

## PERSONAL EXPERIENCE ON INVERTED PAPILLOMA SURGICAL TREATMENT

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### SUMMARY

Inverted papilloma (IP), also known as papilloma Schneideriano or Ewing's papilloma, is the most common benign epithelial tumor of the paranasal sinuses. It originates from the stroma sub-mucosa of the nasal cavity and paranasal sinuses, and as the name suggests, the papillomatous proliferation of squamous epithelium, instead of producing an exophytic growth, extends into the mucosa and as such is reversed. In this retrospective study we report our experience in the surgical treatment of inverted sinonasal papilloma. The aim of the study was to compare results obtained by endoscopic surgery vs results obtained through open surgery.

### Introduction

Inverted Papilloma (IP) of the nasal cavity and paranasal sinuses is a benign epithelial tumor of unknown etiology in which the epithelium invaginates towards the stroma [1, 2]. IP was first described by Ward in 1854 and represents 0.5-4% of all sinonasal tumors [3], it arises from the mucosa of the lateral wall of the nasal cavity, almost always unilaterally. It affects three times more men than women and the peak incidence occurs between the 5th and 6th decade of life [4]. IP is characterized by a destructive pattern of local growth, tendency to recur and, occasionally, associated malignancy [5]. It is clinically significant because it is locally aggressive and its recurrence rates range from 5% to 30% [3,6-9]. Moreover, this tumor appears to undergo malignant transformation into squamous cell carcinoma in 5% to 15% cases [9].

### Materials and Methods

Data were obtained from the database of the Department of Otorhinolaryngology of AOUP "Paolo Giaccone" in Palermo from 2002 to 2012 and were used for a retrospective clinical study. The medical records of patients with a diagnosis of IP of nasal cavity or paranasal sinuses were collected for inclusion in the study.

The patients were evaluated in terms of age, gender, site of presentation of the tumor, symptoms, radiologic studies, surgical treatment and evolution, clinical staging, complications of surgery, treatment of complications, recurrences, malignancy, and follow-up time.

Investigation also included a full clinical and professional history, a complete general otorhinolaryngological physical examination, and 4 mm flexible fiber nasofibrolaryngo-

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**Received:** April 28th, 2013 — **Revised:** May 13th, 2013 — **Accepted:** June 11th, 2013

scopy to characterize the tumor. Clinical staging was based on Krouse’s staging system shown in Chart 1, which is widely used in studies of this disease, and was obtained through the use of imaging CT and/or RM [5,10]. To categorize treatment, surgery was classified as endonasal endoscopic resection, external approach or combined approaches. The review took into account the medical records of 36 patients with a diagnosis of inverted papilloma confirmed by pathology. No patient was excluded because of insufficient data. Recurrences were described as the reappearance of tumors after being considered absent (by endoscopy and/or tomography) in the nasal fossae and paranasal sinuses. All patients were followed up in our clinic with regular endoscopic examinations for a period of 5 years: every three months for the first year, and then every four/six months for at least five years following treatment. After this we recommended an

endoscopic examination once every year, because as we know, this illness is associated with an elevated percentage of recurrence, [11].

**Results**

We examined 36 cases of IP. 80% (n=29) were male and the mean age at diagnosis was 58 years (± SD 6.7), ranging from 34 to 83 years.

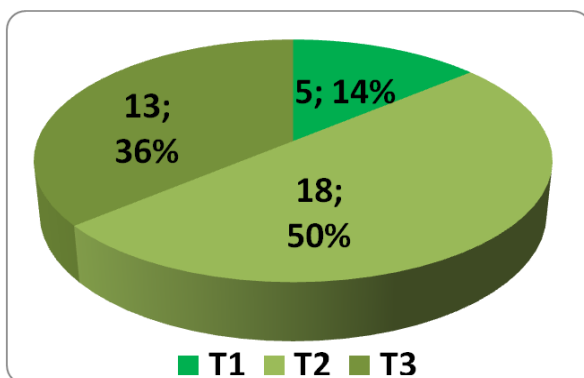
33 were cases diagnosed in our hospital and 3 were patients with recurrences who were treated at other centres (all with malignant inverted papillomas).

We divided our sample in the following way according to the Krouse classification: 14% of patients as T1, 50% of patients as T2, 36% of patients as T3 (Figure 1).

No patients had bilateral tumors, in 21 patients the tumor was on the left side (58.3%), and on the right in 15 patients (41.6%). The tumor affected the lateral wall in 25 patients (69.4%), the maxillary sinus in 20 patients (55%), the ethmoid labyrinth

Staging System for Inverted Papilloma	
T1	Tumor totally confined to the nasal cavity, without extension into the sinuses. The tumor can be localized to one wall or region of the nasal cavity, or can be bulky and extensive within the nasal cavity, but must not extend into the sinuses or into any extranasal compartment. There must be no concurrent malignancy
T2	Tumor involving the ostiomeatal complex, and ethmoid sinuses, and/or the medial portion of the maxillary sinus, with or without involvement of the nasal cavity. There must be no concurrent malignancy
T3	Tumor involving the lateral, inferior, superior, anterior, or posterior walls of the maxillary sinus, the sphenoid sinus, and/or the frontal sinus, with or without involvement of the medial portion of the maxillary sinus, the ethmoid sinuses, or the nasal cavity. There must be no concurrent malignancy
T4	All tumors with any extranasal/extrasinus extension to involve adjacent, contiguous structures such as the orbit, the intracranial compartment, or the pterygomaxillary space. All tumors associated with malignancy

**Table 1:** The Krouse staging system (reproduced from: Krouse et al., Laryngoscope.2000)



**Figure 1:** Preoperative Staging of IP in our patients according to Krouse Staging System: no one was in T4 stage at the diagnosis time.

in 18 patients (50%), the sphenoid sinus in 12 patients (33%), and the frontal sinus in 8 patients (22%).

25 patients (69,4%) had an incision biopsy describing the inverted papilloma prior to surgery. The remaining patients were operated for nasal polyps, with the diagnosis of inverted papilloma being an incidental finding among inflammatory polyps. All incision biopsy results were confirmed after removal of the surgical specimen [3]. We divided our patients into two groups: NR (n=27) patients free of recurrences, and R (n=9) patients with recurrence of pathology. Of 9 cases in the R group, three patients had already under-gone endonasal treatments at other clinics and had been referred to our hospital to evaluate the surgical treatment of tumor relapses, 6 patients were found during our follow up.

**NR GROUP**

As shown in figure 2, endonasal endoscopic resection was performed in 24 patients (89%); an external approach only was done in one patient (3,7%), and a combined approach for tumor removal was performed in the other two patients (7,4%).

There was no relation between tumor staging and the type of surgery, as described in recent literature [5].

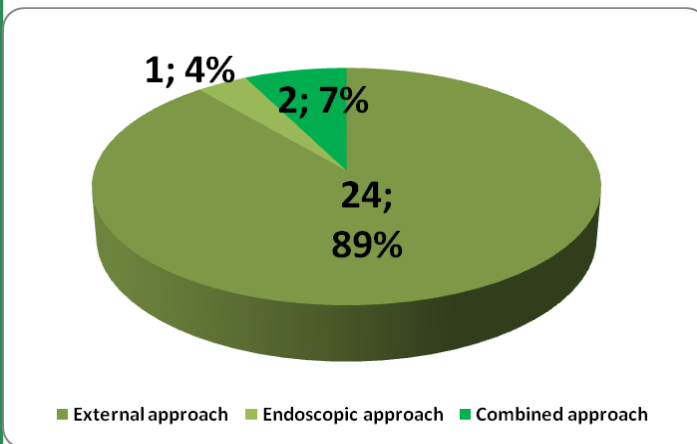
**GROUP R**

The first procedure performed was endonasal endoscopic resection in 4 patients (44%); an external approach was used in four other patients (44%), and a combined approach for tumor removal was used in only one patient (11%). The mean follow-up time was 42 months (ranging from 12 to 84). The treatment of a recurrent tumor consisted of endonasal endoscopy in 7 patients (77.7%), two others were successfully treated to remove the entire tumor, through a combined approach.

As shown in Table 2, ten patients were smokers and 13 were ex smokers, so in our cohort most patients had been exposed to cigarette smoke. 12 were allergic to inhalant allergens and the same group had a history of nasal polyps.

The occupations of the cohort varied widely, and included laborers, traders, pensioners, housewives and a truck driver.

To conclude, we compared mean time of hospitalization in days to evaluate how



**Figure 2:** Different Surgical Treatments employed for IP resection (External Approach vs Endoscopic Approach vs Combined one).

Anamnestic data	N° of Patients (%)
Smokers	10 (27.7)
Former Smokers	13 (36.1)
Allergies	12 (33.3)
Nasal Polyps	12 (33.3)
Job	truck driver 1 (2.7); farmers 6 (16.6); laborers 2 (5.5); workers 6 (16.6); janitors 2 (5.5); traders 4 (11.1); pensioners 8 (22.2); caregiver 1 (2.7); housewives 4 (11.1); unemployed 2 (5.5)

**Table 2:** History and anamnesis of study sample: percentage of smokers or former smokers is very high, as allergies and diagnosis of nasal polyps. Any correlation is noted

these two different approaches (endoscopic Vs open) impacted upon hospital costs. Our results showed that hospitalization length for open surgery was five days longer than post endoscopic treatment hospitalization length (Figure 3).

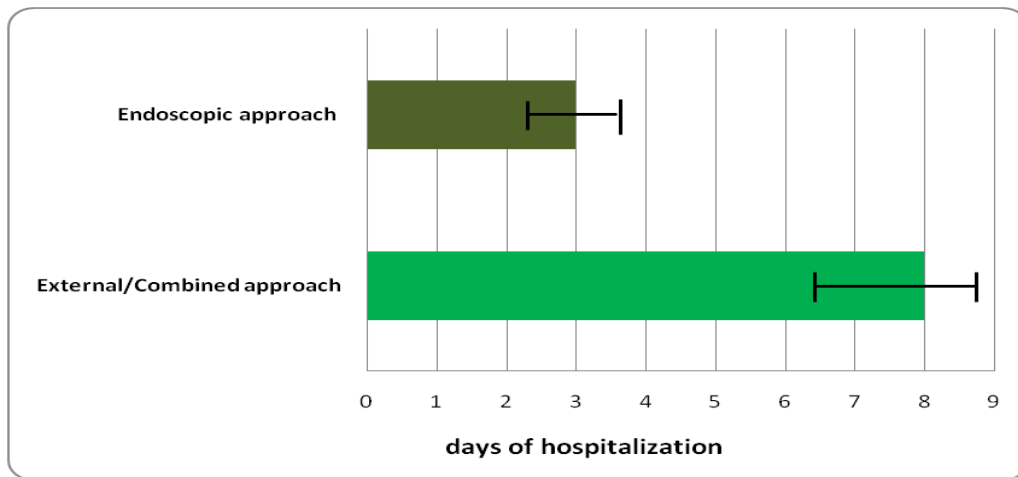
Finally, figure 4 shows the most frequent complaints related to nasal mass [12]. The most frequent symptoms were unilateral nasal block followed by rhinorrhea, headache, epistaxis and anosmia. Anterior transparent serous rhinorrhea, occasional monolateral epistaxis, frontal headache, anosmia and rarely otalgia omolateral were reported. None of the patients reported problems relating to snoring or sense of smell.

None of the medications that patients had tried had resulted in long term improvements in symptoms. The physical examination began with an inspection of the exterior of the nose: no deformities were found.

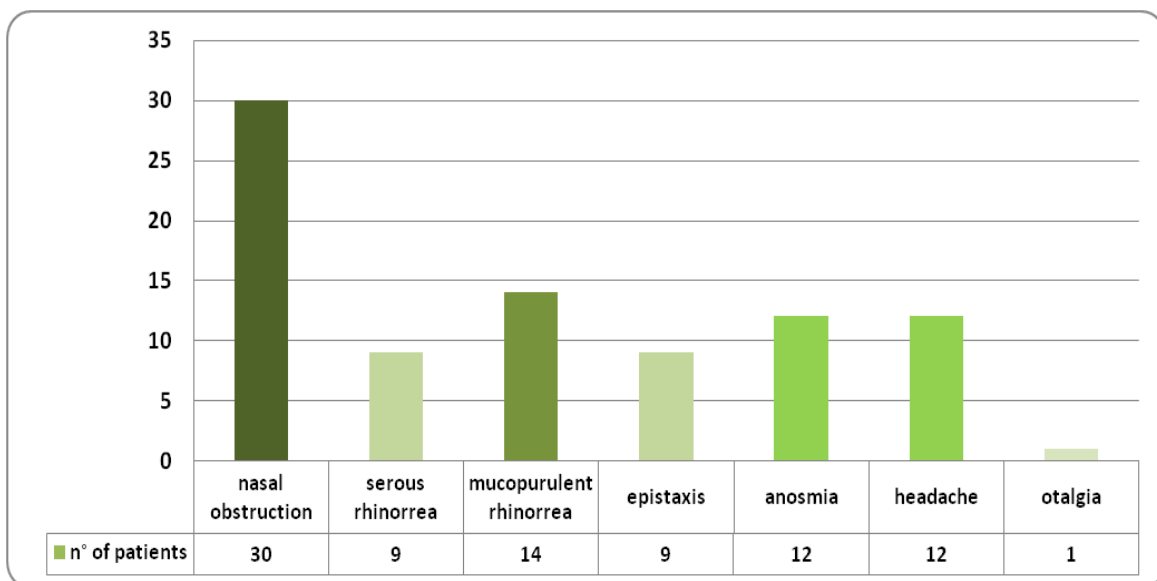
The nasal cavities were investigated through antherior rhinoscopy and endoscopy by flexible instruments. Typically, we found a unilateral mass in the nostril originating from the middle meatus, its colour was from grey to pink, it had an uneven surface, a fleshy consistency, and sometimes bled on palpation, but was never painful.

When such a lesion is associated with secondary inflammatory polyps, or develops within the context of a preexisting nasal polyposis, the characteristics listed above

**Discussion**



**Figure 3:** Comparison of hospitalization’s period (in days) after surgical removing of IP (External/Combined approach vs Endoscopic resection).



**Figure 4:** Clinical Symptoms related to nasal mass.

may be less obvious, and therefore the IP is macroscopically more difficult to distinguish.

As with the diagnosis of all growths, unilateral nasal endoscopic examinations must be followed by an CT and MRI assessment.

Of 36 cases, 19 underwent a CT scan and/or MR in our hospital, the patients were able to show an paranasal sinus' image done previously. The imaging findings that lead to a diagnosis of IP are a lesion with lobulated contours associated with bone remodeling; implanted in the nasal fossa or sinus. The inflammation, often secondary to sinus disease, does not allow for the precise distinction of inflammatory lesions from tumor cells. Therefore, we resort to MRI, which shows the extent of the lesion and any structures involved. Moreover, it differentiates IP from sinonasal malignant tumors and inflammatory changes.

The use of imaging techniques is not only important in understanding the nature of the injury and identifying the extension, but is also essential for preoperative staging.

The frequency of carcinoma in patients with sinonasal IP is around 11%. In two thirds of cases, carcinoma occurs synchronously with IP, but in some patients carcinoma develops at a later time, after previous resection of IP metachronous carcinoma. The associated malignancy is predominantly squamous cell carcinoma (SSC). In our group of patients any carcinoma was identified through histological tests [13].

In the postoperative period we analyzed the incidence of pain, hemorrhage and time of hospitalization.

Regardless of the success or the technique used, all surgery causes tissue damage and the release of mediators of inflammation and pain. One of the most frequently used methods of assessing pain in the clinical environment is the Visual Analog Scale (VAS) which we administered during the first 48 hours after surgery. The VAS is comprised of a 10 cm horizontal line, the ends of which define the minimum and maximum extremes of perceived pain. A mark on the line is made by the patient to indicate the intensity of pain and this is converted to a numerical value.

Endoscopic approach was associated with mild pain in both groups. Moreover, the

resection of papilloma in cases of recurrence is usually linked to moderate/severe pain regardless of the type of surgical resection.

The most common postoperative complication in our patients was hemorrhage resolved by nasal packing in the first 12 hours. There were no differences between our two groups.

Endoscopic surgery alone is not suitable for all cases. In one series of 104 cases when used in isolation the rate of recurrence was 22.4% which dropped to 16.2% when combined with open procedures for more extensive disease [14]. It has been proposed that endoscopic surgery alone is suitable for those lesions confined to the lateral nasal wall with or without extension into the ethmoid, maxillary and sphenoid sinuses [15].

Given that relapse can occur even several years after the primary tumours, we recommend long-term monitoring of these patients [16].

With the support of the data in the literature and based on our experience, we believe that endoscopic treatment is the best treatment option as it is associated with lower morbidity.

With regards to rhinosinusal anatomy and physiology, endoscopic surgery has the following advantages: the absence of external scars, reduced postoperative pain, lower postoperative length of stay (average 3 days), as well as a lower percentage relapse (33% vs. 45%) compared to open surgery, observed in our study.

However, given the retrospective nature of our study, the limited number of both relapse patients and those who were first treated at our unit, we cannot confirm with certainty that the lower occurrence of relapse is related exclusively to endoscopic treatment of IP. However, we are fully convinced that endoscopic surgery is the gold standard for the treatment of this injury, with the exception of cases with massive invasion of the frontal sinus, into the nasofrontal duct, orbit and frontal sinus which may be better treated with a combined procedure [15].

### Conclusion

A key element to consider in the management of patients with IP is a careful follow-up for at least five years. As extensively documented in the literature, the nose-sinus inverted papilloma is characterized

by the tendency to recur and therefore, long-term follow-up is essential for early detection of any recurrence. In the last ten years, the greater accuracy of new angled endoscopes, which allow for "around the corner" vision and for optimal definition of the boundaries of the tumor to normal tissue, together with "training" of the endoscopic surgeon, which has gradually improved their performance, have enabled us to achieve great success with radical surgical treatment of the lesion.

A detailed knowledge of the complex anatomy of the rhino-sinus area is key as regards safety in endoscopic surgery of the paranasal sinuses. The study of the anatomical details with intranasal angled lenses, if implemented with the three-dimensional endoscopic vision, allows for a careful analysis of the nose/sinus area, which is characterized by a high anatomical variability. Another tool which is of great help in the study of anatomy is the high-resolution CT, which thanks to technological upgrading is now able to provide a precise reconstruction in three planes of space.

Endoscopic surgery training therefore is essential as it requires the surgeon to use and compare endoscopic, macroscopic and radiological (CT) anatomical images.

In conclusion, in recent years thanks to the technological development of endoscopic equipment and an improvement in image quality, we have witnessed a broadening of indications for endoscopic surgical approaches, overcoming previously perceived anatomical limitations.

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