International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Role of Endoscopic Denker's Approach in management of Sinonasal Masses in Tertiary Care Hospital

K Ramesh[1], B Sai Swarna[2], Nitya Goddanti[3], B Reshma[3], Archana Mekala[4]

[1]Associate Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India

[2]Assistant Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India
Email: *saiswarnab.2795[at]gmail.com*

[3]Assistant Professor, Government ENT Hospital, Koti, Hyderabad, Telangana, India

[4]Civil Assistant Surgeon, Government ENT Hospital, Koti, Hyderabad, Telangana, India

[5]Senior Resident, Government ENT Hospital, Koti, Hyderabad, Telangana, India

Abstract: ***Purpose: To assess the efficacy, safety and clinical outcomes of Endoscopic Denker's approach in management of Sinonasal masses. Methods: A Prospective Study of 30 patients with sinonasal masses were included in the study. The patients were assessed and operated by endoscopic Denker's approach over a period of 2years between 2023-2025. Results: The study supports the efficacy and safety of endoscopic Denker's approach in managing sinonasal masses with 2 patients requiring adjuvant therapy post- surgery as the HPE suggested of malignancy and 2 patients with recurrence.***

Keywords: Endoscopic Denker's approach, sinonasal mass, microdebrider, Inverted papilloma, juvenile nasopharyngeal angiofibroma

Abbreviations

EDA	Endoscopic Denker's Approach
HPE	Histopathological examination
SCC	Squamous Cell Carcinoma

1. Introduction

Sinonasal masses represent a heterogenous group of lesions ranging from benign inflammatory polyps to aggressive neoplasms[1] and their management poses a surgical challenge due to complex anatomy of nasal cavity and paranasal sinuses, proximity to vital structures and the need for complete excision to prevent recurrence[2] . Though, endoscopic sinus surgery has become the standard approach for sinonasal pathologies, certain lesions which are involving anterior maxillary sinus, lateral nasal wall and extending to infratemporal fossa are difficult to access through conventional endoscopic techniques[3].

The classical Denker's approach, first described in 20th century, provided wide exposure but associated with significant morbidity, facial swelling, infraorbital nerve injury and cosmetic deformity[4]. To overcome these limitations, modified Denker's procedure (EDA) has been evolved as a less invasive alternative that combines the advantages of open exposure with endoscopic visualization. It improves access to anterior and lateral maxillary sinus, facilitates complex tumour removal and minimizes complications[5].

Steps of Procedure[6]

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

- Pterygopalatine fossa block was given after nasal infiltration using 2%lignocaine with 1:1lakh adrenaline concentration.
- Inferior Turbinectomy was done
- Incision was made at pyriform aperture upto the periosteum using monopolar cautery.
- Subperiosteal flap was elevated over anterior face of maxilla upto infraorbital foramen superiorly and infratemporal fossa laterally.
- Osteotomy was done on 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 are saucerized, and after the removal of mass, subperiosteal drilling was done using diamond burr to ensure complete removal and prevent recurrence.

Endoscopic Denker's Approach (EDA) includes the removal of lateral nasal wall and the medial portion of the anterior maxillary wall and transection of the nasolacrimal duct. It could provide a wide exposure and tumour extirpation through a unilateral nostril. In combination with removal of posterior nasal septum, facilitation of 3-4 handed technique is feasible.

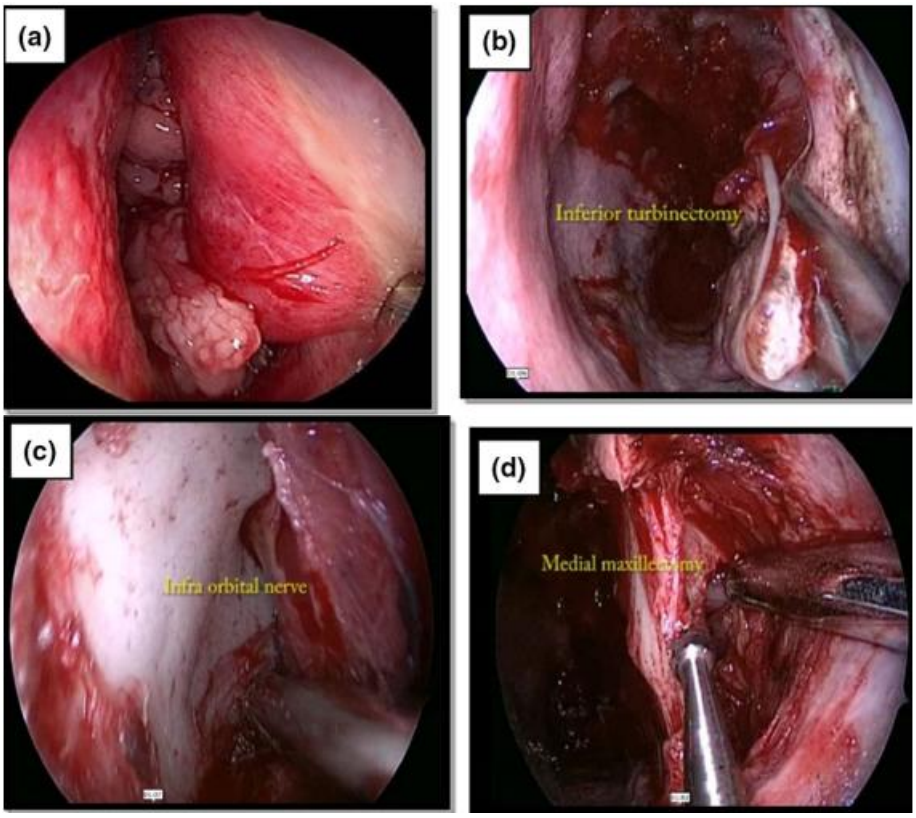

Figure 1: A) Mulberry like appearance of Inverted pappiloma on Endoscopy. B) Inferior Turbinectomy being done to create access. C) Identification and preservation of Infra-orbital nerve D) Anteromedial maxillectomy

2. Materials and Methods

The Prospective study was done in ENT department in Govt ENT Hospital,a tertiary care centre from 2023 to 2025. A total of 30 patients were identified. Demographic and clinical information were collected including age, gender and ethinicity. All patients were followed by periodic endoscopic evaluations. A written informed consent was obtained from all patients prior to surgery explaining the procedure, possible outcomes and complications.

3. Observations

A total of 30 patients were selected and the mean age of patients with sinonasal mass undergoing surgery through EDA was 37.13 ±15.84 years with most of them being below 20 years (30%) followed by 51-60yrs (26.6%). This trend suggests notable representation in both younger and older adult population.

Table 1: Age Distribution

Age	Frequency	Percentage
< 20 years	9	30.00%
21-30 years	2	6.67%
31-40 years	7	23.33%
41-50 years	4	13.33%
51-60 years	8	26.67%
Total	30	100.00%

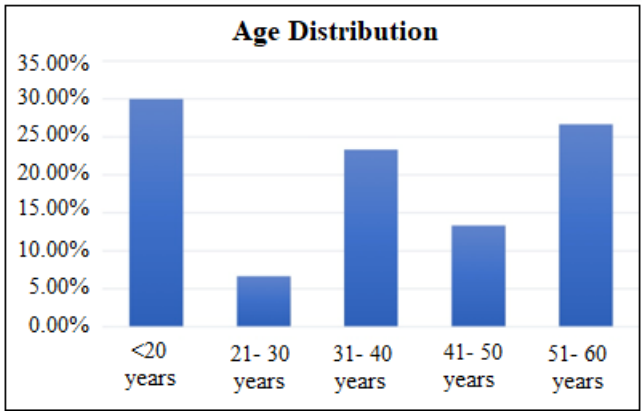

Figure 1: Bar chart showing Age Distribution

Gender distribution- Out of the 30 participants, 22 were males (73.33%) and 8 were females (26.67%). The ratio of males to females was2.75:1. Male predominance has also been seen in other studies on sinonasal masses, maybe attributing to greater environmental and occupational exposure to risk factors such as dust, smoke and industrial pollutants among men.

Table 2: Gender Distribution

Gender	Frequency	Percentage
Male	22	73.33%
Female	8	26.67%

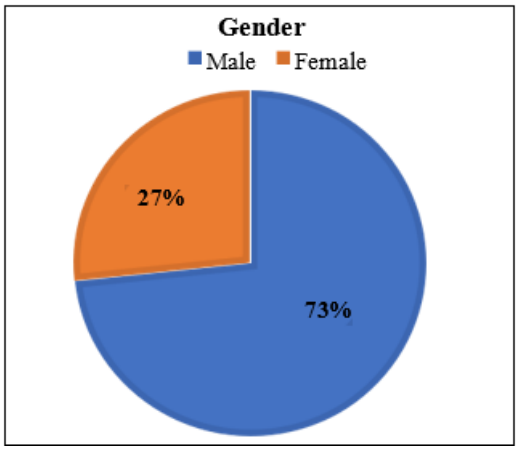

Figure 2: Pie chart showing Gender Distribution

Symptoms- most frequently reported symptom is nasal obstruction and facial pain/headache (93.33% each).

Table 3: Presenting Symptoms

Symptoms	Frequency	Percentage
Nasal obstruction	28	93.33%
Facial pain/headache	28	93.33%
Nasal discharge	22	73.33%
Hyposmia	17	56.67%
Epistaxis	14	46.67%
Cheek swelling	10	33.33%
Visual disturbances	4	13.33%

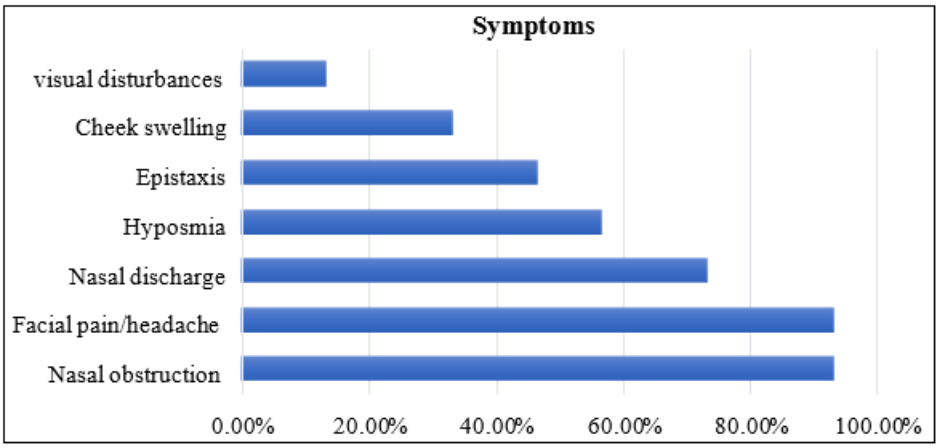

Figure 3: Bar chart showing Presenting Symptoms

History of previous surgery- majority of patients had no history of prior surgical intervention, while only 13.33% reported having undergone previous surgery.

Table 4: History of Previous Surgery

History of previous surgery	Frequency	Percentage
Yes	4	13.33%
No	26	86.67%

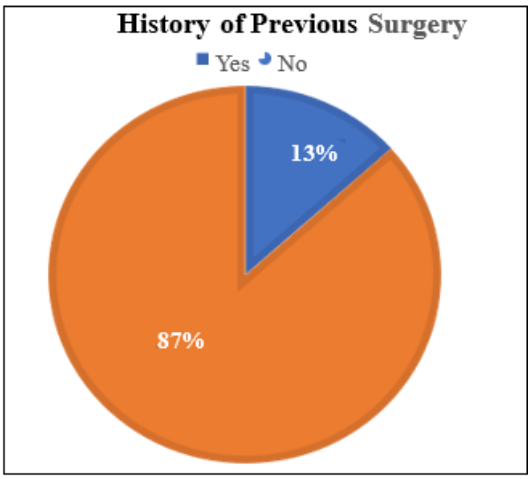

Figure 4: Pie chart showing History of Previous Surgery

Side of lesion- Lesions were more commonly located on the right side (56.67%) compared to the left side (43.33%).

Table 5: Side of Lesion

Side of lesion	Frequency	Percentage
Right	17	56.67%
Left	13	43.33%

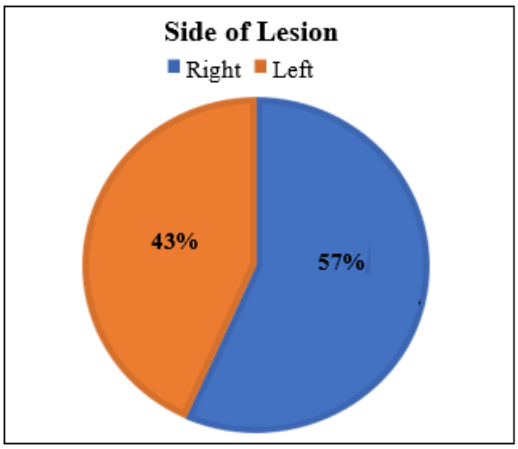

Figure 5: Pie chart showing Side of Lesion

Lesion involvement areas -The nasal cavity (90%) and maxillary sinus (83.33%) were the most frequently involved anatomical sites. Other affected areas included the ethmoid sinus (60%), sphenoid and sphenoethmoidal recess (53.33%), pterygopalatine fossa (36.67%), frontal recess (20%), orbit (16.67%), infratemporal fossa (10%), and skull base (3.33%).

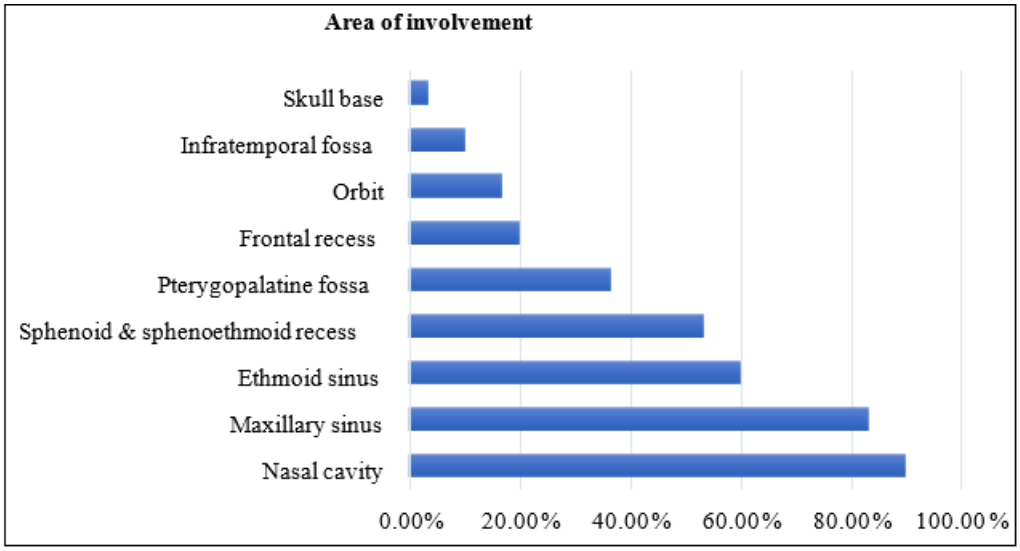

Figure 6: Bar chart showing Area of involvement

Histopathological examination- Histopathology confirmed inverted papilloma and juvenile nasopharyngeal angiofibroma in equal proportions (33.33% each). Other findings included fungal sinusitis (13.33%), mucocele (6.67%), and individual cases (3.33% each) of oncocytic papilloma, inverted papilloma with malignant transformation, squamous cell carcinoma, and granulomatous inflammation

Table 6: Histopathological Diagnosis

Histopathology	Frequency	Percentage
Inverted papilloma	10	33.33%
Juvenile nasopharyngeal angiofibroma	10	33.33%
Fungal sinusitis	4	13.33%
Mucocele	2	6.67%
Oncocytic papilloma	1	3.33%
Inverted papilloma with malignant transformation	1	3.33%
Squamous cell carcinoma	1	3.33%
Granulomatous inflammation	1	3.33%

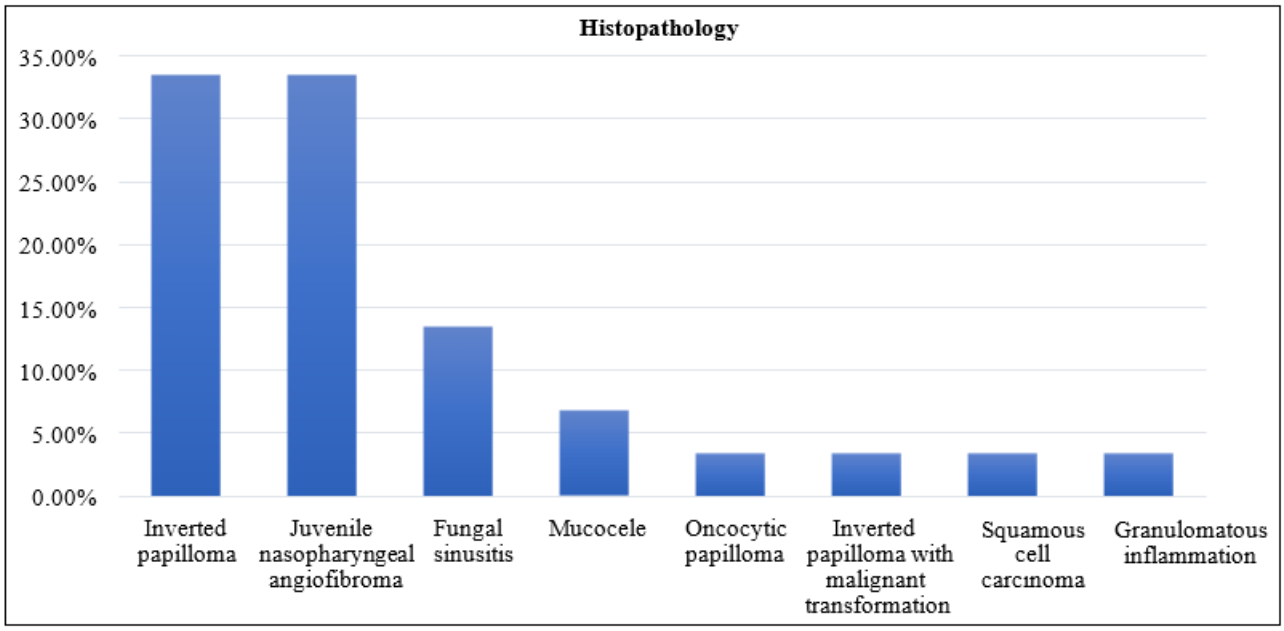

Figure 7: Bar chart showing Histopathological Diagnosis

Intraoperative complications were minimal. Infraorbital nerve injury occurred in 6.67% of cases and sphenopalatine artery bleeding in 3.33%, with no instances of cerebrospinal fluid (CSF) leak

Table 7: Intra operative complications

Intra operative complications	Frequency	Percentage
Infraorbital nerve injury	2	6.67%
Bleeding (sphenopalatine artery injury)	1	3.33%
CSF leak	0	0.00%

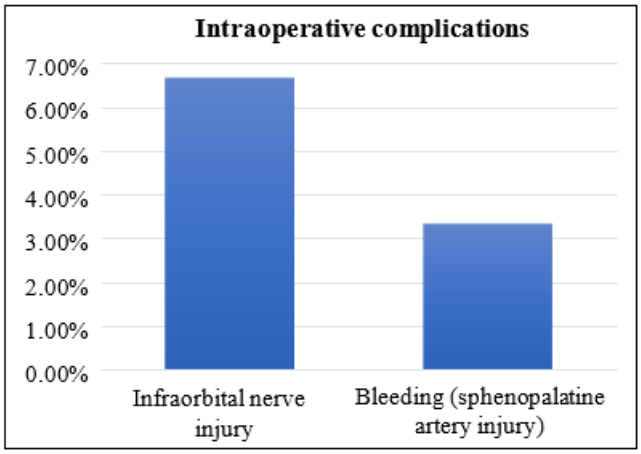

Figure 8: Bar chart showing Intraoperative complications

Postoperative complications -The most common postoperative complication was nasal crusting (16.67%), followed by epiphora (10%) and facial numbness (6.67%). One case of epistaxis was reported (3.33%), and there were no instances of CSF leak or alar collapse.

Table 8: Postoperative complications

Postoperative complications	Frequency	Percentage
Crusting	5	16.67%
Epiphora	3	10.00%
Facial numbness	2	6.67%
Epistaxis	1	3.33%
CSF leak	0	0.00%
Alar collapse	0	0.00%

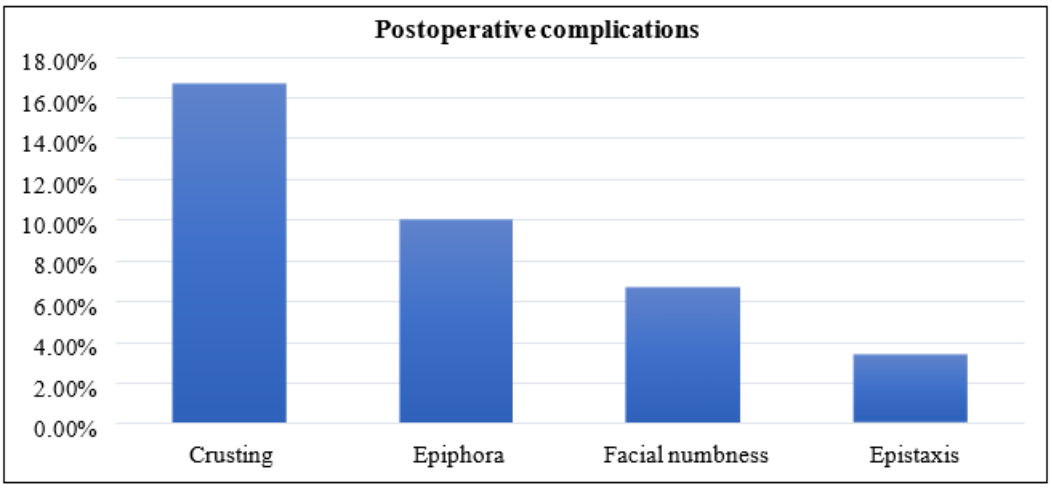

Figure 9: Bar chart showing Postoperative complications

Adjuvant therapy -Only 2 patients (6.67%) confirmed with malignancy required adjuvant therapy postoperatively, while the majority (93.33%) did not need further treatment

Table 9: Adjuvant Therapy

Adjuvant Therapy	Frequency	Percentage
Yes	2	6.67%
No	28	93.33%

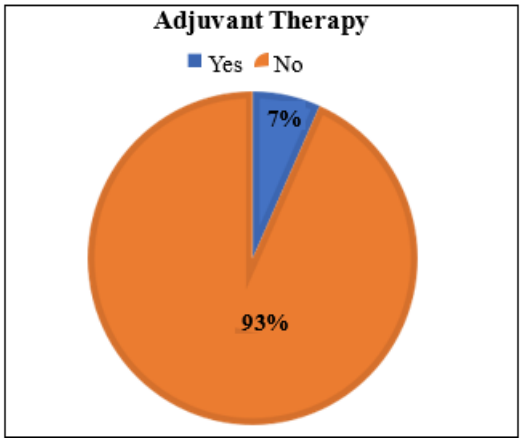

Figure 10: Pie chart showing Adjuvant Therapy

Recurrence rate -Recurrence was observed in 2 cases (6.67%), with the remaining 28 patients (93.33%) showing no signs of recurrence during follow-up.

Table 10: Recurrence Rate

Recurrence	Frequency	Percentage
Yes	2	6.67%
No	28	93.33%

Treatment of recurrence - One case of recurrence occurred at 10 months and was managed by total maxillectomy, while the other recurred at 12 months and was treated with revision endoscopic surgery. Both recurrences were identified via nasal endoscopy and CT imaging.

Table 11: Treatment of Recurrence

Recurrence	Time of recurrence	Diagnosis	Intervention
Case 1	10 months	Nasal endoscopy + CT	Total maxillectomy
Case 2	12 months	Nasal endoscopy + CT	Revision endoscopic surgery

4. Results

A total of 30 patients were selected majority of patients in study were less than 20yrs of age (30%), followed by 51–60 years (26.67%) and 31–40 years (23.33%). Males

constituted 73.33% of the participants, while females accounted for 26.67%, indicating a marked male predominance with a male-to female ratio of approximately 2.75:1. This gender disparity is consistent with findings from several published studies on sinonasal masses. The most frequently reported symptoms among patients with sinonasal masses were nasal obstruction and facial pain/headache (93.33% each), followed by nasal discharge (73.33%). In the present study, a history of previous sinonasal surgery was reported in 13.33% of patients, indicating that the majority (86.67%) underwent surgical management as a primary intervention.

The distribution of lesion laterality revealed that 56.67% of cases were located on the right side, while 43.33% were on the left. This indicates a slight predominance of right-sided sinonasal lesions among the study population. Inverted papilloma and juvenile nasopharyngeal angiofibroma (JNA) were the most frequent histopathological diagnosis, each accounting for 33.33% of cases. Intraoperative complications were encountered in a small fraction of patients, reflecting both the safety and technical efficacy of endoscopic approaches. The most frequent complication was infraorbital nerve injury, reported in 2 cases (6.67%). Adjuvant therapy was administered in only 2 patients (6.67%), while the majority (28 patients, 93.33%) did not require any additional postoperative treatment. This indicates that most cases were managed effectively with complete surgical excision alone, consistent with the typical management of benign sinonasal tumours. Recurrence was observed in two patients, accounting for a recurrence rate of 6.67%. Both cases were detected through nasal endoscopy and confirmed via CT imaging, highlighting the importance of vigilant postoperative surveillance using endoscopic and radiological evaluation.

5. Discussion

The management of sinonasal masses requires a balance between adequate exposure for complete excision and preservation of normal anatomy to reduce morbidity. The EDA has gained popularity in the recent years as it enables the surgeon to access the lateral extensions of the tumour in the infratemporal and parapharyngeal regions. This approach involves removal of frontonasal process of maxilla to widen the pyriform aperture and removal of nasolacrimal duct and at times the lacrimal sac[7]. In Endoscopic Denker's (Sturmann-Canfield) approach rather than staying medial to the pyriform aperture, as in endoscopic medial maxillectomy, the bony dissection is taken laterally over the face of the maxilla, whilst staying below the infraorbital nerve. The bony window therefore not only includes the medial wall, as in a radical endoscopic medial maxillectomy, but also the pyriform aperture and anterior maxillary wall[8]. In our study, EDA provided excellent surgical access to regions that are otherwise difficult to visualize endoscopically. The ability to directly access the anterior maxillary sinus and lateral nasal wall allowed for more complete disease clearance[9]. Compared to classical Denker's approach, the modified technique demonstrated reduced morbidity[10]. Preservation of key anatomical structures, particularly the infraorbital nerve and anterior maxillary wall (to certain extent) contributed to decreased postoperative complications such as facial numbness and cosmetic deformity. Additionally, the integration of endoscopic assistance improved illumination and magnification, enhancing surgical precision. Postoperative outcomes in our series showed satisfactory disease control with low recurrence rates, which may be attributed to improved visualization and complete excision. Complications when present were generally minor and manageable. Despite its advantages, the EDA is not without limitations. It requires surgical expertise, carries a learning curve and careful patient selection and preoperative imaging are essential to optimize outcomes.

Overall, the EDA remains a valuable addition to surgical armamentarium for sinonasal masses. It bridges the gap between endoscopic and open approaches, offering a balance of accessibility and reduced morbidity.

6. Conclusion

The endoscopic Denker's approach has proven to be a highly effective and safe surgical technique[11] for the management of various sinonasal masses, including benign but locally aggressive tumours such as inverted papilloma and juvenile nasopharyngeal angiofibroma. This study demonstrated excellent intraoperative access and complete tumour clearance with minimal morbidity, low complication rates, and a limited need for adjuvant therapy. The recurrence rate was also notably low with timely identification and successful re-intervention. The approach preserves cosmesis, minimizes patient discomfort, and allows for enhanced postoperative surveillance. Thus, the endoscopic Denker's technique stands as a reliable and superior modality in the comprehensive surgical management of complex sinonasal lesions.

Declarations

Funding
The author(s) received no financial support for the research, authorship and /or publication of this article.

Conflicts of interest
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and /or publication of this article.

Availability of data
Not applicable

Authors' contribution
All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by K Ramesh, B Sai Swarna, Nitya Goddanti, B Reshma, Archana Mekala. The first draft of the manuscript was written by B Sai Swarna and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval
The study protocol was approved by the institution ethics committee.

Consent to participate and publication

As this is prospective analysis, informed written consents from the patients were taken to be included in the study.

References

[1] Humayun AHMP, Huq AHZ, Ahmed SMT, Kamal MS, U K, Bhattacharjee N. Clinicopathological study of sinonasal masses. *Bangladesh J Otorhinolaryngol.* 2010;16(1):15-22.

[2] Lund VJ, Stammberger H, Nicolai P, et al. European position paper on endoscopic management of tumours of the nose,paranasal sinuses and skull base. *Rhinol Suppl.* 2010; 22: 1-143.

[3] Mc Cormick JP, Suh JD, Wang EW, et al. *Modified Endoscopic Denker's Approach for Management of Anterior Maxillary Sinus Tumors:* Multicenter Series of 58 cases. International Forum of Allergy & Rhinology. 2022. doi: 10.1177/1945892422111052.

[4] Stavrakas M, Karkos PD, Tsinaslanidouz, Constantinidis J. *Endoscopic Denker's Approach for the treatment of Extensive Sinonasal Tumors: Our Experience.* Laryngoscope. 2021;131(7): 1458-1462. doi:10.1002/lary.29235.

[5] Parikh SL, et al. *Endoscopic Modified Denker's Approach for the treatment of Juvenile Nasopharyngeal Angiofibroma.* Indian Journal of Otolaryngology and Head & Neck Surgery.2022.

[6] Verma D, Sharma N, Garg U, Singh R, Saheewala S. Modified endoscopic Denker's approach for benign Sinonasal tumors: Our surgical experience at a tertiary care center. *Otorhinolaryngol clin Int J.* 2022; 14(2):53-55.

[7] Bradoo R, Joshi A, Shah K, Patel T, Lohiya T. The Four-Post Bradoo Technique: An Alternative to the Modified Endoscopic Denker's Approach for Giant JNA. *Indian Otolaryngol head neck surg.*2017;69(suppl 2): 299-303.doi:10.1007/s12070-017-1150-1.

[8] Ashman A, Psaltis A J, Wormald PJ Tan NC-W.Extended endoscopic approaches to the maxillary sinus.The Journal of Laryngology and Otology.2020;134(suppl): 1-8. doi:10.1017/S0022215120000882.

[9] Baser B, Mishra A, Chaubey P. *Endoscopic Modified Denker's Approach for Management of Sinonasal Inverted Papilloma: Our Experience.* Indian Journal of Otolaryngology and Head & Neck Surgery. 2021;7393): 282- 289. doi :10.1007/s 12070-020-02090-7.

[10] Lee JT, Suh JD, Carrau RL, et al. Endoscopic Denker's approach fornresection of lesions involving the anteroinferior maxillary sinus and infratemporal fossa. *Laryngoscope.*2017;127(3):556-560.

[11] Lee JT, Yoo F, Wang M, Vengerovich G, Suh JD, Modified endoscopic Denker approach in management of inverted papilloma of the anterior maxillary sinus. *Int Forum Allergy Rhinol.* 2020;00:1-6. doi:10.1002/alr.22513.