



PROSPECTIVE STUDY OVER IMPACT OF SUBMUCOUS DIATHERMY IN CASES OF ALLERGIC RHINITIS

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ABSTRACT

Background: Allergic rhinitis frequently causes persistent nasal obstruction through chronic inflammatory enlargement of the inferior turbinates. In patients who remain symptomatic despite medical therapy, submucous diathermy offers a mucosa-preserving method of reducing turbinate volume and improving nasal airflow. **Objectives:** To determine the association between allergic rhinitis and inferior turbinate hypertrophy and to evaluate the effect of submucous diathermy on nasal obstruction, overall symptom burden, allergic rhinitis control, and quality of life. **Materials and Methods:** This one-year prospective interventional study included adults aged >17 years with allergic rhinitis lasting >12 weeks, inferior turbinate hypertrophy confirmed by nasal endoscopy and CT-PNS, and inadequate response to medical therapy. Eligible patients underwent submucous diathermy, and preoperative and postoperative symptom and ARCT scores were statistically compared, with $p < 0.05$ considered significant. **Results:** Among 100 participants, perennial allergic rhinitis was significantly associated with bilateral inferior turbinate hypertrophy (71.2% versus 41.5% in seasonal disease; $p = 0.004$). Mean nasal obstruction score decreased from 2.58 ± 0.50 to 0.89 ± 0.71 , while total symptom score declined from 8.29 ± 1.06 to 4.32 ± 1.19 (both $p < 0.001$). Sneezing, rhinorrhoea, and nasal itching improved significantly, whereas postnasal drip showed no significant change ($p = 0.624$). Mean ARCT score increased from 8.49 ± 2.02 to 19.60 ± 1.75 ($p < 0.001$). Poor disease control decreased from 70% to 5%, while well-controlled disease increased from 0% to 73%. **Conclusion:** Submucous diathermy significantly improved nasal obstruction, overall allergic symptoms, and disease-control scores in medically refractory allergic rhinitis with inferior turbinate hypertrophy. The procedure was particularly effective for congestion-related symptoms, although postnasal drip showed limited response.

KEYWORDS

Allergic rhinitis; inferior turbinate hypertrophy; submucous diathermy; nasal obstruction; Allergic Rhinitis Control Test; turbinate reduction.

INTRODUCTION

The inferior turbinates are highly vascular structures that regulate nasal resistance and contribute to warming, humidification, filtration, and mucociliary conditioning of inspired air. In allergic rhinitis, persistent mucosal inflammation and venous sinusoidal engorgement may produce inferior turbinate hypertrophy, narrowing the nasal airway and causing chronic obstruction. An observational study evaluated symptomatic changes following submucosal diathermy in patients with allergic rhinitis and chronic nasal obstruction.¹ Comparative evidence has also examined submucosal diathermy against partial inferior turbinectomy for the management of inferior turbinate hypertrophy.²

Allergic rhinitis commonly manifests with sneezing, watery rhinorrhoea, nasal itching, and nasal blockage and may follow seasonal or perennial patterns. Persistent obstruction can impair sleep, concentration, daily activity, and quality of life. Submucosal saline infiltration before diathermy or coblation has been reported to protect against postoperative crusting and, following diathermy, turbinate gangrene.³ Electrical submucosal diathermy has also been compared with diode laser for reducing obstruction caused by inferior turbinate hypertrophy.⁴

Medical therapy remains the initial management approach, whereas surgical intervention is considered when nasal obstruction persists despite adequate treatment and demonstrable turbinate enlargement. Comparative evaluation has shown better short- and long-term outcomes with microdebrider-assisted reduction than with submucosal diathermy, although both produced early symptomatic improvement.⁵ Reviews of refractory allergic rhinitis identify inferior turbinate surgery as an option for appropriately selected patients who remain symptomatic despite optimal medical therapy.⁶

In India, allergic-disorder prevalence and allergen-sensitisation patterns may show regional variation. A North Indian tertiary-care study described the prevalence of allergic disorders and regional sensitisation patterns.⁷ Population surveys from China have similarly documented a rising prevalence of allergic rhinitis, illustrating its increasing Asian burden.⁸

Diagnosis is primarily based on compatible symptoms and nasal examination. When chronic rhinosinusitis or nasal polyps are suspected, EPOS 2020 provides standardised definitions, diagnostic criteria, and care pathways incorporating symptom duration with endoscopic or CT findings.⁹ An Indian comparative thesis evaluated partial inferior turbinectomy and submucosal diathermy for inferior turbinate hypertrophy due to allergic rhinitis.¹⁰ However, prospective regional evidence from Jhalawar remains limited. Therefore, evaluating nasal obstruction, symptom burden, Allergic Rhinitis Control Test scores, and three-month clinical benefit is necessary and directly leads to the aim of this study.

MATERIAL AND METHODS

Study Design: A hospital-based prospective interventional study was conducted to evaluate the clinical impact of submucous diathermy in patients with chronic allergic rhinitis and inferior turbinate hypertrophy.

Study Setting: The study was carried out in the Department of Otorhinolaryngology, Jhalawar Medical College, Jhalawar, Rajasthan, over one year following approval from the Institutional Ethics Committee.

Study Population: Adult patients attending the ENT outpatient department with clinically diagnosed allergic rhinitis of more than 12 weeks' duration, inferior turbinate hypertrophy, and persistent symptoms despite medical treatment were considered for enrolment.

Sample Size: Approximately 100 eligible patients were proposed for inclusion.

Inclusion Criteria: Patients were included if they were older than 17 years, had symptoms suggestive of allergic rhinitis for more than 12 weeks, fulfilled the clinical diagnostic criteria for allergic rhinitis, and demonstrated inferior turbinate hypertrophy on diagnostic nasal endoscopy and CT of the paranasal sinuses.

Exclusion criteria: Exclusion criteria included patients with acute sinusitis, obstructing nasal mass or polyp, prior nasal surgery or facial anomalies.

Data Collection and Investigations:

Clinical information was recorded on a predesigned proforma. Assessment included detailed history, clinical examination, blood

count, diagnostic nasal endoscopy and radiological assessment with CT of para nasal sinuses. Eligible patients underwent submucous diathermy for inferior turbinate hypertrophy.

Ethical Consideration:

The study was initiated after approval from the Institutional Ethics Committee of Jhalawar Medical College, Jhalawar. The supplied methodology does not specifically mention written informed consent; this should be added if obtained.

Statistical Analysis:

Data were coded and entered into Microsoft Excel and analysed using appropriate statistical software. Normally distributed continuous variables were expressed as mean ± standard deviation. Suitable statistical tests were applied according to the nature of the variables, and a p-value <0.05 was considered statistically significant.

RESULTS

Table 1. Association Between Type of Allergic Rhinitis and Inferior Turbinate Hypertrophy Pattern on Diagnostic Nasal Endoscopy (n = 100).

Type of Allergic Rhinitis	Bilateral n (%)	Left n (%)	Right n (%)	Total (n)	p-value
Perennial	42 (71.2)	6 (10.2)	11 (18.6)	59	0.004
Seasonal	17 (41.5)	14 (34.1)	10 (24.4)	41	
Total	59 (59.0)	20 (20.0)	21 (21.0)	100	

Statistical test: Chi-square test.

Table 1 shows statistically significant association between type of allergic rhinitis and pattern of inferior turbinate hypertrophy (p=0.004). Bilateral hypertrophy was more frequent in perennial allergic rhinitis (71.2%) than in seasonal allergic rhinitis (41.5%). In contrast, unilateral involvement, especially left-sided hypertrophy, was relatively more common in the seasonal cases.

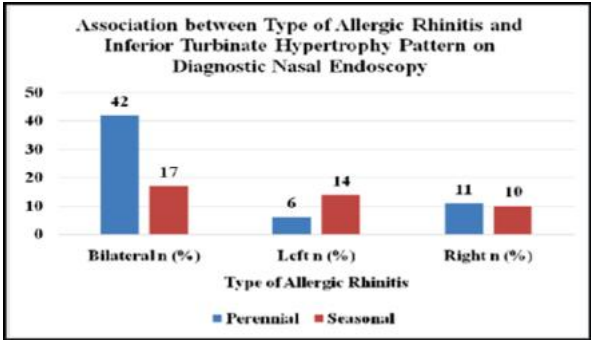


Figure 1. Association Between Type of Allergic Rhinitis and Inferior Turbinate Hypertrophy Pattern on Diagnostic Nasal Endoscopy

Table 2. Comparison of Nasal Obstruction Score before and after Submucous Diathermy among Study Participants (n = 100).

Parameter	Mean ± SD	Median	Standard Error (SE)	p value
Pre-operative Nasal Obstruction Score	2.58 ± 0.50	3.00	0.0496	<0.001
Post-operative Nasal Obstruction Score	0.89 ± 0.71	1.00	0.0709	

Statistical test: Paired samples t-test.

As seen in Table 2, mean nasal obstruction score was significantly decreased from 2.58 ± 0.50 preoperatively to 0.89 ± 0.71 postsubmucous diathermy. Median score fell from 3.00 to 1.00. This improvement was statistically highly significant (p<0.001) and a significant decrease of nasal obstruction was observed after the intervention.

Table 3. Comparison of Total Symptom Score before and after Submucous Diathermy among Study Participants (n = 100).

Parameter	Mean ± SD	Median	Standard Error (SE)	p value
Pre-operative Total Symptom Score	8.29 ± 1.06	8.00	0.106	<0.001
Post-operative Total Symptom Score	4.32 ± 1.19	4.00	0.119	

Statistical test: Paired samples t-test.

A significant reduction in total symptom score was achieved with submucous diathermy (Table 3). The mean score was reduced from 8.29±1.06 preoperatively to 4.32±1.19 postoperatively and the median score was reduced from 8.00 to 4.00. This was statistically significant (p<0.001) and of a magnitude to provide a substantial overall benefit in symptoms.

Table 4. Symptom-wise Comparison of Scores before and after Submucous Diathermy among Study Participants (n = 100).

Symptom	Pre-operative Mean ± SD	Post-operative Mean ± SD	p-value
Nasal Obstruction	2.58 ± 0.50	0.89 ± 0.71	<0.001
Sneezing	1.82 ± 0.63	0.80 ± 0.40	<0.001
Rhinorrhea	1.56 ± 0.50	0.80 ± 0.40	<0.001
Nasal Itching	1.53 ± 0.50	1.00 ± 0.00	<0.001
Postnasal Drip	0.80 ± 0.59	0.83 ± 0.38	0.624

Statistical test: Paired samples t-test.

Table 4 shows statistically significant postoperative reductions in nasal obstruction, sneezing, rhinorrhea, and nasal itching following submucous diathermy (all p<0.001). The greatest improvement occurred in nasal obstruction, decreasing from 2.58 ± 0.50 to 0.89 ± 0.71. Postnasal drip was not significantly different (p=624) .

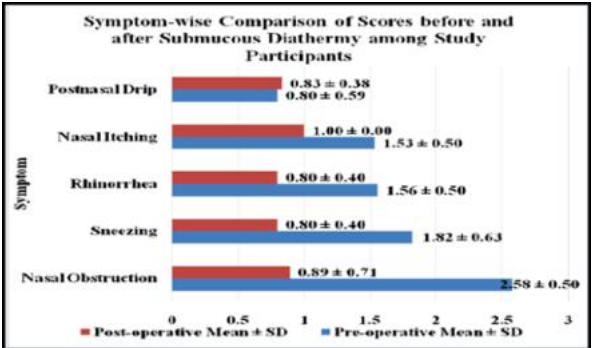


Figure 2. Symptom-wise Comparison of Scores before and after Submucous Diathermy among Study Participants

Table 5. Comparison of ARCT Score before and after Submucous Diathermy among Study Participants (n = 100).

Time Point	Mean ± SD	Median	Standard Error (SE)	p value
Pre-operative ARCT Score	8.49 ± 2.02	9.00	0.202	<0.001
Post-operative ARCT Score	19.60 ± 1.75	20.00	0.175	

Statistical test: Paired samples t-test.

Table 5 demonstrates a marked improvement in allergic rhinitis control following submucous diathermy. The mean ARCT score increased from 8.49 ± 2.02 preoperatively to 19.60 ± 1.75 postoperatively and median increased from 9.00 to 20.00. This improvement was highly significant (p < 0.001) and represented significantly better disease control.

Table 6. ARCT Category Distribution.

Category	Pre-op	Post-op
Poor control	70	5
Partial control	30	22
Well controlled	0	73

Table 6 shows a marked postoperative improvement in the control of allergic rhinitis. Poorly controlled cases went from 70% to 5% postoperative and well controlled cases went from 0% to 73%. Partial control dropped from 30% to 22% which is a clinically significant benefit after submucous diathermy.

DISCUSSION

Among 100 participants, perennial allergic rhinitis showed predominantly bilateral inferior turbinate hypertrophy, affecting 42 of 59 cases (71.2%), whereas bilateral involvement occurred in 17 of 41 seasonal cases (41.5%); the association was significant (p=0.004). A similar pattern is found with chronic turbinate hypertrophy by Vaghasia et al (2023) 1, Vinay et al (2017) 10, and Maniaci et al (2021) 6. Gupta et al. (2024) 7 also reported high burden of allergic rhinitis in

North India. However, none of the reports quantified the perennial versus seasonal laterality. The increased left-sided involvement in seasonal disease (34.1% vs. 10.2%) is an independent observation needing further confirmation.

The mean score for nasal obstruction decreased from 2.58 ± 0.50 to 0.89 ± 0.71 and the median score decreased from 3.00 to 1.00 ($p < 0.001$) after submucous diathermy. This is in agreement with Vaghasia et al. 2023¹ who reported relief from obstruction in 75.8% and Vinay et al. 2017¹⁰ who reported significant reduction in symptoms ($p = 0.001$). Similarly, Madeed et al. 4, reported significant improvement in obstruction and Chavan et al. 5, reported early benefit with diathermy during follow-up. Al-Zobair et al. (2025)² reported 53.3% and 63.3% of SMD relief rates at two weeks and two months respectively with partial turbinectomy doing better.

There was a significant improvement in the total symptom burden after submucous diathermy. The mean score fell from 8.29 ± 1.06 to 4.32 ± 1.19 and the median score from 8.00 to 4.00 ($p < 0.001$). Vinay et al (2017)¹⁰ also reported similar improvement with significant reduction in total symptom scores ($p = 0.001$). Vaghasia et al.¹ showed improvement in nasal obstruction (75.8%) and sneezing (63.6%) post-operatively. Electrical diathermy has been shown to give significant symptomatic relief (Madeed et al, 2021)⁴. Chavan et al (2020)⁵ have also shown improvement but microdebrider assisted reduction has been shown to give more durable results. Exact comparator mean total scores were not reported so direct numerical comparison was not possible.

Nasal obstruction declined from 2.58 ± 0.50 to 0.89 ± 0.71 , sneezing from 1.82 ± 0.63 to 0.80 ± 0.40 , rhinorrhea from 1.56 ± 0.50 to 0.80 ± 0.40 , and nasal itching from 1.53 ± 0.50 to 1.00 ± 0.00 , with all improvements significant at $p < 0.001$. Vaghasia et al. (2023)¹ also demonstrated improvement of nasal obstruction in 75.8% and sneezing in 63.6%. Vinay et al. (2017)¹⁰ showed symptomatic benefit after surgery. Madeed et al. (2021)⁴ Post nasal drip Attia & Hamden (2023)³ 0.80 ± 0.59 to 0.83 ± 0.38 ($p = 0.624$) Microdebrider-assisted reduction (Chavan et al., 2020)⁵ showed more lasting improvement.

The ARCT score was significantly increased from pre-operatively 8.49 ± 2.02 to post-operatively 19.60 ± 1.75 . Median ARCT score increased from 9.00 to 20.00 ($p < 0.001$). This improvement was consistent with the significant reduction in the burden of allergic-rhinitis symptoms reported by Vinay et al. (2017)¹⁰ ($p = 0.001$), relief of obstruction and sneezing reported by Vaghasia et al. (2023)¹ and favourable functional response reported by Madeed et al. (2021)⁴. Surgical turbinate reduction for medically refractory disease was also supported by Maniaci et al. (2021)⁶. The reports submitted did not have a direct ARCT numerical comparison. Al-Zobair et al (2025)², however, found diathermy to be less effective than partial turbinectomy in relieving obstruction at 2 weeks and 2 months.

After submucous diathermy, the control of allergic-rhinitis improved significantly with the number of poorly controlled cases decreasing from 70 pre-operatively to 5 post-operatively, the number of partially controlled cases decreasing from 30 to 22 and the number of well-controlled cases increasing from 0 to 73. This categorical improvement in a way is in agreement with the postoperative symptomatic relief published by Vaghasia et al. (2023)¹ and the drastic reduction in total symptom score noted by Vinay et al. (2017)¹⁰. Madeed et al. (2021)⁴ also found a significant improvement in obstruction following electrical diathermy and Maniaci et al. (2021)⁶ recommended turbinate surgery to be advantageous following failure of medical therapy. None of the supplied comparator reports used identical ARCT control categories. Conversely, the authors found a relatively better improvement in nasal obstruction with partial turbinectomy versus diathermy (Al-Zobair et al. 2025)².

CONCLUSION

Submucous diathermy produced substantial clinical benefit in adults with medically refractory allergic rhinitis and inferior turbinate hypertrophy. Perennial allergic rhinitis was significantly associated with bilateral turbinate hypertrophy, indicating a greater structural burden in patients with persistent disease. The mean nasal obstruction score was significantly reduced from 2.58 ± 0.50 to 0.89 ± 0.71 , and the total symptom score was significantly reduced from 8.29 ± 1.06 to 4.32 ± 1.19 after the intervention. Large reductions were also recorded in sneezing, rhinorrhoea and nasal itching. Postnasal drip was unaffected.

These findings imply that diathermy is primarily effective in treating symptoms related to turbinate congestion and nasal airflow. Allergic Rhinitis Control Test scores improved significantly from poorly to well-controlled disease (8.49 ± 2.02 vs 19.60 ± 1.75). These findings support submucous diathermy as an effective, mucosa-preserving intervention for carefully selected patients who remain symptomatic despite adequate medical therapy.

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