International Journal of Research in Medical Sciences
Sridhar MR et al. Int J Res Med Sci. 2026 Mar;14(3):897-902
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20260354

Original Research Article

Comparative evaluation of surgical techniques for inferior turbinate hypertrophy: a prospective observational study

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Received: 17 January 2026
Revised: 08 February 2026
Accepted: 09 February 2026

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ABSTRACT

Background: Inferior turbinate hypertrophy (ITH) is a common cause of chronic nasal obstruction and significantly affects quality of life. When medical management fails, surgical reduction of the inferior turbinate is indicated. Multiple surgical techniques are available, but comparative evidence regarding their outcomes remains variable. To evaluate and compare the effectiveness of different surgical techniques for the management of inferior turbinate hypertrophy using subjective symptom assessment and objective endoscopic findings.

Methods: This prospective comparative observational study was conducted over 18 months at a tertiary care hospital and included 100 patients aged 18–65 years with chronic nasal obstruction due to inferior turbinate hypertrophy refractory to medical therapy. Patients underwent partial inferior turbinectomy (n=32), powered turbinectomy (n=21), submucous diathermy (n=25) or submucous resection (n=22). Nasal obstruction was assessed subjectively using the Visual Analogue Scale (VAS) and turbinate size was graded endoscopically preoperatively and at 3 months postoperatively. Statistical analysis was performed using SPSS, with $p < 0.05$ considered significant.

Results: The mean age was 40.92±14.05 years, with 59% males. Preoperatively, 64% of patients had severe nasal obstruction and 82% had Grade III turbinate hypertrophy. Mean VAS scores improved significantly from 8.06±1.41 to 3.57±1.79 postoperatively, with a mean improvement of 4.49±1.10. Postoperatively, 52% reported mild symptoms. Significant associations were observed between pre- and postoperative VAS severity ($p=0.013$) and turbinate grade ($p=0.003$). Although powered turbinectomy showed the highest mean VAS improvement, differences among techniques were not statistically significant ($p=0.165$). Overall complication rate was 17%, with epistaxis being most common. Patient satisfaction correlated significantly with VAS improvement ($p<0.001$).

Conclusions: All four surgical techniques resulted in significant symptomatic and objective improvement with acceptable complication rates. No single technique demonstrated clear superiority, highlighting the importance of individualized surgical selection.

Keywords: Inferior turbinate, Nasal obstruction, Turbinectomy, Submucous resection, Diathermy, Endoscopy

INTRODUCTION

Chronic nasal obstruction is one of the most frequently reported complaints in otorhinolaryngology and affects a substantial proportion of the global population.[1] Epidemiological studies estimate that up to one-third of individuals worldwide experience some degree of nasal obstruction during their lives, making it a common presenting symptom in clinical practice.[2] ITH is recognized as a leading structural etiology of chronic nasal obstruction, with observational data from large cohorts showing that up to approximately 72% of patients presenting with sinonasal symptoms have hypertrophied inferior turbinates and a majority of these exhibit clinically significant symptoms warranting intervention.[3]

Allergic rhinitis, a principal inflammatory contributor to turbinate enlargement, affects 10% to 40% of the general

population globally and in India the prevalence of allergic rhinitis and related upper airway allergic diseases is estimated at 20% to 30%.[4] Chronic nasal obstruction has been shown to significantly impair multiple domains of quality of life, including physical functioning, psychological health and social well-being, as measured by validated assessment tools in cross-sectional studies.[5]

In addition to the actual physical discomfort, chronic nasal congestion has an extensive clinical and psychological effect. Sleep disturbance, mouth breathing, snoring, daytime fatigue, poor concentration, decreased productivity at work are often expressed by the patients.[6] The mood disturbances, anxiety and general decrement in overall well-being due to persistence of nasal obstruction have also been associated to support the multidimensional implications.[7] Featuring acute inadequate oxygenation and fragmented sleep, in the most serious cases, hypoxia sets in lasting and sleep disturbances may only be getting worse.[8]

Inferior turbinate hypertrophy has long been treated in a progressive way, whereby pharmacotherapy is the first step.[2] The treatment includes intranasal corticosteroids, antihistamines, topical decongestants, leukotriene receptors blocker and saline irrigation.[9] Although these modalities are effective at reducing the mucosal inflammation and vascular congestion in most patients, a relatively significant proportion fall outside of effective results and experience either insufficient or temporary alleviation.[10]

Extended use of some agents, especially topical decongestants, is linked to such undesirable sequelae as rhinitis medicamentosa, mucosal dryness, epistaxis and rebound congestion.[11] However, long-term intranasal steroid therapy, which is rather considered as a safe method, can as well lead to the mucosal thinning, irritation and reduced compliance on the part of the patient due to ongoing symptoms or fear of long-term medication.[12,13]

Raised awareness of such limitations has driven the patient preferences toward non-pharmacological interventions that are definite and able to provide the patient with long-term relief of symptoms.[14] When used in the context of inferior turbinate hypertrophy, surgical care is performed to treat the structural and functional factors underlying nasal obstruction as opposed to providing a temporary form of symptom relief.[13,15] Importantly, modern surgical ideology focuses on preserving turbinate mucosa and physiological functionality and attaining adequate volume reduction in order to limit postoperative morbidity.[16]

An arsenal of surgical approaches has been developed in order to achieve this trade off, starting with conventional forms of resective surgery, then going on to mucosal-sparing and minimal invasive surgery.[9] The most common ones are partial inferior turbinectomy, submucous resection, submucous diathermy and powered turbinectomy. All methods work through a different mechanism of action, differ in the degree of tissue ablation, have dissimilar effects on the quality of the mucosa and have a different complication profile.[3] The current study was done to compare and contrast these four methods of surgical procedures of inferior turbinate hypertrophy among patients who had chronic nasal obstruction refractory to medical treatment.

Authors supposed that all the procedures would be significant to provide both symptomatic and objective improvement and no single method would prove to be unequivocally better, as long as it is conducted with the right patient selection. This study aims to provide evidence-based patient-centric surgical decisions on the treatment of inferior turbinate hypertrophy by incorporating patient-reported outcomes, Endoscopy examination, complication and satisfaction ratings.

METHODS

Study design and setting

This was a prospective comparative observational study conducted from April 2024 to October 2025 in the Department of Otorhinolaryngology at a tertiary care teaching hospital in India. The study was carried out over a period of 18 months following approval from the Institutional Ethics Committee. The study was performed in accordance with the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrolment.

Study population

The study included 100 patients aged 18 to 65 years who presented with chronic nasal obstruction attributable to inferior turbinate hypertrophy and were evaluated in the outpatient department of a tertiary care hospital. Patients were enrolled based on predefined eligibility criteria and included those with clinical and endoscopic evidence of inferior turbinate hypertrophy who had failed to respond to adequate medical management, comprising topical decongestants and antihistamines, administered for a minimum duration of six weeks.

Patients with or without an associated nasal septal deviation were eligible for inclusion. Individuals with inferior turbinate hypertrophy secondary to sinonasal polyposis, chronic rhinosinusitis, fungal sinusitis or sinonasal neoplasms were excluded from the study.

Patients were allocated to undergo one of the following four surgical procedures based on random allocation and surgeon availability. Partial inferior turbinectomy, powered inferior turbinectomy, submucous diathermy, submucous resection of the inferior turbinate.

All surgeries were performed under standard aseptic precautions by experienced otorhinolaryngologists using established operative techniques. Associated septal deviation, when present, was managed as per standard departmental protocol.

Postoperative assessment and follow-up

Patients were followed up for a period of three months postoperatively. Subjective assessment of nasal obstruction was repeated using the visual analogue scale at follow-up. Objective evaluation of inferior turbinate size and postoperative changes was performed using nasal endoscopy. Postoperative endoscopic findings assessed included turbinate size, edema, discharge, crusting, scarring and presence of polyps. Complications such as epistaxis, crusting, anosmia and paradoxical nasal obstruction were recorded. Patient satisfaction was assessed using a numerical satisfaction score ranging from 6 to 10.

Outcome measures

The primary outcome measure was improvement in nasal obstruction as assessed by change in VAS score from preoperative to postoperative evaluation. Secondary outcome measures included change in inferior turbinate grade on endoscopy, postoperative complications and patient satisfaction.

Statistical analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS). Continuous variables were expressed as mean±standard deviation and categorical variables were expressed as frequencies and percentages. Comparisons between preoperative and postoperative variables were performed using appropriate statistical tests. Associations between categorical variables were assessed using the Chi-square test and comparisons of mean values across groups were analyzed using analysis of variance (ANOVA). A p value of less than 0.05 was considered statistically significant.

RESULTS

Baseline characteristics of the study population

A total of 100 patients with chronic nasal obstruction due to inferior turbinate hypertrophy were included in the analysis. The mean age of the study population was 40.92±14.05 years, with a male predominance (59%). Nasal obstruction was reported by all patients (100%). Other common presenting symptoms included sneezing (78%), nasal discharge (71%), postnasal drip (58%), facial pain (52%), loss of smell (28%) and epistaxis (22%). Among comorbid conditions, asthma was present in 28% of patients, hypertension in 20% and diabetes mellitus in 16%. With respect to personal habits, 29% of patients were smokers, 17% reported alcohol consumption and 14% had a history of tobacco chewing.

Preoperative clinical and endoscopic profile

Preoperative assessment showed that 64% of patients had severe nasal obstruction (VAS score 8–10), while 36% had moderate obstruction (VAS score 6–7). Diagnostic nasal endoscopy revealed Grade III inferior turbinate hypertrophy in 82% of patients and Grade II hypertrophy in 18%. Septal deviation was observed in 67% of cases, with right-sided deviation in 40% and left-sided deviation in 27%, while 33% had a straight nasal septum.

Distribution of surgical procedures

Among the study population, partial inferior turbinectomy was performed in 32% of patients, powered turbinectomy in 21%, submucous diathermy in 25% and submucous resection in 22%.

Change in nasal obstruction severity following surgery

The mean preoperative VAS score was 8.06±1.41, which improved to 3.57±1.79 postoperatively, resulting in a mean improvement of 4.49±1.10. Postoperative assessment showed that 52% of patients had mild symptoms, 32% had moderate symptoms and 16% continued to have severe symptoms. A statistically significant association was observed between preoperative and postoperative VAS severity (χ^2=8.64, p=0.013).

Postoperative endoscopic outcomes and complications

Postoperative endoscopic evaluation demonstrated improvement in inferior turbinate size, with 42% of patients achieving Grade I hypertrophy, 38% Grade II and 20% remaining Grade III. The association between preoperative and postoperative turbinate grading was statistically significant (χ^2=11.92, p=0.003).

Postoperative endoscopic findings showed absence of edema in 46%, discharge in 70%, crusting in 63% and scarring in 79% of patients. Overall, postoperative complications were observed in 17% of cases, while 83% of patients experienced no complications. Epistaxis was the most common complication (10%), followed by crusting (5%). Anosmia and paradoxical nasal obstruction were observed in 1% of patients each.

Comparative outcomes across surgical techniques

Powered turbinectomy demonstrated the highest mean VAS improvement (4.81±1.08), followed by submucous resection (4.65±1.09), partial inferior turbinectomy (4.38±1.02) and submucous diathermy (4.12±1.15). However, the difference in VAS improvement among the four surgical techniques was not statistically significant (F=1.72, p=0.165). No significant association was observed between surgical technique and postoperative turbinate grade (χ^2=4.38, p=0.625), postoperative complications (χ^2=5.12, p=0.164) or septal deviation status (F=0.18, p=0.835). Higher Lund–Mackay score ranges were significantly associated with greater postoperative VAS severity (χ^2=16.74, p=0.002). Patient satisfaction scores demonstrated a strong positive association with VAS improvement (F=9.46, p<0.001).

Table 1: Baseline demographic characteristics, presenting symptoms, comorbidities and personal habits of study participants (n=100).

Variable	Category	N (%) / Mean±SD
Age (in years)	Mean±SD	40.92±14.05
Sex	Male	59 (59)
	Female	41 (41)
Symptoms	Nasal obstruction	100 (100)
	Sneezing	78 (78)
	Nasal discharge	71 (71)
	Postnasal drip	58 (58)
	Facial pain	52 (52)
	Loss of smell	28 (28)
	Epistaxis	22 (22)
Comorbidities	Asthma	28 (28)
	Hypertension	20 (20)
	Diabetes mellitus	16 (16)
Personal habits	Smoking	29 (29)
	Alcohol consumption	17 (17)
	Tobacco chewing	14 (14)

Table 2: Preoperative symptom severity, inferior turbinate grade and septal status (n=100).

Parameter	Category	N (%)
Preoperative VAS severity	Moderate (6–7)	36 (36)
	Severe (8–10)	64 (64)
Inferior turbinate grade	Grade II	18 (18)
	Grade III	82 (82)
Septal status	Deviated right	40 (40)
	Deviated left	27 (27)
	Straight	33 (33)

Table 3: Distribution of surgical procedures performed (n=100).

Surgical procedure	N (%)
Partial inferior turbinectomy	32 (32)
Powered turbinectomy	21 (21)
Submucous diathermy	25 (25)
Submucous resection	22 (22)

Table 4: Comparison of preoperative and postoperative VAS scores and severity distribution (n=100).

Parameter	Value
Preoperative VAS (Mean±SD)	8.06±1.41
Postoperative VAS (Mean±SD)	3.57±1.79
Mean VAS improvement	4.49±1.10
Postoperative severity	Mild
	Moderate
	Severe

Table 5: Postoperative inferior turbinate grading and complications (n=100).

Parameter	N (%)
Turbinate grade I	42 (42)
Turbinate grade II	38 (38)
Turbinate grade III	20 (20)

Continued.

Parameter	N (%)
No postoperative complications	83 (83)
Epistaxis	10 (10)
Crusting	5 (5)
Anosmia	1 (1)
Paradoxical nasal obstruction	1 (1)

DISCUSSION

This is a prospective observational study that compared clinical and endoscopic outcomes of the four prevalent surgical methods that are used to treat inferior turbinate hypertrophy among patients with chronic nasal blockage, which had remained unresponsive to medical treatment. The study aimed to determine whether different surgical techniques would have similar amount of lift in the nasal airflow and the amount of symptom burden and acceptable safety profile. All in all, surgery resulted in a regular symptomatic pain, objective decrease of turbinate volumetrics and patient contentment, thus indicating the role of inferior turbinate surgery as the means of therapy of patients carefully chosen. These results support modern information that a properly signalled turbinate surgery is effectively benefit imparting without unnecessary morbidity. The main objective of the research was the comparison of subjective change in nasal obstruction after disparate surgeries with the use of visual analogue scale (VAS) scores. The identified postoperative outcome enhancement in all procedures is in line with the existing literature which manifested the significant symptom relief after inferior turbinate reduction. Passali et al performed a randomized clinical trial comparing the techniques of surgery to the inferior turbinate and showed significant improvement in nasal obstruction regardless of technique used as long as volume reduction is the attribute which predicts the symptom relief and not the instrument used.[17]

Equally, Joniau et al have compared a number of turbinate reduction procedures and have not identified a single successful technique, as indicated by the lack of statistical significance concerning a difference between the procedure in the current study.[18] The same authors also pointed out that inferior turbinate enlargement is a significant source of nasal obstruction and that surgical reduction is found to have a reliable effect in improving subjective nasal obstruction, unless mucosal functioning is compromised Farmer et al.[19]

This may be attributed by the fact that there is no major difference between inter-techniques in our study, because of common physiological mechanisms, such as attenuation of venous sinuoids, enhancement of optimal airflow and increase of contact with the mucosal area, which leads to symptom improvement regardless of the method used. The secondary objectives included assessment of the objective endoscopic outcomes, Postoperative complications and patient satisfaction. The large change in the turbinate postoperative grading in this study is comparable to what was reported by Hol et al and Huizing et al who found that both resective and mucosal sparing method succeeded in reducing the bulk of the turbinate and enhancing nasal airway patency.[20] Sapci et al compared radiofrequency volumetric tissue reduction (RFTVR, mucosal-preserving) vs. traditional surgical trimming (resective) and found similar subjective symptom improvement (NOSE scores equivalent), RFTVR had significantly FEWER complications (less crusting, bleeding; $p<0.05$), amd RFTVR preserved better mucosal histology despite less volume reduction.[21] Our high correlation between symptom improvement and patient satisfaction ($F=9.46$, $p<0.001$) aligns with Correia et al who demonstrated VAS satisfaction strongly correlates with subjective symptom relief ($r=0.482$, $p=0.017$) rather than objective measures in turbinate surgery.[22]

Combined, the results of this paper would indicate that partial inferior turbinectomy, powered turbinectomy, submucous diathermy and submucous resection are viable solutions to the management of inferior turbinate hypertrophy that is not receptive to medical intervention. None of the methods openly proved to be better in clinical outcomes. It has a significant applied device, especially during resource-variable practices, since it promotes personalized surgical decision-making based on patient, surgeon knowledge and site infrastructure as opposed to utilizing one preferred approach. However, there are a number of constraints that should be mentioned. The post follow-up was limited to three months and no post effects in the long term like viability of the symptoms relief and late complications were determined. Also, since it is an observational study, the possibility of selection bias cannot be fully disregarded. Randomized studies with longer follow-up would be useful in developing long-term comparative outcomes of inferior turbinate surgery in the future.

CONCLUSION

The surgical control of turntoer of hypertrophy of the inferior turbinate in patients who have the symptoms of chronic nasal obstruction resistant to medical treatment creates important habits in symptoms and achieves as well as satisfactory results in terms of complications. The results of this research prove that partial inferior turbinectomy, powered turbinectomy, submucous diathermy and submucous resection are effective methods of the treatment procedure and no particular method has an evident advantage over another one.

These findings endorse a customized method of surgical decisions depending on the characteristics of the patients, the anatomy and the knowledge of the surgeon. The research could have been conducted with more extended follow-up and be randomized to further clarify the long-term outcomes and choose the technique.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Merma-Linares C, Martinez MD, Gonzalez M, Alobid I, Figuerola E, Mullol J. Management of Mechanical Nasal Obstruction Isolated or Associated to Upper Airway Inflammatory Diseases in Real Life: Use of both Subjective and Objective Criteria. Curr Allergy Asthma Rep. 2023;23(10):567–78.
2. Inferior Turbinate Hypertrophy: A Comparison of Surgical Techniques-PMC. Available at: https://pmc.ncbi.nlm.nih.gov/articles. Accessed on 21 September 2025.
3. Smith DH, Daines BS, Cazzaniga J, Bhandarkar ND. Surgical management of inferior turbinate hypertrophy in the era of widespread communicable disease. Cureus. 15(1):34280.
4. Akhouri S, House SA. Allergic Rhinitis. In: StatPearls. Treasure Island (FL): StatPearls Publishing. 2025. Available at: http://www.ncbi.nlm.nih.gov/books. Accessed on 21 September 2025.
5. Fageeh YA, Basurrah MA, ALAzwari KD, AlAmri MA. Prevalence of nasal obstruction and its impact on quality of life in Saudi Arabia. J Fam Med Prim Care. 2024;13(2):572-8.
6. Nyaiteera V, Nakku D, Nakasagga E, Llovet E, Kakande E. The burden of chronic rhinosinusitis and its effect on quality of life among patients re-attending an otolaryngology clinic in south western Uganda. BMC Ear, Nose Throat Disord. 2018;18(1):10.
7. Fu QL, Ma JX, Ou CQ, Guo C, Shen SQ. Influence of self-reported chronic rhinosinusitis on health-related quality of life: a population-based survey. PloS One. 2015;10(5):126881.
8. Chronic Nasal Congestion and Its Impact on Mental Health: What You Need to Know. Available at: https://www.sleepandsinuscenters.com/blog/chronic-nasal-congestion-and-its-impact-on-mental-health-what-you-need-to-know. Accessed on 21 September 2025.
9. Abdullah B, Singh S. Surgical Interventions for Inferior Turbinate Hypertrophy: A Comprehensive Review of Current Techniques and Technologies. Int J Environ Res Public Health. 2021;18(7):3441.
10. Clinical indicators: inferior turbinate surgery - american academy of otolaryngology-head and neck Surgery (AAO-HNS). Available at: https://www.entnet.org/resource/clinical-indicators-inferior-turbinate-surgery. Accessed on 21 September 2025.
11. Salama B, Elboraei Y, Alenezy A, Alrwaili MRA, Alanazi AS, Alanazi FH, et al. Prevalence, Usage Patterns and Side Effects of Nasal Decongestants Among the General Population in Arar City: A Cross-Sectional Study. J Pioneer Med Sci. 2025;14:81–6.
12. Safety concerns of nasal corticosteroids usage in patients with allergic rhinitis-PMC. Available at: https://pmc.ncbi.nlm.nih.gov/articles. Accessed on 21 September 2025.
13. Rollema C, van Roon EN, Ekhart C, van Hunsel FP, de Vries TW. Adverse drug reactions of Intranasal corticosteroids in the Netherlands: an analysis from the Netherlands Pharmacovigilance Center. Drugs-Real World Outcomes. 2022;9(3):321-31.
14. Taha HI, Elgendy MS, Ezz MR, Tolba K, El Safty M, Azzawi MADA, et al. Septoplasty versus non-surgical management for deviated nasal septum: a systematic review and meta-analysis of randomized controlled trials. Eur Arch Otorhinolaryngol. 2025;282(2):597–610.
15. Karamatzanis I, Kosmidou P, Ntarladima V, Catalli B, Kosmidou A, Filippou D, et al. Inferior Turbinate Hypertrophy: A Comparison of Surgical Techniques. Cureus. 14(12):32579.
16. Scheithauer MO. Surgery of the turbinates and "empty nose" syndrome. GMS Curr Top Otorhinolaryngol Head Neck Surg. 2011;27:93.
17. Treatment of inferior turbinate hypertrophy: a randomized clinical trial-PubMed. Available at: https://pubmed.ncbi.nlm.nih.gov. Accessed on 21 September 2025
18. Joniau S, Wong I, Rajapaksa S, Carney SA, Wormald PJ. Long-term comparison between submucosal cauterization and powered reduction of the inferior turbinates. Laryngoscope. 2006;116(9):1612–6.
19. Farmer SEJ, Eccles R. Chronic inferior turbinate enlargement and the implications for surgical intervention. Rhinology. 2006;44(4):234–8.
20. Hol MKS, Huizing EH. Treatment of inferior turbinate pathology: a review and critical evaluation of the different techniques. 2021;4:59-63.
21. Sapçi T, Sahin B, Karavus A, Akbulut UG. Comparison of the effects of radiofrequency tissue ablation, CO2 laser ablation and partial turbinectomy applications on nasal mucociliary functions. Laryngoscope. 2003;113(3):514–9.
22. Tavares Correia J, Sousa F, Silva-Carvalho I, Meireles L, Santos M. Correlation between sinonasal outcome test-22 (SNOT-22) scores and patient satisfaction with nasal breathing after septoplasty with inferior turbinate reduction. Cureus. 2025;17(2):79500.

Cite this article as: Sridhar MR, Teja PS, Sharanam S. Comparative evaluation of surgical techniques for inferior turbinate hypertrophy: a prospective observational study. Int J Res Med Sci 2026;14:897-902.