

Endoscopic medial maxillectomy with preservation of inferior turbinate in maxillary sinus inverted papilloma

Ashraf Khaled, Ramez Reda, Ramez Sabry, Ahmed Kamel

Department of otolaryngology, Faculty of Medicine, Beni-Suef University, Egypt

Correspondence to Ramez Reda
Department of otolaryngology, Faculty of Medicine, Beni-Suef University, Egypt

E-mail: ramez.salama@med.bsu.edu.eg
Tel: 01225012157

Pan Arab Journal of Rhinology
2018, 8:30-33

Objectives: Endoscopic medial maxillectomy has now become the gold standard surgical treatment for the majority of inverted papillomas that involves the maxillary sinus. However, this approach sacrifices the inferior turbinate which is responsible for conditioning of the nasal airflow. This study was done to assess the effectiveness of preservation of inferior turbinate in endoscopic medial maxillectomy.

Method: It was carried on patients diagnosed as inverted papilloma presented to the Otorhinolaryngology outpatient clinic in Beni-Suef University Hospital. Out of these patients, 20 cases of maxillary sinus inverted papilloma were selected from March 2012 to January 2016. All these patients were treated by endoscopic medial maxillectomy with preservation of the inferior turbinate.

Result: During surgery, the presence of inferior turbinate did not interfere the surgical field or the manipulation with instruments. Postoperatively, no crustations nor atrophic changes were reported in all the cases. There were no recurrences, with a mean disease-free interval of 36 months (24-48 months).

Conclusion: Endoscopic medial maxillectomy with preservation of inferior turbinate is an effective technique for treatment of inverted papilloma with no recurrence.

Keywords: Endoscopic medial maxillectomy, preserve inferior turbinate, inverted papilloma.

Pan Arab Journal of Rhinology 2018, 8:30-33

Introduction

Inverted papilloma represents about 70% of all papillomas in the nose and paranasal sinuses. It ranges between 0.5 and 7% of all nasal tumors. [1] It has a tendency to recur ranging from 0 to 24%. [2]

It is a locally aggressive tumor with high rate of recurrence. This recurrence may occur early or late. Inverted papilloma may be associated with carcinoma which diagnosed initially or at recurrence. [3]

For several decades, external approaches were the traditional surgical treatment of tumors involved the maxillary sinus. They were either lateral rhinotomy or sublabial approach. During the 1990s endoscopic medial maxillectomy was used by many authors to treat these tumors. [4,5]

Results with the endoscopic technique are satisfactory and better than external techniques. It presents an aesthetic advantage in avoiding a facial incision as well as a decrease in postoperative morbidity, crusting, pain, bleeding and health care costs. However, the main drawback of this approach is sacrificing the inferior turbinate and consequently its critical function in the conditioning of the nasal airflow. [6]

This study was done to assess the effectiveness of preservation of inferior turbinate in endoscopic medial maxillectomy as regard manipulation during surgery, ability to eradicate the disease and assess the viability of inferior turbinate post operatively.

Materials and Methods

This study was carried on patients diagnosed as inverted papilloma presented to the Otorhinolaryngology outpatient clinic in Beni-Suef University Hospital. Out of these patients, 20 cases of inverted papilloma arising from maxilla were selected from March 2012 to January 2016.

All these cases subjected to sufficient evaluation including history taking, clinical examination, diagnostic nasal endoscopy, preoperative CT scan to assess the lesion and to detect the site of attachment (hyperostosis) in addition to preoperative biopsy.

All patients were classified according to the classification system which introduced by Kamel and his colleagues in 2005 based on the origin of the lesion as type II. [7]

All the cases had no intracranial involvement. Cases originating outside the maxillary sinus were excluded. Also, cases with the subcutaneous extension or malignant invasion were excluded.

All these patients were treated by endoscopic medial maxillectomy with preservation of the inferior turbinate.

Ethical considerations:

Informed consent was taken from our patients, and the principles mentioned in the Declaration of Helsinki were followed. During preoperative counseling, patients were informed of the advantages and limitations of the endoscopic surgery and the possibility that unexpected intraoperative

findings might require the necessity for intraoperative switching to an external procedure. In addition, the protocol of this research was approved by the Research Ethics Committee of our university.

Surgical technique

Endoscopic endonasal surgery was performed under hypotensive general anesthesia, using 0°, 30° and 45° rigid endoscopes. Cottonoids, soaked with xylocaine and adrenaline 1/200000, were placed in the nasal cavity at the beginning of surgery.

Partial debulking of the nasal part of the tumor was done as a first step in the operation for better visualization over all the turbinate. Then passing a reabsorbable 3-0 suture through the anterior end of the inferior turbinate, cutting the anterior two-thirds of the inferior turbinate with a pair of turbinectomy scissors then displaced downwards and medially (**Fig. 1 A,B**).

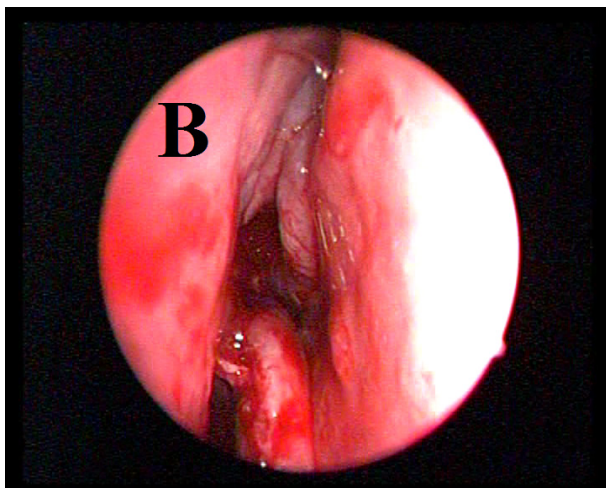
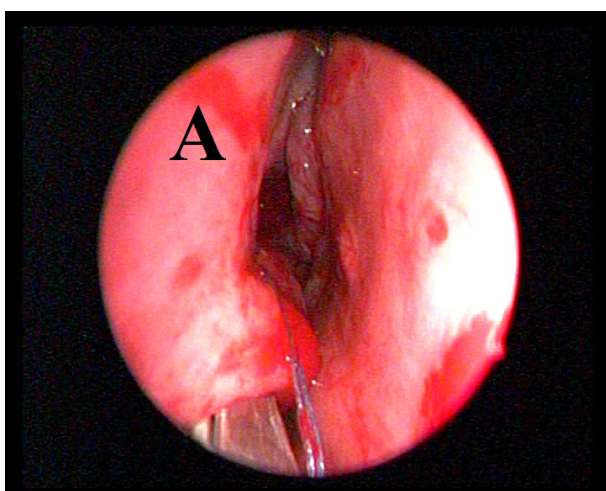


Fig 1 A: The suture passes through the anterior end of inferior turbinate. **B:** The anterior two-thirds of inferior turbinate was cut

The curved needle and the final end of the suture pass through the floor of the nasal fossa and were fixed with a splint outside the nostril to allow a wide access to the maxillary sinus (**Fig. 2**).

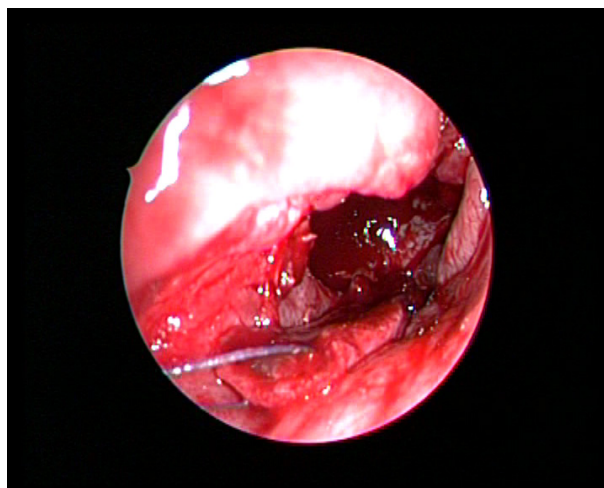


Fig 2 The rest of turbinate is pediculated to its posterior one third

The medial maxillary wall was removed by drilling with burr and back biter forceps, the maxillectomy limits were the floor of the nose inferiorly, the posterior wall of the maxillary sinus posteriorly, orbital floor superiorly and the anterior wall of the sinus anteriorly. Removing the maxillary part of the tumor to find its origin then removal of mucoperiosteum with 0.5 cm safety margin all around, then drilling the underlying bone in this area.

Anterior and posterior ethmoidectomy &/or sphenoidotomy was done according to the extension of the tumor. Anterior ethmoidectomy was done in 18 patients but posterior ethmoidectomy was done in 3 patients.

The nasolacrimal duct was resected in all cases of endoscopic medial maxillectomy (EMM) with no need to stent the lacrimal sac.

At the end of the surgery, the inferior turbinate (IT) repositioned in its original site, suturing its anterior head to the lateral nasal wall with the previously mentioned needle (**Fig. 3**). The nasal cavity was then packed for 48h.

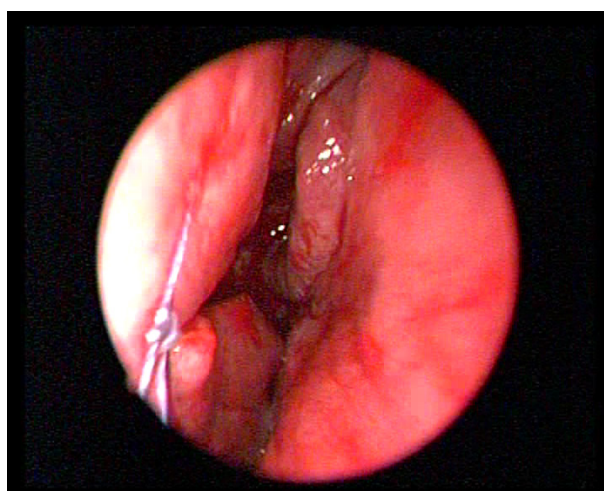


Fig 3 Medial maxillectomy. The head of the turbinate is sutured to the lateral nasal wall

Post operatively, the removed tumor specimens were sent for histopathology.

All patients were discharged home two days after surgery (after removal of the nasal pack) with the amoxicillin-clavulanic acid oral antibiotic, analgesics, alkaline nasal wash and nasal drops.

Patients were followed up every week for the 1st month, monthly for the next 5 months then every 3 months for at least 2-year postoperatively. Evaluation included history taking (for any nasal, ocular or neurological symptoms), Systematic nasal endoscopic examination, postoperative CT after 6 months and biopsy from any suspicious lesion for histopathology study.

Data of our patients were collected. This included demographic data, radiologic findings, operative data, postoperative recurrence and immediate/delayed complications.

Results

Age of the patients was between 39 years and 77 years old (mean was 55 years). 19 patients (95%) were males and only one female (5%). 12 patients (60%) were right sided and 8 patients (40%) were left sided. The main preoperative presenting symptom was a unilateral nasal obstruction and mucopurulent nasal discharge in all patients (100%). No epistaxis, epiphora, headache related to the mass, smell disorders nor proptosis were reported.

In preoperative CT, the origin of the tumor was the maxillary sinus extends to nasal cavity through the ostium in 100% of patients. Extends to the ethmoid sinuses (90%) with retained secretions in the frontal sinuses (15%). There was no orbital, intracranial, hard palate or subcutaneous tissue extension.

During surgery, the presence of inferior turbinate did not interfere the surgical field or the manipulation with instruments. Angled instrumentation (30 and 45-degree endoscopes) were used.

Postoperatively, minimal crustations were found which was completely recovered within 7 to 10 days. No atrophic changes were reported in all the cases.

The inferior turbinate remained fixed to the lateral nasal wall with an appropriate size, showing a good level of vascularization enough to maintain its viability and function in all cases (100%) (**Fig. 4**). Only one case showed lateral displacement of the IT into the maxillary sinus cavity. This was due to large nasal pack. After removal of the pack, the inferior turbinate retained its position during the second month.



Fig 4 Coronal CT cut of the nose and PNOS 6 months post-operative

One patient only had infra orbital paresthesia (5%) which resolved in 4 weeks.

Post operatively, no patients suffered from facial pain, nasal obstruction or epiphora, despite cutting NLD without stenting.

There were no recurrences, with a mean disease-free interval of 36 months (24-48 months).

Discussion

In this study, there was clear male predominance among patients included in the study group, 95% of patients being males and 5% females. Maxillary sinus was involved in 100% of cases, anterior ethmoid sinuses in 90% of cases and posterior ethmoid sinuses in 15% of cases.

As mentioned by Sham and his colleagues in 2008, the presence of focal hyperostosis or bony strut (ie, the elongated bony protrusion with a narrow base) in CT scan has a 100% positive predictive value in identifying the site of attachment of inverted papilloma. Osteitic changes may also be found at the site of origin of inverted papilloma. [8,9] In this study, the site of origin was identified in all cases.

Although CT and/or MRI are good to study the extent of the lesion, endoscopy is excellent in detecting the exact site of origin of papilloma during surgery. [7]

The Inferior turbinate (IT) is an important structure in nasal physiology. It warms, cleans and moistens the inhaled air and regains water during exhalation. [10] But in classic EMM, the IT is removed in spite of not involved in the tumor mass. So preservation of the IT and its function is the aim of this work.

Presenting symptoms in this study were a unilateral nasal obstruction and watery or mucopurulent nasal discharge in all cases.

Regarding IP in this study, we used a classification system introduced by Kamel et al. in 2005 of IP, based on the origin of the lesion:

1. Type I arises from the nasal septum or the lateral nasal wall.
2. Type II arises from the maxillary sinus. [7]

All cases staged as type II, were treated by endoscopic surgery by medial maxillectomy with preservation of the IT.

Gras-Cabrero and his colleagues in 2011 also found that it was not possible to achieve an appropriate access to the anterior maxillary wall without resecting or mobilizing the inferior turbinate. [6]

In another study, transnasal endoscopic medial maxillary sinus wall transposition was done. A rectangular mucosal flap of the lower part of the septum and floor of the nasal cavity extending to the wall of the inferior meatus was elevated up to the insertion of the inferior turbinate. Then displacing the flap upward together with the inferior turbinate. Once the resection of a tumor was completed, the mucosal flap was replaced and the IT lateralized to cover the medial maxillary wall defect and restore the inferior meatus. [11] We found that our technique allows better visualization of the maxillary sinus post operatively by endoscopy.

During surgery, one of the difficulties in our study in the 1st case was to take the suture in the anterior end of IT after its resection as it became flail so, in the other nineteen cases, we sutured the anterior end of the IT before the resection of IT. No obvious intra-operative bleeding noticed in all patients

except two patients who are on antihypertensive medication and controlled intra-operatively.

Weber et al., 2010, occluded the nose for at least 2 weeks, sometimes 3-4 weeks. It was said that this was well tolerated by all patients and is the most important step to ensure successful healing of the IT. [12] This was not the case in our patients as the pack removed after 48 hours with good healing after that.

In this study, Inferior turbinate displacement was noticed in one case due to insertion of a large pack. After removal of the pack, the turbinate returned to its original site in one week. So, small packs were used in next cases. They were inserted above the inferior turbinate.

Weber et al., 2010 and Gras-Cabrerizo et al., 2011 have also observed that survival of the IT in 100% of the cases. [6,12]

One of the limitations of our work, that the functions of the inferior turbinate had not been objectively assessed either by rhinomanometry nor acoustic rhinometry. But on the other side, we noticed that the basic functions of the inferior turbinate such as moistening and subjective nasal comfort cannot be assessed by rhinomanometry nor acoustic rhinometry.

In this study, only one patient (5%) developed infra-orbital paraesthesia and resolved after 2 months.

Dean et al., 2015 have also observed three patients (8.6%) developed inferior orbital nerve distribution paresthesia due to the removal of a tumor from the nerve. [13]

In this study, no epiphora reported in all cases despite resection of the nasolacrimal duct (ND) without stenting.

Suzuki et al., 2011 have also reported that no epiphora in all cases after preservation of IT and NLD. [14]

In this study, no atrophic changes were observed.

There is evidence that radical turbinectomy may result in atrophic rhinitis in other studies. [15]

In the post-operative follow-up period, we found that presence of inferior turbinate does not interfere with the proper visualization of the maxillary sinus using 0°, 30° and 45° rigid endoscopes.

In this study, recurrence was of 0%, during the follow-up period ranging from 24 to 48 months after surgery.

Weber et al., 2010 [12] have also revealed no recurrence of the tumor by postoperative endoscopy in any of the cases after a follow-up period of 12-80 months after EMM with preservation of the inferior turbinate.

Acknowledgments

The study was conducted by the Department of Otolaryngology of Beni Suef University, Egypt.

Conflicts of Interest Statement

The authors whose names are mentioned above certify that they have NO affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

Financial disclosure

The authors declare that they have no conflict of interest.

References

1. Sauter A., Matharu R., Hörmann K. and Naim R. Current advances in the basic research and clinical management of sinonasal inverted papilloma (review). *Oncol Rep.* 2007;17:495-504.
2. Gras-Cabrerizo J., Montserrat-Gili J., Massegur-Solench H., León-Vintró X., DeJuan J. and Fabra-Llopis J. Management of sinonasal inverted papillomas and comparison of classification staging systems. *Am J Rhinol Allergy.* 2010;24:66-69.
3. Lisan Q., Laccourreye O. and Bonfils P. Sinonasal inverted papilloma: From diagnosis to treatment. *Eur Annals Otorhinolaryngol Head Neck Dis.* 2016;133:337-341.
4. Kamel R. Transnasal endoscopic medial maxillectomy in inverted papilloma. *Laryngoscope.* 1995;105:847-853.
5. Sham C., Woo J., and van Hasselt C. Endoscopic resection of inverted papilloma of the nose and paranasal sinuses. *J Laryngol Otol.* 1998;112:758-764.
6. Gras-Cabrerizo J., Massegur-Solench H., Pujol-Olmo A., Montserrat-Gili J., Adema-Alcover J. and Zarraonandia-Andraca I. Endoscopic medial maxillectomy with preservation of inferior turbinate: How do we do it? *Eur Arch Otorhinolaryngol.* 2011;268:389-392.
7. Kamel, R., Khaled, A., and Kandil, T. Inverted Papilloma: New Classification and Guidelines for Endoscopic Surg. *Am J Rhinol.* 2005;19:358-364.
8. Sham C., King A., van Hasselt C. and Tong M. The roles and limitations of computed tomography in the preoperative assessment of sinonasal inverted papillomas. *Am J Rhinol.* 2008;22:144-150.
9. Bhalla R. and Wright E.: Predicting the site of attachment of sinonasal inverted papilloma. *Rhinol.* 2009;47:345-348.
10. Lee H., Poh H. and Chong F. Changes of airflow pattern in inferior turbinate hypertrophy: A computational fluid dynamics model. *Am J Rhinol Allergy.* 2009;23:153-158.
11. Maxfield A., Chen T., Scopel T. et al. Trans-nasal endoscopic medial maxillary sinus wall transposition with preservation of structures. *Laryngoscope.* 2016;126:1504-1509.
12. Weber R., Werner J. and Hildenbrand T. Endonasal endoscopic medial maxillectomy with preservation of the inferior turbinate. *Am J Rhinol Allergy.* 2010;24:e132-e135.
13. Dean N., Illing E. and Woodworth B. Endoscopic resection of anterolateral maxillary sinus inverted papilloma. *Laryngoscope.* 2015;125:807-812.
14. Suzuki M., Nakamura Y., Nakayama M. et al. Modified transnasal endoscopic medial maxillectomy with medial shift of preserved inferior turbinate and nasolacrimal duct. *Laryngoscope.* 2011;121:2399-2401.
15. Willatt D. The evidence for reducing inferior turbinates. *Rhinol.* 2009;47:227-236.