Original Article

SURGICAL MANAGEMENT OF INVERTED PAPILLOMA AND ROLE OF ENDOSCOPIC SINUS SURGERY

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Abstract:
The inverted papilloma is a benign tumor of nose arising from lateral wall, prone to malignancy and having high rate of post operative recurrence. There is much debate in literature whether an endoscopic approach is more beneficial than an external approach.

Study design:
Retrospective.

Material and Methods:
Retrospective analysis of patients treated with inverted papilloma operated at two Centres (Fazle Omar Hospital, Chenab Nagar and Madina Teaching Hospital, Faisalabad) from 1999 to 2013.

Results:
16 patients records were studied. Three patients (18.75%) had tumor recurrence. All three had recurrent advanced disease (T4) at presentation, one was operated by external approach while other two by combined approach.

Discussion:
Krouse’s staging system for inverted papilloma can facilitate better treatment planning and comparison of surgical outcomes. Endoscopic sinus surgery is a viable treatment alternative for sino-nasal inverted papilloma with recurrence rates that are comparable to those of more aggressive techniques in cases with same tumor staging.

Conclusion:
Conservative approach using endoscope can be performed on selected patients with comparable results. The use of endoscope in this type of surgical treatment is an important success factor.

Keywords: Endoscopic sinus surgery, inverted papilloma.

INTRODUCTION

The inverted papilloma is a rare benign tumor arising from lateral nasal wall. It has incidence of 0.5 to 1.5 cases per 100 thousand population\(^1\) corresponding from 0.5 to 04% of all sino-nasal tumors\(^2\). Histologically it has peculiar (distinctive) characteristic of inversion but its high recurrence rate and potential for malignant transformation\(^3\) makes it significant for ENT surgeons to define accurate pre-operative tumor mapping and complete excision\(^4,5,6\).

With the progress in endonasal endoscopic surgical excision this treatment option for naso-sinusal inverted papilloma is under discussion, being compared to external...
approach. In present study we retrospectively analyzed and studied the patients treated at two centres over a period of fourteen years (1999 to 2013) and compared the post operative results of external approach, endonasal endoscopic surgery used alone or combined with external approach staging the patient according to Krouse classification.

PATIENT AND METHODS

It is retrospective study carried out on all the patients with biopsy proven sino-nasal inverted papilloma surgically managed at Department of Otorhinolaryngology, Fazle Omar Hospital, Chenab Nagar between January 1999 to July 2013 and at Department of Otorhinolaryngology, Madina Teaching Hospital, Faisalabad between January 2007 to July 2013. All the patients were operated by same surgeon. Total 16 cases were included who had all the necessary informations and minimum follow up of six months was available. All the patients under went thorough ENT and head and neck examination, pre-operative punch biopsy and CT scan to assess the site and extent of disease. The patient were staged according to the Krouse’s classification for sino-nasal inverted papilloma, as T1 when the tumor is limited to the nasal cavity, T2 when the lesion is restricted to ethmoid sinus and medial / superior part of the maxillary sinus, T3 tumor involving the lateral / inferior part of maxillary sinus or frontal or sphenoid sinus and T4 when the tumor extends beyond the nasal cavity and para-nasal sinuses or malignant transformation. The study included information on patients age, gender, tumor side, time from symptoms onset until surgical treatment at our centre(s), signs and symptoms, prior treatment, stage of disease at the start of treatment, intra and post-operative complications, recurrence and post-operative follow-up. Three patients managed in the early part of study period were operated by external approach (lateral rhinotomy). After 2003 as we gained experience in endoscopic sinus surgery most of the cases were treated endoscopically used either alone or combined with external approach. In cases where tumor attachment was in lateral part of frontal or maxillary sinus or in advanced cases could the lesion not be accessed by endoscopic technique, an appropriate combination with external method was used. Thus, in five patients endoscopic sinus surgery alone was used while in eight others combined approach i.e. combined with CWL or lateral rhinotomy was used.

After excision of tumor margins of healthy mucosa from all around were taken for confirmation of clearance of disease. Per-operative blood loss was assessed (by measuring the blood in suction bottle, weighing the guaze used during the procedure and calculating the total blood loss) and need for any blood transfusion was studied. Any significant per-operative or post-operative complication was also studied. The patients were followed at 15-30 days interval during first 3 months and at 01-02 months interval for next 6 months and there after at 3 months interval for any recurrence judged by patients complaints, clinical examination including nasal endoscopy and where needed by CT scan. The patients were also reviewed in this period for any other complication like dryness of nasal cavity, crusting, hyposmia, anosmia, epistaxis, epiphora, CSF leak, synachiae or cosmetic deformity. Qualitative analysis was done.

Fig I: Gender Distribution

![Gender Distribution](image)

Fig II: Surgical Treatments

![Surgical Treatments](image)
A total of sixteen patients treated between January 1999 to July 2013 were included in the study. These were thirteen males and three females between 28 to 72 years of age (mean age 50.1 years). Majority of patients presented with nasal obstruction 93.75% followed by rhinorrhea 81.25%, headache 43.75%, epistaxis 43.75% and hyposmia 31.25%. (Fig I & II) All the patients had biopsy proven inverted papilloma of nose. The tumor was arising from lateral wall of nose in all cases. It was predominantly involving right side of nose (12 cases) while in four patients disease was on the left side. The average period between the onset of symptoms to the surgical treatment was 24 months with range between 8 months to five years. 43.75% of our patients had previously undergone surgery at some other centre before presenting at our centre(s), one patient had three surgeries while six other cases had undergone surgery twice. Based on Krouse’s Classification we had one patient in T1 stage, three patients in T2 stage, nine patients in T3 stage and three patients in T4 stage. External approach (lateral rhinotomy) was used in three patients (one each in T2, T3 and T4) who were operated in early part of our study period. Endoscopic approach alone was used in five cases while endoscopic excision combined with external approach was used in remaining eight patients (Fig III). The disease was successfully excised in all cases. The inferior turbinate was however preserved in 11 cases (T1, T2, T3 stage patients) who underwent nasal endoscopic excision alone or combined with CWL. In two patients with T4 stage disease who were operated by combined approach (i.e. one FESS combined with lateral rhinotomy and other FESS combined with CWL) inferior turbinate was resected as part of it was involved in tumor. The rate of surgical complication was low. Five patients had injury to sphenopalatine artery. Average blood loss during surgery was 210 ml (range 75 ml to 340 ml). None of the patients required blood transfusion. The blood loss was more in open technique (average 300ml) as compared to combined approach (average 245ml) and endoscopic technique alone (average 100ml). None of our patients had any orbital complication or CSF leak. The average follow up of our patients was 20 months (06 months to 05 years). All the patients initially had nasal crusting, dryness and occasional epistaxis for 2 months which decreased over a period of 4 to 6 months except in five patients in whom inferior turbinate was resected as part of procedure. Four patients underwent resection by lateral rhinotomy alone or combined with FESS and 01 patient by FESS combined with CWL. Three of these patients developed recurrent disease, two with malignant transformation. Hyposmia / anosmia assessed subjectively by using perfume showed hyposmia in all patient initially which improved in 62.5% of cases in 06 to 08 months and 06 patients (37.5%) still had some degree of hyposmia after 1 year of follow up, 50% of these had recurrence of disease. Five of our patients had epiphora early on which settled down within 06 months duration in three patients, one of the patients with persistent epiphora needed DCR while other was lost in follow up after diagnosis of recurrent disease with malignant transformation. Five patients had synachiae formation between inferior turbinate and septum and required lysis. Three of our patients had shown recurrence of disease after 06 and 08 months of follow up, two of these were associated with malignant transformation. The incidence of recurrent disease in our series was 18.75% while the ratio of malignant transformation was 12.5%. All of these three patients had presented with recurrent advanced disease (T4) and thus recurrence of disease in patients who presented with recurrent advanced disease was 42.85% in our series. All three patients after the diagnosis of recurrence, were lost in the follow up. The patients who underwent surgery by external approach i.e. lateral rhinotomy had mild degree of cosmetic deformity due to scar mark. None had significant abnormality like keloid or vestibular stenosis. (See table: I)
### Table: I Results Of Surgical Treatment

**Abbreviation Used**

- **FESS**: Endoscopic resection
- **C+C**: Endoscopic resection combined with CWL
- **C+L**: Endoscopic resection combined with lateral rhinotomy
- **Lat**: Lateral rhinotomy/ medial maxillectomy
- **E**: Early (in first 03 months)
- **I**: Intermediate (in 04 months to 09 months)
- **L**: Late (in 09 months to 05 years)
- **0**: Lost in follow up.

**DISCUSSION:**

Inverted papilloma or schneiderian papilloma, a benign tumor of nose arising from proliferation of reserve or replacement cells located at basement membrane of mucosa due to a stimulus which is mainly unknown, is so named due to its growth pattern into underlying stroma rather than exophytic direction. Although benign these clinically ominous lesions are a nightmare for the surgeons due to their local aggressiveness, location in nasal cavity, high recurrence rates and tendency of malignant transformation. Therefore complete surgical extirpation is the main aim of treatment. For decades radical extra nasal procedures remained treatment of choice and many of these are still being used at a number of centres. Among these lateral rhinotomy and enbloc excision of lateral nasal wall and mid facial degloving procedure are more favoured procedures but the inherent morbity of cosmesis, prolonged aesthesia, palatal dysfunction, oro-antral fistula, vestibular...
stenosis, scaring and recurrence prompts the surgeons to look towards the advancements\textsuperscript{6,9,10} which can avoid these complications. With the invention and rapid progression in endoscopic nasal surgery which provides better magnification and illumination a debate erupted of its possible benefits over traditional external nasal procedures. We in our study though small one carried out at two centres where patients were treated by external approach, endo-nasal endoscopic technique used either alone or combined with CWL or external approach tried to look into benefits or disadvantages of endoscopic surgery used alone or combined with external approach or external approach alone in completely eradicating the disease and effectiveness of such procedure judged by recurrence or complications. Krouse’s classification for the inverted papilloma is based on preoperative CT Scan and the presence of malignant disease\textsuperscript{11}. It allows better pre-operative surgical planning and provides standardization to compare post-operative results. Although CT scan may over estimate the disease extent as it may not be able to differentiate tumoral areas from inflammatory and secretion retention areas it still is a good assessment method\textsuperscript{2,12}. MRI has the advantage of better differentiating tumor from inflammatory tissue/secretion and the presence of convoluted cerebriform pattern on MR imaging may point out towards diagnosis of inverted papilloma however it is of higher cost and may not be able to differentiate the papilloma from a malignant tumor in all cases\textsuperscript{13}. Majority of patients in our study were male (81.25%) and mean age of presentation was 50.1 years (range 28 – 72 years) which was similar to previous studies\textsuperscript{8,14,15} although the youngest patient in our study was a male of 28 years of age. Majority of patients presented with symptoms of nasal obstruction followed by rhinorrhea, headache, epistaxis and hyposmia (Fig: I-II). The tumor was involving right nasal cavity in majority of our patients and its location was lateral nasal wall in all cases which is the most common site of origin of schneiderian tumor, although the tumour can arise medially from middle turbinate or septum\textsuperscript{16}. The tumor which arises from lateral nasal wall is more aggressive and has a tendency to spread to the surrounding vital structures like orbit, maxillary or frontal sinus and brain\textsuperscript{5,11,16} and has high chances of recurrence\textsuperscript{14,15,17,18}. Removal of tumor by lateral rhinotomy, mid facial degloving, Danker’s rhinotomy approach, osteoplastic operation or craniofacial resection was based on the need of wide surgical resection\textsuperscript{6,9}. Majority of our patients (81.25%) were treated endoscopically used either alone, combined with CWL or external approach, although three patients (18.75%) one each in T\textsubscript{2}, T\textsubscript{3}, T\textsubscript{4} stage treated in early part of our study period were operated by lateral rhinotomy approach. In five cases (31.25%) we had successfully removed tumor in toto by endo-nasal endoscopic approach in which the disease was limited to nasal cavity, osteomeatal complex, ethmoids and sphenoid sinus (T\textsubscript{1}, T\textsubscript{2} & T\textsubscript{3}) while in 7 cases (of T\textsubscript{3}) where inferior wall or antero-lateral wall of maxilla was involved we used combined approach i.e. endo-nasal endoscopic procedure combined with CWL and agreed with Constantions Gde T et-al\textsuperscript{15} and Mortuaire G et-al\textsuperscript{19} that CWL combined with endoscopic resection is a good approach for clearance of disease from nose and maxilla with minimal complications and no external scar mark. In one patient who was having T\textsubscript{4} stage external approach i.e. lateral rhinotomy combined with endoscopic clearance was used (Fig: III). We had preserved inferior turbinate in 11 cases (T\textsubscript{1}, T\textsubscript{2}, T\textsubscript{3}) who had undergone endonasal endoscopic excision alone or combined with CWL and agreed with Gras-Cabrerizo JR et-al\textsuperscript{20} and Rutherford KD and Brown SM\textsuperscript{21} that preserving the inferior turbinate helps in preventing nasal dryness, crusting and epistaxis later on and the level of satisfaction in our patients was high. The mean blood loss in our series was (210ml) and blood loss by
endoscopic resection approach used alone (100ml) was quite less compared to the radical external nasal approach (300ml) or combined approach (245ml) in contrast to Sautter et-al\(^{22}\). Part of this is due to use of hypotensive anesthesia, well prepared patients in peri-operative period and the technique which is less invasive than external approach. In literature endoscopic resection combined with KTP laser\(^{23}\) had been used with advantage of bloodless excision which we had not attempted due to lack of resources. The incidence of recurrence in literature ranges from 0 – 36% in endoscopic approach\(^{5,6,10,18,24}\) and 12.5% to 67% in external approach\(^{1,14,15,17,18}\) depending upon the stage of disease. In our series the patients who presented in earlier stage of disease had shown no recurrence whether operated by external approach, endoscopic approach alone or combined with CWL while patients who presented late with recurrent advanced stage T\(_4\) either operated by external approach alone or combined with endoscopic approach had shown recurrence (100%) in 06 to 08 months of surgery thus are results similar to Sautter NB et-al\(^{22}\) and Constantions Gde T et-al\(^{15}\). However over all the patients treated in our series by external approach alone had shown the recurrence rate of 33.3%, the patients treated by combined approach had 25% incidence of recurrence while patients treated by endoscopic approach alone had shown no recurrence (0%) thus the results in our series is similar to the world literature. The minimal recurrence in our series with endoscopic resection alone may be related to the selection of the patients for this type of surgery as only patients with early staged disease and less aggressive one underwent surgery by this technique. The rate of malignant transformation in our series was 12.5% which was comparable to the previous studies\(^{3,14,25}\). The review of literature shows that recurrence of disease may be due to inappropriate primary excision and persistent residual disease\(^{6,24}\) as the tumor lies in difficult anatomical areas of nose which are difficult to clear which was not seen in our series as we had removed the disease in toto in all cases and margins of surgical resection were clear of disease but recurrence of disease in the these three patients who had advanced recurrent disease at presentation confirms the opinion of Jaing XD et-al\(^{26}\) that pathological clearance of margins of surgical resections can only partially judge the prognosis and thus we believe that patients with advanced recurrent tumor behave more aggressively and have higher chances of recurrence regardless of surgical technique unlike Mortuarie G et-al\(^{19}\), although we agree that the precise determination of the site and extent of tumor is key to the treatment outcome\(^{5,6,24}\). Endoscopic resection assisted by CT navigation\(^{27}\) or MRI – CT fusion image navigation is a new advancement especially for difficult areas\(^{28}\). The recurrence of disease depends upon long term follow up\(^{14,25}\), advanced disease at presentation\(^{15,22}\) or malignant transformation\(^{3,14}\) which was also seen in our series. The advantage of preserving the inferior turbinate was seen in our series as none of the patient who had inferior turbinate preserved had shown dryness, nasal crusting or recurrent epistaxis after 6 month of follow up and these findings are similar to that seen in literature\(^{20,21}\). The epiphora also settled down in 6 months duration and only one patient who had undergone endoscopic excision required DCR later on. Thus we conclude that endo-nasal approach alone or combined with CWL is good approach for early staged tumors which is more acceptable to the patients both cosmetically and functionally and provides better results and the use of endoscope even in advanced cases combined with external approach is beneficial. However longer and larger series at other centres are required to confirm or negate our results.
REFERENCES


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The person who calls himself learned, indeed he is ignorant, and the one who calls himself from the dwellers of Paradise surely he is from the dwellers of Hell.

Hazrat Umar
(Razi Allah Tala Anho)