is a fixed functional appliance consisting of bands on upper and lower 6, a lower cantilever and a telescopic arm fixed with screws apple core in order to allow the laterality movements. The device works on the principle of bitejamping (or jumping of the bite) in order to correct the skeletal Class II malocclusion. Patients, recruited on a voluntary basis with written informed consent, are chosen according to inclusion and exclusion criteria.
Inclusion criteria: Patients with Class II Division 1 skeletal malocclusion; Retruded convex profile aesthetically impaired; Mesofacial or brachifacial typology with a sagittal skeletal relationship of Class II due to mandible retrusion highlighted by cephalometric evaluation (SNA-SNB Angle); Age > 20 years.
Exclusion criteria: Periodontal disease; Tooth mobility; Class III malocclusion; Age inferior to 20 years.
Diagnosis includes: first visit, OPT, LL teleragiography, cephalometric examination, study models.
The correction of skeletal Class II malocclusion and overjet are performed by a Herbst functional appliance that improves the retruded profile. Then are positioned upper and lower arches multibracket fixed appliance for alignment, levelling and rifining. Finally the results achieved are maintained by a post-treatment retention with a lower retainer extended from 3.3 to 4.3.
Herbst appliance is used for a period of 12 months.
RESULTS: After treatment the occlusion and the facial profile are improved. Molar and canine Class I relationship are achieved with overjet and overbite within the norms. The panoramic radiograph shows a good radicular parallelism and no signs of root resorption. The cephalometric analysis shows an improvement of the sagittal intermaxillary relation and a slight counter clockwise rotation of the mandible. The clinical examination of the masticatory muscles and TMJ doesn't show any pathological signs or symptoms at ended treatment. The results achieved are maintained during the retention time with a fixed lingual 33-43 retainer. After two year post-treatment control the occlusal relationship, the dental alignment and the inclination of upper and lower central incisors are stable. Facial aesthetic is improved.
CONCLUSIONS: The treatment with Herbst appliance, by mandibular advancement, corrects dental and maxillary sagittal relations and improves the aesthetic of the facial profile even in patients at the end of growth. Finally the multibrackets fixed appliance produces proper finish of the case.

Aesthetic and functional evaluation comparison in brachifacial patients affected by agenesis of lateral incisors treated with opening or closing of space in orthodontic treatment

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BACKGROUND: The purpose of this study is to compare the opening or closing of the spaces in the cases of the agenesis of the lateral incisors in patients with brachifacial tipology.
METHODS: The dental agenesis is an alteration of number between the dental anomalies, genetically based. Dental agenesis, excluding the dental agenesis of the third molars, affects the permanent teeth with an incidence ranging from 1.6 to 9.6 % of the world population. The agenesis more frequently overall in this percentage regards the upper lateral incisors. The therapy of this dental alteration provides an orthodontic therapy with the possibility of opening of the agenesis spaces, with subsequent prosthetic treatment, or the treatment pro-

vides the closure of the agenesis spaces with reduction of the dental crown of the upper canine and the reconstruction of the dental crown of first upper premolars teeth (coronoplastic treatment). In this study we compared the results obtained in the opening of agenesis spaces and the results obtained in the closing of agenesis spaces in patients with brachifacial tipology affected by agenesis of the upper lateral incisors. All the method present some favorable and unfavorable factors.
RESULTS: The patients treated with the opening of the agenetic spaces at level of the upper lateral incisors have a first molar class and a first canine class, facial height increased with mandibular posterior-lateral rotation and the nasolabial angle within the norm. All that causes a consequent improvement of the profile. The patients treated with the closing of the agenetic spaces at level of the upper lateral incisors have a second class of the first molars and a second class of canines, reduced facial height, little mandibular posterior-lateral rotation and profile almost unchanged and finally increased nasolabial angle.
CONCLUSIONS: In the decision to open or close the spaces in orthodontic treatment in the patients with agenesis of the upper central incisors it needs to evaluate the advantages and the disadvantages of both therapies. There is no doubt that the closure of the spaces has the advantage of avoiding the prosthetic therapy, otherwise in cases of brachifacial patients an opening of spaces seems to be the best choice as it not only allows a ratio of the first molar class and the first canine class but above all an increase in height facial with resulting aesthetic improvement of the facial profile.

Skeletal effects induced by twin block in class II malocclusions therapy

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BACKGROUND: The Aim of this clinical study was to evaluate the treatment skeletal effects induced by Twin Block in the therapy of Class II malocclusion during or slightly after the onset of the pubertal peak in the growth velocity.
METHOD: The study sample was obtained from the records of the author's private practice and consisted of a parent sample of 70 Class II division 1 subjects treated consecutively with the Twin-block appliance, from whom good quality lateral cephalograms were available. From this sample, 30 subjects (Study Sample) 15 males and 15 females, were selected according to the following inclusion criteria: ANB greater than or equal to 4°, full Class II or end-to-end molar relationships, no history of previous orthodontic treatment or surgery treatment, absence of congenital anomalies, same caucasian race. All patients received active treatment with Twin-block before or during their pubertal growth spurt, as assessed by the cervical vertebral maturation (CVM) method. Lateral cephalograms for each subject was digitized by a single author (AL) respectively at time 1 (T1), immediately before treatment, (mean age 10.0± 1.1years) and at time 2 (T2) immediately after treatment (mean age 12.0±1.1 years). The error of the method was calculated with the formula described by Dahlberg (1940). In addition systematic error and the coefficient of reliability were determined as suggested by Houston. The Control Group consisted of untreated Class II subjects. A modification of the Twin-block appliance, originally developed by Clark, was used in this study. In the present study the mean duration of the Twin -block treatment was 1.2±0.5 years.
RESULT: The statistical comparisons between Study Sample (treated subjects) and Control Group (untreated subject) during the T1–T2 observation showed significantly favourable changes: the total mandibular length (Co-Me) and ramus height (Co-Go) and corpus length (Go-Me) increased more in cases than in controls. Our results show a significantly higher average answer in the Study Sample, both in the paired t- test, comparing pre and post treatment, and in the unpaired t- test, comparing the Study Sample and the Control Group. Paired T-test data for the variables Co-Me, Co- Go, Go- Me, with a $P = 0.05$ significance level, lead us to reject the null hypothesis (differences average = 0) in favour of the alternative of a positive differences average, meaning that the average of the values is higher after the treatment.
CONCLUSIONS: The Twin Block appliance showed a higher increase of mandibular growth in the Study Sample than in the Control Group, but the most important parameter to use this appliance is the pubertal peak and its influence on the growth.

The combined use of corticotomy and clear aligners: a case report

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BACKGROUND: To describe an orthodontic treatment that combines an esthetic approach (clear aligners) with surgery (alveolar corticotomy). Corticotomy can lead to intensified osteoclastic activity, resulting in osteopenia and increased bone remodeling. The consequent accelerated tooth movement should shorten treatment duration. We describe the combined use of alveolar corticotomy to reduce the treatment time and esthetic clear aligners to solve a moderate crowding of both arches. This technique was previously described by Owen in 2001.
METHODS: A patient with moderate dental crowding and Class I skeletal and molar relationships was selected. Orthodontic records of the patient were taken. Periodontal indexes, oral health–related quality of life (OHRQoL), and treatment time were evaluated. After we reflected a full-thickness flap beyond the teeth apices, the cortical bone was exposed on the buccal aspect and a modified corticotomy procedure was performed. Interproximal corticotomy cuts were extended through the entire thickness of the cortical layer, just barely penetrating into medullary bone. Orthodontic force was applied on the teeth immediately after surgery.
RESULTS: Total treatment duration was approximately 2 months for both arches. At the end of treatment, a Class I molar relationship and normal overjet and overbite were achieved. After therapy, an improvement of periodontal indexes was recorded. A deterioration of OHRQoL was limited to 3 days following surgery. The posttreatment panoramic radiograph showed good root parallelism, no sign of crestal bone height reduction, and no evidence of apical root resorption

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CONCLUSIONS: Reduction of orthodontic treatment time is considered a goal in the management of malocclusions. It was possible to complete treatment in approximately one-third the usual time using esthetic clear aligners. Currently, the long duration of fixed orthodontic treatment increases the risk of caries and external root resorption, decreasing patient compliance. This case report may encourage the use, limited to selected cases, of corticotomy associated with clear aligners to treat moderate crowding. Finally, the limited deterioration of OHRQoL may encourage the use of corticotomy as a time reducer in selected orthodontic cases, but the efficacy of the combined use of these techniques must be proven by controlled clinical trials.

Tele thermography analysis: a new method of not-invasive diagnosis for oral breathing.

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BACKGROUND: The oral breathing is a condition in which airflow transits though the oral cavity where the air is filtred and warmed from the mucosae instead of the nasal airway (choanae), as it happens be the physiologically respiration. The etiology of the oral breathing consists of several causes: deviated bone nasal sept, turbinate hypertrophy, dental and/or skeletal open bite, so the patient is mechanically advantageous to breathe through the mouth and is very difficult to choice if the breathing should be treated functionally. The purpose of this study was to evaluate variations of the temperature on specifications face skin areas and for discerning from a visual point of view the mouth breathing from nasal breathing, through the thermal pattern detected with dynamic thermography imaging.
METHODS: E.V. 9 years old. Female. The extraoral examination reveals the presence of several features of typical "facies adenoidea" as: dark circles around the eyes, incompetent and dry lips, small nostrils, front head posture in order to facilitate the passage of air. The intraoral exam shows a molar and canine class II, iperdivergent, the altered inclination of the superior incisors, increased overjet and low tongue posture.
In this study a control group characterizes by nasal breathing patients is involved the patient and the control group undergoes a thermocamera exam with infrared image quality of 640 x 480 pixels and "FLIR Systems Thermo CAM SC640". To an optimal maturation, the follow environmental criteria have been respected: the temperature (22°C±0,1°C), the aeration (0,3 m/s±0,2m/s), the relative humidity (48%±1%) and the distance detector/subject (1,5m±0,1m). Moreover the subjects are examinated in the sitting position with the head positioned with the Frankfurt plane parallel to the ground. The region of the face analyzed has been cleared of clothes and personal items.
The line tool of the software in used to evaluate the temperature. This instrument delimits the entire length of the area to study and generate a thermic plan. The thermal images referd of the oral breathing patients are compared with those of a nasal respirator subjects.
RESULTS: The thermal images show a clear difference of temperature of the nasal area between the subjects, the temperature differences are evidenced by the variation of the colours of the chromatic scale that process the images on the base of the temperature (in Celsius degrees). Furthermore, processing the images, the obtained values of the temperatures confirm the visual data: in oral breathing (blue nose) the average value of the nasal temperature is 28.7 °C, in the normal breathing the average value of the nasal area is approximately 32.1 °C.
CONCLUSIONS: Thermography is able to draw significant data on the thermoregulation system in the considered district. The method is fast, not-invasive and completely harmless and it can be considered a new diagnostic approach in the oral breathing.

Evaluation of transversal effects after rapid maxillary expansion in patient with UCLP by means of CBCT scanning. A case report

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BACKGROUND: Cleft lip and palate (CLP) is the most prevalent among all craniofacial anomalies, affecting one in every 700 births and disturbing the quality of life of more than 7 million people around the world. Patients with CLP have lip and alveolus repair surgeries during the first years of life and, later, repairs to the hard and soft palates. As a consequence, the growth and development of the maxillary segments are compromised by scar tissues, thus inducing maxillary constriction, particularly in the anterior region. Rapid maxillary expansion (RME) is commonly used to correct this transverse deficiency. The purpose of this study was to evaluate the skeletal and dental changes in the maxillae of a patient with clefts treated with bonded expander (A0630 screw Leone Orthodontic S.p.A., Firenze, Italia).
The authors present a case report of a patient (9 years old male) affected by complete cleft lip and palate.
METHODS: A 9-year-old boy with a complete UCLP with severe maxillary constriction was treated with rapid maxillary expansion (RME) with bonded acrylic splints. The screw applied at the RME was a A0630 produced by Leone. CBCT exams were performed before expansion and after removal of the appliance at the end of the retention period (12 months).
The effects on the transverse dimensions were evaluated by means of "3Diagnosys 4.0" software (3DiEmme - Cantù (CO) by Leone Digital Service. The software realized the volumetric reconstructions of the upper maxilla of the two CBCTs. The two volumes were then superimposed by means of the "CAD Rhinoceros 4.0" software.
DISCUSSION: The maxillary arch of patients with clefts commonly has atresia limited to the anterior region. Thus, these patients would benefit from the use of a maxillary expander that favors intercanine and interpremolar expansion. The use of CBCT to evaluate different appliances in patients with clefts might have great value, enhancing the possibilities and knowledge concerning their treatment. We assessed the short-term effects of RME. Therefore, a long-term evaluation is necessary to obtain a better understanding of the stability and potential periodontal consequences of each treatment.
CONCLUSIONS: The 3D analysis with the Cone-Beam Computed Tomography scanning gives a three-dimensional image of the effects of RME. Rapid maxillary expansion significantly increased the transverse dimensions of the upper dental arch in a patient with cleft palate. The hyrax appliance determined both anterior and posterior maxillary expansion

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and might be better indicated for patients with clefts and an overall maxillary transverse deficiency.

The forsus appliance: injuries, complication's management and patient's acceptance detection

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BACKGROUND: One of the most frequent problems in Orthodontics is Class II malocclusion for this reason the Forsus™ Fatigue Resistant Device has become increasingly popular between orthodontists. A recent survey reported that 26% of american orthodontists use Forsus routinely to treat Class II malocclusion. Clinical effectiveness of the Forsus has been proved by the literature, and the no-compliance nature of this appliance can explain its rising use among orthodontist. As for all fixed appliance, breakages and minor problems may occur. The aim of this essay is to provide a clinical report of a comprehensive series of problems that can occur when using the Forsus appliance. Solutions are reported for each complication. The second aim is to analyze the relevant aspect of the patients' experiences and the detection of the acceptance.
METHODS: The clinical management of the Forsus appliance to correct Class II dental relationships, was analyzed for 120 consecutively treated patients at University Vita Salute, San Raffaele Hospital, Milan, Italy. The Forsus was used five months on average and pictures and clinical record were registered each time a patient had a problem. All minor and major problems related to the Forsus were recorded and each patient filled a Wong Backer formulary and also a five-point Likert scale was used to investigate the patients' feedback and level of acceptance.
RESULTS: The most common problem (22%) was breakage of the appliance. Breakage could occur as debonding of the lower first premolars or as unsoldering of the tube of the upper first molar band. Upper bands need to be changed. Lower premolar debonding could be prevented with an extra layer of flow composite surrounding the bracket base. The same solution was possible to repair the appliance in the mouth. 18 % of the patients experienced the lesion of the cheek mucosa. In four cases it was necessary to temporarily remove the appliance from the mouth to allow for healing. A soft cotton pad used as "wax" was an effective solution to allow mucosa recovery. A minor problem (4%) was deformation of the spring module due to fatigue. Deformation can lead to enhanced friction between the spring module and the push rod module, that make it hard for the patient to open and close the mouth. The solution is to change the spring module. There was also a significative correspondence with complications and the increase of pain reveled on the Wong Baker faces scale by the patients and also the results of the Likert scale were coherent.
CONCLUSIONS: The Forsus™ Fatigue Resistant Device can be effectively managed to allow a full effective correction of Class II malocclusions. A comprehensive list of precautions to prevent problems and acts to repair breakage was presented to decrease the pain and discomfort for the patients, showing the importance of a stable and long lasting appliance in the patients' experience.

Maxillary skeletal movements after functional-orthopedic treatment in class II and class III subjects

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BACKGROUND: This cephalometric study investigated the treatment effects produced by two orthopedic appliances: extraoral orthopedic traction on Stephenson plate (SP) in skeletal Class II malocclusion and Delaire facemask (DF) in skeletal Class III malocclusion.
METHODS: Patients were selected consecutively and grouped into: Group DF comprised 25 patients (13 m; 12 f, mean age 9.3 years, sd 2.3 years, skeletal stage CS 1-2) undergoing Delaire facemask therapy (mean treatment duration 1.5 years, sd 1.2 years, wear-time 10-12 hours/day, traction 700-800 gr per side). Group SP comprised 24 patients (9 m; 15 f, mean age 10.5 years, sd 1.9 years, skeletal stage CS 1-3) treated with extraoral orthopedic traction on Stephenson plate (mean treatment duration 1.6 years, sd 0.8 years, wear-time 14 hours/day, traction 700-900 gr per side). For all subjects lateral cephalograms before (T0) and after (T1) therapy were performed and hand traced by a single examiner. Cephalometric analysis were analyzed using the Jarabak and Pancherz methods. Descriptive statistics and Shapiro-Wilks test were calculated for each variable. T-test was used for comparing the 2 groups data and the probabilities of <0.05 were accepted as significant in all statistical analyses.
RESULTS: We found a mesial movement of the maxillary bone of 2,4 mm in the DF group and a distal movement in the PS group (0,5 mm). SNA°was reduced 1,4° after SP and increased 0,7° after DF. Wits measurement improved 2,3 mm after DM and 0,9 mm after SP. PNS moved mesially 1 mm after DM and moved distally 0,1mm after SP.
CONCLUSIONS: Facemask induced greater skeletal movements than extraoral traction on Stephenson plate. PS produced a downward movement of entire maxillary bone together with a clockwise rotation while DF showed a downward movement only. Based on our results, it could be speculated that orthopedic mesial traction of maxillary bone may result more easy than the distal movement.

Functional orthodontic therapy of hemifacial microsomia: the Parma experience

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BACKGROUND: Hemifacial microsomia (HFM) is an asymmetric craniofacial malformation caused by a hypoplasia of anatomical structures deriving from the first and second branchial arches and involving orbit, maxilla, mandible, ear, cranial nerves and soft tissues.
HFM is a relatively uncommon malformation. Nevertheless, it is supposed to be the second most

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frequent craniofacial birth defect after cleft lip and palate. Reported incidence varies from 1 case every 3500 to 1 case every 6000 births.
Clinically, the condition is characterized by mandibular asymmetry of different degrees of severity so that facial aesthetic and dental occlusion are consequently altered. Patients usually display deviation of the mandible to the affected side, altogether with inclination of the occlusal plane and oral commissure.
Management of such a developmental malformation is multidisciplinary and various treatment protocols have been proposed. These include functional appliances used either alone or in combination with surgery for the following purposes: 1) improve symmetry of the mandible and maxillary growth; 2) prevent or correct dento-alveolar maxillary adaptation to the mandibular asymmetry, 3) allow differential eruption of the maxillary teeth between the opposing arches.
To report a retrospective evaluation of 12 growing patients with HFM who were treated through functional orthodontic therapy. Data evaluated included skeletal, occlusal and aesthetic response to such treatment.
METHODS: Twelve patients with HFM (6 boys, 6 girls; mean age: 11.6±4.8 years) were consecutively treated at the Orthodontic Department of the Academic Hospital of Parma. Data recorded and evaluated included age at the beginning of treatment, gender, side of asymmetry and grade of malformation according to the classification of Kaban (Type I, IIA, IIB, III). Each patient was routinely submitted to clinical, photographic and radiographic (panoramic radiographs, plain radiographs in various projections, computed tomographic in some cases) evaluation. Models of the dental arches were cast in centric occlusion. All patients underwent an initial phase of treatment using an asymmetrical functional activator (AFA). This appliance has a "hybrid" design, being a combination of the biteblock components of the bionator and the vestibular shields of the Frankel appliance on the affected side.
RESULTS: All cases classified as type I and IIA showed a favourable response. In those cases, maxilla-mandibular growth on the malformed side developed sufficiently to re-establish normal occlusion and an almost complete facial symmetry.
Patients with a more severe deformity (type IIB) needed further orthodontic treatment associated to surgical correction.
Functional therapy seems to be effective in terms of improvement of chin symmetry and occlusal plane levelling.
CONCLUSIONS: In our experience, use of the asymmetrical functional activator (AFA) in growing patients with unilateral HFM may induce complete or at least partial balanced maxilla-mandibular growth.

Multiple dental ageneses: an interdisciplinary approach

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BACKGROUND: To present a functional and aesthetic rehabilitation by orthodontic treatment and dental implant surgery in a young adult woman with congenital agenesis of element 13, 14 resulting in a disalignment of maxillary dental arch.
METHODS: A 18 years old female patient was referred to our observation in Polytechnic University of Marche, she was in good general health with excellent hygene and periodontal condition. Clinical examination revealed: a) congenital agenesis of element 35, presence of decidous element 53 with agenesis of element 13 and 14; b) noticeable 6 mm shifting of dental maxillary midline to the right side; c) absence of canine guidance in both right and left laterotrusive excursions; d) derangement of the condyle-disc complex with single click during opening movement. Treatment plan comprised: a) extraction of element 24, 28; b) orthodontic leveling and alignment of teeth in maxillary arch; c) orthodontic mobile retention; d) extraction of element 53; e) immediate loading implant placement in site 13 and 14; f) positioning of definitive metal-ceramic prostheses.
RESULTS: Aesthetic improvement was the main purpose of the patient, therefore clinicians took heed of smile line and soft tissues management according to Arnett aesthetic analysis. Particular attention was paid in controlling undesired movement of posterior anchor teeth using monolateral distalizing device. Single tooth implants revealed as a good treatment option for replacing the missing teeth, provided that the patient's dental and skeletal development was completed. Excellent surgical and prosthetic outcomes were achieved also thanks to an advantageus periodontal and bone status and a correct tissue management. Aesthetic and occlusion compromise had been adopted since agenesis of element 35 and the refusal of patient in restoring it; nevertheless functional aspects were restored.
CONCLUSIONS: The absence of element 35 and the extraction of element 24 affected the final occlusion: on the right side there was a neutral molar class and a class I canine, whereas the left side showed both neutral canine and molar class. Dental maxillary midline mightily reduced its shifting (from 6 mm to 1,5 mm discrepancy). The derangement of condyle disc complex was solved and the canine guidance was recovered. A final prosthesis results in harmony with smile and patient's feature. Patient accepted and understood the occlusal compromise and she referred great satisfaction with aesthetical and functional achievements.
The case underlines the importance of a multidisciplinary approach in solving multiple dental agenesis and its functional effects.

Bite-raising splints to treat deep bite in pediatric patients: an electromyographic and kinesiographic assessment

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BACKGROUND: Deep overbite or deep bite is common in the pediatric population. Although bite-raising splints are often a part of treatment programs for deep bite malocclusion, there are no reports in the literature regarding their effect on the neuromuscular system. The current study aimed to use electromyographic and kinesiographic analysis to investigate

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if and how bite-raising splints applied during early stages of orthodontic treatment affect muscle tone, muscle activity, mandibular kinetics, and freeway space (FWS) in pediatric patients with dental and skeletal deep bite.
Methods: Thirty patients (17 males & 13 females; ages 6 to 13) with a grade 4F condition (increased and complete overbite with gingival or palatal trauma) according to the Index of Orthodontic Treatment Need (IOTN) were enrolled in the study. All the patients had Class II molar and Class II canine relationships bilaterally with a hypodivergent skeletal class II pattern and complete and traumatic overbite. A quantitative EMG and kinesiographic assessment (SCAN 9, 11, 1, and 3) was performed at baseline and four weeks later (T1). Bite-raising splints designed to achieve an overbite of approximate 1-2mm, were positioned after the baseline EMG. Fabricated using the direct composite technique, they were positioned on the four lower deciduous molars in the patients with a mixed dentition and on the four lower permanent premolars in the patients with permanent dentition. Statistical analysis of the data obtained from the two electromyographic and kinesiographic assessments was carried out using the STATISTICA data analysis software system, version 8.0 (StatSoft Inc., 2008), the PASW Statistics 18, version 18.0.0, and the Wilcoxon test was used to compare non-parametric paired data.
Results: Evidence of homogeneous reduction in activity levels in the bilateral masseter and temporalis muscles was found. Although maximum mouth opening was narrower and mandibular deviation during mouth opening movements was slightly increased, neither variation was statistically significant. Nor was there a significant difference in the amount of FWS. The difference between the temporal muscle potentials at baseline and 4 weeks later was found to be statistically significant ($p>0.05$) only for Clench 1 (SCAN 11-A), i.e. referring to natural teeth closure.
CONCLUSIONS: Bite-raising splints are frequently used in orthodontic treatments because of their easy application, efficacy, and low cost. The appliance evaluated here, whose repercussions on the neuromuscular system were assessed four weeks after it was positioned, did not produce negative effects on muscular tone. Neither the reduction in muscular tone, noted in SCANs 9 and 11-A, nor its increase, noted in SCAN 11-B, were statistically significant ($P>0.05$). Differences in jaw openings and in maximal mouth opening which were to the order of tens of millimeters were not statistically significant ($P>0.05$). We can conclude that occlusal splints did not induce negative effects on the chewing muscles or on the stomatognathic apparatus in general in the patients studied over a four week period.

Evaluation of skeletal maturation in the left and the right hand in orthodontics: a pilot study

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BACKGROUND: Evaluation of skeletal age has a fundamental importance in orthodontics in order to establish the ideal time for the treatment. Different methods are used to evaluate skeletal age: cervical vertebras method (CVM), Fishman's hand and wrist radiograph method and recently the middle phalanx method of the third finger analysis (MPM). The aim of this pilot study is to evaluate a differential skeletal maturation between left and right hand to define which hand should be used for this kind of evaluation. Furthermore, differences related to gender and patient's preferred hand were examined.
METHODS: Radiographs of phalanxes were taken in 126 patients. The cone of the x-ray machine was positioned orthogonal to the sensor and close to the finger. The sample was divided according to MPM evaluation into six groups using the right hand as reference. Statistical analysis was performed using the test of proportions. Moreover, statistical analysis was performed related to gender and patient's preferred hand.
RESULTS: A total agreement was found in all the stages except for MPS2. In MPS2 group, 7 out 37 patients had a disagreement between the right and the left hand stages showing MPS3 in the left hand (p-value < 0,01). Differences were found between males and females with a higher percentage of disagreement than females (13% in male *Vs* 28% in female). No differences were found related to patient's preferred hand (p-value < 0,01).
CONCLUSIONS: The pubertal growth spurt was demonstrated to be the most appropriate time to start a functional therapy in class II patients. MPM method is a valuable integration to the classical cervical vertebras method in order to establish the pubertal growth spurt. In order to confirm the data shown in this pilot study, a bigger sample has to be evaluated. Furthermore, authors have to evaluate also a bigger sample of left handed patients in order to verify if patient's preferred hand can have a role in skeletal maturation of the middle phalanx. Moreover, further studies are needed to explain the reason of the ossification difference between the left and the right hand close to pubertal growth spurt.

Treatment effects of removable functional appliances in pre-pubertal and pubertal class ii patients: a systematic review and meta-analysis of controlled studies

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BACKGROUND: Treatment effects of removable functional appliances in Class II malocclusion patients according to the pre-pubertal or pubertal growth phase has yet to be clarified. This study assessed and compared skeletal (mainly in terms of supplementary mandibular growth) and dentoalveolar effects of removable functional appliances in Class II malocclusion treatment between pre-pubertal and pubertal patients.
METHODS: A literature survey using the Medline, SCOPUS, LILACS, SciELO databases and The Cochrane Library was conducted from inception to May 31, 2015 with no language restrictions. A manual search was also performed. The studies had to be Randomized (RCTs) or Controlled clinical trials (CCTs) with a matched untreated control group. The study had to investigate the skeletal and dentoalveolar effects with no restriction as to the type of removable appliance whenever used alone. Studies were excluded if a reliable indicator of growth phase was not used. For the meta-analysis, cephalometric parameters on the supplementary mandibular growth were the main outcomes, with other cephalometric parameters considered as secondary outcomes. Risk of bias in individu-

al and across studies were evaluated along with sensitivity analysis for low quality studies. Mean differences and 95% confidence intervals for annualized changes were computed according to a random model. Differences between pre-pubertal and pubertal patients were assessed by subgroup analyses. GRADE assessment was performed for the main outcomes.
RESULTS: Twelve articles (but only 3 RCTs) were included accounting for 8 pre-pubertal and 7 pubertal groups. Overall supplementary total mandibular length and mandibular ramus height were 0.95 mm (0.38, 1.51) and 0.00 mm (-0.52, 0.53) for pre-pubertal patients and 2.91 mm (2.04, 3.79) and 2.18 mm (1.51, 2.86) for pubertal patients, respectively. The subgroup difference was significant for both parameters ($p<0.001$) and no maxillary growth restrain or increase in facial divergence was seen in either subgroup. The GRADE assessment was low for the pre-pubertal patients, and generally moderate for the pubertal patients.
CONCLUSIONS: Taking into account the limited quality and heterogeneity of the included studies, functional treatment by removable appliances may be effective in correcting Class II malocclusion with clinically relevant skeletal effects if performed during the pubertal growth phase. Skeletal effects of functional treatment were seen at the mandibular level and consist mainly in mandibular elongation and increase in ramus height. Dentoalveolar effects were detected even in pubertal patients, even though, mandibular proinclination would be limited with minimal clinical implications.

Incidence and occurrence of mouth breathing self-correction in early childhood: a longitudinal study

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BACKGROUND: In the mouth breathing mode, a child stops breathing exclusively through the nose and begins mixed breathing, where the nose is supplemented by the mouth. This conditions could be associated to the presence of disorders of speech organs, facial deformities, malocclusion and impairment in body posture, cardiorespiratory and endocrine disease, sleep and mood disorders and poor performance at school. In literature a few articles were found on the prevalence of mouth breathing but were mainly focused on the primary school children, so the aim of this longitudinal study was to evaluate the early childhood breathing mode, from 3 to 5 years-old.
METHODS: The sample included 240 3-years-old children selected from kindergartens in Chiavari, a town nearby Genoa (Italy). Two WHO (World Health Organization) calibrated examiners carried out the clinical examinations for each subject at 3, 4 and 5 years-old. Data were collected with a questionnaire, that was filled out by the parents before the clinical examination, which included questions on child's clinical history, the type of feeding, the use of baby-bottle, the history of non-nutritive sucking habits (dummy-sucking and digit sucking) and the consent to the clinical examination. The dental examination were performed in the classroom environment under natural light, using disposable gloves and masks in compliance with the infection control protocol, sterilized mouth mirrors and probes. Data were collected according to WHO criteria. Statistical analysis included mouth breathing prevalence and incidence.
RESULTS: The overall mouth breathing prevalence in the sample was 13% but showed significant differences between ages: at 3 years-old the prevalence was 21,6%; at the age of 4 there was a significant mouth breathers decrease (8.6%; $p<0,01$), while the percentage didn't modify at 5 years-old (8.7%); the occurrence of mouth breathing's self-correction was 82% (42 out of 51) between 3 and 5 years-old, mouth breathing mode didn't change in the 18% of the children, while the incidence rate of the new cases of mouth breathing is 6%.
CONCLUSIONS: The present study results showed that in the pre-school children an observation period until the age of 5 years is suggested due to the high rate of mouth breathing's self-correction, in fact more than 80% of the children switch their breathing mode from oral to nasal between 3 and 4-years old, with a low incidence until the age of 5.

Long-term oral appliance wear in OSA patients and upper airway effects: retrospective cephalometric study

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BACKGROUND: The purpose of this retrospective study was to evaluate the changes in upper airways soft tissues and surrounding related structures in obstructive sleep apnea (OSA) patients after long-term continuous mandibular advancement device (MAD) use. The currently available studies on this topic are limited in number and exhibit conflicting results.
METHODS: The study sample included 31 subjects (24 men, 7 women; age: 51.9±10.37; pre-treatment AHI: 21.73±13.91 ev/h; BMI: 26.51±2.91 kg/m^2). Sixteen patients (51.6%) had mild OSAS ($5 \leq AHI < 15$ ev/h), 7 patients (22.6%) had moderate OSAS ($15 \leq AHI < 30$ ev/h), and 8 patients (25.8%) had severe OSAS ($AHI \geq 30$ ev/h). Mean treatment duration time (T1-T0) was 4.3±0.8 years.
Subjects included in the study were recruited among the OSA patients treated since January 2008 at the Orthodontics Department, University of Bologna.
Inclusion criteria:
— Caucasian race;
— Age ≥ 25 years;
— Polysomnographic diagnosis of OSA ($AHI \geq 5$ events) at T0 (beginning of the therapy);
— Silensor type MAD (Erkodent Gmbh, Tuttlingen, Germany) therapy for more than 2 years without treatment interruption during the whole study period;
— MAD use for a minimum of 5 nights per week and usually for the entire night, assessed through a questionnaire;
— Presence of lateral cephalograms at T0 and T1 (follow up visit at least 2 years after T0).
Cephalometric analyses (Nemoceph software) were performed at T0 and T1.
The following measurements were taken: soft palate length (PNS-P), soft palate thickness (SPT), spatial position of Hyoid bone (H-c4ia; Mp-H), posterior airway space (PAS), middle airway space (MAS), post-superior airway space (SPAS), position of the maxilla in relation to the cranial base (SNA), position of the mandible in relation to the cranial base (SNB), anteroposterior relation of the maxilla and the mandible (ANB), inclination of the mandibular plane in relation to the anterior cranial base (SN/GoMe) and the spatial position of the

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soft palate to the maxillary plan (SPA). The same orthodontist blinded to patient allocation, digitized and traced each radiograph. To evaluate whether statistically significant differences in cephalometric parameters between T0 and T1 existed, a linear mixed model (repeated measurements: time; fixed effects: time; covariate: months between T0 and T1) was used.
RESULTS: At the cephalometric assessment, the maxilla revealed a significant decrease in its anteroposterior position (SNA: -1.4°±1.72°; P=0.002) while the mandible displayed a significant downward rotation (SN/GoMe: 1.84°±2.22°, P=0.000) and a decrease in its anteroposterior position (SNB: -0.64°±1.51°, P=0.026). The soft tissues analysis showed a significant reduction of length (PNS-P: -3.02±4.52 mm, P=0.001) and thickness (SPT: -0.70±1.43 mm, P=0.011) of the soft palate while the superior posterior airway space revealed a significant increase (SPAS: -0.88±1.80 mm, P=0.011).
CONCLUSIONS: Slight changes in upper airways dimensions occurred after 2 to 5 use of Silensor® type MAD. In particular a dimensional reduction of soft palate (both in length and thickness) and an increase in superior posterior airway space (SPAS) suggested an increased patency in upper airways.

Extraction therapy using aligner appliance: case report

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BACKGROUND: The aim of this study was to evaluate the feasibility of an extraction therapy managed with aligner.
METHODS: Case report: patient M.M., a 32 years old male with a severe upper and lower crowding, slight lip incompetence, head-head 21-31, biprotrusion, malocclusion of I class molar bilateral, positive tip of the canines and Bolton index altered. The treatment plan involved the extraction of the four first bicuspids. The case was handled with 48 aligners. To solve the dental discrepancy, it was provided with a diastema of 1 mm distal to the 12 and 22 elements and pontic in the aligners to manage the aesthetic in extraction sites.
RESULTS: The result provides more harmonic arches and well aligned, normo inclined incisors and correct occlusal relation.
CONCLUSIONS: The analysis of the current study showed favourable prognostic factors in extraction therapy with aligners, such as the positive tip of canines and the incisors proclination without excessive crowding. It demonstrated the ability to perform extraction cases with aligner, if the clinical cases are well selected.

Orthodontic considerations in periodontally involved teeth: a review of literature

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BACKGROUND: An increasing number of adult patients seeking orthodontic treatment to improve their dental appearance, however,special attention must be given to their periodontal status, as periodontal disease and its sequel. In adult patients, the loss of teeth or periodontal support can cause pathologic migration of anterior teeth of a single tooth or a group of teeth, result in esthetic and functional problems. This can result in an alteration of the patient's occlusal stability.
METHODS: 58 abstract evaluated by PubMed research from January 1994 to April 2015.Our research's keywords were: dental esthetics, interdisciplinary dentistry, pathologic tooth migration, periodontal surgery. We have excluded from our research scientific articles about patients with systemic diseases, patients with aggressive periodontitis and patients with malalignment of teeth, but no evidence of periodontal disease.
RESULTS: There is an ever-increasing concern for dentofacial esthetics in the adult population; hence, in contemporary dental care, an increasing number of adult patients are seeking orthodontic treatment. A number of studies have demonstrated that orthodontic treatment can improve the periodontal situation in patients with pathologic migration by providing good function and improved esthetics after realignment. Periodontal health is influenced by numerous factors. Malocclusion and orthodontic treatment may have only a limited effect compared to behavioral influences (smoking, oral hygiene, diet) and genetic conditions. The interdisciplinary approach helps to prevent disease progression and to regenerate the lost periodontal support.A comprehensive clinical management protocol before, during and after orthodontic treatment is key for the long-term success of orthodontic treatment in patients with periodontally compromised dentition.
CONCLUSIONS: With this review, at this time and with the information available, we have no reliable evidence to recommend orthodontic treatment to prevent periodontal disease. However, this information is based on studies of treatment of the more common malocclusions. An interdisciplinary approach is the best option to achieve a predictable outcome in order to resolve complex clinical problems.

Early orthodontic treatment of patients with cleft lip and palate

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BACKGROUND: The aim of this study is to investigate the effect of early orthodontic treatment on the development of dental arches in a group of growing patients with cleft lip and palate (CLP).
METHODS: Twenty-eight patients with CLP (17 boys, 11 girls) were consecutively treated in the Orthodontic Department of the Academic Hospital of Parma, Italy. Treatment strategies and objectives included 1) maxillary expansion to increase transverse dimension; 2) incisors alignment and proclination to resolve crowding, rotations and anterior crossbites and 3) maxillary protraction to reduce maxillary retrusion. Dental casts were taken before orthodontic treatment (T0; mean age, 6.5±1.7 years) and at the end of

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active treatment (T1; mean age, 9.2±2.1 years). Patients were subclassified in two groups according to the age at the beginning of the orthodontic therapy: group A (age < 6 years) and group B (age ³ 6 years).
Dental casts analysis was performed at T0 and T1 with regard to:
1) maxillary arch widths, measured with a millimeter caliper: intermolar arch width, measured as the distance between the mesiobuccal cusp tips of the first molar, and intercanine arch width, measured as the distance between the cusp tips.
2) dental arch relationships, categorized according to the modified Huddart/Bodenham system (HB). This numerical scoring system requires all maxillary teeth to be scored according to their buccolingual relationship to the corresponding mandibular tooth, except for the lateral incisors, which may be missing or in an abnormal position in cleft lip and palate subjects. Overall score ranges between +10 and -30, reflecting the maxillary arch constriction.
Independent and paired t-tests were performed for statistical analysis. Statistical significance was tested at $P< 0.05$.
RESULTS: The evaluation of overall changes from T0 to T1 showed significant differences for the inter-canine distance (4.7 mm; $P <0.001$) and for HB score (6; $P < 0.05$); no statistical difference was found for the inter-molar distance. A statistically significant difference was found for the same variables comparing treatment effects between the two groups of different ages: patients in group A (age < 6 years) exhibited a higher increase both for inter-canine distance (8 mm *vs* 2.7 mm; $P<0.001$) and HB score (9 *vs* 2; $P < 0.05$) when compared with patients in group B (age >/= 6 years). No significant difference was found in the inter-molar distance variation.
CONCLUSIONS: The most appropriate timing of orthodontic treatment in CLP patients is controversial. In our experience, early orthodontic treatment strongly improved the dental arch relationship. In fact, children starting the therapy before the age of 6 showed a better response in terms of anterior maxillary expansion and correction of inter-arch discrepancy.

Natural head position: a review on two- and three- dimensional recording methods

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BACKGROUND: Head orientation has been a subject of great interest for clinical and research orthodontists for more than a century. Both the position of patient's head and a standardized system for acquiring images are essential for an objective evaluation of the facial profile and the skull as well as for the longitudinal superimposition.
The natural head position (NHP) has been introduced in orthodontics in the late 1950s and it has been proposed as a postural basis for craniocervical and craniofacial morphologic analysis. Furthermore, NHP can have a relevant role in the surgical planning for the correction of craniomaxillofacial deformities. The relatively recent transition in orthodontics from 2-dimensional (2D) to 3-dimensional (3D) imaging and from analogic to digital technology has created renovated attention for finding a versatile method for establishing an accurate and reliable head position during the acquisition of serial records.
The aim of the present work is to perform a comprehensive review, focusing topics such as definition, clinical applications, procedures to establish NHP and their reproducibility. Furthermore, various methods to reproduce and record the NHP in two and three planes of space are discussed.
METHODS: A Medline and Scopus search was conducted in order to identify publications related to the topic, with no limitations of language or time period. Entry words included: "head posture", "cephalometric analysis", "natural head position", "lateral cephalometric radiographs", "cephalostat", "3-dimensional imaging", "self balance position", "mirror position". Only original papers (randomized and non-randomized clinical trials, cohort studies, case-control studies, case report and review) were selected for the review process. Relevant information was also derived from reference lists of the publications retrieved.
RESULTS: Many studies addressed the issue of recording head position when it is unrestrained, as it is during image capturing for 3D photography or CBCT. As for 2-dimensional imaging, there are two basic approaches to record the NHP three dimensionally: 1) 3D imagine recording with the patient in his/her NHP; 2) 3D imagine acquisition and subsequent reorientation of the volume according to the predetermined NHP. The second procedure includes the following techniques: a) laser-assisted surface marking followed by imagine acquisition; b) laser surface scanner recording the surface geometry and absolute orientation of soft facial tissues; c) NHP recording device consisting of a digital orientation sensor attached to the patient via a bite jig and a facebow.
CONCLUSIONS: The best and ideal method to register NHP should avoid the use of any head attached device that might interfere with the achievement of NHP; moreover it should be simple and easy to perform, without troublesome markings on the patient face or subjective identification of specific refers points. The success of the protocol should not be operator dependent, so that an inexperienced practitioner can follow the procedures to record and reproduce the 3D NHP without difficult training. Therefore, it is desirable that the method does not produce major artefacts in the CT images and does not affect patient lip position or deform facial soft tissues. Finally, the procedure should be time- and cost- effective.

Non surgical treatment of mandibular condyle fractures in growing patients: a systematic review

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BACKGROUND: The aim of this study is to provide an evaluation of the current evidence regarding on the effectiveness of nonsurgical treatment (NST) of mandibular condyle fracture (MCF) in children and adolescents.
METHODS: A research of the international literature, exam-

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ining Pubmed, Latin and American Caribbean Health Science (LILACS), Scopus, the Cochrane library and Scielo, was done using the following keywords "mandibular condyle", "fracture" and "child". Endpoint was March 2015.
Records generated were preliminary selected on the basis of title. At a second stage, abstracts fitting with the goals of this review were selected by a consensus between two independent reviewers. Original articles were retrieved and evaluated to ensure they match inclusion criteria.
Articles were assessed for the quality of their methodology by two examiners and a critical appraisal was performed regarding the following parameters: study design, sample selection description, prior estimate of sample size, adequacy of outcome measures and follow-up period, method error analysis and adequate statistics. The quality of the studies was ranked on a 13-point scale assessed as follows: high quality, (12 or 13 points); medium-high quality (10 or 11 points); medium quality (8 or 9 points); and low quality (≤ 7 points). The review protocol was developed according to PRISMA statement.
RESULTS: In total only fifteen out of the 491 articles identified matched inclusion criteria, were included in this review. Analysis of methodology revealed quality scores ranging from "low" (13 papers) to "medium" (2 papers). Twelve articles were cross-sectional studies, whereas only 3 were prospective studies. The relatively low quality score of papers as well as the absence of homogeneously evaluated variables did not allow to perform a metanalysis. Clinical outcomes have usually been reported as satisfactory after NST of MCF, the results being in average better in children than teenagers. However, follow-up radiographic evaluations after NST were unsatisfactory in most of the studies, thus highlighting a discrepancy among clinic and radiographig assessment.
CONCLUSIONS: On the basis of the data analysed in the present review it is not possible to draw conclusions on the best NST approach for MCF. Particulary, it seems worthy to mention here that there is not a specific treatment which seem to be more effective than others.

Diagnostic accuracy of the CVM method in the indentification of the mandibular growth spurt

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BACKGROUND: The cervical vertebral maturation (CVM) method has been reported to have doubtful correlation with the mandibular growth spurt. Specifically, diagnostic reliability of CVM stages 3 and 4 (CS3-4 interval) in the identification of the mandibular growth spurt is yet undetermined. One of the reasons underlying this noteworthy lack of data may be the difficulty associated with obtaining diagnostic parameters, such as accuracy, from longitudinal data in a subset of selected subjects all with a predetermined condition (mandibular growth spurt) or a diagnostic outcome (a given CVM stage). Yet the identification of a mandibular growth spurt requires longitudinal data, according to proper time intervals (ideally annual intervals). To overcome such limitation in the present study, individual CVM stages and mandibular growth were recorded longitudinally in a group of untreated subjects according to different predetermined annual (chronological) age intervals. The aim of this study is to evaluate the capability of CS3-4 interval to identify the mandibular growth spurt throughout diagnostic reliability analysis.
METHODS: A previous longitudinal data set derived from 24 untreated growing subjects (15 females and 9 males) detailed elsewhere were reanalyzed. Mandibular growth was defined as annual increments in Condylion (Co)-Gnathion (Gn) (total mandibular length) and Co-Gonion Intersection (Goi) (ramus height) and their aritmetic mean (mean mandibular growth [mMG]). Subsequently, individual annual increments in Co-Gn, Co-Goi and mMG were arranged according to annual age intervals, with the first and last intervals defined as 7-8 years and 15-16 years, respectively. An analysis was performed to establish the diagnostic reliability of the CS3-4 interval in the identification of the maximum individual increments of each Co-Gn, Co-Goi and mMG measurement at each annual age interval.
RESULTS: CS3-4 interval shows variable accuracy across annual age intervals. Analyses regarding the CS3-4 interval yelded accuracy values between 0.67 and 0.95, depending primarily on the mandibular growth parameter used. Generally, satisfactory diagnostic reliability was seen when the mandibular growth spurt was identified on the basis of the Co-Goi and mMG increments (values between 0.81 and 0.95).
CONCLUSIONS: The CS3-4 interval shows satisfactory levels of accuracy in the identification of the mandibular growth spurt when the Co-Goi and mMG incrememts are examined. CVM method may be used in routine clinical pratice to enhance efficiency of treatments requiring identification of the mandibular growth spurt.

Three-dimensional monitoring of lower incisors intrusion in lingual orthodontics

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BACKGROUND: The aim of the present study was to propose a three-dimensional evaluation of what really happens in the early stages of treatment during lower incisors intrusion obtained using i-TTR lingual appliance.
METHODS: 9 adult patients underwent fixed lingual orthodontic treatment with i-TTR lingual brackets system for the correction of crowding in the lower arch associated with a deep overbite. Each patients were banded from lower second right bicuspid to lower second left bicuspid, chosen as

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a mean of anchorage. Initial records, consisting of photos, cone beam computed tomography (cbct) (Newtom, Giano, CEFLA S. C., CEFLA DENTAL GROUP, Imola, BO, Italy; 90 KV, 10 mA, 18 s) and intraoral scans (3Shape TRIOS®, 3Shape A/S, Copenhagen K, Denmark) were collected. Cbct and intraoral scan models were matched to create a three-dimensional digital arch comprising dental crowns and roots. The same procedure was performed to monitor one key step of the i-TTR technique consisting in lower incisors intrusion (T1). Threshold segmentation of the CBCT was performed to generate a three-dimensional virtual model of each the teeth of the lower arch, superimposed with the crown of the same teeth obtained by intraoral surface scan models to generate a complete set of digital composite lower arch. T0-T1 three-dimensional superimposition and color displacement maps were generated to measure and evaluate the movements obtained at the lower arch.
RESULTS: By comparing T0 with T1 lower incisors intruded of 0.8 mm (range 0.3-1.00 mm) with not clinically significant bodily translation toward buccal (range 0.2-0.7 mm).The root displacement of the incisors during their intrusion in the early stage was totally "bone-safe" in the 88.9% (8 of 9) of the cases observed. No significant extrusion of the premolars used as anchorage unit was measured. The inter-premolar diameter remained stable suggesting that the functional anchorage used during the treatment was reliable.
CONCLUSIONS: This method has proved to be an accurate and reliable approach to visualize the 3-dimensional positions of all teeth, including the roots, with no additional radiation for in-progress treatment monitoring. The 3-dimensional evaluation showed that the employed lingual appliance allowed to obtain significant lower incisor intrusion with negligible undesired extrusion of premolars employed as anchorage teeth.

Arnett's aesthetical analysys modified: cutaneous-nasion true vertical line

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BACKGROUND: The reproduction of an idealistic aesthetic repesents a challenge for the specialist, especially when the treatment involves important dental and skeletal repositioning, as in the case of orthognatic surgery.
The objective analysis of the face and the relations between its structures is extremely important in order to achieve results that are predictable on a quality level and reproducible.
METHODS: The cephalometric analysis suggested by Arnett in 1999 places for the first time peculiar attention on the soft facial tissues (STCA, Soft Tissue Cephalometric Analysis). This analysis considers an evaluation of the patient in Natural Head Position, Centric Relation and Relaxed Lips, from both the clinical and x-ray point of view.
The dental and skeletal points are measured comparing to the True Vertical Line perpendicular to the true horizon (and therefore to the NHP), passing through the sub-nasal point (Sn), and can be refferred to 4 areas:
— dental skeletal factors
— soft tissues
— facial heights and lenghts
— projections on the TVL
— facial harmony
RESULTS: The passing of the TVL through the Sn point is a norm suggested by Arnett and adopted by previus studies in order to have a standard and reproducible reference point. As the author highlighted, in the case of the maxillary retrusion the point in which the TVL has to pass through must be moved forward between 1 and 3 millimeters depending on the hypothetical surgical movement The need to diagnose the maxillary retrusion from the beginning, can lead to relevant initial mistakes, considering that the whole analysis will be based on these considerations. They are, as a matter of fact, considerations that should be deduced from the analysis itself, and not precced it. It is possible to change the point of passage of the TVL by changing the ideal reference values, but by the same known quantity; a possible solution to this prblem could be represented, as a matter of fact, by the use of a point other than the Sn through which we can make the TVL pass. The Nasion point of the soft tissues (N') could have some important characteristics of stability, reliability and reproducibility, as Michielis and Tourne suggested in1990. It would be interesting to update Arnett's STCA reference values, making them refer to the N'TVL. The author does not define a specific value of N' projectin towards the TVL, but states that 'the Glabella point of the soft tissues (Gb'), reasonably stable in males and females, is located approximately 2 millimeters front on the Naison of the soft tissues (N'). Since the Gb' projection on TVL is on average -8,5±2,4 millimeters in females and -8±2,5 millimeters in males, we can state that the N' projection on TVL is on average -10,5 millimeters in females and -10 millimeters in males.
CONCLUSIONS: It is possible to change the point through which TVL passes from Sn to N' in order to achieve a greater stability and reliability; it is sufficient to increase respectively by 10,5 and 10 millimeters the absolute values of the projection points on the TVL to obtain the projections of the same points on N'TVL. This grants greater diagnostic precision and surgical planning.

Evaluation of postural changes in patients treated with Invisalign®

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BACKGROUND: The aim of this study was to evaluate if orthodontic treatment with Invisalign®, that uses clear aligners, produced posture changes. The measurements were obtained using Formetric 4D, the non-invasive technique "rasterstereography" (Formetric 4D, DIERS International GmbH, Schlangenbad, Germany).
METHODS: 15 patients were recruited in the Department of Orthognatodontics of Dental School of Turin (9 F and 6 M). All patients presented permanent dentition, during or after growth spurt, and they were treated with Invisalign®, the orthodontic treatment that uses clear aligners. A standardized lateral skull radiograph was taken of each patient treated. The radiograph was digitalized and cephalometric tracing was performed with the OrisCeph® software. The parameters considered in this study for dividing patients into different groups were divergence and skeletal class. In order to measure spinal

shape in the sagittal plane, the non-invasive technique "rasterstereography" (Formetric 4D DIERS International GmbH, Schlangenbad, Germany) was adopted.
This study analyzes the patients in relaxed standing posture into three different situations: a relaxed mandible position without nothing between dental arches, during intercuspal whit highest number of contact points and with Invisalign® clear aligners placed on maxillary and mandibular dental arches.
The parameters calculated were: the kyphotic angle (KA), spanned by the tangent lines in cervico-thoracic inflection point (ICT) and thoraco-lumbar inflection point (ITL); the lordotic angle, spanned by tangents in ITL and lombo-sacral inflection point (ILS) ; the upper thoracic inclination, spanned by plumb line and ICT tangent; pelvic inclination, spanned by the vertical and tangent ILS.
Every patient was analyzed at T0 (Baseline), at T1 (after 1 month of orthodontic treatment with Invisalign®) at T2 (after 3 months of orthodontic treatment with Invisalign®) and at T3 (after 6 months of orthodontic treatment with Invisalign®).
The ANOVA Test is the statistical test used. Distribution normality analysis (Shapiro-Wilk) and multiple comparison (Tukey post hoc) are also calculated.
RESULTS: Any clinically nor statistically relevant differences between the control group and the therapy group at T0, T1, T2 and T3 were found for the parameters of kyphotic angle (KA), lordotic angle, upper thoracic inclination, and pelvic inclination.
CONCLUSIONS: Our working hypothesis was tested to be not correct (within the limitations of this study). This study demonstrated that no posture change in orthodontic patients treated with Invisalign® could be observed by an evaluation with Formetric 4D.

Early post-treatment changes of circumaxillary sutures in young patients treated with rapid maxillary expansion

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BACKGROUND: Rapid maxillary expansion (RME) is frequently used to correct maxillary width deficiency or posterior crossbite or to expand arch perimeters to alleviate dental crowding. Although the major effect of this treatment is noticed clinically in the dentition and maxilla area, RME therapy appears to involve an ample portion of the craniofacial complex. This involvement has been hypothesized following investigations based on histologic methods, radiologic imaging, photoelastic models, bone scintigraphy, and finite element analysis. However, these findings are limited to experimental studies in animals. Therefore, until now, there have been only speculations about whether RME can or cannot disarticolate these structures in humans. With advanced technology and the introduction of three-dimensional computed tomography (3D CT) imaging, this speculation can be verified. The purpose of this investigation was to test the null hypothesis that circumaxillary sutures do not show bony displacement in response to RME therapy. This was done using high-resolution multislice multidetector computed tomography to evaluate quantitatively the early extent of these suture disarticulations in young orthodontic patients following treatment with RME.
METHODS: The materials for this prospective study consisted of good quality cephalometric radiographs and CT records taken from eight growing patients (two male and six female, aged between 8-11.4 years) with Angle Class I malocclusion, bilateral posterior crossbite, transverse maxillary deficiency, deep palatal vault, and dental crowding at the start of the treatment. A Hyrax palatal expander was used for each patient, and activation protocol required the screw to be turned three times per day (0.25 mm per turn) for an average of 18 days for all subjects. Multislice computed tomography (CT) scans were performed before rapid palatal expansion (time T0) and again at the end of the active expansion phase (time T1) without removing the expander. Measurements were carried out directly on the CT image using the OsiriX Imaging software program. Data were analyzed statistically by using the Wilcoxon signed rank test.
RESULTS: Findings from our investigation showed that circumaxillary sutures articulating directly to the maxilla were opened more extensively than those indirectly articulated. Evaluating the changes between T0 and T1, all linear measurements showed an increase and RME determined a widening of the suture of about 0.386 mm, and differences between T0 and T1 were statistically significant.
CONCLUSIONS: According to our findings the null hypothesis is rejected. In fact early treatment with RME produced a significant bony displacement by circumaxillary suture opening. The amount of changes of sutures depends on different factors relating to the subjects and varies between different sutures, showing that sutures that articulate directly with the maxilla face a greater influence by the RME compared with those located further away.

Orthodontic aesthetic treatment with Invisalign® in Juvenile Idiopathic Arthritis patient

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BACKGROUND: The aim of this work is to demonstrate how the orthodontic treatment with Invisalign® custom-made aligners can provide aesthetic and functional good results in patients with Juvenile Idiopathic Arthritis (JIA).
METHODS: Patients with JIA who needed dental alignment were selected at the Department of Orthodontics of the University of Milan to be treated with Invisalign®. Five patients are still under treatment and only two have finished it. This last underwent therapy from February 2006 to January 2016. He was initially treated with functional appliance — according to approved treatments for patients with JIA — until the end of growth. At the age of 15, he presented both skeletal and dental Class I and dental crowding. The orthodontic treatment has continued with use of Invisalign® SmartTrack aligners. Initial dental records were sent to the Company headquarters to make ClinCheck® (a 3D simulation visualizing final results before therapy starts). Once received and analyzed, our Department asks to improve some aspects, including mandibular crowding with not excessive proclination of 31 and harmonic alignment of both arches. After treatment

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confirmed, all 16 aligners in total were received plus a clear plastic template — looks a lot like a regular aligner, with the exception that it has small bulges where attachments need to be placed. Each aligner was held in situ for a period of two weeks. During the treatment, stripping of the lower front teeth was applied to obtain space equal to 1.4 mm. At the end of the treatment, Essix orthodontic retainers were applied.
RESULTS: After last Invisalign® aligner, the patient presented dental and skeletal Class I, with maxillary and mandibular good alignment. During the whole period of treatment, she never complained of joint pain nor showed exacerbation of JIA. Objective clinical examination showed no signs of condylar distress.
CONCLUSIONS: The use of Invisalign® aligners allows to obtain a good alignment even in complicated therapy of patients with JIA. They alternate indeed periods of joint inflammation and quiescence. A standard therapy with a straight-wire appliance can worsen the underway inflammatory joint state. On the contrary, the use of Invisalign® aligners produces equivalent results without incurring this additional risk.

Evaluation of elongated styloid process in digital panoramic radiographs: a pilot study

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BACKGROUND: Eagle's syndrome includes a disorder caused by an elongated or deformed styloid process or ossified/calcified stylohyoid ligament. The compression of this abnormal structure can cause facial and neck pain that can be confused with a variety of disorders: facial neuralgias, oral and dental diseases and temporo-mandibular disorders. Styloid process is a cylindrical projection of temporal bone of approximately 20 to 30 mm in length that serves as an anchor point for several muscles associated with the tongue and the larynx. A styloid process is elongated when it is longer than the normal (>30mm).
Differential diagnosis is possible because of imaging evaluation can easily allow to identify pathological styloid process or stylohyoid ligament. In literature there are a few studies that evaluate the prevalence of the elongated styloid process in different populations.
This pilot study investigates the prevalence of the elongated styloid process or calcificated stylohyoid ligament in North Italian population and its relation to gender, age and side.
METHODS: This study is a retrospective analysis of digital panoramic radiographs of 377 patients (208 females and 169 males, between 6 and 80 years old) taken from Padua University Dental Clinic database. The radiographs were obtained using SIDEXIS system (Sirona) and analyzed with the measurement function of the software: the process is measured from the point where it leaves the tympanic plate to its tip and it is considered elongated with a lenght greater than 30 mm. Data were compared using the test of proportions.
RESULTS: A total of 117 out 377 (31,03%) radiographs present an elongated styloid process. 61 patients (52,13% of the patients) exhibit the abnormal structure on both right and left side, while the others (47,7% of the patients) show it only on one side. The disease doesn't seem to have a correlation with the gender because the percentages of females (45,29%) and males (54,70%) are similar.
CONCLUSIONS: The presence of elongated styloid process in the examinated population is higher than other studies taken by literature. This pilot study indicates the need to increase the sample size to estimate the prevalence in the general population.

Orthodontic patients attitude towards dental monitoring: a smartphone-based digital system for treatment progress monitoring

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BACKGROUND: Evidence is emerging regarding the possibility to increase appointments attendance, reduce emergencies incidence and ameliorate compliance in both oral hygiene maintenance and removable appliances utilization using text messaging apps like WeChat© or WhatsApp©. Specific telemonitoring systems are progressively gaining more diffusion in medicine and in dentistry, together with the improvement of general population skills in new technologies utilization. Therefore the aim of this study was to analyse patients attitude towards the use of Dental Monitoring®, an app based system for orthodontic patients remote monitoring.
METHODS: 50 patients looking for orthodontic treatment were enrolled in this university-based cross-sectional study. Inclusion criteria were: age between 14 and 50 years, absence of difficulties in reading or speaking Italian language and ownership of a smartphone. After an oral presentation explaining through demonstrative videos and printed leaflets the use of Dental Monitoring system participants were asked to fill a questionnaire investigating their attitude towards remote monitoring and their opinion regarding its usefulness. Sociodemographic data were recorded and the Mann-Whitney U test and chi-square contingency tables were utilized to analyse the effect of sex, age and smartphone ownership on telemonitoring attitude; next, a multiple regression analysis was used to estimate this effect.
RESULTS: 96% of patients were not aware of the possibility to use a smartphone based monitoring system, whereas 4% had a friend using one of these systems during the orthodontic treatment to monitor emergencies, oral hygiene maintenance and intraoral elastics use. 88% of patients declared their availability to take pictures of their teeth every 2 weeks, 72% declared their availability to take pictures of their teeth every week, 90% positively judged the possibility to reduce the number of in office visits, 50% declared their availability to pay an extra fee to use Dental Monitoring® and 100% considered the use of remote monitoring systems indicative of high tech and high quality treatment. Sex and age did not influence attitude towards telemonitoring, whereas smartphone ownership was significantly associated with a positive judgement.
CONCLUSIONS: the patients in this study showed a positive attitude towards telemonitoring, proportionally with their "digitalization" degree. A stronger patient motivation is needed if weekly monitoring is required. The reduction in visits number, which saves time and money, is especially appreciated by patients, even if they are not always oriented to pay for this extra service.

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Posture analysis in children with maxillary transverse discrepancy

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BACKGROUND: The aim of this study is to investigate the effects of rapid palatal expansion (RPE) on gait and posture in children with maxillary transverse discrepancy by using of a 6 cameras sterophotogrammetric system (60 - 120 Hz, BTS) synchronized with 2 Bertec force plates and a Novel Pedar plantar pressure system. 3dimensional (3D) joint kinematics, center of pressure displacement (COP), plantar pressure distribution during gait and posturographic parameters were estimated.
METHODS: 50 patients were enrolled, with initial ages ranging from 6 to 12 years old sent from the Dental Clinic of the University of Padua-Italy. They were divided into three groups: a control group composed of 10 children, a second group made of 20 patients with maxillary transverse discrepancy and no crossbite (Nocb group), the third of 20 patients with unilateral posterior crossbite (Monocb group). In the control group maxillary and mandibular arches coordinated properly in the transverse way. The upper inter-molar distance of the first molar was ≥ 33mm on the basis of the cast model of the maxillary arch. In the NoCb group the maxillary arch was contracted but teeth had the correct occlusion in each side, while in the MonoCb there are contraction of the arch with unilateral posterior crossbite (in the right or left side). The analyses were carried out in three stages. In the first phase after oral examination, every subject underwent gait analysis, Romberg Test and surface EMG. After 2 months of the end of RPE' activation it has been executed surface EMG (second phase). The last phase was 3 months after the removal of the RPE. The subject of Nocb and Monocb groups were treated with rapid palatal expander RPE Baby N.Veltri screw ANV 202 CE. Parents were instructed to turn the screw twice a day (0.25 mm of screw expansion per turn) and each child was given a personal number of turns to correct their specific malocclusion. The duration of the active stage of expansion could not exceed 30 days.
RESULTS: The posturographic analysis doesn't revealed significant differences between MonoCb, NoCb and Control groups. The variables of gait analysis are significant before and after treatment with RPE. Surface EMG shows an increase of muscle's force after treatment with a delay of the recruitment of masseter and temporal muscles.
CONCLUSIONS: This study, shows a correlation between dental occlusion and body posture, at least in the age range of subjects included. It tends to disappear when descending in a cranio - caudal direction.

Condylar asymmetries in unilteral molar class II

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BACKGROUND: Unilateral molar class II is a malocclusion characterized by a different relationship between sides of the upper and lower first molars. It is a serious asymmetric condition that may involve all districts of the stomathognatic system as it has been showed in previous studies evaluating the masticatory function, the palatal asymmetry, the Posselt diagram and the postero-anterior x ray of the skull.
The aim of the present study, as a continuation of the previous study, is to compare the condylar and ramus asymmetry of the mandible between two different group of patients, with unilateral molar class II compared with bilateral molar class II.
METHODS: 36 patients with unilateral molar class II and 23 patients with bilateral molar class II were selected. Each patient underwent in orthopantomography and casts. To quantify asymmetries between the mandibular condyles and the rami, the method introduced by Habets *et al*. was used. This method compared vertical heights of the mandibular right and left condyles and rami in orthopantomography. The outlines of the condyle and the ascending ramus of both sides were traced on acetate paper. On the tracing paper a line (A, the ramus tangent) was drawn between the most lateral points of the condylar image (O1) and of the ascending ramus image (O2). A line perpendicular (B) to the ramus tangent was drawn from the most superior point of condylar image. The vertical distance on the ramus tangent from B line to the most lateral point of the condyle (O1) was measured and was called the condylar height. The distance on the ramus tangent between the two most lateral points of the image (O1 and O2) was measured and was called the ramus height. All measurements were performed with a digital calliper and were expressed in millimeters. The symmetry between the right (R) and the left (L) side was calculated with the formula : (R-L)/(R+L) x 100%. The absolute value of the difference between the measured condylar sizes or the rami sizes were divided by the sum of the measured condylar or rami sizes respectively expressed in percentages. The result of this ratio-formula gives a range of asymmetry from 0% (complete symmetry) to 100%. According to the study by Habets *et al*. a 6% difference between the condylar vertical sizes in an orthopantomography is an acceptable limit for diagnosing a condylar asymmetry. Data were expressed as mean±SD and were statistically analyzed.
RESULTS: The results showed differences in the range of asymmetry of the condyles between the two groups analyzed and no differences in the range of asymmetry of the ramus.
In patients with unilateral molar class II the mean asymmetry of the condyles resulted 10% (normal value < 6%) and the mean asymmetry of the rami was 2,94%.
In patients with bilateral molar class II the mean asymmetry of the condyles resulted 5,98% (normal value < 6%) and the mean asymmetry of the rami was 3%.
CONCLUSIONS: Unilateral molar class II is a severe and complex malocclusion responsible of asymmetries of structure, function and growth of the patients affected.
Being orthopantomography routinely included among the essential orthognatodontics diagnostic data, the evaluation of the asymmetry index could be important for orthodontists to improve the diagnosis of this malocclusion.

Correlations between dental malocclusions, ocular motility, and convergence disorders: a cross-sectional study in growing subjects

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BACKGROUND: The purpose of the study was to analyze the association between sagittal and transverse dento-skeletal

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malocclusions, ocular motility and convergence disorders in paediatric subjects and to investigate, in an interdisciplinary manner, the association between dento-skeletal and ocular alterations.
METHODS: The initial sample consisted of 101 subjects enrolled in a screening procedure for celiac disease at the University of Rome "Tor Vergata". The application of exclusion criteria (presence of complex craniofacial malformations, syndromes, active orthodontic treatment and scarce collaboration) reduced the initial sample to the final sample of 84 subjects (49 males, 35 females) with a mean age of 7.3±1.7 years (range: 5-10 years). Each subject underwent an orthodontic, orthoptic, and ophtalmological examination. Orthodontic diagnosis was mainly performed on the basis of clinical examination and of dental casts. For each subject were investigated: the dentition phase, the dental class relationships (according to the Angle classification), the transversal relationships, the presence of cross-bite, facial asymmetries, the dental and facial midline, the oral habits. The recorded orthoptic data included to the corneal reflex, Cover test, ocular motility exam and convergence test. Cohen's Kappa test coefficient was calculated to determine the repeatability of the diagnosis in 2 evaluation periods. An analysis of the sex influence on the prevalence of ocular motility and convergence disorders and an analysis of the prevalence of the orthoptic defects into the sagittal and transversal malocclusions were conducted. Pearson's Chi-Square test with Yates' correction and Fisher's exact test were conducted to assess the association between dento-skeletal malocclusion and orthoptic defects (p

Evaluation of a research protocol for monitoring orthodontic tooth movement

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BACKGROUND: The orthodontic movement is associated with a process of tissue remodeling together with the release of several chimical mediators in periodontal tissues. Each mediator is a potential marker of tooth movement and expresses biological processes as: tissue inflammation and bone remodeling. Different amounts of every mediator are present in several tissues and fluids of the oral cavity.
Therefore, there are different methods that allow sampling with several degrees of invasiveness. Chemical mediators are also substances of different molecular nature, and multiple kind of analysis methods allow detection.
In the literature, has not been identified a unique protocol that allows to study the chemical mediators of orthodontic tooth movement. The purpose of the study was develop the best research protocol to study the efficiency of orthodontic movement.
METHODS: A literature review was made on tooth movement mediators, possible sources and methods of sampling, to draft the best protocol for an optimal study on orthodontic movement efficiency. Subsequently we chose the gold standard of each area. IL-1β and OPG were chosen as mediators, GCF as source and paperstrips as method. Samplings were made on upper canines, one banded (test tooth, in ectopic vestibular position), and the controlateral not banded (control tooth). Samples were made in 6 times (T0-T5). Analysis were performed with ELISA test. Plotting absorbance values, in duplicate, the intra-assay variation coefficient was calculated, to provide information on protocol reproducibility and results accuracy. Findings were positive if coefficient was <10%.
The protocol was tested on two female patients, treated with self-ligating brackets. The subjects selected had similar clinical conditions to minimize any variables or factors that might affect the correlation of the results.
RESULTS: The standard deviation (s), the coefficient of variation (CV), and the variance (s^2) are statistical parameters that allow to assess the accuracy of the analytical method. Good performance was demonstrated for both OPG and IL-1β, but better reproducibility was achieved with the OPG assay.
The amounts of each mediator present in the test and control teeth at T1, T2, T3, T4, and T5, were compared with the corresponding baseline values (T0). Graphs of the trends for both mediators were then constructed to evaluate the quantitative variations as a function of time.
CONCLUSIONS: Positive values achieved demonstrate protocol validity. For a better protocol evaluation, studies in triplicate on a wider sample population are necessary. The standardization of sampling will improve the reliability of the results obtained from the analysis of GCF.

High-resolution ultrasound in the early detection and follow-up of morphological alterations of the temporomandibular joint in patients with juvenile idiopathic arthritis

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BACKGROUND: The aim of this work was to evaluate the usefulness of high-resolution ultrasound (US) in the early detection of temporomandibular joint (TMJ) alterations and to show normal and pathological imaging appearance of the TMJ in patients with Juvenile Idiopathic Arthritis (JIA). Although TMJ arthritis in JIA is frequently asymptomatic, the TMJ is particularly susceptible to damage. The TMJ is commonly involved in JIA and can lead to malocclusion, condylar alterations, facial deformity and restricted mouth opening.
METHODS: High-resolution US examinations were performed in 130 patients with JIA. The sonograms were done using General Electric LOGIQ E9 equipment using real-time linear-array transducers with variable frequencies (9-18 MHz) by an experienced radiologist. Longitudinal and transverse view images were obtained. Dynamic video clips demonstrated condylar translation from "closed mouth" position to "open mouth" position. The movements can be recorded and compared between the left and the right side. Color Doppler US images furnish diagnostic information regarding hyperemia and synovial vascularity, thus allowed to study vascular signals in the soft tissues around the TMJ.
RESULTS: In our clinical cases capsular thickness, enlargement of the intra-articular space, joint effusion, osteophytes, irregular condyle shape, disc displacement, erosions, increased color Doppler signals were detected. Limitations were especially related to the scarce accessibility of the medial part of the TMJ structures, and the need for trained operators.

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An important advantage especially in the case of children is that US examination does not require conscious sedation or general anesthesia.
CONCLUSIONS: The prevalence of TMJ involvement in patients with JIA varies widely (17–87%) and it is often asymptomatic even during the acute phase therefore consequently overlooked. Since inflammation in the TMJ can lead to joint deformity, early diagnosis and treatment of TMJ arthritis are particularly important. High-resolution US could be suggested as a screening tool to detect morphological alterations at an early stage of the JIA. Utilization of high-resolution US for TMJ disorder diagnosis in patients with JIA should increase due to relatively low costs and non-invasivity of the method, moreover it is a nonionizing tool. High-resolution US should be used for detecting inflammatory lesions before permanent TMJ destruction occurs, and monitoring disease progression and treatment response for a more effective therapy.

Cephalometric comparison and statistical analysis of orthodontic interceptive treatments with andresen appliance and literature data

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BACKGROUND: The aim of this study is to analyse the dental skeletal short-term effects of Class II malocclusion treatment with functional appliances (in this study the Andresen monoblock appliance) in patients treated during an early growth stage, comparing them to literature data, regarding patients treated during the growth spurt.
METHODS: In this study 14 patients have been selected. All of them presented Class II dental skeletal malocclusion and hypo development of the mandible. They have been treated with Andresen functional appliance and they have been analysed through latero-lateral teleradiographies pre (time T0) and post treatment (time T1).
Cervical vertebral maturation stages analysis has been used to define bone age. On the teleradiographies 15 cephalometric points have been localized. 12 values, regarding sagittal and vertical growth of the mandible and dent alveolar changes, have been evaluated. They have been obtained with functional therapy and taken from digital cephalometric traces. The statistical comparison of pre and post-treatment variables has been carried out at the beginning through t Student test for pair data and later through non-parametric tests due to the scarceness of the sample.
RESULTS: Statistical analysis results highlighted a significant decrease of ANB value, equal to the average of -2,29±3,05° (P<0,05), showing a correction of sagittal maxillomandibular skeletal relation. An advancement of the sagittal mandibular position close to the statistical significance has been observed. The descriptive statistic of the dent alveolar variables highlighted a significant reduction of the overjet (inferior incisors proclination and superior incisors retrusion), between T0 and T1, equal to the average of -4,44±2,36 mm (P<0,05) and of the sagittal molar relationship equal to the average of -4,37±2,25 mm (P<0,05). These results can be overlapped to those found in literature regarding patients treated during the growth spurt.
CONCLUSION: The results of this study show a favourable effect of the Activator, giving an increase of the mandible growth, even though the subjects are in an early growth stage. This is demonstrated by the improvement of the maxillo-mandibular relation, by the reduction of the overjet and by a first class molar relationship. An early treatment of the patients has to be considered a valid choice, also considering a major disposal of time in which the growth can be modified. Statistical significant differences have not been noticed between literature data (patients treated during the growth spurt) and ours (patients treated during an early growth stage).

3D volumetric morphological study of upper airway before and after oral appliance therapy in obstructive sleep apnoea syndrome (OSAS)

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BACKGROUND: Obstructive Sleep Apnoea Syndrome (OSAS) shows apnoea or hypopnea due to upper airways stenosis during sleep with its typical symptoms including snoring during sleep and excessive daytime sleepiness. Cone Beam Computed Tomography (CBCT) is useful to reach an accurate 3D volumetric analysis of upper airways. The oral appliances (OA) are considered to be an effective treatment for Obstructive Sleep Apnea Syndrome (OSAS). The aim is to detect morphological changes in upper airways using CBCT before and after oral appliance therapy.
METHODS: The study included 20 patients (12 males and 8 females). They were diagnosed with OSAS using polysomnography (PSG). Some criteria has been applied to diagnose OSAS: an apnoea-hypopnoea index (AHI) of >5 per hour during sleep and pathological daytime sleepiness. The therapeutic effect of oral appliance was evaluated by using PSG and when it showed an AHI of <10 or a decrease of >50%. Two types of OA were applied: the Mandibular Advancement Device and Twin Block Appliance. These enlarged the upper airways by holding the mandible forward, at the 60-70% of the maximum mandible advancement and at the minimum vertical position. A CBCT was performed in all the patients.
RESULTS: The mean upper airways' 3D volumetric reconstructions increased significantly during the presence of OA *versus* the absence of OA ($p<0.01$). AHI diminished significantly during the presence of OA ($p<0.01$). Oral therapy is effective for treating mild and moderate OSA.
CONCLUSIONS: The advantage of a 3D evaluation of the upper airway during OA therapy is the accurate visual confirmation of morphological changes in each region of the upper airway and it could increase the compliance and motivation of the patients for the treatment. OSAS treatment methods included surgery, nasal continuous positive airway pressure (NCPAP), weight reduction, drug therapy and, in the mild and moderate OSA, the use of oral appliances. CBCT is useful to detect morphological changes od upper airways, by a 3D evaluation analysis during oral devices' use. The management

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of the obstructive sleep apnoea syndrome could be challenging. The treatment recommendations should be proposed by a multidisciplinary approach, that involves different specialists: otorhinolaryngologists surgeons, neurologists, sleep doctors and dentists.

Orthodontic skeletal anchorage: TADS *vs.* osseo-integrated implants.

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BACKGROUND: This clinical evaluation showed the benefits, possibilities and limits of Temporary Anchorage Devices system (TADs) to obtain a rigid skeletal anchorage for tooth movements. These were compared to osseointegrated implants, used as orthodontic anchorage.
METHODS: The study utilized 88 patients, 51 men and 37 women, aged 20 to 49 years. Were inserted 84 mini-implants and 44 fixtures to control anchorage. The mini-implant K1 system consisted of a pure titanium micro anchor screw and an abutment hook. It had 3 lengths (4, 6, 8 mm) with same diameter of 1,2 mm, and needed of two minimal surgical procedures.
RESULTS: Using osseointegrated implants as anchorage there were more problems because of severity of surgery, the discomfort of initial healing, a longer period of treatment time and they could only be inserted in retromolar, tuber and edentulous areas, evidencing limitations for the direction of force application. The use of mini-implants as anchorage in tooth movement, produced a satisfactory result in a short period of time. This is very important for preventing dental, periodontal, esthetical and psychological problems during orthodontic treatment. Teeth can be moved more efficiently because force can be applied directly in the direction of the position indicated by the treatment objectives. Fundamentally, the force system with implants has consistent single forces and by TADs the efficiency of the mechanics is improved. The entire dentition can be moved at one time because the problems related to anchorage are resolved. The teeth can be simultaneously moved there-dimensionally for several treatment objectives, and simplifies control of asymmetric mechanics.
CONCLUSIONS: The new type of anchorage system has overcome the biomechanical limitations of conventional orthodontic mechanotherapy in terms of anchorage. The features of the used implants are: bone anchoring system for orthodontics using mini-implants; effective to orthodontic treatment with intrusion and distalization of maxillary and mandibular anterior teeth; intrusion, mesialization and uprighting of posterior teeth; minimal surgical wound and maximal orthodontic function; temporary use until achievement to orthodontic treatment; effective retraction using specific hook plates; biocompatible pure titanium mini-implant (anchor screw) well-polished and anodic oxidation-treated; simple surgical approach with minimum tissue surgical invasion. The use of mini-implants as temporary anchorage enables to insert an appliance in any aimed position and carries out easily the tooth movement. They are indicated for: dental-skeletal deformities and intermaxillary fixation after orthognathic surgery.

Dietary habits in adolescent patients undergoing fixed orthodontic treatment

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BACKGROUND:To develop a reliable, well readable and easy to complete questionnaire that evaluated the dietary changes during fixed orthodontic treatment in adolescents and that identified the reasons for these changes.
METHODS: An orthodontist and a psychologist developed a questionnaire with answers on a 5-point-scale from "not at all" to "very much". The functional limitation (FL) domain explored how the presence of the fixed appliance (FL1, 5 questions), pain and discomfort from teeth (FL2, 5 questions) or the occurrence of oral ulcerations (FL3, 5 questions) affected the ability to take a big bite, chew hard and soft food, drink and chew against resistance. The dietary modification (DM) domain investigated if the orthodontic treatment (DM1, 11 questions), the difficulty in maintaining a good oral hygiene (DM2, 11 questions), pain and discomfort from teeth (DM3, 11 questions) or eating within and outside of the home (DM4, 11 questions) affected the consumption of raw and cooked vegetables, cheese, cold cuts, meat, fish, pasta, bread, fresh and dried fruit, sweets. Finally, in the snack frequency (SF) domain, subjects were asked whether orthodontic treatment reduced snack frequency (SF1, 1 question) and to what extent this reduction was due to the difficulty in maintaining a good oral hygiene or eating specific food items, the worry about food getting stuck to braces, the presence of oral ulceration or pain and discomfort from teeth (SF2, 5 questions). Patients aged between 11 and 15 years scheduled for fixed orthodontic treatment were recruited. Exclusion criteria were previous orthodontic treatment and psychophysical impairment. The questionnaire had to be administered 1 month after the bonding of brackets and first molar tubes in the upper arch; a 0.012 Australian wire (AJ Wilcock Australin PTY Ltd, Whittleasea, Victoria, Australia) had to be used as first wire.
A preliminary study was performed on 15 consecutive patients that completed the questionnaire twice, first 1 month after bonding and then 2 weeks later, with no procedures being performed between the 2 completions. The time taken to complete the questionnaire was recorded at first completion. Cohen's K was used to determine reliability; readability was assessed using the Gunning's Fog and the Gulpease index.
47 patients collected between November and December 2015 constituted the study sample. After verbal instructions, each participant was given 10 minutes to complete the questionnaire, with an investigator available for clarifications.
RESULTS: The questionnaire had an excellent intra-examiner reliability ($k=0.996$, $p<0.0005$) and readability (Gunning's Fog index=2, Gulpease index=90). Time for completion was 4-10 minutes. 74% of the patients reported a change in dietary habits. The presence of the fixed appliance, pain from teeth and oral ulcerations affected the ability to chew hard foods (100%, 100%, 77% of the participants respectively), to chew against resistance (100%, 100%, 91%) and to take big bites (97%, 100%, 89%). Patients avoided raw vegetables (97%), dried fruit (97%), bread (77%) and meat (71%) due to pain. The consumption of dried fruit, sweets and meat was reduced also for the difficulty in maintaining a good oral hygiene (83%, 83%, 69% respectively). Snack frequency was reduced in 77% of the participants due to pain from teeth (100%) and worry about food getting stuck in the braces (96%).

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CONCLUSIONS: A reliable, well readable and easy to complete questionnaire was developed to evaluate dietary changes in orthodontic patients. Adolescents changed their habits after 1 month of treatment. The study highlights the need to explore these dietary changes during later stages of treatment.

Telemedicine: a new approach to orthodontic "emergencies"

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BACKGROUND: To ensure the success of orthodontic therapy, it is vital that the practitioner establishes good communication with his patients. Telemedicine is an innovative method of achieving this at distance, and may even be used to change the nature of the orthodontic 'emergency', allowing the practitioner to diagnose the problem and decide whether it can be self-managed by the patient or will warrant a trip to the clinic. We therefore set out to test this theory, after conducting a review of the literature to determine the state of the art, by recruiting a small group of orthodontic patients, who were asked to avail themselves of a pilot 'videoconsulting' service and score their satisfaction of the same.
METHODS: The PubMed/Medline, Google Scholar and Cochrane Library databases were searched for the key words "telemedicine", "teledentistry" and "orthodontics", and the resulting literature reviewed. Subsequently twenty-five patients fitted with orthodontic appliances (twenty conventional and five lingual) in possession of a smart-phone, were provided with a toolkit designed to allow them to self-manage the most common orthodontic 'emergencies'. They were then asked to rate the service they received at their next check-up by means of a purpose-designed questionnaire.
RESULTS: All patients contacted their orthodontist regarding a problem with their appliance. Each video-call was made without connection problems, and both audio and video were high in quality without evident distortions. The picture quality, although not HD, was good enough for the orthodontist to diagnose the nature of the problem in all cases.
The most common complication was a loose ligature (9 cases out of 25), followed by soft tissue irritation (6 cases out of 25). Seventeen of the twentyfive patients were able to remedy the problem by themselves, at home, while 8 had to come into the surgery for professional help. It transpired that lingual appliances were more difficult to resolve, with 40% of patients being unable to do this alone, with respect to 30% of patients fitted with conventional appliances. That being said, two out of the three patients with lingual braces who managed to resolve their own problem were 23 and 24 years old, considerably above the mean age of the sample (14.2 years old). The emergencies most often resolved by the patients themselves were loose brackets and impacted food (100 per cent of cases resolved). Soft tissue irritation was resolved in 67% of cases, loose ligature in 45%, and intrusive wire 33%. The average satisfaction score given by the patients was 7.56. No patient deemed the procedure unsatisfactory.
CONCLUSIONS: Telemedicine appears to be an easily applicable tool in dentistry and, in particular, orthodontics. Not only does this approach facilitate interaction between patient and practitioner, but it also opens new vistas in information sharing among professionals, and consents considerable savings in chairside times and costs, a boon for both patient and clinician. The questionnaire compiled by our patients showed that video-consultation was well received by the patients, many of whom were able to resolve their own problems without the need for a trip to the clinic. Nevertheless, it is essential that the medical-legal aspects of such a technique are thoroughly investigated and catered for, particularly as regards information sharing between clinician and patients below the age of consent, and that such an intervention has no hidden consequences on the final outcome of therapy.

Clinical magement of periodontally comprimised patients trough a combined orthodontic. Surgical approach

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BACKGROUND: The combined orthodontic-surgical treatment is required in several cases in order to improve and correct periodontal defects hence obtaining proper functional and aesthetic results. There are specific clinical situation where the orthodontic treatment is advocated, those are presented by: occlusal trauma, pathologic tooth migration, stabilized deflecting pre-contacts, deep bite associated to direct periodontal and dental trauma, diastema, edentulous sites and molar mesioinclination.
METHODS: Three case reports of orthognatic-surgical patients, who present also periodontal health status impairment, treated at the Orthodontic department of Policlinico Umberto I - Sapienza - University of Rome, are presented as an example of orthodontic treatment performed in order to correct those clinical situations to preserve and improve the periodontal tissues' health.
DISCUSSIONS: The combined orthognatic-surgical therapy can be used to correct skeletal and occlusal discrepancies that have caused periodontal tissues' damages. Limiting factors of combined orthognatic-surgery in periodontally compromised patients are: pocket depth $\geq$ 4mm, bleeding on probation, high plaque index, thin and highly scalloped periodontal biotype, diabetes, smoke (over 10 cigarettes per day), high dental mobility before orthodontics, stabilized and persistent occlusal trauma and low patient's compliance.
CONCLUSIONS: A multidisciplinary ortho-surgical approach in periodontally compromised patients is indicated in specific cases when untreated dental and structural- skeletal malposition results in worsening of periodontal health status. Orthodontic treatment alone, in selected cases without severe dental- skeletal discrepancies, can be effective to improve periodontal tissues' health.

An aesthetic version for the Carriere Distalizer

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BACKGROUND: The recent increasing demand for aesthetic orthodontic treatments stimulates researchers and clinicians to develop new strategies for improving patient compliance and producing less invasive appliances.
The Carriere Distalizer is a non-invasive appliance developed

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to correct Class II malocclusions through the rotation and uprighting of the maxillary first molars. Therefore, the device can induce a distalization of dental posterior segments.
The present study aims to test several aesthetic materials used for covering the Carriere Distalizer in order to improve its aesthetic features.
METHODS: Four types of material of common use in dentistry were selected. A specific coating technique was used for each material. All tests were carried out by using Carriere Motion Appliance Distalizer (size 25 mm).
In the first test, 6 grams nanoparticle titanium dioxide were dissolved into 10 ml of acetic acid (pH 3); the Carriere Distalizer was immerged in such a suspension and heated at 450 °C. In the second test, silicon dioxide has been prepared with tetraethyl orthosilicate (TEOS) by sol-gel process with a base-catalyzed hydrolysis in order to keep a relatively low temperature (150 °C). In the following test, low fusing porcelain (leucite reinforced pressable glass ceramic) was investigated: a stratification technique consisting of an opaque layer covered by two aesthetic layers (dentin and enamel) and reaching a temperature of 760 °C was used. For the last test, a stratification technique was used to apply a composite flow (BisGMA filled with silicon dioxide 74 %): a three layers coating was obtained by polymerization.
Tests about released ions were carried out by immersing 8 Carriere Distalizers (4 coated by composite flow and 4 uncoated) in artificial saliva at different time intervals; potential composition changes relative to the coating presence were investigated by environmental scanning electron microscopy.
RESULTS: All tested materials had a good aesthetic aspect. However, only the composite flow and the low fusing porcelain proved an adequate adhesive capacity, while titanium dioxide suspension and silicon dioxide sol-gel presented a not stable, not uniform and uncompleted adhesion. Furthermore low fusing porcelain showed an irregular coating with cracks. Therefore, the composite flow resulted the only one characterized by a homogenous coloring and eligible for color stability assessment.
CONCLUSIONS: The reported evaluations identified the composite flow as the only possible candidate for aesthetic Carriere Distalizer covering. Results are encouraging even though further *in vitro* studies on composite flow are needed to assess color stability and mechanical stress.
Future development should focus on *in vivo* test and on the research of suitable biocompatible materials not used in dentistry field.

Maxillary molar distalization with palatal miniscrews: from literature to the clinical case

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BACKGROUND: Our objective was to investigate the dental effects of pendulum anchored on miniscrews. Although the current studies suggest that these appliances might be effective in moving molars distally it's important to investigate also other aspects of distalization: type, rate and duration of molar movement and if the movement presents side effects on other teeth. We compared the clinical case to a systematic review of studies about the distalization of teeth with appliances reinforced with temporary skeletal anchorage devices. So we examined dental, skeletal and soft tissues effects of a Bone Anchored Pendulum Appliance (BAPA).
METHODS: The analysis was conducted on Pubmed (Medline) with the words mini implant, miniscrew and molar distalization to identify all articles reporting on the use of orthodontic implants or miniplates in distalization of teeth until the second week of March 2016. We finally selected sixteen articles. Then the results were clinically compared with a case of Dental Class II Malocclusion, normodivergent patient with buccally impacted maxillary canines who was treated using a Pendulum anchored on 2 mini-implants with rests on maxillary premolars. For the study lateral cephalograms before treatment and at the end of distalization were measured, and all differences evaluated for a complete interpretation. We conducted a modified Gosh and Nanda cephalometric analysis with angular and linear measurements. Cranial base superimpositions (CBS) were used to evaluate dentoalveolar, craniofacial and soft tissue changes according to Bjork and Skieller. We evaluated the distance from the center of the crown of the upper first molar from the PTV and from the bispinal plate and angulation on SN plane before and after treatment
RESULTS: The distalization time was 6 months. Superimpositions showed that the maxillary first molars distalized of 4 mm between T1 and T2, comparing with an average of 4.8 mm, 5.5 mm and 3.2 mm respectively for BAPA (Bone Anchored Pendulum Appliance), MGBM (Maino, Gianelly, Bednar, Mura System) and DS (Distal Screw) groups; distal molar tipping was 14°, comparing with an average of 9,1°, 10,3° and 3°respectively for BAPA, MGBM and DS groups. Maxillary first premolar showed a mesial movement of 3 mm with a mesial tipping of 10°, comparing with a mesial movement and tipping respectively of 1.4 mm and 4,4° in the MGBM; on the contrary, first premolar showed a distal movement of 2.2 mm and tipping of 6.2°, in the DS. There was a mean flaring of maxillary incisors: mesial movement and tipping respectively of 5 mm and 5°. We observed also a slight opening of the mandibular plane angle (2°) which correlates with an extrusion of first and second maxillary molars (both 1 mm). No changes of soft tissues were observed. The upper lip moved slightly forward relative to the E-plane as in both MGBM and DS, whereas the lower lip was insignificantly retroclined in all the groups.
CONCLUSIONS: We observed anchorage loss, flaring of maxillary incisors and premolars mesial tipping. Our results are in partial accordance with the literature. This could be due to the presence of rests on premolars realizing in this way a "mixed anchorage". Other studies are necessary to evaluate biomechanics efficacy and efficiency of movement. Future studies are necessary to evaluate the correlation between the degree of eruption and the distal tipping.

Soft tissue changes following the extraction of premolars in nongrowing patients with bimaxillary protrusion

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BACKGROUND: Bimaxillary protrusion is a condition characterized by protrusive and proclined upper and lower

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incisors and an increased procumbency of the lips. This condition generally is seen in African American and Asian populations, but it can be found in almost every ethnic group.
Because the teeth have a normal molar relationship and a relatively normal overbite and overjet, some clinicians in the past considered these cases to be in perfect harmony and balance with their physiognomy. Actually, in most cultures, the negative perception of protruding lips and an overly protrusive dentition leads many patients with bimaxillary protrusion to seek orthodontic care to decrease this procumbency. To achieve this objective, four-premolar extraction is planned to create room for retraction of the anterior teeth.
However, it is a debatable issue whether or not there is an exact relationship between the changes in hard and soft tissue. Current orthodontic literature can be categorized into two major schools of thought. Some studies have reported a high degree of correlation between upper incisor and lip retraction, suggesting a close relationship between soft tissue and the under- lying hard tissue. Others have found that a definite proportional change in the soft tissue does not necessarily follow changes in the dentition.
A systematic review of the available literature on this topic could be of help in decision making regarding extraction for patients affected by bimaxillary protru- sion and in determination of the amount of incisor retraction required to reduce lip procumbency, but such a review has never been published. In this respect, because of the increasing demand for orthodontic treatment in nongrowing patients for esthetic reasons, and the need on the other hand for clinicians to somehow forecast therapy outcomes, it seems useful to summarize the existing literature on the topic. Therefore, the present study was undertaken to evaluate short-term perioral soft tissue changes on lateral cephalograms in patients with bimaxillary protrusion who had nearly completed active growth and were treated by extraction of the four premolars.
To quantify the amount of perioral tissue changes following the extraction of four premolars in patients with bimaxillary protrusion who had nearly completed active growth.
METHODS: A literature search was conducted to identify clinical trials that assessed cephalometric perioral soft tissue changes in patients affected by biprotrusion and treated with extractions. Electronic databases (PubMed, ISI WoS Science Citation Index Expanded, and HubMed) were searched. Abstracts that appeared to fulfill the initial selection criteria were selected, and the full-text original articles were retrieved and analyzed. Only articles that fulfilled the final selection criteria were finally considered. Their references were also hand-searched for possible missing articles from the database searches.
RESULTS: Nine abstracts met the initial inclusion criteria and these articles were retrieved. From these, five were later rejected mostly because the sample dealt with growing subjects. Four articles remained and they showed that the upper and lower lips retracted and the nasolabial angle increased following premolar extraction. Upper lip retraction ranged from 2 mm to 3.2 mm, lower lip retraction ranged from 2 mm to 4.5 mm.
CONCLUSIONS: The lip procumbency improves following the extraction of four premolars and this improvement is predictable. However, the changes are small and do not dramatically modify the profile. A ''dished in'' profile is not to be expected. Individual variation in response is large.

Condyle fossa relationship associated with functional posterior crossbite, before and after rapid maxillary expansion

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BACKGROUND: To investigate condylar symmetry and condyle fossa relationships in subjects with functional posterior crossbite comparing findings before and after rapid maxillary expansion (RME) treatment through low-dose computed tomography (CT).
METHODS: Twenty-six patients (14 girls and 12 boys, mean age 9.6±1.4 years) diagnosed with Angle Class I malocclusion, transverse maxillary deficiency and functional posterior crossbite (FPXB) underwent rapid palatal expansion with a Hyrax appliance. Activation protocol required the screw to be turned three times per day (0.25 mm per turn) for an average of 18 days, for all subjects. Patients' temporomandibular joints (TMJ) underwent multislice low-dose CT scans before rapid palatal expansion (time T0) and again at the end of the active expansion phase (time T1) without removing the expander. The CT images were obtained with the patients in maximum intercuspation. Patients were scanned in the supine position with shoulder rests, as well as having their head positioned with a Camper's plane perpendicular to the ground. Data of each patient were reconstructed with 0.5mm slice thickness and visualized by using the OsiriX medical imaging software program. Joint spaces were compared with those of a control sample of 13 subjects (7 girls and 5 boys, mean age 11±0.6 years). Data were analyzed statistically and every measurement was made twice by the same blinded observer with a 2-week interval between the first and second reading, thus eliminating interobserver error. The average value of the first and second readings was used. Descriptive statistics (mean, standard deviation) were calculated separately on the FPXB side condyle, non-crossbite side condyle, and control condyles.
RESULTS: Anterior joint space (AS), superior joint space (SS) and posterior joint space (PS) measurements at T0, between the FPXB side and contralateral side, demonstrated no statistically significant differences. After RME treatment (T1), all three joint spaces increased on both the FPXB side and the non-crossbite side. However, differences were statistically significant only for the SS when comparing the two sides at T1. SS increased more than AS and PS in the non-crossbite condyle (0.28 mm) and FPXB condyle (0.37 mm), and PS increased only on the FPXB side (0.34 mm).
CONCLUSIONS: There were no statistically significant differences in condyle position within the glenoid fossa between the FPXB and non-crossbite side before treatment. Increases in joint spaces were observed after treatment with RME on both sides. These changes were, however, of small amounts.

Dental monitoring system: a future for orthodontist?

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BACKGROUND: Dental Monitoring is a system to ensure doctors maintain perfect control over the progress of any orth-

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odontic treatment, from the first consultation to the retention period. For the first time, dental movement is measured and quantified in between appointments and communicated to the orthodontist, for optimized schedules. Of course, unexpected situations can always arise. With new data points as often as every week during active treatment, Dental Monitoring allows early assessment and adaptation to all situations before they become problems.
METHODS: Dental Monitoring is divided in three integrated platforms: a mobile application for the patient, a patented movement tracking algorithm, and a web-based Doctor Dashboard where practitioners receive updates of their patients' evolution.
The Dental Monitoring app for patients is a revolutionary tool designed to help patients capture dental pictures easily and efficiently. Developed for Android and iPhones, the app guides the patient through the process of taking the pictures on a regular schedule suggested by Dental Monitoring and refined by the doctor according to their prescription.
RESULTS: The multi patented tracking algorithm was developed using the latest advances in machine vision and metaheuristics. All calculations start with a 3D model of a patient's teeth, provided to Dental Monitoring by their orthodontist. Uploaded to our servers, this 3D model will serve as the first reference point and define the baseline tooth position.
When the patients take photo exams, the pictures are uploaded to our servers and verified to ensure their quality is sufficient to be processed by Dental Monitoring algorithm.
Then, Dental Monitoring's patented algorithm is able to calculate tooth movement with high precision, for all 6 orders. This advanced technology ensures results with a precision of less than one tenth of a millimeter, and less than 0.5° for tip and torque.
After analysis, the results are checked by a team of Dental Monitoring doctors to qualify their clinical pertinence.
Finally, the results are presented to the doctor on a web-based Dashboard in the form of graphs, photos and a unique 3D visualisation of current tooth position called the 3D Matching.
CONCLUSIONS: When the analysis is complete, all results are uploaded to the online Doctor Dashboard. The orthodontist is notified that new results are available and whether alerts have been detected.
The Doctor Dashboard is fully web-based and necessitates no installation of software. Each patient file is regularly updated with graphs, photos, and our unique system of 3D Matching.

Evaluation of oral appliance device in patients with obstructive sleep apnea syndrome: an experimental study

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BACKGROUND: The most recent classification was published in 2005 and was entitled "International Classification of Sleep Disorders: Diagnostic and Coding Manual" describe the obstructive sleep apnea syndrome (OSAs) by recurring episodes of complete or partial upper airway collapse during sleep, resulting in snoring and apneas or hypopneas. The apnea is defined as a reduction in airflow greater than ≥ 90% of baseline and with duration ≥ 10 sec, differently the hypopnea presents a reduction in airflow ≥ 35% from baseline and with reduction in saturation at least ≥ 4% from baseline SpO_2% prior to the event. The aim of this work is to attempt the correct therapy, surgical or with intraoral device, to individual OSAs deseas.
METHODS: Actually, continuous or bi-level positive airway pressure (CPAP/biPap) represent the gold standard in the treatment of obstructive sleep-related breathing disorders. CPAP and surgery treatment require a great patients collaboration. Many authors treat not severe OSAs with Mandibular Advancement Devices (MAD) or Tongue Positioner Device (TPD). Criteria selection of treatment is related to the sleep evaluation with a portable device, a cephalometric evaluation and upper airway space evaluation on latero-lateral head film not in supine position and in some case the drug-induced sleep endoscopy.
RESULTS: In this experimental paper, authors shows two cases of a new method of criteria selection of oral appliance use in OSAs treatment using a supine lateral head film and the drug induced sleep endoscopy done with Tongue Positioner Device (TPD) and Mandibular Advancement Device (MAD). In close collaboration with maxillofacial team we can analyzed the shape of the high and low palate, retropharyngeal collapse, and lingual collapse caused by apnea induction. Immediately we could value the oral breathing change. This study allows us to confirm the utility of MAD or TPD is determinated from lingual collapse, supporting the urgency of maxillofacial surgery in retropharyngeal collapse.
CONCLUSIONS: OSAs is a high social impact and quality of life disease. It is important to be able to reduce or at least stabilize the obstructive apnea. In this paper we want to understand objectively what is the best therapeutic synergy between the surgical choice and the use of intra-oral device.

Accelerated orthodontic tooth movement and corticotomies: the search for the ideal protocol. A literature review

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BACKGROUND: A literature review was performed to examine the evidence for the effectiveness and safety of corticotomy-facilitated orthodontics.
METHODS: PubMed, Embase, and Cochrane databases were searched until April 2016 for articles that examined the rate of corticotomy-facilitated orthodontic tooth movement, reduction of treatment duration, and periodontal and tooth complications. There were no language restrictions during the search phase. Randomized clinical trials (RCTs) and controlled clinical trials (CCTs) were considered. Two article reviewers independently assessed the search results, screened the relevant articles, performed data extraction, and evaluated the methodologic quality of the studies.
RESULTS: Eighteen articles met the inclusion criteria. Seven studies were clinical trials, with small investigated groups. Only studies of moderate and low values of evidence were found. All publications reported temporarily accelerated tooth movement after surgery. Corticotomy procedures did

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not seem to produce unwanted adverse effects on the periodontium, root resorption, and tooth vitality.
However, the level of evidence to support these findings is limited owing to shortcomings in research methodologies and small treated groups. No research concerning long-term stability could be included.
CONCLUSIONS: Corticotomy procedures can produce statistically and clinically meaningful temporary increases in the rate of orthodontic tooth movement with minimal side-effects. This can effectively shorten the duration of orthodontic treatment. Additional high-quality randomized clinical trials are needed to allow more definitive conclusions.

Early functional therapy of HFM. The L.A.1 - L.A.2 combined treatment. Stability at distance

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BACKGROUND: The pseudo hemimandibular hypoplasia is a kind of mandibular hypoplasia who presents a particular mandibular morphology: a condylar - coronoid collapse (ccc) and no soft tissuess involvment. The objective of this work is to present a new appliance (L.A.1 - L.A.2) for early functional treatment of HFMccc
METHOD: In the literature different appliances are reported, but protocols and timing of procedures for treatment of this pathology are controversial. In this work we suggest a new protocol in order to treat the HFMccc very early (before age of school) and we show 2 combined appliances: L.A.1 that increases the vertical lengthening of mandibular ramus of affected side. L.A.2 that allows changes on morphology of condyles and create a new glenoid cavity (who is absent in these deformities). This appliance is patented PCT/IB2015/000277 - International publication under n° WQ2015/132649 - WIPO - GENEVE).
RESULTS: The successful of these appliances is showed in the clinical evaluation and x-ray record. After almost 20 months of therapy the asymmetry of patient is corrected. The compliance of patient is low:he wears that only on the nigth. The activation of this functional appliance is during swallowing. Lastly it is very easy to apply and it avoids surgical treatment
CONCLUSIONS: In the HFMccc cases this treatment allows to correct asymmetry and recreates the morphology and the function absent on TMJ affected. In fact after therapy we observe a new glenoid cavity, a growth of condyles and changes on morphology of coronoid process. Results are stable at distance.

"Difficult-to-treat" OSAS and possible role of combined CPAP and MAD therapy: clinical case

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OSAS (Obstructive Sleep Apnoea Syndrome) is characterized by recurrent episodes of partial or complete upper airway collapse during sleep with consequent oxygen desaturations and cardiovascular, neurological and metabolic impairment. The role of dentistry in diagnosis and treatment is expanding but evidence-based recommendations on therapeutic options in patients affected by severe OSAS indicate that CPAP (Constant Positive Airway Pressure) administered by mechanical ventilation through a nasal or facial mask is the first line choice, capable of a prompt restore of upper airways patency. Unfortunately a large percentage of patients refuse or discontinue ventilatory treatment with serious clinical consequences, mainly for claustrophobia and intolerance to the high pressures of exercise of the ventilators, necessary for preventing occlusion of upper airways. Alternative therapeutic options include MAD (Mandibular Advancement Devices), which are better tolerated than CPAP and show good compliance in real-life studies. Overall efficacy of MADs has been proven in achieving a 50% reduction of AHI (Apnoea – Hypopnea Index) with parallel reduction in snoring, excessive daytime sleepiness, neuropsychological function and cardiovascular risk. Side effects such as pain in the teeth and jaws are mostly mild and short-term compliance is reported to be very high while long-term compliance (after > 2 years) is approximately of 50%, thus higher than CPAP. However guidelines suggest oral appliances in moderate OSAS without respiratory failure only or as a second-choice option in patients who refuse CPAP. Recent researches suggest that combined use of CPAP and MAD in a particular subset of OSAS patients could represent a further option, since improvement of pharyngeal patency secondary to mandibular advancement might allow use of lower pressures of CPAP resulting in better adhesion to ventilatory treatment proven that high pressures and flows represent major causes of CPAP discontinuation. We present a clinical case of a patient with severe OSAS and high risk metabolic syndrome, obesity, macroglossia, increased volume of soft tissues previously treated with surgical uvulo-palatopharyngoplasty, non-compliant to CPAP because of high pressures of the ventilator, who has shown good response to a combined treatment with low-pressure CPAP and MAD, suggesting a possible role of oral appliances in allowing more comfortable exercise pressure of ventilators due to geometrical improvement of upper airways patency.

Proposal of a new method for the evaluation of risk and early treatment of malocclusion in childhood

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BACKGROUND: The aim of this study is to propose some forms in order to assess the risk of malocclusion and to give recommendation for preventive and therapeutic interventions in children, both for primary, mixed, and permanent dentition. These forms can be used to prevent malocclusion by the identification of the risk factors and the early signs of malocclusion, and to establish the procedures for treatment. Early removal of the functional causes of malocclusion, such as oral breathing, thumb or fingers sucking habits, are essential for prevention, in order to promote a correct and harmonic growth of the craniofacial complex, since early childhood. Otherwise, when signs of malocclusion are recognized, the early treatment is recommended.
METHODS: Since risk factors and signs of malocclusion have

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a different significance in the various stages of growth, two distinct forms have been realized. Therefore these two forms can be specifically used in two ages: between three and six years, and older than six years. For the construction of the forms, we used the Baby ROMA Index, the ROMA Index and the "National Guidelines for the promotion of oral health and prevention of oral diseases in children" (Italian Ministry of Health, November 2013). These documents were used as a reference to establish the risk factors, the early signs of malocclusion, the rate of risk (low, moderate, high), the recommended preventive and therapeutic interventions, and the timing control.
RESULTS: These new forms helps the clinicians in the patient management, in order to prevent the malocclusion or to treat it early. The "form for the evaluation of the risk" defines the risk of malocclusion (as: low, moderate or high), identifying functional, occlusal, dental and protective factors. The "form for recommendation of preventive and therapeutic interventions" defines the control timing and the recommended orthodontic procedures, basing on the previously established rate of risk. Each of these forms are related to two different ages. The protocol in their use requires to applicate first the risk evaluation form, and after the intervention form.
CONCLUSIONS: the forms we made are an effective tool for managing young patients, in the context of the malocclusion prevention, and they are realized on a solid epidemiological basis. They can be used by the general dentist, the pedodontist, the orthodontist, and also by the pediatrician. Moreover they are a motivational tool that can be provided to young patients' parents.

Orthodontic treatment need in a sample of preschoolers

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AIM: The aim of the study is to estimate the prevalence of malocclusion and of risk factors, and to evaluate the need for orthodontic and dental treatments in a sample of Italian preschoolers. The study is carried out using dmft (Decayed Missed Filled Teeth score) and Baby ROMA Index (Baby Risk Of Malocclusion Assessment Index); this index, in particular, is a specific tool for children in complete primary dentition that allows the early diagnosis of a developing malocclusion. It measures many occlusal, skeletal and functional parameters that may represent negative risks for the physiological development of the oral-facial system. Furthermore it indicates the need of preventive or interceptive orthodontic treatment in a score scale.
METHODS: Baby ROMA Index and dmft were used in examining 100 children aged between 2 and 6 years, and in complete primary dentition or early mixed dentition. Malocclusion signs and caries were registered by a calibrated operator. A cross-sectional study was realized. After data collection, the prevalence of malocclusion, the distribution of the most frequent signs and symptoms of malocclusion and the dmft score were computed.
RESULTS: The results showed that functional problems (parafunctions, sucking habits, oral breathing and OSAS) have the highest prevalence (46%). 33% of patients are affected by moderate to severe malocclusion (grade 3, 4 and 5 of the index). 9% has a score of 3, 21% has a score of 4 and 3% has a score of 5. 14% of the children have caries and early loss of deciduous teeth, and the average dmft score is 1.57 (with 20 as maximum value registered in the sample). 17% of the children have bad habits and 21% has mouth breathing, frequently associated with different severity of respiratory diseases. Furthermore 24% of the children shows parafunctions, such bruxism and jaw clenching. Open bite (12%), crossbite (12%), increased overjet (9%), reduced overjet (4%) and increased overbite (12%) are the most frequent features founded.
CONCLUSIONS: Baby-ROMA Index is based on the risk that a malocclusion observed in very young children may worsen over time and lead to a damage to health and function of the mouth. Our study shows that 24% of the children need a straight forward orthodontic treatment (score 4 and 5). The 55% of the sample require periodic follow-up and are likely to commence an orthodontic therapy at a later stage (scores 3 and 2). It is important to identify the risk of developing a malocclusion with the aim to determine if the patient needs an interceptive orthodontic treatment at early age or if you can wait until maxillo-facial growth and dentition have fully developed before orthodontic treatment. Furthermore 14% of the children have caries and some of them reported extremely high values of dmft score. This suggest the need to develop screening programs and appropriate preventive and health care programs in pediatric dentistry and in orthodontics. In fact some occlusal characteristics in deciduous dentition persist into mixed dentition and early treatment may reduce the severity of the malocclusion at a later stage. For these reasons preventive and health care programs in pediatric dentistry and in orthodontics should be intensified, raising awareness among parents, pediatricians and general practitioners.

Evaluation of the stability of the A0630 screw after rapid maxillary expansion: a prospective clinical trial

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BACKGROUND: In modern orthodontics rapid maxillary expander (RME) has achieved a prominent role as a safe and effective appliance to correct transversal maxillary deficiency. The screw of the RME is commonly blocked with composite or a stainless steel ligature after the desired expansion has been achieved. This procedure is performed in order to prevent relapse due either to the forces generated by stretched tissues of the enlarged maxillary bone trying to return to their previous state or to back-turning from manipulation by the tongue. The aim of this prospective clinical study was to assess the stability of the A0630 screw (Leone Orthodontic S.p.A., Firenze, Italia) 6 months after the end of the active phase of treatment when it is not blocked.
METHODS: The sample of the study included 32 patients treated consecutively with the Hyrax rapid maxillary expander (RME) with A0630 screw at the University of Florence. The mean age of the selected patients was 7 years ± 6 months. After the application of the RME the parents were instructed

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to activate the expansion screw (1 activation per day, 0.2 mm) until the overcorrection of the transversal deficiency was achieved. At the end of the expansion phase (T1) the RME was not removed and the screw was not blocked with composite or stainless steel ligatures. At this time a silicone impression (Silicone C Zetaplus, Zhermack S.p.A. Rovigo, Italia) of the screw was taken for all patients. During the retention phase, the patients were monitored once a month. After 6 months another silicone impression of the screw was taken (T2). The silicone impressions at T1 and T2 were evaluated by means of a dental caliper to assess the stability of the width of the screw during the T1-T2 interval.
RESULTS: All the 32 patients completed the treatment. The measurements at T1 perfectly matched those at T2 for all patients. Since there had been no relapse in any of the patients, no further statistical analysis of the results was required.
CONCLUSIONS: The A0630 screw is able to maintain during the retention phase the amount of expansion achieved after the active phase of rapid maxillary expansion. This prospective clinical study shows that locking the expansion screw could be considered an unnecessary procedure.

Evaluation of the effectiveness of myofunctional therapy using 3D-stereophotogrammetry

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AIM: Myofunctional therapy is used to recover the normal functionality of the oral and perioral muscles, to adapt normal tongue position and to discourage socking habit. In most cases it's possible to obtain a proper restoration of the orofacial physiological kinetics and normal oral functions such as swallowing, breathing and articulation. The aim of this study is to evaluate the effectiveness of a specific myofunctional therapy protocol, trought the use of the three- dimensional stereophotogrammetry.
METHODS: We analyzed ten patients, five males and five females, in treatment at the "Agostino Gemelli" University Polyclinic, department of Orthodontics, aged between 6- 12 years old at the beginning of treatment. Inclusion criteria were: atypical swallowing, muscular hypotonia and lip incompetence. The diagnostic protocol consisted of: intraoral and extraoral photos analysis before and after therapy, fluorescein test before and after therapy, evaluation of the orbicularis muscle strength before and after therapy using a dynamometer, and three-dimensional stereophotogrammetry before and after therapy. Treatment protocol consisted of some exercises for the myofunctional rehabilitation. This therapy is easy to learn and perform and it's based on simple coordinated movements of the different orofacial area segments. The patients have been instructured to perform the exercises every day for three months. The second three- dimensional stereophotogrammetry image was superimposed on the first image of the face and then the colorimetric map pointed out the differences of the surface. Three- dimensional photogrammetric scanning system is used to obtain precise landmark measurements, without any physical contact, using a noninvasive digital photogrammetric solution.
RESULTS: The speech therapy gives excellent results if properly executed and customized. After a cycle of speech therapy the orbicularis muscle strength increases and a good lip seal can be obtained in all patients. All the sample has become aware of the swallowing districts correct posture. Post treatment three- dimensional stereophotogrammetry shows an increase in the perioral muscles tone.
CONCLUSIONS: Three- dimensional stereophotogrammetry shows the effectiveness of myofunctional therapy that is an important support to the cranio-mandibular-occlusal complex development. This therapy is indispensable to achieve a stable and long-lasting therapeutic outcome. A multidisciplinary approach with cooperation among the medical staff and the compliance of the patient and his family in carrying out the home therapy are crucial to the success of the treatment.

Different postural stability in children and adults with symmetrical and asymmetrical dental occlusion

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BACKGROUND: Posture and dental occlusion is a current debated topic with conflicting results, many doubts and insufficient scientific protocols. Few studies have compared postural effects of dental occlusion between adults - who have a compensatory stabilized system - and children who show a dynamic system in continuous development.
The aim of this study was to test the hypothesis that dental occlusion influences postural stability of the whole body, in children and adults.
METHODS: Sixty-one children (32 males and 29 females) (Group 1), aged between 8 and 14.5 years old, affected with symmetrical (n= 12- Group 1A) and asymmetrical (n= 49 - Group 1B) occlusion were selected and compared with 46 adults (19 males and 27 females) (Group 2), aged between 14.5 and 42 years old, with symmetrical (n= 29 - Group 2A) and asymmetrical (n=17 - Group 2B) occlusion. We employed the cervical vertebral maturation method (CVM) in order to determine individual skeletal maturation age. Subjects of Group 1 had not reached skeletal maturation yet, while those of Group 2 had passed the pubertal growth spike.
The inclusion criterion for Group 1A and 2A was a symmetrical molar class. The inclusion criteria for Group 1B and 2B were: unilateral crossbite and asymmetrical molar class. Subjects with any symptom of dental or orofacial pain, craniomandibular disorders, congenital craniofacial malformations or injuries, ocular, vestibular or neurologic dysfunctions, vertigo, articular trauma and past maxillofacial surgery have been excluded from this study.
Participants have been selected among patients of the Orthodontics Department of Turin University or students in the same university. All subjects underwent a posturometric and stabilometric analysis using a Lizard Ultimate® platform. Two open-eyed tests were performed, with two different mandibular positions: rest position firstly, then maximum intercuspation. Every test was perfomed two times, the first lasting 25 s, the second 50 s. Two stabilometric parameters were evalated: sway area and velocity. Stabilometric area expresses the capacity of postural system to maintain the centre of gravity close to its average balance position. The velocity variance indicates the presence of balance and harmony of postural receptors. Little values of speed variance suggest slow oscillating movements, lower total energetic cost and postural equilibrium.

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Categorical variables were analyzed by cross-tabulations using ANOVA test. P value <0.05 was considered significant.
RESULTS: Group 1 showed statistically significant differences of both the sway area and velocity comparing the recordings in rest position and maximum intercuspation.
All tests showed important significant differences (p= 0.000001) between Group 1 and Group 2, both in terms of sway area and velocity.
The results showed no statistically significant differences (p>0.05) between symmetrical and asymmetrical malocclusions in both groups.
CONCLUSIONS: The influence of occlusion and the greater sway area and velocity variance detected in children exemplified the capacity during growth to automatically and continuously modify motility and posture control. The lack of the occlusal influence and the smaller sway area and velocity variance in adults is due to a compensatory system that enables immediate strategies of balance keeping, not easy to modify. Children still have an enormous capacity of adaptation. For this reason, the early correction of children malocclusions might be important to improve posture, influencing postural stability and avoiding irreversible compensation in adulthood.

Pain and rapid palatal expansion: systematic review

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BACKGROUND: Rapid maxillary expansion is a common orthopedic-orthodontic treatment used to correct a reduced maxillary width. Clinicians using RPE (rapid palatal expansor) procedures are aware of children frequentely report pain during the active expansion time of treatment. Numerous articles have reported the pain associated with various types of orthodontic procedures. The aim of this work is to investigate the current scientific literature regarding the connection between pain and RPE appliance.
METHODS: The Authors examined Medline/Pubmed electronic database using keywords "rapid*", "palatal*", "expansion*" and "pain*" in Dental Journals category. Fixed the following exclusion criteria: not in English papers, reviews, works on surgical expansion, just five articles fulfilled the corresponding inclusion criteria, and the full-texts were assessed.
Results: In all the works analyzed pain was assessed by the use of self-assessment methods, or pain scales. Two of the five studies considered in the present review compared the different pain in two different activation protocols (Needleman HL *et al*, 2000; Baldini *et al*, 2015), one scanned the pain with different activation protocols for different type of expanders (Halicioglu K *et al*, 2012), one compared the different pain in different type of palatal expanders (De Felipe NL *et al*, 2010), only one study measured stress, anxiety and pain during the active phase of expansion and during the subsequent three -month retention (Gecgelen M *et al*, 2012).
CONCLUSIONS: Altrough numerous articles have reported the pain associated with various types of orthodontic appliances and procedures, few studies have investigated the pain using RPE. According to the studies analyzed, the vast majority of children undergoing the active phase of rapid palatal expansion reported pain and a sensation of pressure. The pain generally occurred during the initial phase of expansion and diminished thereafter. There were not statistical differences in either reported pain based on age, sex, or stage of dentition. The different activation protocols influenced the preceived pain, during RME, and less daily expansion was correlated to less pain.

Orthopedic-orthodontic treatment with functional generating bite (FGB) appliance in a open-bite hiperdivergent patient: a case report

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BACKGROUND: The authors wanted to prove that the use of Bracco's functional plate change the growth patterns in a open bite hyperdivergent patient. The open-bite can be caused by etiological and determinated factors. Some authors believe that the forces generated during swallowing and phonation can cause changes in the shape of the dental arches. Although these disorders are associated in the literature with open bite etiology, other studies show that these functions are short lived and not sufficient to cause dental changes. With this appliace we have analyzed the power of structural change through cephalometric radiograph before and after functional treatment.
METHODS: The patient, below treated with a appliance Functional Generating Bite was analyzed both trough the ratio between initial and conclusive cephalometrics radiographs, and using study of models. The treatment was performed in a 36 mouths range. It was made a follow-up a 11 years who gave a most interesting results. Comparasion of pre- and post-functional treatment cephalometric data was based on: divergent angle (NaS^GoMe), interincisal angle (Inc.Sup^Inc.Inf), upper (Ar^GoNa) and lower (Na^GoMe) gonial angle, the ratio of posterior facial height to anterior facial height (S-Ar/Na-Me), the ratio to occlusal, bispinal and madibular plane (Occl^Go-Me – Occl^Snp-sna – Snp-Sna^Go-Me).
RESULTS: The utilization of Functional Generating Bite appliance revealed the following: i) increased of interincisal angle (Inc.Sup.^Inc.Inf.); ii) accentuation of Margolis's line in the occipital plane, that in a hiperdivergent patient it presents these features already; iii) increases of the divergence

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(NaS^GoMe) of anterior cranial base caused by posterolateral occlusal extrusion; iv) consequent increase of lower gonial angle (Na^GoMe) and reduction of upper gonial angle (Ar^GoMe); v) increases of angle Shudy (Occl^GoMe); vi) a right Wylie's ratio between lower facial height and upper facial height.
CONCLUSIONS: The patient presents notable estetics and functionals improvements, resulting in correction of Steiner's estethic line. Subsequent controls the patients presents a further improvement in lateral bite. Meaningful integration of cephalometric value allows the selection of the proper oral appliance. The correct use of Functional Generating Bite treatment in II class open bite malocclusions it has allowed us to have great results. The last clinical check carried out 11 years later highlights control results obtained in the long elapsed time.

Correlation between Candida albicans and orthodontic appliances

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BACKGROUND: Candida albicans is a commensal yeast that is normally present in the oral cavity of the population. This opportunistic pathogen is frequently isolated from the human mouth but its presence in the oral cavity is not indicative of disease.
The purpose of our work is to review the literature, with specific attention to colonization (acquisition and maintenance of a stable population of Candida albicans cells which does not give rise to clinical disease), intra-oral density of the candidal organisms and Candida carriage status in orthodontic patients during treatment.
METHODS: Orthodontic appliances seem to favor candidal presence, so we analyzed the relationship between this yeast and orthodontic patients.
A search of the literature was conducted in the PubMed/Medline electronic database from 2012 up to 2016, using the associations among the keywords Candida albicans, Candidosis, orthodontic appliances and colonization, to identify appropriate articles that addressed the aim of this review. Free articles, reviews and articles published solely in English language were sought. Articles were previously selected by title and abstract. The study design, sample, follow-up period, collection and microbial analysis methods, statistical treatment, results and discussion were assessed. Articles that met the inclusion criteria were analyzed (134 articles). 33 articles were finally selected.
RESULTS: The literature demonstrated that the density of Candida increases in the orthodontic patient, that the most common Candida species isolated is Candida albicans and that there seems to be a direct relationship between the presence of a removable appliance, Candida and low salivary pH levels. It is important to emphasize that no healthy patients developed Candida infection from the orthodontic appliances.
More opportunistic bacteria and fungi are detected in orthodontic patients than in non-orthodontic patients. The isolation frequencies of opportunistic bacteria and fungi increase during orthodontic treatment, suggesting the importance of paying special attention to oral hygiene in orthodontic patients to prevent periodontal disease and the aggravation of systemic disease in immunocompromised conditions.
Moreover, the use of dental devices significantly increased the prevalence of yeasts in periodontal pockets in patients presenting gingivitis.
CONCLUSION: In conclusion, orthodontic appliances may favor the adherence of Candida to epithelial cells but do not influence the presence of these yeasts in saliva, and the levels of anti-Candida albicans IgA do not correlate with yeast adherence or presence of this yeast in the oral cavity.
Patients should be recalled within short time intervals to be motivated for oral hygiene during their orthodontic therapy.

Rapid maxillary expansion affects the spheno-occipital synchondrosis in youngsters

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BACKGROUND: This study want to test the null hypothesis that the spheno-occipital synchondrosis does not show bony displacement in response to Rapid Maxillary Expansion (RME) therapy in youngsters.
METHODS: Lateral cephalometric radiographs and a total of 16 computed tomography (CT) records were taken from 8 growing patients (2 males and 6 females), before (T0) and after (T1) treatment with Rapid Maxillary Expansion therapy. All patients had been diagnosed originally with transverse maxillary deficiency, bilateral posterior crossbite, a deep palatal vault, and dental crowding. The mean chronological age of the patients was 9.8±1.8 years. Each patient was treated with a Hyrax palatal expander, and the activation protocol included three turns per day of the screw (0.25 mm per turn), for an average of 18 days, in all subjects. The appliance was left in place for approximately 6 months after active expansion. Expansion was considered adequate when the occlusal aspect of the maxillary lingual cusp of the permanent first molar contacted the occlusal aspect of the mandibular facial cusp of the permanent first molar. A cephalometric analysis of the lateral radiographs was performed, and cranial base measurements of the nasion-sella-basion angle (N-S-Na^) and the distance in millimeters of the sella-basion (S-Ba) were recorded. High-resolution multislice multidetector CT, taken with a low-dose scan protocol (80 kV, 10 mA), was used to study quantitatively the extent of the opening of the spheno-occipital synchondrosis following Rapid Maxillary Expansion therapy. The data file of each patient was transferred to a workstation where anteroposterior width of the spheno-occipital synchondrosis was measured on axial images almost parallel to the orbitomeatal line, which was identified by lateral CT scans passing through the lower third of the synchondrosis.
RESULTS: Before treatment with Rapid Maxillary Expansion therapy (T0), the mean anteroposterior width of the spheno-occipital synchondrosis was 1.73±0.46 mm. Immediately after the active phase of expansion (T1), the width of the synchondrosis increased in every patient with a mean of 2.30±0.47 mm. This indicates a difference of 0.57 mm between T0 and T1. This difference was statistically significant according to the Wilcoxon signed rank test (P<.05).
CONCLUSIONS: Rapid maxillary expansion therapy leads to a small immediate widening of the spheno-occipital synchondrosis in youngsters.

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Transparent aligners and detersion: bacterial analysis

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BACKGROUND: The aim of this prospective randomized study is to evaluate the quali-quantitative variation of bacteria on the removable appliances surface. In this study the variation bacteria on occluso-o-guide and invisalign after three different disinfection methods.
METHODS: A sample of 24 patients had been chosen, every patients needed ortodontic treatment with Occluso-o-guide® or Invisalign®. Patients had been treated with professional horal hygiene at T0. All patients had been tought about correct way to brush their teeth and about a proper use of dental floss. Then, we divided patients in two groups: G1, treated with Occluso-o-guide® and G2, treated whit Invisalign®. Standard of care on the use of orthodontic system had been shown when the appliances were delivered: G1 patients had been tought about using of Occluso-o-guide® for 4 hours during the day and for all night long, G2 patients had been tought about using Invisalign® for 20-22 hours a day. Both groups had been instructed about cleaning and sanitizing of their appliances. Stage 1: washing with current water. Stage 2: washing whit clorexidine spray 0,12% (Curadent) and rinse. Stage 3: sodium carbonate and solphate solution (Cleaning cristals Invisalign®) immersion without rinsing. A microbiological sample had been taken with sterile stubs after each stage. All patients experienced all the three stages, each stage lasted one week for G1 patients and two weeks for G2 patients. This choice depended on the different number of hours involved using appliances. We decided to space the following cleaning stages with a period of a week in which patients had to clean their appliances using current water. Microbiological samples had been analized using LB agar growth medium appreciating the growth after 24-48 hours at 37° incubation.
RESULTS: A non significant detersion was observed using current water only. We noted a reduction of 20% bacterial load using clorexidine 0,12% and rinse, as compared to use only current water. Using sodium carbonate and solphate solution we obtained a reduction of about 50% compared with current water. This reduction is more evident in Occluso-o-guide® appliances than in Invisalign® appliances and it is indipendent from cleaning methods used.
CONCLUSIONS: The analysis of the resultsts obtained enable to confirm that a proper cleaning of orthodontic appliances is really important. It is essential that clinician gives patients correct instructions on daily orthodontic appliances cleaning, beacuse various methods lead to different results and may condition patients' oral health.

The etiology of palatal displacement of maxillary canines: a systematic review

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BACKGROUND: The palatally displaced canine anomaly is a tooth malposition occurring in 1% to 3%. The etiology is controversial and it caused much interest to researchers for many years. The aim of this systematic review was to evaluate the theories related with the etiology of palatally displaced maxillary canines.
METHODS: Studies assessing the etiology of palatally displaced maxillary canines were considered eligible. Randomized clinical trials (RCTs), controlled clinical trials, cohort studies, retrospective studies and case series were included. Studies involving animals or *in vitro* models, case reports, letters to editors, and narrative or systematic reviews were excluded. An electronic search of databases plus a manual search on the most-relevant journals up to February 2016 was performed. Electronic searching was performed using the following keywords: ("Tooth Eruption, Ectopic/etiology" OR "Tooth Eruption, Ectopic/genetics" OR "Tooth Eruption, Ectopic/epidemiology" OR "Tooth, Displaced /etiology"). Bibliographies of all retrieved papers and review articles on palatally displaced maxillary canines were also checked to select potentially relevant additional studies published in journals other than the ones that were searched manually.
RESULTS: The electronic search identified 502 studies and the manual search yielded an additional 21 publications. After article selection process, 28 studies were included in the review and 2 main theories have been detected to explain the occurrence of palatally displaced canines: the "guidance theory" and the "genetic theory". According to the "guidance theory" the distal surface of the upper lateral incisors root is the guide that allows the canine to erupt into proper position. Therefore an excess of space in the anterior maxillary bone, due to hypoplasia or aplasia of the upper lateral incisors, spaced or late-developing dentitions, may be cause of palatally displaced canines. Several studies have established a strong association between small, peg-shaped, missing upper lateral incisors and palatal displacement of one or both canines. The theory of "genetic origin" is based on the observation that palatal canine displacement rarely occurs as an isolated symptom but is accompanied in most cases by genetically determined tooth anomalies such as hypoplasia or agenesis of the upper lateral incisors, agenesis of mandibular premolars, infraocclusion of the deciduos molars, enamel hypoplasia. Different authors also indicated multiple evidential categories for the genetic origin of palatally displaced canine, as, familial occurrence, bilateral occurrence, sex differences (indicating involvement of the sexual chromosomes), differences in prevalence rates among different populations, and increased occurrence of other concomitant dental anomalies.
CONCLUSIONS: There is no sufficient evidence to support only one of the two theories, reported in the present systematic review, related to the etiology of displaced maxillary canines. Further studies with larger samples and robust designs are needed to have a clear understanding of the causes of palatal canine impaction.

Comparison between rapid and mixed maxillary expansion through assessment of postero-anterior cephalograms and dental casts

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BACKGROUND: The aim of this retrospective observational study is to compare the dento-skeletal effects assessed

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on postero-anterior (PA) cephalograms and upper and lower dental changes assessed by dental cast analysis in patients treated with Rapid Maxillary Expansion (RME) and Mixed Maxillary Expansion (MME),
METHODS: Treatment groups consisted of 42 patients: the RME group (n = 21) consisted of 13 females and 8 males with the mean age of 8.8±1.37 years at T0 and 9.6±1.45 years at T1; the MME group (n = 21) consisted of 12 females and 9 males with a mean age of 8.9±2.34 years at T0 and 10.5±2.08 years at T1. Seventeen bilateral anatomic landmarks, 16 linear (12 skeletal and 4 dental) and 4 angular measurements were assessed for each patient at T0 and T1 on postero-anterior radiographs. The upper and lower arch analysis was performed on four dental bilateral landmarks on upper and lower casts; also upper and lower arch depths were measured. The groups were compared using independent sample t-test.
RESULTS: The analysis of postero-anterior cephalograms showed that at T0 the groups were similar for all the examined variables. Significant and equal increase of lateronasal and maxillary and upper and lower molar widths ($p < 0.01$) occurred in both groups at T1. Significant but different increases were observed for maxillary incisal, upper left and first molar-laterorbitale, and maxillary first molar angles. At T1, differences in maxillary incisal angle ($p < 0.05$), upper left first molar-laterorbitale, and maxillary first molar angles ($p < 0.001$) were noted. The study of dental casts showed that before treatment (T0), the groups were similar for all the examined variables. In both RME and MME group, significant increments in all the variables for maxillary and mandibular arch widths were observed at T1. No significant differences in maxillary and mandibular arch depths were observed at the end of treatment in both groups. An evaluation of the changes after RME and MME (T1) showed statistically significant differences in mandibular arch depth ($p < 0.001$) and maxillary intercanine widths ($p < 0.05$).
CONCLUSIONS: RME and MME were both effective to increase skeletal transverse dimensions by opening mid-palatal suture in growing patients. MME was associated with minor dental side effects than RME and a greater lower arch expansion was observed in the MME group, which might be attributed to the "lip bumper effects" observed in the MME protocol.

Clinical evaluation of maxillary hypoplasia in patients with different type of cleft

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BACKGROUND: To describe some clinical features of patients with cleft lip and palate (CLP), with regard to maxillary arch width and inter-arch relationship.
METHODS: Seventy-six consecutive patients, with several types of orofacial cleft and referred to the Orthodontic Department of the Academic Hospital of Parma, Italy, between 2004 and 2015, were included.
Data recorded included date of birth, gender, type of cleft, surgical procedures and orthodontic therapy. Patients were subclassified according to the type of cleft: 1) Unilateral CLP (UCLP); 2) Bilateral CLP (BCLP); 3) Cleft Palate (CP); 4) Cleft soft palate (CSP).
Dental cast analysis was performed before orthodontic treatment with regard to:
1) maxillary arch widths, measured with a millimeter caliper: intermolar arch width, measured as the distance between the mesiobuccal cusp tips of the first molar, and intercanine arch width, measured as the distance between the cusp tips;
2) dental arch relationships, according to the modified Huddart/Bodenham system (HB). This numerical scoring system requires all maxillary teeth to be scored according to their buccolingual relationship to the corresponding mandibular tooth, except for the lateral incisors, which may be missing or in an abnormal position in cleft lip and palate subjects. The sum of the scores ranges from to +10 and -30 and it reflects the maxillary arch constriction.
To asses differences between types of cleft, "One way ANOVA" and "Tukey post-hoc" tests were performed. Statistical significance was tested at $P < 0.05$.
RESULTS: Among 76 patients selected for the present evaluation (54 males, 22 females; mean age 7,24 years), 53 (69,7%) had UCLP, 13 (17,1%) had BCLP; 5 (6,5%) had CP and 5 had SCP (6,5%).
There were no significant differences between groups with regard to the measurements of intercanine and intermolar distance.
A statistically significant difference for HB score was found between BCLP *vs* CSP ($P<0.05$); UCLP *vs* CP ($P<0.05$) and CSP ($P<0.01$).
CONCLUSIONS: Maxillary growth deficiency affected the majority of the subjects, even though the upper arch constriction exhibited a large variability.
The clefting process involves different anatomical parts in UCLP and BCLP. Nevertheless, in the present study no statistical difference in maxillary arch width was found between these two types of malformation. The HB scoring system seems to be more sensitive to asses arch constriction than intercanine and intermolar distances; it may be used to provide an objective evaluation of the relative maxillary contraction in all types of orofacial clefting.

Levelling of curve of Spee with continuous archwire appliance in different vertical skeletal pattern. A retrospective study

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BACKGROUND: The aim of the study was to determine the effects of the levelling of curve of Spee in orthodontically subjects treated with full-fixed edgewise preadjusted appliance in different skeletal vertical pattern.
METHODS: The study sample consisted of 90 white Caucasian patients' orthodontic records (39 M and 51 F; mean age 19y4m±1y9m), with a curve of Spee ≥ 2 mm before treatment, treated without extractions. The following measurements were determined on each lateral cephalogram: SNA, SNB, ANB, SN^GoGn, FMA, Y-Axis, SN^OP, OP^MP, SN^PP, IMPA, Up.Inc.^FP, overjet, overbite, interincisal angle (Int.Inc.). After data collection, the subjects were grouped according to their facial types (normal-angle, high-angle, low-angle) based on their pretreatment cephalometric values for Y-axis, mandibular plane angle (FMA), and SN^GoGn angle. The vertical position

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of the maxillary and mandibular central incisors (L1), mandibular first premolar (L4) and first (L6) and second (L7) molars were measured perpendicular to palatal and mandibular planes, respectively. These additional cephalometric reference points and planes (U1-PP, L1-MP, L4-MP, L6-MP, L7-MP, L6^MP, L7^MP) were used to evaluate the different dental movements in the groups after treatment. Additionally, the COS was measured on digital dental casts pre and post-treatment as the perpendicular distances from the occlusal plane to the buccal cusp tip of each lateral tooth were measured. The COS value was the summation of the COS on the right and left sides of the dental arch and the deepest point was used as a representative value for the curve of Spee on each side. A multicomparison ANOVA test (analysis of variance) was used to determine whether there were differences between the changes in the groups with time.
RESULTS: For skeletal variables, the high-angle group showed an increase of the SN^PP angle when compared with other groups. For dentoalveolar variables, low-angle group showed an intrusion of lower incisors significantly greater than the high-angle group and an increased buccal movement of the mandibular incisors than both normal and high-angle groups. The high-angle group evidenced a greater extrusion of posterior teeth associated with uprighting of first and second molars with respect to low-angle group and a significant increased uprighting of second molar with respect to normal-angle group. The normal-angle exhibited a significant reduction of interincisal angle when compared with high-angle group. Moreover, the high-angle group showed an increased clockwise rotation of the occlusal plane when compared to low-angle and normal-angle groups.
CONCLUSIONS: The levelling of the curve of Spee depends from different dental parameters based on skeletal vertical pattern. The difference in dental movements based on the vertical skeletal pattern during the curve of Spee levelling could be important for the control and management of tooth movement in the orthodontic therapy and also to predict the stability of the treatment.

OSAS in pediatric patients and elastodontic appliances: case report

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BACKGROUND: Obstructive sleep apnea syndrome (OSAS) is a respiratory disorder characterized by total or partial obstruction of the upper airways and consequential alteration of nightime breathing.OSAS can affect children of any age, but a peak in its incidence is observed in pre-scholar age (4-6 years). The main risk factor is adenoids and tonsillar hypertrophy which causes reduction of the upper airways dimensions that can thus collapse during nightime and cause apnea. Also craniofacial and orthodontic abnormalities, such as mandibular retrusion or maxilla-mandibular biretrusion, can be related to OSAS. Children affected by OSAS are often irritable, hyperactive and can develop learning problems at school. Polysomnography is essential for diagnosis of OSAS. Recent studies have claimed that a useful treatment option for adult patients with sleep-disordered breathing is the use of an oral appliance that improves maxillo-mandibular relationship during nightime, thus preventing apnea. In childhood the use of such appliances can induce orthopaedic changes and lead to a complete and stable reveal from OSAS.Elastomeric appliances can be a simple and safe solution for children with OSAS, because of they are comfortable, easy to use and do not have any particular contraindication. They combine characteristics of a functional device and an eruption guidance appliance and promote correction of dysfunctional habits, induce sagittal and vertical dento-skeletal effects together with achieving minor tooth movement as a result of the head-to-head bite construction and the elastomeric material. The aim of the present study was to evaluate treatment's outcome of the use of an elastomeric device in a patient with severe OSAS relative to occlusal and polysomnographic parameters.
METHODS: The 5 years-old patient E.F. suffered from severe OSAS: her AHI (apnea–hypopnea index) was 10 events per hour and she had also a low grade adenoids and tonsillar hypertrophy. The clinical inspection showed contraction of maxilla, openbite, posterior displacement of the tongue base and mandibular retroposition. She underwent early orthodontic therapy with a prefabricated orthodontic appliance of EFline® (EF KID) and was instructed to wear the appliance night-time and 2 hours day-time. This 2 hours were divided into four periods of half an hour. In each period the patient had to bite into the appliance and swallow, keeping the lips in contact. She was evaluated after 6 months of active treatment and demonstrated adequate levels of cooperation.
RESULTS: After six months of active treatment, good occlusal changes were visible: openbite was almost completely corrected and mandibular advancement was obtained. She underwent a new standard overnight polysomnography that showed that AHI were significantly lower after the trial (AHI = 4) and also the index of obstructive apnea significantly decreased (from 14 to 2 events).
CONCLUSIONS: This case report suggests that early orthodontic treatment performed with elastodontics is a good and simple treatment option in deciduous dentition in children with OSAS. Orthopedic therapy should be encouraged in pediatric OSAS because an early approach maypermanently modify nasal breathing and respiration, thereby preventing obstruction of the upper airway. Elastodontic appliances, since are extremely comfortable and safe, are very accepted by patients and significant outcomes can be achieved to have a reveal from OSAS.

Early orthodontic treatment and speech performance in patients with cleft lip and palate: a preliminary investigation

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BACKGROUND: Several factors can directly affect language development in children with cleft lip and palate (CLP). For example, it is well known that the combination of dental and jaw anomalies may be significant underlying causes of disordered

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speech and could affect tongue positioning. To avoid future language problems, some Authors have therefore advocated early orthodontic treatment. Recently, a considerable number of reviews have investigated the impact of surgical procedures on speech production. However, there is a lack of studies focusing on relationships among dental or occlusal deviations and speech production as well as on the effects of early orthodontic treatment on language and speech development. The aim of the present research is to investigate speech during early orthodontic treatment in patients affected by different types of orofacial cleft.
METHODS: Twenty-five patients with CLP (18 boys, 7 girls) were consecutively treated in the Orthodontic Department of the Academic Hospital of Parma. Clinical and epidemiological data evaluated included: age, gender, type of cleft, occlusal status, surgical procedures and orthodontic therapy. Orthodontic treatment protocol included maxillary expansion to increase transverse dimension, incisors alignment and proclination to resolve crowding, rotations and anterior crossbites, and maxillary protraction to reduce maxillary retrusion. Patients were examined by two speech and language therapist before the orthodontic treatment (T0; mean age of patients: 4.4±1.1 years) and after a first phase of treatment (T1; mean age: 9.2±1.9 years). The following speech parameters have been investigated: consonant sound characteristics (presence, absence, distortion and substitution) resonance and intelligibility of speech. The presence or absence of any abnormality and its severity were scored for all consonant and vowel sounds as follows: 0, not present; 1, normal; 2, resonance; 3 distortion; 4, substitution. Consonant sounds were classified, according to the place of articulation, in bilabial, labiodental, dental/alveolar, post-alveolar, palatal, velar and according to the manner of articulation (fricative, plosive, affricate). Chi-square tests were performed for statistical analysis. Statistical significance was tested at $P<0.05$.
RESULTS: The statistical comparison of T0 to T1 changes showed a statistically significant difference for labiodental and velar consonant ($P< 0.05$); a highly statistically significant difference for bilabial and palatal consonant ($P<0.01$); a very highly statistically significant difference for dental, post-alveolar, plosive, fricative and affricate consonant ($P<0.001$).
CONCLUSIONS. Orthodontic treatment of CLP patients during the deciduous and mixed dentition period has been recommended in order to create more favorable conditions for midfacial growth and development, to normalize the intermaxillary basal relationship and to prevent or eliminate functional disturbances. In the present investigation, an overall improvement of the speech was observed during the orthodontic therapy. Dental and skeletal modification may have an impact on speech and language management, given the relationship among articulation performance and various physiologic and anatomic factors. Therefore, a multidisciplinary approach is recommended to combine the development of proper occlusal conditions with speech treatment.

Maxillary transverse deficiency and nasal septum deviation: a potential relationship? A retrospective study on prepubertal subjects

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BACKGROUND: Deviated nasal septum may cause a reduction of the nasal airflow, thus, during the craniofacial development, a reduced nasal airflow could originate a chronic mouth-breathing pattern, related with moderate to severe maxillary constriction. The aim of this retrospective study is to analyze the correlation between maxillary transverse deficiency and nasal septum deviation.
METHODS: A retrospective evaluation was performed on 66 posterior-anterior radiographs of subjects (34M, 32F; mean age 9.95±2.50years)with maxillary transverse deficiency clinically diagnosed by an expert orthodontist were selected according to the following criteria: maxillary transverse constriction with monolateral or bilateral molar crossbite, no history of orthodontic treatment, prepubertal age, high quality standardized posterior-anterior radiographs. A control group of 31 posterior-anterior radiographs of subjects (13M, 18F; 9.29±2.08 years) were selected according to the following criteria: absence of maxillary transverse constriction, no history of orthodontic treatment, prepubertal age, high quality standardized posterior-anterior radiographs. All the subjects were free from congenital anomalies and syndromes.
Posteroanterior radiographs were taken using the same equipment and technique for both constricted and non-constricted patients, with bipupillar plane parallel to ground floor and a specific support in order to assure a standardized position.
The same operator manually traced each frontal cephalogram and a second operator checked landmarks and anatomic contours. In case of disagreement the cephalograms were retraced reaching a mutual satisfaction of both the operators.
The following angular measurements were calculated: deviation of the lateral borders (right and left) of the nasal cavity (NC, NC') from the midline, deviation of the inferior and middle nasal septum (SNI, SNM), skeletal asymmetry of the two nasal chambers (ASY).
A Shapiro-Wilk test was conducted in order to demonstrate the normal distribution of the data. A Student's T test was used to analyze the differences between the two groups. The significance level was set at $p<0.05$.
Results: all the parameters are very similar between the two groups except for the ASY angle that differs for about the 27%; anyway the Student's T test showed no statistically significant differences between the two groups (mostly $p>0.20$); no statistically significant results on deviation of the lateral borders of the nasal cavity from the midline ($\rho=0,285$; $\rho=0,078$); on deviation of the inferior ($\rho=0,899$) and middle nasal septum ($\rho=0,676$); on skeletal asymmetry of the two nasal chambres ($\rho=0,217$).
CONCLUSIONS: this study failed to show an association between transverse maxillary deficiencies and nasal septum deviations. Moreover, no significant differences were found between the mean nasal cavities dimensions in subjects with transverse maxillary deficiency and the control group.

Morpho-structural features and aging properties of "two generation" Invisalign® appliances

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BACKGROUND: The aim of this study was to investigate and compare the morphological features and aging properties

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of Invisalign® (Align Technology, Santa Clara, CA, USA) aligners made with two different polymer blends, EX30 and Smart Track.
METHODS: Patterns of Invisalign® aligners were randomly selected from 20 patients. The samples consist of 10 Smart track aligners, including 5 never used and 5 used (worn intra-orally for 2 weeks, approximately 22 hours for day) and 10 EX30 aligners, including 5 never used and 5 used (worn intra-orally for 2 weeks, approximately 22 hours for day). All samples were subjected to scanning electron microscopy and aging tests.
RESULTS: The morphological properties of the two polyurethane-based blends were investigated. Smart Track appeared to be more homogeneous and translucently than EX30. SEM images of used aligners, where superficial cracks in the polymer are commonly observed. Although these modifications can occur, aging tests revealed no weight losses in either material.
CONCLUSIONS: these analyses confirm the better quality of Smart Track orthodontic aligners than those produced with the previous polymer blend EX30; this results in a further improvement of the aesthetic value of this orthodontic treatment system.

An analysis of the gingival crevicular fluid during orthodontic treatment with Invisalign® Aligners: a split mouth study

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BACKGROUND: The aim of this study is to analyze the change of gingival crevicular fluid (GCF) in human subjects undergoing orthodontic treatment with Invisalign aligners. However the alveolar bone is not the only interested tissue: the root surface and the periodontal ligament (PDL) are also affected by mechanical loading Aligners provide intermittent orthodontic forces and despite their spread among the orthodontic community, there are no studies describing the bone metabolism induced by this kind of appliances.
METHODS: 10 patients treated with Invisalign aligners were selected. For each of them 2 teeth were selected, a frontal tooth on which no force was applied and molar to be distalized. Distalization of the selected molar was the only movement planned for the first aligner.
GCF sampling was executed in the mesial and distal sides of the considered teeth. With the application of PerioPaper Strips (Oraflow NY) for 30 seconds at 1mm depth the GCF was taken. Sampling was carried out before force application (t0), after one hour (t1), one week (t2) and 3 weeks (t3) from the beginning of the treatment.
With an electronic analyzer (Periotron 8000, Oraflow NY) a quantitative analysis of the samples was obtained. Strips were then placed in a buffered solution of NaCl, stored at -80 C° and analyzed by ELISA test to measure osteprotegerin and osteopontin IL-1β, RANKL, TGF β, concentration.
RESULTS: IL-1β and IL-6 have been demonstrated to be increased in the PDL and alveolar bone following mechanical force application. Interestingly a significant increase of IL-1β in the GCF samples of cases teeth with respect to those obtained from the control teeth, was observed in this study. After 3 weeks of aligner therapy our results showed an increased level of TGF-1β at the tension sites of cases teeth, compared to the compression sites.
In this study we observed that an increase of flow rate occured before the biochemical changes as well as Orthodontic forces produced tissue-degrading enzymes and inflammatory mediators. A difference in the expression of the enzymes and mediators was observed, with an increase in the molar group were the force was applied. The differences were statistically and clinically significant.
CONCLUSIONS: The difference in the biochemical response indicates the efficiency of the force applied in order to obtain the requested orthodontic tooth movement.

Permanent magnets in orthodontics: synthesis and characterization of an innovative biocompatible coating

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BACKGROUND: The corrosion is the main problem for magnets in orthodontic biomechanics. It leads to superficial and mechanical damage, which can lead to breakage, and a fast degradation of the magnetic properties. The goal of this study is to evaluate corrosion resistance of commercially coated magnets and of a new multi-layered organic-inorganic NdFeB magnets coating, by immersing them in artificial Fusayama saliva system. To evaluate the effects of different thicknesses of coupling agents applied on a metallic interlayer (such as Au, Ni, Zn, etc), the coating effects on the magnetic force. Finally, to assess the biocompatibility of the system.
METHODS: Samples were analyzed by Electrochemical Impedance Spectroscopy (EIS), using the potentiostat PAR Versastat.
The samples of NeFeB selected for corrosion tests, with and without coating with coupling agents, were separately immersed in a synthetic saliva solution in an aggressive means with pH 5.5. Preliminary studies show that the static magnetic fields with different magnetic forces (19,61N and 1,37N) affect the DNA, by immersion of the magnets in the peripheral lymphocyte cultures. Cell viability was determined by propidium iodide staining and cytofluorometric analysis. Comet assay was used to evaluate the genotoxic effects of exposing the human lymphocyte cells for 72 hours to samples.
RESULTS: For nickel plates magnets aged in Fusayama solution, starting from 0h up to 72h, the maximum force decreased dramatically.
After 72h the commercially plated magnets show a reduction of Fmax from 132.85g to 105.67g. Silane coated magnets, however, after 72h of aging exhibit, there was no significant variance from the start value. Analyzing the acquired data is possible to evidence how coupling agent coated samples have higher protective performances than samples without coupling agent, both to low and high immersion times. These results confirm that the addition of a coupling agent layer on a magnet surface enhances its durability in biological electrolyte solution.
Similar results are obtained for sample with higher dipping layer suggesting this multi-steps procedure stabilize the electrochemical activity of commercial electroplated

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Nd-Fe-B magnets. We tested magnet-induced effects on cell viability of human peripheral lymphocytes incubated for 72h in presence or absence of HCM and NCM. The cell death of HPBL exposed to HCM showed no differences in comparison to controls, whereas a significant increase in cell death of HPBL exposed to NCM (about 1.4 fold) has been observed.
The exposure of HPBL to both HCM and NCM showed changes in DNA fragmentation in comparison to controls. However the exposure to HCM produced a slight increase in tail length of about 11.7+/-1.4% in comparison to control value. On the contrary, under exposure to NCM evident changes in DNA damage were observed. In particular, tail length showed significant increases in comparison to HCM-exposed lymphocytes as well as controls.
CONCLUSIONS: It was evidenced that at different thicknesses (up to 14 mm) the coupling agent provides a barrier effect with the formation of a stable structure of hybrid organic-inorganic coating. The magnetic field produced from the alloy is not altered. The biocompatibility tests show that the use of a magnetic force 1.37N, which is the biological force needed for tooth movement, it doesn't affect cell viability and DNA. The results of this study show that the aspects limiting the use of magnets for orthodontic applications can be overcome using coupling agents as surface coatings.

When additional dental features influence orthodontic-surgical planning of class III malocclusion treatment

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BACKGROUND: To present an interdisciplinary orthodontic-surgical approach of skeletal Class III malocclusion in which dental recovery influences the treatment planning.
METHODS: C.S. 22 years old. Female. The patient presents a severe skeletal Class III malocclusion with temporomandibular disorders. Extraoral examination shows a mandibular shift towards left side and an imbalance of facial heights, the patient's profile observation proves an increased lower facial height and the mandibular prognatism. Intraoral exam reveals a molar Class III, subdivision right malocclusion and bilateral cross-bite. In the upper arch the exam points out the absence of element 1.3 and the shift of upper dental midline towards right side. In the lower arch the element 4.6 has been extracted before treatment. The analysis of orthopanoramic shows an impacted 1.3 and the devitalized 3.6 and 4.6 with periapical infections. The cephalometric analysis on lateral radiographs suggests: skeletal Class III (ANB= -4°), hyperdivergent growth (FMA= 33°), normal inclination of lower incisors (IMPA= 89°) and vestibular inclination of upper incisors (Inc^FP= 123°). The treatment is performed in three phases: presurgical orthodontic preparation, orthognathic surgery and orthodontic finishing. The first step consists of the extraction of left first premolar to allow upper midline correction and the alignment and leveling of upper arch achieving the right torque of the teeth. The alignment and the leveling in the lower arch has been conducted preserving the implant space for the following rehabilitation in the 4.6 area. The surgical procedure is planned according to facial analysis and predictive cephalometric tracing. Surgery includes the extraction of impacted 1.3, the 2mm advancement and the clockwise rotation (5mm in the posterior part and 2mm in the anterior section) of the maxilla. Mandibular prognathism is corrected with sagittal osteotomy of the mandible ramus, which allows the adequate intercuspation of the dental arches with the repositioned maxilla and decrease of the angle of the mandibular plane (FMA=26°), thus reducing the height of the lower face third. The orthodontic finishing stabilizes the achieved results.
RESULTS: At the end of treatment, the patient presents functional occlusion, normal overjet and overbite, adequate intercuspation, with Class II molar relationship and Class I canine relationship, normal lateral and protrusive excursions and the absence of temporomandibular disorder symptoms. Mandibular prognathism is eliminated and facial esthetics is considerably improved.
CONCLUSIONS: In this case the impacted 1.3 and the dental imbalance in the lower arch, as factors which make complicated the visualization of the orthodontic-surgical treatment result, underline the importance of collaboration between specialists in diagnosis and planning for having success and long-term stability.

Changes in dental arch and skeletal sagittal features associated with different activation protocols of rapid maxillary expansion

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BACKGROUND: Rapid maxillary expansion therapy is the most effective orthopaedic procedure to increase the maxillary transverse dimension in young patients by opening the midpalatal suture. In the scientific literature different activation protocols of rapid maxillary expansion are frequently described. The aim of this study was to analyze if different activation protocols in rapid maxillary expansion (RME) could be associated with differences in dental arches and skeletal sagittal changes.
METHODS: A total of 114 subjects (56 F, 58 M) were treated with a Rapid Maxillary Expander and randomly divided in two groups: the group " 1/4 turn " per day and the group " 2/4 turn " per day. The expansion screw has been activated until the molar overcorrection was reached. Model casts and latero-lateral radiography were obtained at the beginning of therapy (T_0) and after removal of the expander (T_1). The quality of model casts and radiographs respectively was assessed and from the initial sample, dental casts of 101 subjects (the group " 1/4 turn " consisted of 27 F 20 M, mean age 10,70±1,74 ys; the group " 2/4 turn " consisted of 25 F 29 M, mean age 11,19±2,04 ys) and cephalometric exams from a sample of 102 subjects (the group " ¼ turn" consisted of 29 F 28 M, mean age 10,35±1,55 ys ; the group " 2/4 turn" consisted of 24 F 21 M, mean age 10,44±1,66 ys) were analyzed. On model casts the measurements were: intermolar distance and intercanine distance for upper and lower arch and upper arch length. On the laterolateral radiographs 12 cephalometric parameters were recorded: 4 measurements were about skeletal relationship (SNA, SNB, ANB, WITS), 3 measurements were about vertical dimension (SN ^ PP, MP ^ PP, SN ^ MP) and 5 records were about dental analysis (IsiP ^ SN, IIIP ^ SN, InterInc, OVJ, OVB). A Student's t-test was applied to analyze differences in skeletal and dental effects recorded between the groups.
RESULTS: The dental casts reported increases in measurements after the RME, while little skeletal sagittal changes were reported. No significant differences were found between measurements increases between group " 1/4 turn " and group

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" 2/4 turn " (p>0.05) both dental casts and latero – lateral radiograph analysis.
CONCLUSIONS: In RME different activation protocols seem to have similar effects on dental arch and sagittal skeletal pattern.

Dental and skeletal features in subjects with missing maxillary lateral incisors

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BACKGROUND: The maxillary lateral incisor is the second most frequently missing tooth in the dental arch and its management is conditioned by the facial, occlusal and skeletal features of the patient, leading the orthodontist to different treatment possibilities. Aim of this study is to evaluate the relationship between agenesis of maxillary lateral incisor, unilateral or bilateral, and teeth mesial-distal size and the occlusal and skeletal features of the patients.
METHODS: 79 patients from the U.O.C. of Orthodontics, Policlinico Umberto I, were considered, analyzing their dental casts, orthopanoramics and latero-lateral teleradiography: 30 of patients with missing maxillary lateral incisor (13 unilateral, 17 bilateral), 49 of patients of control group.
RESULTS: In patients with agenesis of the maxillary lateral incisor(s) almost every tooth resulted smaller than normal tooth size, even if not all the differences were statistically significant. A statistically significant reduction in overjet, an average of about 1 mm, was observed in patients with agenesis compared with patients in the control group. For what concerns the shape of arch, in subjects with agenesis the most frequently encountered form is the square one, both for the upper and the lower arch. In subjects without agenesis, the most frequent shape is the ovoid one. Through the ortopantomography, the finding of agenesis different from those of the upper incisors was observed in 7 out of 30 in the case group, and in only 1 subject out of 49 in the control group. Lastly, cephalometric analysis showed that in patients with agenesis, compared with subjects without agenesis, the angle of the total divergence was reduced on average, while the interincisal angle was increased, with a mean difference of 6.85 °.
CONCLUSIONS: Our results agree only partly with the data available in literature. In particular, almost all authors reported a reduction in the mesial-distal width of almost all teeth in patients with agenesis of the upper lateral incisors, compared to the average of population.
As for the associated anomalies, again confirming the results of the literature, the agenesis of the upper lateral incisors are often associated with other agenesis, especially those affecting the lower second premolar (not considering the third molars) with a frequency of 23%. Furthermore, the most significant data obtained from the cephalometric in individuals with agenesis are the reduction in the angle of the total divergence and especially the significant increase in average of the interincisal angle, the latter data correlated to the observed reduction in overjet, so it is conceivable that in patients with agenesis there is a higher crown-palatal inclination of the upper central incisors in relation to a larger perimeter of distribution of these teeth in the arch. However, few data are available in literature that relate the agenesis of the maxillary lateral incisors and skeletal features.
Since the agenesis of the upper lateral incisors is one of the anomalies most frequently encountered in clinical practice and a risk indicator for other dental anomalies, it is crucial to make a multidisciplinary diagnosis of the patient. In addition, subjects with agenesis have altered occlusal and dento-skeletal features compared to general population. From all these considerations, it will be possible for the clinician to make the most appropriate therapeutic choice, opting for opening or for closing spaces.

Three-dimensional assessment of nasolabial area in patients with unilateral cleft lip and palate following different pre-surgical orthopedic treatment: case series

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BACKGROUND: Presurgical infant orthopedic therapy was introduced by McNeil in 1956 in order to facilitate patients' feeding ando to provide stimulation and guidance of maxillary segments' growth as well as to facilitate surgical management of cleft lip and palate patients.
To quantify soft-tissue labial changes in patients treated different orthopedic appliances for the correction of unilateral complete cleft lip and palate (UCCLP) a new three-dimensional (3D) software (3dMD, Atlanta,Ge) was employed.
Previous studies have used this new technology to investigate the growth rate and the effectiveness of orthopedic equipment in patients affected by UCCLP.
The aim of the study is to evaluate three dimensional subsequent changes to nasolabial area following different orthopedic procedures in the treatment of patients with UCCLP.
METHODS: Three male patients with congenital non-syndromic unilateral complete cleft lip and palate (III Veau class) on the left side are presented in this report. The study reports the results achieved at the last month of the therapy.
As described in the putty-wash technique, maxillary impressions covering the critical areas of the alveolar ridge and palate cleft were taken in two stages using putty-dough and light-bodied fast setting polyvinyl siloxane (P*Vs*) impression materials with a light-cured resin custom-made impression tray. ADA Type III plaster casts were poured. All the orthopedic devices were fabricated by the same laboratory technician. In patient A, the stone cast was duplicated and then discarded 1 mm in the midsagittal plane before plate realization in order to reduce the transversal discrepancy between maxillary segments prior to surgery. The cast replica was used to realize a custom tray.
In patient B, after alveolar segments had achieved a proper alignment, clinicians decided to realize a final passive plate in order to avoid recurrence.
According with the Cutting-Grayson technique, in patient C a nasal stent was applied with the aim of moulding nasal cartilage and improving the length of the columella, thus facilitating surgical intervention.
Three-dimensional photographs were obtained using the 3dMD system (3dMD, Inc, Atlanta, GA) 1 month before the try-in and delivery of the orthopedic appliance and 1 month later.All measurements were carried out blindly to the patient group.

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The authors assessed the qualitative and quantitative changes in asymmetry using the 3dMDtrio System and 3dMD patient software.
RESULTS: Individuals with active device showed a reduction in cleft and an improvement of symmetry, the
subject with passive orthopedic appliance showed no changes in the analyzed parameters.
CONCLUSIONS: The use of new 3D technologies allows clinicians to study very accurately the growth and the effects of treatment in newborns with malformation problems. The analysis of these three cases of UCCLP confirms that the treatment with presurgical infant orthopedic therapy is effective in restoring the symmetry of the face. The difference between active and passive devices also suggests the need to evaluate their ability of improving nasoalveolar simmetry in long-term studies.

Orthodontic treatment of impacted maxillary canines

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BACKGROUND: Purpose of this study is to evaluate the reposition of impacted maxillary canines, buccal or palatal placed, using a combined orthodontic-surgical therapy. A tooth is impacted when its apex is formed but doesn't erupt in physiological time and remains impacted at the level of bone or bone and soft tissue without tendency to migrate. Maxillary canines, after third molars, are the teeth that more frequently remain included for their longest physiological path to erupt. Maxillary canine inclusion causes problems as root resorption of adjacent permanent elements, malocclusion, functional and aesthetical problems, asymmetry, asymptomatic cysts.
METHODS: Etiology of impacted maxillary canines includes: local factors (absence of space in arch, crowding, presence of deciduous correspondent, supernumerary elements, trauma in early age, cysts, tumours, root fragment); general and genetic factors (endocrine/metabolic diseases, canines'germs malpositioned, dental anomalies, conoid lateral maxillary incisors or their agenesis). Patients, recruited on a voluntary basis with written informed consent, are chosen according to:
Inclusion criteria. Patients with unilateral/bilateral palatal/buccal inclusion upper canine with/or not the corresponding deciduous tooth in arch; patients with the crown completely overlapping the root of the lateral incisor, insufficient space.
Exclusion criteria. The root resorption or deformations of the impacted tooth, loss of bone support, subject with craniofacial syndromes, systemic diseases, traumatic sequelae.
The clinical course is divided in: diagnosis, treatment and follow up. Diagnosis includes: first visit, intraoral palpation, OPT, LL teleradiography, study models (to evaluate the maxillary arch dimension and crowding). OPT parameters evaluated are: alpha angle, lateral inclination, dental age, stage of canines'root development, presence of deciduous canines, eruption obstacles and dental anomalies. Parameters evaluated in LL teleradiography 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 median plane (Ericson and Kurol analysis). Treatment follows various steps: in the first phase it's used a BTP (Bar transpalatal) and arches multibrackets fixed appliance to recover the molar ratio and an adequate form of arch. Then is made the surgical exposure of the tooth to engage it. Often it's necessary osteotomy to release part of the tooth crown to anchorage it. After surgery a system statically determined (cantilever TMA) produces the vertical extrusion, buccal movement and alignment of the impacted tooth. Once the tooth is extruded, the orthodontic leveling and refining is obtained. Finally dental alignment and the results achieved are maintained during follow-up post-treatment checks.
RESULTS: A correct diagnosis is important for evaluating the possibility to recovery impacted canines and a early diagnosis prevents a possible impaction. After surgery, intra-oral traction with cantilever moves the maxillary canine obtaining the disinclusion through extrusion, distalization and vestibular extension, respecting periodontal tissue support. Cantilever mechanics, placing canine in dental arch rightly, allow orthodontic recovery of impacted teeth with an excellent functional and aesthetic result. The deciduous canine is extracted later, for aesthetic needs of the patient. It's possible to complete the orthodontic treatment in two years.
CONCLUSIONS: The inclusion of the upper canines occurs frequently. Their repositioning in arch is reached with a good treatment orthodontic-surgical plan. The cantilever mechanics and straightwire fixed appliances are efficacy to recover impacted teeth and to obtain an ideal torque control. Today, the surgical-orthodontic disimpaction treatment of impacted canines in teenager and adults is important to achieving optimal aesthetics and proper function.

Prevalence of hypodontia in a sample of Italian orthodontic patients

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BACKGROUND: The congenital missing of one or more teeth is a frequent abnormality of dental development. It consists in the lack of development of some dental buds which results in the presence of an empty space within dental arches. The etiology could be multifactorial: genetic factors are known for playing a fundamental role, but environmental factors, endocrine disorders, hereditary factors, infectious disease, facial traumas, drugs intake and radiation exposure are also involved.
The risk factors listed above, could be the explanation of the variability in the prevalence of hypodontia among countries and races.
The aim of this study is to analyze the current prevalence of tooth agenesis, excluding third molars, in a sample of Italian orthodontic patients.
METHODS: We examined 4006 panoramic radiographies of Italian orthodontic patients aged between 9 and 16: 1865 males and 2141 females. They were selected from the orthodontic folders of the dental clinic of the University of Padua. The radiographies were analyzed by the same operator, who filled in an Excel table with the following data: patient's date of birth, age at the time of radiography, number of missing teeth and their location. Patients with agenesis of primary dentition, agenesis of third molars, children with syndromes, and patients with missing teeth for other reasons (such as extractions or traumas) are not enrolled in this protocol.
Data were examined using the R software version 3.2.2 on Linux/Ubuntu 12.04.
RESULTS: The prevalence of tooth agenesis in our sample was 9%.

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Of 4006 patients, 359 presented the lack of at least one tooth, excluding third molars, 196 were females (9,1%) and 163 were males (8,7%).
The overall number of missing permanent teeth was 702: 401 among females (0,7%) and 301 among males (0,6%).
Of 702 missing teeth, 363 were in the maxilla (0,64%) and 339 in the mandible (0,60%). Patients with at least one missing teeth in the maxilla were 218 (5,4%), whereas 195 were in the mandible (4,7%).
Unilateral and bilateral agenesis occurred almost with the same frequency: 4,6% were unilateral and 4,4% were bilateral.
The most frequent missing teeth were: lower left second premolar (2,9%), lower right second premolar (2,6%), upper lateral incisors (2,5%), upper left second premolar (1,1%), upper right first premolar (0,5%).
The couples of most frequent missing teeth at the same time were mandibular left and right second premolars and the two maxillary lateral incisors.
CONCLUSIONS: This study showed no statistically significant difference in the prevalence of tooth agenesis between males and females. The number of missing teeth in the maxilla was slightly higher compared to the mandible, but this difference was not statistically significant, as well as the number of patients with agenesis in the maxilla or in the mandible. Comparing our results with those taken by other similar studies, we found out a great variability in the prevalence of hypodontia, depending on the sample and population considered.

Evaluation of facial asymmetry comparing 2D and 3D analysis: a systematic review

G. Rodi

BACKGROUND: Since asymmetries are skeletal deformation developing in the three dimensional of the space the aim of this study is to evaluated the use of CBCT compared to CT and the traditional 2D radiographic records, in patients with facial asymmetries. our purpose is to highlight the evidence for, the clinical use of CBCT in orthodontics, and to review the findings to answer clinically relevant questions.
METHODS: The following data bases were searched in PubMed and Science Direct and Google schoolar. We used the keywords: Facial asymmetry;2D analysis;3D analysis; dose radiation;
RESULTS: The use of the 2D PA in the study of asymmetries leads to many disadvantages like the superimposition of bony structures in the deeper regions of the craniofacial complex and the incomplete assessment of soft tissues, there are geometric magnification in projection images that caused optical distortions, rotation effects related to patient positioning in the cephalostat, and penumbra. Moreover errors in identification of the landmarks serving as reference points are considered by many studies as the major sources of error in cephalometri, from this consideration we can say that there are several advantages to use the 3D analysis.
At first natural head position that we can obtain with 3D analysis, it is basic how show Cook *et al*. study's the orientation of the head in PA cephalometric radiography is extremely important when asymmetry is evaluated, because a rotation through only 5° resulted in a complete reversal of the apparent asymmetry. However, the use of TC is limited in orthodontics because of the radiation dose is to high, the lack of availability, poor resolution and interpretation difficulties, the cost.
Some of these issues can be achieved with the use of CBCT, which presents dose reduction, and several advantages like rapid scan time, reduce of image artifact. CBCT showed also to produce accurate 3D images of the craniofacial region and a 1-to-1 image-to-reality ratio, which has greatly reduced errors of frontal cephalometry and improved our ability to diagnose asymmetry.
Moreover, conventional images such as panoramic, lateral, and anterior/posterior radiographs can be directly obtained from the CBCT.
The disadvantages that we have verify in the use of 3D analysis is that the error for 3D measurements is larger than that for conventional 2D measurements because by adding the third dimension an additional source of inaccuracy is introduced. This could explain the larger standard error in the 3D measurements than in the 2D measurements. Another possible explanation is that there is a learning curve in tracing 3D models, especially when one is used to tracing 2D images. Another consideration about the use of a CBCT image is not recommended routinely in orthodontic practice, because the doses associated with conventional panoramic and cephalometric images are smaller than the the doses associated with CBCT.
CONCLUSIONS: Based on screening of literature we have found that there are advantages for the clinician practice start from diagnosis to the treatment of the asymmetries in the use of 3D analysis especially in the use of CBCT. Moreover we consider the benefit for patients not all in the x-ray dose reduction compared to TC and in the quality of treatment due to the better evaluation of skeletal and soft tissue anomalies, when 3D imaging is required in orthodontic practice.

The impact of 3D imaging CBCT derived on orthodontic treatment planning of impacted canines.

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BACKGROUND:The aim of this study was to evaluate the impact of 3-dimensional (3D) virtual visualization of teeth in orthodontic treatment planning of impacted canines.
METHODS: Fourteen orthodontic clinicians were involved in this study. In order to elaborate a hypothetical treatment plan, seven clinicians were asked to evaluate complete sets of CBCT scans in all three planes of space (sagittal, coronal, axial) of patients affected by impacted canines. They then evaluated the same cases with a 3D virtual visualization obtained with a segmentation technique and a 3D surface rendering of teeth derived from the CBCT scan. Seven clinicians evaluated first the 3D images and then the 2D scans. The number of treatment plan changes after the second evaluation was noted along with the time required formulating each treatment plan. Descriptive statistics including mean and standard deviation was performed for the data collected as treatment planning duration. Inferential statistics was performed using unpaired t-test comparing treatment time duration in the two groups that were preliminarily evaluated with 2D scans and with 3D images. The significance level was set at a=0.05. A preliminary power analysis was performed in order to evaluate the proper sample size with b set at 0.8.

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RESULTS: When clinicians evaluated 2D images firstly and 3D virtual representation afterwards, some treatment plans were modified. No change was reported when 3D images were preliminarily evaluated. The elaboration of treatment plan with 3D virtual visualization required on average less time ($p<0.05$) when compared with the time required to formulate a treatment plan with 2D CBCT conventional scans, 12 minutes *vs*. 23 minutes respectively.
CONCLUSIONS: The results of this study showed that 2D and 3D images CBCT derived of impacted maxillary canines could rarely produce different diagnoses and treatment plans. However the results support the concept that post processing imaging techniques involving segmentation technique and 3D surface renderings are able to improve treatment planning and reduce the time necessary to properly elaborate it. As a consequence this post processing procedures should always be performed in all cases of impacted canines.

Effectiveness of orthodontic treatment with functional appliances on maxillary growth in the short term: a systematic review and meta-analysis

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BACKGROUND: The aim of this systematic review was to evaluate the treatment effects on maxillary growth of removable functional appliances that advance the mandible in a more forward position in patients with Class II malocclusion.

METHODS: This systematic review and meta-analysis was conducted according to the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions (version 5.1.0) and is reported according to the PRISMA statement. A survey of articles published up to April 2015 about the effects of functional appliances for the treatment of Class II malocclusion was performed by means of several electronic databases Sixteen electronic databases and reference lists of included studies were searched. Only randomized clinical trials (RCTs) and prospective controlled clinical trials (pCCTs) investigating Class II growing patients treated with removable functional appliances were included.
Two review authors screened all titles and abstracts retrieved from the database searches. The same authors reviewed the full texts of the potentially relevant articles and abstracts. The eligibility of the trials was assessed independently, and any disagreement was resolved after consulting another author. The level of agreement between the two reviewers was assessed by the Cohen's kappa statistics. The two authors accomplished independently, data extraction, and risk of bias's assessment too. All the pooled analyses of data were based on random effects models. Statistical heterogeneity was evaluated.
RESULTS: In total, 14 studies were included (5 RCTs and 9 pCCTs) collecting data from 765 patients (405 treated and 360 untreated controls). The mean difference in treatment effect of functional appliances, relative to the untreated controls for SNA was -0.61° per year (95% CI = -0.69 to -0.25), for Anterior Maxillary Displacement was - 0.61 mm per year (95% CI = -0.90 to -0.32), and for Maxillary Plane Rotation was +0.07° per year (95% CI = -0.17 to +0.32).
CONCLUSIONS: Removable functional appliances in Class II growing patients have a slight inhibitory effect on the sagittal growth of the maxilla in the short-term, while they do not seem to affect the rotation of maxillary plane.

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Periodontal and systemic inflammation in obese pregnant women

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BACKGROUND: Both periodontal disease (PD) and pregnancy can induce local and systemic inflammation and immunological changes. The interplay between pregnancy, obesity and PD can be particularly harmful for both mother and fetus. This study evaluated the correlations between obesity and PD focusing on the role of PD as a distant source of low-grade systemic inflammation in the mother and the possible indirect effects on the placenta and the fetus.
METHODS: 93 singleton pregnant women were prospectively enrolled at their first prenatal visit; 73 were obese (OB, BMI ≥30 kg/m²) and 20 had normal weight (NW, BMI 18-25 kg/m²). Pregnancies with maternal infections (HIV, HCV), maternal drug abuse, abnormal placental insertion, fetal malformations, chromosomal abnormalities and complete edentulism were excluded. At recruitment, the following information were recorded: (i) medical history and obstetrical history (ii) data about the current pregnancy, such as gestational age, maternal weight, pre-pregnancy BMI, smoking habits. Nutritional and lifestyle advices were provided to OB patients related to advisable weight gain and oral care. CRP levels were measured every trimester by blood testing. Gestational weight gain (GWG), gestational age, type of delivery, birthweight, newborn sex and placental biometry data were recorded at delivery. Periodontal status was assessed by complete oral clinical examination during the third trimester (28-38 weeks) in a subset of patients. The oral examination included (i) DMFT dental score (ii) periodontal examination with recording of plaque index (PII), gingival bleeding on probing (BOP), probing pocket depth (PPD), clinical attachment level (CAL). PD was defined as the presence of at least one periodontal pocket ≥ 4 mm.
RESULTS: Periodontal status: none of the women presented high scores of PD and/or dental disease indexes at clinical oral examination. However, OB had deeper periodontal pockets and reported a significant increase in gingival bleeding. Obesity was associated with PD during pregnancy, with an odds ratio of 4.5 compared to NW. Plasma CRP levels during the 3 trimesters indicated mild or severe inflammatory status in OB (I trim: 16.5±10.9; II trim: 12.5±6.9; III trim:11.1±9.4 mg/dL). GWG was significantly lower in OB (7.6±7.1 kg) *vs* NW (14.5±4.7kg) women (p=0.000), according to the provided nutritional advice. Gestational age, birthweight and placental diameters were not significantly different in OB *vs* NW. Placental weight was significantly different (p<0.005) with OB women having heavier placentas.
CONCLUSIONS: Obesity is an aggravating inflammatory condition of pregnancy. PD may also represent one distant source of low-grade systemic inflammation with the potential to increase adverse pregnancy outcomes through the direct and indirect effects of oral pathogens. In our study population, higher gingival bleeding, together with deeper periodontal pockets may reflect the systemic inflammation of obesity; this was confirmed by higher CRP levels in obese women as a marker of maternal systemic inflammation.

Mandibular alveolar bone dehiscences and fenestrations: a Cone Beam Computerized Tomography evaluation of 600 teeth in an Italian Caucasian population

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BACKGROUND: Cone beam computed tomography (CBCT) was used to measure the horizontal width of facial alveolar bone overlying healthy mandibular incisors and canines to determine prevalence of alveolar bone dehiscences and fenestrations.
METHODS: Cone Beam Computerized Tomographies (CBCTs) from patients aged 18 to 30 years were randomly selected from a private database. The thickness of facial bone in the sagittal scan was measured perpendicular to the long axis of 6 teeth at two locations : a) 2 mm apical to the cementoenamel junction (CEJ), and b) at the middle of the root. A single calibrated examiner performed all measurements. Descriptive and inferential statistics were performed.
RESULTS: A total of 100 CBCTs met the inclusion criteria and were selected for the analysis. From this sample, 600 teeth (corresponding to the 6 lower anterior teeth) were used for the analyses of the present study. Dehiscences and fenestrations were shown to have a mean value of 6.78±1.90 mm and 4.89±1.74 mm, respectively. The average bone width 2 mm from the CEJ was 0.81±0.23 mm, while bone width at the middle of the root was 0.77±0.28 mm. The overall prevalence of dehiscences and fenestrations was 89,16% and 5,16%, respectively. The severity of dehiscences and fenestrations was similar between young and old subjects as well as between men and women. Bone width at 2 mm from the CEJ was thinner in older patients (0.84±0.22 mm) and significantly (0.0007) thinner in women (0.71±013). In terms of mean length of dehiscence among different teeth, several statistical significant differences were found .In contrast, comparisons of bone

width at the middle of the root among the 6 analyzed teeth showed no statistical difference.The correlation coefficient between age and dehiscences was very low (0.0733), as well as for age and fenestrations (0.1424).
CONCLUSIONS: CBCT was an effective and convenient tool for identifying and diagnosing fenestrations and dehiscences and for measuring vestibular bone width. The study demonstrated a high prevalence of thin facial facial bone that may contribute to fenestrations, dehiscences and, indirectly, soft tissue recession. The diagnosis of these defects may be of significant importance during treatment planning in order to minimize post surgical complications such as gingival recession. In specific cases, CBCT prior to treatment is recommended.

Reactive oxygen species production, metabolic syndrome and periodontitis

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BACKGROUND: Metabolic syndrome (MetS) is often associated with obesity, impaired glucose tolerance, hyperinsulinemia and diabetes. Recent clinical studies provided evidence that MetS is associated with an increased risk of periodontitis; moreover literature data showed a link between obesity and periodontitis, however, the underlying mechanisms remain unknown. It is important to note that MetS is characterized by an alteration of reactive oxygen species (ROS) metabolism with a consequent cellular dysfunction. The association between obesity and periodontal diseases could be based on the effect of pro-inflammatory cytokines released by adipose tissue. An increased caloric intake with higher metabolic activity, resulting in an increased production of ROS, could also be considered. Those conditions show increased serum levels of products derived from oxidative damage, promoting a proinflammatory state. For these reasons, we investigated if differences in ROS metabolism of phagocytes isolated from (a) patients with MetS, (b) patients with both MetS and periodontitis, (c) patients with periodontitis and (d) healthy subjects, were present.
METHODS: Venous blood (10 mL), obtained from each volunteers, was diluted with physiological solution (10 mL). Dextran was added in physiological solution (6%, 4 mL) to enhance the sedimentation rate of erythrocytes at 1 × g. After 30 min, the white blood cells suspension was centrifuged on Lymphoprep to remove contaminating mononuclear cells, and the pellet underwent hypotonic lysis to remove erythrocytes. The recovered PMNs were washed three times and resuspended in Krebs Ringer phosphate (KRP) solution (200.000/mL, pH 7,4).
Lympho-monocytes were isolated through Lymphoprep density gradient centrifugation. Monocytes were then isolated from lympho-monocytes by adherence. Briefly, lymphomonocytes (1 × 106 cells/mL), resuspended in RPMI 1640 containing 2% inactivated fetal calf serum, were allowed to adhere directly to Chemiluminescence (CL) vials for 1 h at 37°C in a 5% CO2 humidified atmosphere. Non-adhered cells were then gently removed by three washes with modified KRP buffer and counted by Trypan blue exclusion test in order to calculate (by subtraction from the whole) the number of adhered cells .
ROS metabolism was studied by a CL technique: the system was made up of luminol (5-amino-2,3-dihydro-1,4-phthalazindione, 100 nmol/L) and cells (1 × 105) in the presence or absence of stimulus constituted by opsonized zymosan (0.5 mg). The final volume (1.0 mL) was obtained using modified KRP buffer. ROS production was measured at 25°C for 2 h, using a LB 953 Luminometer. All the experiments were performed in triplicate.
All results are mean±standard deviation (SD). The group of means were compared by analysis of variance (ANOVA), followed when appropriate by a multiple comparison of means by Student–Newman–Keulz test. A value of $p < 0.05$ was considered significant.
RESULTS: Results showed that basal ROS production (both from PMNs and from PBMs) of group A was increased respect to that obtained from group D ($p< 0.05$).
CONCLUSION: These results are congruent with literature data and represent a further link point between oxidative stress, MetS and periodontitis. Although, the actual clinical relevance of the phenomenon remains to be evaluated.

Possible treatments for mucogingival tissue augmentation: current state of knowledge in literature

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BACKGROUND: In the last few years different materials were proposed for mucogingival tissue augmentation. The aim of this study is to evaluate the possible alternatives to autogenous grafts found in literature, their uses and efficacy.
METHODS: We carried out an initial research of the abstracts using the "PubMed" scientific archive. The research was limited to international English bibliography and to clinical trials on humans published from 1998 until today. Only the most relevant publications(for a total of 56 articles) have been selected.
RESULTS: Free Gingival Graft(FGG) and Connective Tissue Graft(CTG) demonstrated similar clinical predictability and they represent the "gold standard" for mucogingival surgery. Keratinized mucosa (KM) augmentation has been studied through autogenous grafts, acellular dermal matrices(ADM) and apically positioned flaps(APF). CTG are also used for gingival recessions treatment, showing good outcomes and coverage percentages. Compared to other surgical techniques, CTG associated with coronally advanced flap(CTG+CAF) turned out to be the most performing technique to obtain root coverage.
The use of CTG has also been tested in association with or without particulate bone to maintain post extraction sockets. Although many different KM augmentation techniques around teeth and implants have been described in literature, FGG is still the most used procedure in periodontal surgery. CTG represents the "gold standard" for covering recessions. However, the limits of CTG and FGG are patient morbidity, necrosis and lack of chromatic integration of the grafted mucosa: for these reasons, new alternative materials have been developed.
The most promising material for the future is the porcine acellular collagen matrix (CM).

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Recently it has been observed that the apically positioned flap(APF or vestibuloplasty) associated with FGG/CTG, is the most documented and successful method for increasing KM area. APF/V+CM has shown similar results in KM gain, less patient morbidity and reduced operative times.
Regarding gingival recessions, comparing CAF alone to CTG or CM, the gold standard seems to be the association CAF+CTG. CM+CAF shows good results, inferior to CAF+CTG but better to CAF alone. The association of CM with bone substitutes showed good results even in socket preservation. In the last years steps forwards in tissue engineering were done. These products are made by isolated cells and biological mediators (inducing tissue proliferation) and natural or synthetic scaffold.
Both grafts, HF-DDS(Human Fibroblast Derived Dermal Substitute) and BCT(Bi-layer Cell Therapy), have been studied in clinical trials compared to autogenous soft tissue with the aim of increasing the quote of KM, showing lower outcomes due to a high contraction rate.
Besides HA-PADM has good biocompatibility and it can be used as cells carrier for tissue regeneration.
CONCLUSIONS: Gingival recession treatment: Nowadays the use of CM is considered a valid substitute for CTG, since no statistical differences have been found.
Keratinized tissue area augmentation: Although APF+FGG/CTG is still the most successful technique, APF+CM shows slightly lower results.
Keratinized tissue volume augmentation: Autogenous grafts have to be considered first choice treatments for augmenting soft tissues width.
Grafts substitutes lack of clinical data and they cannot be recommended for this clinical indication by now, although preliminary evidences seem to be in favour of their use.
Socket preservation: There are still few results in the literature. The association of xenogenic bone substitute with CM gives positive initial results to prevent alveolar ridge resorption and a better soft tissue management.
In conclusion, connective graft substitutes let less patient morbidity, reduced operative times, a better color integration and lower complication percentages.

Effects of periodontal surgery on blood pressure

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BACKGROUND: The aim of the study is to check whether , in periodontal patients who require periodontal surgical treatment , surgery is able or not to vary blood pressure , in normotensive and hypertensive patients, even in drug treatment .
METHODS: 60 patients,32 females and 28 males , all affected by periodontal disease are monitored. They are divided in two groups: 30 without high blood pressure and 30 hypertensive.
Protocol study was:
— blood pressure measurement at time 0;
— determination of periodontal parameters ;
— causal therapy and blood pressure measurement at the end of the cycle .
— periodontal surgery;
— blood pressure measurement after 4 months ;
— Blood pressure measurement after 8 months
RESULTS: Hypertensive patients , with generalized or localized aggressive periodontitis who had the highest spikes in blood pressure , showed a blood pressure reduction , in particular systolic blood pressure has been reduced by 10/20 mmHg in 4 months , maintaining this value at 8 months. Normotensive patients showed no significant changes in blood pressure checks .
Hypertensive patients , with cronic periodontitis(C.P.) showed a blood pressure reduction by 10/20 mmHg but 10 patients had after 8 month the same blood pressure value prior to periodontal surgery.The normotensive , with C.P., show no change in blood pressure in any of the pressure-sensing controls .
CONCLUSIONS: Surgical treatment of periodontal disease , contributes to the improvement in blood pressure in hypertensive patients . This could be due to the lowering of inflammatory mediators that are involved in hypertension mechanism.

The protein expression network in periodontal pocket tissue: a preliminary study

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BACKGROUND: The periodontal disease (PD) is caused by a set of inflammatory disorders characterized by periodontal pocket formation that lead to tooth loss if untreated.
Periodontitis diagnosis is only based on clinical assessment only, in the absence of a reliable pathogenic check based on appropriate interpretation of inflammation.
A modern pathogenic model based on a multilevel framework including disease-initiating and -resolving mechanisms is requested. Studies on PD utilizing proteomic analysis have been performed on saliva or crevicular fluid samples, peripheral blood or periodontal plaque samples, but not on the pathologic tissue of the periodontal pocket, which is the key lesion of the PD.
The aim of this work was to compare the proteomic profile of the pathologic interproximal gingival pocket tissue with the corresponding of interproximal gingival healthy tissue, obtained from sites where no periodontal-pathogenic bacteria were detectable.
METHODS: Twenty healthy subjects (T, test group), affected by chronic PD and twenty periodontally healthy subjects (C, control group), were enrolled in the study. T subjects underwent to the periodontal resective treatment, while C subjects underwent to the crown lengthening surgical treatment. To characterize the proteomic profile of periodontally-affected patients, their interproximal periodontal pocket tissue was compared with that of periodontally-healthy patients. Pocket-associated and healthy tissue samples, harvested during surgical therapy, were treated to extract the protein content. Tissues were always collected at sites where no periodontal-pathogenic bacteria were detectable. 2DE (Two-dimensional gel electrophoresis) and LC-MS/MS (Liquid Chromatography-tandem mass spectrometry) analysis were performed for T and C gingival tissue samples to separate and identify the proteins. Web-based bioinformatics tools (iPROClass and CateGOrize) were employed to investigate all potential localizations, molecular functions and biological processes of the

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identified proteins. After identification, proteins were selected for subsequent Western Blot quantitation both in pathological and healthy tissues.
RESULTS: The identified proteins are mainly involved in metabolism (32 %), transport (13 %) and cell organization and biogenesis (13 %). A significant unbalance in protein expression between healthy and pathological sites was recorded. Thirty-two protein spots were overall identified, and four proteins, the protein S100-A9 (S100A9), heat shock protein beta-1 (HSPB1), Galectin-7 (LEG7) and 14-3-3 protein zeta/delta (14-3-3) were selected for Western blot analysis of both periodontally-affected and healthy patients. The four selected proteins resulted extremely over-expressed in periodontal pocket tissue when compared with the corresponding tissue of periodontally-healthy patients.
CONCLUSIONS: S100A9 is involved in the regulation of inflammatory processes, immune response, oxidant-scavenging and apoptosis-inducing activities. HSPB1 synthesis increases in response to a variety of stresses (e.g. elevated temperatures, heavy metals, toxins, oxidants, bacterial and viral infections) in order to minimize the attendant deleterious consequences. LEG7 expression contributes to the tissue remodeling processes following tissue damage and protects cell from death. The 14-3-3 proteins are involved in the control of several cell cycle checkpoint, connective tissue remodeling, apoptosis signaling, during inflammation response. The Western blot and proteomic analyses are congruent with the reaction of injured periodontal tissues in PD. The proteomic analysis was performed for the first time directly on periodontal pocket tissue. The proteomic network highlighted enhances the understanding of PD pathogenesis revealing a defensive protein strategy which, however, evidently fails in patients affected by PD. Further study are requested also for specific therapeutic strategies setting.

Regenerative periodontal therapy of intrabony defects with enamel matrix derivative proteins using a novel flapless approach versus minimally invasive surgery: a 2-year randomized prospective study on clinical and patient-related outcomes.

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BACKGROUND: The aim of the present investigation was to compare radiographic and clinical effectiveness of enamel matrix derivative (EMD) proteins combined with flapless procedure and minimally invasive surgery in the regenerative treatment of deep intrabony defects.
METHODS: This trial was designed as a single-center, randomized-controlled, parallel group study of 24 months duration. Thirty generalized chronic periodontitis patients who had at least one residual periodontal defect with an intrabony component of ≥3 mm at the completion of the non-surgical periodontal therapy were consecutively enrolled. All the experimental sites were treated with the application of EMD. The test sites (n=15) received the regenerative material at a completion of a closed surgical periodontal treatment (Flapless procedure). In the control sites (n=15), EMD was applied to the debrided root surfaces accessed with a minimally invasive surgery (MIS). Clinical and radiographic parameters were recorded at baseline, 12 and 24 months postoperatively by a blinded examiner.
RESULTS: The operative chair-time was twice as long in the MIS compared to the Flapless group, whereas comparable patient-oriented outcomes were observed. Full-Mouth Plaque Score and Full-Mouth Bleeding Score remained below 15% throughout the study, and no statistically significant differences were observed between groups at any time point. Both therapeutic modalities yielded similar probing depth (PD) reduction and clinical attachment level (CAL) gain at 24 months compared to baseline ($p<0.001$). In Flapless-treated sites a mean PD reduction of 3.6±1.0 mm and a CAL gain of 3.2±1.1 mm were observed. In the MIS group they amounted to 3.7±0.6 mm and 3.6±0.9 mm. The radiographic defect fill was statistically significantly higher in the MIS when compared to the Flapless group at either 12 or 24 months ($p\leq 0.002$). When molar teeth were excluded from the analysis a comparable defect fill was obtained in both treatment groups (3.5±1.1 mm *versus* 3.7±1.3 mm).
CONCLUSIONS: Based on the enhanced biological wound stability, the Flapless approach may represent an attractive alternative to the MIS in the regenerative treatment of non-contained intrabony defects mainly on anterior teeth. Further studies are needed to validate the present findings and to identify the characteristics of defects that may benefit most from either a minimally invasive surgical or non-surgical regenerative strategy.

Changes in clinical periodontal parameters and subgingival microbial community composition in orthodontic patients after debonding

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BACKGROUND: The orthodontic treatment with fixed appliances represents a potential threat for periodontal health due to plaque retention and it is still unclear whether periodontal conditions, including the composition of sub-gingival microflora, normalize after debonding. The composition of sub-gingival microflora during and after orthodontic treatment has been evaluated in several studies using culturing techniques, which are biased due to culturing difficulties in case of anaerobic species. Among culture-independent techniques, metagenomic high-throughput next generation sequencing is a very powerful technology as it targets the entirety of the genetic information contained in a biological sample and it is able to analyse complex bacterial communities including those representing sub-gingival microenvironment.
The aim of this prospective longitudinal observational study was to monitor patients' periodontal clinical parameters and the composition of subgingival microflora at debonding and after 3 months.
METHODS: 11 patients (6F, 5M) aged 17±7 years who underwent fixed orthodontic treatment at the Department of Dental Science of the University of Trieste were included in the study. The following parameters were recorded at debonding (T0), when a professional hygiene was performed and oral hygiene instructions and motivation were provided, and at 3 months follow-up (T1): O'Leary's Plaque Control Record

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(PI), Gingival index (GI) and Bleeding on probing (BOP).
At the same time, sub-gingival plaque samples were obtained from the buccal and palatal surfaces of left maxillary first molars.
During sample processing, DNA was extracted, purified, quantified with NanoDrop and amplified by RT-PCR using bacterial primers targeting the 16S rRNA gene V1-V2 variable region. The obtained bacterial DNA was then sequenced using Ion Personal Genome Machine (PGM) and the obtained sequences were aligned using publicly available bioinformatics tools. Statistical analysis including Fisher's exact test, paired Student's T-test and Wilcoxon's signed-rank test was performed using Microsoft Excel and IBM SPSS 22.0. UniFrac was used to measure phylogenetic distances among samples.
RESULTS: At T1, all periodontal clinical parameters improved compared to T0 (PI p<0,01; BOP p<0,01; GI p<0,01).
After Multiple sequence alignment (MSA), 316075 Operational Taxonomic Units (OTUs) were detected at T0 and 167069 at T1, corresponding to 16 phyla, 28 classes, 58 orders, 106 families and 202 genera.
At T0, periodontal pathogens genera Aggregatibacter, Eikenella, Fusobacterium, Porphyromonas, Campylobacter, Prevotella, and Treponema and cariogenic pathogens Streptococcus, Veillonella, Lactobacillus, Bifidobacteriales, Actinomycineae and Peptostreptococcus were detected.
At T1, despite of clinical periodontal status improvement and overall OTUs reduction (p<0,001), a significant decrease was observed only in Streptococcus genera.
UniFrac weighted analysis showed a clustering of samples at T0, showing that orthodontic appliances may contribute to the selection of a less heterogeneous microbiota, while in T1 the phylogenetic diversity seems to be higher.
CONCLUSIONS: The results of this study show how aggressive periodontal and cariogenic bacteria can persist among the patients' subgingival microbial community even after the improvement of clinical periodontal conditions after the removal of fixed orthodontic appliances.

Prevalence estimation of halitosis and its association with oral health-related parameters in an adult population of a city in North Italy

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BACKGROUND: Even worldwide only few epidemiological and etiological studies on halitosis are available and the prevalence is largely variable (2.4% - 57.9%), depending on the methods of assessment, population studied and additional risk factors. No epidemiological data on halitosis are available from Italy. Thus, the aim of this population-based cross-sectional study was to estimate the prevalence of halitosis in an urban adult population from North Italy and to explore related oral risk indicators.
METHODS: The survey used a two-stage probability sampling method to collect a representative sample of inhabitants, aged between 20 and 75 years, in the city of Turin. 802 subjects underwent oral and periodontal examination by experienced clinicians and 744 accepted to have also the halitosis examination, that consisted in a structured questionnaire about health and halitosis-related parameters, an organoleptic testing (OLT). Of these 744, the first 250 consecutive study subjects were also examined for volatile sulphur compounds (*Vs*C) with a portable gas chromatograph, analyzing hydrogen sulphide (H_2S), methylmercaptan (CH_3SH) and dimethylsulphyde [$(CH_3)_2S$]. Age and sex stratum was weighted using as reference the population of Turin at 01/01/2010. Logistic models with interaction terms between tongue coating scores (TCS), periodontal status, such as full mouth bleeding score (FMBS%), and oral health related variables, such as oral hygiene practices, were used to explore halitosis risk indicators.
RESULTS: The prevalence estimate of halitosis of any grade according to the organoleptic assessment was 53.51% (95% CI: 48.55-58.50), 36.71% (95% CI: 33.17-40.25) for grade 2-3 (light-moderate malodor), 16.80% (95% CI: 13.77-19.83) for grade 4-5 (strong bad breath). The prevalence increases with age. Very low agreement was found between self reported halitosis and organoleptic assessment (Cohen's K index = 0.152). Instead a statistically significant correlation was found between organoleptic and gas chromatography measurements (P<0.001).
Educational levels, severity of periodontitis, FMPS/FMBS, oral hygiene practices and TCS were found to be statistically correlated with halitosis diagnosis.
In particular, stronger associations between halitosis and periodontitis were observed in people having higher TCS: adjusted odds ratio considering low and high TCS in individuals with severe periodontitis were 2.95 and 20.77 ($p \leq 0.003$).
CONCLUSIONS: Even with the limitation of this study, like the moderate response rate and the wide interval confidence of some of the associations, the results can be considered representative of the population studied. The prevalence of the halitosis in the Turin area is high and so its diagnosis and management should be incorporated in comprehensive dental care. Periodontal status and TCS are the main clinical characteristic correlated with halitosis.

Accuracy and reliability of image processing techniques for three-dimensional analysis of severely resorbed alveolar sockets in periodontitis patients

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BACKGROUND: In patients with advanced periodontal disease alveolar sockets often present with severely resorbed facial/lingual plate and loss of interproximal attachment level and require bone reconstruction procedures. Nowadays, the dimensional changes in extraction sockets as well as the outcomes of the reconstructive treatment are assessed clinically or radiographically on intraoral periapical radiographs or cone-beam computed tomography (CBCT). However, they provide clinicians with only vertical and horizontal linear measurements that poorly reflect the three-dimensional (3D) aspect of bone resorption. The aim of the present study was to validate a novel procedure for quantitative volumetric assessment of alveolar defects that combines CBCT and image pro-

cessing techniques.
METHODS: Nine patients with generalized chronic periodontitis who required the extraction of at least one hopeless tooth for periodontal reasons were consecutively enrolled in the study. After the periodontal non-surgical therapy, minimally traumatic extractions were performed. If >50% of any socket wall was absent, the site was included in the study. Immediately after extraction a CBCT was taken using a custom-made template in acrylic resin with 3 aluminum radiopaque markers used a reference tool to standardize measurements. The CBCT datasets of these extraction sockets were analysed by means of two image processing softwares (Mimics 17.0 and ImageJ) using manual and automatic segmentation techniques. In order to test the accuracy of the method, the procedures of image processing were applied on 5-mm spherical aluminum markers (real volume 65 mm^3) and on a PVC model of a severely resorbed alveolar socket scanned with Micro CT.
RESULTS: When using Mimics 17.0 software the automatic segmentation procedure provided more accurate and reproducible results compared to those obtained with the manual technique even if a perfect image segmentation of the extraction sites was not reached. In comparison to to the open-source ImageJ software, Mimics was more accurate in recreating the socket walls damaged by the periodontal disease. The relative error induced by the automatic segmentation protocol using Mimics was 1.5%, considerably smaller than the error of 7% and of 10% introduced by the manual method using Mimics and by the automated method using ImageJ, respectively. An high intra- and inter-examiner reliability was observed when using the automatic segmentation procedure by Mimics. No statistical significant differences were detected between observers with extensive and little clinical experience.
CONCLUSIONS: The currently proposed segmentation protocol for the 3D rendering of alveolar sockets showed an excellent inter-observer similarity, a reduced computing time and increased user friendliness. The clinical application of this method enables a 3D follow-up of alveolar morphology after recontructive surgery and may have the potential to be applied to develop novel 3D self-made scaffolds.

Effects of Stanozolol on growth pattern and apposition of bone mineral matrix in SaOS-2 cells

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BACKGROUMD: The aim of this study was to assess the effects of the androgen Stanozolol (ST) on osteogenic activity and gene expression in SaOS-2 cells.
METHODS: SaOS-2 viability and proliferation in response to growing doses of ST (0-1000 nM) was evaluated through Resazurin assay, while cell osteogenic activity was assessed through Alizarin Red S, Calcein Green and von Kossa staining techniques at 6, 12 and 24 days of culture. Growth curves were analyzed with Boltzmann sigmoidal function and a comparison of curve fits was performed in order to verify the null hypothesis of one curve fitting all data sets and the alternative hypothesis of different curves for each culture condition. Analysis of osteogenic activity and gene expression was carried out with one-way ANOVA and Tukey's post-test considering a level of significance $p<0.05$.
RESULTS: Cell growth perfectly fitted sigmoidal Boltzmann curve up to 10 days of culture (DMEM low: $r^2=0.94$, ETOH 0.1%: $r^2=0.96$, ST 1nM: $r^2=0.98$, ST 10nM: $r^2=0.93$, ST 100nM: $r^2=0.99$, ST 1000 nM: $r^2=0.98$), without significant differences between any tested conditions ($p=0.8$).
Alizarin Red S staining revealed calcified granules with a roundly shape in ST-treated wells since the earlier observation time-point, which tended to increase with growing doses of steroid (test *vs* control: $p>0.05$). At 12 days, wells administered with ST appeared consistently more filled with calcified granules compared to controls at all the tested doses (fold change *vs* control ST 1nM: 1.920±0.085; ST 10nM: 1.955±0.092; ST 100 nM: 2.060±0.113; ST 500 nM: 2.105±0.163; ST 1000 nM: 2.170±0.014, $p < 0.01$). A similar outcome was detected at 24 days (fold change *vs* control ST 1nM: 2.025±0.191; ST 100 nM: 2.130±0.240; ST 500 nM: 2.250±0.014, ST 1000 nM: 2.200±0.566, $p< 0.05$). Von Kossa staining and Calcein Green labeling confirmed these findings: at 6 days significant differences between test and control samples were not yet detectable with Calcein Green fluorescence, while at 12 days ST doses ranging from 10 nM to 1000 nM doses produced a significant osteogenic effect over controls (fold change *vs* control ST 1nM: 2.001±0.413, $p>0.05$; ST 10nM: 2.452±0.190, $p<0.05$; ST 100 nM: 3.102±0.157, $p<0.005$; ST 500 nM: 3.201±0.131, $p<0.005$; ST 1000 nM: 4.103±0.158, $p < 0.01$). At 24 days, a massive calcification was detected under all ST concentrations (fold change *vs* control ST 1nM: 1.747±0.098; ST 10nM: 1.793±0.040; ST 100 nM: 2.074±0.040; ST 500 nM: 1.674±0.041; ST 1000 nM: 1.739±0.041; $p<0.001$).
CONCLUSIONS: ST did not significantly affect cell proliferation, while it promoted the osteogenic activity in SaOS-2. Further studies are required to test ST effects on primary cells as well as to investigate its molecular pathways of action.

Semi-quantitative and qualitative clinical analysis of periodontal soft tissues early wound healing after surgical incision

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BACKGROUMD: In order to learn more about the early wound healing of keratinized gingiva and alveolar mucosa, in this study it was proposed to clinically evaluate the state of vertical releasing incisions (VRIs) 24 hours after their execution to have a chance of observing characteristics and differences of each occurred healing in the most effective way in both keratinized gingiva and alveolar mucosa at the same time.
METHODS: Twenty-one patients have been selected for implant or periodontal surgeries. 30 VRIs have been performed by one periodontist. Each incision has been extended from the angular lines of the tooth apically to the mucogingival line, including the alveolar mucosa for an equivalent length compared to the keratinized gingiva. On completion of surgery, the operator has performed interrupted sutures

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at VRI level in order to obtain a passive closure of the flap and a primary intention healing. The types of suture material used have been: polyamide 5-0, polyglycolic acid 5-0 and polypropylene 5-0. At 24 hours after surgery, the following clinical parameters were assessed by evaluating intraoral photographs of the surgically treated area: Modified-Early Wound Healing Index (M-EHI), the Wound Healing Index (WHI) and Periodontal Soft Tissue Color (PSTC). Information concerning age and gender of the patient, localization of the VRIs and suture materials have been collected. Data have been reported as mean±standard deviation.

RESULTS: Mean value of m-EHI was 1.46±0.81, with a range from 1 to 4. 29 VRI exhibited a complete wound closure at 24h, 21 (70%) with m-EHI1, 5 (16,7%) with m-EHI2, 3 (10%) with m-EHI3. 1 (3,3%) incision exhibited m-EHI4. No incision presented m-EHI5. The mean value of WHI was 1.4±0.56, with a range from 1 to 3. 19 (63,3%) VRI exhibited WHI1, 10 (33,3%) with WHI2 and 1 (3,3%) with WHI3. The mean value of PSTC-KG was 1.13±0.34, with a range from 1 to 2. 26 (86,7%) VRI exhibited PSTC-KG 1 and 4 (13,3%) with PSTC-KG 2. The mean value of PSTC-AM was 1.53±0.77, with a range from 1 to 3. 19 (63,3%) VRI exhibited PSTC-AM 1, 6 (20%) with PSTC-AM 2 and 5 (16,7%) with PSTC-AM 3.

CONCLUSIONS: Within their limits, the results concerning m-EHI and WHI have shown that the periodontal soft tissues have peculiar early wound healing ability. Moreover, the PSTC has indicated that the alveolar mucosa tends to show a greater inflammatory response than keratinized gingiva, in terms of frequency and entities. These findings can be considered a starting point for an histological study, aimed at a better understanding of bio-molecular and structural architect-healing during the early wound healing of periodontal soft tissues.

Clinical results of a control released doxycycline system combined with a new non surgical approach in peri-implant pockets. One year follow-up

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BACKGROUND: Implant surface decontamination and resolution of inflammation represent the main objectives in the treatment of peri-implantitis. Impaired access for plaque control around the prosthetic reconstruction and surface roughness of the contaminated implant limit the reduction of the bacterial load at sites with peri-implantitis and resolution of inflammation is often incomplete. In the non-surgical management of peri-implantitis, the effects of adjunctive therapies to mechanical debridement alone, such as topic antibiotic and air polishing device were investigated. Clinical and microbiological improvements of peri-implantitis lesions were also reported after adjunctive delivery of local resorbable antibiotics (doxycycline 8,5%). Recently it was introduced a new control released doxycycline 14% system. The aim of this study was to evaluate the clinical outcomes of a new Multiple Anti-Infective Non Surgical Therapy (MAINST) in patients affected by severe peri-implatitis.

METHODS: 108 sites of 15 healthy and no smoker patients affected by acute peri-implantitis were recruited.

All patients presented peri-implant pockets (here identified as "experimental sites") with probing depth (PPD> 5 mm), bleeding on probing (BOP) and suppuration on probing (SOP).

Patients were treated with the MAINST protocol which is divided in two different steps:. Step one (T0): drainage, supragingival decontamination with abrasive systems (Airflow Master Piezon EMS® with Erythritol Powder Plus®), pocket disinfection with chlorexidine 0,20% and subgingival application of topic doxycycline 14% (Ligosan Heraeus Kulzer®). Step two (T1): after one week, supra and sub gingival removal of biofilm with air-abrasive system (Airflow and Perioflow EMS® PowderPLUS®), supra and sub gingival debridement with piezoelectric systems (Piezon EMS®), manual curettage and second subgingival application of Ligosan®. The follow-up consist in control at 12 days (T2), 30 days (T3) and then every 3 months where supra and subgingival full mouth erythritol powder air-polishing therapy (FM-EPAPT) was performed. For each time all periodontal parameter were assessed: PPD, BOP, SOP, relative attachment level (RAL) and Gingival Margin (GM).

RESULTS: Initial mean PPD was 7,83 (IC 6,81; 8,84) mm, RAL 8,05 (IC 7,01; 9,09) mm, GM 0,05 (IC -0,39; 0,48) mm, BOP 100% and SOP 100%.

At one year the parameters were respectively PPD: 3,10 (IC 2,63; 3,58) mm, RAL: 4,80 (IC 4,01; 5,60) mm, GM: 1,67 (IC 1,07; 2,28) mm, BOP 1% (IC 0,0%; 7,0%) and SOP 0%.

All patients were asymptomatic already at T1.

At baseline the pockets < 4mm were 0,93% and one year after were 98,2%.

We obtained the stabilization of the bone level and in the minimal infra osseous component we could obtain a good remineralization.

CONCLUSIONS: MAINST protocol was effective in solving symptoms already at T1 and achieved clinically significant results up to one year. We think that the most important criteria to obtain a long term stability of the clinical parameters are: an extremely accurate decontamination and debridement, the use of a topical antimicrobial controlled released system, very strict instructions of oral hygiene and a quarterly recall visit at least for a FM-EPAPT. We presented preliminary clinical results with this new approach, however posing for a randomized controlled clinical trial for better understanding the real impact of an air abrasive system in the use of adjunctive local drug delivery to non surgical therapy.

Randomized prospective clinical trial in surgical treatment of class II mandibular furcation

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BACKGROUND: To evaluate the clinical response of class-II mandibular furcation involvement treated with different surgical techniques.

METHODS: The study design was a double-blind randomized prospective clinical trial.

30 systemically healthy subjects (age range 40-70 years) with moderate-severe chronic periodontitis with class-II buccal mandibular furcations were randomly assigned to the group 1

(n=10) - open flap debridement (OFD); group 2 (n=10) OFD + contouring of furcation roof with piezoelectric surgery; group 3 (n=10) OFD + contouring of furcation roof with piezoelectric surgery+ filling with bone graft. The biomaterial is a heterologous, porcine origine, cortico-cancellous collagenated bone mix made of pre-hydrated granules (600-1000 μm) and collagen gel.
Clinical and radiological variables as bleeding on probing (BoP), probing depth (PPD), vertical and horizontal bone level (CAL and PH), gingival recession (GR), root trunk length (RTL), radicular separation (RS) and furcation perimeter (FP) were evaluated at baseline and 180 days after surgery.
All clinical parameters were analyzed statistically with Kruskal-Wallis test. Through a multivariated analysis have been evaluated relationship between clinical and radiological variables.
Furcation defects were also classified by Tarnow&Fletcher classification of vertical component of furcation involvement.
RESULTS: All considered surgical techniques for treatment of mandibular furcations caused a clinical (CAL, PPD, PH) and radiographic (FP) improvement. There was a reduction of periodontal tissues inflammation especially in groups treated with recountouring of furcation roof. Radiographic reduction of furcation areas, have shown how regenerative techniques are able to lead a class II furcation defect into a class I (33%) or completely enclosed furcation defect (11%) using a biomaterial. The multivariated analysis have been shown relationship between clinical and radiological variables. CAL is related with FP ($p<0.013$) and SR at baseline with CAL at 180 days after surgery ($p<0.03$). Also HTR and FP are related at baseline and after surgery ($p<0.01$; $p<0.043$). These results showed how anatomical features are influencing on surgery outcomes.
CONCLUSIONS: The results of present study indicate that at 6 months after surgery, all therapies resulted in significant horizontal and vertical probing depth reduction and gain in clinical attachment level.
Recontouring of furcation roof resulted in a reduction of inflammation of periodontal tissues.This practice made furcation more cleansing, and less comfortable for plaque accumulation.
With only mechanical or manual periodontal instrumentation is often impossible to remove calculus in the furcation area because of complex anatomic features. Recontourig furcation with piezosurgery allowed to clean more accurately this area. After surgery, the patient is able to clean more easily in order to manage periodontal health, necessary to guarantee a long therm prognosis.

Clinical outcomes of a doxycycline-based gel in conjunction with ultrasonic scaling at periodontal and peri-implant pockets persisting after non-surgical therapy

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BACKGROUND: Doxicycline has antimicrobial properties and inhibits the synthesis of MMP-8, collagenase and elastase. Recently, a slow release doxycicline-based gel has been developed. The present study was performed to evaluate the clinical outcomes of ultrasonic scaling (US) plus a doxicycline-based gel at deep periodontal and peri-implant pockets persisting following non-surgical therapy.
METHODS: Four patients affected by generalized aggressive periodontitis (GAP), moderate to severe chronic periodontitis (CP), periodontitis associated with type 2 diabetes (T2D-P) or peri-implantitis (PI), were included in the study. GAP and PI patients had concluded the active non-surgical treatment phase, consisting of multiple sessions of periodontal debridement with manual and mechanical instruments followed by oral hygiene instructions, whereas CP and T2D-P patients were enrolled in a supportive periodontal therapy program including full-mouth sessions of US followed by oral hygiene motivation and reinforcement. All patients presented residual periodontal pockets (here identified as "experimental sites") with probing depth (PD)≥ 5 mm and bleeding on probing (BoP). Fifteen experimental sites located at single-rooted teeth or multi-rooted teeth (n= 5 and n= 2, respectively) and one experimental site located around a dental implant were included in the study. Six, 7 and 2 sites were associated to periodontal supraosseous, intraosseous and furcation defects, respectively. At experimental sites, PD ranged from 5 to 9 mm. Eight over 16 sites showed suppuration upon probing (SoP). All experimental sites underwent US with a piezoelectric device and fine tips, followed by the professional subgingival administration of a doxicycline-based gel (Ligosan Slow Release®; Heraeus Kulzer GmbH, Germany). The gel was applied into periodontal pockets with the apposite cartridge till its extrusion from the gingival margin. Excesses of gel were removed with a microbrush. PD, presence of BoP and SoP were recorded at 4-6 weeks and at 3-6 months following treatment administration.
RESULTS: No adverse events (either observed by the operator or reported by the patients) were recorded during the follow-up period. At 4-6 weeks, 12 (80%) and 3 (20%) dental sites showed a PD≤ 4 mm or PD= 5 mm, respectively. Fourteen (94%) sites were BoP-negative and no sites were positive to SoP. The implant site showed a residual PD of 6 mm, and was BoP- and SoP-negative. At 3-6 months, 5 (33.3%) experimental sites (4 around teeth, 1 around implant) showed a PD of 5-6 mm. Thirteen sites (86.7%) were BoP-negative around teeth, while the implant site was BoP-positive. No sites were positive to SoP.
CONCLUSIONS: At dental and implant sites showing persistent, deep bleeding pockets following non-surgical therapy, the subgingival administration of a doxicycline-based gel in conjunction with an additional session of US may result in substantial clinical improvements up to 6 months following treatment. The nature of the lesion (periodontitis *vs* peri-implantitis) and defect type (supraosseous, infraosseous or furcation) seem to influence, at least in part, the outcomes of the procedure.

A novel combined mucogingival and regenerative approach in the treatment of an hopeless tooth: a case report

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BACKGROUND: The aim of this case report is to describe the clinical outcomes of a combined mucogingival and regenerative therapy in the treatment of a severely compromised maxillary lateral incisor
METHODS: a 32 years old systemically healthy patient was

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referred to the Dental Clinic Vita -Salute San Raffaele Hospital (Milan) for evaluation of a # 2.2 presenting a periodontal defect with 14 mm attachment loss (at the vestibular aspect 12 mm PPD and 2 mm REC). The x-ray showed the presence of an intrabony defect extended beyond the apex (with a periapical radiolucency). Treatment procedures comprised endodontic therapy of the periapical lesion, splinting to the neighbouring teeth and cause related therapy aimed to eliminate bleeding on probing at the defect site and to eliminate infection in the rest of the mouth were performed before surgery.
3 months later a mucogingival and regenerative periodontal surgery has been performed. The buccal flap, consisting of submarginal interdental incisions and a distal releasing incision, was raised with a split-full-split approach already adopted in soft tissue plastic surgery. Flap elevation was continued beyond the apex of the tooth, since the buccal bone was completely missing, and considered adequate when the entire vertical bone defects resulted accessible for inspection and careful instrumentation.
Following scaling and root planing, the exposed root surface was conditioned with a 24% EDTA gel for 2 minutes to remove the smear layer. Subsequently, the root was rinsed with saline. An enamel matrix protein (EMP) gel was gently applied, with particular care in order to avoid blood contamination, on the exposed root surface and a xenograft of bovine origin was packed into the defect. Two incisions, one deep to detach muscle from the periostium and one superficial to remove muscle from the inner surface of the lying mucosa were performed to allow coronal displacement of the buccal flap. A Connective Tissue Graft (CTG), resulting from the extraoral de-epithelialization with the knife blade of a free gingival graft harvested from the palate, was sutured, with two single sutures, at the inner surface of the buccal flap. The CTG was used in order to stabilize the biomaterial and to reduce the post-operative flap shrinkage. Sling sutures were used to anchor the surgical papillae to the corresponding disepithelized anatomic papillae in the most coronal position and single sutures at the level of the releasing incision in order to obtain a perfect closure and to avoid any possible bleeding.6 months after surgery a restorative treatment of the lateral incisor was performed in order to improve aesthetic outcome.
RESULTS: Clinical examination at the 6 months after surgery visit revealed clinical attachment gain of 6 mm with a shallow residual probing pocket depth (4 mm) and a slight increase in gingival recession (2 mm); the radiographic examination showed a complete defect fill.
CONCLUSION: This case report showed the possibility to change the prognosis of an hopeless tooth with an infrabony defect extending beyond the apex and achieve highest patient satisfaction through a novel combined mucogingival and regenerative treatment.

Clinical effectiveness of platelet concentrates for periodontal regeneration

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BACKGROUND: the aim of this study was to retrieve the published literature on order to clarify application and efficacy of the use of platelet concentrates (PC) in combination with open flap debridement (OFD) for the treatment of periodontal defects. Many different materials have been used to improve the clinical parameters in Guided Tissue Regeneration (GTR). Among this: resorbable and not resorbable membranes, bone substitutes (BS), enamel matrix derivatives (EMD) and platelet concentrates represent promising materials for their biological features. However, it is not clear whether the regenerative procedures are more beneficial than conservative ones. In particular, the furcation involvement may severely compromise the prognosis of the affected teeth and the treatment of furcation defects seems to be unpredictable.
METHODS: a careful literature search, via electronic databases (MEDLINE, EBSCO library, Cochrane Database of Systematic Reviews and SCOPUS), was performed independently by two authors on January 2016 and data extraction was carried out through an ad hoc extraction sheet. Only studies who directly compare the addition of a PC to OFD were included in the meta-analysis. Only studies written in English language were evaluated for inclusion in this systematic review. Studies on animal model were not included; no restrictions about the year of publication was applied. Only studies related to the treatment of class II mandibular furcation defects were included in this study.
RESULTS: Of 254 articles screened, only 11 were read fulltext and 3 of these responded to the requirements and were included in the final meta-analysis. The three studies compared the use of PC added to OFD and OFD alone in the treatment of mandibular class II furcation defects. The use of PC revealed improvements in next clinical parameters: horizontal clinical attachment level (HCAL), vertical clinical attachment level (VCAL) and probing depth (PD); while no changes have been recorded for the level of gingival margin (LGM). Regarding the different subtypes of PC, results concern only the use of platelet-rich plasma (PRP) and platelet-rich fibrin (PRF), while no scientific evidence is available in the literature as regard plasma rich in growth (PRGF) and platelet poor plasma (PPP).
CONCLUSIONS: The addition of PC to OFD could improve the treatment of class II mandibular furcation defects. However, for reduce the source of heterogeneity among studies and to improve the reliability of scientific data, other trials with large sampling should be performed in the future.

C-reactive protein: assessment of serum concentrations before and three months after non-surgical periodontal therapy

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BACKGROUND: Periodontitis (P) is an infectious as well as chronic inflammatory disease of the supporting tissues around the teeth, which leads to irreversible anatomical sequelae such as periodontal attachment loss, alveolar bone destruction, subsequent tooth mobility, and eventually, when left untreated, tooth exfoliation. The C-reactive protein (CRP) is an acute phase reactant and a marker associated with increased cardiovascular risk. It is an acute-phase protein of hepatic origin that increases following IL-6 secretion by macrophages and T cells. CRP is used mainly as a marker of inflamma-

tion. Patients with elevated CRP levels are at an increased risk of cardiovascular disease, hypertension and diabetes; Epidemiological studies have shown elevated serum CRP levels in PD patients. There is a more and more emerging evidence in the literature regarding the association between serum level concentrations of CRP and patient's periodontal status. This study aimed at evaluating and comparing the serological profiles of patients affected by P before and 3 months after non-surgical periodontal treatment.

METHODS: Patients relating at the Unit of Periodontology, Halitosis and Periodontal Medicine of the University Hospital of Pisa were screened for inclusion. Subjects were invited to participate and signed the informed consent before the beginning of the study. All included patients had a full-mouth periodontal examination including probing depth, gingival recession, full-mouth plaque score and bleeding on probing. Therefore all subjects underwent non-surgical periodontal treatment according to the full-mouth protocol. Serum analyses, performed before and 3 months after the treatment, investigated the levels of CRP, IL-10, total cholesterol, HDL, triglycerides and fibrinogen. Information as far as smoking status was concerned were collected.

RESULTS: Ninety-nine subjects were included and signed the informed consent; 58 females and 41 males, mean age 55 years (range 24-86, SD= 10). The study population consisted of 34.5% smokers, 47.9% non smokers and 17.6% former smokers. Three months after non-surgical periodontal treatment an amelioration of all clinical periodontal parameters was observed; CRP serum levels demonstrated a statistically significant reduction varying from 1.87 mg/L (SD=2.3) to 1.52 mg/L (SD= 2.38) (p=0.007) while IL-10, a potent anti-inflammatory cytokine, serum concentration incremented (p=0.001). No statistically significant differences were observed for the remaining hematochemical parameters.

CONCLUSIONS: A consistent reduction in CRP serum levels accompanied by an increment in IL-10 concentration was observed 3 months after non-surgical periodontal treatment. Scaling and root planing may moderate systemic inflammation. Nevertheless, the impact on the risk of future systemic disease onset necessitates further investigations.

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Validation of "Liverpool sicca index" on a sample of elderly patients

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BACKGROUND: The elderly population shows a higher prevalence of oral health problems, especially for the higher incidence of several diseases that negatively affect the oral cavity. The polypharmacy is most common in the elderly, because these subjects frequently had comorbidity, and adverse reactions to medications may have a variety of clinical presentations in the oral cavity. Among these, the xerostomia is the most common adverse event, and above all influence the quality of life in institutionalized elderly. Furthermore, xerostomia is a common symptom in the elderly, usually associated with decreased salivary gland function. Xerostomia has several negative consequences, which adversely affect quality of life, such as difficulties in speaking, chewing, swallowing and maintaining a comfortable prosthetic fit. The oral mucosa appears dry, hypersensitive, with mycosis infections, wounds, inflammation, burning pain, dysgeusia, and halitosis.
The BACKGROUND: of this study is to evaluate the relationship between xerostomia and oral and periodontal tissues, and investigate effects induced by xerostomia on oral health-related quality of life.
METHODS: A case control study was carried out at dental clinic of Polytechnic University of Marche in Ancona, between June and October 2015. A total of 22 elderly patients of both sexes treated with polypharmacy regimens were recruited. The risk factors associated with xerostomia were recorded if present. The subjects who clBACKGROUND:ed xerostomia were also subjected to "Liverpool sicca index". An equivalent number of controls matched for age and sex was selected.
Liverpool sicca index is a questionnaire with 28 items developed to assess symptoms and dysfunction in patients with primary Sjogren's syndrome. For this study, a modified version of this questionnaire was used, adding some items associated with a VAS scale. Other questions about ocular, nasal, or skin dryness, or the presence of dysgeusia were asked.
For the assessment of oral health, the following clinical parameters were used: oral hygiene, gingival inflammation, periodontal support loss, number of missing teeth, and presence of prosthetic rehabilitation.
Data were analyzed using GraphPad Prism software version 5.00 for Windows (GraphPad Software, San Diego, CA, USA). Kruskall-Wallis test was used for continuous variables. The level of significance was set at $p < 0.05$.
RESULTS: In the group of patients with xerostomia, 30% say they have this symptom occasionally, while 70% of subjects had persistent symptom. The risk factors for xerostomia were found in order of frequency: polypharmacy (100%), hypertension (50%), gastrointestinal diseases (23%), thyroiditis (18%), diabetes (14%), sicca syndrome (14%), hepatitis (5%).
Regarding the periodontal health status, there were no significant differences between the two groups for periodontal support loss, while gingival inflammation was increased in the patients with xerostomia. Liverpool sicca index showed higher scores in patients who had persistent xerostomia.
CONCLUSIONS: In agreement with the literature, the main risk factor for xerostomia in the elderly population is the drug therapy. Liverpool sicca index has proven to be a reliable tool in detecting patients with xerostomia and in highlighting extra-oral problems. The greater prevalence of gingival inflammation in patients with xerostomia may be linked to plaque accumulation due to iposalivation.
Because of the serious adverse health consequences of xerostomia, it is of paramount importance that dental practitioners provide a diagnostic and therapeutic service to patients with xerostomia, preventing the onset of side effects.

Ki67 overexpression in mucosa distant from oral carcinoma: a poor prognostic factor in patients with a long-term follow-up

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BACKGROUND: The aggressive behavior of oral squamous cell carcinoma (OSCC) has recently been related to the mucosa surrounding the primary mass, consisting of genetically altered cells that might be responsible for cancer progression. Two of our previous studies proposed the analysis of Ki67 expression in areas distant from the original tumor, specifically in the clinically and histologically normal mucosa opposite the primary OSCC. Background of the study was to determine whether an abnormal cell turnover in clinically and histologically "normal" mucosa distant from the primary tumor is associated with a poor prognosis in terms of locoregional control (LRC) of disease (appearance of local recurrence, second primary tumor and lymph node metastasis) and disease-specific survival (DSS).
METHODS: This prospective study monitored 55 OSCC patients surgically treated from 2004 to 2009. DSS was defined as the time from diagnosis of the primary tumor to

death from OSCC, LRC was defined as time from OSCC diagnosis to appearance of local recurrence, second primary tumor, or LymphNode Metastasis. Cell turnover in areas clinically and histologically distant from the tumor mass (opposite cheek) was evaluated by immunohistochemical expression of Ki67. A Ki67 value >20% was considered "high" as reported in previous studies.
RESULTS: The mean follow-up period of the population studied was 53.7±32.4 months; range 12-110 months. 23/55 (41,8%) patients developed a second loco/regional manifestation and eleven/55 (20%) patients died of OSCC.
Low Ki67 values (<20%), were observed in the 37/55 patients. Eleven cases with "low Ki67 values"(29.7%) presented a second locoregional neoplastic event, of whom four died of disease after a time interval ranging from 11 to 52 months; mean 25.5±18.2 months.
High Ki67 values (>20%) and presence of Ki67-positive mature keratinocytes were observed in 18/55 patients. Twelve cases (66.7%) with "high" Ki67 values (>20%) presented a second locoregional neoplastic manifestation, of whom seven died of disease after a time interval ranging from one to 66 months; mean 14.6±23.1 months).
Multivariate analysis showed that the Ki67 value in distant mucosa was the most powerful independent prognostic factor for LRC. In addition, high Ki67 expression in distant mucosa was the only variable statistically related to worse LRC (χ^2 9.5; p= 0.002) and DSS (χ^2 5.51; p=0.02) in early OSCCs (T1-2N0).
CONCLUSIONS: The present study confirmed the role of Ki67 in tumor-distant areas as a prognostic marker for OSCC patients.

What is the best surgical approach for the treatment of solid/multicystic ameloblastoma?

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BACKGROUND: Ameloblastoma is the second most common odontogenic tumor SMA is the most common subtype of ameloblastoma and it is characterized by a higher rate of recurrence. The target of this study was to establish if there was a difference in the recurrence rate between radical and conservative surgical approach of the ameloblastoma solid/multicystic (SMA). This study was carried out performing a systematic review of the literature based on evidence of the past decade.
METHODS: This systematic review was realized following the PRISMA statement and the Cochrane Handbook. Two unblinded reviewers have screened 4234 studies realized between January 2006 and September 2015, in an independent manner. Only six articles that focused on treatment modality and relapse for SMA and also met PICOS criteria were read in full text. The analysis of the risk of bias in the individual studies and across the studies were conducted using the Cochrane Collaboration tool and the graphical evaluation respectively. Only four studies reported about a direct comparison between conservative and radical approach, and were included in the study. The Relative Risk was evaluated for each study and a direct comparison with the inverse of variance test was performed. The Higgins index was used to assess heterogeneity, and confirmed by a chi squared test.
RESULTS: All the included studies were non randomized observational retrospective cohorts published in English. The recurrence rate was respectively (59/147) 40% for the conservative and (11/109) 10% for the radical approach. Because the Higgins Index was at a medium level (58%) we performed both fixed and random effects model. Both demonstrated a statistically significant difference between conservative and radical approach (P<0.05) with a lower rate of recurrence for the radical approach. Among the included studies three argued strongly in favour to the radical approach and one did not detect any difference between the two groups.
CONCLUSIONS: The analysis carried out in this study showed a lower possibility of recurrence when the radical approach is performed for the treatment of solid/multicistic ameloblastoma. Despite the high level of risk of bias, these data are in accord with other studies of the same field. Due to a lack of organization of the studies present in literature and a poor strength of evidences,in order to better understand the best surgical approach to perform, randomized clinical trials based on treatment modality and histological subtypes are necessary.

Long term efficacy of cord blood platelet gel applied to oral lesions in patients with epidermolysis bullosa

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BACKGROUND: Epidermolysis bullosa (EB) is a rare group of genetically heterogeneous skin and mucosal diseases, characterized by deficiencies in the synthesis of proteins involved in the adhesion of the connective tissue to the epithelium, frequently involving the oral cavity with bullae, ulcers, and erosions.
We report a pilot evaluation of the efficacy (during a follow-up period of 6 months) of a platelet gel derived from cord blood (CBPG) with low-level laser therapy (LLLT) for the treatment of oral mucosal lesions in seven EB patients.
METHODS: The platelets concentrates was heated at 37° C using a warming oven and applied on to the oral lesions followed by laser stimulation, using a Lumix 2 HFPL Dental Device. Patients were exposed to a pulsed 904-nm infrared laser (50 kHz, 28.4 J/cm^2 energy density, 40% duty cycle, spot size 0.8 cm), used in slight contact with the tissues with a fluence of 180J (30 kHz) for 15 minutes.
RESULTS: A significant improvement in pain and clinical lesion size was seen, the first day of treatment in every patient, and after. During the 6 months of follow-up, no patient reported any new lesion in the site of the previous treatment. No adverse effects were detailed.
CONCLUSIONS: This study revealed that CPBG with LLLT could be a promising and safe option for the treatment of EB oral lesions also in the long period.

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Topical tocopherol treatment of oral lichen planus: randomized controlled double-blind, cross-over *vs* placebo

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BACKGROUND: This controlled, randomized, crossover, double-blind study was performed to evaluate the efficacy of tocopherol acetate in terms of improvement of the clinical aspect and the discomfort level in patients with oral reticular Oral Lichen Planus comparing the results a Placebo.
METHODS: We recruited 26 patients with clinical and histological diagnosis of OLP. Patients were divided in two groups (A and B) according to a randomization list generated by a specifical software (SAS 9.2 for Windows, SAS Institute Inc., Cary, NC, USA). Both groups were assigned to one of two treatments, each lasting one month, then, after two weeks of wash-out (cross-over), the second treatment. Treatment consisted of tocopherol acetate in oily formulation, placebo was Paraffinum Liquidum. The primary variable was measured in discomfort, as measured by a visual analogue scale (VAS) with range of valid values from 0 to 10. Secondary variable was evaluated measuring the extension of the reticular lesions. This was assessed by measuring the extent of the lesions with a caliber and even take a picture at the time of each visit. The photos were then compared with each other using the program ImageJ, calibrating each photograph with measurements performed during clinical visits. Finally it has been applied a scale of scores to 6 degrees, according to clinical criteria elaborated by Thongprasom.
RESULTS: Not any statistical significance was detected (P> 0.05) in the comparison of the VAS, or between the lengths; It was detected instead statistically significant differences (P <0.05) between the two treatment sequences for the two periods, about the surface of the lesions and the Thongprasom scale.
CONCLUSIONS: This study exploits the role of antioxidant tocopherol as a factor in preventing the oxidation of polyunsaturated fatty acids, in the development of the process of lipid peroxidation. Tocopherol has proven to be a valuable support in the management of OLP reticular, although asymptomatic. Surprisingly, we noticed significant differences (P <0.05) between two treatment sequences for two periods, limited the extent of lesions and the scale of Thongprasom; while there has been no statistical significance (P> 0.05) in the comparison of VAS, nor between the lengths.

Effect of mucocutaneous disease on periodontal parameters: results of a case-control study

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BACKGROUND: Desquamative gingivitis (DG) is a clinical manifestation of several deseases. DG is characterized by a diffuse erythema of the marginal and attached gingivae associated with areas of vesiculation, erosion and desquamation. In most cases, the three major pathologies associated to DG are: Lichen planus, Pemphigus Vulgaris and mucous membrane Pemphigoid. These three diseases explain a percentage of cases of DG variable from 88 to 90%. The purpose of this study is to evaluate the presence of alterations of the deep periodontium in patients with DG.
METHODS: This was a case-control clinical pilot study. The study population was composed of two different groups: The case group included 7 patients with various forms of DG; the control group consisted of seven healthy subjects. A diagnosis with biopsy and direct immunofluorescence against IgG and IgA was made in the patients affected by DG. The two study groups were subjected to a complete periodontal charting. The results of periodontal examinations of the two groups were then compared to test a hypothetical increase in periodontal indices in patients of the case group, and specifically, in sites affected by DG.
The variables with normal distribution were evaluated by means of an Anova test to probe for differences between the case group and the control group, as well as between the sites affected by desquamative gingivitis and healthy sites.
RESULTS: The results of the biopsies showed that five patients affected by DG suffered from forms of erosive OLP and only 2 from PV. The comparison of the periodontal results of the two groups shows: REC > in cases than in controls; PD < in patients with DG (Tables 1.1- 1.2); IP > in the case group. From the comparison of the same parameters in sites affected by DG and in sites not affected by DG (Tables 2.1-2.2) emerges: REC > in the affected sites; PD < in sites affected by DG compared to healthy sites and IP > in sites affected by DG than healthy sites.
CONCLUSIONS: The results of this study show that patients with desquamative gingivitis suffer from a general deterioration of their periodontal status linked to an increase of the gingival recession and plaque indices. No differences were found between the two groups in the pocket depth parameter.

Non-surgical periodontal microinvasive treatment with the assistance of laser diodes in patients with special needs: a case report

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BACKGROUND: The object of this study is to evaluate the efficiency of laser diodes to assist the SRP in the periodontal treatment of a patient suffering from atrial fibrillation in TAO who has been diagnosed with severe periodonditis of 4.6, thereby avoiding a more invasive surgical approach which in this case would be unsuitable.
METHODS: The patient underwent three treatment sessions and a system of controls was implemented following the results of these.
In the first session an accurate case history was obtained, radiographic examinations were studied, and finally there was a professional session of oral hygiene followed by instructions on how to conduct oral hygiene at home.
In the second session the patent's compliance with the instructions regarding oral hygiene at home was checked, an examination of all four quadrants carried out with a second session

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of tartar removal, and further encouragement to follow the programme of oral hygiene at home.
The third session consisted of laser therapy (2,5W*30 sec; Ton 30us; Toff 70us) followed by an SRP and more laser therapy (2,5W*30sec; Ton 30us; Toff 70us). The session finished with a biostimulation of the treated area (0,1W*1min in CW-3 cycles with an interval of 1 minute between them). The laser used is a Doctor Smile-Lambda 808 nm.
The patient was advised to rinse with 0.20% clorexidina twice daily for four days in addition to a scrupulous oral hygiene.
Periodic controls were carried out at 15/30/60 days and in each session the area was treated with laser biostimulation.
Ninety days after the end of the treatment an examination of all four quadrants and post-treatment radiographs was carried out. The patient has been placed on a maintenance regime consisting of professional oral hygiene and motivation sessions every three months.
RESULTS: From the long term (90 days) clinical controls we have noticed that the laser diode is effective as a support but not as substitute for SRP in second phase periodontal treatment.
CONCLUSIONS: The treatment of patients with special needs with laser diodes combined with SRP can in certain cases be a substitute for periodontal surgery.
This is a very important advantage given that we do not subject patients that are being treated to oral anti-coagulants, local anaesthesia and bridge therapy with the attendant risk of thromboembolism and haemorrhage.

Management of medication-related osteonecrosis of the jaws combining piezoelectric bone resection and autologous platelet-rich fibrin (PRF)

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BACKGROUND: Bisphosphonates are a class of synthetic drugs commonly used to treat bone metastasis and various bone diseases that cause osseous fragility (such as osteoporosis). Osteonecrosis of the jaws is a common complication in patients who received bisphosphonates and other drugs; for this reason, these pathological events were denominated medical related osteonecrosis of the jaws (MRONJ). This report describes a treatment modality for advanced cases of MRONJ that involves bone resection with piezolelectric surgery and use of autologous platelet-rich fibrin (PRF).
METHODS: In our report we considered 12 patients in treatment with bisphosphonates who came to our attention with clear signs of MRONJ (current or previous treatment with antiresorptive or antiangiogenic agents, exposed bone or bone that can be probed through an intraoral or extraoral fistula in the maxillofacial region that has persisted for more than eight weeks, no history of radiation therapy to the jaws or obvious metastatic disease to the jaws) at stage 2 or 3. 5 women and 7 men (age range, 55 to 78 years; average age, 66.8 years) were included: 5 patients had prostate cancer, 3 patients had breast cancer, 4 patients had osteoporosis. After clinical examination, including history, physical, and oral examinations, and radiographic examination by orthopantomogram, computed tomography (CT), all patients were initially treated conservatively with antibiotic, professional dental hygiene and mouth rinse with nystatin and chlorhexidine 0.2 %. Surgery was performed under local anaesthesia, protocol included resection of all infected and necrotic bone with piezoelectric surgery. Resection bone margins were determined by the clinical appearance of bleeding bone. After bone resection the surgical site was filled with L-PRF membranes and the wound was sutured with absorbable material. To prepare the L-PRF we toke 40 ml of pheripheal autologous blood collected into four tube of 10 ml (with clot activator additive) that were immediately centrifuged at 2700 rpm for 12 minutes. i-PRF was prepared with 36 ml of pheripheal autologous blood collected into four tube of 9 ml (without additives) that were immediately centrifuged at 700 rpm for 3 minutes and injected around fistulas and in the site underwent surgery. Sutures were removed 7 days after surgery. Antibiotic therapy was carried out according to protocol.
RESULTS: Surgical treatment with piezoelectric surgery and use of L-PRF and topical injection of i-PRF were performed at least 4 times. 8 patients (67 %) showed complete resolution, 3 (25 %) had delayed resolution, and 1 (8%) did not resolve at all and needed repeated treatment. The combination of surgical treatment with piezoelectric technology and use of PRF led to better and faster healing with less pain.
CONCLUSIONS: PRF is characterized by a natural polymerisation that produces physiologically favourable fibrinous architecture with incorporation of platelets, leukocytes, cytokines, and circulating stem cells into the fibrin network that works as a biological healing matrix. Good results shown by PRF in improving wound healing suggest to start case-control randomized studies that could give scientific evidence of its effectiveness.

Sjogren's syndrome and thyroid disease: is there a real relationship?

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BACKGROUND: Sjogren's syndrome (SS) is a chronic inflammatory autoimmune disease which can occur alone as primary SS (pSS), or in association with other autoimmune diseases as secondary SS (sSS).
Although the disease affects primarily the salivary and lachrymal glands in its early stage, it can subsequently involve other organs or systems of the body other than exocrine glands such as kidneys, thyroid, the circulatory system, and central nervous system.
Of these, the thyroid gland is of concern because of its histological and functional similarities with the lacrimal and salivary glands and the coexistence of thyroiditis in patients with SS.
The BACKGROUND: of our study was to assess the prevalence of thyroid disease in patients affected by primary and secondary Sjogren's syndrome undergoing clinical follow-up in in the Unit of Oral Medicine Section of the University of Turin.
METHODS: Patients were searched using both digital database and paper medical charts from 2003 to 2016, selecting patients diagnosed with Sjogren's syndrome according to the criteria established by the American European Consensus Group (AECG); 100 patients were thus selected.
RESULTS: Of the 100 patients selected, 57 were diagnosed

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with pSS, while the remaining 43 were diagnosed with sSS, mostly related to chronic autoimmune diseases such as rheumatoid arthritis, systemic scleroderma, systemic lupus erythematosus or undifferentiated connective tissue disease.
Of the 57 pSS patients, 13 of them (22,81%) were found with a concurrent thyroid disease such as hypothyroidism, goiter, and thyroid hyperplasia, treated with levothyroxine in 8 (61,54%) cases.
On the other hand, 16 (37,2%) of the 43 sSS patients reported a coexisting thyroid malfunction, predominantly in the form of goiter (enlarged thyroid gland) or autoimmune thyroiditis, so that levothyroxine substitutive treatment was also required for 14 (87,5%) of them.
CONCLUSIONS: Our study shows the presence of a possible association between thyroid disease and sSS, expressed in more than one third of patients suffering from this condition, compared to remaining patients affected with pSS; in particular autoimmune thyroiditis has proved, in three cases, to be the endocrine disorder that determined the nature of secondary Sjogren's syndrome.
On the other hand, one every five pSS patients was found to suffer from a concurrent thyroid disease.
Further studies are needed to clarify if this association is the result of confounding factors (age, sex, postmenopausal period) or if the presence of thyroid malfunction can rise to predictor of Sjogren's syndrome, as demonstrated in the only study that, to our knowledge, has investigated this captivating relationship.

Analysis of the topographic distribution of burning sensation in patients diagnosed with burning mouth syndrome (BMS)

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BACKGROUND: The BACKGROUND: of this work is to study the topographic distribution (exact location) in the mouth of the burning sensation as reported by a group of patients affected by BMS.
METHODS: 83 patients diagnosed as affected by primary BMS and followed at the of Turin University Oral Pathology department of the dental School were selected and the oral topographic location of the areas affected by the burning sensation was observed. Every patient was instructed to indicate the location(s) of the symptom on a scheme of the mouth.
RESULTS: 80 patients (96.39%) reported a location at the tongue (60 at the tip, 45 at the edges, 39 at the back, 5 at the pelvis??), 36 patients (43.37%) reported a palatal location, 33 (39.36%) at the lower lip, 28 (33.73%) at the upper lip, 13(15.66%) at the gingiva, 7 (8.43%) at the cheeks, 6 (7.23%) at the throat, 3(3.61%) at the mouth floor.
24 patients (28.92%) reported only one location, of these 23 at the tongue and one only at the upper lip, 21 patients (25.30%) at two sites, 18 patients (21.69%) at three sites, 14 patients (16.87%) at four sites, 5 (6.02%) at five sites and one patient (1.2%) at 6 sites, that is to say at the entire mouth.
CONCLUSIONS: An analysis of these data shows that the location that is most affected is the tongue, either as a single location, either as multiple localization in combination with other oral districts. This finding could be related with the rich network of nerve fibers present in the tongue.

Oral lichenoid lesion (lupus-like) occurred as possible first manifestation in a female patient with PROMM

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BACKGROUND: Performing a research on digital scientific literature databases, associating the words "PROMM" and "Myotonic dystrophy" to the words "lupus", "lichenoid", "oral lesion" and "mouth", there are not encountered cases of lesions in the oral mucosa related to myotonic dystrophy type II (PROMM) or however appeared in such patients. However, it is highlighted that often the PROMM can present with unusual symptoms or different phenotypes from the classic form.
CAS REPORT: A 49 year-old female patient arrived at the oral medicine unit of CIR - Dental School in July 2008, referring the appearance from about 3 months of persistent red spot located on the palatine folds. The clinical feature put the suspect of lupus. In September, a biopsy of the lesion with histopathological test and direct immunofluorescence was performed, which gave outcome of lichenoid mucositis. Histological signalled a weak positivity of basement membrane to IgM. Search for specific Ab for Systemic Lupus Erythematous gave negative results. Also the dental Patch test gave a negative result. She doesn't take drugs. In February 2010 she underwent a new biopsy, giving the result of "diagnosis of interface vacuolar mucositis and lichenoid a prevalence of lymphocytes, and a negative immunofluorescence for pemphigus". In the same year, the patient reports the first muscle aches, which are repeated with certain cyclicality about once monthly. Autoantibodies, ESR, c-protein, rheumatoid factor are always negative. In 2013 in the control blood tests will detect increased s-CK. Rheumatologist and neurologist consulted the patient. In 2014 she reported to be followed for genetic and family assessments to neuromuscular Center, concerning the s-CK value increased. In November 2015 the genetic diagnosis of myotonic dystrophy type 2 (PROMM) was finally made.
DISCUSSION: The lesion described, lichenoid (lupus-like) type, has never had a clear etiological context. All the diagnostic hypotheses formulated were excluded from histological and blood tests performed.
Seven years after the first sign target patient found to be suffering from myotonic dystrophy type II. The palatine stain anticipated of about two years the first typical symptom of the disease, the muscle pain, and five years the first alterations in blood chemistry levels.
To the best of our current knowledge, this could be the first described case of lesion to the oral mucosa arose in the context of multi system disease that is the PROMM, with also appeared as the first clinical manifestation of the disease.

Dual localization of oral Kaposi's sarcoma in HIV-negative patient: a rare case report

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BACKGROUND: Kaposi's Sarcoma (KS) is a well-known spindle-cell malignant vascular tumor with multifocal locali-

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zation on the skin, lymph nodes and visceral organs, firstly described by Moriz Kaposi in 1872. As many vascular lesions, Kaposi' s Sarcoma can clinically show different red gradation from fair pink to dark purple or blue. In the current literature, four main types of Kaposi' s Sarcoma are described: epidemic or AIDS-related KS, KS in the immunocompromised patient, classic KS and endemic or African KS. All types of Kaposi' s Sarcoma are more frequent in men than in women. In the head and neck region, especially in the oral cavity, Kaposi' s Sarcoma is frequently observed in AIDS-related malignant neoplasm. The oral Kaposi' s Sarcoma differential diagnosis includes several malignant tumors, such as squamous cell carcinoma, lymphoma, angiosarcoma.
Classic KS, a solitary and no aggressive form, has been rarely described in oral cavity of HIV-negative and non-immunosuppressed subjects. Up to one-third of these patients with classic Kaposi' s Sarcoma develops a second primary malignancy, most often non-Hodgkin's lymphoma.
We report a case of HIV-negative woman affected with dual localization of oral Kaposi's Sarcoma and with concomitant and diffuse cutaneous lesions.
CASE REPORT: A 75-year-old Caucasian woman referred to our Department Surgical, Oncological and Oral Sciences of Palermo for worsening diffuse oral pain. Medical history showed hypertension and diabetes. Oral examination showed blue nodular lesions on the dorsum of the tongue and on the hard palate. Oral hygiene was poor. Concomitant and diffuse cutaneous blue lesions were present. Biopsy was performed and histological examination led to the final diagnosis of Kaposi's Sarcoma. Serological tests did not provide data on HIV-infection neither immunocompromised status.
The patient was hospitalized in the hematology department for management.
CONCLUSIONS: Oral Kaposi' s Sarcoma could be a common finding in patients with advanced HIV infection, but it is an extremely rare condition in the non-HIV-infected people. Classic Kaposi' s Sarcoma in oral cavity should be included in the differential diagnosis of oral lesions that are clinically suspicious and it is important considered in order to plan a multidisciplinary approach.

Quality of life and medication-related osteonecrosis of the jaws (MRONJ): a preliminary study

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BACKGROUND: MRONJ (Medication Related Osteo-Necrosis of the Jaws) is an exposed or probing non-healing bone lesion in the maxillofacial region that persists for more than 8 weeks, without history of radiation therapy to the jaws in patients exposed or currently under antiresorptive (bisphosphonates and/or denosumab) and/or antiangiogenic treatment for osteo-metabolic or cancer diseases. Redness and mucosal swellings, purulent exudate sometimes with fistula formation can determine a further decrease of quality of life in these patients. Often the patients complain of bad taste and feeding difficulties, pain and discomfort in the mouth. MRONJ condition may progress to severe forms with involvement of the lower margin and fracture of the mandible, severe maxillary sinusitis, oro-antral fistula, orbital abscess, extra-oral fistula, intractable pain and inability to eat, especially when it affects debilitated patients.
The BACKGROUND: of this study is to evaluate the health related quality of life (HRQoL) under a physical and mental point of view in patients affected by MRONJ, compared with the general population.
METHODS: The study has been accomplished through the administration of the SF-12 questionnaire which investigates the HRQoL. MRONJ patients of "C.R.O.Ma." (Coordination of Research on Osteonecrosis of the Jaws) project of "Sapienza" University of Rome were included in the study, and the collected data were compared with general population data, previously reported in scientific literature.
RESULTS: 15 patients with MRONJ were included; the values of test sample showed how MRONJ can aggravate patients' conditions, above all under a physical point of view. Significant differences based on the level of education and age of the subjects, on the location and finally on the stage of necrosis of the jaw, have been identified.
CONCLUSIONS: This study shows that MRONJ can be a further cause of QOL decrease in debilitated patients, mainly under a physical point of view. We want to reach at least 30 of these questionnaires to confirm the preliminary results. Prevention of MRONJ and its symptoms as oral pain, immunological compromission, dysphagia and the need of frequent antibiotic therapies is an important issue for oral pathology and dentistry, above all in oncologic patients, who already have an overall decrease of health-related quality of life. Spreading the mind-set of prevention in the whole health specialists community and intercepting early stages of MRONJ can avoid side effects and improve the conditions of our patients.

Low-level laser therapy: a therapeutic approach for oral mucositis in oncological patients

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BACKGROUND: Oral mucositis (OM) are frequent side effects in oncological patients treated by radiotherapy and/or chemotherapy and hematopoietic stem cell transplantation. OM are inflammatory-like process resulting from a complex array of cytokine-mediated events, which begins with mucosal atrophy and eventually leads to the painful ulceration of the mucosa. Chemotherapy associated mucositis typically peaks at 7 to 14 days after the initiation of chemotherapy and resolves within a few days as compared to radiotherapy associated mucositis in head and neck cancer patients, which peaks at weeks 4 to 6 of treatment and usually lasts few weeks after completion of radiation.
The World Health Organization (WHO) classification of OM is graded from 0 to 4: 0 no signs and symptoms; 1 painless ulcers, edema, or mild soreness; 2 painful erythema, edema, or ulcers but able to eat; 3 painful erythema, edema, or ulcers but unable eat; 4 requirement for parenteral or enteral support. Many pharmacologic therapeutic approach are proposed to prevent and to treat OM, but clinical trials have yielded inconsistent results.

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Nowadays, according to Literature data, Low Level Laser Therapy (LLLT) is considered efficacy tool for OM treatment.
The BACKGROUND: of this paper is to evaluate the state-of-the-art knowledge for LLLT
METHODS: LLLT is a non-invasive and atraumatic device, which emits a low level laser beam with a wavelength between 630-900 nm, that guarantees three main effects: analgesic effect, anti-inflammatory effect and wound healing property. LLLT mechanism of action is due to biomodulation effect that include: ATP production in mitochondria, increased collagen production, fibroblast cells proliferation, detoxification of free radicals and neo-angiogenesis.
An evaluation of the Literature data about this topic was made.
RESULTS: All the studies available in Literature data demonstrate the efficacy of LLLT in management of OM.
The major limit in the use of LLLT for OM is that there isn't any protocol standardization about technical parameters (power, dose, wavelength, time of treatment).
Various authors recommend using a power between 5-200mW and a fluence of 2J/cm2 for prophylactic and 4J/cm2 for therapeutic effects. It is suggested a LLLT application once daily until resolution.
In fact, if LLLT is used as a preventive misure, it can reduce the onset of the lesions, while it is applied as a therapeutic device, it can decrease the severity and duration of OM.
In particular the prophylactic use of LLLT avoids the risk of development of OM grade >2.
Due to his analgesic effect, LLLT allows an improvement of dysphagia and a reduction of pain, need for opioid analgesia and unplanned radiotherapy interruptions.
CONCLUSIONS: LLLT can improve the quality of life in these vulnerable patients to limit distress from mucositis.
The very encouraging results of LLLT in the prevention and treatment of OM in oncological patients could soon be proposed as a new standard of care, being part of a multidisciplinary approach. It is desirable that new studies can lead to a standardized protocol.

Biomarkers in oral pathology

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BACKGROUND: Human saliva is a multi-component oral fluid, which has high-potential for the early diagnoses of oral diseases and malignant transformation of lesions. Saliva contains 99% water as well as minerals, nucleic acids, electrolytes, mucus and proteins. It is also a non invasive and stress-free alternative to plasma and serum, and it is widely accepted as a potential method for clinical diagnostics. Saliva has the advantage to be simple to collect, easy and less expensive to analyze, compared to other fluids.
Then, most oral squamous cell carcinomas (OSCC) develop in a precancerous field of epitherlial cells characterized by tumor-associated genetic alteration. These fields could note be visible during clinical examination, so it is important to find an alternative method to identify precociously the risk areas. Of this paper is to consider a non-invasive screening approach to asses the value of molecular markers to identify patients at risk for oral cancer, using verified studies from the literature.
METHODS: Relevant articles were identified using MEDLINE and PUBMED. Key words identified were: molecular markers, salivary markers, oral dysplasia and biomarkers. Data on the same marker were grouped. Informative markers for malignant malformation were distinguished from those for oral disease presence.
The studies identified different methods of saliva collection: oral brushing and oral rinse, used in different studies and, in few of them, used in comparison to each other; also different labpratory analysis were utilized for different markers. in fact, nPCR was adopted to analyze the loss of heterozygosis (LOH) in extracted DNA, while immunohistochemistry was used p53 and TP53 sequencing.
RESULTS: Evidence is well defined by retrospective studies. In oral dysplasia, LOH increases the risk of progression to cancer, as does survivin, TP53, matrix metalloproteinase (MMP9) and DNA content. On the contrary, other markers identified, such as p53, MMP1, mRna and cathepsin 1, do not predict malignant transformation.
113 marker were identified in literature. The most identified markers during a literature investigation are p53, Ki67, PCNA, LOH and Cyclins.
CONCLUSIONS: Still many methodological limitations should be overtaken, but oral biomarkers are one of the most interesting and actual issue in both oral and general medicine. Research into this field should concentrate on longitudinal design, in order to collect more data from different centers. Data and methods of collection should be standardized, in pursuance of data comparison and of discovery a non-invasive reliable method to predict malignant transformation of oral lesions.

Salivary and oral alterations among eating disorders patients.

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BACKGROUND: Eating disorders (ED) are psychosomatic disorders that may influence oral health because dental hard tissue, as well as salivary conditions, may be affected. They are characterized by a specific psychopathology focused on eating behavior, body weight, and shape, and the individual's efforts at controlling them. In the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV), the EDs are divided into three main diagnoses: anorexia nervosa (AN), bulimia nervosa (BN), and ED not otherwise specified (EDNOS).
The aim of this study was to examine and evaluate the prevalence of specific oral manifestations in patients affected by ED, the biochemical composition of saliva in patients with ED, the relationship between ED and oral hygiene, and the patient's perception on the quality of life in relation to oral health.
METHODS: The research was carried out at two centers for ED management present in central Italy regions. Oral examination and saliva samples collection were performed for each patient. Two questionnaires was filled by each patient. The first was carried out in order to evaluate the oral hygiene of individual patients, the methods and the importance of cleaning the teeth, the smoking and the presence of oral disorders such as bleeding gums, dentin hypersensitivity and the feeling of dry mouth. The second questionnaire was the "Oral Health Impact Profile-14".
RESULTS: 21 hospitalized patients were enrolled in the

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study. All patients were female with mean age of 20.5 years (range between 14 and 56 years). 14% had atrophic mucosa, 38% presented atrophic glossitis, 76% presented dry and chapped lips and 29% reported temporo-mandibular disorders. Moreover, 57% of patients had poor oral hygiene, 38% of patients had good oral hygiene, whereas only one patient (5%) had excellent oral hygiene. During the dental examination, 104 dental erosions, 34 dental caries and 54 dental fillings were recorded in total for all patients.
Collected saliva was estimated for superoxide dismutase (SOD) activity and highly reactive oxygen species (hROS). The analysis of saliva samples showed that the mean and standard deviation of SOD (U/ml) was 0.5665±0.3283 for ED patients and was 0.9954±0.5245 for control group. The median of hROS (RFU) was 184.5 for ED patients and 217 for control group.
The questionnaire related to oral hygiene status showed that: 75% of patients gave great importance to oral hygiene; more than half of patients (55%) referred to brush their teeth after each main meal. 75% of patients referred sometimes the feeling of dry mouth, while 20% referred persistent sensation of dry mouth. 70% suffered from dentinal hypersensitivity. Finally, more than half of patients (55%) were smokers.
The average total score of the " Oral Health Impact Profile-14" questionnaire was 20.9.
CONCLUSIONS: Data analysis revealed that despite the majority of patients give great importance to oral hygiene, patients with good oral hygiene is less than the half. Data from oral examination were consistent with previous report, indeed increased prevalence of dental erosion and caries have been reported, in addition to xerostomia, hyposalivation, and enlargement of salivary glands. Drugs for ED therapy may be responsible for xerostomia. The increase of NO and decrease of SOD in the saliva of ED patients may be consistent with the augmented oral inflammation found in this type of patients. However, studies involving a larger number of patients were necessary to confirm these issues.

Doctoral: a mobile application for oral health

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DoctOral is the first mobile app for those working in the health sector, including medical, dentistry and PhD students. In the form of a logic guided pathway, it regards the diagnosis of lesions in the oral cavity and the (dental) treatment of patients who at risk of drug-related osteonecrosis of the jaw bone.
The principal function of the app is simple but powerful, and based on the recognition of initial lesions in the oral cavity, differentiating them by colour or morphology. Each pathway is selected by multiple-choice questions, leading to one or more diagnostic hypotheses. Each diagnostic hypothesis contains a summary and various clinical images of the disease in question as supporting information. In addition, the user will be able to take clinical photos of their own cases throughout the entire pathway for comparison with the final hypothesis/es, as suggested by the app.
Another special tool in the DoctOral mobile app is that of requesting and making use of (at the end of the pathway) a free second opinion service via e-mail (doctoral@odonto.unipa.it). However, this opinion is NOT intended as a medical consultation and/or the creation or provision of guidelines or recommendations. The user knowingly accepts the obligation to refer to medical criteria for the ascertaining of causal links, the principles of rule-based ethics and possible standards of care in diagnosing and caring for individual patients. As one of many functions of the DoctOral app, the user will be able to review some of the main and common pathologies of the oral cavity (Synopses of Pathology), elementary lesions and the symbols key.
Accessing the Osteonecrosis Risk page will enable to user to consult guided pathways regarding the dental treatment of oncological and osteometabolic patients, at risk of drug-related osteonecrosis of the jaw, in their various pre- and post-therapy phases, starting from a given patient case by a tailored approach-

A rare case of oral multifocal Langerhans cell histiocytosis

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BACKGROUND: Langerhans cell histiocytosis (LCH) is a rare disorder characterized by high proliferation of Langerhans dendritic cells. LCH is a solitary or multifocal disease that primarily involves bone tissue. It often affects children and young men. Histological and immunohistochemistry analysis are essential to obtain the correct diagnosis.
CASE REPORT: A 29 years-old Caucasian man is referred to the Oral Surgery Unit of George Eastman Hospital, Umberto I Teaching Hospital, with third degree mobility of teeth belonging to second, third and sixth sexstant. Panoramic radiograph showed multiple radiolucent areas with well demarcated borders on the right and left mandible and on the left maxilla. The presence of osteolytic lesions were confirmed by a subsequent CT scan. Tooth extractions and biopsy of the osteolytic tissue were performed. Histological and immunohistochemistry analysis revealed Birbeck bodies, S100 protein and CD1a antigen positive markers. According to these findings the final diagnosis of multifocal Langerhans cell histiocytosis of the oral cavity was made. The patient was sent to the Hematology department of Umberto I Teaching Hospital of "Sapienza" – University of Rome for the appropriate treatment.
DISCUSSION: A brief literature review conducted by the authors reveals that Langerhans cell histiocytosis is common in children and that in about the 50% of cases it presents itself as a unifocal lesion involving the mandibular bone. Other findings in the most recent literature suggest that LCH can also have clinical appearance of hypertrophic gingivitis, premature tooth loss and oral ulcers; root resorption and tooth displacement are considered more uncommon clinical presentations. The present case of rare multifocal LCH only involving oral hard tissues shows the strong importance of better investigate, with appropriate additional exams, initial shifty symptoms that could lead to a misdiagnosis.
CONCLUSIONS: In this case the absence of oral manifestations except teeth mobility showed the importance to better investigate unusual findings such as third degree teeth mobility in a young patient with no history of periodontitis performing radiograph examinations and histological and immunohis-

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tochemistry analysis. The correct integration of the clinical and radiographic data allows the clinician to reach the final diagnosis. Early diagnosis of LCH is important to improve the patient's prognosis and quality of life.

A rare form of adenomatoid odontogenic tumor of the mandible in a 14 year old girl: a case report

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BACKGROUND: Adenomatoid Odontogenic Tumor (AOT) is a benign neoplasm arising from the epithelial tissue and represents 2-13% of the all odontogenic tumors. It occurs particularly in young females and is mostly diagnosed in the second decade of life. The lesion is frequently located in the anterior maxilla associated with an impacted canine and rarely is found in the mandible. The World Health Organization (WHO) considers AOT a mixed tumor of odontogenic epithelium with duct-like structures and with different degrees of inductive changes in the connective tissue. Because of its slow-growing and asymptomatic nature, it is usually discovered as an incidental radiographic finding. Radiographically it may show features similar to dentigerous cysts, ameloblastomas, keratocystic odontogenic tumors or periapical disease. In about 75% of cases it appears as a well-defined radiolucency involving the crown of an impacted tooth or the whole impacted tooth. However, in very rare cases the lesion may contain snowflake-like calcifications. Histologically it usually presents as strands of spindled, columnar, and polygonal epithelial cells; solid and reticular areas and duct like structures and basophilic droplets of enameloid. Three documented variants are known: 1) the follicular type (the only one associated with an impacted tooth), 2) the extrafollicular type and 3) the extraosseous type. BACKGROUND: of this work is to illustrate the management of rare AOT case located in the right mandible, related to an impacted canine in a 14-year-old girl.
CLINICAL CASE: A 14-year-old female presented to our Unit on April 2015. The clinical history was negative and a Orthopantomography (OPG) performed a month before, showed a radiolucency area in the region of the lower-right-canine (4.3). A mandibular Cone Beam CT was prescribed. The CT showed a 1.3x0.7x0.4 cm well-defined radiolucency surrounding tooth 4.3 and mesially extending to the right lateral and central incisors, containing internal snowflake-like calcifications. The lesion did not erode the cortical mandibular bone even if the cortical lamina surrounding the canine was quite thinned. It has been decided to proceed with a multidisciplinary approach, collaborating with the Orthodontic Unit. Before the surgery, the dental vitality has been checked, and only the tooth 4.2 was non-vital; a pre-operatory endodontic treatment was performed then. After an injection of local anesthetic, a mucoperiosteal flap has been arranged and a bone bur has been used to expose the lesion, which was enucleated sparing the 4.3. Once the lesion has been removed, the canine was extracted because was mobile. A 4.0 vicryl suture was placed and an antibiotic therapy was prescribed.
RESULTS: The histological examination stated the presence of spindled and columnar epithelial cells organized in duct-like structures, and the presence of calcified material inside the cystic lumen, confirming the diagnosis of AOT. The patient has referred no post-operative pain, and no signs of recurrence appeared at ten-month follow-up.
CONCLUSIONS: The AOT is a slow-growing, benign, painless, and non-invasive tumor that radiographically is often misdiagnosed as a periapical or odontogenic cyst. It usually occurs in young females and is most common in the anterior maxilla. Imaging with CT is recommended to determine its dimension, its relationship with teeth, neurovascular bundles and soft tissues, and to determine the surgical approach to the lesion. Surgery is the standard treatment modality and AOT has a relatively good prognosis with very few recurrences. As reported in literature, also in this study no recurrence has been showed so far during follow-ups.

Tissue engineering and stem cells in dentistry: a review

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BACKGROUND: Tissue engineering and, in particular, stem cells hold great interest in scientific research in order to provide techniques and materials to repair the loss of damaged tissues. Adult mesenchymal stem cells have been recently isolated from tooth related tissues and they may represent in the future a new protocol in the regeneration of all oral tissues. The aim of our review is to provide an overview on the topic reporting the current knowledge for each class of dental stem cells and to identify their potential clinical applications as a therapeutic tool in various branches of dentistry.
METHODS: We performed a research on PUBMED database entering "STEM CELL" as main query, "AND" as default Boolean operator, and "IN DENTISTRY" as secondary key word. We also added four search filters offered by the same database. We mainly selected works focused on *in vivo* studies on stem cells in tissue engineering applications. The research highlighted 586 articles including 129 revision on the subject. At first we considered 116 papers reading titles and abstract, and hereafter we analyzed 40 articles reading the complete text.
RESULTS: Several types of adult stem cells have been isolated and characterized from teeth including dental stem cells (DPSCs), periodontal ligament stem cells (PDLSCs), stem cells from human exfoliated deciduous teeth (SHEDs), dental follicle progenitor stem cells (DFPCs), and stem cells from apical papilla (SCAPs). Studies and comparisons have been undertaken on these human cells both *in vitro* and *in vivo* on animals. Each type of these human cells has been studied both *in vitro* and *in vivo* on animal and were compared between them. In these studies have been used different biological scaffold an GFs to allow the growth and differentiation of the cells. According to their differentiation capacity, every oral stem cell type represents a determined source for a specific application field: SCAP and SHED can be suggested for use in regenerative endodontics. DPSCs, SHED, SCAPs, PDLSCs, and DFSCs are good candidates for improving the existing regenerative procedures of craniofacial bone defects.
CONCLUSIONS: Dental stem cells are an easily obtainable source of multipotent cells and *in vivo* studies on animal models confirmed the significative outcomes of *in vitro* studies.. Furthermore dental stem cells may provide innovative solutions also in other medical branches thanks to their multipotent differentiation ability and immunomodula-

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tory properties. Nevertheless there are no *in vivo* studies on humans yet that supports the reliability for therapeutic use and further evidence is required to demonstrate the possibility of using dental stem cells as a therapeutic tool for daily clinical practice.

A new home protocol of low level laser therapy to reduce pain in patients with TMJ disorders: clinical preliminary study

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BACKGROUND: The aim of this randomized, double-blind, placebo-controlled clinical preliminary study is evaluate the efficacy in the reduction of pain in patients with temporomandibular joint disorders (TMJD) of a new home protocol of Low Level Laser Therapy (LLLT).
METHODS: In this preliminary clinical study, 30 patients affected by TMJD have been sub-divided randomly into a Study Group, a Placeb o Group and a Drugs Group according to a series generated by the computer.
The Study Group patients (n=1a0), have used a B-cure Dental Pro low level laser, provided by Biocare Enterprise Limited (Good Energies, Haifa Israel). This medical device emits a low level laser beam with a wavelength of 808nm, which is directed over the painful area twice a day, for seven consecutive days, for 8 minutes for each application. An examiner expert in laser therapy performed the first application at the Department of Dental Sciences and Maxillo-facial Surgery of the Sapienza, University of Rome. This first application has been used as instruction to the patients that will perform by themselves at home the successive applications.
The Placebo Group patients (n=10), have received the same instructions and followed the same protocol of the Study Group ones but they have receive an ineffective device predisposed also by Biocare Enterprise Limited (Good Energies, Haifa Israel), having the same exterior characteristics of the normal device, but without the diode therapeutic source.
The Drugs Group patients (n=10) have received the conventional drug therapy protocol, composed by two non consecutive cycles of 5 days of Nimesulide (100mg a day), interspersed with one 5 days cycle of cyclobenzaprine hydrochloride (10 mg a day).
A pain evaluation have been requested by the examiner immediately before the laser treatment (T0), and at the end of the laser treatment (T1). For the pain evaluation has been adopted the Verbal Numeric Scale (VNS). The VNS is based upon a request of the examiner to the patient to indicate the level of the pain sensation on a 1-100 scale, and was successfully adopted, thanks to its good reliability and accuracy in many previous clinical trials.
After the treatment all the patients will receive the conventional therapy for the resolution of the TMJD.
RESULTS: In the Study group it was noted a significant reduction of the pain from T0 to T1 of 360 points of the VNS, with a mean of 36 per patient.
Also in the placebo group it was found a pain decrease of 220 points, with a mean of 22 per patient. In the Drug Group, was noted a reduction of pain of 360 points, with a mean of 36 per patient. This preliminary evaluation demonstrated that LLLT and drug therapy have the same efficacy in the treatment of pain related to TMJD.
CONCLUSION: The preliminary considerations that emerged by our study, even with the limitations imposed by the little number of patients, support the thesis of using LLLT as an effective alternative in reducing the TMJ related pain and also allow us to appreciate this new at home protocol easy to use and with excellent results and no side effects as for drugs.

MRONJ risks factors in 213 cancer patients under zoledronic acid versus other antiresorptive-antiangiogenic drugs

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BACKGROUND: The aim of this work is to highlight possible epidemiological differences between two groups of cancer patients affected by Medication Related Osteonecrosis of the Jaws (MRONJ); Group1: patients treated with Zoledronic acid alone and Group2: patients receiving antiresorptive-antiangiogenic drugs with or without Zoledronic acid.
Differences on the outcome of five different therapeutical approaches in G1 and G2 were also analyzed.
METHODS: We analyzed 213 patients (81 Male and 132 Female, 66,32 y) treated at the Center of Oral Medicine, Pathology and Laser Surgery of the Academic Hospital at the University of Parma, between January2004 and February2016.
One hundred ninety three patients were included in Group1 (90,61%, 68 Male and 125 Female) and 20 patients were included in Group2 (9,39%, 13 Male and 7 Female). Specific antiresorptive-antiangiogenic drugs used on patients of Group 2 were: Bevacizumab, Bortezomib, Dalotuzumab, Denosumab, Pertuzumab, Pembrolizumab, Sunitinib and Trastuzumab.
In the same group of patients we also analyzed retrospectively 200 sites of MRONJ, treated at our Center.
Sites were subclassified as follows: 176sites (SA) belonging to patients in Group1 and 24sites (SB) belonging to patients in Group2.
Twenty one sites of SA and SB were treated with a medical approach (T1) (amoxicillin 2gr/day and metronidazole 1 gr/day); 49sites (T2) were treated with medical approach and low level laser therapy (LLLT) applications (Nd:YAG 1064 nm FidelisPlus®, Fotona–Slovenia 1,25W–15Hz); 12 sites (T3) were treated with medical therapy and traditional rotary surgery; 37sites (T4) were treated with medical therapy, traditional rotary surgery and LLLT and 81sites (T5) were treated antibiotic, surgery with Er:YAG laser (2940 nm FidelisPlus®, Fotona-Slovenia 250 mJ, 20 Hz VSP-Fluence50J/cm²/300mJ 30 Hz VSP-Fluence 60 J/cm²) and LLLT.
Stages of MRONJ (I,II or III) were also taken into account.
Outcomes were assessed using the scoring system proposed by Vescovi *et al.*
RESULTS: Patients with kidney cancer treated with Sunitinib are more at risks for developing MRONJ (10, 50%).
Maxillary sites in Group2 (8, 40%) are affected almost twice as much than in Group1 (50, 25,77%).
Results show no differences between Group1 and Group2 regarding the average age of patients (G1: 65,47 y, G2: 67,18 y), stages (G1: I 41, II 115, III 37, G2: I 4,II 12, III 4) and

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locations (G1: 79,27% single and 20,73% multiple, G2: 75% and 25%).
For SA, taking into account the clinical improvement and complete healing, interesting results were highlighted comparing T1 *vs* T2 (29,4% *vs* 56,81%, 23,5% *vs* 31,81%), T1+T2 *vs* T3+T4+T5 (49,18% *vs* 87,82%, 29,50% *vs* 81,74%) and T3 *vs* T4+T5 (50% *vs* 92,23%, 50% *vs* 85,44%).
Results comparing an early approach (stage I) *vs* therapies in stage II and III lled almost twice as much to stage 0 (80% *vs* 57,14%)
CONCLUSIONS: In SB no differences between non surgical and surgical approach were highlighted.
In both groups the use of laser significantly improves the outcome of treatments.
Surgical laser approach in Stage III led to complete healing in all cases.
Early surgical approach leads in almost every cases to a complete healing.
Further studies are needed to test if the suspension of the administration of drugs could lead to higher percentage of improvement and/or healing in patients treated through Zoledronic acid combined with antiresorptive-antiangiogenic drugs or antiresorptive-antiangiogenic drugs only.

Oral manifestations in immunodeficient patients

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BACKGROUND: The oral cavity is an anatomical structure characterized by the juxtaposition of soft and hard tissues, and is continuously threatened by the external environment and foreign materials. Diseases and disorders caused by oral microorganisms are very common, particularly dental caries, periodontitis and halitosis. Oral diseases can also arise in the setting of a systemic compromission due to immunodeficiency, whose clinical importance is becoming more and more outstanding. In such conditions, oral manifestations may be more frequent, or even more severe. The aim of this study is to highlight oral and more specifically orthodontic manifestations shared by individuals with immunodeficiencies, so that precautions that will improve patients' quality of life, especially in regard to dental aspects, may be established in the future.
METHODS: A group of subjects (11 males and 9 females, mean age 12-20 years) was selected from patients with immunodeficiencies who referred to the Immunohaematology Department of San Raffaele Scientific Institute in Milan, Italy, between 2010 and 2015. All these subjects underwent the following iter: laboratory tests, microbiological, haematological and immunological evaluation, brain MRI, brain CT, orthopantomography and oral examination, hand–wrist radiography BACKGROUND:ed at evaluating the effects of pathologies of the immune system on patients' growth.
RESULTS: Medical signs and symptoms which are characteristic of peculiar immunodeficiency syndromes, such as recurrent infections, eczema, thrombocytopenia, anaemia, petechiae, ecchymosis, mucosal bleeding and major bleeding, were usually observed. The oral examination revealed gingivitis, periodontitis, aphthous lesions, gingival bleeding, petechiae in the oral mucosa, severe oral infections (caries, pulpitis, abscesses). As for orthodontic aspects, we found a higher incidence of alterations in the physiological eruptive sequence, i.e. inclusions and transpositions, probably caused by untreated inflammatory and infectious processes. Infections affecting permanent teeth may also result in malocclusion, which possibly paves the way for future skeletal problems. In addition to that, immunodeficiency may compromise orthodontic treatments and interfere with their purpose of aligning teeth and solving skeletal issues.
CONCLUSIONS: Since immunodeficiencies comprise a wide spectrum of symptoms and complications, it is mandatory to increase awareness of this entity. Although little attention was dedicated to this matter in the literature, a multidisciplinary approach for the treatment of these patients should always include the dentist, whose role is to intercept pathologies of the oral cavity and ultimately improve their quality of life.

Early onset ONJ in patient treated with denosumab and bevacizumab: case report

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BACKGROUND:
Osteonecrosis of the jaw (ONJ) is a no longer serious complication related to many drugs, notoriously aminobisphosphonate (BP) but also antiresorptives and anti-angiogenetics. Several cases of denosumab-related ONJ have been reported and the overall incidence is similar to that for BP-related ONJ. It is known that, concomitant administration of two or more of these drugs increase considerably the risk of onset and severity of ONJ.
We describe a case report of early onset ONJ in oncologic patient treated with denosumab and bevacizumab, with negative anamnesis for BP administration.
METHODS: In March 2015, a 58-year-old female patient was referred to our department for pain and swelling of upper left maxilla.
Patient reported the following anamnestic data: in 2010, for the diagnosis of breast cancer, she was underwent to right quadrantectomy surgery and radiant treatment; she was treated with monthly subcutaneous injections of 120 mg denosumab (eight doses from April 2014 to November 2014) and bevacizumab (five doses from August 2014 to November 2014); she had no history head and neck radiotherapy and BP administration. One trigger (local risk factor for ONJ) has been recognized: extractions of maxillary left second premolar and first molar have been performed few months before.
Intraoral examination showed a painful area of bone exposure in the left posterior maxilla and erythematous soft tissue with purulent discharge and swelling was detected.
After OPT and CBCT scans, bone necrosis was classified as stage II, according to Bedogni *et al*.
Systemic antibiotic (ampicillina/sulbactam intramuscularly twice daily for 8 days and metronidazole (off-label use) 250 mg orally twice daily for 8 days), local antiseptics (chlorhexidine 0.2% mouth rinses and 0.5% chlorhexidine gel) were administered. The patient was referred to Oral and Maxillofacial surgery for surgical management.
CONCLUSIONS: It is widely described in literature that early-onset ONJ is more hazardous in oncologic patients,

particularly when taking BP plus another ONJ-related drug. It is our opinion that it is necessary to give attention for prevention protocols also to the patients in therapy with all drugs related to ONJ.

Overexpression of Nicotinamide n-Methyltransferase in HSC-2 OSCC cell line: effect on apoptosis and cell proliferation.

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BACKGROUND: The oral squamous cell carcinoma (OSCC) is the most common head and neck malignancy, representing up to 90% of oral cavity cancers. In the last decades, despite progress in therapeutic strategies of OSCC, the 5-year survival rate showed no significant improvement, remaining slightly below 50%.

Nicotinamide N-Methyltransferase (NNMT) is a drug-metabolizing enzyme that is overexpressed in several tumors, including OSCC. In particular, NNMT overexpression in OSCC inversely correlates with lymph node metastasis, pT, pathological staging and histological grading. In addition to the potential role of NNMT as a prognostic factor, the measurement of salivary NNMT could serve as biomarker for early diagnosis of OSCC. In this study, in order to further explore the biological function of NNMT in OSCC cell metabolism, we investigated the effects of plasmid-mediated overexpression of NNMT in OSCC cell line.

METHODS: Human oral cancer cell line HSC-2 was transfected with the pcDNA3-NNMT plasmid. Control cells were transfected with the empty vector (pcDNA3) or treated with transfection reagent only (mock). Real-Time PCR, Western blot, and HPLC assay were used to evaluate NNMT expression, both at mRNA and protein levels. The assessment of cell proliferation was performed with MTT colorimetric assay. Furthermore, the effect of NNMT upregulation on β-catenin, survivin, and Ki-67 expression was also investigated. Data were analyzed using GraphPad Prism software. Differences between groups were determined using the Kruskal-Wallis test.

RESULTS: Compared with mock and pcDNA3-treated, cells transfected with pcDNA3-NNMT displayed significantly increased NNMT expression levels. Real-Time PCR showed a significant NNMT upregulation, that was confirmed at protein level by Western blot analysis. Furthermore, NNMT specific activity was significantly higher in transfected cells compared with controls. The results of MTT colorimetric assay showed that pcDNA3-NNMT plasmid was able to increase cell growth of HSC-2 cells compared with controls.

In order to explore the potential involvement of NNMT in cellular pathways, such as apoptosis, cell proliferation and cell signaling, we examined whether NNMT overexpression was able to affect the expression of β-catenin, survivin, and Ki-67. The results seem to indicate a statistically significant upregulation of survivin ΔEx3 isoform in pcDNA3-NNMT plasmid transfected cells, while the expression of 3B and 2α survivin isoforms was not detectable.

CONCLUSION: Our results show that NNMT overexpression in OSCC cell line significantly increases cell growth. The effect on the antiapoptotic survivin ΔEx3 isoform seems to suggest a possible involvement of NNMT in the proliferation and tumorigenic capacity of OSCC cells.

Prognostic value of mithocondrial DNA analysis in patients with secondary oral squamous cell carcinoma

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BACKGROUND: In head and neck oncology a novel classification of the secondary tumors was recently proposed on the basis of the clonal analysis of the tumors and the genetically altered mucosal field. Second neoplastic lesions can be classified as: Second Primary Tumors (SPTs) independent from the index tumor at the molecular level, Local Recurrences (LRs) or metastases that are instead related to the primary tumor and ''second field tumors" (SFTs), derived from the same genetically altered mucosal field as the primary tumor. The distinction between LR, SPT and SFT is not a simply problem of classification but may influence prognosis and the choice of treatment. mtDNA (D-loop) sequence analysis was proposed in previous studies as a reliable method for establishing the clonal relationship between two neoplastic manifestations. In the present study mtDNA D-loop analysis was applied in a group of consecutive patients experiencing a second loco-regional neoplastic manifestation after surgical resection of a primary Oral Squamous Cell Carcinoma (OSCC). The purpose was to evaluate differences in terms of survival rate between LRs, SPTs and SFTs.

METHODS: The study population consisted of 24 patients who experienced a second neoplastic lesion after a surgical resection of a primary OSCC. 21/24 (87,5%) were limited to the oral cavity whereas 3/24 (12,5%) presented a neck nodal metastasis (LNM) as second event. mtDNA D-loop analysis was performed by deep sequencing and phylogenetic clusterization in all index OSCCs, in all secondary events and in respective normal mucosa. Disease-free survival endpoints was defined as the duration between appearance of second neoplastic lesion and dead of disease or last follow-up visit.

RESULTS: mtDNA analysis showed 7/24 second neoplastic events (31,1%) phylogenetically related to index OSCC, and 17/24 cases (68,9%) phylogenetically independent. The genetic distinction of secondary tumours in LR, SPT and SFT was acquired on the basis of the phylogenetic relationship between normal mucosa of index OSCC and normal mucosa of secondary OSCC. All 7 clonal paired tumours showed respective normal mucosa phylogenetically related, suggesting a genetic diagnosis of LR. Among non clonal patients 3 out of 17 presented respective normal mucosa phylogenetically related, suggesting a genetic diagnosis of SPT whereas in remaining 14 out of 17 non clonal paired lesions also the respective normal mucosa resulted phylogenetically distant entities suggesting the presence of an altered mucosal field and a genetic diagnosis of SFT. The presence of an altered mucosal field in non clonal patients resulted a variable significantly related with a better survival rate ($p<.05$), indeed 2/17 (11,8%) SFTs events failed as compared to 5/7 LR. (71,4%) and 3/3 SPTs (100%).

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CONCLUSIONS: The presence of a clonal relationship between primary and secondary manifestations and presence of an altered mucosal field are two variables that influence the prognosis. mtDNA analysis may be considered a useful tool to give more insights and influence the choice of appropriate treatment in patients with multiple OSCCs.

Metastasis to the oral cavity: report of 11 cases and review of the literature

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BACKGROUND: The jaws and mouth are uncommon site of metastatic tumors from distant organs: approximately 1-3% of all oral malignancies are attributed to metastases.
Nevertheless, numerous metastatic tumors remain undiagnosed post-mortem and so their incidence is probably higher than suggested. The most common primary malignancies metastasizing to the oral cavity are localized in the lungs, kidneys, liver and prostate in males, and in the breasts, female genital organs, kidney, and colo-rectum in females. The aim of this paper is to highlight some clinical and epidemiological features of solid malignancies that more frequently metastasize in oral region. Variables analyzed included gender, age, clinical presentation of oral metastasis (OM), site involved, symptomatology and prognosis. We also report the experience with 11 cases of OM diagnosed at the Center of Oral Medicine, Pathology and Laser Surgery of the University of Parma, between 1997 and 2014.
METHODS: We searched the English literature in MEDLINE between 1985 and 2015. Endpoint of research was May, 1st, 2015. We identified 9479 titles which were screened through reading the abstract. Two hundred and twenty-four papers were eventually selected. Inclusion criteria were: full-text studies reporting number of cases, male to female ratio, mean age of patients, site of primary tumor, oral subsite of OM, histologic diagnosis, and follow-up data. Case series and case report without histologic confirmation were excluded. Finally, they were searched and analyzed medical charts of 11 Parma Hospital's patients with oral metastasis.
RESULTS: Lungs are the most common sites in the human body from were an OM can derive (13,95%); following sites of primary include kidney (11,96%) and liver (11,62%). Mean age of OM diagnosis is approximately 55 years. Males are most frequently affected (59%). Lower jaw is the oral site more frequently affected (43%). Clinical presentation is tipically a rapidly progressing swelling with associated edema and pain. Prognosis appeared to be dependent on the extent of metastases; mean survival among in detailed case series is 6,58 months. In ¼ of cases, oral metastases are the first manifestation of the neoplastic disease. In our experience OM derived from kidneys in 3 cases, from lungs in 2 cases and in single cases from prostate, breatst, esophagous, skin, stomach and brain. Mean age of patients of our case series was 68 years with a higher incidence in males (8 males and 3 females). Oral site more frequently affected is the tongue (3 cases) followed by gengiva, mandibular and maxillary bone, hard palate. In 7 cases signs and symptoms were swelling and then pain.
CONCLUSIONS: Our experience partially confirms literature data: oral metastases from solid cancer are unusual and may affect soft tissue or jawbones.
The primary tumor giving oral metastasis in our studies is the bladder cancer while the tongue is the most common site of OM.

Frequency of young patients with squamous cell carcinoma of the oral cavity (OSCC) in a population of Western Sicily

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BACKGROUND: Squamous cell carcinoma of the oral cavity (OSCC) is a disease known in middle-aged or elderly adults. However, an increased frequency of young people under 45 years of age with OSCC has been recently reported. This finding may be related to popularity of high-risk habits such as tobacco and alcohol use in young individuals, apart from HPV infection. The aim of this study is to evaluate the frequency of young patients with squamous cell carcinoma of the oral cavity (OSCC) in a population of Western Sicily
METHODS: A retrospective analysis of patients with diagnosis of OSCC was performed. Secondary hospital based subjects, consecutively referring from March 2012 to February 2016 to the Sector of Oral Medicine, University of Palermo, were considered. Subjects with histologically confirmed diagnosis of OSCC were selected. Among them, subjects under 45 years old were identified. Data regarding related risk factors (i.e. tobacco and alcohol use) and location of the primary lesion were also reviewed.
RESULTS: From a total of 4022 subjects, one hundred thirty-two had a histologically confirmed diagnosis of OSCC. Subjects under 45 years old (mean age 41 yrs±SD 2.34) were thirteen (9.84%), five males and eight females. Of them, 11 smokers (84.6%) were identified (mean 25 cig/die for 25 yrs). Three patients (23%) declared to be regular alcohol consumers. When the cumulative exposure to risk factors was analyzed, 61.5% had one risk factor, 23% had two risk factors, and 15.3% had no risk factors,. The high percentage of primary lesions was localized in tongue (n.7) and in the mucosa of the cheek (n.5) (53.8 and 38.4%, respectively). Only one lesion was seen in the palate (7.6%).
CONCLUSIONS: The results of this study show a high frequency of young people under 45 years old with OSCC. The frequency founded is higher than that reported by literature (1-6%). In the current study, high-risk factors exposure is detected in most young patients with OSCC. Given the younger age and potential long-term adverse sequelae of traditional treatments, oral potentially malignant disorders (OPMDs) of subjects under 45 years old should be accurately focused in order to avoid possible malignant transformations, and post-therapy quality of life must be considered in any treatment-decision making process.

Hereditary hemorrhagic teleangiectasia: diode laser treatment of cutaneous perioral lesions

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BACKGROUND: Hereditary Hemorrhagic Teleangiectasia (HHT), known as Osler-Weber-Rendu disease, is an inherited mucocutaneous disease caused by mutation of the genes involved in the signaling pathway of transforming growth

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factor-β, which plays an important role in vascular endothelia formation. Symptoms are recurrent epistaxis (often the first disease sign), visceral arterio-venous malformations, multiple muco-cutaneous telangectatic lesions. These ones are red macules, first plane, then nodular mainly located in the oral cavity. The risks correlated with these lesions are: number increase, enlargement, bleeding, superinfection. The aim of this work was to highlight the diode laser effectiveness in the preventive treatment of early cutaneous perioral lesions (< 2 mm) and therapeutic treatment of advanced ones (>2mm).
METHODS. We report the cases of 38 patients suffering from HHT syndrome showing multiple perioral telangectatic nodules, totally about 1200 cutaneous lesions. Each patient has been treated in multiple Laser sessions according to the number and the extension of the telangiectasias. The laser application was preceded by local anesthesia and cooling of the treated site to avoid the tissue damage. The authors used a diode laser with a wavelength of 800 nm in defocalised mode (spot 2 mm). The parameters were chosen according to the dimensions of the teleangectasias:
— Cutaneous perioral lesions <2mm: single impulse in ultra-pulsed mode (t_{on} 50 ms – t_{off} 50 ms) at a power of 9-14W;
— Cutaneous perioral lesions >2mm: repeated impulses in pulsed mode (t_{on} 190-250 ms – t_{off} 250-450 ms) at a power of 9-14W;
Each laser session ended with application of gel compound containing aminoacids and sodium hyaluronate, and cool packs on the treated areas.
RESULTS: During the treatment, we obtained rapid and conclusive percutaneous coagulation after single impulse in the early cutaneous perioral lesions without bleeding and with slight post-operatory pain and edema. In the telengiectasias > 2mm, at the end of each session, we noticed a definite improvement of treated areas but with more discomforts for patients, especially if treated lesions are numerous.
CONCLUSIONS: Diode laser, used in pulsed and ultra-pulsed mode for consecutive sessions, has been proved to be very effective as non-invasive treatment of the early and advanced cutaneous perioral telangiectatic lesions.

Oral squamous cell carcinoma in patients affected by Graft *versus* Host Disease: epidemiologic, histologic and immunohistochemical features

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BACKGROUND: Graft-*versus*-Host Disease is an alloimmune inflammatory process, which results from a donor-origin cellular response against host tissues. It is considered a complication of allogeneic hematopoietic stem cell transplantation (aHSCT). Chronic GVHD (cGVHD) occurs approximately in 40-70% of patient post aHSTC and is a syndrome that most commonly involves skin, oral, vaginal and conjunctival mucosa, salivary and lacrimal glands, and the liver. The oral manifestations present as atrophic-erosive and/or hyperkeratotic lesions that clinically mimic autoimmune diseases such as Lichen Planus, with oral inflammation and erythema, atrophy, tongue depapillation, hyposalivation and pain. Patients with cGVHD show high risk for oral squamous cell carcinoma (OSCC) as a result of long-term immunologic injury to the oral mucosa by T-cells, and of immunodeficiency after prolonged drug use to control cGVHD. This work was aimed at describing the particular epidemiology, histology and immunoistochemistry of OSCC in patients affected by cGVHD.
METHODS: Nineteen patients affected by cGVHD post aHSTC referred to the Complex Operating Unit of Odontostomatology, Policlinic of Bari, presenting 47 lesions considered to be precancerous on different oral sites appearing as: Leuko-erythroplastic lesions (79%), Ulcers (12%) and Nodules (9%). All the patients underwent microbiopsy. The study inclusion criteria were diagnosis of cGVHD post aHSTC and the histological diagnosis of OSCC; the exclusion criterion used was a histological diagnosis different from OSCC. Patients included in the study underwent vital staining, high definition intraoral ultrasonography, enhanced multislice spiral CT, MRI, one-time 3D wide excision of the lesions with intraoperatory histological analysis of both superficial (anterior, posterior and lateral) and deep margins. Surgical specimen where formaline fixed and paraffine embedded. Thin section (3 µm) were obtained using a microtome; some slides were stained with eosin and haematoxylin and sent for conventional histological examination, other were sent for immunohistochemical analysis in order to highlight the presence of CD3, CD20 and CD1a.
RESULTS: Six patient, 3 males and 3 females (gender ratio 1:1), with an average of 53,3 years (range 35-64 years) were affected by 19 OSCCs: 15 on the tongue, 3 on the buccal mucosa and one on the gingiva; as regard their appearance: 4 were leukoplakia, 2 erythroplakia, 8 ulcers and 5 nodules. 11 were classified as cT1-N0 and 8 as cT2-N0; G1 were 8, G2 were 9 and G3 2. Conventional histological examination revealed a prominent peritumoral flogistic infiltrate in the 63,2% of the OSCCs. Immunoistochemistry showed positivity for CD1a (normally poorly present in OSCC in patient not affected by GVHD),CD3 and CD20.
CONCLUSION: OSCCs in patients affected by GVHD were typically multifocal, both synchronous and metachronous with no gender predilection. Tongue was the most involved site. They have a high rate of peritumoral flogistic infiltrate that was mainly composed of lymphocytes. The presence almost stable of this flogistic infiltrate augurs well for an immune rehearsal therapy that will be able to reduce the incidence rate of OSCC in GVHD patients improving their prognostic attendance.

A clinical study on the subjective perception of xerostomia and how it affects the quality of life of the patients

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BACKGROUND: Xerostomia is the subjective complaint of dry mouth; the symptom affects mainly the population aged over fifty. The aim of this study was to investigate through a questionnaire the prevalence of xerostomia, how the patients perceived it and to assess the common risk factors related. The patients treated at the Dental Clinic, University of Milano

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received a questionnaire examining their general health, oral symptoms, list of medications, social and dietary habits.
METHODS Data were collected with an interview and an anonymous questionnaire offered to adult patients (age 20-92) attending the Oral Diagnosis Unit during their appointments for oral care check-ups or hygiene recalls. The questionnaire evaluated demographic and social data, risk factors and a thorough medical history including the Sjögren syndrome, oncologic treatments such as radiotherapy or chemotherapy in the last 2 years, eating disorders, neuropsychiatric disorders, the list of systemic medications and the xerostomia inventory.
RESULTS The total sample of the patients was 359, 203 females (57%) and 156 males (43%). The age of the patients ranged from 20 to 92 years (mean age 55.7, st.d. 17.98). 95 patients were smokers (26%), while 264 were former or non-smokers (74%). 182 patients didn't drink any alcohol (51%) and 177 patients had at least one alcoholic beverage (wine mainly) during meals (49%). CVD affected 76 subjects (21%), hypertension 114 (32%) and 22 patients reported diabetes (6%). Neuropsychiatric disorders affected 33 patients (9%) and 219 subjects did take some medications (61%). Regarding their dental appointments: 173 patients had a check-up twice a year (48%), 135 came in just for emergencies (38%), and 48 had a yearly check-up (13%). Oral prophylaxis was performed regularly on 317 subjects (88%) and 42 patients didn't have a regular oral prophylaxis with a dental hygienist (12%). The prevalence of xerostomia complaints in patients treated with systemic medications, (48.4% *vs* 22.9%), resulted significantly different than without drug therapies (chi square = 23.55, Pearsson $p < 0.0001$, OR 3.17). The mean xerostomia score was 26.5 (s.d. 8.4) in the case group compared to the 16.0 (s.d. 4.74) of the control group. The statistical analysis revealed a strong association between the groups of subjects divided by the number of drugs assumed per day compared with the mean of total xerostomia score in the group; ANOVA test according to Levene resulted $p = 0.081$
CONCLUSIONS: The assessment and detection of xerostomia should be performed through a comprehensive oral examination and review of the medical history of the patient. Then, the patient could be referred to the dental hygienist that implements a series of clinical measures to improve the oral hygiene and general oral health of the patient. The use of specific products such as gels or mouthwashes to enhance the lubrication of the dry mouth surfaces should be encouraged. Moreover, an adequate education of the patients to oral hygienic measures and use of moisturizing products has an outstanding relevance in relation to the causes and oral consequences of the dry mouth conditions.

Dental effects of the treatment of acute myeloid leukemia in children: case report and literature review.

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A case of a male patient of 25 years of age affected at the age of 5 years of acute myeloid leukemia (FAB M5 stadied) is presented. The patient was treated with chemotherapy and radiation therapy and bone marrow transplantation, with multiple recurrences at one and two years. The patient was treated according to Italian Association of Paediatric Hematoncology(AIEOP) protocol, as emended in 1992. This protocol is based on the administration of a combination of asparaginase, methotrexate, vincristine, daunoblastine, prednisone and desamethasone. In 2009, ten years after the last transplants, the patient has been considered healed, with the following side effects: lower left limb hypermetria resulting in dorsal scoliosis left-convex; small stature treated with hormone replacement therapy (recombinant human growth hormone); reduction in tear secretion, framed as sindromen sicca in the context of a graft *versus* host disease; restrictive dysventilatory syndrome of mild entities; appearance of hyperplastic thyroid nodules; hypogonadotropic hypogonadism. In 2009 the patient was subjected to total tireidectomy. In 2016 the patient was subjected to dental examination which revealed the presence of dental agenesis, root malformations, dental severe mobility, microdontia, enamel hypoplasy. Acute myeloid leukemia is a rare disease in the pediatric age, representing approximately 5% of all childhood leukaemias and having an incidence of 1.6 - 2.2 per million per year. The treatment of this disease includes chemotherapy, radiation therapy and bone marrow transplants. In literature there are no reports of the oral effect of this therapy in a patient fifteen years after he received the cures. After the examination of this case and review of the literature seems appropriate to conclude that among the the side effects of acute myeloid leukemia therapy should be also taken into account the effects in the maxillo-facial region. The rate of children who survived cancer, has considerably improved and a serious effort has been made to avoid the late and side effects of antineoplastic therapies. Children affected by haemathological diseases requires special attentions and dental care in addition to the antineoplastic treatment. A close cooperation between the paediatric oncohaematologists, pediatrics dental surgeons and dental hygienists is raccomanded. In these cases a strict control of oral hygene and prevention of dental diseases is fundamental to avoid impairement of residual theet.

Clinic and prejudice: case report of partial glossectomy in 92 years old woman

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BACKGROUND: This case report shows oral carcinoma surgery in a 92 years old woman, who was affected by moderately differentiated keratinized squamous cell carcinoma on the right side of the tongue. Oral squamous cell carcinoma has many risk factors, such as smoking or alcol (which are the most frequent ones), but there is also the chronic trauma that increases cells replication and, consequently, the risk of cells mutation. In this case, the aged woman wore removable prosthesis, so OSCC may be caused by prosthesis continuous trauma on tongue. The woman underwent surgery of cancer removal in general anesthesia. In this case report is showed how - despite common practice - a 92 years old woman successfully underwent partial glossectomy and she's currently in the process of healing.
METHODS: The woman, before surgery, underwent incisional biopsy on the anterior part of the lesion including healthy margins to understand infiltration degree of the lesion. The biopsy results reported moderately differentiated keratinized squamous cell carcinoma. In addition, there was tumor

infiltration at tongue base and mount floor. The 92 years old woman was operated in December 2015 in general anesthesia. During the operation the part of the tongue with lesion, the right side, and the infiltrated tissues at the tongue base and mount floor were removed. The surgery was concluded with primary closure of the surgical defect. The patient does not need any supporting chemio or radiotherapy. Before surgery blood tests, ECG and X-ray chest were done to attest the good health of the patient.
RESULTS: The surgery was done in December 2015, without supporting therapy, 10 days after the surgery the woman underwent her first control and lesion was correctly healing without signs of disease persistence. The second control, the last one, was done 1 month after the surgery and there was no OSCC residue.
CONCLUSIONS: Often, clinicians think that surgery in old people is risky because of the high morbidity during surgery for associated diseases. This means worse treatment in elder people than in young one. However, clinicians need to do adequate preoperative analysis of the elder patient to understand the actual surgical risk. Indeed, the woman underwent surgery because we've done laboratory tests and X-ray to understand her health conditions. In this case report, the woman was in good health so it has been possible doing the surgery in general anesthesia and remove the OSCC. The focus of this case report is promoting a therapy aimed to the patient's health, and not based to the common clinical prejudices in order to ensure a better treatment in the elderly.

Bisphosphonates-related osteonecrosis of the jaws: a single center 10 years experience with 100 patients.

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BACKGROUND:To describe the anamnestic, clinical, and pathologic features and risk factors for osteonecrosis of the jaw (ONJ) in a cohort of 100 patients in order to provide a risk stratification between bisphosphonate and patient population.
METHODS:A retrospective review of 100 patients who developed MRONJ, who had been followed in the Dental Service of the Policlinic Gaetano Martino Hospital, Center for Prevention, Diagnosis and Treatment of the Osteonecrosis of The Jaws, University of Messina, Messina, from January 2005 to 2015. We studied the incidence, characteristics, and risk factors for the development of ONJ among patients receiving intra-venous and oral bisphosphonates for the treatment of bone metastases or osteoporosis.
RESULTS: The data have been stratified in relation to the primary disease N=34 (%) were patients receiving bisphosphonates for the treatment of osteoporosis and N=55 (%) were onco-hematologic patients and expressed as the average value±standard deviation (DS). According to gender we registered 3 (8.8) males in the dysmetabolic patients group and 16 (29.1) in the onco-hematologic patients group. The mean age was 73.3±10.3 for the dysmetabolic patients group and 67.8±9.4 in the in the onco-hematologic patients group. In relation to the type of BPP used the most common BP administrad in the onco-hematologic patients group was Zoledronate 54 (98.2) while Alendronate was administred in 25 (73.5) patients of the dysmetabolic patients group and in 1 (1.8) patient in the onco-hematologic patients group. As to the site of the lesions in dysmetabolic patients group 27 (79.4) appeared in the mandible, in the 6 (17.6)) in the upper maxilla while in the onco-hematologic patients group 39 (70.9) in the mandible and 10 (18.2) in the upper jaw. In the dysmetabolic patients group in 1 patient (2.9) both jaws were affected and in the onco-hematologic patients group 6 patients (10.9) had a double localization. The most common trigger for BRONJ was dental alveolar surgery. In relation to the cumulative dose of BPP in the onco-hematologic patients group the average dose administred until the moment of the diagnosis was 120±134 of Zoledronate and in the dysmetabolic patients group it was 22,330±13,632 of Alendronate.
CONCLUSIONS: Cumulative dose and length of exposure seem to be the most important risk factors for this complication.ONJ appears to be time-dependent with higher risk after long-term use of bisphosphonates, often after dental extractions. Trials addressing the benefits/risks of continuing bisphosphonate therapy are needed.

Effectiveness of topical therapy in case of non-responsive oral pemphigus vulgaris

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BACKGROUND: Pemphigus vulgaris is a chronic inflammatory autoimmune bullous disease, in which the initial lesions are small asymptomatic blisters, although these are thin-walled and easily rupture, causing painful and hemorrhagic erosions. In most cases, the first signs of disease appear on the oral mucosa, and the oral cavity may be the only site of involvement for years. While the lesions can be located anywhere within the oral cavity, they are most often found in areas subjected to frictional trauma, such as tongue and palate. The ulcerations may affect other mucous membranes, such as the conjunctiva, nasal and genital mucosa. Regarding cutaneous lesions, flaccid blisters filled with clear fluid are more commonly seen. The diagnosis is generally based on the oral manifestations, while confirmation is provided by the histological findings. Patients with generalized pemphigus vulgaris may require an aggressive immunosuppressive therapy to suppress blistering. The major difficulty in managing these patients is achieving a balance between the risks associated with high-dose steroid therapy and those of poorly controlled disease. This case describes a patient in whom the oral lesions were not in remission, despite the use of systemic therapy.
METHODS: A 76-year-old man was referred from his physician to the Dental clinic of Ancona University Hospital because the oral manifestations do not respond to therapy and it was contraindicated to increase systemic therapy. Medical interview revealed a 7-year history of oral ulcers. Personal histories reported a diagnosis of Pemphigus vulgaris in 2008. The patient reported a recent worsening of the oral health, due to the lesions that caused considerable discomfort and difficulty in swallowing solid food and liquids. His medical history reported skin lesions caused by the Pemphigus, currently in remission. He received chronic therapy for Pemphigus, with 80 mg of prednisolone and 100 mg of azathioprine. Physical

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examination showed cutaneous hyperpigmentation, suggesting adrenal suppression due to the therapy. On intraoral examination, ulcers were observed on the palatal mucosa and dorsal surface of tongue.
RESULTS: Treatment consisted in relining of maxillary complete denture and topical application of clobetasol propionate 0.05% placed in 4% hydroxyethyl cellulose bioadhesive gel on internal surface of the denture twice daily for 15 days. At the end of second week, clobetasol applications were reduced to one a day. The patient was significantly improved after 3 weeks of topical therapy; in the examination, the dorsal surfaces of tongue and palatal mucosa had healed. Furthermore, the resolution of the intraoral lesions has allowed reducing the doses of systemic therapy, in order to reduce its side effects.
CONCLUSION: In this case report, we described the management of a patient with Pemphigus vulgaris who had previously undergone treatment based on systemic immunosuppressive therapy. The oral lesions were not in remission, despite the use of a high dose systemic therapy. The use of dentures as a support for the topical application of clobetasol propionate has led to a significant improvement of oral lesions, also allowing reducing the dosage of systemic therapy.

Healing evaluation by means of Optical Coherence Tomography of an extraction socket with L-PRF application in a patient at ONJ risk: a case report

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BACKGROUND: Tooth extraction has been described as the main trigger of most of osteonecrosis of the jaw (ONJ) events in patients assuming antiresorptive and antiangiogenic agents. The primary goal of dental extraction in the patient at risk of ONJ is to achieve rapidly the primary closure of the extraction socket.
In the last years the application of platelet concentrates, such L-PRF, for surgical use has widely spread, and these products are designed for the local release of platelet growth factor to stimulate tissue healing and bone regeneration, clinically reducing the healing time.
The use of Optical Coherence Tomography (OCT) is constantly increasing in medicine: it is a new biomedical device that uses light to acquire cross-sectional images of tissues with micrometer-resolution.
We report the evaluation of the wound closure by means of the OCT in a patient at risk of ONJ after a dental extraction and the application of autologous L-PRF.
METHODS: A 87-year-old partially edentulous woman was referred to our Department Surgical, Oncological and Oral Sciences, University of Palermo, for the extraction of the tooth 11, with severe mobility and root resorption.
Anamnestically, Alendronic acid assumption was reported weekly from 2007 to 2013 for osteoporosis.
The PROMaF protocol was applied, being the BP assumption >3yr (professional oral hygiene session – antibiotic prophylaxis – atraumatic tooth extraction), moreover, L-PRF (Leukocyte-Platelet Rich Fibrin, Intra-spin®, Intra-system Europa spa, Salerno, IT), was applied in the socket avoiding the vestibular mucoperiosteal flaps. Patients were given standard postoperative instructions.
One week after, the sutures were removed and the wound was checked by the OCT (VivoSight, Michelson Diagnostics, Kent, UK) in order to evaluate the closure, as control site an area of healthy keratinazed mucosa was used.
One month after,another follow up visit was scheduled: x-ray was performed and OCT evaluation was repeated.
RESULTS: One week after surgery the wound shows a central depression, although the mucosa closure was achieved; there were no clincal signs of inflammation or swelling. The OCT displayed comparable images of the wound with the healthy mucosa of the patient. No healing problems were observed in the extraction socket at the next follow-up at 4 weeks.
CONCLUSIONS: Primary closure of the extraction socket is an important goal of dental extraction in patient at risk of ONJ, since the passage of bacteria from the mouth to the wound should be minimized. Lately the application of autologous platelet concentrates, as L-PRF, showed great results, reducing surgical operating times and improving wound healing.
OCT imaging can produce detailed cross-sectional images of tissue of oral cavity, it could be a new non-invasive approach that will help the clinical evaluation of the wound.
Further researches are needed, but our result showed a completed closure of the extraction socket without sign of scar tissues with micrometer resolution.

Diagnostic and therapeutic approach in a case of Langerhans cell histiocytosis with oral manifestations

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BACKGROUND: Langerhans cell histiocytosis (LCH) is a rare proliferative disorder characterized by inflammatory lesions including pathological CD1a+/CD207+/S100+ dendritic cells, lymphocytes, and macrophages mixed with eosinophils and neutrophils. The accumulation of these cells causes lytic bone lesions, skin rashes, lymphadenopathy, splenomegaly, and organ dysfunction of the pituitary, lung, liver, and bone marrow. Despite indistinguishable histology between the lesions, LCH encompasses a broad spectrum of clinical manifestations, ranging from self-limited lesions that resolve with curettage to life-threatening disseminated disease that requires intensive chemotherapy. LCH is a challenging diagnosis due to the spectrum of clinical manifestations and overlap with more common conditions.
The purpose of this report is to describe the clinical approach to a case of jaw lesion in a female adult patient with multisystem-LCH.
METHODS: A 41-year female with multisystem-LCH was sent from the Hematology department to the Odontoiatric department for an oral assessment. Medical history disclosed multifocal bone lesions (ribs), hypopituitarism and cutaneous involvement (scalp). Panoramic and intra-oral periapical radiographs demonstrated a well-defined radiolucent lesion involving the interproximal septum between the maxillary left first and second molars. The tooth 2.6 was endodontically treated and with a large cavity on the distal side. Intra-oral examination revealed gingival recession on the buccal side, deep

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periodontal pocket, grade 2 furcation involvement and grade 2 tooth mobility. Based on these findings, and on the anamnestic data, the differential diagnoses included a flogistic process of dental or periodontal origin or a LCH-lesion. The first molar was extracted with a limited curettage of the bone tissue for the histopathological analysis. The procedure was planned to minimize the risk of damaging the periodontium of 2.7 or removing bone tissue without a real benefit for the patient. Histopathology of the curetted specimen revealed a hypercellular collection of lymphocytes, polymorphonuclear leukocyte and histiocytes with folded or centrally creased nuclei. The latter population displayed diffuse CD1a and S100 positivity. Treatment with high dose systemic steroids was initiated. During the follow-up, there was a clinical and radiographical improvement of the site without delayed healing.
RESULTS: Correct diagnosis at early stages is crucial in preventing progressive destruction and reduces the risk of negative sequelae. Gross total resection of LCH bone lesions is not only unnecessary but harmful, impeding the physiological remodeling that occurs when bone margins remain intact. The current path of medicine leads us not only to choose wisely the best care (the most effective and efficient) but also to adapt it to the patient, ie choosing the appropriate treatment for that specific patient. It is important to keep in mind who do not care diseases, but people with disease.
CONCLUSIONS: The clinical course of LCH is highly variable and unpredictable. LCH may manifest orally with single or multiple lesions of the alveolar bone of the soft tissue that overlap with various forms of chronic, aggressive or necrotizing periodontal disease. Therefore, to monitor these patients, we use diagnostic methods adopted by the Periodontist. Improvement in controlling the oral manifestations of LCH can be successfully achieved with conventional and surgical periodontal treatments. Nonetheless, only local treatment of LCH may be not sufficient and a multidisciplinary approach, in such rare condition, is essential to disclose any systemic involvement for a correct patient's management.

Special needs patients in odontostomatologic Day Hospital

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BACKGROUND: The concept of frailty expresses the patient's vulnerability before stressful events and it involves the presence of comorbidity and psychosocial factors that increase the functional dependence from somebody else's help. In odontostomatologic field vulnerable sanitary patients are those patients suffering from chronic liver disease, HIV, IRC, severe cardiovascular diseases, coagulation disorders or on anticoagulant therapy, severe autoimmune diseases, addiction to drugs, psychotropic substances and alcohol, psychiatric disorders, people with various psycho - physical, disabilities, serious anatomical deficits as a result of loss of soft/hard tissue resulting from tumors or trauma.
The purpose of this study was to evaluate the average age of the patients, the most frequent comorbidity, and the percentage of patients divided according to the operative risk classification ASA.
METHODS: At the UOSD of diagnosis hygiene and oral prevention with general and special medical-surgical vulnerable subjects DH at Policlinico Tor Vergata, there was established the odontostomtological day hospital activity. There, sanitary vulnerable patients whose systemic situation is compromised and consequently in need of a careful pre-, intra- and post-operative evaluation undergo surgery and diagnostic dental procedures.
The preoperative evaluation is carried out through an anesthesiological and cardiological visit together with complete blood count.
Patients who received the suitability to support the intervention from the anesthesiologist are divided by classes of risk according to the ASA (American Society of Anesthesiologists) classification. The need to resort to sedation techniques was evaluated by Ellis test.
Interventions are performed using equipped armchairs in the UOSD of diagnosis hygiene and oral prevention and patients' cardiovascular parameters are continuously monitored through the entire intervention.
In the case of poorly cooperating patients techniques of sedation with benzodiazepines or nitrous oxide were used.
Totally uncooperative patients are treated in general anesthesia regime in operating rooms.
RESULTS: In the period between January 2015 and January 2016 334 patients were treated: 5% belonged to ASA class 1, 34% to ASA class 2, 60% to ASA class 3 and less than 1% to ASA class 4. The average age of patients attending to odontostomatological dh was 64. The analysis of patients' clinical and anestesiological records that come to our attention shows that the most frequent comorbidities are therapy with oral anticoagulant following TVP or atrial fibrillation, myocardial infarction and cerebral vascular accidents.
CONCLUSION: The service offered by our structure turns out to be of primary importance because the increasing age of general population and the consequential increase in the prevalence of chronic degenerative diseases may result in important complications during dental procedures without adequate pre intra and post-operative assessments.
The careful evaluation of pre-operative risk along with an adequate anxiety and pain control are essential requirements for the proper management of this kind of patients.

Low level laser therapy in non-surgical management of bisphosphonated-related osteonecrosis of the jaws

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BACKGROUND: To report clinical outcomes of low level laser therapy (LLLT) in non-surgical management of related bisphosphonated osteonecrosis of the jaws. Currently the use of the laser application at low intensity has been reported in the literature for the treatment of bisphosphonated-related osteonecrosis of the jaws in association with surgery. Biostimulant effects of laser improve reparative process, increase inorganic matrix of bone and osteoblast mitotic index and stimulate lymphatic and blood capillaries growth

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METHODS: A 70 years old female patient, was referred to the Unit of Dentistry and Oral Maxillofacial Surgery of San Rocco Hospital, Brescia, for swelling and pain of the right lower jaw. The patients was in therapy with bisphosphonate for bone metastasis of breast cancer. Intraoral clinical examination highlighted the presence of a pus drainage area at the site of the right mandibular near a dental implant. Radiographic examination showed a generalized osteolysis of the right lower jaw. Based on clinical and radiographic findings, a diagnosis of bisphosphonated-related osteonecrosis was rendered. After the implant extraction and the necrotic bone, the patient was administered with antibiotics (amoxicillin and clavulanic acid, 1 gr tw/day) and metronidazole (250mg, four times/day for 15 days). Patient received LLLT (Diode laser nm, Fotona, Slovenia, power density 0.50 Watt; diameter of the fibre 320 nm) which was delivered in non-focused mode, at 2 mm of distance from the tissue, for 1 minute, repeated 5 times, once a week. Hystopathological examination of the necrotic bone, confirmed the clinical diagnosis of osteonecrosis.
RESULTS: After a period of 6 months the patients showed a complete healing of the oral mucosa. At one year follow-up, the patients reported a good tissue healing, without relapses of infection. Radiographic examination showed an augmentation of the bone architecture in the area previously affected by osteonecrosis
CONCLUSIONS: LLLT in association with systemic antibiotic therapy could represent a conservative treatment alternative to surgery, without potential side effects. LLLT seems to be effective in the treatment of osteonecrosis related bisphosphonate of the jaws; future studies need to confirm this report.

Oral manifestation of chronic lymphatic leukemia: an unusual case localized on the upper lip.

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BACKGROUND: To report a case of recurrence of Chronic Lymphatic Leukemia (CLL) primarily affecting the upper lip.
METHODS: A 75 year-old male patient was referred to the Center of Oral Medicine, Pathology and Laser Surgery of the University of Parma, because of an asymptomatic, 2 month-standing swelling in the right superior vestibular lip. The lesion measured approximately 3 cm in the larger size and showed area of ulceration and bleeding as well as a mild coverage with fibrin. An hard-fibrous consistence altogether with the clinical impression of an infiltrative process could be detected on palpation. Dental causes where excluded by a careful examination.
Medical history disclosed an history of Chronic Lymphatic Leukemia in remission from 6 months and presence of diabetes.
Working diagnosis included oral manifestation of Chronic Lymphatic Leukemia (CLL), Miescher's granulomatosis and infectious disease with a granulomatous pattern.
RESULTS: Three incisional biopsies with quantic molecular resonance scalpel (RQM) in different areas of the lesion were performed. The histopathological and immunohistochemical examination demonstrated the presence of granulation tissue with chronic lymphocytic leukemia infiltration. Neoplastic cells showed the following immunohistochemical pattern: CD20±, CD5+, CD23+, Ki-67 proliferation index: 15%.
A diagnosis of oral manifestation of Chronic Lymphatic Leukemia (CLL) was rendered and the patient was referred to his hematologist for further management.
CONCLUSIONS: Chronic lymphatic leukemia (CLL) is typically an adult disease; its incidence is higher in the fourth and fifth decade being rare in children. CLL is the most common type of chronic leukemia and it is often asymptomatic at diagnosi. Signs of progression, may include lymphadenopathy splenomegaly and hepatomegaly.
In 25% of cases the diagnosis is done occasionally in asymptomatic subjects, for routine laboratory tests that show a lymphocytosis.
Usually, oral manifestations of chronic lymphocytic leukemia (CLL) are related to an advanced stage of a diagnosed disease. Lips are an uncommon site of presentation of the CLL. Generally are mostly constituted by hemorrhagic areas, shallow ulcers and petechiae. Are described also palatal location. Chronic lymphatic leukemia is, in the initial stages, generally asymptomatic and accompanied with a relatively good prognosis. In more advanced stages the survival decreases and disease therapy, entirely medical (chemotherapy), is not curative, but greatly improves the clinical features.

Human papillomavirus (HPV) detection in dysplastic oral epithelium: comparison between cytobrush and biopsy

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BACKGROUND: Human Papillomavirus (HPV) has suggested as an etiologic agent in development of oral mucosal lesions. Even though HPVs have been widely investigated in potentially malignant and malignant oral lesions, the role of HPV in oral carcinogenesis is still unclear.
The purpose of this retrospective study was to evaluate the prevalence of HPV in oral dysplastic epithelium and evaluate the relationship between HPV prevalence and behavioural information obtained from the patient's records. Furthermore, we aimed to compare cytobrush and biopsy in HPV detection.
METHODS: Data from patients, whit an histological diagnosis of dysplasia of the oral mucosa (excluding Waldeyer ring) and HPV samples collected thorough cytobrush and biopsy were analysed.
Patients' charts were retrospectively reviewed (period 2013-2016) in order to obtain behavioural and clinical-pathological data.
For each lesion, three tests were performed: one sample for histological diagnosis and two samples for HPV detection (one sample obtained by cytobrush, one sample from perilesional biopsy).
The pathologic diagnosis was made based on routine haematoxylin and eosin-stained slides: dysplastic oral lesions were divided into mild, moderate or severe dysplasia grades according to WHO criteria.

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Real-Time PCR was used to detect high and low-risk HPV both in cytobrush and biopsy specimens.
Descriptive and analytical statistics were performed. Fisher's exact test was performed for the analysis of contingency tables.
RESULTS: We studied 17 oral dysplastic lesions classified as mild (13 cases; 76,5 %) and severe (4 cases; 23,5 %) from 14 subjects. The study group was composed of 6 males (42,9 %) and 8 females (57,1 %); the age of patients ranged from 48 to 78 years with a mean age of 63,76 years (DS±10,72). Nine (52,9 %) samples were collected from tongue mucosa.
As regard to smoking habits, 47,1 % of patients were non-smokers, 35,3% smokers and 17,6 % ex-smokers. 64,7 % of samples were derived from alcohol consumers.
Clinically, 9 of the 17 (52,9 %) oral lesions were described as leukoplakia, 2 (11,8 %) erythroplakia, 4 (23,5 %) verrucous lesions and 2 (11,8 %) ulcerative lesions.
HPV DNA was detected in 2/17 (11,8 %) of oral dysplastic lesions; both were oral severe dysplasia.
One case was positive to HPV 6; the other one has a triple infection by HPV 11, 16, 53.
Biopsy and cytological sampling by brushing were not statistically significant correlated ($p = 0.99$); the two tests were not overlapped.
CONCLUSION: Although the analysed cases were small, our study reveals a low prevalence (11,8 %) of HPV in oral dysplasia. Statistical analysis reveals that two tests can not be considered superimposed. The cytobrush technique has many advantages such as easy execution, it is less expensive, and it is less invasive. However, it does not allow analysis of deep cells layer and it seems to be less accurate than biopsy. Viral DNA presence in premalignant or malignant oral mucosal lesions may only be expression of secondary viral infection; immunoistochemical studies highlights signal expressed by cell following the integration of HPV into the host cell.
Therefore, immunohistochemical studies would be needed to assess the real integration of the HPV into the oral mucosal cells.

Tens effects on salivary stress markers: a pilot study

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BACKGROUND: The objective of this pilot study is to evaluate salivary alpha amylase (sAA) as a marker of stress in two groups of healthy subjects, one receiving ultra-low frequency transcutaneous electrical nerve stimulation (ULF-TENS) and one without stimulation.
METHODS: Sixty healthy people were enrolled. The test group consisted of 30 participants (15 men, 15 women). The control group consisted of 30 participants (15 men, 15 women).
RESULTS: Statistical analysis showed that sAA levels were statistically different between men and women independently from TENS; we hypothesize that treatment could influence sAA levels because it is thought to activate μ opioid receptors. The results of this study seem to indicate that the analysis of sAA, through a non-invasive saliva sample, could be an efficient aid for understanding the functions of the autonomic nervous system.
CONCLUSIONS: The results seem to indicate that women have a lower ability to relax both in spontaneous conditions and with TENS stimulation, compared to men, in both the test and control groups. In particular, TENS stimulation increases relaxation, especially in men. This result may prove that TENS could reduce stress, as other scientific studies have already reported.

Oral lesions as primary manifestations of acute agranulocytosis related to metamizole: a case report

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BACKGROUND: Metamizole (dipyrone) is a non-opioid compound with potent analgesic, antipyretic and spasmolytic effects. Its prolonged administration could be related to severe condition called "acute agranulocytosis": a potentially fatal event already discovered in the early 1930s but only in the 1980s recognized as a possible drug-related adverse reaction by the International Agranulocytosis and Aplastic Anemia Study (IAAAS). Agranulocytosis was characterized by neutrophil granulocyte count below 100 cells/mm^3 and normal values of other blood cell lines. The main clinical manifestation of agranulocytosis are fever, tonsillitis, pharyngitis, sepsis, pneumonia and, in the oral cavity, periodontitis, alveolar bone loss, ulcerations and local supra-infections (i.e. oral candidosis). If underdiagnosed, the mortality rate is 10%. On the contrary, with early diagnosis and appropriate management, this rate is tending to drop significantly and complete recovery is expected in over 80% of patients.
We present a case of a woman with primary oral manifestation of neutropenia related to metamizole administrated for dental pain.
CASE REPORT: A 55-year-old woman was referred to the Department of Surgical, Oncological and Oral Sciences, with worsening diffuse oral pain. Clinically, ulcer and pseudomembranous lesions on the mouth floor and alveolitis post 3.6 extraction were recognized. Oral hygiene was poor. No significant medical history was distinguished. The patient reported dental pain before and after 3.6 extraction, and took metamizole for 2 weeks; moreover, she had hematological investigations positive for severe neutropenia (neutrophil granulocyte count: 20 cells/mm^3). In accordance with hematologist, the diagnosis of acute agranulocytosis related to metamizole was made. During hospitalization for appropriate neutrophils replacement and antimicrobial therapies (by intravenous administration of antibiotics, antifungal drugs and bone marrow growth factors), the management of oral manifestation was performed by antiseptic topical treatment (chlorhexidine gel, thrice daily for 10 days). Furthermore, the patient was educated to oral hygiene. One month after hematological therapy, the intra-oral examination showed resolution of all oral manifestations.
CONCLUSIONS: Acute agranulocytosis is a severe disease potentially associated with the use of the drugs (i.e. metamizole). Although rarely, the oral manifestations could be

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the first signs of this adverse reaction and must be promptly diagnosed/treated by a multidisciplinary approach.

Use of *in vivo* reflectance confocal microscope for evaluation of oral cavity lesions: a systematic review of the literature

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BACKGROUND: Since the early 2000s, several authors have studied the application of reflectance confocal microscopy (RCM) to the oral cavity. This technology offers the opportunity to carry out a "real time" inspection at a microscopic level during the clinical examination, obtaining horizontal (en face) images of the scanned region. In addition, RCM can examine both soft and hard tissues of the oral cavity. Being an *in vivo* method, RCM could in theory bypass all of the difficulties and problems related to a biopsy and the subsequent histological examination, which still represents the gold standard for definitive diagnosis. Aims of this review are to provide an overview of the literature on RCM analysis of the oral cavity *in vivo* and to identify any flaws in the studies, providing guidance to improve RCM applications and the design of future studies of RCM.
METHODS: We performed a systematic literature search using three search engines: PubMed, Web of Science, and Cochrane Library. The search strategy included the use of "reflectance confocal microscopy" and "RCM" in combination with "mouth" and other terms related to the topic of interest. Selection criteria for studies to include were as follows: RCM studies performed on the human oral cavity, *in vivo*, published in English, for which the full text was available. In the first examination of the search results, the reviewers eliminated studies based solely on reading the titles and abstracts, if the abstracts showed that the studies did not meet the selection criteria. This first step also served to exclude all duplicate publications. Subsequently, the reviewers read the full text of the remaining papers for more accurate screening.
RESULTS: The search gave 419 results. Only 32 were related to *in vivo* RCM analysis of the human oral cavity. After reading the full texts, 16 of the 32 articles met our criteria. We decided to organize the selected articles according to four topics: healthy mucosa, autoimmune diseases, cancer and precancerous lesions, and hard dental tissues.
CONCLUSIONS: This systematic review identified some flaws in *in vivo* RCM studies of the oral cavity. However, there are still too few publications on this topic. Moreover, most of the studies concern subjects with healthy mucosa. The paucity of work conducted in patients with autoimmune diseases or precancerous and neoplastic lesions suggests that more RCM analyses of these patients are indispensable. In addition, the small size of the examined samples must be considered. A further problem, regarding studies of soft tissues, is the absence of comparison with histological studies. Consequently, it is difficult to establish criteria for a viable differential diagnosis based on the use of RCM, which cannot be a substitute for histology. In conclusion, although RCM is a promising device for diagnosing and monitoring oral pathology, there are shortcomings with RCM. Future studies need to consider these guidelines to increase the quantity and quality of the results, to translate research into clinical practice.

White Sponge Nevus: two case reports and a review of the literature

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BACKGROUND: The aim of this paper is to describe two new cases of White Sponge Nevus (WSN) and perform a critical review of the literature.
METHODS: Two patients, one fourteen and the other nineteen years old, were referred to our Clinic for the diagnosis of white spongy asymptomatic diffuse oral lesions.
RESULTS: After a thorough medical history, an incisional biopsy was performed in both cases and pathology revealed a hyperparakeratotic epithelium with acanthosis and spongiosis. No dysplasia was found in the specimens, so a final diagnosis of WSN was performed. Even if WSN is due to a genetic mutation, no parents of the two patients presented oral lesions.
CONCLUSIONS: White lesions in the oral cavity are common and have multiple etiologies. While most intraoral white lesions are benign, some are premalignant or malignant at the time of diagnosis, thus it is extremely important to accurately identify and appropriately manage these lesions. Due to the similar clinical appearances, it may be difficult, sometimes, to differentiate benign white lesions from their premalignant/malignant counterparts. Between hereditary white lesion leukoedema and WSN are the most common to find. White Sponge Nevus is an autosomal-dominant condition that is due to point mutations for genes coding for keratin 4 and/or 13. It is an asymptomatic, white lesion that may affect several mucosal sites. Lesions tend to be thickened and have a spongy consistency. The presentation intraorally is almost always bilateral and symmetric and usually appears early in life, typically before puberty. The characteristic clinical manifestations of this particular form of keratosis are usually best observed on the buccal mucosa, although other areas such as the tongue and vestibular mucosa may also be involved. Also esophageal and genital mucosa may be affected.
The differential diagnosis includes leukoedema, hereditary benign epithelial dyskeratosis, lichen planus, lichenoid drug reaction, lupus erythematosus, cheek chewing and candidiasis. A correct diagnosis can be made combining clinical with pathological features; WSN does not disappear when stretched so it can be differentiated from leukoedema; the absence of an inflammatory infiltrate, dysplasia and hyphae help in the differential diagnosis toward OLP, leukoplakia and candidiasis. A final diagnosis of WSN is necessary because the lesion is benign and no further biopsies or specific treatments are required.

Medication-related osteonecrosis of the jaw (MRONJ): proposal of non-surgical treatment protocols

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BACKGROUND: The research aim is to describe a complete protocol centred on a non surgical approach to man-

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age Medication-Related Osteonecrosis of the Jaw (MRONJ) lesions occured in patients treated with antiresorptive medications as oncologic therapy A successful treatment is achieved by the lesion's complete healing with absence of symptoms as well as the inflammation both due to bone infection and exposure.
METHODS: During 24 months of observation time 30 MRONJ lesions in 27 patients were detected. All patients were treated at Dental Unit, University Hospital, Ferrara, Italy. 3 patients received oral BPs treatment, 21 patients received ev Bisphosphonates (BPs) and/or denosumab treatment, 3 patients received oral BPs treatment. Patients underwent prevention program protocol set at Dental Unit for patients elegible for ev BPs theraphy and/or denosumab. 24 patients were observed after (BPs) and/or denosumab treatment has begun, avoiding any concrete chance to apply a complete preventive protocol. Lesions' trigger events were indentified, then every lesion was staged according to criteria suggested by the literature. A specific pharmacological local and systemic protocol was applied to all patients. All patients underwent non surgical therapy, including lesion debridement and irrigation. The surgical treatment was done only for specific cases after consulting Physician and Oral Surgeon. Follow-up went on until lesion healing was achieved and/or during patients life.
RESULTS: When patients followed all protocol assuming both oral and local therapy, best results were achieved. Lesions changed their stages from a symptomatic to an asymptomatic one. In specific cases it was observed the resolution of most serious complications. Complete healing was achieved in 26.6% of cases. Nevertheless, 10% of the lesions healed after surgical therapy. Patients with low compliance did not show any short term improvement in lesions staging, resulting in enlargement of oral and local antimicrobic therapy.
CONCLUSIONS: MRONJ is a rare but serious complication of cancer treatment or osteoporosis management. The clinical report confirms that antiresorptive medications such as oral or intravenous bisphosphonates and/or denosumab are the most common risk factors for developing ONJ. The suggested protocol is proven to be efficient when applied with adherence in patients diagnosed with not complicated MRONJ. First aim of dentist should be to control patient's symptoms and infection, then to reduce MRONJ stage and then to achieve complete healing when allowed.

Oral cancer: a secondary prevention project in L'Aquila

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BACKGROUND: The squamous cell carcinoma is the most frequent malignant tumor of oral cavity. It can appear as an ulcer, a nodul or a vegetation, which can modify itself in time, more or less slowly. According to the ranking of incidence of all malignant tumors, it is at the 8th place for males and the 11th for females. By observing the statistics of the last 20 years, it is clear that there is not any decrease of mortality percentage. This happens because of the too delayed diagnosis of oral cancer: most of diagnosis cases are made in the 3rd or the 4th stage. Early diagnosis is the most effective way to decrease mortality, and in light of this the following project was performed.
METHODS: The project consist in the activation of a "Prevention Point". Here dentists do an accurate examination of oral mucoses to patients selected by general population. Oral cancer occurres mostly in 50-70 years old patients, while oral premalignant lesion in 40-50 years old ones. The male to female ratio indicates an higher prevalence of the disease in the male population. So, on the basis of data contains in the current literature, males from 45 to 55 years old living in L'Aquila have been selected to be included in our project. They were invited to undergo an intraoral examination at the Dental Clinic of the University of L'Aquila. Here patients receive a clinical examination of soft tissues in order to intercept any oral potentially malignant disorder. During the exam the clinician fill a medical record which have been projected expecially for this trial; anagraphic data, presence or absence of conservative or prosthetic restoration, and the sequence to follow during the soft tissue analysis are indicated in this form.
RESULTS AND CONCLUSIONS: This secondary prevention project was born with the idea that the early diagnosis is the most important way to tread to obtain the decrease of oral cancer related mortality. Furthermore, the patients' awareness is a needful condition to reach this aim their consciousness about disease, risk factor, early presentation of pre-malignant form, is the basis from which prevention starts. The project is still active with the purpose to be an effective prevention instrument of oral cancer in our territory.

Oxidative stress status in the saliva of growing subjects as a potential pubertal biomarker

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BACKGROUND: The aim of this study was to evaluate the oxidative stress in saliva during physical growth.
METHODS: A cohort of 30 volunteers subjects (16F/14M), 6–30 years of age, was enrolled in this study. The subjects were randomly recruited from patients who were referred to the Dental Clinic of the University of L'Aquila for a regular checkup. Each subject's maturity level was assessed according to the Tanner scale and their saliva samples were collected by "spitting method". Thiobarbituric acid reactive substances (TBARS) and ferric ion reducing antioxidant power (FRAP) assays were assessed to evaluate lipid peroxidation - one of major compound of oxidative stress - and antioxidant power of saliva.
RESULTS: The results show TBARS values increased from Pre- (0.273±0.046) to Early (0.528±0.041) to Midpubertal (0.702±0.208) status, peaked at Midpubertal status, and then decreased steadily from Late- (0.612±0.225) to Post- pubertal (0.376±0.129). Tukeys Post-Hoc showed statistical differences in TBARS between Pre *vs* Late (p=0.004); Post *vs* Mid (p=0.003); Pre *vs* Mid (p=0.00013). No linear correlation was observed between TBARS and age. Meanwhile, no characteristic trends in the FRAP data in relation to Tanner stage were observed. Our findings suggest that the peak of peroxidation was found to coincide with the period of midpuberty (pubertal peak – period with strongest growth).

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CONCLUSIONS: In conclusion, the present data provide a easy, non-invasive method for monitoring development stage in subjects receiving orthodontic therapy.

Orodental health in an Italian group of drug addicted

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BACKGROUND: Within the medical and social recovery of drug addicts, an oral rehabilitation is necessary due the strong connection between oral disease and addiction.
The aim of our research was to evaluate,among a group of drug addicts in recovery treatment with methadone, the incidence of the factors and patognomonical signs indicated as responsible of caries and parodontal disease, during the period of drug addiction and rehabilitation therapy.
METHODS: Our research was carried out on a sample of drug addicts in treatment with methadone, aged between 16 and 31, including 4 women and 46 men, belonging to different socioeconomic conditions.
A medical history especially referring drug addiction features and stomatological apparatus analysis was made.
A intraoral objective exam has been done for each patient to evaluate the oral and parodontal health index, the plaque index and the presence of parafunctional habits.
Sugar consumption was evaluated, considering the quantitative and qualitative presence of diet based on food rich in sugar.
The presence of xerostomia has been analyzed too.
RESULTS: The 80% of the subjects showed wide caries injuries, root residues, previous tooth extraction results.
The 12% showed an atypical cervical carie already described by Lowenthal in 1979.
The 80% of subjects had parodontal disease, while the 44% showed pathological occlusion and/or parafunctional habits.
The 56% of patients used to brush regularly their teeth, during the period of usual drug addiction and only the 8% didn't care about oral hygiene.
The Loe and Silness index, showed only a 4% of patients with a good oral hygiene, with a value between 0 and 0,5.
The 64% of subjects had a quantitative normal diet, but a qualitative evaluation showed a high percentage (48%) of immoderate refined sugars use.
Lowenthal carie was found in 12% of subjects examined and is prevalence in evident in the third cervical upper maxillary incisor; in all patients in which this lesion was evident the dependence period was superior to two years.
No patients show any presences of previous restorative therapies.
Xerostomia, that was present in 92% of patients in drug dependence period showed a marked reduction during the abstinence period (0-2 months 40% 3-6 months 8%)
CONCLUSIONS: Our research shows how drug addiction is directly linked to poor oral health. A severe xerostomia could be considered a pathognomonic sign of addiction.
Odontostomatological therapies should be integrated in the patient's rehabilitation route strictly linked to the medical and psychological treatment plan.

Frequency of peripheral odontogenic tumors presenting as gingival overgrowth

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BACKGROUND: Among the non plaque-related lesions, the developmental lesions such as peripheral odontogenic tumors (POT), may mimic localized gingival mass. POT, also known as extraosseous odontogenic tumors, are a rare variant of odontogenic tumors that occur in the soft tissue covering the tooth-bearing portion of the jaws. There is little information in the literature regarding the relative frequency of POT, due to the rarity of these tumor variants. The aim of this study is to analyze 323 odontogenic tumors diagnosed and treated the University Hospital "Ospedali Riuniti" in Ancona, from 1990 to 2015, and, specifically, to describe the frequency of POT relative to their central counterparts.
METHODS: A retrospective survey of 323 patients treated for odontogenic tumors from 1990 to 2015 was performed. The lesions were classified according to 2005 WHO histological classification, and the following variables were analyzed: age, gender, histopathological diagnosis, and onset site. Clinical information of the patients was obtained from the biopsy submission forms. Data were analyzed using GraphPad Prism software version 5.00 for Windows (GraphPad Software, San Diego, CA, USA). Significant differences between groups were determined using Kruskal–Wallis test, followed by Dunn's post-hoc test. Chi-square test was used for grouped variables, The level of significance was set at $p < 0.05$.
RESULTS: For the 20-year period, 323 odontogenic tumors were accessed, of which 294 (91.1%) were central, and 29 (8.9%) were peripheral. Among all cases, 63% were males and 37% were females, with a M:F ratio of 1.7:1, while the mean age was 46.8 years, ranging from 5 to 94 years. Regarding the localization, mandible (31%) was the most commonly involved site. The most common tumor was ameloblastoma, with 9 cases (34%), followed by Odontogenic fibroma, Calcifying epithelial odontogenic tumor and Calcifying cystic odontogenic tumor. Recurrence was found in 17% of cases. Regarding other histopathological features, satellite cysts were rarely present (3%), as well as the dysplasia (3%), and inflammation (28%).
CONCLUSIONS: POT are rarely included in the differential diagnosis of gingival swellings. Their clinical diagnosis is almost impossible, due to the rarity of these tumors. In fact, regarding the true relative frequency of POT, no conclusions can be drawn, and further studies should be conducted. Clinically, these lesions generally appear as firm pedunculated masses, covered by normal-looking mucosa. This non-specific clinical appearance is shared by different types of gingival overgrowths. Regarding the prognosis, POT are benign lesions, but may recur if not completely removed. Therefore, it is important to surgically excise them with margins of normal tissue and to evaluate them histologically for follow-up.

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MoMax project: 18 months of activity

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BACKGROUND: Most of the patients affected by oral potentially malignant disorders (OPMD) or oral cancers undergoes to a specialist in a late stage, when their lesions become symptomatic, which may lead to an important negative influence on the diagnosis and the prognosis of pathology. Furthermore the management of these lesions is complex and needs a multidisciplinary approach, so the patients are forced to move among different specialists in order to be adequately treated. This can lead to further delay in diagnosis and to a more stressing situation for the patients. MoMax (Oral Medicine and Maxillo-facial Surgery) project was founded by the cooperation between oral pathologists, prosthodontists, maxillofacial surgeons, oncologists, radiotherapists and anatomo-pathologists, who meet once a week in the same unit in order to simplify the route of patients among all different aspects of pathology and to plan the most effective therapy. The aim of this paper is to describe the first 18 months activity of MoMax.
METHODS: The MoMax project was founded in June 2014 at the Department of Oral and Maxillofacial Sciences of Sapienza University of Rome. Patients affected by OPMD, oral cancers and other complex lesions such as osteonecrosis are addressed to this ambulatory. MoMax group take care of patients from diagnosis to treatment: cytological exams (brush and oropharyngeal buffer), histological exams (scalpel and laser biopsy), pharmacological therapies, maxillofacial surgery and prosthetic rehabilitations are performed. Patients which require radiotherapy and/or chemotherapy are visited and, eventually, treated in order to eliminate trigger factors to prevent osteonecrosis.Fluoroprophylaxis masks are realized for patients that undergo radiotherapy in order to limit decay development due to xerostomia. From June 2014 to December 2015, 182 patients (91 males, 91 females), aged between 20 and 96 years, were treated. Among the patients, 38 were affected by head-neck cancer, 38 by OPMD and 101 of them by other different lesions.
RESULTS: Regarding oral cancers, 23 patients were males and 15 were females; 7 patients were smokers and 2 were ex-smokers. The most vulnerable among these patients were aged between 60-69 years; the most frequent localization was the tongue (40%) and the most prevalent diagnosed cancer was squamous cells carcinoma (75%). Among the 38 OPMD, 22 were male and 16 were females; 14 patients were smokers and 5 were ex-smokers. The most affected group was aged between 70-79 years; oral lichen planus (38%) and leukoplakia (34%) were the most frequent OPMD and the principal localization was cheek mucosa (36%). From the first visit to the end of the dental treatment, the maximum time recorded to complete the cures has usually been less than two months; in particular, for the oncological patients sent for pre-radiotherapy or pre-chemoterapy protocol, the average time has been 7 to 14 days. Health services performed by MoMax during these months have been: 79 biopsies (63 by scalpel and 16 by diode laser or $C0_2$ laser); 19 brush (14 positive for high-risk Human Papilloma Virus types), 14 oropharyngeal buffers (10 positive for Oral Candida), 38 pre-radiotherapy or pre-chemotherapy visits.
CONCLUSIONS: Today, a multidisciplinary approach is the tool to guarantee the best treatment plan definition with the ultimate goal to improve survival. In fact available studies in Literature data confirm that the five-years survival outcomes is better with a multidisciplinary group management compared to single-specialist treatment. Thanks to MoMax project timing of treatment is considerably reduced, improving not only the prognosis but also the quality of patients' life.

The superpulsed low level laser therapy in the management of pain in patients affected by osteonecrosis of the jaw

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BACKGROUND: Osteonecrosis of the jaw (ONJ) has been associated with the use of bisphosphonates and denosumab in people affected by cancer, osteoporosis and multiple myeloma. Patients affected by ONJ show big areas of exposed necrotic bone while the main symptom is pain. Several therapies have been proposed for the ONJ, such as the intralesional transplantation of bone marrow stem cells, the local application of platelet derived growth factor, the hyperbaric oxygen and the tissue grafting. Recently, great attention has been focused on the use of Low Level Laser Therapy (LLLT) for the management of ONJ related pain. The aim of this study is to investigate the efficacy of LLLT in the management and the enhancement of the pain due to ONJ.
METHODS: Twenty-five consecutive patients (15F/10M) aged between 55-87 years old in treatment with bisphosphonates or denosumab, for systemic diseases such as: lung and breast cancers, multiple myeloma, bone metastases and osteoporosis, and affected by ONJ at stages II and III according to the position paper of American Association of Oral and Maxillo Suregeons (AAOMS), were enrolled in the study. All the patients referred various pain degrees from severe to unbearable. All the osteonecrotic sites were treated with LLLT, with a superpulsed double diode laser (650 nm-910 nm, spot size = 8 mm) (Lumix2®, Fisioline, Verduno, Italy). Each site was irradiated with a fluence of 0.053 J/cm^2 for 15 minutes twice a week for 4 weeks, in a non-contact mode, at about 1 mm from the pathologic area. Maximum and minimum pain, felt by patients were recorded by the numeric rating scale (NRS) with values comprehended between 0 (no pain) and 10 (unbearable pain and discomfort) before and after the treatment. Follow-up has been performed at 3 months.
RESULTS: A significant decrease of pain (more than 2 NRS points) was recorded in each patient. In some cases even patients referring NRS values of 8-10 points before the treatment, after the LLLT cycle did not show any kind of discomfort (3 of 6, 50%) with final NRS values of 0-2. In the other cases the pain level decreased to slight or moderate, with NRS values of 4-5. Twenty-two of 25 patients (88%) referred NRS values under 4 points at the end of the treatment. In no case a worsening of the symptom was registered. At three months follow up no recurrence of symptom was registered.
CONCLUSIONS: Within the limits derived by the small sample of patients it is possible to affirm that at these parameters the superpulsed LLLT can be a valid support in the treatment of ONJ related pain. In fact, LLLT has biostimulant effects improving and accelerating reparative processes, increases the bone inorganic matrix and osteoblast mitotic index and stimulates the neoangiogenesis. Moreover, the LLLT permits to perform a no invasive treatment at different stages of the

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disease without side effects and with a good patients compliance, with a significant enhancement of their perceived quality of life.

The use of diode laser for the therapy of vascular malformations of the oral cavity

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BACKGROUND: Vascular abnormalities include two distinct groups of lesions: vascular tumors (TV) and vascular malformations (MV).
The MV can be divided into high and low-flow malformations. The low-flow malformations include lymphatic, capillary or venous malformations,whereas those with a high flow, more rare, include arteriovenous malformations. Venous malformations are the most frequent and appear as dark red, not beating at palpation papules.
The treatment of vascular lesions is variable.
There are numerous articles in literature that show a profitable use of the laser in the treatment of vascular malformations of the oral cavity.
The aim of the study is to present a consecutive, clinically followed prospectively series of cases of vascular, low flow malformations of the oral cavity treated with diode laser, with a follow-up of one year.
METHODS: 59 patients with the presence of a vascular, variously located, clinically evaluated low flow malformation of the oral cavity have been treated consecutively. The size of the lesions treated with laser ranged from a minimum of 2 mm x 2 mm, to a maximum of 20 mm x 15 mm. For each patient, after performing a general medical history, the following clinical data were collected: the age and sex of the patient, the location, time of appearance, size and any previous treatment. It was also performed an intraoral photography.
The therapeutic protocol has provided for the infiltration with a local anesthetic without vasoconstrictor, associated, in some cases, to conscious sedation. The laser used is a diode laser of 830 nm (Sharplan OPUS 10, Sharplan Laser Industries, Ltd., Tel-Aviv, Israel), with continuous emission at 1.6 W, using a flexible fiber of 320 um in diameter.
The used technique is a transmucosal coagulation. Laser was interrupted when the shrinkage of the lesion could be clinically noticed. Postoperatively, NSAIDs and chlorhexidine mouthwashes were prescribed. Patients were also asked to complete daily, for seven days, a visual analogue scale for pain (VAS scale).
RESULTS: In the postoperative period no complications were revealed as bleeding or infection, while pain at 7 days was always modest, reaching a value on the VAS scale of 8 out of 10 on the day following the application of laser (and an average value of 5, seven days after the treatment) only in a case of treatment of a lingual, relatively large (20 mm x 15 mm) hemangioma.
After 7 and 30 days, and for 1 year from therapy, all lesions have been revalued with a rating scale from 1 to 5 in relation to the percentage of reduction.
After 30 days, the reduction of the lesion was excellent in 44 cases, while only 6 cases showed a poor result, necessitating the repetition of laser therapy. At one year, the complete recoveries increased to 48 cases out of 59, while five cases have relapsed.
There were no infections in the treated areas for the duration of follow-up, while in one case the formation of scar sequelae occurred.
CONCLUSIONS: The laser therapy offers many advantages in comparison with the surgery of vascular malformations such as the need for lower doses of local anaesthetics, the reduction of surgical time and the postoperative complications. However, there are also disadvantages, such as the inability to perform a histological examination of the treated area and the difficulty of treatment of deeper lesions, using transmucosal technique.

Papillary lesion of the palate: presentation of a case with difficult management and review of the literature

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BACKGROUND: Different pathologies, either benign (chronic candidiasis, HPV-related diseases), potentially malignant (proliferative verrucous leukoplakia) or frankly malignant (verrucous carcinomas), can clinically present as verruco-papillary lesions of the palate. Aim of the paper is to report a case of papillary hyperplasia due to chronic candidiasis and review the literature about its management.
METHODS: A 69 years old patient, suffering from undifferentiated connectivitis, came to our attention for papillary lesions of the palate. At physical examination, the patient showed an eritroplasic lesion composed by three main parts: a papillary part at the level of the hard palate, another verrucal lesion on the left soft palate and an eritematous edentulous ridge. The lesion was mainly under a removable partial prosthesis. A swab for fungal infection and two incisional biopsies were performed: the first biopsy was performed on the papillary area of the hard palate (a) and the second one on the verrucous lesion (b).
RESULTS: Mycotic culture revealed an infection with C. glabrata which usually is more difficult to eradicate than C. albicans because of its lower susceptibility to antifungal drugs, in particular to the azole drugs, as confirmed by the antimycogram. Pathology revealed: (a) oral mucosa with acanthosis and iperparacheratosis and small mucosal extroversion with pseudoephiteliomatous hyperplasia and chronic inflammation with lymphocyte infiltration, and (b) squamous papilloma. Even if the patient underwent several therapeutical interventions with local and systemic antifungal therapy, a complete recovery of the lesion was not reached.
Papillary hyperplasia appears almost exclusively on the hard palate and generally in association with removable prosthesis. This condition seems to be due to candida's proliferation in the gap between the gingival tissue and prosthesis in ill-fitted or loose dentures although the exact aetiology has not been yet thoroughly understood. Tissue hyperplasia has been related to the presence of the fungal organism in the setting of low-grade trauma. Presentation is characterised by multiple erythematous and edematous papillary projections that are tightly aggregated, producing an overall verrucous, granular or cobblestone appearance. Most of the verruco-papillary benign lesions are associated with viral infections by HPV (squamous

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cell papilloma, verruca vulgaris, focal epithelial hyperplasia or Heck's disease, condiloma) or to fungal infections (denture stomatitis associated with candida or chronic candidiasis).
CONCLUSIONS: From a critical review of the literature, surgical approach with curattage, cryosurgery, electrosurgery, microabrasion or laser abrasion are all effective clinical approach, together with denture reconstruction. The removal and disinfection of prosthesis at bedtime, with the achievement of good oral hygiene and the use of topical antifungal therapy may help in reducing the intensity of these lesions, but can't afford a complete cure when used alone. The presence of C. glabrata species together with a fibrous-papilary response to chronic mild trauma can result in a chronic lesions difficult to cure.

Frequency of young patients with oral leukoplakia (OL) and oral lichen planus (OLP) in a population of Western Sicily

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BACKGROUND: Oral Leukoplakia (OL) and Oral Lichen Planus (OLP) are oral potentially malignant disorders (OPMDs) of the oral cavity. OL is a clinical term which is based on exclusion criteria after excluding other white lesions. The WHO in 2005 defined leukoplakia as "a white plaque of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer". This lesion is seen most often in middle-aged and elderly men. Although leukoplakia can occur at any age, it often occurs in individuals under the age of 40. OLP is a chronic immunologically mediated mucocutaneous disorder of stratified squamous epithelium of uncertain etiology that affects oral and genital mucous membranes, skin, nails, and scalp. OLP is estimated to affect 0.5% to 2.0% of the general population. This disease has frequentely been reported in middle-aged patients with 30-60 years of age and is more common in females than in males (F:M=65:35). The aim of this study is to evaluate the frequency of young patients with OL and OLP in a population of Western Sicily.
METHODS: A retrospective analysis of patients with diagnosis of OL and OLP was performed. Secondary hospital-based subjects consecutively referreing from March 2012 to February 2016 to the Sector of Oral Medicine, University of Palermo, were considered. Patients with histologically confirmed diagnosis of OL and OLP were selected. Among them, subjects under 40 years old were identified. Data regarding related risk factors (i.e. tobacco use) were reviewed.
RESULTS: From a total of 4022 subjects, 417 cases of OL and 846 cases of OLP were identified. Patients aged under 40 and with a confirmed diagnosis were 35 (8.4%) and 42 (4.9%) with OL and OLP, respectively. The mean age was 35.6±3.8 in the OL patients and 35.4±4.5 in the OLP patients. In the OL group, 19 smokers (mean 20.2 cig/die for 15.14 years) were identified and 5 patients were former smoker. In the OLP group, 13 smokers (mean 13.3 cig/die for 9 years) were identified.
CONCLUSIONS: The results of the study shows a high frequency of OL and OLP in young subjects (8.4% and 4.9%, respectively). The frequency founded is higher than that reported by literature. Considering the growing onset of these OPMDs in young patients, paying more attention to the diagnosis is needed, in order to avoid possible complications and malignant transformations.

Oral atrophic lichen planus and oral lichenoid lesion malignant transformation: report and management of two cases.

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BACKGROUND: There is an ongoing debate in the literature whether patients with oral lichen planus (OLP) carry an increased risk of developing a squamous cell carcinomas. Nevertheless, there is a tendency to accept that there is. The an¬nual malignant transformation rate amounting less than 0.5%. This chronic disorder mainly affects middle-aged people. The etiopathogenesis is still poorly understood. There is no effective treatment and there are no preventive measures either. An important obstacle in the discussion on the possible potentially malignant character of oral lichen planus is caused by the lack of clear clinical and histopathologic diagnostic criteria of oral lichen planus, resulting in a poor clinicopathologic correlation in the diagnosis. One of the major problems of interpretation of malignant potential studies of OLP is the inexistence of strict diagnostic criteria to differentiate lichenoid processes. Some studies have included cases of OLP with OLL and vice versa. The differentiation between OLP and OLL has become important, since the latter might have a greater malignant potential. For this reason, it is important to establish precise clinical and histopathological criteria of differentiation of the lesions.
CASE REPORT: 1st) A 73 years old woman with a 12 months histological diagnosis of oral lichen planus localized on tongue dorsum, previously biopsied and studied in a different structure, came to our attention to investigate an ulcerative lesion on tongue midline. No smoking habit, alcohol abuse, anemia or previous malignancies diagnosis were referred; topical corticosteroid therapy was referred.
An incisional biopsy was performed showing lichenoid lesion, atypia and high grade of dysplasia at histological examination. Subsequently, lesion was radically removed with wide excision margins. Microscopic examination returned diagnosis of mild differentiated squamous cell carcinoma arose on lichenoid lesion. Resection margins were clean without perineural or vascular invasion.
After 18 months follow-up, symptoms of dull pain and burn sensation were referred. Tongue dorsum was macroscopically altered, with an ulcer-like lesion surrounded by edematous mucosa. Consequently, an incisional biopsy was performed showing the presence of a low differentiated squamous cell carcinoma. Lesion was radically excised, margins were widened and examined with frozen sections. Patient underwent to bilateral SND (level I-III) and RTP.
Histological examination returns a diagnosis of recurrent pT1 pN1 micro-invasive squamous cell carcinoma. Microscopic signs of lichenoid lesion were still evident.
2nd) A 74 years old woman, with a 20 months history of

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tongue symptomatic atrophic lichen planus, treated with topical corticosteroid, was referred to investigate two grayish nodular lesions, one median and one paramedian, arose on tongue dorsum. No smoking habit, alcohol abuse, anemia or previous malignancies diagnosis were referred.
Two punch biopsies were performed. The histologic analysis revealed presence of cluster of moderate dysplasia; clear signs of OLP were still present and necessarily the alteration is classified as OLL.
Lesion was radically removed with wide and clean excision margins. A strictly 3,6,9 and 12 months follow up was instituted.
However, after 11 months, a paramedian greyish and verrucous alteration of the tongue mucosa dorsum was observed and subsequently biopsied.
Histologic analysis revealed the presence of a micro-invasive squamous cell carcinoma with early stage neoplastic infiltration in deep stroma margins. Furthermore, signs of lichenoid lesion were still appreciable in the tissue contest.
Clinical and instrumental (US and RMN) investigation of neck nodes was negative (cN0); after collegial discussion and accordingly with NCCN Guidelines, no neck dissection was planned.

Medication-related osteonecrosis of the jaw and new antiresorptive therapies (denosumab/bevacizumab): clinical and prognostic features

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BACKGROUND: Medication-related osteonecrosis of the jaw (MRONJ) is defined as the presence of exposed bone or bone that can be probed through an intraoral or extraoral fistula in the maxillofacial region, that has persisted for longer than 8 weeks in patients who were administered antiresorptive or antiangiogenic agents, and have not history of radiation therapy to the jaws. Firstly, it was associated with intravenous or oral bisphosphonates administration; more recently, cases of MRONJ related to other different antiresorptive drugs (denosumab and bevacizumab) have been described.
Aim of this study was to describe the clinical and prognostic features of denosumab/bevacizumab related osteonecrosis of the jaws.
METHODS: From 2013 to 2015, 35 neoplastic patients (25 females, 10 males) were referred to the Odontostomatology Unit of the University of Bari showing different stages of MRONJ. All the patients underwent antiresorptive therapy because of the presence of bone metastases of different solid tumours; 6 of them were administered denosumab (120mg sc monthly), 21 were administered zoledronic acid (4mg iv monthly), 6 were administered zoledronic acid and subsequently denosumab, 2 were administered zoledronic acid and then bevacizumab (250mg sc every 15 days). Totally, 42 lesions were evaluated. After clinical examination, radiological exams (Rx OPT and Spiral Multislice CT) and cycles of antibiotic therapy, patients underwent surgical removal of the necrotic bone with histopathological analysis of all the surgical samples. A clinical and radiological follow-up was established for each patient.
RESULTS: All the treated lesions healed with no clinical or radiological signs of recurrence except for 1 lesion in a patient who started again chemotherapy due to its systemic conditions.
All MRONJ were classified using the staging system of the American Association of Oral and Maxillofacial Surgeons with these results: 2 were classified as Stage I, 18 as Stage II, 22 as Stage III.
In particular, Stage III lesions were 67% of the lesions among patients treated with denosumab, 69% of the lesions among patients treated with both zoledronic acid and denosumab, 63% of the lesions among patients treated with zoledronic acid, 50% of the lesions among patients treated with bevacizumab and zoledronic acid. The only recurrence was highlighted in a patient who was treated with zoledronic acid and denosumab.
CONCLUSIONS: MRONJ is an important complication of the administration of the new antiresorptive therapies. While many studies report that MRONJ related to denosumab/bevacizumab are characterized by a less aggressive behaviour needing a more conservative approach, in our experience there is no difference regarding the osteonecrosis severity among patients taking bisphosphonates or denosumab/bevacizumab, and the percentage of Stage III MRONJ are almost the same in the different groups of patients.

Chronic inflammation and immune activation in vesiculobullous disease could be a trigger factor for oral cancer? A case report

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BACKGROUND: Several studies have highlighted the important role of inflammation in the pathogenesis of oral squamous cell carcinoma (OSCC). Inflammatory stressor input by chronic infections, immune-mediated diseases and chronic injuries are potential risk factors involved in all phases of the process of carcinogenesis: the beginning of cell transformation, the local tissue invasion and the metastasis formation. Molecular studies have shown that inflammatory cells of myeloid origin and cytokines-based microenvironment of the peritumoral stroma are more engaged in promoting tumor growth than as an effective anti-tumor factor.
Pemphigus is a chronic inflammatory autoimmune disorder due to the presence of antibodies targeted against proteins of keratinocyte adhesion, characterized by painful vesiculobullous lesions: histological view is characterized by acantholysis, inflammatory cells with numerous eosinophils and perivascular chronic inflammation with an intercellular deposition of IgG and C3.
METHODS: In April 2012, a 67 years old woman, no smoker with sufficient hygienic conditions, came at our observation for the presence on the dorsal area of the tongue of a large strongly erythematous atrophic and painful lesion. Candida infection (by swab) and alteration or of glucose, serum iron, ferritin, vitamin B12 and folic acid were excluded. Regenerative topical therapy and selective diet were prescribed. After about two months, for the occurrence of vesicular-bullous lesions on the same site, biopsy and sieric dosage of autoantibodies against DSG1 and DSG3 were applied. Histological evaluation showed the presence of intraepithelial acantholytic bullous lesion with low inflammatory infiltrate,

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and an increase of antiAb anti DSG1 and DSG3 were found. Diagnosis of pemphigus was defined and tacrolimus per os was prescribed. After four months, vesiculobullous lesions were ameliorated, but it was evident in the right anterior part of the dorsal area of the tongue an irregular ulceration with hardened edges. A second biopsy was carried out and histological outcome reported presence of atypical newly formed epithelial cells with aspects of the squamous cell carcinoma. The patient was referred to the department of maxillofacial surgery for surgical management.
CONCLUSIONS: Some recent molecular studies showed the important association between carcinogenesis and peritumoral inflammatory microenvironment. This case report suggests that "activated" inflammatory cells and cytokine network can be responsible of oxidative DNA damage and of tissue architecture and function decay, thus they are likely to be risk factors for malignant transformation of the cells.

Paraneoplastic oral lupus in a patient with bladder cancer: a case report

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BACKGROUND: We report a case of a 63-year-old woman ultimately diagnosed with bladder cancer initially presented with lupus-like lesions on the oral mucosa.
METHODS: Scientific literature data report cases of dermatitis associated with both known and occult malignancies, which are a series of signs and symptoms in organs distant from the tumour, not due to metastasis. These events are called "paraneoplastic syndromes". A literary review was performed using MEDLINE in order to understand the dermatosis as uncommon primary presentation oral signs of cancer.
CASE REPORT: A 63-year-old patient was referred by the attending physician because of erosive lesions on her bilateral cheek mucosa and presence of malar face eruption. Medical history also reports joint pain. Blood tests showed a benign monoclonal gammopathy (GMB) of undetermined significance in association with Bence Jones proteinuria. The clinical appearance was that of a lichenoid mucositis. An incisional oral biopsy was performed and the patient was referred in onco-hematology ward for further investigations of the case. The histological appearance compatible with Lupus that is consistent with one of the clinical hypothesis. The insights made in haematology showed the presence of bladder cancer. Paraneoplastic lupus was the final diagnosis. The patient was treated surgically and with chemotherapy for cancer. For the oral and skin lesions were instead administered plaquenil and thalidomide. During the follow-up period, the patient showed a gradual decrease of the oral lesion and the malar rash in association with tumour remission and a negativization of autoimmune serology.
CONCLUSIONS: Approximately 30-50% of cancer patients have paraneoplastic syndromes of varying severity. Dermatosis, connective tissue disease and rarely lupus, have been reported as a possible manifestations of paraneoplastic syndrome to various internal malignancies. There are no prior report of oral lupus as a presenting sign of bladder cancer underlying that an occult neoplasm should be considered in the differential diagnosis of a cases that does not fall in epidemiological standards (most affected females of childbearing age). Dentists may be the first clinical observers of oral lesions that could be the primary manifestation of serious systemic diseases.

High risk population for MRONJ onset: oral condition of oncologic and hematologic patients undergoing individual preventive program.

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BACKGROUND: Antiresorptive agents such as bisphosphonates (BPs) effectively reduce skeletal-related events incidence in patients with metastatic bone cancer and multiple myeloma, thereby placing them at potential risk for developing Medical Related Osteonecrosis of the Jaw (MRONJ). MRONJ onset and progression is due to BPs and many local risk factors, such as periodontal conditions. It is reported that 84% of MRONJ patients had periodontal disease, including 29% with advanced disease. Prevention of BPs side effects and MRONJ onset and progression is a challenge for medical team, considering Dentist, Dental Hygienists and Physician's involved in BPs prescription. The aim of the study was to evaluate the association between periodontal disease and MRONJ and to assess the impact of non surgical periodontal treatment on oral health in a population at risk for MRONJ onset.
METHODS: In collaboration with the Hematology and Oncology Unit of the University Hospital of Ferrara, Dental Unit developed a preventive program focused on primary prevention of MRONJ onset and developed minimally invasive protocol to manage signs and symptoms in all cases of MRONJ. All participants underwent complete oral and radiographical examination and clinical parameters records (PD, BoP, PII mobile dentures examination). Then all parameters were merged to assign each patient a comprehensive risk evaluation score for MRONJ, "HIGH" or "LOW" score.
RESULTS: During 24 months observation time, 184 patients underwent to complete oral examination and treatment at Dental Unit. On average, patients received 9.7 drug treatment cycles (range 1–48). 115 patients, eligible for BPs and denosumab therapy (cohort 1), mean age of 67 years (range 33-92), received complete dental preventive treatments, including dental extraction. 69 patients, previously exposed to BPs and denosumab (cohort 2), mean age of 67 years (range 44-87), received only non surgical treatments. Both population showed same demographical and medical baseline characteristics. Individual risk for MRONJ was checked for each patients during first visit and after 3 months at least. For cohort 1, after 3 months 38.1% of the patients reduced their risk for MRONJ from "HIGH" to "LOW". For cohort 2, after 3 months only 12.2% of the patients reduced their risk for MRONJ from "HIGH" to "LOW". None patient changed his risk for MRONJ from "LOW" to "HIGH" during observation time. 24 patients developed MRONJ (3 cohort 1, 21 cohort 2). It was observed a correlation between HIGH risk and established MRONJ. The construction of the ROC Curve showed the test sensibility (96%).
CONCLUSIONS: MRONJ is a clinically significant adverse effect of antiresorptive agents. A mandatory preventive program for oral health, involving a multidisciplinary team

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should be developed for all patients eligible for antiresorptive agents treatment. Although several studies did not found an association between periodontal parameters record and MRONJ onset, some evidence suggest that presence of oral infection could affect MRONJ risk. The proposed risk assessment method seems to be sensible and effective.

Retrospective epidemiological study in the emergency Dental Unit of Trieste

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BACKGROUND: The aim of this epidemiological study is to describe the amount of patients admitted to the stomatological emergency unit of Trieste; we focused on access reason, performed treatments and prescribed therapies.
METHODS: Data of every access to the stomatological emergency unit during 5 months (January-May 2015) were collected. A descriptive analysis of gathered data have been performed. Information regarding motivation for emergency unit access, pain evaluated with Numerical Rating Scale (NRS), anamnestic and pharmacological history, diagnosis performed, therapies prescribed and treatments received during the visit have been registered to have the complete prospectus of every patient. Also time spent in the waiting room and the total duration of the visit was examined. Information about therapies prescribed were collected, antibiotics were divided into classes, and NSAIDs or steroids prescription was considered. We also evaluated if patients needed follow up and if he or she came or not at the following appointment.
RESULTS: The sample was composed of 1634 patients (846 males and 788 females) with mean age of 46.4± 19.2 years. We observed that the patients were suffering from one or more of the following main pathologies: 24.1% cardiovascular disease; 5% diabetes; 5.7% infectious disease (HBV, HCV, HIV virus infection; previous tuberculosis or other infectious pathologies); 5.9% pathologies of the respiratory tract; 1.7% autoimmune disease; 6.1% thyroid problems. We found also that 32% of patients were smokers. Concerning the NRS we registered that the 40% of patients referred a NRS>5, 40% <4. For the remaining 20% pain scale was not registered. 28.7% of the sample was diagnosed with paradentitis; 9.1% with dental abscess; 10% with symptomatic caries or painful root residual; 8.5% with acute pulpitis; 7.2% with tooth fracture; 6.5% with periodontal problems; and the remaining 30% with other dental problems such as lesion of the oral mucosa, gnathological dysfunctions, hyperesthesia, bleeding or wound in the stomathognatic system. The 38.7% of the sample underwent an immediate treatment such as pulpectomy, tooth extraction, stitches application, tooth filling with a temporary material or other therapies. The most prescribed treatment was antibiotic therapy (47.7%), followed by NSAIDs (20%) and steroids (0.4%). Between all these patients, 72.2% needed a follow-up to continue cures or just to verify the effectiveness of the intervention performed or therapy prescribed. Among these, in 13.5% of cases the patient did not came back to the control.
CONCLUSIONS: From this study emerged that dental emergency room has a very important role in treatment of acute dental pathologies. It offers, when possible, a prompt problem solution and when necessary an appropriate medical therapy. Despite that there is a considerable percentage of patients who does not return to complete started therapies.

Xenobiotic substances and multiple chemical sensitivity (MCS)

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BACKGROUND: Multiple Chemical Sensitivity (MCS) has been classified by WHO as "Not specified respiratory disorder in relation to the exposure to chemicals, gases, fumes, vapors" in ICD10 with code J68.9.
It is an environmental immuno-neuro-toxic disease characterized by recurrent symptoms related to multiple organs and systems. Symptoms are caused by hypersensitivity against environmental xenobiotic substances with whom the patient comes into contact. Therefore, in patients with MCS, exposure to concentrations of xenobiotics much lower than those toxic to the general population is sufficient to determine disorders. The most frequently manifested symptomatology is a multisystemic disorder affecting the respiratory, gastro-intestinal, musculoskeletal and central nervous systems.
Responsible xenobiotic substances are commonly detectable both in indoor and outdoor environments and consist of heavy metals, chemicals, natural gases, metabolites of fungi, pesticides, detergents, plastic derivatives, bactericides, and drugs. Many materials which are present in dental office or used in clinical practice could determine symptomatology.
Dental amalgam is an alloy obtained by mixing mercury with a powder based on silver-tin, to which are added small amounts of copper and zinc. It has been used for over 150 years in dentistry as filling material in the management of dental caries because of its excellent physical and mechanical properties.
In recent years, dental amalgam has become a highly debated topic because of the possible toxicity of mercury contained therein, both for patients and operators.
The aim of this work is to provide a preliminary search of the scientific literature dealing with the correlation between dental amalgam and MCS.
METHODS: In order to perform an overview on the topic we consulted PUBMED database. We considered articles of the most recent scientific literature regarding MCS and heavy metals, in particular mercury.
RESULTS: Mercury is a highly toxic heavy metal whose accumulation in the human body is capable of causing the onset of MCS and the aggravation of its symptoms. It has a high vapor pressure and moves to the gaseous state since from room temperature.
In the mouth of patients with dental amalgams there is a continuous mobilization of mercury due to contact with hot food and to the effect of galvanic cell that is created in the oral environment. Mercury can be found in the blood of patients with dental amalgam fillings.
The dentist is frequently exposed to mercury through the manipulation of materials that contain it and through the inhalation of particles that are released during the interventions of positioning, processing or removal of dental amalgam in the oral cavity.
The determination of mercury accumulations into the body can be performed by testing hair tissue, through blood tests in order to detect it free in the blood stream or bound to

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circulating metallothioneins and by means of epigenetic analyzes aimed at tracking it in lymphocytes' DNA adducts. Furthermore any sensitivity of lymphocytes against mercury can be investigated through lymphocytic sensitivity testing.
CONCLUSIONS: The results show a substantial correlation between mercury and MCS. This work sheds light on a still little known disease, which is closely related to the field of dentistry, and represents the starting point of a series of research works on the topic.

Autologous platelet concentrates as regenerative tool: the platelet-rich fibrin (PRF) protocol

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BACKGROUND: Platelet-Rich Fibrin (PRF) is a new generation autologous platelet concentrate, invented by Choukroun in 2001, consisting of fibrin matrix which releases growth factors and cytokines in a slow and substained way, promoting physiologic healing processes. It is obtained without adding any anticoagulant to blood. PRF is a very versatile material 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 show the various steps of the PRF protocol and to highline the biological aspects which underlie the mechanism of action of this platelet concentrate and distinguish it among the old generation ones.
METHODS: A review of literature was carried out on the Pubmed database (http://www.ncbi.nlm.nih.gov/pubmed); only articles written over the past 15 years have been considered and analyzed. The PRF protocol showed in the work is that original described by Choukroun. Venous blood is collected from the patient immediately before surgery, and is placed in 10 ml glass vials without anticoagulant; these are immediately centrifuged at 3000 r.p.m. (with a centrifugal acceleration of approximately 400g) for 10 minutes in a PC-02 table centrifuge. Since no anticoagulant is present, the contact of the blood with the walls of the tube determines the trigger of the coagulation cascade and platelet activation in a few minutes. Once the centrifugation is complete, the content of the tube is arranged in 3 different layers: one composed of red corpuscles and lying on the bottom of the tube; an intermediate formed by the fibrin clot (PRF); a supernatant of Platelet poor plasma (PPP) or acellular plasma. The supernatant liquid (PPP) is easily aspired: it is readily separable from the remaining part of the preparation, which has a higher consistency. At this point the remaining layers are removed from the tube and the fibrin clot (PRF)is detached from the corpuscular phase via scissors or tweezers.
RESULTS: PRF is obtained by centrifugation of the patient's blood, immediately after its withdrawal, without the use of additives (such as anticoagulants, bovine thrombin or gelling), differently from what occurs in the production of other old generation fibrin adhesives. This peculiar production protocol allows the formation of a fibrin matrix very similar to the natural one, in which are harnessed activated platelets and leukocytes with their respective cytokines and growth factors. Each of the mentioned components contributes importantly to the characteristics of PRF, which can be considered as a natural cicatrizant autologous biomaterial capable of accelerating all the mucosa and bone physiological healing phenomena; it moreover acts as a modulator of local inflammatory response at the surgical site.
CONCLUSIONS: Biological aspects arising from the PRF preparing protocol explain its efficiency as a regenerative tool for the treatment of wounds and hard tissue soft in oral and maxillofacial surgery.

Potentially malignant disorders of the oral mucosa

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BACKGROUND: Potentially malignant disorders of the oral mucosa are a fundamental subject in oral pathology with a particular focus on the prevention of squamous cell carcinoma. Their classification has been subjected to several revisions during the last 30 years, for the purpose of improving the placement and definition of this group of clinical appearances and of optimizing interactions between clinicians, pathologists and epidemiologists. The aim of this work is to review the modern classification of oral precancers particularly referring to the workshop coordinated in 2005 by the WHO in London, in which it has been recommended to abandon the repartition between "potentially malignant oral lesions" and "potentially malignant oral conditions", and to use the definition "potentially malignant oral disorders".
METHODS: A review of literature was carried out on the Pubmed database (http://www.ncbi.nlm.nih.gov/pubmed) and only articles written over the past 15 years have been considered and analyzed.
RESULTS: The concept of "potentially malignant disorder" conceived on 2005 arises some differences with the old classifications. The terms "pre-cancer", "precancerous" "premalignant", "precursor lesions" have been used in the past to broadly describe clinical appearances that may have a potential to become cancer. The WHO 2005 working group recommended to use the term "potentially malignant" referred to these clinical presentations as it conveys that not all lesions and conditions described under this term may turn into cancer, but there is a family of morphological alterations and some of them may have an increased potential of malignant transformation. Before the 2005 revision, clinical appearances of the oral mucosa recognized as precancerous, were classified, as proposed in 1978 during a earlier workshop coordinated by the WHO, into two broad groups: precancerous lesions and precancerous conditions. It is now known that even clinically normal appearing mucosa may have dysplasia or molecular aberrations in a patient with a precancerous lesion and, consequently, cancer could arise in apparently normal tissue (not only on the site of the precancer). So the use of the term "disorders" (rather than lesions and conditions) referring to all precancerous clinical presentations conveys better the concept of their wide-spread anatomical distribution.
CONCLUSIONS: The terminology and classifications proposed in this workshop fit better with the most actual knowledgements about oral pre-cancers and increase the efficiency of collaboration between clinicians, epidemiologists and pathologists, allowing an improvement in oral cancer prevention.

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Cameriere's methods for age estimation normalized measurements (CNM) of the each single tooth. Children

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BACKGROUND: Radiographic evaluation of development of an exact number of mandibular permanent teeth is one of the most used age estimation techniques in children. The possibility of performing age estimation in cases in which only a single or just a few available teeth can be evaluated represents an interesting issue in forensic and anthropological disciplines. In 2006 Cameriere *et al*. presented a new method for estimating chronological age in children, based on the relationship between age and normalized measurement of open apices of the seven left mandibular permanent teeth.

The aim of this study is to evaluate the applicability of Cameriere's normalized measurements (CNM) of each single mandibular tooth for age estimation in children.

METHODS: A sample of OPTs of 482 (263 girls and 219 boys) Italian healthy subjects aged between 4 and 13 years was collected from the Radmedica, Radiologia Odontoiatrica Digitale of Rome, Italy. Patients' identification number, gender, date of birth and date of X-rays were recorded in Microsoft Excel® file. Radiographs were converted in computer files and processed by a computer-aided drafting program (Adobe® Photo-shop1 CS4).

Dental maturity was evaluated by using CNM on the seven left permanent mandibular teeth. CNM were calculated by normalizing the distance between the inner sides of the open apex by the tooth length. In teeth with two roots the sum of the distances between the inner sides of the two open apices was considered. Intra- and inter-observer agreement was analyzed by interclass correlation coefficient of CNM on 50 randomly selected OPTs.

RESULTS: The distribution of CNM varied among mandibular teeth. The seven mandibular teeth ended their growth up to 14 years in the majority of the subjects of the sample. The teeth which showed apex closure firstly among the others were central incisors at 8 years, followed by lateral incisors and first molars at 9 years of age. Canines and first premolars ended their development at 12 years, followed by second premolars and second molars at 13 years of age. The obtained results show that CNM has good correlations with chronological age in the group of teeth which have finished their development before the age of ten (No.37, No.34, No.35 and No.33), while correlations are smaller for those which finished their development by the age of fourteen (No.31, No.32 and No.36). Sex didn't give a significant contribution to the CNM growth model of mandibular teeth except for lateral incisors and second molars.

CONCLUSIONS: CNM approach used for a single tooth may be useful in age estimation of children for biological, forensic and anthropological purposes. Anyway, all mandibular teeth taken singularly do not have equal applicability. The authors point out that prediction model for age estimation showed in this work needs further validation tests on new and more numerous samples also based on other different populations. Furthermore the combination between CNM single tooth approach and the evaluation of other anatomical parameters, such as hand/wrist or vertebra, should also be verified in order to improve the accuracy of the estimation.

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Evaluation of different powders in oral bacterial biofilm removal: an *in vitro* study

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BACKGROUND: The aim of this study was to evaluate the effectiveness of six different powders for airpolishing in removing oral biofilm.

METHODS: Six freshly extracted teeth were collected: three central incisors, one lateral incisor and two canines. Polishing and pumice were used to remove soft tissue residues.

A fluorescent paint prepared to simulate the bacterial biofilm [Spraytec Group] was applied with the following protocol: a 5mm diameter circle was drawn on each tooth crown and filled with the same amount of fluorescent paint. The paint was mixed and placed inside the circles with a microbrush and left thicken for 10 minutes.

Two standard airpolishing units (Handy3 EMS, Handy3 EMS perio) were installed according to the manufacturer's instructions and used to apply the following powders: (A) Erythritol with a particle size of 14 microns [pluss EMS] (B) glycine with a particle size 25 microns [perio EMS] (C) glycine with a particle size 65 microns [soft EMS], (D) bicarbonate with a particle size 45 microns [comfort EMS], (E) bicarbonate with a particle size 65 microns [classic EMS], (F) bioactive glass [sectional] as supplied by the manufacturer of the APD, were evaluated. The airpolishing unit was held five millimeters from each tooth and each powder was applied for ten seconds. Pictures were taken before and after the application of the powders, keeping the same position and settings of the camera.

All the samples have been evaluated with the Paint Net software®.

The fluorescent areas were overlaid before and after airpolishing and the pixels were gauged in order to define the efficacy of any powders.

The measurments were taken also in millimetres.

RESULTS: Each powder tested was effective in removing fluorescent paint during the treatment.

The most effective powder was the bioglasses (diameter reduction of 0.82 cm); erythritol was the less effective powder (diameter reduction of 0.11 cm).

Differences were found also between 25µm glycine and 65µm glycine (more effective), and between 45µm bicarbonate and 65 µm bicarbonate (more effective).

The results were statistically singnificant for the conventional criteria (p value <0.005).

CONCLUSIONS:. Scientific papers confirm that powders are able to remove bacterial biofilm. Our results indicate what type of powder is more adapt to this. Powders can be used safely, keeping a short treatment time, an appropriate working distance and powder emission.

This study has some limitations: it is an *in vitro* study and it has a reduced number of speciments. However, it has an important strenght: the accuracy of the procedure and of the analysis.

Glycine powder can be reccommended in several situations, because of the reduced abrasivity and the good effectiveness.

Evaluation of gingival bleeding during and after professional hygiene treatments in patients taking novel oral anticoagulants (NOAS) and Vitamine K antagonists (AVK): a comparative clinical study

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BACKGROUND: The purpose of this preliminary study was to analyze the amount of gingival bleeding during and after dental procedures, such as scaling and root planing, in a group of patients taking new oral anticoagulants (NOAs) as dabigatran etexilate, rivaroxaban and apixaban compared with a control group taking vitamine K antagonists (AVKs) as warfarin and acenocumarol.

METHODS: The present study included 30 patients (mean age of 76.27±6.19), 15 taking NOAs (mean age of 76.07±6.96) and 15 taking AVKs (mean age of 76.47±5.55). In the preclinical phase, patients' medical history was collected and a risk score based on CHA2ds2vasc and HAS-BLED scales has been assigned to all patients. In the clinical phase a periodontal chart and professional debridement session were performed without the suspension of the anticoagulation therapy. Blood pressure was measured in all patients before dental hygiene session. For patients taking AVK, all procedures were performed after monitoring daily INR value. Assessment during and immediately after this session was provided to intercept bleeding events. Then, a postoperative form was given to the patient in order to report bleeding events during the first week after dental scaling and root planing procedures. Bleeding prevention and control advices were given to all patients. In case of severe bleeding events, they were solicited to contact the physician or the closest hospital. All data collection were performed after patient's informed consent signature.

RESULTS: Postoperative bleeding complications occurred more often in patients taking NOAs (3 cases, 20%) than in the control AVK group (0 cases, 0%). However, all of the bleeding events were manageable: the first one was treated with local compression, the last two with tranexamic acid local applications and with the suspension of the NOA's daily dose (suggested by the cardiologist). All of the postoperative bleeding episodes occurred during the first week after professional hygiene treatments.
CONCLUSIONS: taking this study as an initial explorative clinical trial, according to our preliminar data, anticoagulation therapy with NOAs can increase postoperative bleeding risk after professional debridement rather than AVK therapy, although the bleeding events are easily managed with local measures and in some cases with NOA's temporary suspension. Close observation up to one week postoperatively is advisable to monitoring bleeding events in patients taking NOAs.

In-office education of the patient to the use of an electric toothbrush

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BACKGROUND: Objectives of this study is to evaluate differences in Plaque Index between manual and electric toothbrush.
METHODS: 15 patients of 7 to 70 years old in healthy conditions were selected to try an electric toothbrush (Oral-B® Pro 6000 Triumph™) Test Drive Kit. Plaque Index was measured in three different times, using a plaque detector (Gum® Sunstar Red-Cote™) and recorded by Williams *et al*. Plaque Index. Six teeth per patient were choosen for this study: two upper central incisors, two upper first molars and two lower canines; Plaque was checked on four surfaces: mesial, buccal, oral and distal. At time 0, the initial plaque index of the patient were recorded. At time 1, patients were invited to brush their teeth for 2 minutes with a manual single use toothbrush, without get any instructions. At time 3, the patients, were educated and invited to brush their teeth with the electrical toothbrush with a Cross Action™ head and the Daily Clean program, after another application of the plaque detector. Plaque Index was recorded again. At the end of the session, patiens were invited to fill in a questionnarie on their impressions about the device.
RESULTS: Student's t-test demonstrates statistically significant differences between PI's averages in manual and electric toothbrush ($p<0,05$), (confidence interval 95%). Younger patients (7 to 44 yrs) showed a lower plaque index than older ones, probably due to a better dexterity. After electrical toothbrushing, an average plaque index of 11% was recorded in the population. Average percentage of residual plaque after electrical toothbrush was significantly reduced than manual toothbrush, mostly in interproximal spaces. Questionnaire's aswers showed a positive approach of the patients to the electrical toothbrush that seemed to give them an enhanced feeling of cleaningness. Electrical toothbrush resulted also ease of handling and detergibile, as or better than the manual one.
CONCLUSIONS: What influences the effectiveness of a brushing compared to another, does not depend exclusively from the peculiarities of the device. Factors involved are the technique used by the patient, the feeling that the patient has in brushing teeth, how often it is used to repeat those movements, and the ease of use of the instrument. Although each brushing technique is valid if correctly executed, electric toothbrush would be recommended by the clinicians in treatment plans for home care, especially for people who can't reach a good home hygiene control.

Oral health and plant based diet: pilot study

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BACKGROUND: The correlation between general health and vegan choice has been assessed both clinically and epidemiologically. However, the link between vegan and oral health is unclear; the few existing studies, underline the increased risk of dental erosion and abrasion, a lower incidence of gingival inflammation and better overall oral care.
Aim of study is to focus on the oral health status and Oral Health Related Quality of Life (OHRQoL) in vegan adults.
METHODS: Adult subjects who follow a vegan diet from a minimum of 24 months were involved in the two phases of the study. The first phase (F1) provided a cognitive assessment through the administration of two questionnaires on oral health status and risk factors and OHIP-14 for OHRQoL. Second phase (F2) provided clinical data on relevant oral conditions (caries, periodontal status, erosion, hypersensitivity). The surveys were conducted by a team of calibrated dentist and hygienist.
RESULTS: The sample consists of 77 individuals, 35 males and 42 females, aged 21 -67.
Last visit to the dentist go up to 13 months on average and professional oral hygiene to 19 months. 5.2% of the sample reported GERD, and 15.6% tobacco smoking.
As for beverages, 44.2%, deny beer or wine drinking, while the remaining 55.8% reported a sporadic habit. No spirits consumption is reported in 84.41%. Soda drinks consumption is reported by 25.97% of respondents. No drinking sugar containing beverages was reported by 80.5% and the remaining 19.5% stated to take them only occasionally.
7.8% reported suffering from oral mucosa sores while following vegan nutrition, 10.4% reported gingival inflammation, 26% bleeding on brushing teeth, 27.3% dental hypersensitivity, specifically 3.9% from heat, 23.4% from cold stimuli. Almost 100% of the sample answered to "never and almost never" suffer any kind of discomfort at OHIP-14 questionnaire, except for the presence of pain, that was reported as "sometimes" by 41% of respondents.
The clinical phase involved 20 participants, 13 female and 7 male. Dental plaques detected in 70% of subjects while in 50% there is the presence of calculus; BoP in 55%; DMFT was 4.95 (D = 6%, F = 88%, M = 5%). The totality of participants had at least one gingival recession, mostly in the posterior region; enamel demineralizations and erosions were detected in 15% of subjects; dentinal hypersensitivity was positive in 45% of subjects.
CONCLUSIONS: From our study, a fairly good overall oral health status and OHRQoL resulted in the involved Vegan adult. Lifestyle and habit factors resulted also health-oriented: in fact, from the study data emerged a low prevalence (about 15%) of smokers and / or people using sugar in their diet. The study also showed that 80% reaching the Gold Standard

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of twice daily brushing, but on the other hand a high rate of gingival recession, to indicate possible risk in using abrasive craft toothpastes in saline base or herbal products for daily oral hygiene. Custom prevention protocols should therefore focus on the most appropriate brushing techniques to avoid gingival recessions risk and advising on less aggressive oral hygiene aids and toothpaste, since those of vegetable nature and homemade can have an uncontrolled abrasive power, in order to prevent in the long runw the risk of dental abrasion and gingival recession.

Evaluation of oral conditions in children with neurological diseases fed through percutaneous endoscopic gastrostomy: preliminary results.

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BACKGROUND: The purpose of the study is to compare the oral health status in patients with neurological diseases, fed with PEG "Percutaneos Endoscopic Gastronomy" to the oral health status in healthy children. The study examines the level of DMFT/dmft, the amount of bacterial plaque and Tartar. Moreover, through a sample of bacterial plaque, the study verifies the amount of Streptococcus Mutans.
METHODS: Two groups of children, group A: sick children, consists of four girls and two boys aged between 3 and 12 years and group B: healthy children, consists of four girls and two boys aged between 3 and 12 years, were examined from October 2015 to late February 2016. During the visit the indices were detected: DMFT / dmft, Plaque Control Record, Simplified Calculus Index; it was picked a sample of plaque in both groups to investigate the presence of Streptococcus Mutans and lactobacillus.
Through an interview to parents, were investigated frequency and method of oral hygiene.
Preliminary results:
Group A (sick children) shows a DMFT/dmft of 0.2 (average value) compared to group B which is 3.
The tartar index in sick children is in a percentage of 40% while in the healthy children is of 1%. However in sick children the percentage of placque index is of 75%, in healthy children is of 31%.
Preliminary conclusions:
Preliminary results show that children who are fed through PEG don't have caries, despite the high index of bacterial plaque and tartar. The results of amount that streptococco mutans in the sick and healthy children is not available for the moment. The study aims to recruit others individuals to increase the study population.

Academic stress effect on gingival inflammation: a case-control study

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BACKGROUND: The main objective is to estimate the gingival inflammation related to academic stress through the bleeding and gingival index and evaluate the amount of cortisol and nitric oxide (NO) in salivary flow. Secondary objectives:evaluate differences of plaque index and oral microbiota.
METHODS: The case group was recruited among engineering and medical students during exam period; the control group was represented by dental hygiene third and second year course's students away from the exam period.
All participants underwent:
— Perceived Stress Scale (PSS) questionnaire
—Sources of Stress Test (SST) based on Sreeramareddy studies
—Self-assessment Visual Analogue Scale stress (VAS)
—Eating anti-inflammatory habits Questionnaire (EQ)
—Piking of bacterial plaque through paper cone
—Assessment of Full Mouth Plaque Score (FMPS);Full Mouth Bleeding Score (FMBS); Gingival Index GI
—Salivary pH; flow measurement and sampling of saliva.
The Polymerase Chain Reaction (PCR) was used for the microbial analysis; the competitive immunoenzymatic colorimetric method was used for the cortisol concentration; Total Nitric Oxide and Nitrate/Nitrite Parameter Assay Kit was used for NO concentration.
Statistic analysis: Shapiro-Wilk test to verify the values of cortisol, nitric oxide and the bacterial count; chi-square test or Student's t test to assess the significance of differences between the two groups.
RESULTS: 84 subjects between 20 and 30 years were included in the study; 48classified into cases ((Academic Stress Group-ASG) and 36 classified into controls (No Academic Stress Group-NASG). Bivariate analysis found no significant differences in relation tosocio-demographic parameters, luxuries and eating habits. No difference in psychometric parameters (PSS). Significantly higher the VAS scale score in the ASG (6.00±0.68)compared to NASG (3.50±0.78) (p=0.04).The bivariate analysis showed that in subjects belonging to ASG oral inflammation indices FMBS(p=0,001), GI(p=0,024): and FMPS (p=0,001) were significantly higher than controls. The ASG had a higher concentration of salivary cortisol (68.61±9.09) compared to the control group (27.31±14.16) ($p<0.05$), while the levels of nitric oxide measured in the two groups showed no significant difference. Total microorganisms count of supragingival plaque was higher in cases compared to controls as well as Prevotella intermedia and Veillonelladispar.

Effectiveness of Diode Laser in reducing periodontal clinical indices in etiological non-surgical therapy

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BACKGROUND: Aim of this study is to evaluate if the diode laser with 980 nm waveleght should be a useful tool in helping the conventional non – surgical periodontal therapy, allowing a more stable and lasting healing, based on the reduction of the Pocket Probing Depth (PPD) and the Bleeding On Probing (BoP).
METHODS: We analyzed a group of 15 patients with chronic periodontitis, evaluated by a complete periodontal charting and treated, at the baseline with the Simplified One-Stage Full

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Mouth Disinfection protocol. In each patients were treated two of the four half-arches (with random selection) adding the laser light to conventional OSFMD procedures. We choose for each patient 6 sites (2 molar sites, 2 premolar sites, 2 central sites) with probing depth ≥ 5mm, for a total of 90 sites; of these, 45 sites are treated with only the conventional non – surgical periodontal therapy (OSFMD) and the other 45 with non – surgical periodontal therapy laser assisted (OSFMD+L). In order to analyze the effectiveness of diode laser in statistical terms, we studied the variations of probing depth and bleeding on probing of sample teeth comparing baseline values with those recorded at two months (t_1) and at six months after treatments (t_2). For the statistical analysis we resorted to the 3x2 repeated measures MANOVA tests for both variables investigated (probing depth and bleeding on probing), separated by type of dental element, producing results for molar sites, premolar sites and central sites.
RESULTS: At the end of the physiological healing phase of the periodontal tissue at t_1 (60 days after OSMFD or OSFMD+L procedures) and also in the medium term at t_2 (six months after OSFMD or OSFMD+L) has not been possible to observe a statistically significant contribution of laser therapy in the investigated sample, in order to improve the clinical outcome.
CONCLUSIONS: The application of a laser – assisted decontamination protocol in addition to conventional non – surgical periodontal therapy, has not allowed to show clinically more effectiveness in the reduction of probing depth and bleeding on probing in the evaluated samples and at the periods investigated. The obtained results should be interpreted as an indication to realize more detailed and complete studies (also with a microbiological evaluation) to investigate how the laser light acts in the periodontal defect on the bacterial flora. The small sample size and the application of a protocol that provides a single laser application are additional aspects that future analysis should consider in order to describe, as fully as possible, the interaction between the laser light and the subgingival environment.

Diabetes: salivary ph and oral microbiotic flora what change

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BACKGROUND: Diabetes is a chronic disease resulting from a relative or absolute deficiency of insulin, which affects the metabolism. The most obvious abnormality is a high level of blood glucose especially following a meal.
Various oral complications have been reported in diabetic patients: changes in salivary glands, altered saliva composition, changes in oral microflora. Those may significantly influence the incidence of oral diseases.
The study is the evaluate the different of microbiotic flora, salivary Ph and diet habits in diabetics children and no-diabetic children aged 5-13 years old.
METHODS: The cross-sectional study has been conducted as a Matched Controlled study, including a population of 204 children age 5-13 years old, living in Sassari and surrounding region. The group was shared in three categories: 136 children no-diabetic, 20 children with a good metabolic control (Hb1ac<7.5) and the last one, 48 children with bad metabolic control (Hb1ac>7.5). The study took place from January 2013 to September 2015
The children must have good general health, a good oral hygiene and, for the diabetic ones, at least two years of diagnosis of the disease; instead would be considered as exclusion criteria oral pathology on the mucosa, allergy to one of the components of the test products and the ongoing of oral treatment.
The selection and the visit has been made in the Clinic of Pediatric and Dentistry at the University of Sassari, where at visits were also collected informed consent, a questionnaire on alimentary and oral hygiene.
The saliva sample was collected for microbiological test, in stand for Plaque-pH measurement was used the simplified strip pH method. The only instruction given was that the children , before the visit, must have their normal oral hygiene habits and not drink (except water) or eat after the cleaning.
The salivary microflora was analyzed in the Department of Microbiology of the University of Bologna with the DNA Checkerboard Method for Bacterial Pathogen Identification in Oral microflora.
RESULTS: The three groups took under observation were similar for age, a media of twelve years old. In the hygiene habits was not found an unanimity even in each group: every children clean teeth every day at least one time with the majority two times. In stand the use of fluoridated toothpaste and mouthwash weren't used from quite the totality of the children: only 37,26% of the children use fluoridated toothpaste. The group that use most was the controlled diabetes, 50% of them, in stand 3,58 % of the total use every day a fluoridated mouthwash.
The microbial flora count was in the range for each group, but for the most cariogenic batteries (S. Mutans, S. Sobrinus, S. Sanguinis, S. Salivarius S. Mitis and L. Salivarius) was found an higher number in diabetics children than in the control group.
A similar analysis it is possible done for the salivary Ph: the three groups had level in the range and an higher Ph was found in controlled group.
It is possible to say that from the comparison from the two groups, diabetics and non diabetics, the first one have an higher possibility to go under dental pathology.
CONCLUSIONS: The high level of sugar in the saliva put diabetic children in a condition of higher danger for oral pathology so they must have a better oral hygiene and a more frequent dentistry control visit.

Nutraceuticals and oral health: probiotics

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BACKGROUND: The Nutraceutical is a branch that is born from fusion of Nutrition & Pharmaceuticals in 1989 with the intention to investigate all of the components or active ingredients of the food by approaching the subject with scientific, identifying which components present in foods are responsible for the beneficial effects, in a close relationship between biology, chemistry and medicine. It is natural constituents substances present in plant extracts, animal-derived extracts,

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vitamins, minerals, and finally the probiotics, special beneficial microorganisms and prebiotics. In some years probiotics are the subject of intensive research aimed to investigate the mechanisms of action, the health properties and their use, often with encouraging results. Aim of this work is to review the literature on the use of probiotics in treatment of some conditions, pathological and not in the oral cavity.
METHODS: It 'was carried out a literature review ion the main international databases: PubMed and Scopus, inserting into the search field the key words: functional foods, nutraceuticals, probiotics and oral disease.
RESULTS: 684 articles on probiotics and oral health were found since 1985; the attention has been focused on studies of the past decade, particularly the newer ones that take into account these special bacteria and their usefulness for the health of oral cavity. In the considered studies, probiotics are administered as food supplements which mainly contain bacteria, in particular bifidobacteria and lactic acid bacteria, but also yeast and molds, in the inoculated milk-based foods (such as milk, yogurt, cheese) added in drinks (such as fruit juices) or packaged in the form of powders, tablets or gelatin capsules. The results identify the range of use of probiotics in the oral prevention and salivary ecosystem biomodulation, being able to balance and strengthen the natural defenses of the mouth. Targeting the oral microflora probiotics are proposed to reduce dental plaque, thus helping to tooth decay risk control and improve gingival health and halitosis.
CONCLUSIONS: The use of probiotics for oral health is spreading, given their ability to counteract the development of pathogenic microflora, reducing the growth and thus helping to resolve tissue inflammation (microbial therapy or, recently, bacterial replacement). The results show the need to select the microbes that have the ability to adhere and grow in the human oral cavity, isolating them from the human microbioma and making sure that they are supporting eubiotic conditions.

Pilot study: reliability and validity of the Italian version of the short form of the dentine hypersensitivity experience questionnaire (DHEQ-15)

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BACKGROUND: The aim of this study is to evaluate the reliability and the validity of the Italian version of the short form of the Dentine Hypersensitivity Experience Questionnaire (DHEQ-15), and to verify if it's still possible to assess the presence or absence of Dentine Hypersensitivity through the use of this kind of questionnaire when we are not provided with a triple air dental syringe.
METHODS: After translation and cross-cultural adaptation following international guidelines, 21 patients with DH were recruited to complete the questionnaire. The Schiff Cold Air Sensitivity Scale was used to assess patient's response to air blast sensitivity. Patients were included if they have at least two nonadjacent teeth with a response ≥1. The reliability of the Italian version of the DHEQ was evaluated through internal consistency and test–retest methods, using data from the 21 patients who completed DHEQ-15 again after a 2-week interval. Construct validity was determined based on factor analysis, discriminative validity (by comparing the subscale scores difference in the degree of sensitivity being investigated), and convergent validity (by analyzing the correlation between DHEQ- 15 subscale scores and the global rating of oral health question).
RESULTS: The Cronbach's alpha of the scale was 0.92. No correlation was negative and the correlation coefficients extended from 0.27 (the correlation between "1" "4") to 0.72 (the correlation between "3" and "7"). The coefficients ranged from 0.55 to 0.74 with no value above the drop-out value of 0.20 recommended for included an item in a 15 points scale.
DISCUSSION:The measurement of dentine hypersensitivity could be impossible without the proper instrument for it assessment. An alternative method would be to translate an existing DHEQ to assess the patients with DH. The present study attempts to validate an Italian version of DHEQ-15 and to adapt the original English version to Italian cultural environment and to investigate its psychometric properties. The value of the ICC is lower than the Chinese translated version but, anyways, indicates a sufficient reliability. The high alpha value (0,92) indicates that the 15 items of translated DHEQ-15 scale measure the same construct.
CONCLUSIONS: In conclusion, the results provide an initial evidence that the Italian translated version of Dentine Hypersensitivity Experience Questionnaire -15 (DHEQ-15) can be properly used for assessment of Italian-speaking patients with DH.

Functional foods: a new approach in treatment and prevention of oral infections

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BACKGROUND: Current drug therapies against biofilm-mediated diseases e.g. periodontitis, caries, endodontic infection and peri-implantitis, are reaching their limits due the worrying emergence of bacteria drug resistance. This leads to care failure, decrease of quality life and cost increase. Facing the lack of alternative treatments, scientists are searching after natural compounds to help fighting the above mentioned diseases. To suit this purpose, Pistacia lentiscus, a plant growing in Mediterranean maquis and Lentinula edodes (Shiitake), an edible mushroom were selected. Preliminary studies have showed that extracts of these plants have an inhibitory action against oral pathogens. However, little is known if these substances interact with the biofilm formation in the oral cavity. The aim of the present study was therefore to test the efficacy of these extracts as a modulator of the oral biofilm growth *in vitro*.
METHODS: Different bacterial species belonging to the Streptococci family were selected because they play a key-role in the formation of biofilm in the oral cavity or in other systemic affections. They were: S. hominis , S. intermedius, S. mitis, S. mutans, S. pyogenes, S. agalatiae, in addition we have used as control a oral probiotic strain S. salivarius K12. Pistacia lentiscus oil (LBO) (Mediflora, Cagliari, Italy) and an aqueous extract of Shiitake (Miconet-Pavia) 1/7 v/v, were

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studied as functional foods. The bacteria were cultivated in Schaedler broth and grown under 37°C and 5% of CO_2 conditions in a particular bioreactor to mimic the oral cavity.
The first step was to establish the antibiotic sensitivity expressed in terms of minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) following the National Committee for Clinical Laboratory Standard protocols (NCCLS). These quantitative results are useful for predicting in the oral tissues (i.e periodontal pocket), the antimicrobial concentration that must be attained to insure the inhibition or kill the pathogen microbiota. The second step was to evaluate the minimal biofilm inhibitory concentration (MBIC). Each strain was exposed at different concentrations of extract, previously mixed with growth medium from ½ to 1/128, extract/liquid medium . After 4 days of incubation, the biofilm was evaluated by a staining method and expressed as 550 nm of absorbance .
RESULTS: LBO and Shitake showed a different antimicrobial profile against oral Streptococcus spp. In fact only S. intermedius and S. mitis resulted sensitives to LBO (MIC = 25%, MCB < 50%). Despite by using the Shiitake all tested Streptococci resulted inhibits , MICs from 50% to 12.5 %. Only the probiotic strain S. salivarius was insensitive at these functional extracts . The experiments performed *in vitro* with a simulating oral biofilm bioreactor, showed that all extracts were able to inhibit the biofilm for all pathogens, except for the probiotic strain. The MBICs were comprised: (i) LBO from 25 to 3.1 % and (ii) Shiitake from 25 to 1.12%. These experiments suggesting a different mechanism of bacterial inhibition between these functional foods .
CONCLUSIONS: This opens new ways on the possible treatments of oral pathologies based on the modulation pathogens/probiotics with subsequent formation of an new physiological oral microbiota. Furthermore, being foods, these substances have limited side-effects and might be considered as potential candidates to support existing no surgical therapies.

FROHI-L : FRail Oral Hygiene Index Long term Care

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BACKGROUND: The elderly, especially the instutionalized elderly, have to deal with a lot of problems in maintaining oral health. Sickness and chronic disease may result in declined ability to carry out daily oral hygiene manoeuvres. Poor oral hygiene, periodontal disease, oral mucosal lesion, caries and xerostomia are common in this patients. Poor oral hygiene may affect systemic health, nutritional status and the well being of elderly persons. An oral assessment tool can highlight oral health problems and be used to suggest appropriate medical treatment. The aim of this study was to test the credibility and the effectiveness of a revised oral assessment guide (FROHI-L) for patients residing in a geriatric rehabilitation ward.
METHODS: This study was carried out in a geriatric rehabilitation ward of Pio Albergo Trivulzio in Milan. A consecutive sample of 100 patients were included in this study. The Oral Assessment Guide (OAG) has been broadened with the Oral Health Assessment Tool (OHAT) in order to create a complete chart for elderly institutionalized patients. The student of Dental Hygiene of University of Milan cooperated with registered nurse to compile charts.
RESULTS: It was found a trend of correlation between Mini-Mental State Examination and revised Oral Health Assessment Guide (FROHI-L) to determine relationships between the need for dental treatments of institutionalized elderly people, cognitive impairment and the general level of care needed. The data collected have shown that oral health problems like oral mucosal lesion , xerostomia and periodontal disease were decreased significantly and caries were treated. Oral health has been increased substantially in these patients.
CONCLUSIONS: Assessment of oral health status and the medical treatment designated to improve oral health are an essential component in the nursing care of elderly persons. FROHI-L (FRail Oral Hygiene Index Long term Care) was found to be a clinically useful assessment tool. This tool can be useful to see the improvment about interventions in terms of dental cure, profesional and at home. A continuous support from dental hygienist and nurse it's necessary to improve the reliability of the oral health assessment tool.

Dental erosion as a symptom of gastroesophageal reflux disease: treatment and role of dental hygienists

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BACKGROUND: To analyse the role of the dental hygienist and the dental team in regards to the identification of gastroesophageal reflux disease by the signs of tooth erosion and erythema of the oral mucosa.
Since the prevalence of gastroesophageal reflux disease and dental erosion has become a growing problem for the health of global population, this thesis also aims to examine which treatments are most effective in protecting enamel and dentin by the repeated acid attacks.
METHODS: An investigation over the last ten years of scientific literature was carried out by using the internet as the main source, which resulted in 43 articles being selected and examined.Some Pathology and Surgery case reports were also retrieved from the Department of Dentistry and Stomatology of the University Hospital of Padua; the patients had signs of severe dental erosion caused by gastroesophageal reflux disease indicated in their medical charts.
RESULTS: The results from the studies analysed for the preparation of this thesis show that there is a strong link between gastroesophageal reflux disease and cases of consequential dental erosion, with 89% of the articles regarding the two diseases suggesting a significant association between them.
In case of gastroesophageal reflux disease, the first tooth surfaces affected by erosion will be those of the upper palatal and the occlusal lower molars. When it comes to dental erosion, the localisation of some specific damaged areas allows distinguishing the differential diagnosis between the erosion due to acid endogenous or exogenous, where the latter usually damages the vestibular surfaces first.
In regards to the treatments applied by dental hygienists, the research shows that the most effective products for the pro-

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tection of enamel and dentin against acid attacks are those containing not only fluoride but also tin. The Tooth Mousse, thanks to its active ingredient CPP-ACP, appears to be the best product to protect not only from erosion but also from abrasion caused by tooth brushing.
It is also essential to educate patients with certain rules of best practice, to mitigate the risk of erosion of hard tissues and erythema of the oral mucosa caused by an acid attack.
CONCLUSIONS: In view of the studies considered for the development of this thesis, it can be concluded that dental erosion is an extra-esophageal manifestation closely associated with gastroesophageal reflux disease.
Given the severity of the injuries observed, it is essential to know how to interpret the signs and symptoms of both diseases for a correct and early diagnosis; it is also important to know which methods of prevention and therapy are the most effective for a timely treatment of tooth surfaces, before the erosion of the elements can lead to serious morphological and often irreversible changes.

Evaluation of an orthodontic toothbrush in the removal of bacterial plaque

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BACKGROUND: The presence of bacterial plaque on brackets and orthodontic wires is hard to control. The inflammation of the periodontal tissues can bring to the suspension of orthodontic treatment. The aim of this study is to evaluate the efficacy of three toothbrushes in a bacterial plaque manual removal. Different orthodontics patients were selected for this study. Several hygiene instructions were gave to them. Oral soft tissues, dental elements, the oral hygiene habits, the percentage of tooth surfaces covered with plaque, and sites who had bleeding were evaluated. The percentage of sites with plaque were evaluated according to the originally described by "Silness and Loe" measurement index. However this plaque index is consider in absence of attacks and orthodontic arches. For this study was resumed the same method but adapted to the presence of brackets. Each dental element has been divided into four areas (mesial, distal, gingival and incisal) and measured the plaque index in each region.
METHODS: After photographs, each group was subjected to a session of oral hygiene. At the end it has been delivered to them a different manual toothbrush and were provided accurate of oral hygiene instructions.
Group A received the traditional toothbrush with average head and bristles of equal length;
Group B received the sulcus toothbrush, with only two strands of bristles; the C Group received the orthodontic toothbrush, having a "V" profile for the shape of the bristles, higher externally and centrally lowest order to better adapt to orthodontic brackets. The oral hygiene instructions provide for the modified Bass technique: application of the bristles between tooth and gum at an angle, if possible, to 45 °; they do perform vibratory movements and rotational movements of seeds, with sliding of the head from the gingiva to the tooth. After the first round were carried out to 15 days controls (T1), at 30 days (T2) and 60 days (T3) for each group. With every call with plaque sites were evaluated, using always the aid of a revealing tablet, the status of the periodontal tissues, carried photographs and reinforced the oral hygiene instructions. Between March 2013 and January 2014, at the "Policlinico Campus Biomedico" Trigoria, forty five orthodontic patients were selected, aged between 10 and 13 years in orthodontic treatment fixed to both arches for about a year. The patients were divided into three groups (A, B, C), 15 children for each group. For each group was considered:
— oral soft tissues
— number of dental elements present in the oral cavity
— the oral hygiene habits
— the tooth surfaces covered with plaque with aid of a revealing plaque tablet
— bleeding sites in the survey
— photos
RESULTS: For group A, it is shown an average reduction of P.I. from 50.47% to 32.3% . For group B, it has shown an average reduction of P.I. from 47,50% to 37,42%. For the C group, it showed a mean reduction of P.I. from 46% to 37.5%.
CONCLUSIONS: No patient had a deterioration in health of the gingival tissues. However, patients in group A received lower values P.I. 20% at the end of the study than patients in the other two groups B and C whose plaque levels decreased by only 10%. The significance of the results shows that in patients with fixed orthodontic treatment using traditional toothbrushes with bristles of equal lengths, leading to a satisfactory result.

Dental hygenist in long-term care facility for patients with Alzheimer disease and cognitive impairment

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BACKGROUND: The project aims to include the dental hygienist within the multidisciplinary team caring for the patient Alzheimer's in order to establish a bridge and continuing collaboration between the teams and the Alzheimer's Oral Health Service of the Department of Dentale Hygiene of Pio Albergo Trivulzio through the development of a shared protocol in order to pursue the following objectives:
— Improve the appearance of care understood as a structure, staff, family;
— Improve the quality of life of hospitalized patients;
— Reduce Risks factor; Reduce acute and chronic diseases related.
METHODS: As part of the multidisciplinary nature of patient suffering from dementia, the Oral Health Service of the Department of Dentistry of the Pio Albergo Trivulzio began in January 2011, a collaboration with the RSA and Alzheimer. Through this multidisciplinary collaborative project were examined and evaluated 70 of the 80 Alzheimer patients RSA residents.
The project followed the precise steps and timing:
— Phase 1: observation.
— Phase 2: oral assessment and compiling medical records (via module FROHIL –frail oral hygiene index and Silness and Loe PLAQUE and GINGIVAL index).

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— Step 3: education to health care.
— Step 4: reassessment of all patients, development of custom protocols, reporting to doctors of geriatric patients who needed a dental examination and oral hygiene sessions, inclusion of the clinical nursing integrated within the folder of each patient.
— Step5 : Delivery of service satisfaction forms of oral hygiene, addressed to relatives and medical team.
RESULTS: Following appropriate treatment of oral hygiene and use of suitable products to increase the lubrication of the mucous membranes, the number of patients with moderate alterations of oral health, (maximum score between 2 and 4), are reduced from 60 to 35, corresponding to 54% of patients. Following the interventions required for dentistry restoring implants incongruous and care of teeth and further compromises the necessary care of oral hygiene, the number of patients with oral health (score 0), would rise from 0 to 30, corresponding to 46% of patients. Consequently the number of patients with severely impaired oral health would be reduced to 0.
CONCLUSIONS: This article tried to highlight the importance of including dental hygienist within the care team, with the aim to assess and restore the oral health of these patients in what is the overall care individual. Through this project we have been able to confirm the data reported in the literature on the prevalence of poor oral hygiene in patients with dementia residents in nursing homes. Furthermore, the reduction of the scores obtained from oral forms of assessment, (FROHIL and Silness and Loe PLAQUE and GINGIVAL index), through the insertion of a protocol of oral hygiene allows us to take a step towards the achieving oral health. In conclusion, this project, which can be extended to other departments within the facility, highlighting the role of social and clinical dental hygienist in RSA.

Paediatric obstructive sleep apnea syndrome: effects on periodontal health and craniofacial growth

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BACKGROUND: The aim of this study was to evaluate the possible negative effects that the obstructive sleep apnea syndrome (OSAS) causes on the stomatognathic apparatus development and periodontal health of a young patient.
METHODS: A research was conducted over the last fifteen years of scientific literature, from which 57 articles were examined. Moreover, the history of 45 paediatric patients aged 2 to 16 years was also analysed; those patients were slated for an adenoidectomy with or without tonsillectomy at the Department of Otolaryngology of the Hospital Santa Maria di Ca' Foncello, Treviso, where their parents filled a questionnaire which purpose was to investigate the main symptoms of OSAS and any alterations identified by the relevant specialists (ENT, dentist, dental hygienist).
RISULTS: Obstructive sleep apnea syndrome can lead to the occurrence of craniofacial abnormalities, to affecting the child's occlusal balance and somatic profile. The most common malocclusions and dimorphisms are an increased lower and total facial height, a high and narrow palate, a posterior cross-bite, decreased maxillary width, an anterior open bite, a Class II malocclusion, a retrognathic mandible, an increased overjet and teeth crowding. In addition, this thesis confirms the positive association between OSAS and periodontal disease; in this regard, it was highlighted how children with obstructive sleep apnea can present a worse periodontal health than healthy children, with an increase of gingival inflammation (GI), plaque levels (PI) and pocket depth (PPD). The results of the questionnaires also showed that children with OSAS are also more predisposed to the damage of hard tissues, having a higher probability of developing caries, dental erosion and bruxism.
CONCLUSIONS: The prevalence of OSAS in children ranges from 0.7% to 10.3%. In most of those case, sleep-related breathing disorders are due to adenotonsillar hypertrophy, which interrupts the airflow at pharyngeal level during night time breathing, leading to the occurrence of OSAS. Early diagnosis and timely therapeutic intervention allow to avoid or at least reduce the problems at periodontal level and the formation of malocclusion, ensuring a proper growth of facial bones. It is therefore recommended a multidisciplinary approach to the paediatric patient with OSAS, involving the otolaryngologist, dentist and dental hygienist. The latter, during the periodic oral hygiene appointment, can analyse those aspects, intra-oral and extra-oral, that may be a sign of a sleep respiratory disorder, and subsequently re-direct the patient to the relevant specialists for a further assessment on the case.

Oral hygiene status in patients with implant-supported prosthetic reabilitation in patients following surgical resection due to oral cancer

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BACKGROUND: Oral tumors of the head and neck in Italy represent about 5% of all malignant tumors and are located on the 5th place as frequency.
The treatment choice for these pathologies are surgery and radiation therapy alone or in combination with chemotherapy is instead used almost exclusively for palliation or to decrease recidivism .
The surgeries of Oro - Facial tumors often behave more or less extensive demolition is the soft parts of both the bone support , resulting in functional deficits that may relate to the phonetics, breathing , chewing and salivation.
The aim of this study is to investigate the peri-implant soft condition in patients treated with implant-prosthetic rehabiltation after surgical resection for oral cancer.
METHODS: Eighteen patients were esaminated. The Plaque Index (PI) and Gingival Index (GI) have been relevated. Patients Satisfactionary Questionnaire (PSQ) was also administered during the oral hygiene sessions regarding their previous surgical treatment to investigate their psycologic status. Plastic surgery , the last fifteen years , developed techniques designed to restore functional and aesthetic defects that result from the oncological surgery of the Oro - Facial district . Such techniques from a part can ensure a good or acceptable rehabilitation for small defects of the other part does not always guarantee function and aesthetics
RESULTS: Plastic surgery, the last fifteen years, developed

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techniques designed to restore functional and aesthetic defects that result from the oncological surgery of the Oro - Facial district . Such techniques from a part can ensure a good or acceptable rehabilitation for small defects of the other part does not always guarantee function and aesthetics.
The quality of maintenance often goes acceptance of the disease ,many patients accept the new prosthetic rehabilitation and this will impact on performance oral hygiene at home .
So do not always where the prosthesis helps the patient have positive results , so patients get discouraged further.
CONCLUSIONS: It is desirable that hygienist, dental surgeon work in synergy from the outset in order to obtain the best possible result.
The oral hygiene instructions should be simple, concise and customized. Considering the state of anxiety, which tends to reduce the learning capacity, it is useful to provide the patient with written instructions and involve family to support patient.

Heavy metals in dentistry: a 'natural' secondary prevention for the team is possible?

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BACKGROUND: Among the various types of pollutants, the inorganic contaminants is perhaps the most widespread and at the same time the least known and investigated. Various are the mechanisms of damage of heavy metals: genetic, epigenetic, enzyme, and the only conceivable solution is to perform a secondary prevention eliminating them from the body. The heavy metal pollution in dentistry remains a topic sometimes underestimated: exposure to heavy metals for the dental operator is minimal but protracted. The dental staff who daily is exposed to risks of the kind through, for example, polishing of silver amalgams, polishing of prosthesis in metal alloys, removal and replacement of amalgam, etc., can and must perform a secondary prevention through chelation therapy.
Aim of the work: To implement a primary prevention is the responsibility of the institutions; this is partly happening, for example, with restricting the use of lead in gasoline, put the mercury ban, etc. Secondary prevention, intended to eliminate from the body of heavy metals is in some cases institutionalized and hospitalized (acute intoxication, protection of workers at risk, etc.) in other cases delegated to the individual: in both chelation therapy is needed.
The aim of this study is a systematic review of the literature regarding the secondary prevention of pollution from inorganic contaminants in dentistry, particularly through homeopathic, herbal and natural chelating agents.
Secondary objective is to draw up a nutritional handbook and a list of practical tips for the dental team who wants to improve their health and reduce the risks associated with constant exposure to heavy metals.
METHODS: Literature search in PubMed-Medline database about chelation in dentistry, particularly with natural agents; Literature search about food and natural supplements that allow a simple and daily chelation; identification of the guidelines for a gradual and natural chelation, changing diet and lifestyle.
RESULTS: The natural chelating appears to be lower power chelating than traditional active ingredients used but constitutes an appropriate and effective alternative. Is recommended for the dental team take biannual natural food supplements with chelating action to have a good secondary prevention of heavy metal contamination, lowering the risk of complications and side effects.
CONCLUSIONS: Secondary prevention and chelation of heavy metals from the body is possible, and with good results, also following a 'natural' way, changing for the better the lifestyle of the dental team.

Redox balance and oral health: a literature review

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BACKGROUND: Oxidative stress reflects an imbalance between the systemic manifestation of reactive oxygen species and a biological system's ability to readily detoxify the reactive intermediates or to repair the resulting damage. Disturbances in the normal redox state of cells can cause toxic effects through the production of peroxides and free radicals that damage all components of the cell, including proteins, lipids, and DNA. Oxidative stress from oxidative metabolism causes base damage, as well as strand breaks in DNA. Base damage is mostly indirect and caused by reactive oxygen species (ROS) generated, e.g. O2− (superoxide radical), OH (hydroxyl radical) and H2O2 (hydrogen peroxide). Further, some ROS act as cellular messengers in redox signaling. Thus, oxidative stress can cause disruptions in normal mechanisms of cellular signaling. Epidemiological studies reveal that more than two-third of the world's population suffers from chronic periodontitis. The primary etiological agent is a polymicrobial complex, predominantly Gram-negative anaerobic or facultative bacteria within the sub-gingival biofilm. These bacterial species initiate the production of various cytokines such as interleukin-8 and TNF-α, causing an increase in number and activity of polymorphonucleocytes (PMN) along with these cytokines, PMNs also produce ROS superoxide via the respiratory burst mechanism as the part of the defence response to infection. ROS just like the interleukins have deleterious effects on tissue cells when produced in excess. The aim of this review is to investigate the relationship between oxidative stress and oral health.
METHODS: Searches were made of the PubMed database in November 2015 and February 2016 using the following keywords: "oxidative stress" AND "periodontitis", "oxidative stress" AND "gingivitis", "oxidative stress" AND "oral health". The search was performed by two researchers and limited to studies involving human subjects. English language restriction was applied. Three researchers examined the articles obtained.
RESULTS: 287 articles were found for "oxidative stress and periodontitis", 36 for "oxidative stress and gingivitis" and 897 for "oxidative stress and oral health". Literature reviews were excluded. Reading the title and the abstract of each article we selected 73 articles for full text examinations.
DISCUSSION: This review focuses predominantly on the role of ROS and antioxidant defence systems in the pathobiology of periodontitis. A role of ROS in inducing periodontal tissue damage has been evidenced in many clinical trials showing increased local and systemic alterations in the redox balance of periodontitis. This may impair circulating pro-oxidant/anti-oxidant balance and induce the oxidation of low-density

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lipoprotein (LDL) in blood. Periodontal patients shows higher levels of circulating oxidized LDL (oxLDL) and oxidative stress than healthy subjects; improved oral hygiene and non-surgical periodontal treatment are effective in decreasing oxLDL, which is positively associated with a reduction in circulating oxidative stress. The imbalance between the levels of myeloperoxidase/IL-1β and glutathione peroxidase/lactoferrin result in tissue damage of ROS in periodontitis, which is initiated and perpetuated by the chronic insults of periodontopathogens. A positive association was found between plasma oxidative status and CAL (clinical attachment level) in patients in the maintenance phase of periodontal therapy. A systemic increase in oxidative stress may influence the rate of progression of periodontal disease. Measurement of salivary 8-hydroxydeoxyguanosine (8-OHdG) levels, a marker of oxidative stress, may prove to be useful in identifying patients with teeth of hopeless prognosis. ROS are implicated in the destruction of the periodontium during inflammatory periodontal diseases. The imbalance in oxidant/antioxidant activity may be a key factor in the damaging effects of ROS.

A comparative *in vitro* study between sealings performed by using blue light laser or classic led curing lamp

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BACKGROUND: The caries disease is one of the most widespread diseases in the world today. On these days sealings are one of the most commons dental practices for prevents the insurgence of caries disease. Diode Laser technology is an innovation in dentistry and can be used in many treatments like surgery, endodontics and more recently in resin curing. The purpose of this study is to evaluate the curing power of the Diode Blue Laser (K-laser blue) respect to LED Light Lamp one ("Carlo de Giorgi" CU80 Walldo) using an exposition time of 6 seconds for the laser and 40 seconds for LED light lamp.
METHODS: 85 bovine teeth were used for the study, selected between molars and premolars, caries free with intact crowns, divided in 2 groups: group LS (Laser) 43 elements cured with blue laser K-laser with dental hygienist personalized parameters: laser light maximum emission power was 1 Watt starting from 0.2 Watt for a total 3 Joule of released energy at the end of the 6 seconds exposure; group LP (LED lamp) 42 elements cured with LED light for 40 seconds. Sealings were performed all by the same trained operator using standard procedure and the surface was prepared with 32% orthophosphoric acid gel. In both groups 2 tests were made: retention test, using an explorer probe; infiltration test, using a brown dye. Both tests were made by the same trained operator.
RESULTS: In group LS 37 teeth passed the retention test, 6 didn't pass; in group LP 38 teeth passed the same test, 4 didn't pass. We considered the test passed when the sealing remained intact after the probe action without losing any scrap. In group LS 35 teeth passed the infiltration test, 8 didn't pass; in group LP 36 teeth passed the same test, 6 didn't pass. We considered the test passed when no infiltration was detected under the sealing surface (However when infiltration was detected it was always less than 3mm deep).
CONCLUSIONS: From the results of this study we can say that the diode blue laser K-laser curing power is comparable with the classic LED lamp curing power but with the advantage of a lower exposition time and then a faster treatment.

Investigation on the existing correlations between rheumatoid arthritis (RA) and periodontal disease

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BACKGROUND: The aim of this study is to evaluate the role of periodontal desease in the pathogenesis of RA and the chances of improvement in the oral hygiene of patients affected by these conditions through a careful and optimal non-surgical hygiene and periodontal therapy. RA is a highly invalidating condition classified as a chronic polyarthritic inflammatory illness, ankylosing and progressive, with an autoimmune pathogenesis and unknown aetiology, primarily affecting synovial articulations. It can cause deformities and pain, that can lead to the total loss of joint mobility. In patients affected by RA, there has been found the presence of anti-citrullinated protein antibodies, which is not present in other pathologies. In this article, we will also focus on the action of a particular bacterium, Porphyromonas gingivalis, which is involved in the aetiology of periodontal disease, as it is capable to stimulate, via the production of a particular enzyme (PAD), the synthesis of anti-citrullinated protein antibodies.
METHODS: A questionnaire on the hygienic and feeding habit has been presented to 10 patients affected by RA (test group). They also received a complete periodontal examination. The same questionnaire and examination were then carried out in 10 people of similar age group not affected by RA (control group).
RESULTS: RA affected patients presented a higher level of plaque accumulation, gingival inflammation, bleeding and survey depth compared to the control group. The test group also reported a shorter brushing time and a lower use of the correct brushing technique. By encouraging the patient and/or his/her caregiver to maintain an optimal oral hygiene and to use, in addition to the toothbrush, other instruments such as dental floss, pipe cleaners, clorexidine based mouth-washes as well as electric tooth brushes, we noted an improvement in the oral clinical condition.
CONCLUSIONS: The different periodontal status observed in patients affected by RA might be due to different hygiene habits which are a consequence of their invalid status. Therefore, it is necessary to adequately educate the patients to avoid the long duration of the illness.

Dimensions of orthodontic brackets: tailoring of oral hygiene protocols

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BACKGROUND: The complexity of the orthodontic treatment needs a multidisciplinary approach, where the dental hygienist participate fully. We know that the presence of a fixed orthodontic appliance induces changes in the oral ecosystem making the cleansing of

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the teeth more difficult. This favours the accumulation of bacterial plaque around the brackets and creates retentive niches that promote bacterial colonization (Streptococcus mutans), which leads to a greater risk of caries and periodontal problems. This paper draws attention to the products of the various types of orthodontic brackets on the market today, considering the variability of materials, sizes, techniques (lingual or buccal), the interbracket distance, and how this knowledge can lead to the choice of a tailor-made hygiene protocol and shared (tailoring), chosen not only on the patient but also on merchandise knowledge of the materials used.
METHODS: We took into account the different types of orthodontic brackets and studied the various features related to them, trying to understand how these differences may affect the oral hygiene protocols. There are numerous types of brackets and each company produces a variety of types. These may differ in: material, size, shape, presence of accessories, intrinsic functions, locking type, insertion location. The brackets are not all equal, but they have specific peculiarities and the orthodontist chooses from time to time the attack according to malocclusion of the patient and according to the most appropriate orthodontic technique to the treatment of the individual case.
RESULTS: By analyzing the different types and sizes of orthodontic brackets it is highlighted how the type of attack and the technique used can achieve different results in terms of prevention for a correct hygiene control. Therefore the application of interventions based on knowledge of various techniques has led the dental hygienist to the formulation of different protocols as well as new tools and new principals (powders of glycine with EasyJet Perio) that are helpful to dental hygienists to optimise their interventions not only to patients but also of orthodontists for a better job and to reduce treatment times.
CONCLUSIONS: The presence in the oral cavity of fixed orthodontic principals and the difference on their size, types and materials used (conventional attacks and Self Ligating) can make it more difficult to implement oral hygiene. In the present work it is shown that the in-depth knowledge of the dental hygienist of the materials used and the different types can lead to the proposal of a personalized prevention plan based on the type of orthodontic coverage and increasingly motivate the degree of compliance. At the same time the study also wants to put focus on the effectiveness of the Tailoring method in facilitating the orthodontist's work, and how the close cooperation between the dental hygienist and orthodontist is the foundation of successful prevention of complications during orthodontic treatment.

Management of patient's maintenance suffering from discolorations in the vegetarian diet: innovative technology of a mouthwash. A pilot study

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BACKGROUND: Scientific evidences show that everyone need to improve their social life through a bright and aesthetic smile. The importance of having bright and white smile depends on nutrition lifestyles. Foods like vegetables (beetroots, red wine, spinach..etc.) are full of pigments which are the main responsible of colouring and staining teeth. Generally speaking, a high intake of vegetables may be the cause of extrinsic teeth discolorations. Patients who show an invasive presence of such pigments must have frequent sessions of deplaquing, performed by Air Polishing with the use of glycine powders, which is a minimally intrusive clinical practice that allows to remove discolorations rapidly and successfully. In order to protect dental surfaces, patients need to perform a bacterial biofilm control by using personalized home-kits based on Tailoring technique (Nardi *et al*., 2014), suggested and shared by the experts, and by using Listerine Advanced White mouthwash. Thank to the dual action of polyphosphates, Listerine Advanced White is able to influence the interaction between extrinsic stains and enamel breaking bonds between the film and the pigmentation of enamel. This process allows the inhibition of absorption of new spots.
METHODS: Vegetarian healthy adults have been selected and have been randomly divided into two groups. Following the same treatment, the first 20 people have been asked to perform their usual customary oral hygiene using a fluoride toothpaste while the remaining 20 people have been asked to add Listerine Advanced White mouthwash twice a day for 2 minutes. At t(0), each patient showed some discolorations on their teeth surfaces, due to the presence of pigments that were quantified in compliance with the Lobene index (1988). For the purpose of the evaluation, the dental element has been divided into two areas: the cervical region and the wall. The main criteria for the discoloration ranking are two: Intensity: values between 0 and 3 indicate, respectively, absent/mild/moderate/intense pigmentation. Detection area: values between 0 and 3 indicate, respectively, absent pigmentation, pigmentation extended up to 1/3 of the area, pigmentation extended up to 2/3 of the area and pigmentation extended over more than 2/3 of the area. Teeth colouring has been calculated twice: at t(0) and at the last check, using a chromatic scale. The same index observed at the base line has been identified every 15 days in 3 months.
RESULTS: No patients dropped out the study and no collateral effects or permanent alterations affecting the crown have been noticed. The results were statistically significant for the student T-test (p value <0.05). At t_0 and at t_1 any statistically significant differences have not been detected in the 2 groups. At t_2, some differences have been detected, but they were not considered statistically significant. At t_3, some marked and statistically significant differences appeared between the two groups. During subsequent follow-ups, the results remained stable and statistically significant.
CONCLUSIONS: Results arising from the pilot study signify that vegetarian diet patients can significantly reduce their discomfort caused by acquired discolorations by brushing and using, on a regular basis, Listerine Advanced White mouthwash. Literature already reports other methods for maintenance, but the procedure we tested may be considered as an effective alternative to such methods.

Efficacy of oral hygienic protocol instruction on a group of children in interceptive orthodontic therapy with removable appliances

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BACKGROUND: Many children experience the orthodontic treatment; in particular, removable appliances are often worn by very young children.

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Oral hygiene in children in interceptive orthodontic therapy with removable appliances is not different from that in patients not undergoing orthodontic treatment. However, attention should be paid in cleaning the appliances, which it is often covered with plaque, and can be consequently a risk factor for the development of caries and gingivitis. To decrease the incidence of these diseases the correct cleaning of appliances and the use of antiseptic products is mandatory.
The aim of this study is to promote health education in children with removable appliances, investigating the knowledge and habits of young patients regarding the frequency and method of cleaning teeth and mobile appliances, implementing a protocol of oral hygiene education and motivation aimed at these children and evaluating the final results.
METHODS: A group of 20 children (age 7-12) with removable appliances from at least three months were enrolled. At the beginning of the study, plaque index (PI) and the presence of tartar on orthodontic appliances were clinically; at the same time, a first questionnaire was subjected to the patients on every aspect of daily life connected to the practice of oral hygiene. Then, a dental hygienist instructed the children about correct oral and appliance hygiene protocols and she gave them an illustrated brochure; finally, she made a session of professional oral hygiene and she cleaned the appliances.
After 3 months PI and tartar on appliance were recorded, dental hygienist made another time a session of professional oral hygiene and she cleaned the appliances, and children were questioned again.
RESULTS: In the first survey, many children had improvable plaque index, and significant accumulations of plaque and tartar on the appliance. This situation, after the intervention of the dental hygienist, was significantly improved. In the questionnaires, patients showed to understand protocols and to put them into practice.
Descriptive statistics analysis showed that the reduction of the indices was statistically significant.
CONCLUSIONS: Evaluating the results obtained from the project of education and motivation for hygiene care, and considering the number of incorrect answers selected in the first questionnaire, it is clear the need to increase the number of educational campaigns as part of primary prevention.
The role of dental hygienist is fundamental in teaching and maintaining oral hygiene status in children with removable appliances.

Epidemiological study of the correlation and prevention of odontostomatological diseases in patients with juvenile idiopathic arthritis

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BACKGROUND: The aim of this work was to test the knowledge about the correlation between juvenile idiopathic arthritis (JIA) and oral health and investigate on the wish of the individual about including the figure of the dental hygienist inside the JIA team at the Rheumatology Department.
METHODS: 122 multiethnic volunteers, resident in Italy (95 females and 27 males), aged between 10 and 79 years, were interviewed and divided into five groups:
— A. JIA patients;
— B. JIA patients' relatives;
— C. JIA medical team;
— D. JIA paramedical team;
— E. other.
The survey was conducted anonymously, through a multiple choice self-completion questionnaire, at the Rheumatology Department of the Orthopedic Institute "Gaetano Pini" in Milan and through the social network dissemination for 24 hours.
RESULTS: The results indicate that 62% of the interviewed persons believe that there is a correlation between JIA and oral health; 52% of them associate it to the temporomandibular joint, 21% to the risk of caries and periodontal problems and only 10% attribute it to the reduction of the salivary flow; 98% of the interviewed persons think that the prevention of oral problems correlated to JIA might be possible throughout more information, the help of a dental hygienist and of the whole JIA team. In fact, 97% of the sample expressed the wish to include the figure of the dental hygienist into the AIG team of the Rheumatology Department of Gaetano Pini of Milan.
CONCLUSIONS: This epidemiological study has highlighted the wish of the individual about the importance of including the dental hygienist into the JIA team to intercept the causes that could threaten the oral health and affect the clinical picture of the patients. In addition, a discrepancy of notions among the five groups regarding the lack of knowledge have been raised, especially in the Group D represented by JIA paramedical team. The latter result suggests the importance of adopting an information program at the Italian rheumatology departments in order to inform both the paramedics and JIA patients and their relatives.

Oral health and nutrition: epidemiological survey on a multiethnic sample resident in Italy

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BACKGROUND: Evaluate the knowledge of oral health correlated to alimentation of individuals resident in Italy, by the administration of a test.
METHODS: An anonymous research was done on a multiethnic sample of 365 individuals resident in Italy (233 females and 132 males, aged between 10 and 79 years). 15 multiple choice questions about dental hygienists' role, principals and habits for home oral hygiene (HOH), oral health correlated to alimentation, pregnancy and pediatric age, were given.
The answers to the questions were designed according to the "multiple choice model" (Frederick J. Kelly, 1914 Kansas University) in order to help participants and standardize the questions. Facilitating the participants through their task, questions were inserted in funnel order, that is interposing general questions before focalizing the attention on the ones more inherent to the proposed theme.
The language was selected trying to identify with the numerous types of answerers, from the child to the elderly, from the less cultured to the well-educated, also considering the different socio-cultural influences between north and south and between people born in Italy or coming from other countries.
Once completed, the test was transcribed on Google Forms.
The diffusion on the whole Italian territory was obtained through the most common social networks, such as Facebook, Whats-App, e-mail, SMS (new technologies as CAPI) and door-to-door (using a paper form, transcribed online in a

second step). The second way was mostly adopted with the patients and the support and nursing staff of the Dental Clinic-Ospedale Maggiore Policlinico.
RESULTS: 80% of participants replies on dental hygienist in order to learn how to prevent oral problems and considers oral health synonymous of morpho-functional state, wellness and aesthetic. 48% collaborates brushing teeth twice a day (68% of them before going to bed), adopting a vertical movement (44%), interdental brushers and interdental floss (69%). Up to 70% of the answerers, oral health is correlated to alimentation; in fact 93% of them thinks that a bad diet might have an influence on oral level. During pregnancy, according to 61%, we should have a diet poor of sugars and rich of foods containing calcium and minerals, besides good HOH, in order to prevent caries and gingivitis for the mother's and child's oral health. 73% reports that the use of pacifier soaked with honey is a cause of caries.
CONCLUSIONS: 55% of the sample has a medium knowledge about oral health and correct alimentation.

Soft tissue management with implant-supported prosthetic reabilitation in patients after surgical resection.

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BACKGROUND: Over the past years, the frequent soft tissue complications at the abutment level caused by peri-implant inflammation have become a major problem for the zygomatic implants resulting in a need for additional studies. The aim of this study was to evaluate the clinical and microbiological outcomes of two mechanical anti-infective protocols for the treatment of mucositis around these implants.
METHODS: Nineteen patients with zygomatic implants diagnosed with peri-implant mucositis (bleeding on probing (BOP) with no loss of supporting bone) were included in the study. At baseline subjects were randomly assigned to receive a mechanical debridement using an ultrasonic device, Vector® (control group = C), or a plaque biofilm remover combined with the same ultrasonic device (test group = T). The prostheses were removed at the follow-up appointments to perform the clinical assessments. Visible plaque index (VPI), modified plaque index (mPI), bleeding on probing (BOP), modified bleeding index (mBI), probing pocket depth and gingival recession were assessed at baseline and at 3 months after therapies. Treatment was only performed during the baseline examination. At the same time points microbial samples were collected to qualitatively and quantitatively analyze bacterial species around zygomatic implants. A real-time PCR technique was performed to detect the periodontal pathogens, such as P. gingivalis, T. denticola, T. forsythia, and A. actinomycetemcomitans.
RESULTS: A total of 60 zygomatic implants were placed in 19 patients (12 women and 7 men), with a mean age of 62.8±15.2 years (range 26-86 years). At baseline clinical differences between the two groups were found. The control group showed better soft tissue condition than the test group (mBI p=0.02). Visible plaque index and bleeding on probing decreased in both the groups but no statistical differences were found between the test and the control group.Colonisation with periodontal pathogens was only found in patients with history of periodontitis. Counts of Porphyromonas gingivalis were reduced in the test group immediately after treatment and at 3 months. In the control group the periodontal pathogen increased and the bacterial counts at 3 months were higher than at baseline.
CONCLUSIONS: The use of an ultrasonic device, Vector® , specifically designed to allow an atraumatic implant surface debridement has shown to be effective to solve clinical signs of peri-implant mucositis around zygomatic implants. However, microbiological findings were not modified by this treatment. The adjunctive use of a plaque biofilm remover with hygroscopic properties does not seem to enhance the healing outcomes of the procedure more than the use of the ultrasonic device alone. Further evaluations will be essential in order to determine whether these outcomes will be sustained over the long term.

Dental sealant procedure laser *vs.* LED: an *in vitro* pilot study

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BACKGROUND: The present *in vitro* pilot study was to evaluate the efficiency of a diod laser *vs.* a led curing light on sealant (Helioseal-F, Ivoclar Vivadent) polymerization to prevent dental caries.
METHODS: Twenty extracted human teeth were recruited from San Raffaele's Dental Clinic Department. All samples were permanent molars and extracted for orthodonthic treatment. All showed no caries, no trauma and integral occlusal surphace. All samples were washed with dental brush and toothpaste, and stored in physiological solution at 0,09% NaCl. Roots dental elements were incorporated in dental plaster blocks with only the crown free. After, the samples were cleaned with air-polishig (NaHCO3 powder at 65 μm) and were thermal cycled with ventilated oven at 37°C for 48h. All samples occlusal surphaces were treated with 37% orthophosphoric acid (Ultra-Etch, Ultradent) for 30 sec. After the dental sealant (Helioseal-F, Ivoclar Vivadent) were applied on the occlusal pits and fissures. Then, were selected into 2 balance groups. The Group A (LED curing light) of the teeth were treated with led-blue light characterized by wavelenght 420-450 nm, power 5 watt, exposure time 20 sec and the Group B (LASER curing light) with laser-blue light characterized by wavelight 450 ± 10 nm, power 0.5 watt, exposure time 3 sec. All Occlusal surfaces of the samples were analyzed with Electron Scanning Microscope (Stereoscan 360-Cambridge Instrument).
RESULTS: All samples showed perfect clinicaly polymerization and all occlusal surfaces were clinicaly covered by sealant. At SEM morphological analysis it was possible to evaluate that in Group A the samples showed the 40% of sealant detachment, 40% of microgaps, and in all occlusal surfaces was possible to observe shrinkage. In the 80% of the samples the shrinkage observed were perimetral, and in the 20% of the occlusal surphaces were localizated. In the 20% of the sample was possible to evaluate the presence of deficits and bubbles and microcracks. In Group B the occlusal surphaces showed 20% of the sealant detachment and 40% microgaps. In the 100% of the samples it was possible to found perimetral areas of shrinkage. In 60% of the sample it was possible to show bubbles and in 80% microcracks.
CONCLUSIONS: Considering the small number of samples used for the study, further research and evaluations will be needed to define the real problems of tooth sealing. However, preliminary data obtained is possible to outline that there are shrinkage, microgaps, microcracks and sealant detachment that could be ineffective the sealing procedure used in the prevention of tooth decay.

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A novel nutraceutical approach to halitosis. Lactoferrin pilot study.

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BACKGROUND: Halitosis is strongly influenced by the development of bacteria in biofilms. Recently, it was shown how salivary lactoferrin (Lf) is lower in individuals suffering from oral diseases than in healthy subjects (20 mg / ml). Decrease of Lf concentration is particularly important because it represent a powerful anti-inflammatory activity indicator associated with oral inflammation. The administration of Lf via buccal tablets is emerging as an innovative and effective treatment of halitosis, as it restores its physiological concentration in saliva. The present study aims at demonstrating the efficacy of a daily administration of 100 mg of lactoferrin tablets against halitosis.
METHODS: Adult subjects, mean aged 44, suffering from bad breath to various degrees, distributed randomly into two groups: Group A- control, proper oral hygiene and healthy lifestyle motivation; Group B- lactoferrin, daily administration of a Lf 50 mg buccal tablet 2 times a day 20' after oral hygiene. Patients were not allowed to use antimicrobial or anti-inflammatory of any kind. The clinical halitosis evaluation was carried out through organoleptic and hedonic methods (Count-to-twenty tests, Wrist-lick tests and Floss test). Experimental moments: T0 = initial organoleptic rating; T1 = 5 days; T2 = 10 days.
RESULTS: 31 adult subjects, aged 18-65 years, were involved in the study. Count-to-Twenty Test and Wrist-lick tests results are perfectly overlapping: Group A, while starting from the lowest values of halitosis (0,1), at T2 stabilizes on a higher values (1, 3); in contrast, Group B, at T0 resulted at higher values (2, 3) and at T2 almost all patients resolved their discomfort (0). At the Floss Test, Group A showed a modest regression of cases of slight halitosis settling after 10 days around a value (1); in Group B on T2 it still reaches a value of less halitosis (0).
CONCLUSIONS: Common maneuvers of daily oral hygiene, if not linked to the use of the dental floss or brush, have little effect on the bacterial biofilm disruption accumulated in the interdental spaces. The result in B group indicating that the addition of lactoferrin to the daily home care, helps to reduce the action of bacteria also present in inter-proximal level.
In conclusion, even if more clinical trial on a larger sample are needed, our pilot data indicate that Lf may be an effective and decisive aid against halitosis.

Prospective evaluation of prosthetic implant rehabilitation in HIV positive patients: the role dental hygienist in health management perim-plant

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BACKGROUND: Assessing the health of the peri-implant tissues in HIV + patients rehabilitated with implant-prosthetic solutions, using two different types of implant surface, by recording appropriate clinical parameters peri-implant in order to assess whether the immunosuppressive syndrome can affect the success of the rehabilitation and if, in these patients, the implant surface treatment is a variable that could affect the success of rehabilitation.
METHODS: The study was carried out at the Dentistry Unit of San Luigi Ville Turro, of the Dentistry Department, San Raffaele Hospital, in Milan. Hiv positive fully or partially edentuolous patients were evaluated for implant prosthodontic rehabilitations. 30 patients (28 males, 2 females) were enrolled and 87 implants were placed: 44 sand-blasted acid etched surface (study group A) and 43 plasma-spray treated surface (study group B). For each patients only one type of implant was placed. During the first examination (baseline), the Dental Hygienist performed a periodontal screening of the patient, to evaluate the health conditions of the oral cavity prior to the intervention, in order to identify a pre and post operative hygienic protocol and acquire periodontal parameters: pocket probing depth (PPD), Bleeding on Probing (BoP), Clinical Attach Level (CAL), Recessions (REC), suppuration, teeth mobility (MOB) and Furcations involvement. Moreover, O'Leary Plaque Index (PI) was recorded. At t1 (30 days after baseline) implants were placed and 6 months (t2) and 12 months (t3) after the surgery, clinical peri-implant parameters were collected: PPD, BoP, suppuration, fixtures mobility. Moreover, a t2 and t3, PI was again recorded and Orthopantomography was performed. All the collected data were evaluated with statistical approach in search of possible correlation between implant surface type and clinical outcomes and between HIV and implant failure both in early post-surgical phases and after functional loading.
RESULTS: No early failures were observed in both groups A and B. No failure after functional load were observed after 1-year follow-up, in both groups A and B. No significant differences between groups in peri-implant clinical parameters were found.
CONCLUSIONS: The observed result lead us to believe that HIV + patients should be rehabilitated using implants and, as the same ways of any other kind of patient, the success of an implant rehabilitation results in a right choice of surgical and prosthetic protocol but in a supportive professional hygiene protocol in order to evaluate and intercept every possible microbiological or mechanical problem that should lead to a loss of osseointegration of the implants.

Icon® color stability in celiac-related DDE. Spectrophotometric follow up at 12 months

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BACKGROUND: Developmental defects of enamel (DDE) are common oral manifestation of celiac disease, whose onset can overlap to teeth calcification in permanent dentition. The defects of enamel occur symmetrically and chronologically in all quadrants, particularly in maxillary and mandibular incisors and molars. Icon® infiltrative technique is a minimally invasive procedure for DDE treatment. The authors report two cases of celiac siblings treatment with aesthetic purpose at 12 months follow up. The aesthetic evaluation was made by means of spectrophotometry as an objective standardized method. This case report shows an innovative objective

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method to evaluate quantitatively the color stability clinical outcome of the minimally invasive treatment with Icon® of DDE in celiac patients at 12 months.
CASE HISTORY: Two celiac female siblings (aged 14 and 18) with demarcated DDE is described. They presented yellow, brown and white multiple opacities on the clinical crown of the upper teeth and lower central incisors. Intraoral photographs and spectrophotometric measurement against black and white backgrounds were taken before treatment. Teeth were cleaned, rubber dam placed and resin infiltration performed according to the manufacturer indication (etching up to three times, followed by drying agent). The teeth were polished. Measurements were repeated at a week and at 1 year follow-up in order to assess color variations and esthetic outcome. Spectrophotometric CIE L* a* b*, CR (Contrast Ratio), opalescence, ΔE have been calculated in the three dental areas (gingival, central and incisal) to assess the colorimetric variation before (T0) and after (T1) treatment and at 12 months (T2).
RESULTS: Overall opalescence in the incisal zone is higher at T2, in the central zone is much higher and in the gingival zone is equal or lower than before. CR in all the zones is decreasing after treatment. Every dental areas presenting a defect show a $\Delta E_{(T0\text{-}T2)} > 3.3$, confirming defects covering and color stability to the follow up of 12 months.
DISCUSSION AND CONCLUSIONS: DDE management is challenging both for clinical procedure and for aesthetic outcome. Icon® is an infiltrant resin that take on the appearance of the surrounding sound enamel. At 12 months follow up, the clinical outcome and the consistent spectrophotometric measurements of the color stability in the reported cases is overall satisfactory, especially considering the minimally invasive approach.

Treatment of HSCT mucositis with mucosamin

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BACKGROUND: Oral mucositis (OM) may occur in up to 100% of patients undergoing high-dose conditiong and hematopoietic stem cell transplant (HSCT). From the patient's perspective, OM is one of transplantation's most debilitating side effects.
It is common thoughts that patients' oral hygiene can modify the incidence and severity of oral mucositis, therefore professional oral health care (POHC) is recommended prior to conditioning regimen for HSCT.
A new strategy for the treatment of OM is the sodium hyaluronate combined with amino acid precursors of collagen (Aas) (Mucosamin®). SH is a mucoaderent polymer acting as a mechanical barrier and pain reliever. Furthermore it allows prolonged contact of the product with the mucous membrane.
METHODS: A total of 60 adult patients prepared for HSCT for allogenic and autologous transplant were recruited at the Stem Cell Transplant Unit. Patients were divided in two groups. A group was treated with POHC before HSCT and applications of Mucosamin® during the recovery after transplantation. The second group served as control. After HSCT, the same observer, an expert in oral medicine and trained for the clinical trial, evaluated symptoms of patients mucositis of both group every day.
RESULTS: There were no differences in OM location and time of onset among patients receiving Mucosamin® (group A) and in those who did not (group B). There was no indication of any intolerance to the product. All patients, except one, liked the consistency of the product in the mouth, they were able to use it during the day based on the instructions of the dentist.
Patients treated developed significant less severe OM, the Mucosamin® seems to have a protective role against the more severe phases of mucositis .
The maximum OM pain, measured with the VAS scale, was significantly higher in patients who did not assumed Mucosamin®. In the group treated OM resolved sooner than control.
CONCLUSIONS: According to our study, the use of Mucosamin® can influence the type and severity of the oral mucositis allowing patients to have a better quality of life. The efficacy of Mucosamin® rely on its ability in tissue repair, activation and modulation of inflammatory responses and promoting the proliferation and cell migration, angiogenesis, increased re-epithelialization, borne of basal keratinocytes and collagen deposition, thus acting on stage ulcerative mucositis by forming a protective layer that reduces pain and accelerates healing clinic.

Effectiveness of a desensitizing varnish in reducing tooth sensitivity: a randomized double-blind clinical trial

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BACKGROUND: Cervical dentine sensitivity is a short painful response to an external stimulus applied to the buccal surface around the cervical region of the tooth.
Several hypotheses have been expressed to explain how external stimuli may influence the nerve fibers, the most widely accepted is the hydrodynamic theory.
Also plaque accumulation seems to have an important role, invading dentinal tubules causing decalcification of peritubular dentine and the consequent enlargement of tubules, leading to dentine hypersensitivity.
Many different treatments have been proposed, both in office and at home, including toothpastes, mouthwashes, bonding agents, diode lasers, fluoride applications, fluoride ionophoresis, tubules sealants, desensitizing varnishes, with different percentages of success depending by the author.
The aim of this study is to evaluate the effectiveness of a desensitizing varnish compared to a placebo in reducing tooth hypersensitivity.
METHODS: Sixty healthy adults suffering from tooth sensitivity on at least two teeth were divided into two groups, the test group and the control one. Cervitec F varnish (Ivoclar Vivadent Schaan, Liechtenstein), containing 1400 ppm fluoride and chlorhexidine was used for the test group. A placebo

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containing water and ethanol was applied for the control group.
Each patient received a professional oral hygiene. Varnish or placebo was applied to the buccal surface of each selected tooth by a blinded operator at baseline and after each control session.
Tooth sensitivity was collected according the Schiff' scale at baseline and after thirty (T1) and ninety days (T2). A different operator evaluated the results and carried out statistical analysis. T- test for paired data was applied ($p<0.05$).
Home maintenance protocol was given to each patient according the Tailor-made protocol. Patients were recommended to brush twice per day with a medium bristles toothbrush (Gum Technique Pro Compact Medium) without any toothpaste and any mouthwash.
RESULTS: All the subjects completed the study. Test group improved with statistically significative results (p value <0.0005). Control group did not show any improvements and any statistically significant reductions were found. No side or adverse effects were found.
CONCLUSIONS: Our results confirm that desensitizing varnishes are a valid treatment for tooth hypersensitivity. The addition of chlorhexidine to fluoride to reduce tooth hypersensitivity seems to be effective in improving symptoms, playing an anti plaque and an anti bacterial role.

Effectiveness of two different powered toothbrushes in perimplant mucosal stimulation.

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BACKGROUND: The presence of healthy tissues around an implant is one of the key factors for the long-term success of oral implants. is the maintenance of. Plaque accumulation can induce inflammatory changes in soft tissues and leads to mucositis. It may lead also to the progressive destruction of tissues around implants (perimplantitis). Different procedures have been proposed to treat perimplantitis; however it is still unclear which is the most effective.
The best strategy to keep healthy tissues around impants is to prevent inflammation, and this can be reached by managing plaque accumulation. Having said that, a proper home maintenance protocol is crucial to have healthy tissues.
Yaacob *et al* (2014) proved that oscillating rotating powered toothbrushes remove more plaque than manual toothbrushes in the short and long term and that they are more effective in reducing gingivitis. Furthermore, no statistically significative differences were found between tissue trauma induced by powered or manual toothbrushes.
The aim of this study was to evaluate the effectiveness of two different powered toothbrushes in perimplant mucosal stimulation.
METHODS: 100 healthy adult patients with one endosteal implant just loaded were recruited for this randomized clinical trial. Each patient received a professional oral hygiene treatment including airpolishing (Mectron Combi) with glycine powder <63 μm (Mectron Glicyne powder) and supragingival ultrasonic scaling (Mectron Combi) with universal tip (Mectron S1) for natural teeth. Only airpolishing was performed on implants.
Patient were randomly divided in two groups. Patients of Group 1 were asked to brush at home twice per day for two minutes with an oscillating rotating powered toothbrush (Braun Oral B) using the Cross Action head. Patients of Group 2 were asked to do the same protocol using the Precision Clean head.
At baseline and after 30, 90 and 180 days, the following parameters were evaluated: plaque index (percentage of sites with plauqe on the total sites), probing depth (value of probing depth around implants, average) and oedema (presence/absence of oedema around mucosa).
A different operator evaluated the results and carried out statistical analysis. T test for paired data was applied ($p<0.05$).
RESULTS: None patient dropped out and no side effects were collected. Both groups had a proper plaque removal for all the period of the study. Oedema was not present at T1 and T2 in both groups, but was detected after 180 days in group 2. All the results at any time of observation were statistically significant compared to baseline. No statistically significant differences were found between both groups at baseline.
CONCLUSIONS: Many treatments have been proposed to treat perimplantitis, but their effectiveness is still not well proved. It is crucial to prevent this situation, first of all removing the cause. Plaque accumulation has to be avoided with a proper home maintenance protocol. Oscillating rotating powered toothbrushes are effective in removing plaque and they can be considered safe also on just loaded implants. Furthermore, the design of Cross Action head enhances bristles to a better approximal areas penetration. If the vertical bristles are effective in removing plaque, the Share Force effect of the Cross Action head seems also to to stimulate peri implant mucosa and prevent oedema.

Motivational effectiveness of a new professional tongue cleaning tool: a randomized blind clinical trial

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BACKGROUND: The tongue dorsum is an ideal environment for oral biofilm growth. It is able to harbor microrganism of different species, such as Candida species, oral streptococci and red complex periodontopathic bacteria. Nevertheless tongue cleaning is rarely reccommended by dental hygienists and dentists, or only indicated to those patients suffering from halitosis. But tongue cleaning need goes beyond oral malodor, representing an adjunct value to gain a lasting oral health condition. The most commonly recommended tooth cleaning procedures do not involve tongue cleaning. The aim of this study is to evaluate the motivational effectiveness of a new professional tongue cleaning tool (TS1, Ideco) in stimulating adherence to the tongue cleaning at home.
METHODS: Eighty healthy adults were enrolled for this randomized blind clinical trial. A randomization software was used to divide the patients in two groups composed of forty patients each. Home maintenance protocol was given according to the Tailoring approach. Patients of control group received exaustive information about the tongue cleaning, while patients of test group received an adjunctive motivational session with a new professional tongue cleaning tool, TS1. Test group patients were asked to follow with a mirror the professional

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tongue cleaning session; the operator was providing exaustive explanations of the procedure. TS1 has two different sides: one with soft bristles to spread a cleaning gel massaging the tongue, and the other one with delicate slats to remove biofilm. TS1 is used connected to a vacuum.
Tongue coating was assessed at baseline and after thirty days (T1) by a blind operator using the Winkel Tongue Coating Index (WTCI): the dorsum of the tongue was divided into six areas (three posterior, three anterior) and tongue coating was assessed in each sextant as follows; 0 = no coating, 1 = light coating, 2 = severe coating. The WTCI was obtained by adding all six scores, for a possible range of 0–12. Statistical analysis was performed, t Test for paired data was used ($p< 0.05$).
RESULTS: None patients dropped out the study. Test group showed a major adherence to the protocol; At baseline WTCI score was 5,4 for test group and 5,2 for the control one. No statistically singnificant differences were found between groups. A T1 the score of WTCI was 1,7 for test group and 3,1 for control group. This result was statistically singnificant.
CONCLUSIONS: Poor attention has been paid by dental professionals in motivating patients in tongue cleaning at home, but this is an adjunct value to gain a lasting oral health condition. Our results clearly indicate that it is crucial to follow an efficient motivational session to reach the concordance required for this important cleaning procedure.

Application baby food

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BACKGROUND: In November 2009, the World Health Organization published a set of guidelines on children foods marketing; Recommendations aim to reduce the content of saturated fat, fatty acids, sugars and salt. In this regard, the American Dental Association states that nutrition is an integral part of oral health. From a literature analysis, only few studies focus on the qualitative analysis of "baby food" in correlation to their potential impact on oral health.
Aim of the study is to facilitate oral health-oriented choice of infants foods marketed in Italy. To this aim, we created a new application for smartphones and tablets that allow interested parties to compare the nutrients, energy value, the price, etc. The study paid attention to their quality, quantity and the presence of added sugars in foods for early childhood consumption.
METHODS: 415 baby food products of the five most advertised brands have been reviewed. We then compared, grouping them by type, the nutritional content tables. Statistical analysis of 339 foods was performed with dedicated software SPSS 20 (IBM, Armonk, NY, USA), the exploratory bivariate analysis was performed with ANOVA with respect to continuous variables and the chi-square test for categorical variables, with no post-hoc comparisons. Multivariate analysis were performed according to a general linear model. The results were reported as the mean of the nutrient content considered by the manufacturer (with a confidence interval of 95%) and its p-value.
An application APP Baby Food was developed as SaaS (software as service) on Debian servers Linux, MySQL Database High Availability, in order to recognize all marketed products in Italy providing immediate quali-quantitative comparison of nutrients content,.
RESULTS: 49.9% of the considered baby food are perceived as sweet foods and 42.2%have added sugar among the main ingredients. More than 44% do not present any note on the presence of gluten.
All the surveyed baby foods, divided by type, show strong inhomogeneity with significant statistically differences ($p <0.001$) in terms of quantity and quality of nutritional values: in carbohydrates, protein, total and saturated fat, in the amount of sodium and in alimentary fibers. Furthermore it was found statistically significant differences in carbohydrate content for the meat homogenized (p: 0.003) and paste ($p <0.001$).
It is observed significant statistically differences comparing products based on the really content of sugar ($p <0.001$).
DISCUSSION AND CONCLUSIONS: The study has the peculiarity of relying on a large database of 415 products with 149 different types of baby food and provides a dedicated application that completely collects them in a DataBase.
It is clear that among the foods for infants exist significant statistically difference at the level of nutritional values. The use of the App is a powerful means of disclosure and public information, since parents often completely ignore the composition of these products and the possible impact on their children oral health. Furthermore it can promote the awareness among companies to implement oral health-oriented choices in their manufacturing lines.

The use of probiotics as microbial adjuvant therapy in patients with periodontal disease: experimental case-control study

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BACKGROUND: The daily intake of probiotics can be a great help in times of greatest stress and fatigue, poor diet or illness, intake of allopathic drugs, smoking, pregnancy, osteoporosis and, in our field, combined with appropriate education and motivation to the oral hygiene, even in patients who suffer from dry mouth, orthodontic patients, people with dentures or implants, with gingivitis and periodontitis, bad breath and to prevent tooth decay in children. The probiotic may, in fact, be able to colonize even the oral cavity as well as the intestine, adhering to the mouth tissues, producing antibacterial agents that help fight bacterial pathogens, and stimulating our immune system.
METHODS: Our clinical research was conducted in a population of 80 patients (40 males and 40 females), aged between 18 and 80 years. 40 patients were subjected to microbial treatment with the use of Reuterin OS® tablets (Noos S.r.l.), a dietary supplement containing the patented combination of two strains of lactic acid bacteria: Lactobacillus reuteri DSM 17938 and Lactobacillus reuteri ATCC PTA 5289. After detected the PSR and have established the presence of periodontitis, Reuterin OS® tablets was taken by patients at the dose to 2 tablets a day, slowly dissolved in the mouth without chewing, for three months preferably after a scrupulous oral hygiene. The remaining 40 patients, who did not take the probiotic, were evaluated as the control group.
All subjects included in the study have only periodontitis and met the inclusion and exclusion criteria described below.
Inclusion criteria:

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— patients aged 18 to 80 years;
— patients with periodontitis;
— patients willing to participate to all scheduled visits to complete the study;
— patients willing to take probiotic tablets for the entire study period.
Exclusion criteria:
— minor patients or over the age of 80 years;
— patients with negative PSR.
Each patient underwent 4 visits (T0 baseline; T1 15 days; T2 30 days; T3 90 days), during which we performed: PSR; PI; GI and GBI; Education and motivation. Only at T0 and T3 patients were subjected to professional oral hygiene.
RESULTS: In patients treated with the probiotic the plaque index (PI) significantly decreased between T0 and T1 (PI_{T0} = 2.31±0.71 *vs.* PI_{T1}=1.78±0.64, p<0.001), between T1 and T2 (PI_{T1} = 1.78; DS = ±0.64 *vs.* PI_{T2}=0.98±0.66, p<0.001), and between T2 and T3 (PI_{T2}=0.98±0.66 *vs.* PI_{T3}=0.44±0.51, p<0.001). Also for the bleeding index (BoP) there was a time-dependent decrease (BoP_{T0} = 2.09±0.59 *vs.* BoP_{T1} = 1.93±0.58, p=0.018; BoP_{T1} = 1.93±0.58 *vs.* BoP_{T2} =1.18±0.65, p<0.001; BoP_{T2} =1.18±0.65 *vs.* BoP_{T3} =0.38±0.55, p<0.001). Even in the control group there was a trend similar to that obtained for the group treated with the probiotic, but with a less statistically significant reduction at T2 and T3 (p<0.001).
CONCLUSIONS: The limited sample size and narrow time frame indicate that the results obtained from this study can only be interpreted as a suggestion rather than assessed as firm conclusions on the preventive role of probiotics for periodontal disease. In the examined patients, however, the intake of Reuterin OS® tablets proved to be a valuable aid to conventional treatments for periodontal disease, contributing on one side to a favorable management of the oral microflora and on the other side to the resolution of the inflammatory phase of the marginal soft tissue. Based on the findings and given the promising results obtained, we hope we will be able to more thoroughly evaluate in the future the role of probiotics as protective factors for oral health, based on a statistic population higher and possibly more heterogeneous.

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Screw-retained *vs.* cemented implant reconstruction: a systematic review

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BACKGROUND: The implant-prosthetic therapy, originally created to rehabilitate the patient totally edentulous, involved the use of a screw-retained prosthesis. Subsequently, this treatment option has been extended also to the partially edentulous patients and therefore the scientific research on the one hand and the aesthetics required by the other, have initiated the development of a new fixing system of the prosthesis that provides for the cementation of the same. Even if there are several retrospective and prospective studies that evaluated the placement of screwed or cemented reconstructions, there is a lack of systematic evaluations of their results. This makes difficult the decision between the two types of rehabilitation and, even today, it is rather a matter of personal preference than scientific evidence. To be applicable as alternatives in any clinical situation, however, both types of prostheses must show similar survival rates and complications.

The objectives of this review, therefore, were the following: 1) To obtain robust estimates of the 5-year survival rates of cemented and screw-retained single-unit and multiple-unit reconstructions and their supporting implants 2) To obtain robust estimates of the biological and technical complication rates of the cemented and screw-retained single-unit and multiple-unit reconstructions.

METHODS: An electronic Medline search complemented by manual searching was conducted to identify randomized controlled clinical trials (RCTs), and prospective and retrospective studies from 1990 up to 2013 giving information on cemented and screw-retained single-unit and multiple-unit implant reconstructions with a mean follow-up time of at least 1 year.

RESULTS: Fifty-nine clinical studies were selected from an initial yield of 4511 titles and the data were extracted. For cemented single crowns the estimated 5-year reconstruction survival was 96.5%, for screw-retained single crowns it was 89.3%. The 5-year survival for cemented partial fixed dental prostheses (FDPs) was 96.9%, similar to the one for screw-retained partial FDPs with 98. For cemented full-arch FDPs the 5-year survival was 100%, which was somewhat higher than that for screw-retained FDPs with 95.8%. The estimated 5-year cumulative incidence of technical complications at cemented single crowns was 11.9% and 24.4% at screw-retained crowns. At the partial and full-arch FDPs, in contrast, a trend to less complication at the screw-retained was found than at the cemented ones (partial FDPs cemented 24.5%, screw-retained 22.1%; full-arch FDPs cemented 62.9%, screw-retained 54.1%). Biological complications like marginal bone loss >2 mm occurred more frequently at cemented crowns (5-year incidence: 2.8%) than at screw-retained ones (5-year incidence: 0%).

CONCLUSIONS: This study suggests that both types of reconstructions influenced the clinical outcomes in different ways, none of the fixation methods were clearly advantageous over the other. Cemented reconstructions exhibited more serious biological complications (implant loss, bone loss >2 mm), screw-retained reconstructions exhibited more technical problems. Screw-retained reconstructions are more easily retrievable than cemented reconstructions and, therefore, technical and eventually biological complications can be treated more easily. For this reason and for their apparently higher biological compatibility, these reconstructions seem to be preferable.

Surface 3D evaluation after exposure to acidulated phospate fluoride on dental ceramic

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BACKGROUND: The aim of this study is to evaluate the degradation of ceramic surfaces of prostohdontic crowns following their exposure to Acidulated Phosphate Fluoride (APF).

METHODS: We built 60 ceramic discs with 8 mm of diameter and 3 mm height; 30 discs made in feldspathic ceramic (Ceramco 3, Finesse) and another 30 made in lithium disilicate (Empress 2, Ivoclar), we followed manufacturers instructions. All the sample were standardized by a tungsten cabide cutter, then they were polished by an ultrasound pool for ten minutes, so we dried them and last we glazed them as manufacturers instructions.

Each group was cutted in three subroups: subgroups A was not process, subroups B was process by a single APF application for 60 seconds, subgroups C was process by a single APF application for 120 seconds.

After this they all the discs were washed with water at the temperature of 20 °C, so the samples were submerge by a buffer solution made by water and sodium bicarbonate (18 g/20 cl at 20 °C) since the soultion were bring back to pH 7.

Aftermath the samples were analyzed by a profilometer (Tencor:10) and we made a 3D scan valutation of the discs. With the scan results with obtain an Anova's statistic analysis.

RESULTS: it is highlighted that the surfaces of feldspathic ceramics result more wrinkled than lithium disilicate. After 60 seconds of the processing there is a 274% increase of wrinkled in the feldspathic ceramics as opposed to a 41% in litihum

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disilicate ones with a medium surfaces wrinkled variation (Sa) from 14168 µm to 38948 µm for the first ones and from 6557 µm to 10440 µm for the seconds. After 120 seconds there is a increase of wrinkled respetively of 132% and 9% with a Sa variation from 38948 µm to 56046 µm and from 10440 µm to 11156 µm in the litihum disilicate ones. Aftermath it transposes that there is a self-restraint of ceramics degradation as function of time.
CONCLUSIONS: From the results we can deduced that the feldspathic ceramics are more affected from the APF effect compared to litihum disilicate. So the use of APF ointments among ceramics surfaces, particulary with the feldspathic ones just for small time frame can increase the wrinkled of cosmetic surfaces of crowns that it could lead to a loss of optical property and aesthetic ones.
APF is often blend in glaze oinments that are used in the last stages of professionale hygiene treatment and it also is blend in prophylactically fluoride gel, it could be necessary to pay attention in those patients that have placed ceramics crowns especially in aesthetic sectors.

A comparative assesment of tensile strength offered by an adhesive applied between irreversible hydrocolloid and elastomeric impression materials

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BACKGROUND: To establish a repeatable procedure for the comparative assessment of the effectiveness of adhesives when irreversible hydrocolloid materials are paired with elastomers used to take impressions for total dentures; to evaluate the adhesive effectiveness in different commercial products.
METHODS: We assembled an aluminum box, with an opening on top and with the following dimensions: height=4cm–width=6cm–length=6cm. We subsequently set up a second base with a hole in its center, in order to position the handle of one of the two perforated retentive plates matching the 6x6cm box base dimension.
A Diethylenetriamine (DETA) adhesive was tested, both in liquid and spray form.
The additional silicone two components were mixed in equal parts, then they were placed on a retentive plate and pushed in the box. When ready, this half-sample was removed from the cast and finished by handcutting the surplus material at its sides. Then the adhesive was applied on the exposed surface. As per manufacturer's instructions, after three minutes the adhesive had dried, so the sample was positioned in the box, which had been assembled with its perforated base with the exposed surface facing up. The alginate powder and cold demineralized water were mixed according to quantities suggested by the alginate manufacturer, the paste was spread on the second retentive plate, then pushed in the master against the surface of the silicone half-sample treated with the adhesive. When ready, the complete specimen was removed from the cast and the surplus material on its sides was finished by handcutting to be sure that the two materials were in contact only through the surface where the adhesive had been applied.
Using this procedure, four groups of samples were created:
— Group 1: alginate/alginate, no adhesive, 10 specimens, to measures the alginate intrinsic tensile strength.
— Group 2: silicone/alginate, no adhesive, 10 specimens; to confirm the incompatibility of elastomer and hydrocolloid without any chemical adjuvant.
— Group 3A: silicone/alginate, liquid adhesive, 15 specimens;
— Group 3B: silicone/alginate, spray adhesive, 15 specimens.
Each specimen was tested with an Instron 4467 Universal Testing Machine, with a constant tension of 127mm/min till the detachment of the two juxtaposed surfaces of the sample occurred.
After the detachment, the impression material surfaces were observed, in order to evaluate the kind of adhesion failure: adhesive (the adhesive is only on one of two juxtaposed areas) or cohesive (separation inside the adhesive layer; adhesive traces are on both juxtaposed areas).
RESULTS: Group 3A (silicone/alginate, liquid adhesive) showed a tensile strength of 123.86 N (3.44 N/cm^2), which is 39.84% higher (p.value= 0.014) than the 88.7 N (2.46 N/cm^2) we measured in Group 3B (silicone/alginate, spray adhesive). Surface analysis showed differences (p.value= 0.029) in the kind of adhesion failure. The liquid adhesive presented an adhesive kind of detachment while the spray adhesive showed a cohesive one.
CONCLUSIONS: This procedure led to statistical relevant results. The tensile strength offered by liquid Diethylenetriamine (DETA) adhesives when placed between the silicone and the alginate impression materials was the highest among the samples tested.

Prosthetic maintenance in mandibular overdentures retained by single median implant: 5 years follow up preliminary results

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BACKGROUND: Mandibular overdenture retained by two implants is considered the gold standard in the removable rehabilitation of the edentulous mandible. In the last 15 years the overdenture retained by single median implant has been also proposed in the international literature. People with complete denture and high mandibular bone resorption rate are mainly elders and most of them have health problems and financial difficulties. Not all of them can access for this reasons the implant rehabilitation. It seem that the use of a single implant to retain the mandibular denture can be considered a viable, economic option of treatment for frail, maladaptive patients. Many studies have been done with good results for this treatment, but few of them have more than 1 year of follow up. This study had the aim to investigate the 5 years prosthetic results of this treatment.
METHODS: 15 patients were included in the study. They were all rehabilitated with new complete denture from at least 2 years in the same hospital facility. The prosthetic connections have been realized with Locator attachments three

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months after the surgical intervention. Patients have been recalled regularly every six months for recording prosthetic data and verifying the functionality of the attachments and the need of relinings or repairs. Interventions out of the scheduled recalls have been also recorded.
RESULTS: All the patients followed the recall program. Some of them showed up out of the scheduled visits for urgent interventions (fractured denture and loss of attachments). The main interventions were the substitution of the retentive part of the matrix, in one case denture fractured in the area of the attachment, in few cases relinings have been necessary. In one case the all denture has been made from the beginning because of a vertical dimension of occlusion low and uncomfortable.
CONCLUSIONS: 5 years results confirm results present in the literature at 1 and 2 years of follow up. Type and number of interventions did not differ from those reported in the literature for two implants retained overdentures. This kind of rehabilitation can be proposed as an option of treatment for the mandibular denture with lack of retention, especially for those patients who cannot afford economically the costs of two implants and for those having systemic and local conditions contraindicating the insertion of two implants.

Load bearing capacity and failure types of high translucency zirconia crowns

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BACKGROUND: In the last years Prosthodontics has focused on the research of new materials which better respect aesthetics standards, in addition to mechanical ones. This goal can be reached by using a new extremely high resistance ceramic material called zirconia and, in this case, an hight translucency ones. For improving metal free restoration, especially zirconia crows with feldspathic veneer, is possible working on framework's thickness and design: thus, the aim of this study is to evaluate fracture load and failure type of three different zirconia frameworks and crowns for anterior teeth, testing mechanical and optical properties of high translucent zirconia.
METHODS: A metal abutment of central maxilla incisive was scanned and three different framework was constructed (CAD-CAM), 7 samples per group: anatomically zirconia framework (3Y-TZP) group 1, support framework veneered (5Y-TZP) group 2, monolithic zirconia crown (5Y-TZP) group 3. Groups 1-2 were veneered with feldspathic ceramic. Crowns were cemented with glass ionomer cement on their corresponding CoCr abutment analogues and after 10 minutes the cemented crows were subjected to testing procedure. Fracture load was measured using a shear test and the specimens were loaded in a Universal Testing Machine. The load was inducted with a flat jig on the palatal surface of incisal edge at the angle of 45° to the long axis of the teeth. The measurement stopped as soon as fracture load decreased by 10% of the maximum load. Three types of fracture were observed: chipping of the veneering porcelain, delamination of veneering porcelain from zirconia core, total fracture interesting veneer and framework and total fracture of monolithic crown. Failure types were observed by one operator under a stereomicroscope.
RESULTS: Crowns of group 1 have showed Max fracture load of 900N and Min of 337N, in group 2 Max = 867 and Min = 372 and in group 3 Max = 1139 and Min = 442. Among three group, monolithic crowns showed significantly higher mean fracture load (833 N) compared to the crowns of groups 1 (618 N) and 2 (565 N). Between groups 1 and 2 wasn't observed significantly difference (t-test: $p>0,05$). For the failure type, chipping (group 1) started at the occlusal surface contact and propagated throughout the porcelain layer has leaded to exposure infrastructure material. In group 2 critical flaw was originated from occlusal surface contact also interesting total zirconia framework. Total fracture was the only fracture type that was occurred in monolithic crowns (group 3).
CONCLUSIONS: Despite of the limits of this vitro study, can be concluded that 5Y-TZP crowns have a static load resistance significantly higher than 5Y-TZP framework crowns and than 3Y-TZP crowns layered with feldspathic ceramic and despite 5Y-TZP new high translucence, it's less resistant than other types of zirconia analyzed in this study. For this reason thickness higher than 1 mm is needed to use this material: this goal can't be reached in the framework production. So, before use of 5Y-TZP for prosthetic rehabilitation of anterior teeth, it's necessary to evaluate the esthetic property of this Zirconia.

Managing gastroesophageal reflux: review and treatment protocol

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BACKGROUND: Gastroesophageal reflux disease (GERD) is a pervasive condition, with an estimate prevalence of about 35-40% of adult western people, frequently seen in women and associated with eating disorders, like bulimia nervosa and anorexia. The recurring intrinsic acid reflux causes a particular pattern of linguopalatal tooth erosion, that can be associated with attrition from parafunction (appearing as lesions on antagonist surfaces) and/or abrasion from extrinsic cause (usually appearing as lesions located on the vestibular surfaces). Due to the high prevalence of tooth lesions in GERD or eating disorders, dentists could be in a front line for referring suspected cases to specialists. We reviewed the existing literature to obtain a rationally-based treatment protocol for GERD patients starting from the first visit.
METHODS: We performed a PubMed/MEDLINE search using "gastroesophageal reflux AND (dental materials OR restoration OR rehabilitation)" as keyword with the "Dental journals" filter activated. Of the 60 records we found, only 31 were written in English or Italian and had a pertinent title. Of these 31, we could acquire 17 full articles due to the UniMoRe subscription. Two additional articles have been added scanning the references.
RESULTS: Of the 17 articles retrieved, 13 contained at least a case report with a total of 16 patients described. Direct and indirect composite is the main choice for restoring anterior lesions (11/16) followed by full ceramic crowns (4/5) and ceramic laminate veneers (1/5). The posterior sectors received treatment in 11 patients: 6 cases of full crowns (2 lithium disilicate ceramic, 2 metal-ceram, 1 leucite reinforced glass-

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ceramic and 1 zirconia) and 5 of partial restorations (3 direct composite, 1 indirect composite and one 3/4 golden crown); on posterior sectors, crown lengthening was performed to expose larger portions of dental substance in order to give more resistance and retention to restorations. Parafunctions (bruxism) were present in only 2 cases. Only 6 patients received follow up, that was generally short. We found no cases of treatment in active GERD, all patients were under behavioral, environmental or pharmacological treatment or had history for acid reflux.
CONCLUSIONS: Basing on case report studies and existing reviews, we formulated a 3-steps approach for GERD patients: recognize the origin of the lesion, treat the active cause of acid environment and finally decide the restoration approach basing on the occlusal anatomy left and the residual dental substance.
Recognize the type of lesion: abrasion, attrition, erosion or combination
If erosion, identify the source of acid: is it intrinsic or extrinsic or both? If intrinsic, clinician should ask if patients already received diagnosis of GERD or bulimia or anorexia: if he has, consult his gastroenterologist to know if pathology is in an active state, if he hasn't, refer him to a specialist and protect residual dental substance with fluoride varnishes and toothpaste, calcium rich diet and increasing his salivar flow rate with medications like pilocarpine or 5% citric acid per os or with chewing gums
Check oral pH with salivar paper pH strips. If acceptable and if gastroenterologists confirms the cessation of acid reflux, proceed with rehabilitation with appropriate technique.

In vitro analysis of the fracture resistance of CAD-CAM monolithic zirconia molar crowns with different occlusal thickness

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BACKGROUND: The present in vitro study aimed at comparing the fracture resistance and mode of failure of CAD-CAM monolithic zirconia single crowns (SCs) with different occlusal thickness cemented onto human molars. The null hypotheses stated that there was no association between the occlusal thickness and either the fracture resistance [1] and the mode of failure [2] of CAD-CAM monolithic zirconia SCs.
METHODS: Forty CAD-CAM monolithic zirconia crowns were cemented onto human molars with a self-adhesive resin cement. The crowns were randomly divided into 4 groups of 10 specimens each and standardized preparations with different occlusal thickness were performed as follows: 2.0 mm (group 1), 1.5 mm (group 2), 1.0 mm (group 3) and 0.5 mm (group 4). The specimens were loaded until fracture with a universal loading machine and the maximum breaking loads were recorded in Newtons (N). The fracture resistance and mode of failure were recorded and analyzed with Scanning Electron Microscopy. The data were statistically analyzed.
RESULTS: The highest fracture resistance values were reported in group 1 while the lowest were noticed in group 4. The fracture resistance values of all the specimens exceeded the maximum physiological occlusal loads in molar regions. All the crowns showed cohesive microcracks of the zirconia core in the occlusal region, particularly at level of the load application area; only 1 crown in group 4 was interested by a complete fracture. No statistically significant differences between groups were evidenced either for the fracture strength ($p>0.05$) and the failure mode ($p>0.05$).
CONCLUSIONS: The occlusal thickness of CAD-CAM monolithic zirconia crowns did not influence either the fracture resistance and the mode of failure of the restorations; the occlusal thickness of CAD-CAM monolithic zirconia crowns can be reduced up to a lower bound of 0.5 mm keeping a sufficient strength to withstand occlusal loads; CAD-CAM monolithic zirconia crowns showed sufficient fracture resistance to be used in molar regions, even in a thin configuration (0.5 mm). The present study showed that minimally invasive CAD-CAM monolithic zirconia crowns can withstand the physiological range of occlusal loads and can be clinically useful to save dental tissues and/or in case of reduced interocclusal space.

The role of proximal plates in removable partial dentures: preliminary results of a prospective, randomized, double-blind clinical study.

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BACKGROUND: To evaluate patient's psychological and functional satisfaction after the insertion of a provisional RPD with wire clasps with or without proximal plates.
METHODS: After the Approval of the ethics committee of the University of Modena, during the preliminary part of the study 18 patients were recruited both requiring prosthetic rehabilitation with RPD and patients already rehabilitated with provisional RPD with wire clasps, treated at the dental clinic of Modena University. Exclusion criteria were patients unfit to plead; non-self sufficient people; presence of neurological diseases and mouth cancer.
The co-experimenter submitted to the patient a OHIP-49 questionnaire, and collected clinical data, oral physiological conditions, health and social condition and pre-operative subjective assessment of the treatment difficulty.
Then intra- and extra-oral pictures were taken, and the experimenter prepared the guide planes on abutment teeth. Then polyether precision impressions were taken with polyether and a new provisional RPD was required.
At prosthesis delivery, the stage randomization for the trial was made. This first stage could be "experimental" (provisional RPD with proximal plates made chairside with hard self curing acrilic resin) or "control" (provisional RPD without proximal plates). Common tests were made to verify prosthesis adaptation.
Controls were made 1 week, 1 and 3 months after the delivery, or more frequently in case of decubitus ulcers. Occlusal contacts, ulcers number and frequence, clasps and base fit, clasps retention and prosthesis stability were checked and recorded.
At the 3 months control, the second stage started: proximal plates were removed from stage-1 experimental prosthesis and added to controls.
At the end of every stage, the OHIP-49 questionnaire was filled again and photoghraphs were taken.

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The statistical analysis was performed with STATA13 (StataCorp. 2011. Stata: Release 12. Statistical Software. College Station, TX: StataCorp LP).
RESULTS: The psychological condition of the patient improved after the prosthetic rehabilitation, irrespective of the stage of the study.
Total scores of the OHIP-49 questionnaire in the experimental stage are lower than total scores before the RPD insertion and in the control stage. Patients in the experimental stage had a better quality of life, from both a psychological and a functional point of view.
Despite there aren't statistically significant differences regarding problems during the two stages of the experimentation, these have occurred less frequently in the experimental phase, in particular regarding decubitus ulcers, additional controls and necessity of clasps adaptation. On the other side during experimental stage an increased loss of occlusal contacts was recorded.
The most important changes of the OHRQoL took place in the first three month after prosthesis insertion.
CONCLUSIONS: Although RPD requires longer period of adjustment compared to other types of rehabilitation, the partially edentulous patient obtains benefits from RPD's use.
Edentulism rehabilitation improves patient conditions, especially with the use of proximal plates, both from a subjective and clinical perspective.
The addition of proximal plates on the provisional RPD with wire clasps has a positive impact on denture's functionality and on OHRQoL.
For a restricted number of patients the rehabilitation with RPD has a negative effect on OHRQoL, recommending the use of different types of prosthesis.

Introduction of a system for choosing and placing the anterior teeth of complete dentures

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BACKGROUND: The correct choice and placement of artificial teeth play an important role for the success when a patient is rehabilitated with a complete denture; so most of the issue of the esthetics of a complete denture depends on the correct tooth position and the right choice of the artificial anterior teeth.
The aim of this poster is to introduce a new system, Dental Veneers Selection Form, (Dental VSF) (registered in: European Patent Bulletin. EP2759278 Device and methods for manufacturing dental prostheses. 31/2014: 204. Available at https://register.epo.org/espacenet/regviewer?AP=14000336&CY=EP&LG=en&DB=R) for choosing and positioning artificial teeth in the anterior region of complete dentures.
METHODS: The Dental VSF system is a system consisting of 18 maxillary and 6 mandibular anterior molds. The molds differ, exactly like the traditional ones present on the market, in size and shape. The peculiarity of the system is that the six teeth of each mold are represented by veneers, with intact incisal edges, and they are connected to each other on the lingual surface by a fiber that allows to each veneer some degree of movement. During the esthetic and phonetic test it's possible to choose the most suitable mold in size and form, and, after removing the anterior wax rim, from canine to canine, to place the chosen mold, to give the desired overjet and overbite, to change the tilt of a singular tooth for individualizing the denture with some characterization. After the aesthetic and phonetic test, the technician makes a silicon template in order to record all the information sent by the dentist and in order to be able to place the teeth of the dental mold corresponding to that chosen with the Dental VSF system.
RESULTS: The Dental VSF system allows the dentist to not delegate the choice of most suitable mold to the dental technician, but to choose it directly on the face of the patient, trying on the different ones without having to work the heated wax. Moreover, the system allows to involve directly the patient about the shape and size of the teeth, and also about the overbite and any individual characterizations. The use of the Dental VSF system may be extended to implant supported dentures and to CAD-CAM technology: the assembly may be scanned and the scanned image may be used to design a screw-retained denture or a Toronto bridge.
CONCLUSIONS: The Dental VSF can be an useful system to try simply the anterior maxillary and mandibular molds, different in shape and size, and at the same time to change the buccal-palatal inclination of each tooth.

Preliminary study about the efficiency of diode laser compared with retraction cords used for exposing the finishing lines of dental abutments before the optic impression

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BACKGROUND: Different tissue displacement methods have been used to expose the finishing lines before the final impression. Recently, the diode laser was proposed as an innovative instrument to achieve the conditioning of the gingival sulcus. The aim of this study was to evaluate the efficiency of diode laser to expose the finishing lines of dental abutments, comparing the results with the conventional impression technique with retraction cords before the optic dental impression.
METHODS: A group of 21 adult patients, 11 men and 10 women, requiring a tooth supported fixed partial denture, were enrolled at the Department of Surgical, Oncological and Oral Sciences of University of Palermo. The following inclusion criteria were observed: aged 18 to 75 years, no sistemic diseases, no medical devices, no allergy to dental materials used, no pregnancy, good oral hygiene (no bleeding on probe, probing depth < 3 mm, no gingival recessions). All the enrolled patients underwent to an oral hygiene session 15 days before tooth preparation. Tooth abutments for complete crowns with iuxta-gingival chamfer finishing line were prepared; then patients were randomly divided in 2 groups to receive the final impression either with retraction cord technique (RCT) (12 patients, 18 abutments) or with diode laser technique (DLT) (9 patients, 16 abutments). For the RCT a not impregnated single cord (size 0, Ultrapak®, Ultradent, USA) was used. For the DLT a laser Epic 10 by Biolase© was used, the peak power was 1,8W, the impulse duration was 100 microseconds and the pulse interval was 200 microseconds with an average power of 0,9W. The tip used had a diameter of 300 microns. The amount of gingival retraction for exposing the finishing line were calculated measuring the differences in height of clinical crowns at 3 different times:

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before the exposure procedures (T0), after the exposure of the finishing line (T1) and 15 days after the final impression session (T2). The height of the clinical crowns was measured in 3 points of the buccal surface: mesial, midline and distal. Each measurement was performed in a line from the more coronal part (mesial, midline and distal) to the gingival margin using a software (Exocad, Germany) on the acquired image of abutments (Dental Software Image) after the optic impression (CS3500, Carestream, USA). The differences in height of clinical crowns between T1 and T0 and between T2 and T0 were compared and analyzed. Moreover the required time for each technique was recorded.
RESULTS: The mean age of the enrolled patients was 59 yr (±12.1yr) (61.1±0.7 for the RCT and 56.5±3.5 for the DLT), 11 men (5 for RCT and 6 for DLT) and 10 women (7 for RCT and 3 for DLT). The mean of gingival retraction (ΔT1-T0) was 0.68mm (±0.3mm) and 0.61mm (±0.07mm) for RCT and DLT, respectively. The mean of coronal heights differences between T2 and T1 was 0.05mm (±0.3mm) and -0.02mm (±0.4mm) for RCT and DLT, respectively. For the RCT the requiring time was 210 seconds (±98sec.), while for the DLT was 17.1 seconds (±4.2sec.).
CONCLUSIONS: This preliminary results showed that the diode laser technique efficiency is comparable to the conventional retraction cord technique for the exposure of the finishing line of dental abutments. Both of techniques did not cause clinical relevant gingival recession after 15 days. Moreover, the laser technique was faster than the conventional one.

Different designs of prosthetic solutions for implant positioning. Case series

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BACKGROUND: Rehabilitation of edentulous patients with implant-supported fixed dentures provides significant psychosocial achievements due to the reestablishment of dentate state. Nowadays, the various kind of implants, and the high number of hard and soft tissue augmentation techniques allow the placement of implants even in the most challenging sites and help the clinician in achieving an ideal implant placement. The prosthetic restoration of implants is often compromised, delayed or modified from the initial treatment plan due to a number of problems that may be encountered. These complications can be surgical or restorative in nature such as compensate atrophic third-classes or compensate loss of vertical height due to massive bone resorption. The purpose of this Case Series is to present the prosthetic solutions adopted in a series of complex implant cases, in which we tried to avoid complex pre-prosthetic surgery, which could expose the patient to increased risks. The data and cases in this Case Series will be obtained from the records of patients who underwent surgical and restorative implant treatment at the Department of Dentistry and Maxillofacial-Surgery in Verona.
METHODS: Five implanto-prothesic cases rehabilitated were assessed and compared with different techniques and methods to reach the fixed prosthesis: prosthesis on noble-alloy bar, prosthesis on Chromium-Cobalt bar, prosthesis on Carbon bar, fixed prosthesis made by Zirconium Prettau® and amovo-inamovible prostheses. For each case it was analyzed the hardness of the material, his elasticity, his specific-weight, his cost, his workability and his aesthetics.
RESULTS: The clinical success and patient satisfaction was achieved with all the different methods analyzed. The Clinician's main task is to know the range of possible methods to rehabilitate different implanto-prostethic cases, and his assessment about which prefer and choose must consider many parameters such as the aesthetic one, functional one, analysis of the cost and hygiene maintenance.
CONCLUSIONS: After seeing these cases, it can be concluded that the various prosthetic solutions should be considered case by case. Rehabilitation therapy must always take into consideration the anatomical condition of starting, that often forces the surgeon to an implants compromise position, where you do not want to resort to reconstructive or skeletal bases surgery. In general we would like to remember that it's critical to keep in mind the fundamental role that a proper hygiene of the prosthesis have on long-term maintenance of implants and prosthesis themselves.

Prosthetic rehabilitation with partial removable and aesthetic dentures (Valplast®) in a patient with recurrent right TMJ ankylosis: a case report

P. Papi, D. Rosella, R. Giardino, S. Di Carlo, L. Piccoli, P. Cascone, G. Pompa

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BACKGROUND: Among Temporomandibular joint (TMJ) disorders, ankylosis is considered to be one of the most debilitating: is characterized by articular bony or fibrous tissue fusion. A limitation of mandibular function with a severe reduction of interinsical opening, mandibular asymmetry, hypomobility and subsequent retrognathia are all consequences of the dentofacial deformity.
TMJ ankylosis may have different causes: trauma, which is the most common, local infection such as otitis media and mastoiditis, or systemic infections such as tuberculosis, gonorrhoea, and scarlet fever. Ankylosing spondylitis, rheumatoid arthritis, and psoriasis are all systemic diseases implicated in its pathogenesis.
Several techniques have been described for the management of TMJ ankylosis, however none of them has been considered consistently successful: autogenous tissue grafting or total alloplastic temporomandibular joint replacement (TMJ TJR). Furthermore, prosthetic rehabilitation of these patients is a demanding challenge for prosthodontists, due to their severe limitation of mouth opening.
The aim of this paper is to present the case report of a 45 years-old woman (E.B.), suffering from recurrent right TMJ ankylosis resulting from a Car Accident Related Trauma, who was treated by patient-fitted TMJ prostheses and prosthetically rehabilitated by flexible, aesthetic removable partial dentures (Valplast, Wilocs, Rome, Italy).
METHODS: The patient came to our observation with a history of a car accident related trauma in 2010, managed in another hospital: the mandibular fractures were treated by open reduction and rigid internal fixation (RIF) with three

titanium plates (one at the mandibular angle and two at the symphisis).
In 2013 the patient was treated for bilateral ankylosis: an arthroplasty was performed with the removal of the ankylotic block and the interposition of a temporal muscle flap in the new articular space.
After two years the patient was diagnosed with a recurrent right TMJ ankylosis.
CT scans were obtained and processed using a rapid prototyping system in order to produce a 3D stereolithographic model of the maxillomandibular skeleton, teeth, and TMJs.
Based on these models the surgeon selectively repositioned the mandible and performed condylectomy and recontouring of the fossa and ramus.
One Techmedica patient-fitted TMJ TJR device (Ventura, CA, USA) was realized based on the 3D model: the fossa component composed of a commercialy pure (CP) titanium shells, which was covered on both sides with a CP titanium mesh adapted to the patient's glenoid fossa and articular eminence. The fossa's articulating surfaces were composed of a ultrahigh molecular-weight polyethylene (UHMWPE) bondend to the mesh of the titanium base.
The mandibular component was manufactured from wrought titanium alloy (90% titanium, 6% aluminum, and 4% vanadium), with a condylar head composed of cast cobalt-chromium-molybdenum.
The TMJ-TJR prostheses were inserted in the adapted glenoid fossa and an osteotomy of the mandibular ramus was performed.
After two month of healing of the soft tissues, dental impressions were taken and individual impression trays were realized.
In 15 days the upper and lower removable partial prostheses (RPDs) were manufactured: they were both flexible and aesthetic with invisible clasps that surround the natural teeth.
RESULTS: After 12 months of follow-up the patient is satisfied both for the aesthetic and functional outcomes of the prosthetic rehabilitation.
CONCLUSIONS: Patient-fitted TMJ-TJR prostheses represent a good option in treatment of recurrent ankylosis, aesthetic and flexible RPDs are better accepted by patients who experienced severe functional limitation of mouth opening.

Cytokine levels in gingival crevicular fluid before and after de novo plaque accumulation around zyrconia crowns and healthy teeth. A split mouth study.

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BACKGROUND: Combining aesthetics with full crown restoration often means interfering with the precious balance between the tooth and its surrounding periodontal tissues. Recently regarding the aesthetic, in the oral teeth rehabilitation, has been introduced the zirconia material.
The aim of this study was to investigate the inflammatory parameters around zirconia crowns compared to natural teeth.
METHODS: 15 patients were enrolled from the Turin Dental School (average age 43±11), all in good general health and with at least one metal-free core Procera zirconia crown, coated with specific zirconia ceramic for at least six months. A single zirconia crown and a healthy natural tooth in the same quadrant were selected for study in all cases. After enrolment they were given a professional oral hygiene session. One week after the session (baseline, day 0), the patients were asked to refrain from performing any further oral hygiene procedure on the study quadrant, for three weeks. After the 3 week period (day 21), the subjects started their routine oral hygiene again. The Gingival Crevicular Fluid (GCF) volume sampling was taken at day 0 (baseline), day 21 before starting routine oral hygiene and 3 months after baseline (day 90).
Two Periopaper™ absorbing strips were inserted into the gingiva and two into the peri-prosthesis crevice, for 30 seconds, starting from the mesial-buccal site, followed by the distal-buccal surfaces. The crevicular fluid volume was determined by positioning the strips between the upper and lower counterparts of the pre-calibrated Periotron 8000™, measured as "Periotron Units" and then converted, with the aid of the specific software, into microlitres. After 15 minutes of shaking at room temperature, the strips were removed and the elutes centrifuged (5 min, 3000 x g) to remove plaque and/or cellular elements. The samples were stored at -80°C for subsequent assays. The IL-1β levels were determined by a commercial ELISA kit. Total amount of 180 samples were evaluated.
Statistical analysis was carried out by Wilcoxon matched-pairs signed-ranks test.
RESULTS: GCF increases with plaque accumulation and decreases when restarting regular daily hygiene procedures in both zirconia and natural teeth. IL-1β level increases around natural teeth after plaque accumulation, but not around zirconia crowns. After restarting hygiene, it decreases significantly around natural teeth, but not around zirconia crowns. Natural tooth vs. zirconia: at the first sample either GCF volume and IL-1β are higher around zirconia than natural teeth; at the second sample (after plaque accumulation), there are no significant differences; at the third sample (after restarting daily hygiene), GCF volumes are the same, whereas IL-1β remains higher around zirconia than natural teeth.
CONCLUSIONS: After 21 days of plaque accumulation the re-establishment of correct oral hygiene restores clinical health of the mucosal tissues. Refraining from hygiene procedures induces inflammation, as shown by GCF volume increase around zirconia and natural teeth, and by IL-1β increase only around the latter. Zirconia shows no increased level of IL-1β after the absence of oral hygiene. The highest level of IL-1β in zirconia at the initial experimental time might be related to the material, but also to the minimal marginal gap, which always exists between a prepared tooth and its crown. Further studies are needed in this regard. (Study granted by MIUR).

Tantalum: an ancient material for modern technology

A. Quarato

BACKGROUND: The medical device industry's interest in open porous, metallic biomaterials has increased in response to additive manufacturing techniques enabling the production of complex shapes that cannot be produced with conventional techniques. Porous tantalum is a biomaterial that was recently introduced in orthopedics in order to overcome problems related to implant loosening. It is found to have osteoconduc-

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tive, and possibly, osteoinductive properties hence useful in difficult cases with severe bone defects. Tantalum is an important metal for medical devices because of its good biocompatibility. The architecture of the porous structure in combination with the material properties of tantalum result in mechanical properties close to those of human bone and allow for bone ingrowth. The objective of this study is to show the qualities and physical and mechanical properties of tantalum applied in implantology by Trabecular Metal Implants.
METHODS: The Trabecular Metal process demands strict specifications for pore size, and shape to ensure a cancellous bone-like structure is obtained. Utilizing a thermal deposition process, elemental tantalum is deposited onto a substrate, creating a textured surface topography to build Trabecular Metal Material, one atom at a time. This proprietary process utilizes the physical and biological properties of tantalum to create a unique material that has a structure similar to cancellous bone. This study is based on a retrospective review performed on 76 patients treated in Implanto-Proshthesis Unit of Head and Neck department in University of Rome "La Sapienza" in 2015.
RESULTS: The results show that the Young's modulus of porous Ta can be tailored between 1.5 to 20 GPa by changing the pore volume fraction between 27 and 55%. In vitro biocompatibility in terms of MTT assay and immunochemistry study showed excellent cellular adherence, growth and differentitation with abundant extracellular matrix formation on porous Ta structures compared to porous Ti control. These results indicate that porous Ta structures can promote enhanced/early biological fixation. Trabecular metal due to its composition tantalum and its innovative geometry allows early osseointegration and greater effectiveness compared to traditional screw titanium implants, introducing the concept of bone incorporation.
CONCLUSIONS: The research for new implant systems aims to achieve increasingly satisfactory results in the implant. The Trabecular Metal technology aims to evolve from a situation osseointegration of the implant-bone contact of classical titanium implants, to that of a real bone incorporation, by exploiting the physical characteristics and biocompatibility of tantalum, over an innovative three-dimensional geometry that mimics the cancellous bone.

A novel procedure of tooth preparation in fixed prosthodontics for dental students and novice dentists

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BACKGROUND: The aim of this research is to assess a new procedure of tooth preparation in fixed prosthodontics suitable for dental students and novice dentists.
METHODS: Twenty-four dental students of the 6th years course of "Sapienza" University of Rome were enrolled in this study to verify the new technique: to be included in the study they replayed to an email sent to the sixth-year class. Each participant prepared two mandibular second premolars (#4.5) on a typodont for a full dental crown with a 90° shoulder finishing line. One tooth was prepared utilizing standard techniques learned at University; the other tooth was prepared with the novel procedure. Three Professors of Prosthodontics assessed the outcome on the basis of 10 criteria (Total occlusal convergence, Occlusocervical dimension, Ratio of occlusocervical/incisocervical dimension, Circumferential morphology, Finish line location, Finish line form and depth, Axial and occlusal reduction dephts, Line angle form, Surface texture, Lesion of the proximal teeth). Each criterion was associated with a specific letter grade and point value (A=5, B=4, C=3, D=2, F=0) and they were summed together to produce the full amount.
RESULTS: It was found a statistically significant discrepancy among the two techniques in 8 out of 10 criteria: only "surface texture" and "line angle form" had p value > 0.05. The new procedure had better results ($p<0.05$) in 7 criteria, while the conventional technique showed higher values in just 1 criterion ("lesion of the proximal teeth"). In addition, the total score was higher for the new technique compared to the conventional procedure ($p<0.05$).
CONCLUSIONS: Corresponding to our outcome, the novel preparation procedure is more predictable than the standard technique for no experienced doctors. The explanation is that the end result is less dependent by manual skills and experience. The research has shown a better management of depth and direction of tooth preparation as well as a more appropriate delimitation of the finishing line. The stump completed with the novel technique has shown statistically significant more predictable results. However, the inability to modify the depth of preparation as well as the only possibility to finish with a 90° shoulder could be a restriction. The dentist should use this technique only in precise clinical situations. The new procedure may be a helpful choice in tooth preparation especially for novice dentists: they could utilize it as a training procedure in their learning curve. Moreover it could be available to use the new procedure in combination with other techniques. Due to the limited dimensions of the sample (N dental students = 24, N teeth = 48), which could be influenced by selection and information biases, these data should be interpreted prudently. However the new technique is a good choice in the panorama of fixed prosthodontic preparation procedures.

Healing of oro-antral communication after maxillary bone resection with removable obturator prosthesis in patients affected by medication-related osteonecrosis of the jaw.

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Complex Operating Unit of Odontostomatology, "Aldo Moro" University, Policlinic of Bari

BACKGROUND: Medication-related osteonecrosis of the jaw (MRONJ) is a commonly reported side effect of antiresorptive drugs prescribed for the treatment of bone metastases of solid tumours or osteoporosis. Its management is almost always surgical, especially for the cases classified as Stage III following the American Association of Oral and Maxillofacial Surgeons staging System. When Stage III MRONJ are located on the upper jaw, maxillary sinus involvement is always present and a postsurgical oro-antral communication (OAC) is a frequent compliction.
Aim of this study was to describe the accelerated post-surgical healing of OAC after maxillary necrotic bone resection using a removable obturator prosthesis.
METHODS: Eighteen patients (13 females, 5 males) were

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referred to the Odontostomatology Unit of the University of Bari showing Stage III MRONJ of the upper jaw. After clinical examination, radiological analysis (Rx OPT and Spiral Multislice CT) and cycles of antibiotic therapy, patients underwent surgical resection of maxillary necrotic bone. In all the cases, OAC were evaluated during patients follow-up and a temporary obturator with a bulb extending into the defect area was constructed from a postsurgical impression cast. The patient is usually seen every two weeks because of the rapid soft tissue changes that occur within the defect during the organization and healing of the wound and the continuous shrinking of the OAC that requires the obturator adaptation until the complete healing.
RESULTS: After a 12 months follow-up, all patients healed without clinical or radiological signs of MRONJ recurrence. OAC completely healed in 14 patients; in 4 patients these persisted but with very reduced dimension, and a definitive obturator was realized.
CONCLUSION: Removable obturator prostheses are essentials to promote healing of OAC after maxillary resection in patients affected by MRONJ of the upper jaw. Obturators, avoiding food passage, allow to reduce the risk of postsurgical infection thus accelerating wound healing and reducing the risk of MRONJ recurrence. Moreover, they ensure the restoration of acceptable esthetics and maintenance of oral function at a reasonable level during the initial postoperative period.

Prosthetic riabilitation with B.O.P.T. and aesthetic materials

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UOSD Diagnosis, Prevention and Oral Hygiene with Day Hospital Medical-Surgical General and Special for vulnerable patients, Polyclinic of Rome Tor Vergata, Rome, Italy

BACKGROUND: Aim of our case-report is to show the possibility of soft tissue management in aesthetic sectors by a prosthetic rehabilitation using the latest generation material,lithium disilicate, a vertical preparation, and the B.O.P.T. Protocol TECHNIQUE created by Dr. Loi.The B.O.P.T. technique consists of the vertical preparation of the natural post to allow the adaptation of the mucosa to the prosthetic profiles determined by the crowns. The prosthetic protocol is known as the B.O.P.T. or Biologically Oriented Preparation Technique, indicating that tissues themselves naturally adapt to the preparation and the restoration. This technique, documented by Dr. Loi's long clinical experience, has shown that it guarantees tissues' medium- and long-term stability. The dislicate (LS2), instead, is recommended for the fabrication of single monolithic restorations. It is used for prosthetic rehabilitation in aesthetic areas, since, thanks to its color and its translucency, it allows to obtain a high resistance and an optimal aesthetic result.
METHODS: The patient, female, 53, smoker, diabetic, came to our attention in October 2015. She complains of imperfections in the area 2.2 due to incongruous prosthetic restoration and soft tissue recession in that area (Phase 1). We decided to proceed with the removal of the restoration and subsequent reprocessing of the previously prosthetic natural stump with shoulder preparation, using the B.O.P.T. technique.
Then we applied the provisional resin element (with relining and refining). We temporarily cemented and waited for the recovery of tissues (phase 2). Three weeks after the first treatment the provisional element is removed and the abutment is finished following the adaptation and the recovery of the surrounding soft tissue (stage 3). The subsequent week the patient is subjected to dental hygiene. Three days later, after verifying the absence of tissue inflammation, we proceeded with the precision dental impression. The retraction of the gingiva is entrusted to a single type of retraction fiber, which is fiber 000, and the fingerprint is recorded with direct single-phase technique with putty and light silicone (polyethers) (step 4). After developing the model in the laboratory the prosthetic product is created. Two weeks later we received the patient in our department in order to verify the aesthetic and functional aspects. We proceeded with the crown final cementation with lithium disilicate and RelyX Unicem2 Automix cement.
RESULTS: The aesthetic and functional success and the perfect tissue integration is evident to the doctor as well as to the patient. Since we live in a society in which the aesthetic aspect is an integral part of social life, it is important that she has begun smiling freely and without any embarrassment. From a clinical point of view it is worth noticing the thickening and the adaptation of the marginal gingiva on the new final crown that allows a greater long-term predictability of the aesthetic result.
CONCLUSIONS: Since our study is a case-report, even though we apply the protocol in the everyday-life of our department, we could not talk about a scientific evidence but indeed about clinical evidence. Possible future investigations supported by a careful follow-up on this procedure can confirm or deny the actual thickening of the marginal gingival obtained by B.O.P.T. TECHNIQUE.

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