Section: ENT

Original Research Article

EFFECTIVENESS OF POSTERIOR NASAL NERVE NEURECTOMY AND INFERIOR TURBINOPLASTY IN PATIENTS OF INTRACTABLE RHINITIS

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Received : 05/02/2024
Received in revised form : 07/04/2024
Accepted : 22/04/2024

Keywords:
rhinitis, rhinorrhea, quality of life, posterior nerve neurectomy, inferior turbinoplasty, intractable rhinitis.

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DOI: 10.47009/jamp.2024.6.2.247

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

Int J Acad Med Pharm
2024; 6 (2); 1238-1242

Abstract

Rhinitis is defined clinically as having two or more symptoms of anterior or posterior rhinorrhea, sneezing, nasal blockage and/or itching of the nose during two or more consecutive days for more than 1 hour on most days. It affects the quality of life and contributes to unproductive time at school or work, disturbed sleep pattern and day time somnolence. Nerve irritation causes sneezing and itching, the loss of mucosal integrity causes rhinorrhoea and the vascular engorgement leads to nasal blockage. Medical modalities are symptomatically effective in mild cases, with temporary relief. Prolonged treatment causes financial burden. Posterior nasal nerve neurectomy is short, easy and effective alternative. The procedure is to selectively coblate nerve bundles at the level anterior to the sphenopalatine foramen (SPF) with a trans nasal approach. Inferior turbinoplasty gives long term nasal patency without compromising its function as medial mucosal surface is preserved. Our aim is to study the relief in the symptoms of intractable rhinitis patients post operatively and to reduce the financial burden of medications and finally to improve the quality of life of patient The study is a hospital based prospective study, conducted on 15 patients who presented to the ENT department of HNB base Hospital srikot, Srinagar from May 2023 to December 2023 (6 months) suffering from intractable rhinitis and did not show any satisfactory improvement even after 2 year of medical treatment. Adult patients in the age group of 20–45 yrs. diagnosed with intractable rhinitis were enrolled into the study after obtaining a due written consent. Patients with any anatomical feature which precipitates to rhinitis such as deviated nasal septum, mass in nasal cavity sino-nasal polyposis, medical management less than 2 years and unfit for surgery were excluded from the study. During our study period, 15 patients were enrolled and subjective severity of all the domains of RQLQ (Rhinoconjuctivitis quality of life questionnaire) assessed preoperatively and all the patients were followed up at 1st and 3rd month postoperatively. Amongst these patients, there were 7 females (46.6%) and 8 were male (53.3%). Subjective symptoms of all 15 patients improved over the period of 3 months. The mean RQLQ improved from preoperatively to 3rd month post operatively with p value <0.001. Endoscopic resection of the posterior nasal nerve and inferior turbinoplasty combined is a safe and less invasive technique with long standing results. Medical treatment usually provides mild and symptomatic relief with long duration of treatment period. Thus, Posterior Nasal Nerve neurectomy and inferior turbinoplasty is safer, economical & easier alternative to current trend of treatment of allergic rhinitis and vasomotor rhinitis, proving to be highly efficient in cases of intractable allergic rhinitis.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

INTRODUCTION

Allergic rhinitis (AR) is clinically defined as having two or more symptoms of anterior or posterior rhinorrhea, sneezing, nasal blockage and/or itching of the nose during 2 or more consecutive days for more than 1 hour on most days.[1] It affects one in six individuals and is associated with significant morbidity, loss of productivity and healthcare cost. AR is known to peak in the second to fourth decades of life and then gradually decline. Reduction of allergen exposure, pharmacological interventions, immunotherapy, surgical treatment and complementary therapies are the options available.

Vasomotor rhinitis is Characterized primarily by symptoms of nasal blockage , rhinorrhea and sneezing associated with non allergic non infectious triggers ,Partly due to an imbalance between parasympathetic and sympathetic inputs. The imbalance among mediators results in increased vascular permeability and mucus secretion from the submucosal nasal glands .Patients with vasomotor rhinitis tend to categorize into two groups depending on predominant symptomatology: “blockers” with congestion and “runners” with rhinorrhea. Patients with rhinorrhea tend to have an enhanced cholinergic response.

Despite various medical therapies available for rhinitis, some patients fail to respond to medical management and hence, in these patients, surgical options become the treatment of choice.[2] With options available are: Inferior turbinate reduction, lateralization, out fracture of the inferior turbinate, submucosal resection, radiofrequency ablation and coblation turbinoplasty, laser vaporization, vidian neurectomy and posterior nasal neurectomy (PNN).[3-6]

Vidian neurectomy, a surgical procedure was also done to treat refractory vasomotor rhinitis. The Vidian nerve supplies parasympathetic fibers to the nasal mucosa, palate, and lacrimal gland via the pterygopalatine ganglion. The sacrifice of this nerve by reducing the autonomic supply to the nasal cavity is proven to improve nasal hypersecretion. But this technique has many complications such as Postoperative bleeding (likely source of bleeding is from sphenopalatine artery branches and is controllable with nasal packing or cautery), dry eye, Palatal/Gingival/Cheek numbness, Nasal crusting/dryness. So this procedure has become obsolete nowadays.

Prolonged treatment with allergy immunotherapy causes a sustainable financial burden. Posterior nasal nerve neurectomy is short, easy and effective alternative where we selectively coblate the nerve bundles at the level anterior to the area of the sphenopalatine foramen (SPF) with a trans nasal approach. By denervating the nasal mucosa one renders it unresponsive to any sorts of allergen or allergic reaction and Inferior turbinoplasty gives long term nasal patency without compromising its function as medial mucosal surface is preserved.

Aims and Objective

Our aim is to study the relief in the symptoms of rhinitis patients post operatively and to reduce the financial burden of medications and finally to improve the quality of life of patient.

MATERIALS AND METHODS

Inclusion Criteria

Patients with age group of 20–45 years diagnosed with intractable rhinitis (allergic and vasomotor rhinitis) that are refractory to medical management for 2 years having moderate to severe symptoms after obtaining a due written consent (with scores3-5 on RQLQ scoring).

Exclusion Criteria

Patients with any anatomical feature which precipitates to rhinitis such as deviated nasal septum, mass in nasal cavity sino-nasal polyposis, medical management less than 2 years and unfit for surgery were excluded from the study.

Methodology

It’s a prospective study conducted in a tertiary care centre in ENT department of HNB Base hospital from December 2022 to May 2023(6 months) on 15 (8 male and 7 females) intractable rhinitis patients.

A thorough ENT history and examination with anterior rhinoscopy, pre-operative diagnostic nasal endoscopy and a non-contrast computed tomographic scan of the nose and the paranasal sinus was done for the conformation of our diagnosis and treatment was planned accordingly.

Patients recall how bothered they have been by their rhinoconjunctivitis during the preop period and then they respond to each question of RQLQ score on a 5-point scale of 0–5, where 0 is none, symptoms completely absent, 1-2 = mild, symptoms present, 3-4= moderate, bothersome symptoms, 5 = severe symptoms.

Surgical Procedure

All patients were operated under GA. Preoperatively the nasal cavity was packed with cotton pellets soaked in 4% xylocaine and adrenaline solution. A zero degree, 4 mm rigid nasal endoscope with a high-definition camera was used. Local anesthesia with adrenaline 0.5–1 ml in the solution of 1:10,0000 was injected into the lateral nasal wall, along the posterior end of the inferior turbinate. 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 and diathermy was done with the help of coblator at the superior part of posterior end of inferior turbinate.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

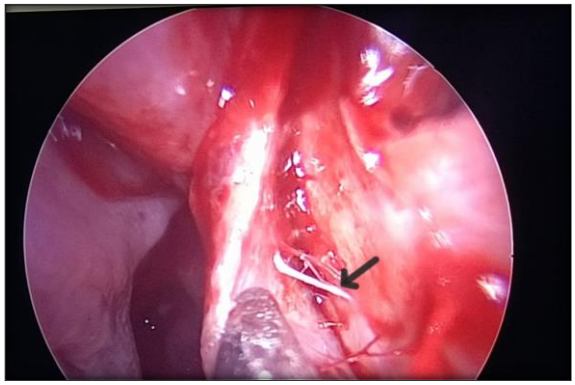

Figure 1: Image showing posterior nasal nerve at the region anterior to the sphenopalatine foramen.

Inferior turbinate was infiltrated with saline and sub mucosal resection of the lateral lamella of inferior turbinate was done with the help of medtronic microdebrider and inferior turbinoplasty blade.

The patients were followed up at 1st and 3rd month post-operatively using the RQLQ score (Rhinoconjuctivitis Quality of Life Questionnaire) having 28 questions in 8domains :

1. Rhinitis
2. Eye symptoms
3. Troublesome symptoms
4. Role limitation
5. Physical activity functioning
6. Sleep
7. Social functioning
8. Emotions

Each domain contain 3-4 subdomains and in our study we have given importance to Rhinitis domain which includes rhinnorhea, sneezing, itching and nasal obstruction.

The Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) was developed to measure the functional problems (physical, emotional, social and occupational) that are most troublesome to adults (17-70 years) with either seasonal or perennial rhinoconjunctivitis of either allergic or non-allergic origin.

There are 4 'patient-specific' questions in the activity domain which allow patients to select 3 activities in which they are most limited by their rhinoconjunctivitis. All the patients were followed at 1st and 3rd Month post operatively and same questionnaire of RQLQ score was asked and recorded and mean of RQLQ score was compared to see the statistical significance in the pre op and post op period.

Statistical Analysis

The data obtained was put into a master chart and was statistically analysed. Continuous data was represented as mean and standard deviation was calculated.

t-Test was used as test of significance to identify the mean difference between more than two quantitative variables. P value (Probability that the result is true) of < 0.001 was considered as statistically significant after assuming all the rules of statistical tests.

RESULTS

During our study period from May 2023-December 2023, 15 patients were enrolled in the study. All the patients were followed up at 1st and 3rd month postoperatively.

Amongst these patients, there were 7 females (46.6%) and 8 were male (53.3%).

In RQLQ score, from 8 domains we compare mainly rhinitis domain which consist of rhinorrhoea, sneezing, nasal obstruction and itching in pre op and 1st and 3rd month post op period .Results showed the maximum improvement after the 1st post-operative month, the mean values for these symptoms further reduced by the end of 3th postoperative month with p value < 0.001 showing its statistical significance. [Table 1]

Also all the domains of RQLQ score was compared in preoperative and 1st and 3rd month postoperatively. There is maximal improvement in all subjective symptoms after 3rd post-operative month with p value <0.001 showing its statistical significance.

There were no major complications in the immediate or late post-operative period. No bleeding from the sphenopalatine artery or its branches, no severe postoperative pain, dry eyes, dry mouth, numbness of cheek or palate related to the procedure were noted. [Table 2]

Table 1: RHINITIS domain of RQLQ (rhinoconjuctivitis quality of life questionnare) score in pre op , 1st post op and 3rd post op month

Time Period	Pre-op	1st Post-op	3rd Post-op	Pre-op Vs 3rd Post-op
RHINORRHEA	2.6 ± 0.49	0.73 ± 0.24	0	0.0001
SNEEZING	3.33 ± 0.39	1.33± 0.21	0.2± 0.1	0.0001
STUFFY NOSE	2.67 ±0.33	0.8± 0.24	0	0.0001
ITCHY NOSE	2.33 ± 0.42	0.6± 0.23	0	0.0001

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: Statistical comparision of all the domain in RQLQ score in pre op, 1st month post op and 3rd month post op

Time Period	Pre-op	1st Post-op	3rd Post-op	Pre-op Vs 3rd Post-op
RHINITIS	10.13 ± 3.31	2.80 ± 0.31	1.00± 0.00	0.00
EYE SYMPTOMS	3.00 ± 1.89	1.47 ± 0.74	1.00± 0.00	0.00
TROUBLESOME SYMPTOMS	6.20 ±5.45	2.53 ±0.79	1.27 ±1.03	0.002
ROLE LIMITATION	4.93± 3.94	1.80± 0.54	1.33 ±1.29	0.002
PHYSICAL ACTIVITY FUNCTIONING	1.80 ± 1.37	1.13± 0.52	1.00± 0.00	0.032
SLEEP	2.13 ±1.46	1.07 ± 0.26	1.00± 0.00	0.005
SOCIAL FUNCTIONING	2.13 ± 1.30	1.40± 0.63	1.07± 0.26	0.004
EMOTIONS	1.67 ± 0.82	1.27±0.79	1.00± 0.00	0.004

DISCUSSION

The prevalence of rhinitis has increased in India , over the past years . All the patients undergo for medical management in the initial phases of disease. Surgical management is indicated as a successful alternative strategy when patients fail to respond to medical treatments.

Vidian neurectomy yields dramatic relief of nasal hypersecretion in patients with allergic rhinitis. Clinical studies conducted on vidian neurectomized nasal mucosa have shown that nasal hypersecretion observed after challenging the nasal mucosa with antigen is caused by reflexively induced activation of the parasympathetic center secondary to stimulation of the sensory nerve terminals in the nasal mucosa by histamine. On the contrary, nasal mucosal swelling is caused mostly by the direct effects of chemical mediators on the nasal vasculature, although vascular reflex mediated by the noncholinergic parasympathetic nerve may be partially involved in the onset of nasal mucosal swelling after antigen challenge. Considering the long-term side effects of inhibition of lacrimation and possible partial recurrence of hyperreactive nasal symptoms observed after vidian neurectomy, less invasive endoscopic posterior nasal neurectomy is considered the treatment of choice for patients with allergic rhinitis who require surgical intervention.[7]

Rhinorrhoea being the most common complaint in both allergic and vasomotor rhinitis. Resection of the posterior nasal nerve is especially effective for severe rhinorrhoea because the interruption of parasympathetic nerve fibres suppresses nasal secretion. As it contains afferent sensory fiber supplying the posterior half of the mucosa in the nasal cavity, sneezing can be reduced, thus making this procedure superior to Vidian neurectomy.[8]

The posterior nasal nerve emerges from the SPF and is distributed to the inferior turbinate mucosa following the branches of the sphenopalatine vessels. Innervation of the parasympathetic component increases the secretomotor function and innervation of the sensory component regulates the sensitivity of the nasal mucosa.[9,10] By resection of the posterior nasal nerve at this point, we can expect modifying the hyperreactivity of the neural network that augments the allergic reaction. In addition, this technique causes partial denervation of the middle turbinate and septum submucosal glands based on anatomical innervation.[11]

Inferior turbinate hypertrophy leads to nasal obstruction due to venous sinosoidal filling so, Inferior turbinoplasty gives long term nasal patency without compromising its function as medial mucosal surface is preserved

The Rhinoconjunctivitis Quality of Life Questionnaire (RQLQ) was developed to measure the functional problems (physical, emotional, social and occupational) that are most troublesome to adults (17-70 years) with either seasonal or perennial rhinoconjunctivitis of either allergic or non-allergic origin. It is rare for patients with rhinitis to have no eye symptoms at all. In those few patients who have no eye involvement, the Rhinoconjunctivitis Quality of Life Questionnaire will capture all the problems that they experience due to their nose symptoms

Ogawa et al,[12] found out that PNN in allergic rhinitis patients significantly reduce levels of IL-5, eotaxin protein in nasal secretions. They also observed reduction of infiltrated immuno-component cells in the subepithelial mucous layer, which are major sources of cytokine release.

Mori et al,[13] Kobayashi et al,[14] also reported similar patient benefits following posterior nasal neurectomy. They concluded that selective resection

ISSN (O): 2687-5365; ISSN (P): 2753-6556

of peripheral branches of the posterior nerve could reduce allergic symptoms.

Kawamura et al,[15] in their study of PNN with harmonic scalpel among 20 patients, observed subjective improvement in nasal obstruction, sneezing and nasal discharge in 100%, 90 and 75% patients respectively.

Cassano et al. attributes the reduction in sneezing and nasal pruritis following posterior nasal nerve transection to the resection of posterior inferior nasal nerve fibres.[16] In our study, there was substantial reduction in RQLQ score which continued to reduce 6 months following surgery, showing significant reduction in parasympathetic supply.

In our study, we found that the mean score for each symptom of all patients was statistically decreased from pre-operative levels at the 3-month follow-up without any major complications.

CONCLUSION

Endoscopic resection of the posterior nasal nerve and inferior turbinoplasty combined is a safe and less invasive technique with long standing results. Medical treatment usually provides mild and symptomatic relief with long duration of treatment period. Thus, Posterior Nasal Nerve neurectomy and inferior turbinoplasty is safer, economical & easier alternative to current trend of treatment of allergic rhinitis and vasomotor rhinitis, proving to be highly efficient in cases of intractable allergic rhinitis.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556