Section: ENT

Original Research Article

ENDOSCOPIC POSTERIOR NASAL NEURECTOMY FOR INTRACTABLE ALLERGIC RHINITIS: A PROSPECTIVE EVALUATION OF SYMPTOM CONTROL AND QUALITY-OF-LIFE OUTCOMES

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Received *: 27/03/2025*
Received in revised form *: 26/05/2025*
Accepted *: 17/06/2025*

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DOI: 10.70034/ijmedph.2025.2.475

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 2620-2624

ABSTRACT

Background: Allergic rhinitis is a chronic condition that can be debilitating when symptoms persist despite maximal medical therapy. Posterior nasal neurectomy (PNNx) has emerged as a surgical alternative targeting parasympathetic innervation of the nasal mucosa to alleviate refractory symptoms.

Materials and Methods: This prospective observational study was conducted in the Department of ENT, NRI Medical College and General Hospital, over 12 months (February 2024 to January 2025). Sixty adult patients with allergic rhinitis unresponsive to guideline-based pharmacotherapy underwent endoscopic posterior nasal neurectomy. Pre- and postoperative symptom severity was assessed using the Total Nasal Symptom Score (TNSS), Visual Analog Scale (VAS), and Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ). Statistical analysis included paired t-tests with a significance level of $p < 0.05$.

Results: The mean TNSS significantly decreased from 14.2 ± 2.1 preoperatively to 5.0 ± 1.7 at 3-month follow-up ($p < 0.001$). VAS scores for nasal obstruction, rhinorrhea, sneezing, and itching showed similar reductions (all $p < 0.001$). RQLQ scores improved across all domains, indicating enhanced patient-reported quality of life. Minor complications such as crusting (10%), transient epistaxis (5%), and mucosal dryness (3.3%) were observed, with no major adverse events.

Conclusion: Posterior nasal neurectomy is an effective and safe intervention for patients with allergic rhinitis refractory to medical therapy. It significantly reduces nasal symptoms and improves quality-of-life outcomes, supporting its inclusion as a surgical option in treatment-resistant cases.

Keywords: Allergic rhinitis, posterior nasal neurectomy, endoscopic surgery, refractory symptoms, quality of life, TNSS.

INTRODUCTION

Allergic rhinitis (AR) is a globally prevalent, chronic inflammatory condition of the nasal mucosa, characterized by nasal obstruction, sneezing, itching, and rhinorrhea. It affects approximately 10–40% of the global population, with rising incidence particularly in urban areas due to increasing environmental pollution and allergen exposure.[1] Though AR is not life-threatening, its persistent symptoms significantly impair quality of life, disrupt sleep, and decrease academic and occupational productivity.[2] Furthermore, AR often coexists with asthma, sinusitis, otitis media, and conjunctivitis, making its effective management a public health priority.[3]

Conventional treatment strategies for AR typically involve allergen avoidance, antihistamines, intranasal corticosteroids, leukotriene receptor antagonists, and immunotherapy.[4] While most

patients achieve satisfactory symptom control with these medical modalities, a substantial subset continues to experience persistent and refractory symptoms despite maximal pharmacologic therapy.[5] These refractory cases are often associated with heightened parasympathetic tone and exaggerated neural reflexes within the nasal mucosa, particularly involving the posterior nasal nerve (PNN), which contributes to the hypersecretory and congestive components of the disease.[6]

Posterior nasal neurectomy (PNNx), a minimally invasive surgical intervention targeting the parasympathetic fibers of the vidian or posterior nasal nerve, has emerged as a promising therapeutic option for patients unresponsive to conservative management. The procedure involves selective transection of the posterior nasal nerve branches in the sphenopalatine foramen region, thereby attenuating nasal hyperreactivity and secretion.[7] With the advent of endoscopic techniques, PNNx has gained traction due to its safety, precision, and ability to preserve sensory function while reducing symptom burden.[8]

Existing literature suggests that PNNx can offer long-term relief from refractory nasal symptoms with low complication rates. However, variability in study designs, sample sizes, and outcome measures across prior investigations limits the generalizability of current evidence.[9] Moreover, there remains a lack of consensus regarding its definitive role in standard AR treatment algorithms, particularly in cases unresponsive to pharmacotherapy.

In this context, the present study was undertaken to evaluate the effectiveness of posterior nasal neurectomy in patients with allergic rhinitis who failed to achieve adequate control with maximal medical therapy. The study aims to assess symptom improvement, quality-of-life outcomes, and safety profile following PNNx, thereby contributing to evidence-based refinement of treatment protocols for refractory AR.

MATERIALS AND METHODS

Study Design and Setting: This prospective observational study was carried out in the Department of Otorhinolaryngology, NRI Medical College and General Hospital, over a one-year period from February 2024 to January 2025. The primary objective was to evaluate the effectiveness of posterior nasal neurectomy (PNNx) in patients with allergic rhinitis who had failed to respond to standard pharmacologic therapy.

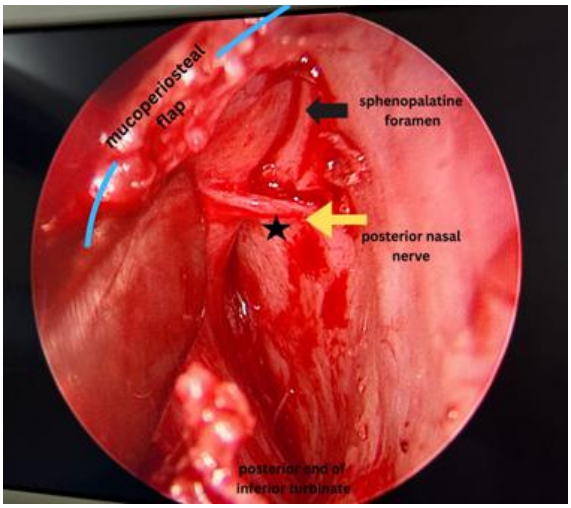
Participant Selection: Patients aged 18 years and above presenting with clinical features of allergic rhinitis—such as sneezing, nasal obstruction, rhinorrhea, and nasal itching—were screened for eligibility. Inclusion required documented failure of at least 12 consecutive weeks of maximal medical therapy, including intranasal corticosteroids, oral antihistamines, and leukotriene receptor antagonists. A total of 60 patients who met the eligibility criteria and provided informed consent were enrolled.

Inclusion and Exclusion Criteria

Patients were included if they (1) were 18 years or older, (2) had a diagnosis of allergic rhinitis based on ARIA guidelines, (3) experienced symptoms refractory to medical therapy for at least 3 months, and (4) were willing to undergo surgical treatment with structured follow-up.

Exclusion criteria comprised (1) history of previous nasal or sinus surgery, (2) significant anatomical abnormalities such as gross septal deviation, (3) associated chronic rhinosinusitis or nasal polyps, (4) systemic comorbidities including bleeding disorders, and (5) pregnancy or lactation.

Surgical Procedure: All patients underwent preoperative diagnostic nasal endoscopy and CT imaging of the paranasal sinuses to rule out co-existing conditions. Posterior nasal neurectomy was performed using a 0° rigid nasal endoscope under local or general anesthesia. The sphenopalatine foramen was identified, and selective transection of the posterior nasal nerve branches was performed using blunt dissection and bipolar cautery. Care was taken to preserve vascular structures. Routine nasal packing was avoided unless clinically indicated.



Outcome Assessment: Symptom severity was quantified using two validated tools: the Total Nasal Symptom Score (TNSS) and the Visual Analog Scale (VAS), both recorded preoperatively and at 1 week, 1 month, and 3 months postoperatively. Domains assessed included nasal blockage, rhinorrhea, sneezing, and nasal itching. Secondary measures included quality-of-life assessment using the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) and the occurrence of postoperative complications such as epistaxis, crusting, or mucosal dryness.

Data Collection and Statistical Analysis: Clinical and demographic data were collected using structured forms. All data were entered and analyzed using IBM SPSS version 26.0. Descriptive statistics were presented as mean ± standard deviation (SD).

Differences between preoperative and postoperative symptom scores were analyzed using paired t-tests. A p-value of <0.05 was considered statistically significant. Confidence intervals (95%) were reported for primary outcome parameters to ensure statistical robustness.

Ethical Approval: This study was conducted in accordance with the Declaration of Helsinki and received approval from the Institutional Ethics Committee of NRI Medical College. Written informed consent was obtained from all participants prior to inclusion in the study. Confidentiality and anonymity were maintained throughout the research process.

RESULTS

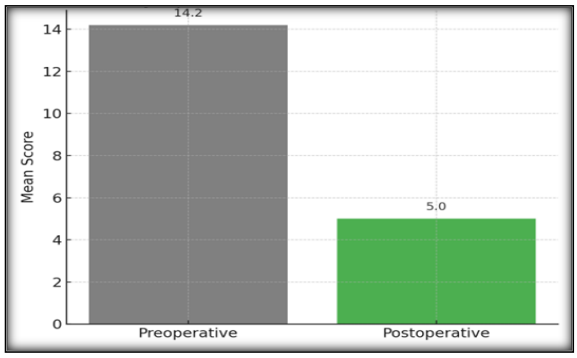


Figure 1: TNSS before and after procedure

Table 1: Demographic Characteristics.

Variable	Value
Total Patients	60
Mean Age (years)	32.8
Age Range (years)	18–55
Males	34
Females	26

Table 2: TNSS Scores Before and After Surgery

Symptom Domain	Preoperative (Mean ± SD)	3-Month Postoperative (Mean ± SD)	p-value
Nasal Obstruction	3.8 ± 0.7	1.4 ± 0.6	<0.001
Rhinorrhea	3.5 ± 0.9	1.2 ± 0.7	<0.001
Sneezing	3.6 ± 0.8	1.3 ± 0.5	<0.001
Nasal Itching	3.3 ± 0.8	1.1 ± 0.6	<0.001
Total TNSS	14.2 ± 2.1	5.0 ± 1.7	<0.001

Table 3: VAS Score Reduction

Symptom	Preoperative VAS	Postoperative VAS (3 Months)	p-value
Nasal Obstruction	8.2	2.6	<0.001
Rhinorrhea	7.9	2.1	<0.001
Sneezing	8.1	2.3	<0.001
Itching	7.6	1.9	<0.001

Table 4: RQLQ Quality-of-Life Scores

Domain	Preoperative Score (Mean ± SD)	Postoperative Score (Mean ± SD)	p-value
Activity Limitation	3.2 ± 0.6	1.4 ± 0.5	<0.001
Sleep Disturbance	3.5 ± 0.8	1.5 ± 0.6	<0.001
Practical Problems	3.1 ± 0.7	1.2 ± 0.4	<0.001
Nasal Symptoms	3.6 ± 0.9	1.3 ± 0.6	<0.001
Eye Symptoms	3.0 ± 0.5	1.1 ± 0.4	<0.001
Emotional Function	3.3 ± 0.6	1.2 ± 0.5	<0.001

Table 5: Postoperative Complications

Complication	Number of Patients	Percentage (%)
Mild Crusting	6	10.0%
Transient Epistaxis	3	5.0%
Mucosal Dryness	2	3.3%
No Complications	49	81.7%

A total of 60 patients were included in this prospective study, with a mean age of 32.8 years. The majority of participants were male (56.7%), and the age range extended from 18 to 55 years. All patients underwent posterior nasal neurectomy following a confirmed diagnosis of allergic rhinitis unresponsive to maximal medical therapy.

Symptom severity, measured using the Total Nasal Symptom Score (TNSS), demonstrated a statistically significant improvement across all domains. The mean preoperative TNSS was 14.2 ± 2.1, which decreased to 5.0 ± 1.7 at the 3-month follow-up ($p < 0.001$). Nasal obstruction scores decreased from 3.8 ± 0.7 to 1.4 ± 0.6, while rhinorrhea dropped from 3.5 ± 0.9 to 1.2 ± 0.7. Sneezing and nasal itching also showed significant reductions, from 3.6 ± 0.8 to 1.3 ± 0.5, and from 3.3 ± 0.8 to 1.1 ± 0.6, respectively (all $p < 0.001$).

Similar improvements were observed in the Visual Analog Scale (VAS) scores. Nasal obstruction decreased from 8.2 to 2.6, rhinorrhea from 7.9 to 2.1,

sneezing from 8.1 to 2.3, and itching from 7.6 to 1.9 (all p-values < 0.001).

Quality-of-life outcomes, assessed using the Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ), also showed significant enhancement in all domains. Sleep disturbance scores decreased from 3.5 ± 0.8 to 1.5 ± 0.6, and nasal symptom scores from 3.6 ± 0.9 to 1.3 ± 0.6. Other domains such as activity limitation, practical problems, eye symptoms, and emotional function also recorded substantial reductions ($p < 0.001$ across all comparisons).

Postoperative complications were minimal and self-limiting. Mild crusting occurred in 10% of patients, transient epistaxis in 5%, and mucosal dryness in 3.3%, while the majority (81.7%) had no postoperative issues.

These findings indicate that posterior nasal neurectomy significantly alleviates core symptoms of allergic rhinitis and improves patient-reported quality of life, with a favorable safety profile.

DISCUSSION

Allergic rhinitis is a chronic inflammatory condition of the nasal mucosa that poses a significant health burden globally. While most patients respond to standard pharmacological interventions such as antihistamines, intranasal corticosteroids, and leukotriene antagonists, a considerable proportion remain symptomatic despite maximal medical therapy. For these refractory cases, posterior nasal neurectomy (PNNx) has emerged as a minimally invasive surgical alternative that targets the parasympathetic fibers contributing to persistent symptoms.

This study was conducted to evaluate the clinical efficacy and safety of PNNx in patients with drug-resistant allergic rhinitis. A total of 60 patients underwent endoscopic neurectomy and were followed up for three months postoperatively. The intervention resulted in a significant reduction in all key symptom domains as measured by TNSS and VAS scores. Notably, the TNSS reduced from a baseline mean of 14.2 to 5.0 after surgery ($p < 0.001$), and VAS scores for nasal obstruction, rhinorrhea, sneezing, and itching showed marked improvements with all p-values below 0.001.

These findings are consistent with those reported in previous studies. Kim et al. reported significant improvement in nasal symptoms following selective posterior nasal neurectomy, with a TNSS reduction exceeding 60% within three months.[10] Similarly, Kang et al. demonstrated comparable results in their cohort, with improvements maintained at long-term follow-up.[11] Our findings support the reproducibility of these outcomes in an Indian patient population, adding to the growing global evidence base.

In addition to symptomatic relief, the current study demonstrated substantial improvements in disease-related quality of life. The RQLQ scores showed consistent reductions across all domains, including sleep quality, emotional function, and activity limitation. This aligns with the work of Wang et al., who emphasized the role of PNNx in improving quality-of-life parameters alongside symptom control.[12]

The surgical procedure was well-tolerated, with minimal postoperative morbidity. Minor complications such as crusting (10%), transient bleeding (5%), and dryness (3.3%) were self-limiting and resolved without the need for further intervention. These outcomes reflect the safety profile reported in other studies utilizing endoscopic techniques for selective neurectomy.[13,14]

However, the study is not without limitations. The follow-up period was limited to three months; thus, long-term durability of symptom control remains to be established. Additionally, the study lacked a control group, which could have provided stronger comparative insights. Subjective outcome measures, while validated, may still carry response bias. Larger randomized controlled trials with extended follow-up and objective mucosal assessments are warranted to validate and refine the indications for PNNx in resistant allergic rhinitis.

In summary, posterior nasal neurectomy offers a safe and effective treatment alternative for patients with refractory allergic rhinitis. It significantly improves nasal symptoms and enhances patient-reported outcomes, with minimal complications. With further research and standardization, PNNx could be incorporated as a viable option in future clinical algorithms for managing chronic allergic rhinitis.

CONCLUSION

Posterior nasal neurectomy has demonstrated significant efficacy in reducing the symptom burden in patients with allergic rhinitis unresponsive to medical therapy. In this prospective study, patients showed substantial improvements in nasal obstruction, rhinorrhea, sneezing, and itching as measured by TNSS and VAS scores. Additionally, marked enhancement in quality-of-life parameters was observed following the procedure. The surgical technique was safe, minimally invasive, and associated with a low complication rate. These findings affirm the utility of posterior nasal neurectomy as a viable alternative in cases where conventional pharmacologic treatment fails. While the short-term outcomes are promising, further multicenter, randomized controlled trials with longer follow-up are warranted to confirm durability, refine patient selection criteria, and integrate this approach into standard treatment protocols. Until then, posterior nasal neurectomy remains a valuable adjunctive option in the multidisciplinary management of refractory allergic rhinitis.

Acknowledgement: The authors would like to acknowledge the institutional support provided by the staff while conducting this study.

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