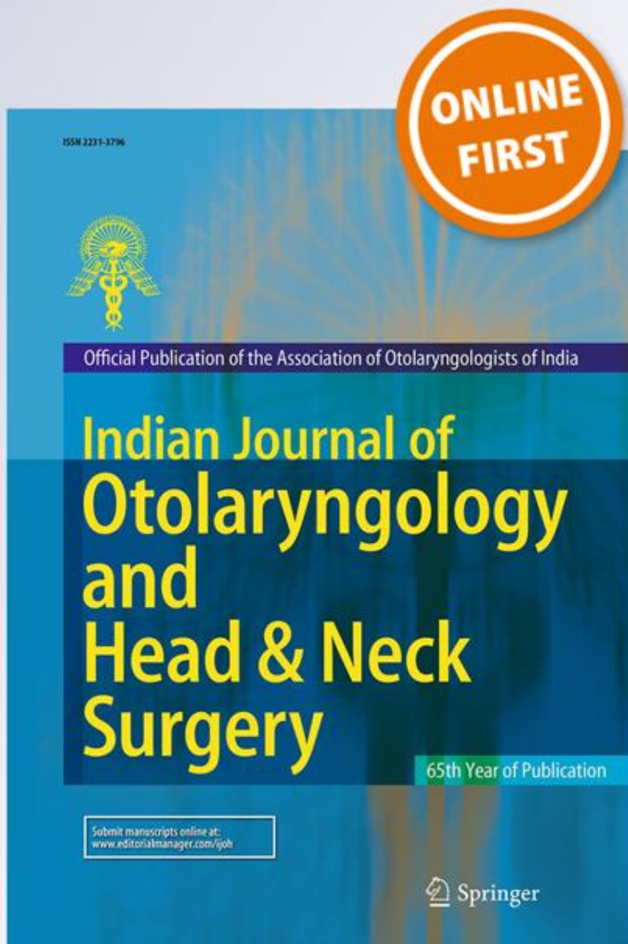
Newer Surgical Options for Nasal Allergy

Ahilasamy Nagalingeswaran & Rajendran Dinesh Kumar

Indian Journal of Otolaryngology and Head & Neck Surgery

ISSN 2231-3796

Indian J Otolaryngol Head Neck Surg
DOI 10.1007/s12070-019-01772-1



Springer

Indian J Otolaryngol Head Neck Surg
https://doi.org/10.1007/s12070-019-01772-1

ORIGINAL ARTICLE

Newer Surgical Options for Nasal Allergy

Ahilasamy Nagalingeswaran[1] · Rajendran Dinesh Kumar[2]

Received: 22 September 2019 / Accepted: 21 November 2019

Abstract Allergic rhinitis is a common disorder that affects several patients annually and the hallmark symptoms are nasal obstruction, rhinorrhea and sneezing which significantly impacts the quality of life. Many surgical options exist for the treatment of allergic rhinitis which is directed primarily addressing the nasal obstructive component. The purpose of this review article is to highlight newer surgical options in the management of patients with nasal allergy. Surgical modalities such as endoscopic resection of the posterior nasal nerve and senior author's own mini inferior turbinoplasty tunnelling technique for patients with nasal allergy is described here. Most of the literature has focused on medical management for patients with allergic rhinitis. Endoscopic Posterior Nasal neurectomy combined with mini inferior turbinoplasty has good overall significant improvement in nasal allergy symptom scores by 60–80%. Although no single modality has evolved as the gold standard for the surgical management of allergic rhinitis. The main stay of surgical intervention targets the inferior turbinate and posterior nasal nerve which is the parasympathetic supply to the nose causing rhinorrhea. This combined technique provides consistent, robust results with long-term relief of nasal symptoms due to allergic and vasomotor rhinitis without additional risk of complication.

Keywords Nasal obstruction · Sneezing · Rhinorrhea · Inferior turbinate reduction · Tunneling · Microdebrider · Allergic rhinitis · Vasomotor rhinitis · Posterior nasal nerve · Endoscopic Posterior Nasal Neurectomy

Introduction

Allergic rhinitis is a common disorder that affects several patients annually and the hallmark symptoms are nasal obstruction, rhinorrhea and sneezing which significantly impacts the quality of life. Many surgical options exist for the treatment of allergic rhinitis which is directed primarily addressing the nasal obstructive component only. The purpose of this review is to highlight newer surgical options in the management of patients with nasal allergy.

Methods

A retrospective study conducted in a tertiary medical centre, from January 2012 to February 2017 where in 212 patients with symptoms of allergic rhinitis or intractable rhinitis, not satisfied with medical line of management were enrolled for the study. The patients were evaluated 2 weeks before and after surgery, postoperatively followed up from 1st, 2nd, 6th and 12th month postoperatively. Subjective evaluation was performed with Sino nasal outcome questionnaire SNOT-22. Surgical modalities described here are Endoscopic resection of the

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s12070-019-01772-1) contains supplementary material, which is available to authorized users.

✉ Rajendran Dinesh Kumar
dinuraj1186@gmail.com

Ahilasamy Nagalingeswaran
nahilasamy@yahoo.com

[1] Ahilasamy ENT Centre, Chennai, Tamil Nadu 600 042, India

[2] Department of ENT and Head-Neck Surgery, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka 560 074, India

Published online: 02 December 2019

posterior nasal nerve and Mini inferior turbinoplasty tunnelling technique which were simultaneously performed bilaterally in the same surgical sitting.

Mini Inferior Turbinoplasty

Mini turbinoplasty by tunneling technique of the inferior turbinates is designed to preserve the mucosa which also permits endoscopic visualization similar to a tunnel, reducing soft tissue of inferior turbinate and allowing visualization of inferior turbinate bone which can also be removed under vision. Powered instrumentation offers advantages compared to other techniques with regard to complications and mucosal preservation [1–3].

Preparation—Position, Premedication, Infiltration, Nerve Block

The patient's head placed in the neutral anatomic position, slightly turned to surgeon side with the operative bed placed in 30° reverse trendelenburg position. Premedication with intravenous sedation, fentanyl and dexmedetomidine are administered as per body weight. Under Local Anaesthesia, gentle nasal packing done with ribbon gauze soaked with 4% lignocaine with adrenaline in the ratio of 1:1 for nasal decongestion and analgesic effect. Transoral greater palatine or transnasal sphenopalatine ganglion blocks with 23 gauge spinal needle (1–2 cc) were performed bilaterally with 0.5% ropivacaine or 1% Lignocaine with 1/40,000 adrenaline. The inferior turbinates were injected with the same solution in a submucosal plane. Alternatively, patient may be taken under General anesthesia but the above infiltrations are given to getter better hemostasis, plane of dissection and postoperative analgesic effect. For a bloodless clean field bloodless field local anaesthesia is preferred at our centre. Endoscope- '0' degree 4 mm rigid endoscope is used, along with a high definition camera.

Description of the Procedure

The procedure commences with the creation of a window in anterior end of the inferior turbinate with a straight microdebrider blade (4-mm tip with tricut blade or serrated). The inferior turbinate soft tissue with bony component was debrided at 3500-rpm oscillating mode for soft tissue and non-oscillating mode for bony component in anterior to posterior direction. Debridement was performed with the blade positioned laterally which is the tunneling technique, with intent of converting a convex looking inferior turbinate to concave. This allows proper debulking of most of the soft tissue of the inferior turbinate and widening of the nasal valve area. Tunneling should be done up to the posterior end of the inferior turbinate without damaging the medial mucosa.

In this Tunneling technique one can visualize inside the tunnel by a 0° rigid Hopkins endoscope. With endoscopic vision undebrided hard bones are removed with thru-cutting/3 mm Blekesly forceps instruments and loose bony fragments can be removed with Tilley's nasal dressing forceps. We haven't come across severe bleeding needing cautery. The reduction in size of the inferior turbinate was easily recognized immediately after approximating mucosal surface at the site of window created. No packing of the nasal cavity was done post procedure. Complications of bleeding, crusting, foul odor, mucosal tears, synechia were minimal, with no nasolacrimal duct injury. In postoperative long term follow up to 7 years, the size of the inferior turbinate have significantly reduced with good nasal airway passage compared to preoperative status (Fig. 1)

Endoscopic Posterior Nasal Neurectomy (PNN)

Rhinorrhea and Sneezing are frequent Symptom which is noted among patients with allergic and vasomotor rhinitis. Most of these patients usually respond well to medical treatment. Indications for surgical treatment are warranted only when medical treatment fails, patients wants a permanent solution without daily medication or combined with other sinonasal procedures like FESS/Septoplasty.

In 1961, Golding-Wood [4] first described Vidian neurectomy for the treatment of allergic and vasomotor rhinitis, with high incidence of postoperative complications such as disturbed lacrimal secretion and numbness of the cheek and gums.

In 2007, Kikawada [5] reported an endoscopic technique that resects the posterior nasal nerve near sphenopalatine artery and can control intraoperative bleeding under direct vision.

The posterior nasal nerve is a peripheral branch of the sphenopalatine ganglion, entering the nasal cavity through separate foramen 4 to 5 mm below the sphenopalatine foramen/crista ethmoidalis after bifurcation of the nerve into the lacrimal nerve. The posterior superior nasal nerves innervate the superior and middle conchae and the superior and middle meatus. Other parasympathetic nerve fibres of the nose branch off from the greater palatine nerve and enter the nasal cavity through the canaliculi of the perpendicular plate of the palatine bone as the posterior inferior nasal nerves. These nerves innervate the inferior turbinate and the inferior meatus [6].

Operative procedure

Anaesthesia This procedure can be conducted either under general anaesthesia or local anaesthesia. Local anaesthesia

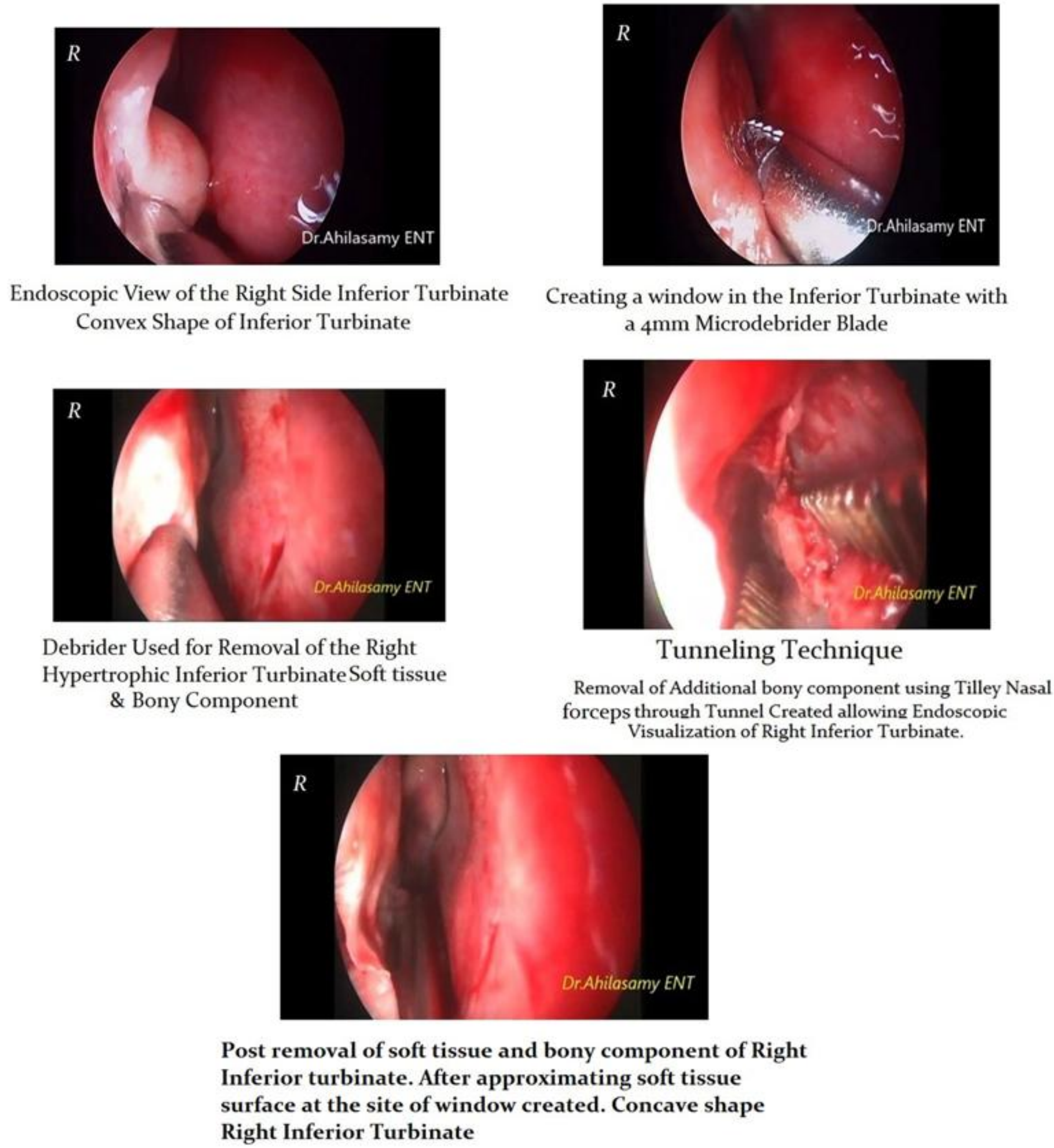


Fig. 1 Mini inferior turbinoplasty tunneling technique steps

is preferred at our centre, for a clear bloodless field, which enables better visualisation of the slender nerve fibres.

Positioning The patient is placed in a supine posture in a reverse Trendelenburg position. The head end is elevated to 30 degrees, to decrease venous return. A 0-degree 4 mm rigid endoscope with a high-definition camera is used. Pre-medication with fentanyl and dexmedetomidine is administered intravenously as per body weight.

Infiltration and nerve block A dose of 1–2 ml ropivacaine (0.5 %) or lignocaine with adrenaline (1 %) at a dilution of 1:40,000 solution is administered as a sphenopalatine block. The solution is injected inferior to the posterior attachment of the middle turbinate, just behind the posterior fontanelle, or through the greater palatine foramen (transoral) if there is a gross septal deviation. A 23 gauge spinal needle is used, with about 1.5 cm of the tip of the needle bent to 45 degrees.

Incision A vertical incision is made behind the posterior fontanelle. The posterior end of posterior fontanelle is identified by palpation with elevator. Just behind this a vertical incision is made on the lateral nasal wall, running all the way down till the attachment of inferior turbinate. The incision is made with angled elevator designed by the senior author. However one can use a needle tipped electro cautery/Colorado needle for the same, so that the bleeding from incision site can be avoided if the procedure is performed under general anaesthesia.

Identifying posterior nasal nerve The mucoperiosteum is raised gently using an elevator designed by the senior author or by a suction freer elevator, after making the initial incisions. Alternatively if middle meatal antrostomy (MMA) had been made, the mucoperostium is elevated from the posterior edge of MMA. Care must be taken not to injure the sphenopalatine vessel during flap elevation. The peripheral part of the posterior nasal nerve can be usually identified just behind the incision, about 4 or 5 mm inferior to sphenopalatine artery/crista ethmoidalis. It is always better to identify the main trunk or the proximal part of posterior nasal nerve below the sphenopalatine foramen area, where the nerve lies inferior to the vessel. The nerve may divide into several branches at it exit into nasal cavity, each through its foramen. The surgeon stands a chance of missing, a branch if the peripheral part of nerve is targeted instead of the proximal one near the foramina. After identifying the nerve, they are cauterised using a monopolar suction cautery or cut using micro scissors. It is essential to do this procedure on both sides for effective results.

Closure The mucoperiosteal flaps are repositioned, no nasal packing is done. Patients are discharged on the same day as a day care procedure (Fig. 2).

Complications

In our series we did encounter 2 cases of sphenopalatine artery injury and bleeding peroperatively which was coagulated with the same monopolar suction cautery.

Postoperative Care

Nasal irrigation commences from 2nd post operative day and the patient follows up between 15 and 21 days postoperatively for removal of any crusting over the anterior end the inferior turbinate (window area) and over neurectomy site posteriorly.

Results

We conducted a retrospective review of the patient's clinical records. During our study period from January 2012 to February 2017, 212 patients were enrolled for the study. Subjective evaluation was performed with Sino nasal outcome questionnaire SNOT-22 score. 2 patients were lost to follow up; and were hence excluded. There were 90 male patients (42.85%) and 130 female patients (57.14%), age range of 27–52 (36.24 $\pm$ 7.93) (Fig. 3).The patients were evaluated 2 weeks before and after surgery, postoperatively followed up from 1st, 2nd, 6th and 12th month postoperatively.

Statistical analysis data was obtained and put into a master chart and it was assessed using the SPSS V16 software. The variables were presented as mean $\pm$ SD. Post-operative improvement in symptom scores were evaluated with Wilcoxon signed-rank test. A p value < 0.0001 was considered to be statistically significant.

Sino nasal outcome questionnaire SNOT-22 is a numerical score based system where each symptom which is scored on a scale of 0–5 (0-no problem, 1-very mild problem, 2-mild problem, 3-moderate problem, 4-severe problem, 5-problem as bad as it can be). The SNOT-22 Score was calculated by adding the scores of the individual nasal symptoms. The mean symptom scores for sneezing, rhinorrhea, and nasal obstruction were all significantly decreased at 12 months compared to the preoperative baseline (Fig. 5). The data stratification of the SNOT-22 score, with Mild being defined on the SNOT-22 score as 8-20 inclusive, Moderate as $>$ 20–50 and Severe as $>$ 50 [7].

Regarding clinical effectiveness, most of the patients reported subjectively excellent or good results. The mean SNOT-22 Score after the procedure also significantly decreased from 50 to 8 at 12 months. In addition, 39.6% (84/212) of the patients had remained almost free from all symptoms without medication at 12 months. The p-values for these were statistically significant (< 0.01). We observed a significant improvement in patients' quality of life at the end of 12 months post-operatively (Fig. 4).

Discussion

Inferior turbinates serves several important functions, such as warming, humidifying and cleansing inspired air [8]. They contribute to inspiratory resistance, which creates intrathoracic negative pressure needed for inspiration. Greater negative pressure enhances pulmonary ventilation and venous return to the lungs and heart [9]. However, they

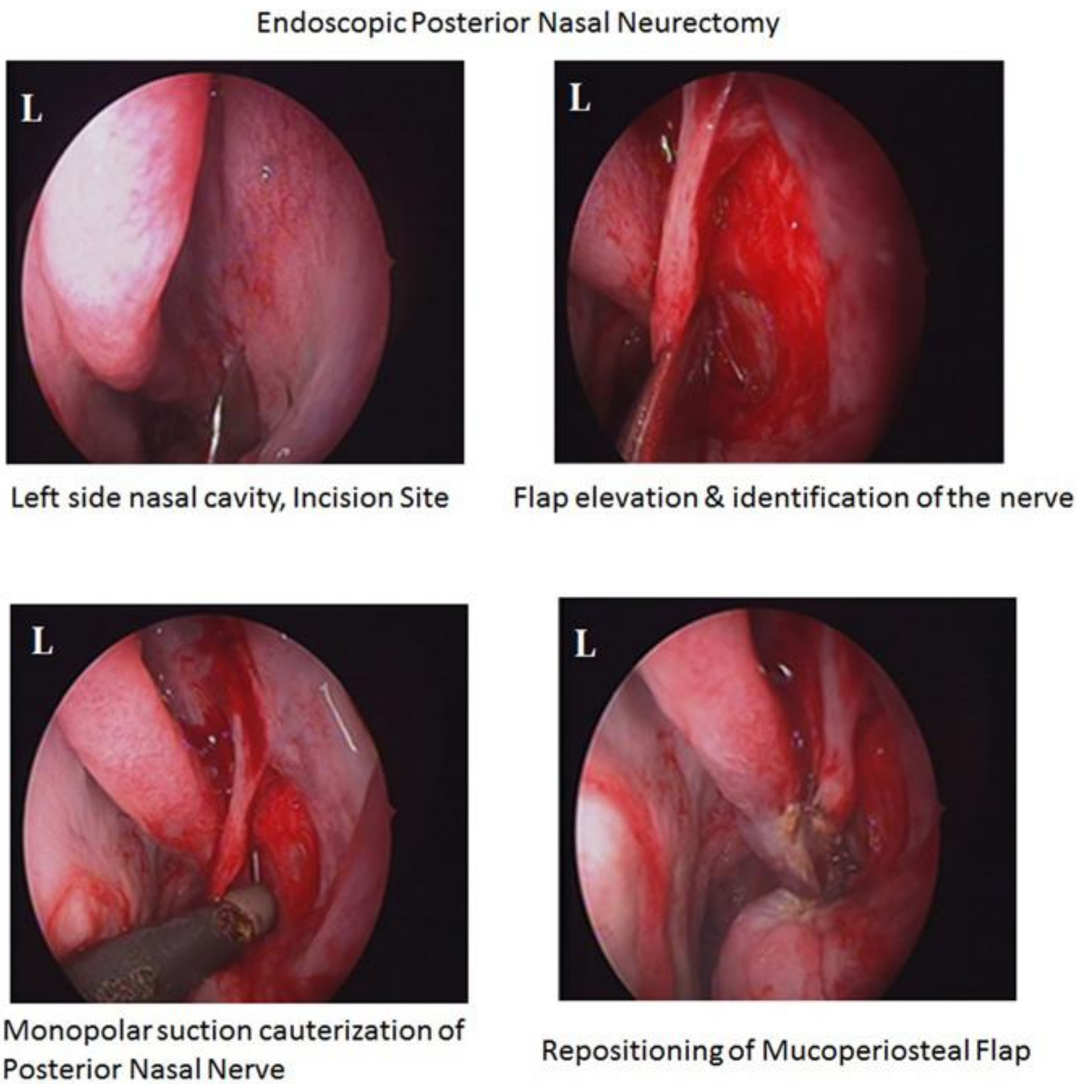


Fig. 2 Endoscopic Posterior nasal neurectomy

are also the main structures contributing to chronic nasal obstruction. If symptomatic hypertrophy unresponsive to medical management is involved, the turbinates may still be considered surgically treatable.

One significant advantage of this procedure is the ability to preserve the entire turbinate mucosa except for a notch in the anterior pole of the turbinate. Keeping its functional structures intact, the turbinate can remain fully normal after the procedure. In addition, because it shares the same instruments with functional endoscopic sinus surgery, it would be very convenient to complete such a procedure after the preceding sinus surgery.

Resection of the posterior nasal nerve is especially effective for severe rhinorrhea with sneezing patients because the interruption of parasympathetic nerve fibres suppresses nasal secretion. They contain afferent parasympathetic fibres supplying the lateral wall of mucosa in the nasal cavity, sneezing can be reduced, thus making this procedure superior to Vidian neurectomy [10].

Malcomson [11] showed conclusively that stimulation of the parasympathetic or interruption of the sympathetic nerve supply to the nasal mucous membrane causes vasodilatation, hyper secretion and sneezing and hence it is reasonable to assume that under normal conditions there exists a balance between the two systems. The effectiveness of this technique is accompanied by decrease in local secretary mucous glands and basement membrane thickening but the allergy mediator cell eosinophil remained same as by comparison histopathology preoperative and postoperative (Fig. 5).

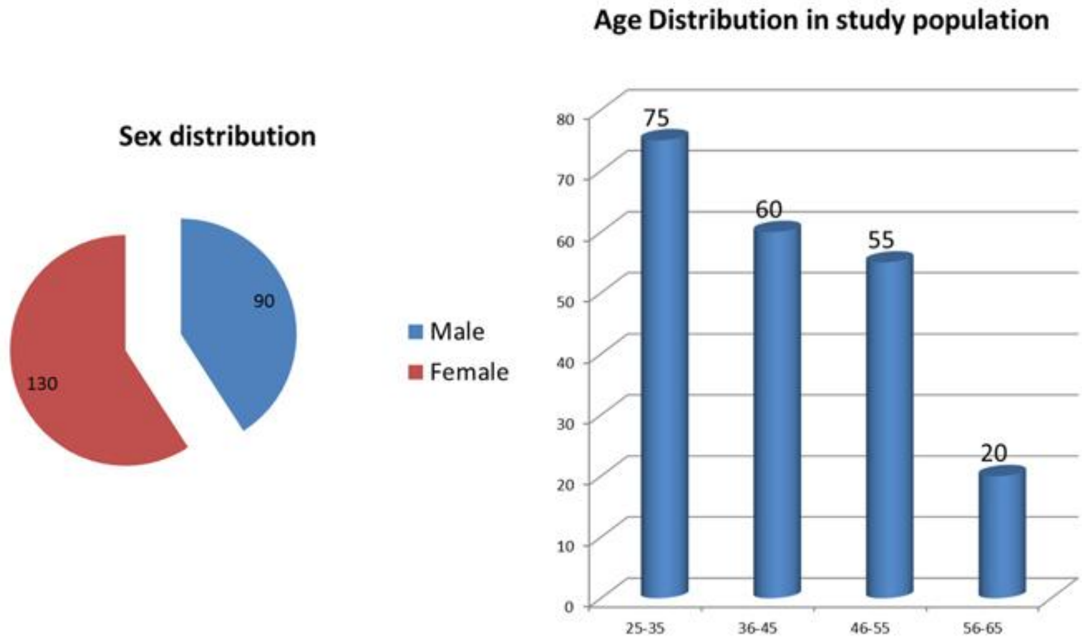


Fig. 3 Age and Sex distribution of the study population

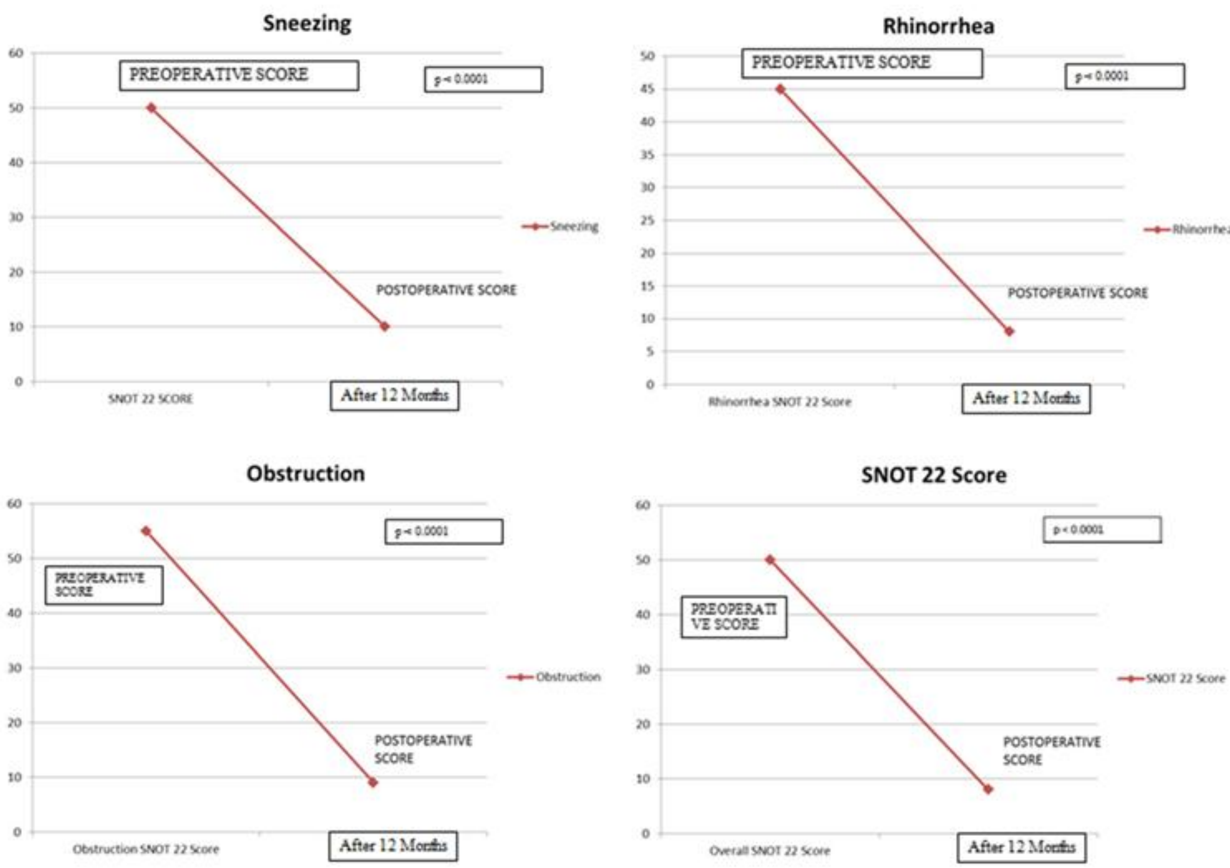


Fig. 4 Changes in each nasal symptom and the SNOT 22 (Sino nasal outcome questionnaire SNOT-22) Score before and after surgery (n = 212). The data were examined with the Wilcoxon signed rank test

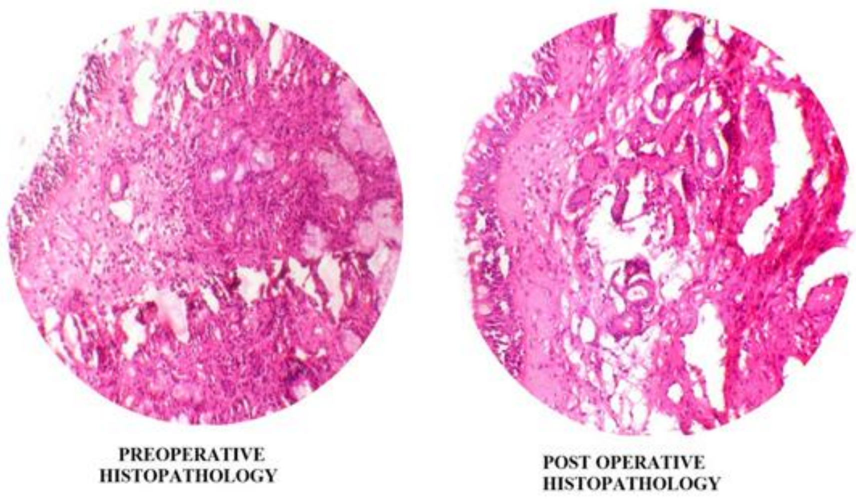


Fig. 5 ×4 magnification, haematoxylin and eosin staining, pre-operative and post-operative histopathological changes in the nasal mucosa of the lateral nasal wall after posterior nasal neurectomy

Conclusion

Although no single modality has evolved as the gold standard for the surgical management of allergic rhinitis, the main stay of surgical intervention targets the inferior turbinate and posterior nasal nerve. This combined technique provides consistent, robust results with long-term relief of nasal symptoms due to allergic and vasomotor rhinitis without additional risk of complication.

Author Contribution AN Performed surgery, own surgical technique and patient preoperative and postoperative management and follow up; RDN Preparation of the manuscript, literature review and review of manuscript.

Funding No funding received.

Compliance with Ethical Standards

Conflict of interest No potential conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Kizilkaya Z, Ceylan K, Emir H et al (2008) Comparison of radiofrequency tissue volume reduction and submucosal resection with microdebrider in inferior turbinate hypertrophy. Otolaryngol Head Neck Surg 138:176–181
2. Lee CF, Chen TA (2004) Power microdebrider-assisted modification of endoscopic inferior turbinoplasty: a preliminary report. Chang Gung Med J 27:359–365
3. Chen YL, Liu CM, Huang HM (2007) Comparison of microdebrider-assisted inferior turbinoplasty and submucosal resection for children with hypertrophic inferior turbinates. Int J Pediatr Otorhinolaryngol 71:921–927
4. Golding-Wood PH (1961) Observations on petrosal and vidian neurectomy in chronic vasomotor rhinitis. J Laryngol Otol 75:232–247
5. Kikawada T (2007) Endoscopic posterior nasal neurectomy: an alternative to vidian neurectomy. Oper Tech Otolaryngol 18(4):297–301. https://doi.org/10.1016/j.otot.2007.05.010
6. Kobayashi T, Hyodo M, Nakamura K, Komobuchi H, Honda N (2012) Resection of peripheral branches of the posterior nasal nerve compared to conventional posterior neurectomy in severe allergic rhinitis. Auris Nasus Larynx 39:593–596
7. Toma S, Hopkins C (2016) Stratification of SNOT-22 scores into mild, moderate or severe and relationship with other subjective instruments. Rhinology 54(2):129–133. https://doi.org/10.4193/Rhin15.072
8. Abramson M, Harker LA (1973) Physiology of the nose. Otolaryngol Clin N Am 6:623–635
9. Haight JS, Cole P (1983) The site and function of the nasal valve. Laryngoscope 93:49–55
10. Ogawa T, Takeno S, Ishino T, Hirakawa K (2007) Submucous turbinectomy combined with posterior nasal neurectomy in the management of severe allergic rhinitis: clinical outcomes and local cytokine changes. Auris Nasus Larynx 34:319–326
11. Malcomson KG (1959) The vasomotor activities of the nasal mucous membrane. J Laryngol Otol 73:73–98