

# Modified Endoscopic Denker's Approach for Benign Sinonasal Tumors: Our Surgical Experience at a Tertiary Care Center

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## ABSTRACT

**Objective:** To study the benefits of modified endoscopic Denker's approach for benign sinonasal tumors.

**Methods:** The study includes prospective analysis of six histopathologically diagnosed patients of sinonasal inverted Papilloma with special emphasis on our experience with modified endoscopic Denker procedure. All patients underwent detailed preoperative evaluation with clinical history, nasal endoscopic examination, and contrast-enhanced computed tomography scan to see the origin and extent of disease. All the relevant findings including patient demographic profile, tumor staging, and surgical outcomes including recurrence were studied. Patients with intracranial or intraorbital extension, extensive frontal sinus involvement, or with sinus malignancy were excluded for this endoscopic approach. All patients were called for periodic endoscopic evaluations in the follow-up period.

**Results:** All six patients operated in the study were in stage III of Krouse staging system. All patients underwent endoscopic surgical resection using modified Denker's approach and endoscopic dacryocystorhinostomy were done as an adjunctive surgical procedure. Intraoperative period was uneventful and no complication was encountered in any of the patients. No recurrence was noted in any of them at the end of follow-up of 18 months.

**Conclusions:** Preoperative evaluation including histopathological biopsy and radiological examination if rules out malignancy, surgical resection using modified endoscopic Denker's approach is an excellent option and could be helpful in achieving complete resection of benign sinonasal tumor such as inverted papilloma. Subperiosteal dissection at the site of involved areas and regular endoscopic evaluation in the follow-up period are the keys for success and thus chances of recurrence can be reduced.

**Keywords:** Endoscopic medial maxillectomy, Inverted papilloma, Sinonasal tumors.

*Otorhinolaryngology Clinics: An International Journal* (2022): 10.5005/jp-journals-10003-1429

## INTRODUCTION

Inverted Papilloma, a rare benign sinonasal tumor, constitutes about 0.5–4% of sinonasal tumors<sup>1</sup> and originates from pseudostratified ciliated columnar epithelium lining or Schneiderian membrane of the nasal cavity, more specifically lateral nasal wall. This is the reason inverted Papilloma is also known as Schneiderian papilloma. The first description of the tumor was given by Ward in 1854 and Billroth in 1855<sup>2</sup> but the classical histopathological description of this tumor was given by Ringertz<sup>3</sup> and thus also called as Ringertz tumor. Various other names have been mentioned in the literature for this papilloma such as epithelial papilloma, transitional cell papilloma, villiform papilloma, and Ewing's papilloma.<sup>4</sup> The patients usually present in 5th to 7th decades and males are much more commonly affected than females.<sup>5</sup> Although the tumor is histopathological benign in nature but is well known in literature for its aggressive local invasion and chances of recurrences are there after incomplete surgical excision.<sup>6</sup> Therefore, complete surgical excision with subperiosteal dissection is advocated. Earlier, resection using external approach like lateral rhinotomy was considered as the main surgical approach for these tumors, but now with the advent of endoscopes, these traditional external approaches are being replaced by transnasal endoscopic resection. Thus this approach has many advantages in terms of excellent visualization with the help of endoscopes, no external scars or disfigurement, less hospital stay, and better evaluation in the follow-up period with early detection of recurrence.<sup>7,8</sup>

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**How to cite this article:** Verma D, Sharma N, Garg U, *et al.* Modified Endoscopic Denker's Approach for Benign Sinonasal Tumors: Our Surgical Experience at a Tertiary Care Center. *Int J Otorhinolaryngol Clin* 2022;14(2):53–55.

**Source of support:** Nil

**Conflict of interest:** None

## MATERIALS AND METHODS

The prospective analysis was done in the Otorhinolaryngology Department in a tertiary care center from 2017 to 2020. A total of six histopathologically diagnosed cases of inverted papilloma were included in the study for endoscopic surgical resection using modified Denker's approach. All the relevant findings including patient demographic profile, tumor staging, and surgical outcomes including recurrence were studied as shown in Table 1. Patients with intracranial or intraorbital extension, extensive frontal sinus involvement, or with sinus malignancy were excluded for this

**Table 1:** Summary of origin, staging of tumor, and follow-up result of all six cases

Case	Age and sex	Origin and extent	Krouse staging	Follow-up (18 months)
1	45/M	Maxillary sinus, anterior and posterior ethmoids, frontal recess/sinus	III	No recurrence
2	48/M	Maxillary sinus, middle turbinate, anterior and posterior ethmoids, frontal recess/sinus	III	No recurrence
3	50/F	Maxillary sinus, anterior and posterior ethmoids, frontal recess/sinus	III	No recurrence
4	55/M	Maxillary sinus, middle turbinate, anterior and posterior ethmoids, frontal recess/sinus	III	Small polyp in maxillary sinus at 1 year (Biopsy negative for recurrence)
5	62/M	Maxillary sinus, anterior and posterior ethmoids, frontal recess/sinus	III	No recurrence
6	54/M	Maxillary sinus, middle turbinate, anterior and posterior ethmoids, frontal recess/sinus	III	No recurrence

endoscopic approach. All patients were followed by periodic endoscopic evaluations. A written informed consent was obtained from all patients prior to surgery explaining the procedure, other alternatives, possible outcomes, and complications.

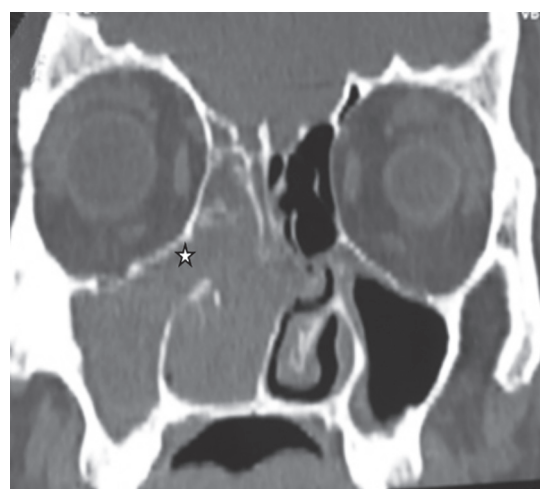
### STEPS OF PROCEDURE

All patients underwent endoscopic surgical resection under general anesthesia. After proper nasal packing with merocele to make the space for endoscopic resection, the following surgical steps were followed in all the cases:

- Pterygopalatine fossa block was given after nasal infiltration using 2% lignocaine with 1:1 Lac adrenaline concentration.
- Inferior turbinectomy was done.
- Incision was made at the pyriform aperture up to the periosteum using monopolar cautery.
- Subperiosteal flap was elevated over anterior face of maxilla up to infraorbital foramen superiorly and infratemporal fossa laterally.
- Osteotomy was done on the anterior wall of maxilla taking care of infraorbital nerve.
- Medial wall of maxilla was removed and joined with anterior osteotomy to create large window.
- Margins were saucerized, and after removal of tumor mass, subperiosteal drilling was done using diamond burr to ensure complete removal and prevent future recurrence.

### RESULTS

All six patients enrolled in the study underwent endoscopic surgical resection of inverted papilloma. The average age of patients was 52 years with a range of 45–62 years, with five males and one female in the group. All of them presented with unilateral nasal obstruction, blood stained nasal discharge, and decreased smell while one of them also presented with nasal mass protruding out of nasal cavity. Preoperative nasal endoscopy showed pale, polypoidal mass arising from lateral nasal wall, filling the middle meatus and extending posteriorly into nasopharynx. On the basis of preoperative contrast CT scan findings, all patients were in stage III of Krouse staging system (Fig. 1). None of the patients showed skull base or orbital invasion in the group. All patients underwent endoscopic surgical resection using modified Denker's approach and endoscopic dacryocystorhinostomy was done as an

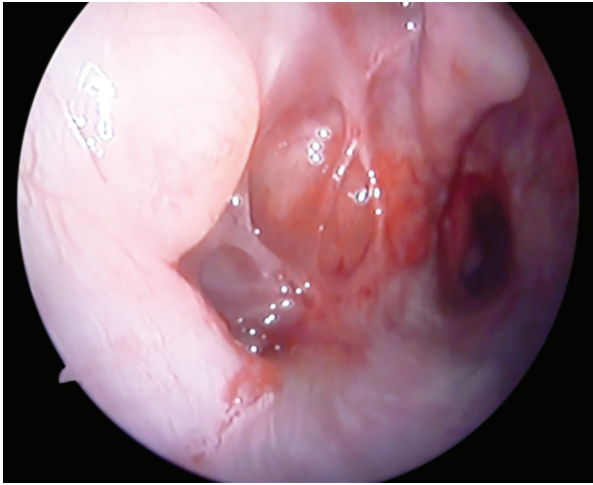


**Fig. 1:** Coronal CT picture demonstrating soft-tissue density involving the (R) maxillary sinus and ethmoids consistent with inverted papilloma

adjunctive surgical procedure. Resection along the subperiosteal plane at the involved areas with drilling of the bone underlying the diseased mucosa and intraoperative frozen section was done to ensure complete excision so as to ensure complete tumor removal and to prevent recurrence. Intraoperative period was uneventful and no complication was encountered in any of patients. No recurrence was noted in any of them at the end of follow-up of 18 months. One of the patients developed a small polyp in the maxillary antrum at the completion of 1 year in the follow-up period (Fig. 2). To rule out recurrence, patient underwent polypectomy and histopathological picture was suggestive of inflammatory polyp.

### DISCUSSION

Inverted papilloma despite being benign histopathologically is well known in literature for its aggressive local invasive and recurrence behavior after incomplete excision. The potential of harboring areas of squamous cell carcinoma has also been very well documented in literature.<sup>6</sup> Therefore, these tumors must be treated wisely and aggressively with complete subperiosteal surgical resection makes a standard surgical procedure for these tumors. With the recent advances, the traditional external surgical approaches for the treatment of inverted papilloma via lateral rhinotomy and



**Fig. 2:** Endoscopic picture showing small polyp in (R) maxillary antrum at 1 year follow-up

medial maxillectomy have been replaced by minimal invasive endoscopic transnasal approaches with favorable outcomes and disease control as reported by many authors in the literature.<sup>7,8</sup> The feasibility of endoscopic approach for resection of this tumor was first demonstrated by Waitz and Wigand<sup>9</sup> and Kamel.<sup>10</sup> Krouse<sup>11</sup> in 2000 in his review stated that tumor excision and control by endoscopic resection were comparable with open approaches. Our present surgical experience also demonstrated the advantages of endoscopic approach for the treatment of sinonasal inverted papilloma. When comparing both the surgical options, external approach (like classical lateral rhinotomy) is usually associated with higher complications and morbidities in the form of epiphora, dacryocystitis, mucocele, epistaxis, external disfigurement, and cerebrospinal fluid leak. On the other hand, endoscopic transnasal approach provides better magnification and illumination, avoids external facial scars or disfigurement, and angled endoscopes have made visualization more easier even in inaccessible sites such as the anterior or lateral wall of the maxillary sinus thus helps in complete resection of this tumor.<sup>7,8</sup> Despite considering all these factors, selection of appropriate approach is usually variable and based on the extent of disease and surgeon's experience with advanced endoscopic surgical techniques. Preoperative assessment should include clinical, endoscopic, and radiological evaluations with contrast-enhanced computed tomography to know the exact site of origin and extent of tumor and to know the presence of intracranial or intraorbital invasion, thus guiding the treating surgeon regarding the plan and approach for the management of such tumor. All patients in the study were in stage III of disease according to the Krouse<sup>11</sup> staging system. Complete tumor excision was achieved in all six cases and no recurrence was reported in any of the patients at a mean follow-up period of 18 months. According to the literature available most of the recurrences usually occur at the site of the origin of tumor, suggesting that incomplete surgical resection is the main root cause of the recurrence. A long-term follow-up of

these patients is mandatory with periodic nasal endoscopy and, if needed, by radiological evaluation with contrast CT or MRI scans. Any suspicious tissue in the form of granulations or polypoid tissue should be biopsied for early detection of recurrence of disease as done in one of our patients but that came out negative for recurrence and any associated malignancy.

## CONCLUSION

Inverted papilloma is a rare benign sinonasal tumor that most commonly arises from the lateral nasal wall with well documented local aggressive behavior and recurrences after incomplete surgical excision. If preoperative evaluation including histopathological biopsy and radiological examination rules out malignancy, surgical resection using modified endoscopic Denker's approach is an excellent option and could be helpful in achieving complete resection of benign sinonasal tumor such as inverted Papilloma with minimal morbidity and low recurrence rates. However, subperiosteal dissection (drilling of the bone underlying the diseased mucosa) at the involved sites is the main determinant for success and thus chances of recurrence can be reduced.

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