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Effectiveness of Medical and Surgical Treatments in Managing Inferior Turbinate Hypertrophy: A Systematic Review

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Abstract

Inferior turbinate hypertrophy is a major cause of chronic nasal obstruction and significantly reduces quality of life. Multiple treatment modalities are available, ranging from medical therapy to minimally invasive procedures and conventional surgery, yet their comparative clinical effectiveness remains unclear. This systematic review followed the PRISMA protocol. Literature searches were conducted in PubMed, SpringerLink, ScienceDirect, and Google Scholar. A total of 3,300 records were identified, and 27 studies met the inclusion criteria. Clinical outcomes were assessed using patient-reported symptom scales and quality-of-life instruments, including the Visual Analogue Scale, Nasal Obstruction Symptom Evaluation, and Sino-Nasal Outcome Test (SNOT-20/22). Overall, 25 of 27 studies (92.6%) reported clinically significant improvement in nasal obstruction symptoms. Surgical interventions demonstrated the most consistent effectiveness, with all surgical studies (100%) reporting significant symptom reduction and quality-of-life improvement, particularly with inferior turbinoplasty and microdebrider-assisted techniques. Minimally invasive modalities such as radiofrequency ablation and laser therapy were effective in 90% of studies, mainly providing faster early symptom relief with low complication rates. In contrast, medical therapy showed improvement in mild to moderate cases but was generally less durable and less effective compared to procedural interventions. Evidence suggests that surgical reduction, especially microdebrider-assisted turbinoplasty and inferior turbinoplasty, provides the most consistent and sustained clinical benefit in patients with inferior turbinate hypertrophy refractory to medication.

Keywords: inferior turbinate hypertrophy, management, medical, minimal invasive, surgical

INTRODUCTION

Turbinate hypertrophy is one of the most common causes of chronic nasal airway obstruction.[1] Turbinate hypertrophy itself is defined as enlargement of the nasal mucosa in the turbinates and is caused by an increase in the size of the turbinate mucosal cells. The anatomy most commonly affected by hypertrophy is the inferior turbinate. This condition is caused by the inferior turbinate having a larger anatomical size compared to other turbinate structures.[2]

Inferior turbinate hypertrophy is known to be quite prevalent in various populations worldwide, with an estimated prevalence ranging from 10–20% in the general adult population. This condition is often associated with various etiological factors such as allergic rhinitis, vasomotor rhinitis, recurrent infections, and long-term exposure to environmental irritants. Inferior turbinate hypertrophy significantly affects the quality of life of sufferers through various clinical manifestations such as difficulty breathing, sleep disturbances, decreased sense of smell, and other systemic complaints such as headaches and chronic fatigue. Due to these widespread clinical and socioeconomic impacts, inferior turbinate hypertrophy has become an important concern in the field of health, particularly in terms of effective management to improve patients' quality of life.[3]

Turbinate hypertrophy is influenced by both allergic and non-allergic factors. Allergic rhinitis is the most common allergic cause. Meanwhile, non-allergic factors include vasomotor disorders, exposure to chemicals, temperature or air, anatomical abnormalities, and infections.[2] Turbinate enlargement may occur unilaterally or

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bilaterally and involves two main components: mucosal and bony hypertrophy. Mucosal enlargement is primarily driven by venous sinus dilation, resulting in increased tissue volume due to elevated blood flow. Chronic inflammation or allergic responses may further contribute through mucosal edema and structural remodeling, including cellular hypertrophy and hyperplasia. In addition, bony enlargement of the inferior turbinate may occur due to similar remodeling processes within the turbinate bone, leading to thickening that further worsens nasal airway obstruction. Overall, combined mucosal and bony changes can significantly impair nasal airflow, reduce quality of life, and should be considered when selecting appropriate medical or surgical management.[1]

The occurrence of turbinate hypertrophy can be characterized by chronic nasal congestion, excessive, thick, and mucopurulent nasal secretions.[4] Mucopurulent nasal secretions are typically found at the base of the nasal cavity and between the inferior turbinate and the septum. Some patients with turbinate hypertrophy also complain of impaired sense of smell, headaches, a heavy feeling in the head, dryness in the pharynx, post-nasal drip, impaired Eustachian tube function, and reduced work productivity. During initial examination, the turbinate will appear swollen and red. The turbinate mucosa is thickened and does not bend when pressed.[2]

Treatment can be either medical and surgical treatments. Medical treatment includes antihistamines, decongestants, corticosteroids, mast cell stabilizers, and immunotherapy. Both systemic and local decongestants are effective in treating nasal obstruction due to turbinate hypertrophy. Corticosteroids are effective for nasal obstruction but have side effects such as easy nosebleeds, dry mucosa, and crusting. In chronic cases where connective tissue has formed due to chronic inflammation that no longer responds to medication after two months of treatment, surgical intervention may be performed.[5] Surgical treatment consists of conventional surgery (total and partial turbinectomy, turbinoplasty, and submucosal resection) and minimally invasive surgery (radiofrequency ablation, coblation, laser cautery, electrocoagulation, vidian neurectomy, and cryosurgery).[6] Surgical procedures for turbinate hypertrophy were first performed by Hartman in the 1890s, after which many techniques were developed. The main goal of surgery is to improve nasal breathing and maintain physiological function.[7]

This study aims to compare various treatment modalities available for inferior turbinate hypertrophy, both medical and surgical approaches, to determine the most effective and appropriate treatment strategy for patients. With this systematic review, it is hoped that evidence-based recommendations can be obtained to assist clinicians in selecting the optimal therapy according to the patient's condition and reducing the risk of unwanted side effects.

METHODS

This study applied a systematic review design using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) method, which consists of four stages, namely journal identification, journal screening, journal eligibility, and final accepted journal results.

Search Strategy

Literature was obtained from four main databases, with a total of 3,300 articles consisting of PubMed (n = 554), SpringerLink (n = 614), Science Direct (n = 942), and Google Scholar (n = 1,190). The search was conducted systematically using a combination of relevant keywords, namely "('turbinate hypertrophy' OR 'inferior turbinate enlargement') AND ('treatment' OR 'management') OR ('antihistamines' OR 'decongestants' OR 'corticosteroids' OR 'mast cell stabilizers') OR ('turbinectomy' OR 'turbinoplasty' OR 'submucosal resection' OR 'radiofrequency ablation' OR 'coblation' OR 'laser cautery' OR 'electrocoagulation')". There was no screening related to publication year or availability of literature in this identification stage. All search results were stored in Zotero software and combined from the databases.

Journal Screening

The screening process was conducted to filter relevant articles based on inclusion and exclusion criteria. The inclusion criteria for this study were articles that were relevant to the research topic based on the title, keywords, and abstract screening. Only original research articles were included. In addition, studies were required to have accessible full-text articles and be published in English between 2015-2025. The exclusion criteria included duplicate records and articles removed for other reasons prior to screening. During the screening process, studies were excluded if the title or abstract was not relevant to the topic. Articles were also excluded if they were not original research articles, if the full text was not accessible, or if the publication was not written in English. Articles were selected based on the relevance of the title and abstract to the research topic. A total of 1,857 were excluded because of irrelevant titles and 115 articles had irrelevant abstracts. Furthermore, screening was carried out to ensure full access to the article text, and 41 freely accessible articles were selected for further evaluation.

Journal Eligibility

Total of 41 articles that passed the screening process were then evaluated for eligibility. The evaluation was based on relevance to the research topic, methodology used, quality of research results, and relevant publication period (2015–2025). 14 articles were excluded because they did not meet the eligibility criteria, mainly because they were not included in the specified time period. Summary of the restriction criteria presented in **Figure 1.**

Final Results Included

From the entire selection process, 27 articles met all inclusion criteria and were selected for further analysis in a systematic review. The accepted articles covered topics relevant to the effectiveness of various therapeutic modalities in the management of inferior turbinate hypertrophy. Table 1 summarizes the characteristics and findings of the included studies.

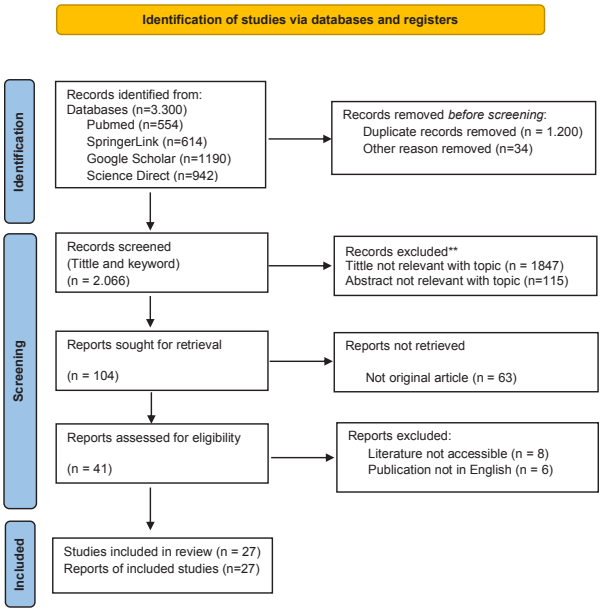

Figure 1. PRISMA Flow Chart Diagram

RESULTS

This review includes 27 studies examining various treatment modalities for inferior turbinate hypertrophy, including medical, non-medical, and surgical therapies. The studies analyzed (Table 1) had diverse research designs, with a total population that included patients of various ages and causes of nasal obstruction due to inferior turbinate hypertrophy. Based on the study design, 16 studies (59.3%) were RCTs, 6 studies (22.2%) were non-randomized comparative or prospective observational studies, and the rest consisted of cross-sectional, descriptive, or retrospective studies (18.5%). This indicates that most of the evidence analyzed has a high level of internal validity. In terms of intervention type, 2 studies (7.4%) assessed medical therapy, 10 studies (37%) evaluated minimally invasive therapy, and 15 studies (55.6%) assessed various forms of surgical or combined surgical procedures. This indicates a greater tendency to evaluate invasive approaches compared to conservative ones, in line with the fact that most patients in these studies were those who did not respond to previous therapy.

The effectiveness of therapy was assessed using various instruments, such as the Visual Analogue Scale (VAS), Nasal Obstruction Symptom Evaluation (NOSE), and Sino-Nasal

Outcome Test (SNOT-20/22). A total of 25 out of 27 studies (92.6%) reported clinically significant results in terms of improvement in nasal obstruction symptoms and increased quality of life post-intervention. Specifically, all studies evaluating surgical procedures (15 studies, 100%) showed positive results, both in the short and long term. Among these surgical interventions, inferior turbinoplasty and microdebrider-assisted techniques were the most commonly used and demonstrated high stability in symptom improvement.[8]

Minimally invasive interventions such as radiofrequency ablation, laser, cryosurgery, and silver nitrate cauterization, 9 out of 10 studies (90%) reported effective results, particularly in reducing symptoms in the early recovery phase and with a low complication rate. However, some techniques, such as Potassium Titanyl Phosphate (PTP) laser are associated with local complications like crusting and synechia, which were noted in 2 studies (20% of the minimally invasive group). Meanwhile, of the two medical treatment studies, both (100%) reported improvement in nasal symptoms, but with relatively lower efficacy compared to minimally invasive and surgical approaches, as well as with a more limited duration of effect. Of the total, 21 studies (77.8%) utilized the VAS scale as a symptom measurement tool, making it the most commonly used instrument for assessing treatment efficacy. Additionally, 14 studies (51.9%) also measured patients' quality of life post-treatment using standard instruments such as SNOT-20/22 and SF-36. Furthermore, 7 studies (25.9%) specifically compared two techniques within the same group, such as Submucosal Diathermy (SMD) vs. turbinoplasty, or coblation vs. partial turbinectomy, and in all of these studies, one technique tended to be superior to the other in terms of both effectiveness and complications. Among them, microdebrider-assisted turbinoplasty emerged as the technique that provided the best clinical results with minimal complications.[9]

The data indicate that surgical therapy is the most evaluated option and shows the most consistent results in improving symptoms of inferior turbinate hypertrophy. Minimally invasive therapy is an effective alternative for certain patients, particularly those who wish to avoid invasive procedures, while medical therapy is more suitable for use in the early stages or as adjunctive therapy. These results underscore the importance of individualizing therapy based on patient profile, symptom severity, and response to previous therapy.

Table 1. Characteristics and summary of findings of included studies

Author	Study Design	Population	Intervention		Comparison
			Category	Specific Technique	
Akagun et al., (2016)[10]	RCT	40 patients with nasal obstruction, did not respond to medical treatment	Minimally invasive	Radiofrequency Thermal Ablation (RFTA)	Microdebrider-Assisted Turbinoplasty
Ali A et al., (2024)[11]	RCT	40 patients with nasal obstruction, did not respond to medical treatment	Surgery	Partial Inferior Turbinectomy (PIT)	Coblation-Assisted Inferior Turbinate Reduction
Al Sumairi et al., (2024)[12]	Cross-Sectional Study	301 adult patients with inferior turbinate hypertrophy who underwent turbinoplasty	Surgery	Inferior turbinate reduction (medial flap, microdebrider)	-
Aydoğdu and Bayram., (2020)[13]	RCT	47 patients with nasal obstruction with/without allergic rhinitis	Minimally invasive	Radiofrequency (RF) ablation with allergic rhinitis	RF ablation without allergic rhinitis
Bozan et al., (2019)[14]	Retrospective study	66 patients with nasal obstruction due to septal deviation	Surgery	Turbinoplasty	Bipolar outfracture and cauterization
Gunturu et al., (2019)[15]	Prospective descriptive study	50 patients with inferior turbinate hypertrophy and/or allergic rhinitis who did not respond to medical treatment	Surgery	Submucosal turbinoplasty	-

Guvenmez et al., (2023)[16]	Comparative study	638 patients with chronic rhinitis and chronic turbinate hypertrophy and 520 control patients	Minimally invasive	*Silver nitrate cauterization*	Control group
Iqbal et al., (2017)[17]	RCT	120 patients with inferior turbinate hypertrophy who had nasal obstruction and did not respond to treatment	Minimally invasive	*Submucosal Diathermy* (SMD)	*Microdebrider-Assisted Turbinoplasty*
Ibrahim et al., (2017)[18]	Comparative study	40 patients with inferior turbinate hypertrophy who did not respond to medical treatment	Surgery	*Powered turbinoplasty*	*Powered turbinectomy*
Karataş (2017)[19]	Comparative study	50 patients with bilateral inferior turbinate hypertrophy aged ≥18	Medical therapy	Nasal decongestant (*oxymetazoline*)	*Sseroid spray (mometasone furoate)*
Karodpati et al., (2019)[20]	RCT	50 patients with septal deviation accompanied by inferior conchae hypertrophy	Surgery	Septoplasty only	Septoplasty with turbinectomy
Karamatzanis et al., (2022)[21]	Prospective study	205 patients with inferior turbinate hypertrophy requiring surgical management (3 different method groups)	Minimally invasive	*Radiofrequency ablation*	*Microdebrider* and *electrocautery*
Koçak et., al (2016)[22]	Prospective, Randomized, Single-Blind Study	71 patients with inferior turbinate hypertrophy who did not respond to medical therapy	Minimally invasive	Monopolar *radiofrequency* (MP RF)	*Bipolar radiofrequency* (BP RF)
Yasir L., (2015)[23]	RCT	25 patients with nasal obstruction due to inferior turbinate hypertrophy who did not respond to medical therapy	Surgery	*Microdebrider-Assisted Turbinoplasty* (MAT)	Submucosal Diathermy (SMD)
Mahato et al., (2018)[24]	Descriptive Cross-Sectional	50 patients with symptomatic inferior turbinate hypertrophy aged 15–45 years	Minimally invasive	Reduction with Diode laser (980 nm)	-
Mehta et al., (2019)[25]	Non-Controlled Randomized Study	150 patients with nasal obstruction due to inferior turbinate hypertrophy who did not respond to medical treatment	Minimally invasive	*Turbinoplasty* with *Turbinator wand*	Turbinoplasty with Reflex Ultra wand
Nguyen et al., (2024)[26]	RCT	108 patients underwent septoplasty with inferior turbinate hypertrophy.	Surgery	Medial flap inferior turbinoplasty + septoplasty	Inferior turbinator coblation turbinoplasty + septoplasty
Nilsen et al., (2018)[27]	Prospective observational study	171 patients with septal deviation, septal deviation with ITH, or ITH alone	Minimally invasive	Inferior Conchae Radiofrequency Therapy (RFIT)	-
Ravichandran et al., (2020)[28]	RCT	209 patients with inferior turbinate hypertrophy did not respond to medical therapy.	Minimally invasive	Potassium Titanyl Phosphate (PTP) Laser	Laser Diode
Rifki D., (2021)[29]	Retrospective Cohort	30 patients with complaints of nasal obstruction, sneezing, itching, and mucus	Minimally invasive	*Erbium YAG laser* (non-ablative and thermal SMOOTH)	-
Samarei and Mabarian (2020)[30]	RCT	137 patients with nasal obstruction due to septal deviation and contralateral inferior turbinate hypertrophy	Surgery	Septoplasty without inferior turbinoplasty	Septoplasty with inferior turbinoplasty

Satpute et al., (2020)[31]	RCT	70 patients aged 20–40 years with inferior turbinate hypertrophy	Minimally invasive	*Cryosurgery*	*Trichloroacetic Acid* (TCA) Cautery
Senturk et al., (2019)[32]	Descriptive Cross-Sectional	27 patients with inferior turbinate hypertrophy and nasal obstruction	Minimally invasive	*Radiofrequency*	-
Shinde et al., (2024)[33]	Prospective comparative	56 patients with nasal septal deviation and inferior turbinate hypertrophy	Minimally invasive	*Submucosal Diathermy* (SMD)	*Inferior Turbinoplasty* (IT)
Türk et al., (2018)[34]	Non-randomized prospective	59 patients (37 women, 22 men) aged 18–67 years with inferior turbinate hypertrophy	Minimally invasive	*Radiofrequency Ablation* (RFA)	-
Uluyol et al., (2016)[35]	Comparative study	43 patients (23 RFTA, 20 BEC) with inferior turbinate hypertrophy	Minimally invasive	*Radiofrequency Thermal Ablation* (RFTA)	*Bipolar Electrocautery* (BEC)
Vijayakumar et al., (2016)[36]	Descriptive	30 patients with inferior turbinate hypertrophy did not respond to therapy.	Minimally invasive	*Potassium Titanyl Phosphate* (PTP) Laser	-

Total of 27 studies were included in this review in Table 1., comprising randomized controlled trials, prospective and retrospective studies, and cross-sectional analyses. The total sample involved more than 2,700 patients diagnosed with inferior turbinate hypertrophy who did not respond adequately to medical management.

Wide range of surgical and minimally invasive techniques were investigated, including radiofrequency ablation (RFA), microdebrider-assisted turbinoplasty (MAT/MAIT), submucosal diathermy (SMD), coblation, diode and potassium titanyl phosphate (PTP) laser, cryosurgery, trichloroacetic acid (TCA) cautery, and turbinectomy.[32,37] Several studies also compared these procedures with septoplasty alone, intranasal pharmacologic therapy, or non-surgical management. The findings indicated that surgical reduction of the inferior turbinate resulted in significant improvement in nasal patency, reduction of nasal obstruction symptoms, and enhancement of overall quality of life. Among the evaluated methods, radiofrequency ablation and microdebrider-assisted turbinoplasty consistently demonstrated superior clinical outcomes, fewer postoperative complications, and better preservation of mucosal integrity compared with more aggressive resection techniques.[38]

The aggregated evidence supports that minimally invasive inferior turbinate reduction procedures, particularly radiofrequency ablation and microdebrider-assisted turbinoplasty represent effective and safe treatment modalities that provide optimal symptom relief while maintaining nasal function in patients with refractory inferior turbinate hypertrophy.

Table 2. evaluated various clinical outcomes and effectiveness measures following different surgical and minimally invasive procedures for inferior turbinate hypertrophy. The most frequently assessed parameters included the Visual Analog Scale (VAS), Nasal Obstruction Symptom Evaluation (NOSE) score, Saccharin Transit Time (STT), rhinomanometry, and quality of ife indices such as SNOT-20 and SNOT-22.

Table 2. Outcomes and effectiveness of included study findings

Author	Outcome	Effectiveness
Akagun et al., (2016)[10]	Visual Analog Scale (VAS) for measuring symptoms of nasal obstruction - Saccharin Transit Time (STT) to assess mucociliary function - Rhinomanometry to assess nasal patency	MAIT showed faster improvement in nasal obstruction symptoms in the first week postoperatively than RFTA, but both techniques provided effective results in the long term.
Ali A et al., (2024)[11]	Visual Analog Scale (VAS)	Coblation demonstrated shorter operative time, less blood loss, and less postoperative pain than PIT. PIT demonstrated a more significant reduction in postoperative nasal obstruction, but Coblation had a faster recovery and fewer complications.
Al Sumairi et al., (2024)[12]	Measurement of symptoms of nasal obstruction, nasal discharge, sneeze, headache, snoring, and hyposmia - Rhinomanometry	Most patients showed significant postoperative improvement. Nasal patency was excellent with the SMD, microdebrider, out-fracture, and medial flap techniques. Complications such as crusting and postoperative bleeding occurred in only a small proportion of patients.
Aydoğdu and Bayram., (2020)[13]	Symptom measurement using SNOT-22, peak nasal inspiratory flowmetry, and olfactory function through the CCCRC test	Both groups showed significant improvements in nasal airflow, quality of life, and olfactory function postoperatively. However, the group without allergic rhinitis showed greater improvements than the group with allergic rhinitis.
Bozan et al., (2019)[14]	Inferior turbinate volume was measured by CT before and after surgery.	Turbinoplasty results in a greater reduction in turbinate volume than outfracture, as well as a smaller postoperative turbinate volume.
Gunturu et al., (2019)[15]	Visual Analog Scale (VAS) and endoscopic assessment	Submucosal turbinoplasty combined with immunotherapy and pharmacotherapy improved quality of life. Improvement in VAS scores and reduction in endoscopic scores were noted.
Guvenmez et al., (2023)[16]	Nasal Obstruction Symptom Evaluation (NOSE) Score	Silver nitrate cauterization is effective as a non-surgical alternative to reduce nasal obstruction, with significant improvement in inspiratory function and reduction in NOSE scores after 1 and 3 months.
Iqbal et al., (2017)[17]	Nasal Obstruction Relief, Nasal Patency (VAS), and Endoscopic Findings	MAT showed better results in improving nasal obstruction symptoms and more stable long-term results than SMD, but SMD showed faster results in initial improvement.
Ibrahim et al., (2017)[18]	Turbinate size measurement and postoperative complications (crustation, bleeding, mucus)	Both procedures successfully reduced the size of the turbinates, but powered turbinoplasty showed fewer complications.
Karataş (2017)[19]	Visual Analog Scale (VAS) and Peak Nasal Inspiratory Flow (PNIF)	Nasal decongestants provide better results than intranasal steroids, but both have a positive effect on the recovery of inferior turbinate hypertrophy.
Karodpati et al., (2019)[20]	NOSE (Nasal Obstruction Symptom Evaluation)	Septoplasty with turbinectomy showed greater improvement in symptoms such as nasal congestion, difficulty breathing, and sleep disturbances.
Karamatzanis et al., (2022)[21]	Comparison of complication rates between techniques	Microdebrider-assisted turbinoplasty has the lowest complication rate, followed by RF ablation and electrocautery; all three are effective in relieving symptoms.
Koçak et., al (2016)[22]	Visual Analog Scale (VAS)	Both techniques are effective long-term, but MP RF provides faster symptom relief and less procedural pain than BP RF.
Yasir L., (2015)[23]	Subjective symptom measurement and endoscopic evaluation	MAT showed a significant reduction in sneezing after 3 months and better mucosal outcomes than SMD which had more mucosal complications.
Mahato et al., (2018)[24]	Symptom improvement with VAS	Turbinate reduction with diode laser is a safe procedure under local anesthesia; 86% of patients experienced improvement in nasal obstruction symptoms within 1 month.
Mehta et al., (2019)[25]	VAS and Nasal Endoscopic Score (NES)	Both methods are effective long term, but the Turbinator Wand provides faster improvement in the first week.
Nguyen et al., (2024)[26]	VAS, SNOT-22, NOSE	Coblation showed more significant improvement in symptoms and quality of life than medial flap turbinoplasty.
Nilsen et al., (2018)[27]	VAS, HQOL (SNOT-20, SF-36)	All groups showed significant improvement, the combination of septoplasty + RFIT was most effective in nasal obstruction symptoms.
Ravichandran et al., (2020)[28]	NOSE score and STT	Laser PTP is more effective in improving symptoms, but has more complications of crusting and synechia.

Rifki D., (2021)[29]	NO Score and VAS	Erbium YAG laser is simple, safe, and non-invasive; results show significant improvement for up to 6 months.
Samarei and Mabarian (2020)[30]	NOSE and VASE	Septoplasty with turbinoplasty provides more visible improvements up to 48 months post-operatively.
Satpute et al., (2020)[31]	SNOT-20 Score and complications (bleeding, scarring, infection, adhesions)	Cryosurgery is safer and more curative than TCA which causes more scarring.
Senturk et al., (2019)[32]	Comet assay (DNA damage), TAS & TOS	Radiofrequency increased oxidative stress and some initial DNA damage, but returned to normal by day 15.
Shinde et al., (2024)[33]	SNOT-22	Both are effective, but inferior turbinoplasty shows better results in symptom improvement.
Türk et al., (2018)[34]	VASE	RFA significantly reduced nasal obstruction in both allergic and non-allergic rhinitis patients, more significantly in allergic patients.
Uluyol et al., (2016)[35]	VAS and Saccharine Clearance Test	Both methods are effective, there is no significant difference in saccharine clearance test.
Vijayakumar et al., (2016)[36]	Symptom Improvement and Saccharin Transit Time	PTP is safe, effective, and minimally invasive; all symptoms improved and mucociliary transit time returned to normal by the third month.

Across the studies, nearly all intervention methods demonstrated significant improvement in nasal obstruction symptoms, nasal airflow, and patient-reported quality of life compared to baseline. Techniques such as microdebrider-assisted turbinoplasty (MAT/MAIT), radiofrequency ablation (RFA), coblation, and diode or PTP laser consistently showed positive postoperative outcomes with measurable functional gains. Procedures like cryosurgery, submucosal diathermy (SMD), and Erbium YAG laser were also reported to be safe and effective, with minimal complications.[29,39] Comparative studies indicated that microdebrider-assisted turbinoplasty and radiofrequency ablation achieved the most favorable balance between symptom relief, mucosal preservation, and low complication rates. Coblation offered faster recovery and less intraoperative bleeding, while diode and PTP laser techniques produced effective results but carried higher risks of crusting or synechia.

The reviewed evidence demonstrates that multiple surgical modalities effectively alleviate nasal obstruction due to inferior turbinate hypertrophy. Among these, minimally invasive procedures such as radiofrequency ablation, microdebrider-assisted turbinoplasty, and coblation appear to provide optimal long-term outcomes, combining high efficacy, shorter recovery times, and superior mucosal preservation.

DISCUSSION

Inferior turbinate hypertrophy is a condition that often causes chronic nasal obstruction and requires various therapeutic approaches, including medication, non-medication, and surgery. Based on an analysis of 27 identified journals, it was found that various therapeutic modalities have varying effectiveness depending on the patient population, measurement methods, and follow-up duration used in these studies. Therefore, the selection of the appropriate therapy is very important in achieving symptom improvement and improving the quality of life of patients, with the advantages and disadvantages that need considered in detail.

Medical Therapy

Medical therapy for inferior turbinate hypertrophy, although it has more limited effectiveness in mild to moderate cases, remains a widely used initial approach. The most common therapies in this category are the use of nasal decongestants and intranasal steroid sprays. A study conducted by Karatas et al. (2017) showed that therapy with nasal decongestants, such as oxymetazoline can provide better results than the use of intranasal steroids (mometasone furoate) in improving nasal airflow [40]owever, this therapy only provides temporary improvement and is not effective enough to treat more severe inferior turbinate hypertrophy or cases that do not respond to long-term medical treatment [41]. Nasal steroids also

have a place in the management of inferior turbinate hypertrophy, as they can reduce inflammation in the nasal mucosa and improve symptoms of nasal obstruction. However, their effects tend to be slower and more effective in patients with mild to moderate hypertrophy, or in those with allergic rhinitis contributing to inferior turbinate swelling. Aydoğdu et al. (2020) found that the use of radiofrequency ablation (RF) in patients with inferior turbinate hypertrophy and allergic rhinitis showed a significant improvement in quality of life and nasal airflow, but its effectiveness was reduced in patients with more severe allergic disorders.[42]

Minimally invasive Therapy

In the minimally invasive therapy category, the use of radiofrequency (RF) and laser techniques has become a popular choice due to its minimally invasive nature and relative speed in reducing symptoms. Radiofrequency ablation (RFA) is one of the most commonly used options in clinical practice. Based on research conducted by Turk et al. (2018), RF therapy shows a significant reduction in nasal obstruction symptoms and is well tolerated by patients. This technique works by heating the inferior turbinate tissue to reduce the volume of enlarged tissue and improve nasal airflow.[43] RFA also has the advantage of being a quick procedure with a relatively short recovery time, although there may be some pain or swelling after the procedure. In addition, Potassium Titanyl Phosphate (PTP) laser has shown excellent results in improving nasal obstruction symptoms in patients with inferior turbinate hypertrophy.[44] Vijayakumar et al. (2016) reported that the use of PTP laser resulted in significant improvement in symptoms such as nasal congestion, sneezing, and runny nose in a relatively short time.[45] The advantages of this laser are its minimally invasive nature and its ability to effectively reduce symptoms without causing damage to the nasal mucosa.[46] However, PTP laser can cause mild mucociliary disturbances during the first few weeks after surgery, but these effects are temporary and insignificant in the long term. In addition to RF and PTP lasers, there are also other non-surgical techniques, such as microdebrider-assisted turbinoplasty (MAT), that have also been proven effective.[47] Based on research by Hassoun et al. (2015), MAT showed a significant reduction in nasal obstruction symptoms and had a lower complication rate compared to the submucosal diathermy (SMD) technique. MAT is preferred because of ability to remove hypertrophic tissue more precisely and efficiently without damaging nasal mucosa.

Surgical Therapy

More severe cases of inferior turbinate hypertrophy or those that do not respond to medical treatment, surgical procedures are the most effective option. Some common surgical procedures include inferior turbinoplasty and turbinectomy.[48] Samarai et al. (2020) showed that a combination of septoplasty and inferior turbinoplasty provided better results in reducing nasal obstruction symptoms, with improvements lasting up to 48 months post-surgery.[49] In more extreme cases, turbinectomy (removal of part or all of the inferior turbinate) is often considered.[50] Although effective, this procedure tends to be more invasive and has a higher risk of complications, such as bleeding or postoperative infection. A newer approach is the use of submucosal diathermy (SMD) or microdebrider-assisted turbinoplasty, which is highly effective in reducing nasal obstruction symptoms and improving patients' quality of life.[51] Nguyen et al. (2024) compared the Coblation inferior turbinate turbinoplasty and medial flap turbinoplasty techniques and found that Coblation turbinate was more effective in reducing short-term symptoms and provided better results in improving patients' quality of life.[52] However, although these surgical techniques offer more durable results, they also carry risks of complications that need to be considered. For example, Kocak et al. (2016) found that although monopolar radiofrequency (MP RF) and bipolar radiofrequency (BP RF) procedures have similar levels of effectiveness, MP RF is faster in improving postoperative symptoms, while BP RF requires more time in the procedure but can reduce pain during surgery.[51,52] It is important to note that surgery carries a higher risk of complications, such as bleeding, swelling, or mucosal crusting, which need to be managed carefully.[53]

Comparison of Effectiveness and Selection of Treatment Modalities

The selection of the best treatment for inferior turbinate hypertrophy depends heavily on the severity of the condition and the patient's response to treatment. For patients with mild to moderate symptoms, medical and non-surgical treatments such as radiofrequency or laser therapy may be effective options. However, for patients with more severe symptoms or those who do not respond to non-surgical therapy, surgical procedures such as turbinoplasty or turbinectomy are more appropriate options for achieving better long-term results.

CONCLUSION

Comprehensive approach to the management of inferior turbinate hypertrophy is important, taking into account the patient's medical condition, the severity of symptoms, and the long-term goals of treatment. Based on existing studies, medical therapy, minimally invasive therapy, and surgical therapy each have their own effectiveness, but the choice of therapy must be tailored to the patient's condition. Minimally invasive therapies such as radiofrequency and PTP laser offer effective alternatives with faster recovery times, while surgical procedures such as turbinoplasty and turbinectomy are more suitable for more severe cases or those that do not respond to medical therapy. Considering these various factors, the treatment of inferior turbinate hypertrophy can be tailored to achieve best results for the patient.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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