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Research Article

Effect of Posterior Nasal Nerve Neurectomy in Allergic and Non Allergic Rhinitis Patients - A Comparison with Medical Treatment

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Abstract

Introduction: Rhinitis, an inflammation of the nasal mucosa, is a common condition that can be classified into allergic rhinitis and non-allergic rhinitis. Both forms of rhinitis are characterized by symptoms such as nasal congestion, rhinorrhea, sneezing, and nasal itching. The Primary outcome of the study was to evaluate the efficacy of Posterior nasal nerve neurectomy compared to conventional medical treatments in patients with allergic rhinitis and non-allergic rhinitis.

Materials and Methods: 50 participants were selected over 18 months and participants were allocated into two groups of 25, based on patient preference and refractory status. Group one underwent Posterior nasal nerve neurectomy, while Group two received conventional medical treatments. Symptomatic improvement was assessed using the Total Nasal Symptom Score (TNSS), which includes scores for nasal congestion rhinorrhea, sneezing, and nasal itching, with each symptom rated from 0 (no symptoms) to 3 (severe symptoms). The total score ranges from 0 to 12. Symptom scores were recorded at baseline (before treatment) and follow-up visits.

Result: The p-value for the distribution of TNSS at 6 months between the two groups is 0.025, indicating a statistically significant difference in TNSS at 6 months, with the Posterior Nasal Nerve Neurectomy group showing significantly better symptom control compared to the Medical Therapy group.

Conclusion: Study demonstrates that Posterior Nasal Nerve Neurectomy is significantly more effective than Medical Therapy in managing chronic rhinitis symptoms. Patients undergoing Posterior Nasal Nerve Neurectomy exhibited marked improvements in nasal congestion, sneezing, nasal itching, rhinorrhoea and overall TNSS at both one and six months post-treatment. The surgical intervention showed sustained symptom relief, highlighting its superiority over conventional medical therapy.

Keywords: Allergic Rhinitis; Non-Allergic Rhinitis; Posterior Nasal Nerve Neurectomy; Total Nasal Symptom Score (TNSS)

Introduction

Rhinitis, an inflammation of the nasal mucosa, is a common condition that can be classified into allergic rhinitis (AR) and non-allergic rhinitis (NAR) [1]. Both forms of rhinitis are characterized by symptoms such as nasal congestion, rhinorrhea (runny nose), sneezing, and nasal itching. These symptoms, while often perceived as minor, can have a profound impact on an individual's quality of life, affecting physical health, emotional well-being, and daily functioning [1]. Understanding the differences between AR and NAR, their pathophysiology, and their effects on quality of life is crucial for effective management and treatment. Allergic rhinitis is an IgE-mediated inflammatory response to allergens such as pollen, dust mites, animal dander, and mold spores. This cascade of events results in the characteristic symptoms of AR. AR is often associated with other allergic conditions such as asthma, eczema, and conjunctivitis. Diagnosis is typically based on a combination of clinical history, physical examination, and allergen testing (e.g., skin prick tests or specific IgE blood tests) [2]. Non-allergic rhinitis encompasses a diverse group of conditions that cause nasal inflammation without an IgE-mediated immune response. The exact mechanisms underlying NAR are not well understood, but they may involve non-specific nasal hyperreactivity, autonomic dysfunction, and local inflammation [3]. Common subtypes of NAR include vasomotor rhinitis, gustatory rhinitis, and drug-induced rhinitis. However, NAR is not triggered by allergens [4]. Diagnosis is often one of exclusion, relying on the absence of specific IgE antibodies and a lack of correlation between symptoms and allergen exposure. Other potential causes, such as structural abnormalities and chronic infections, must also be ruled out [5]. The management of AR typically involves a combination of allergen avoidance, pharmacotherapy, and immunotherapy [6,7]. Identifying and minimizing exposure to specific allergens is a crucial step in managing AR. This may involve measures such as using air purifiers, regularly cleaning living spaces, and avoiding outdoor activities during high pollen seasons [8,9]. Medications such as antihistamines, intranasal corticosteroids, and decongestants are commonly used to alleviate symptoms [10,11]. For patients with severe or refractory AR, allergen-specific immunotherapy (Subcutaneous Immunotherapy/ Sublingual Immunotherapy) can be an effective long term treatment. The treatment of non-Allergic Rhinitis is more challenging due to the lack of a specific trigger. Management strategies may include medications such as intranasal corticosteroids, antihistamines, and saline sprays can be used to manage symptoms. However, the efficacy of these treatments may vary. Surgical Interventions is significant in allergy cases. In refractory cases, surgical procedures such as Posterior nasal nerve neurectomy may be considered. This involves the selective ablation of nerve fibers to reduce nasal hyperreactivity and congestion.

Patients and Methods

Sample size

A Prospective Cohort Study was conducted at the Department of Otorhinolaryngology of a Tertiary Care Teaching Hospital. Overall 50 patients were selected for study and 25 participants were divided in each group i.e. Surgical Group and Medical Group over the period of 18 months.

Participants in the study had to meet specific criteria, including being between 18 and 60 years old, having a diagnosis of allergic rhinitis (AR) based on clinical history and physical examination, having a diagnosis of non-allergic rhinitis (NAR) based on clinical history, physical examination, and exclusion of allergic etiology, and providing written informed consent to participate in the study. Exclusion criteria for the study included chronic sinusitis or other nasal conditions, significant comorbidities, prior nasal surgery, neuropathy or nervous disorders, allergy to Lignocaine or other local anesthetics, and acute rhinitis.

The study participants were divided into two groups: Surgical Group (Group A): This group consisted of patients who underwent Posterior nasal nerve neurectomy. The surgical procedure involved the selective bipolar cautery ablation of the Posterior nasal nerves to reduce nasal hyperreactivity and inflammation. The eligibility criteria of the patients for undergoing surgery includes patients that are on Medical Treatment for at least 3 months, have No significant reduction in TNSS score over a period of 3 months after medical treatment, Willing to undergo surgery. Medical Group (Group B): This group included patients who received conventional medical treatments. The treatment regimen comprised antihistamines, intranasal corticosteroids, and decongestants, tailored to each patient's symptoms and severity based on current clinical guidelines and patients not willing for surgery.

All patients were operated under GA or LA and Sedation with 2% lignocaine with 1:100,000 adrenaline 0.5–1 ml solution injected into lateral nasal wall, along the posterior end of the

middle turbinate visualized with a zero degree, 4 mm rigid nasal endoscope. The proximal portion or the main trunk of the posterior nasal nerve lies anterior to sphenopalatine artery at the sphenopalatine foramen level. The nerve was carefully identified after elevation of mucosa and diathermy was done with the help of Bipolar cautery at the superior part of posterior end of middle turbinate.

Figure 1

The ethmoidal crest is often used as a surgical landmark to identify the sphenopalatine foramen and the sphenopalatine artery. Before transection, a ball probe was used to identify and separate one of the four posterior lateral nasal nerves (indicated by white arrow) from the sphenopalatine artery.

Follow-up visits

The Total Nasal Symptom Score (TNSS) was calculated to assess baseline symptoms of nasal congestion, rhinorrhea, sneezing, and nasal itching. The Rhinitis Quality of Life Questionnaire (RQLQ) was used to measure the impact of rhinitis on daily activities, sleep, non-nasal symptoms, and emotional function. The TNSS includes scores for nasal congestion, rhinorrhea, sneezing, and nasal itching, with each symptom rated on a scale from 0 (no symptoms) to 3 (severe symptoms). The total score ranges from 0 to 12. Symptom scores were recorded at baseline (before treatment), and at follow-up visits at 15 and 21 days. During these visits, the following data were collected: TNSS was calculated again to assess changes in symptom severity compared to baseline. RQLQ was re-calculated to evaluate changes in quality of life. Participants were interviewed about any adverse events or complications. Physical examinations were conducted, and medical records were reviewed to document and categorize any side effects.

Result

	Medical Therapy (n = 25)		**Posterior Nasal Nerve Neurectomy (n = 25)**	
	n	**%**	**n**	**%**
0-3	4	16	1	4
4-6	11	44	14	56
7-9	9	36	9	36
10-12	1	4	1	4
P-value = 0.540				

Table 1: Total Nasal Symptom Score (TNSS) at Baseline.

In our study of both groups (25 patients each) we found that in the Medical Therapy as well as in Posterior Nasal Nerve Neurectomy Surgery group TNSS score of 4-6 was seen in 11 (44%) and 14 (56%) cases and higher score of 10-12 is seen in only 1 (4%) case in both group. We did not find any significant difference (p = 0.540) in baseline TNSS between patients in the Posterior Nasal Nerve Neurectomy and Medical Therapy groups.

	Medical Therapy (n = 25)				**Posterior Nasal Nerve Neurectomy (n = 25)**			
	1 month		**6 month**		**1 month**		**6 month**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
0-3	11	44	16	64	14	56	22	88
4-6	8	32	8	32	7	28	3	12
7-9	6	24	1	4	4	16	0	0
	P-value = 0.106				P-value = 0.025			

Table 2: TNSS Follow-up.

Table 2 presents the Total Nasal Symptom Score (TNSS) at Follow up after 1 and 6 months.

On follow-up after 1 month we found that in Medical Therapy group 11 (44%) patients had a TNSS of 0-3, while 8(32%) had

a TNSS of 4-6 and 6 (24%) had a TNSS of 7-9. However in the Posterior Nasal Nerve Neurectomy group, 16 (64%) patients had a TNSS of 0-3, 8 (32%) had a TNSS of 4-6, and 1 (4%) had a TNSS of 7-9 at 1 month. We found that though there is no significant difference (p = 0.106) in baseline TNSS between patients in the Posterior Nasal Nerve Neurectomy and Medical Therapy groups at 1 month. But there is a trend towards better symptom control in the Posterior Nasal Nerve Neurectomy group.

Similarly after 6 months the Medical Therapy group, 14 (56%) of patients had a TNSS of 0-3, 7 (28%) had a TNSS of 4-6, and 4 (16%) had a TNSS of 7-9. While in the Posterior Nasal Nerve Neurectomy group, 22 (88%) of patients had a TNSS of 0-3, 3 (12%) had a TNSS of 4-6, and none had a TNSS of 7-9 at 6 months. Thus we observed that there is significant difference (p = 0.025) in TNSS at 6 months, with the Posterior Nasal Nerve Neurectomy group showing significantly better symptom control compared to the Medical Therapy group. Thus the Surgical group demonstrated a greater reduction in symptom severity across all parameters, with a higher percentage of participants reporting no symptoms after 6 months post-treatment. Though Medical Therapy showed improvement, however the reduction in severe cases and overall symptom relief was more pronounced in the Surgical group indicating a stronger therapeutic impact. Post-operative complications were minimal. No cases of palatal numbness were observed. Five patients experienced mild epistaxis in the immediate post-operative period, which was self-limiting and managed conservatively.

Discussion

The objective of this study was to evaluate the efficacy of Posterior Nasal Nerve Neurectomy to Medical Therapy in managing symptoms of allergic and non-allergic rhinitis. Specifically, the study aimed to assess differences in nasal congestion, severity of sneezing, nasal itching, rhinorrhoea, and Total Nasal Symptom Scores (TNSS) at baseline, one month, and six months post-treatment. Post operatively, patients were advised saline nasal douching, prophylactic antibiotics and analgesics along with once daily dose of oral Levocetirizine 5 mg with Montelukast 10 mg for a period of 3 days and were discharged after 3 days with advise to continue saline nasal douching and to follow-up after one week and after one month. During the follow-up after one month of surgery, patients were enquired about symptoms if any, a clinical examination including nasal endoscopy was performed. Patients were followed up for a period of 6 months from the day of surgery. The significance of conducting this study lies in the prevalent and debilitating nature of chronic rhinitis, which affects a significant portion of the population and has considerable impacts on daily functioning and quality of life. Current treatments vary widely in efficacy and side effects, necessitating a thorough comparison of available therapeutic options. This study contributes to the body of knowledge by providing evidence on the effectiveness of Posterior Nasal Nerve Neurectomy versus Medical Therapy, thereby aiding clinicians in making informed decisions regarding the most appropriate treatment strategy for their patients.

The importance of comparing the two treatment groups-Medical Therapy and Posterior Nasal Nerve Neurectomy cannot be overstated. Each treatment has its own mechanism of action, potential benefits, and side effects. Medical Therapy often involves pharmacological interventions that can be effective but may have limitations such as side effects or reduced efficacy over time. Posterior Nasal Nerve Neurectomy, on the other hand, is a more invasive procedure with the potential for long-term symptom relief but carries surgical risks. By comparing these two approaches, the study provides valuable insights into their relative effectiveness and informs clinical practice by highlighting the most beneficial treatment option for patients with chronic rhinitis. The findings suggest that Posterior Nasal Nerve Neurectomy offers significant improvements in nasal symptoms compared to Medical Therapy, particularly in the long-term management of chronic rhinitis. The procedure was associated with minimal complications, with no cases of palatal numbness and only occasional self-limiting epistaxis.

The findings of the present study indicate that Posterior Nasal Nerve Neurectomy offers significant improvements in nasal symptoms compared to Medical Therapy, particularly evident at the six-month follow-up. This aligns with existing research that highlights the effectiveness of surgical interventions in alleviating symptoms of rhinitis and other related conditions.

Joseph L., *et al*. (2022) also found that surgical intervention resulted in more significant symptom improvement. Similarly, our study demonstrated that Posterior Nasal Nerve Neurectomy was more effective than Medical Therapy in managing chronic rhinitis symptoms, particularly in the long-term. This comparison underscores the potential advantages of surgical treatments over pharmacological approaches, especially for patients with

refractory symptoms [12]. Zhou Q., *et al*. (2023) examined the impact of Posterior nasal nerve neurectomy (PNN) combined with pharyngeal neurectomy (PN) on chronic rhinosinusitis with nasal polyps and perennial allergic rhinitis (PAR). Their findings indicated that the combination treatment significantly reduced effusion, sneezing, and improved quality of life scores compared to the control group. Although our study focused solely on Posterior Nasal Nerve Neurectomy without additional procedures, the observed efficacy in reducing nasal symptoms supports Zhou Q., *et al*. conclusion that surgical intervention can markedly enhance patient outcomes [13]. These comparative insights highlight the effectiveness of Posterior Nasal Nerve Neurectomy in significantly reducing chronic rhinitis symptoms and improving patient outcomes, both in the short and long term. The implications for clinical practice are profound, suggesting that surgical intervention should be considered a viable treatment option for patients who do not respond adequately to medical therapy. Future research should continue to explore the long-term outcomes, safety profiles, and comparative effectiveness of different surgical techniques, ultimately aiming to refine treatment protocols and enhance patient care for those suffering from chronic rhinitis.

Conclusion

In conclusion, this study demonstrates that Posterior Nasal Nerve Neurectomy in patients, who have taken three months medical therapy, is significantly more effective than Medical Therapy alone in managing chronic rhinitis symptoms. Patients undergoing Posterior Nasal Nerve Neurectomy exhibited marked improvements in nasal congestion, sneezing, nasal itching, rhinorrhoea, and overall Total Nasal Symptom Scores (TNSS) at both one and six months post-treatment. The surgical intervention showed sustained symptom relief, highlighting its potential as a superior treatment option for both allergic and non-allergic rhinitis compared to conventional medical therapy.

The findings align with previous research, underscoring the efficacy of surgical approaches in treating severe and persistent rhinitis symptoms. Given the significant improvements observed in our study, Posterior Nasal Nerve Neurectomy should be considered a viable treatment option for patients with chronic rhinitis who do not achieve adequate symptom control with medical therapy alone. Future research should focus on long-term outcomes, safety profiles, and the exploration of combined surgical techniques to further optimize patient care and enhance the quality of life for individuals suffering from chronic rhinitis.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. Through the form, the patient has given his consent for his images and other clinical information can be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of Interest

The authors declare no conflicts of interest.

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