

The management of sinonasal inverted papilloma: our experience*

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SUMMARY

The inverted papilloma of the nose and paranasal sinuses is a controversial disease. It invades surrounded structures, shows a high recurrence rate after surgical excision and may coexist with squamous cell carcinoma. The use of the optimal surgical approach and technique is of the utmost importance, as it is related to the possibility of recurrence. In cases of tumors of limited size a conservative local excision is sufficient, while, in larger tumors filling the nasal cavity and the paranasal sinuses a more aggressive strategy is needed, such as a medial maxillectomy after lateral rhinotomy.

In this paper we present our experience from treating 42 sinonasal inverted papillomas, using a surgical technique which is based on the conservation of as much part of the healthy lateral nasal wall as possible. This modified medial maxillectomy allows us to create a limited in size and normally functioning nasal cavity, thus minimizing the disadvantages of the classical medial maxillectomy without jeopardizing the safety of the operation.

Key words: inverted papilloma, sinonasal tumors, medial maxillectomy, lateral rhinotomy

INTRODUCTION

The inverted papilloma (IP) of the nose and paranasal sinuses is a rare tumor, with an incidence of 0.5-4% of the tumors of the area (Vrabec, 1975). The lesion shows an unpredictable behavior, including bony destruction, multicentricity, tendency to recurrence and association to malignancy. Thus, the timely diagnosis and its radical treatment is of the utmost importance. The importance of radical excision of the tumor has been widely stressed in the literature. The medial maxillectomy through a lateral rhinotomy incision has been proposed as the safest procedure at least for large tumors (Lawson et al., 1995; Weisman, 1995; Vrabec, 1994), regardless of the possible post-operative disadvantages due to orbital complications and the creation of large cavities. In this paper we present our experience with an alternative surgical technique for the treatment of sinonasal IP. It is a modified medial maxillectomy, with preservation of healthy parts of the mucoperiosteum of the lateral nasal wall, which minimizes the disadvantages of the classical approach, while being as safe and effective in the eradication of the disease.

MATERIALS AND METHOD

Forty-two (42) patients with IP of the nose and paranasal sinuses were included in the study. They were all diagnosed and treated in our Department from January 1978 to December 1997. Twenty-nine (29) were men and 13 women, aged from 15 to 80 years (mean 52.4 yrs). Age distribution of the patients is shown in Table 1.

Table 1. Age and sex distribution of patients with IP.

AGE	Number of patients	(male: female)
15-30	1	(1:0)
31-45	4	(2:2)
46-60	29	(21:8)
61-80	8	(5:3)

All patients were referred to our Department because of one or more of the following symptoms: unilateral nasal obstruction, nasal discharge, recurrent nose bleeding and headache. Two patients suffered from tearing, one had proptosis and one complained for dental pain. Duration of the symptoms varied from one month to several years. The clinical examination revealed the presence of a reddish-gray, irregular and friable

tumor causing partial to complete unilateral obstruction of the nasal airway. Then, the patients were submitted to an imaging study, including plain radiograph films (37/42=88.09%), a CT scan (39/42=92.85%) and/or a MRI (7/42=16.66%) of the face. This examination was followed by rigid nasal endoscopy and biopsy of the tumor under local anesthesia, because the unilateral location set the suspicion of a nasal tumor other than polyps. Once the diagnosis of IP was established the patients were scheduled for surgery. All patients have been operated by the first author of this paper (G.T.), except for 9 patients that have been operated by the former Director of the Department of Otorhinolaryngology of the Red Cross Hospital (G.D.).

The selection of the surgical procedure for each individual patient was based on the specific location and extent of the tumor. As there is no unanimously accepted staging system for the IP for now, we have considered two major categories of tumors. The first is that of limited size (limited to the inferior and middle turbinates or middle meatal region with minimal extension into the anterior ethmoids or antrum). The second category is comprised of those with a large size (extending to the supraorbital air cells, periacrimal cells, frontal sinus, sphenoid sinus, cribriform plate or anywhere outside the nose and sinuses), as was done by previous researchers (Lawson et al., 1995). The aggressive nature of the pathology, the possible multifocality and malignant transformation called for a procedure offering the best exposure to allow complete removal of the tumor, an easy post-operative examination and limited functional problems. Thus, in the majority of cases (33/42=78.57%), where the tumors were large, we have applied a modified medial maxillectomy through a lateral rhinotomy incision, whenever that was possible, in order to reduce the post-operative problems caused by the large cavity created by a classic medial maxillectomy.

The procedure was as follows: with the patient in the supine position, the face was prepared for the operation and draped and the eyes were closed with sutures. We infiltrated a local anesthetic with epinephrine (1:200.000) into the line of incision. A lateral rhinotomy incision was carried down to the anterior wall of the antrum. The alar incision was extended into the nasal cavity and a traction suture permitted exposure of the vestibule and the anterior nasal cavity. The angular artery and vein were identified, clamped and ligated, to avoid troublesome bleeding. Then, the periosteum was elevated from the lateral nasal wall and the anterior wall of the antrum, preserving the infraorbital nerve, and over the inferior orbital rim along the medial wall and the floor of the orbit. The lacrimal sac was then found and the duct was followed, mobilized from its bony bed and retracted laterally. We tried to preserve the lacrimal duct whenever that was possible and did not jeopardize the radical excision of the IP. Sufficient nasal bone and ascending processes of the maxilla along with the neighboring medial and upper part of the anterior wall of the antrum were then removed for proper visualization of the

nasal cavity and inspection of the maxillary sinus. The latter was cleaned from the tumor whenever it had an extension there. Then we proceeded with external ethmoidectomy. As the bony lateral nasal wall had been removed, it became possible to move the mucoperiosteum with the intranasal part of the tumor laterally, fully expose it and check its limits. The next step was the division of the mucoperiosteum of the lateral wall of the nose where the papilloma arose, leaving free margins from the piriform aperture to the posterior wall of the antrum. Depending on the extent of the tumor, either both the middle and inferior turbinates or just the inferior turbinate was preserved. The remaining healthy mucoperiosteum along with the preserved turbinate provided a significant part of the lateral nasal wall. Mainly the microscope and in few patients the endoscopes have been used occasionally, where there were doubts about the exact margins of the pathology, in order to achieve a radical excision. After careful hemostasis and smoothing of the resected edges, the defect was filled with an iodoform gauze and the packing was brought out of the nostril. The nasal soft tissues were then returned to their original position and the wound was finally closed in two layers.

The patients in whom malignant transformation of the tumor was found in the specimen underwent post-operative radiation therapy.

The mean follow-up of patients was 63 months, ranging from 8 to 162 months.

In follow-up visits the patients were asked to report on post-operative problems associated with the cavity created by the operation, regarding crusting, odor, bleeding, postnasal dripping and breathing.

RESULTS

In 40 cases the tumor originated in the nasal cavity, while in one patient it originated from the ethmoid labyrinth and in another one from the maxillary sinus. In 35 cases the medial turbinate and meatus was the site of origin, while in 5 cases it was the inferior turbinate.

The tumor was restricted in the nasal cavity in 7 cases, in 34 cases it extended to the ethmoid labyrinth and in 28 cases the maxillary sinus was involved (Figure 1). Finally, in one patient the tumor also extended to the frontal and sphenoid sinus. There were no cases of bilateral disease or with intracranial extension. The frequency of involvement of specific sites is shown in Table 2.

Table 2. Frequency of involvement of specific sites.

Lateral nasal wall	42 (100%)
Ethmoid labyrinth	34 (80,95%)
Maxillary sinus	28 (66.66%)
Frontal sinus	1 (2.38%)
Sphenoid sinus	1 (2.38%)

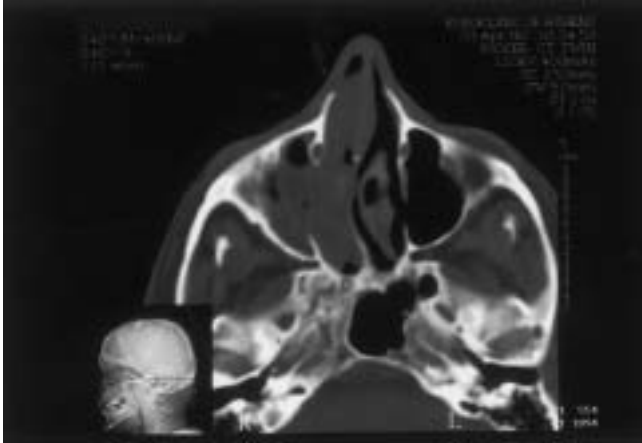


Figure 1. Pre-operative CT scan of a 48-years-old man with unilateral nasal obstruction and epistaxis. The tumor is filling the right nasal cavity and extends to the ethmoid cells and the right maxillary antrum.

The imaging of the facial skeleton demonstrated the presence of a unilateral mass, causing bony erosion in 7 patients (16.66%), 4 of whom were proved to have synchronous carcinoma. Opacification of the sinuses was also recorded in 19 patients (45.23%).

In 3 cases the papillomas coexisted with squamous cell carcinoma and in one case with undifferentiated invasive carcinoma (9.5%).

One patient was treated with an intranasal approach, 3 patients underwent a combination of the intranasal approach and a radical antrotomy, 33 patients underwent a modified medial maxillectomy and 5 patients a classic medial maxillectomy. Four of these patients (10,52%) recurred and were eventually submitted to a radical maxillectomy. Recurrence occurred 1,2 to 9 years after primary surgery, with a median of 47 months. One patient with associated malignancy died of the disease 2.6 years after surgery.

No perioperative complications regarding the orbit or CSF leaks were recorded. Only two patients suffered transient post-operative epiphora. The patients with a modified medial maxillectomy reported mild post-operative problems from the cavity, with limited crusting (9/33), absence of bad odor (0/33), sporadic postnasal dripping (5/33) and breathing similar to that before the operation (30/33). On the contrary, all patients who underwent a complete traditional medial maxillectomy suffered from persistent crusting and postnasal dripping and experienced discomfort from the cavity.

DISCUSSION

The inverted or schneiderian papilloma of the nose and paranasal sinuses is a rare and controversial type of neoplasia. While it is a benign lesion, it is classified as clinically malignant, and should be treated as such. The tumor is usually unilateral, recurs easily after surgical removal and may show malignant change (Vrabec, 1975). The incidence of IP is lower than 5% of the tumors of the area. There is a male preponderance and occurs usually in the 5th to 7th decade of life, while

isolated cases have been reported to occur in childhood (Snyder and Perzin, 1972; Eavey, 1985; Skolnik et al., 1966; Tribble, 1971; Lawson et al., 1989).

While several factors such as allergy, nasal polyposis, chronic and viral infections and environmental carcinogens have been considered responsible for the disease, its cause remains still unclear (Skolnik et al., 1966). A viral etiology has been proposed, based on the multicentricity of the tumor and its tendency to recurrence. The identification of pure DNA from Human Papilloma Virus types 6, 11, 16 and 18 in specimen from IP supports this theory (Respler, 1987; Weber et al., 1988).

The tumor arises usually from the lateral wall of the nasal cavity (medial turbinate and meatus) occasionally extending to the paranasal sinuses, as the maxillary sinus and the ethmoid labyrinth. The frontal and sphenoid sinuses are rarely involved. Primary involvement of the paranasal sinuses has been reported (Hyams, 1971), as well as cases where the tumor originated from the nasal septum (8%) or occurred bilaterally (4%). Multicentricity is another feature of the tumor in up to 30% of cases.

The IP usually causes unilateral nasal obstruction, nasal discharge, recurrent epistaxis, facial pain and other symptoms mimicking sinusitis, thus delaying diagnosis and treatment. External deformity, symptoms indicating extension of the disease to the sinuses or the orbit (pain in the teeth, exophthalmos, diplopia, paresthesia or anesthesia of the cheek) and even intracranial extension may be rarely seen (Bielamowicz et al., 1993).

The IP is classified as a benign tumor characterized by inversion of the neoplastic epithelium into the underlying stroma. Pathologically the tumor shows metaplasia of the columnar ciliated epithelium into stratified or transitional, with multiple mitoses, but without atypia or invasion of the basilar membrane. The epithelium is thickened with invaginations within. The cells are regular in shape, demonstrating normal patterns of maturation. Numerous mucous cysts and cells with glycogen containing organelles are characteristic of the tumor (Kramer and Som, 1935).

Diagnosis is based on a detailed history, on a careful clinical examination of the area, on the radiographic evaluation and finally on the histology of the specimens.

The appearance of the IP is similar to that of polyps, with concurrent presence of both being possible. Thus, multiple biopsies from the tumor are necessary before proceeding to the final treatment. Imaging of the facial bones and brain (CT or MRI) is mandatory, as it provides information for the extension of the tumor. In most cases a secondary sinusitis is recorded, due to obstruction (Mansell and Bates, 2000).

Unfortunately, there is no widely accepted staging system for these tumors. A recent effort by Krause (Krause, 2000) to stage

IP is too new to be already evaluated. Thus, tumors are currently characterized as small or large depending on their extent into the sinuses and other areas of the facial skeleton, causing difficulties in the comparison of results of different surgical procedures.

The IP may be potentially malignant, the incidence of malignancy in 19 series being 10.8% (Mansell and Bates, 2000). Associated malignancy may arise from the papilloma, may be an incidental and unassociated finding (synchronous tumor) or may follow surgery for the tumor (metachronous tumor) (Vrabec, 1994). Prognosis is guarded especially in cases of delayed diagnosis and treatment, and in large multifocal tumors, which are complicated with a high recurrence rate (Calcaterra et al., 1980). Moreover, the inability to radically excise the tumor is connected to a higher recurrence rate, but being radical is difficult when the tumor invades distant areas.

Surgery is the treatment of choice for sinonasal IP. In cases of small tumors an intranasal approach with or without a Caldwell-Luc operation or an endoscopic procedure seems to be usually adequate. Mid-facial degloving is another option for the treatment of sinonasal papilloma, with the considerable advantage of no external incision and scar. On the other hand, this approach does not allow for sufficient access to distant areas of the facial skeleton, such as the supraorbital ethmoid cells or the frontal sinus, thus compromising the radical excision of the pathology (Myers et al., 1990; Phillips et al., 1990; Suh et al., 1997; Sachs, 1984). However, in large tumors extending to the paranasal sinuses there is need for a more wide surgical field, which is achieved with a lateral rhinotomy incision and a medial maxillectomy (Myers et al., 1990; Weisman, 1995). This technique provides the possibility for a radical excision, but also creates a huge cavity, responsible for crusting, bad odor, sense of fullness and postnasal drip, with an effect to the post-operative quality of life of the patient (Calcaterra et al., 1980).

To reduce this disadvantage, in our department we have used a modified medial maxillectomy in the treatment of patients with IP, whenever possible. The critical point of this operation was removal of the bony lateral nasal wall with preservation of the healthy parts of the mucoperiosteum. Thus, the mucoperiosteum could be retracted laterally exposing the exact site where the IP arose and its precise extent. As a result, it was not necessary to remove the entire lateral nasal wall, but just parts of it, and the inferior turbinate was preserved, with the exception of cases where the turbinate was also involved by the tumor (Figure 2). In some cases of tumors of limited size it has been possible to preserve also the middle turbinate (Figures 3, 4). The procedure was safe enough, as it yielded a recurrence rate of just 10% and at the same time had a positive effect on the post-operative quality of life of the patients.

There are several reports in the literature concerning the endoscopic management of sinonasal IP or its combination with an external approach (Tufano et al., 1999; Winter et al., 2000;



Figure 2. Post-operative CT scan from the patient of picture 1. The patient had a modified medial maxillectomy, where the bony lateral wall of the nasal cavity has been removed, with preservation of the inferior turbinate. The patient is free of disease 5 years now.



Figure 3. Pre-operative CT scan of a 32-years-old man with nasal obstruction, headache and epistaxis showing obliteration of the nose and the maxillary antrum by a tumor.



Figure 4. Post-operative CT scan of patient of picture 3. The patient had a modified medial maxillectomy, with preservation of the medial and inferior turbinates. The patient remains free of disease 16 years now and has never experienced problems from the cavity.

Stankiewicz and Girgis, 1993; Lund, 2000). The use of a microscope or endoscope or both instruments during surgery is an important factor, regardless of the approach itself, as it could contribute to the radical excision of the tumor and lowering of the recurrence rate.

However, while the endoscopic approach seems to be less invasive and comparable to the external approach with regard to the recurrence rate of the tumor, it appears that the medial maxillectomy in its traditional or modified versions remains the method of choice when dealing with large tumors (Lawson et al., 1995; Weisman, 1995; Myers et al., 1990; Osguthorpe and Weisman, 1991; Bielamowicz et al., 1993). Our experience supports the idea that at least when treating IP not restricted in the nose, the medial maxillectomy remains the standard treatment. Moreover, the effort to preserve some healthy parts of the mucoperiosteum of the lateral nasal wall reduces the problems caused by the large cavity without compromising the efficacy and safety of the method.

In conclusion, the surgical management of the sinonasal IP demands application of the best possible approach and technique in order to avoid recurrence. The medial maxillectomy through a lateral rhinotomy incision is the traditional operation for these tumors, but it is responsible for creating a large post-operative cavity with several functional problems for the patient. It appears that the application of a modified medial maxillectomy with preservation of a significant part of the lateral nasal wall could contribute to a smaller and normally functioning nasal cavity, with limited problems and equal safety for the patient.

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