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Original Research Article

Clinical Outcomes of Inferior Turbinate Reduction Surgery in Patients with Allergic Rhinitis: A Prospective Observational Study

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Abstract:

Background: Allergic rhinitis is a chronic inflammatory disorder of the nasal mucosa characterized by nasal obstruction, rhinorrhoea, sneezing, and itching, significantly affecting quality of life. Persistent nasal obstruction secondary to inferior turbinate hypertrophy may remain refractory to medical treatment, necessitating surgical intervention. Inferior turbinate reduction surgery aims to improve nasal airflow while preserving mucosal function. The present study evaluated the clinical outcomes of inferior turbinate reduction surgery in patients with allergic rhinitis.

Aim and Objective: To assess the efficacy of inferior turbinate reduction surgery in patients with allergic rhinitis using postoperative symptomatic improvement, Total Nasal Symptom Score (TNSS), nasal airway patency, and clinical outcomes.

Materials and Methods: A prospective observational study was conducted in the Department of Otorhinolaryngology at Bundelkhand Medical College, Sagar, Madhya Pradesh, India, over 18 months (September 2023–February 2025). Ninety patients with allergic rhinitis associated with inferior turbinate hypertrophy and persistent symptoms despite medical therapy were included. Patients underwent submucosal inferior turbinate reduction surgery and were followed up for 90 days postoperatively. Clinical evaluation included TNSS assessment, anterior rhinoscopy, diagnostic nasal endoscopy, assessment of nasal airway patency, and postoperative healing.

Results: Among the 90 participants, the majority belonged to the 18–25-year age group (43.3%), with a mean age of 31.8 years, and males constituted 70% of the study population. Nasal obstruction was the most common presenting symptom (90%), followed by rhinorrhoea (71%). Mean TNSS significantly decreased from 10.4 preoperatively to 5.4 at 90 days postoperatively ($p<0.05$), indicating substantial symptomatic improvement following surgery. Postoperative follow-up demonstrated satisfactory healing and improved nasal airway patency. Crusting was the most common postoperative complaint and resolved with conservative management, while no cases of severe hemorrhage or empty nose syndrome were observed.

Conclusion: Inferior turbinate reduction surgery was associated with significant improvement in symptom severity, reduction in nasal obstruction, and favorable postoperative outcomes with minimal complications among patients with allergic rhinitis. The findings support submucosal inferior turbinate reduction as a safe and effective treatment option for selected patients with persistent symptoms despite medical therapy.

Keywords: Allergic rhinitis; Inferior turbinate hypertrophy; Turbinate reduction surgery; Total Nasal Symptom Score; Nasal obstruction; Surgical outcome.

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Introduction

Allergic rhinitis (AR) is a chronic inflammatory disorder of the nasal mucosa mediated predominantly by immunoglobulin E (IgE) following exposure to allergens. It is characterized by symptoms such as sneezing, rhinorrhoea, nasal itching, and nasal obstruction, which substantially affect sleep quality, productivity, and overall quality of life [1,2]. The global prevalence of allergic rhinitis has increased considerably over recent decades, affecting approximately 10–30% of adults and up to 40% of children, making it a significant public health concern [2].

Nasal obstruction is among the most troublesome and persistent symptoms of allergic rhinitis. It is frequently associated with hypertrophy of the inferior turbinate, resulting from chronic inflammation, mucosal edema, and vascular congestion [3]. Persistent turbinate enlargement contributes to increased nasal airway resistance and may remain refractory despite prolonged medical management with antihistamines, intranasal corticosteroids, and decongestants [4]. In such cases, surgical intervention to reduce turbinate volume is an important therapeutic option.

Inferior turbinate reduction procedures are designed to improve nasal airflow while preserving the mucosa's function in humidification, filtration, and regulation of inspired air [5]. Various techniques, including radiofrequency ablation, microdebrider-assisted turbinoplasty, laser reduction, and conventional turbinate surgery, have demonstrated improvement in nasal obstruction and symptom burden. However, differences exist regarding long-term efficacy and complications [5,6].

Assessment of postoperative outcomes in allergic rhinitis commonly involves both subjective and objective measures. The Total Nasal Symptom Score (TNSS) is a validated tool for evaluating symptom severity, whereas anterior rhinoscopy and diagnostic nasal endoscopy provide objective assessment of airway patency and turbinate status [7]. Despite increasing utilization of turbinate reduction surgery, evidence regarding comprehensive evaluation of symptomatic improvement and endoscopic outcomes in patients with allergic rhinitis remains limited, particularly in prospective observational settings.

Therefore, the present study aimed to evaluate the clinical efficacy of inferior turbinate reduction surgery in patients with allergic rhinitis by comparing preoperative and postoperative symptom scores, nasal obstruction, endoscopic findings, and overall clinical outcomes.

Materials and Methods

Study Design and Setting: A prospective observational study was conducted in the Department of Otorhinolaryngology at Bundelkhand Medical College, Sagar, Madhya Pradesh, India, over 18 months, from September 2023 to February 2025. The study was designed to evaluate clinical outcomes following inferior turbinate reduction surgery in patients with allergic rhinitis who had persistent symptoms despite adequate medical management.

Study Population: The study population comprised patients presenting to the outpatient and inpatient departments with symptoms suggestive of allergic rhinitis and evidence of hypertrophy of the inferior turbinate. Patients fulfilling the predefined eligibility criteria were enrolled consecutively during the study period. A total of 90 patients were included in the final analysis. Detailed clinical evaluation and baseline investigations were performed before surgical intervention.

Inclusion Criteria: Patients aged 18 to 50 years with clinically diagnosed allergic rhinitis, with persistent nasal obstruction and inferior turbinate hypertrophy, were included in the study. Individuals with inadequate symptomatic improvement despite prolonged medical therapy and those willing to undergo surgical treatment and postoperative follow-up were considered eligible for participation.

Exclusion Criteria: Patients with a history of previous nasal surgery, sinonasal malignancy, nasal polyposis, significant septal deviation requiring isolated septoplasty, chronic rhinosinusitis with complications, systemic inflammatory disorders, or those unwilling to provide informed consent were excluded from the study.

Preoperative Evaluation: All participants underwent comprehensive history-taking and clinical examination, with emphasis on symptoms such as nasal obstruction, rhinorrhoea, sneezing, nasal itching, and associated upper airway complaints. Otorhinolaryngological examination included anterior rhinoscopy and diagnostic nasal endoscopy to assess turbinate hypertrophy and nasal airway patency. Additional investigations, including routine hematological tests and radiological evaluation, when indicated, were performed before surgery. Baseline symptom severity and anatomical findings were documented for comparison during postoperative follow-up.

Symptom Assessment: Symptom severity was assessed using the Total Nasal Symptom Score (TNSS), which evaluates principal manifestations of allergic rhinitis, including nasal obstruction, rhinorrhoea, sneezing, and nasal itching. Higher TNSS values indicated greater symptom burden. TNSS assessment was performed preoperatively and repeated during postoperative follow-up visits to evaluate changes in symptom severity following surgical intervention. Improvement in TNSS constituted one of the primary outcome measures of the study.

Surgical Procedure: All enrolled patients underwent submucosal inferior turbinate reduction surgery in accordance with standard operative protocols. The surgical technique aimed to reduce turbinate volume while preserving mucosal integrity and maintaining physiological nasal functions such as humidification and filtration. Radical turbinate excision was avoided to minimize postoperative complications, including excessive bleeding, crusting, mucosal atrophy, and empty nose

syndrome. Conservative submucosal reduction was preferred in all cases.

Postoperative Follow-up: Patients were followed up regularly for 90 days after surgery. During each follow-up visit, symptomatic improvement, turbinate healing status, nasal airway patency, crusting, discharge, adhesions, and endoscopic findings were assessed. Local postoperative care included suctioning to clear crusts, clots, and discharge, facilitating healing and reducing the risk of synechiae formation. Adhesions, if identified, were released during follow-up visits. Clinical improvement and postoperative complications were systematically documented.

Outcome Measures: The primary outcome measures included improvement in Total Nasal Symptom Score, reduction in nasal obstruction, enhancement of nasal airway patency, and improvement in endoscopic findings following surgery. Secondary outcomes comprised postoperative complications such as crusting, bleeding, delayed healing, adhesion formation, and persistent nasal symptoms.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using IBM® SPSS® Statistics version 24. Continuous variables were expressed as mean ± standard deviation, while categorical variables were represented as frequencies and percentages. A paired t-test was used to compare preoperative and postoperative TNSS scores. Statistical significance was considered at a p-value of less than 0.05.

Ethical Consideration: The study was conducted after obtaining approval from the Institutional Ethics Committee of Bundelkhand Medical College, Sagar. Written informed consent was obtained from all participants before enrollment, and the confidentiality of patient information was maintained throughout the study period.

Results

A total of 90 patients with allergic rhinitis refractory to medical therapy underwent inferior turbinate reduction surgery and completed follow-up over a 90-day postoperative period. The study was conducted over 18 months at Bundelkhand Medical College, Sagar.

Baseline characteristics: The mean age of participants was 31.8 years, with the largest proportion in the 18–25-year age group (43.3%), followed by the 42–50-year age group (31.1%). Males constituted 70% of the study population, with a male-to-female ratio of approximately 7:3.

Table 1: Baseline demographic profile of study participants (n=90)

Variable	Category	Frequency (%)
Age	18–25 years	39 (43.33)
	26–33 years	13 (14.44)
	34–41 years	10 (11.11)
	42–50 years	28 (31.11)
Gender	Male	63 (70.0)
	Female	27 (30.0)

Regarding occupation, students formed the largest subgroup (23.3%), followed by farmers (20.0%) and grocery shopkeepers (7.8%).

Table 2: Occupational distribution of study participants

Occupation	Frequency (%)
Student	21 (23.33)
Farmer	18 (20.00)
Grocery shopkeeper	7 (7.77)
Singer	6 (6.66)
Teacher	6 (6.66)
Cook	5 (5.55)
Tailor	5 (5.55)
Vegetable shopkeeper	5 (5.55)
Housewife	4 (4.44)
Plumber	4 (4.44)
Priest	4 (4.44)
Health worker	2 (2.22)
Carpenter	1 (1.11)
Mobile shopkeeper	1 (1.11)

Clinical presentation: Nasal obstruction was the most frequent presenting complaint, reported by 81 (90%) patients, followed by rhinorrhoea in 64 (71%) patients. These symptoms represented the predominant indications for surgical intervention.

Table 3: Predominant presenting symptoms

Symptom	Frequency (%)
Nasal obstruction	81 (90.0)
Rhinorrhoea	64 (71.0)
Sneezing	54 (60)
Itching	57 (63.3)

Surgical outcome assessment using TNSS: A statistically significant reduction in Total Nasal Symptom Score (TNSS) was observed following inferior turbinate reduction surgery. Mean TNSS decreased from 10.4 preoperatively to 5.4 at 90 days postoperatively. Paired t-test analysis demonstrated a significant improvement ($p < 0.05$), indicating symptomatic benefit and improved quality of life following surgery.

Table 4: Comparison of preoperative and postoperative TNSS

Parameter	Preoperative	Postoperative (90 days)	p-value
Mean TNSS	10.4	5.4	<0.05*

*Paired t-test

Postoperative observations and complications: During follow-up, crusting was the most commonly encountered postoperative complaint. Symptoms improved with local care and nasal douching, with resolution occurring within approximately two weeks. No cases of empty nose syndrome were reported. Only submucosal resection was performed, which may have contributed to fewer severe complications.

Table 5: Postoperative complications observed during follow-up

Complication	Observation
Crusting	Present; resolved within 2 weeks
Severe hemorrhage	Not observed
Empty nose syndrome	Not observed

Discussion

Allergic rhinitis is a common chronic inflammatory condition of the upper airway characterized by nasal obstruction, rhinorrhoea, sneezing, and itching, with substantial impact on sleep, quality of life, and daily functioning [2]. Persistent nasal obstruction resulting from inferior turbinate hypertrophy remains one of the major indications for surgical intervention when medical management fails. This prospective observational study evaluated the outcome of inferior turbinate reduction surgery in patients with allergic rhinitis and demonstrated significant symptomatic improvement with minimal complications.

In the present study, the majority of patients belonged to the 18–25 years age group (43.3%), with a mean age of 31.8 years, and males constituted 70% of the study population. Similar demographic predominance among younger adults has been reported in previous studies evaluating allergic rhinitis and turbinate hypertrophy, suggesting greater exposure to environmental allergens and higher healthcare-seeking behavior in this age group [1,3]. The male predominance observed in our study is comparable to findings reported by Sivaranjani et al., who also noted an increased prevalence among young adult males with symptomatic allergic rhinitis [4].

Nasal obstruction was the predominant presenting complaint in the present study, affecting 90% of participants, followed by rhinorrhoea. This observation is consistent with previous literature identifying nasal obstruction as the most disabling symptom in allergic rhinitis and a major contributor to impaired quality of life [4]. Chronic inflammation and vascular congestion within the inferior turbinate lead to mucosal hypertrophy and reduced nasal airway patency, thereby justifying surgical reduction in medically refractory cases [8].

A major finding of the present study was a statistically significant reduction in mean TNSS from 10.4 preoperatively to 5.4 postoperatively ($p < 0.05$), indicating marked symptomatic improvement following surgery. Similar improvements in symptom severity after turbinate surgery have been reported by Passali et al., who demonstrated sustained reduction in nasal obstruction and improved nasal airflow after inferior turbinate procedures [9]. Comparable findings were also reported by Coste et al., who found that conservative turbinate surgery significantly improved nasal breathing while preserving mucosal function [10].

The observed reduction in TNSS in the current study supports the effectiveness of submucosal turbinate reduction in reducing symptom burden and improving postoperative quality of life.

Postoperative follow-up in the present study demonstrated satisfactory healing with minimal complications. Crusting was the most frequently encountered postoperative complaint, but it resolved within two weeks with conservative care. No severe hemorrhage or empty nose syndrome was observed. Similar complication profiles have been described in studies evaluating mucosa-preserving turbinate procedures, which report lower rates of bleeding, atrophic changes, and postoperative dysfunction than those observed with radical turbinectomy [9,11]. Preservation of mucosal integrity during surgery likely contributed to favorable healing outcomes in our patients.

The absence of severe postoperative complications in the present study further supports the safety of conservative submucosal reduction of the inferior turbinate. Huizing and de Groot emphasized that excessive turbinate resection may predispose patients to chronic crusting, mucosal atrophy, and empty nose syndrome, whereas tissue-preserving approaches maintain physiological nasal function [11]. Our findings reinforce this concept and support conservative turbinate reduction as a safer surgical strategy.

Overall, the present study demonstrated that inferior turbinate reduction surgery resulted in significant symptomatic improvement, reduction in TNSS scores, improved nasal patency, and minimal postoperative morbidity among patients with allergic rhinitis. These findings support the use of inferior turbinate reduction as an effective treatment for selected patients with persistent symptoms despite adequate medical therapy.

Strengths of the study: The strengths of the present study include its prospective design, standardized postoperative follow-up, and the use of TNSS as a validated clinical outcome measure to evaluate symptomatic improvement after surgery.

Limitations of the study: The study had certain limitations, including a relatively short follow-up duration, a single-center design, and the absence of a comparison group receiving only medical management. Long-term studies with larger multicentric cohorts and objective airflow measurements may provide further evidence regarding the durability of surgical outcomes.

Conclusion

Inferior turbinate reduction surgery was associated with significant symptomatic improvement in patients with allergic rhinitis who remained refractory to medical treatment. The procedure resulted in a marked reduction in the Total Nasal Symptom Score (TNSS), improved nasal obstruction, enhanced nasal airway patency, and a favorable postoperative recovery with minimal complications. Crusting was the most common postoperative complaint and was effectively managed with conservative measures, while severe hemorrhage and empty nose syndrome were not observed. The findings of the present study support submucosal inferior turbinate reduction as a safe and effective surgical option for improving clinical outcomes and quality of life in selected patients with persistent allergic rhinitis. However, larger multicentric studies with longer follow-up periods are required to determine the long-term durability of surgical benefits and postoperative outcomes.

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