



Outcome of Submucosal Inferior Turbinoplasty in Perennial Allergic Rhinitis

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Abstract Pharmacotherapy forms mainstay of treatment for allergic rhinitis, and has adverse effects associated with it. Topical steroid therapy is the preferred medication and considered best for long term prophylaxis but with limited compliance. Submucosal turbinoplasty reduces the duration of treatment in comparison to topical steroid which has to be taken daily for a long time. The aim was to evaluate the outcome of submucosal inferior turbinoplasty in patients with perennial allergic rhinitis. A prospective interventional study was performed on 35 patients diagnosed with perennial allergic rhinitis, diagnosed as per ARIA criteria from July 2016 to July 2018. The severity of the disease was assessed using mini RQLQ scoring system. The patients were then subjected to bilateral submucosal inferior turbinoplasty under endoscopic guidance under local anesthesia. 50% significant improvement (p value < 0.05) seen in symptoms were need to blow nose, sneezing, nasal obstruction, nasal discharge, watery eyes, need to rub eye, regular house work, recreational activities, sore eyes, tiredness, irritability and thirst. 100% improvement (p value < 0.05) seen in symptoms were sleep, need to blow nose, sneezing, nasal discharge, watery eyes, need to rub eye, recreational activities and irritability. Nasal obstruction was not severe in 17 (48.5%) patients giving a very good symptom relief and improving quality of life. This is due to reduction in the erectile tissue and roominess in the nasal cavity. All patients with allergic rhinitis with associated hypertrophied turbinates should

invariably be given option of inferior turbinoplasty along with proper counselling regarding its advantages and disadvantages.

Keywords Outcome of submucosal inferior turbinoplasty · Treatment option for allergic rhinitis · Complications of turbinate surgery · Burden of allergic rhinitis · Symptom scoring for allergic rhinitis

Introduction

Allergic rhinitis is a global problem and the available treatment options include pharmacotherapy, immunotherapy and surgical treatment [1]. Pharmacotherapy includes corticosteroids, antihistamines, decongestants, anticholinergics and leukotriene receptor antagonists [2]. Although pharmacotherapy forms mainstay of treatment for allergic rhinitis and has adverse effects associated with it. Topical steroid therapy is the preferred medication and considered best for long term prophylaxis but with limited compliance. Steroids reduce the hyper responsiveness of nasal mucosal with anti-inflammatory effect. The adverse effects include headache, nose and throat irritation, transient dryness, suppressing local immunity and epistaxis in 5–10% of patients [3].

Antihistamines are effective in relieving nasal discharge, itching and sneezing but have less effect on nasal blockage. They cause sedation, psychomotor retardation and learning impairment. Long term use of decongestants leads to rhinitis medicamentosa [3–5]. Intra nasal anticholinergics can aggravate glaucoma, prostatism, dryness of mouth and eyes. Leukotriene antagonists are effective against congestion and mucous production but not as

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effective as topical steroids. Immunotherapy involves administration of monoclonal antibodies if patients do not respond to other modalities of treatment [3].

At present surgical management is reserved only for patients who do not respond to conservative treatment and includes LASER resection, submucosal diathermy, partial inferior turbinate resection, submucosal inferior turbinoplasty and radiofrequency ablation of inferior turbinate. Inferior turbinectomy is the preferred treatment to treat nasal obstruction due to turbinate hypertrophy. However it can lead to atrophic change, crusting and empty nose syndrome [6]. In contrast submucosal turbinoplasty helps in preserving the mucociliary epithelium and reduces not only the nasal obstruction but also other allergic symptoms such as sneezing, rhinorrhea and itching [5]. Better symptom control and lesser complication rates have been documented following submucosal turbinoplasty [7].

Submucosal turbinoplasty reduces the duration of treatment in comparison to topical steroid which has to be taken daily for a long time. Only a few studies have used submucosal inferior turbinoplasty as a first line of management in perennial allergic rhinitis [6, 7]. In this study we have documented the outcome of submucosal inferior turbinoplasty for perennial allergic rhinitis.

Aims and Objectives of Study

To evaluate the outcome of submucosal inferior turbinoplasty in patients with perennial allergic rhinitis.

Materials and Methods

A prospective interventional study was performed on 35 patients diagnosed with perennial allergic rhinitis, diagnosed as per ARIA criteria from July 2016 to July 2018. All these patients were between 20 and 60 years of age and had associated bilateral hypertrophy of inferior turbinate. They had stopped antihistamines and steroids 2 weeks prior to the onset of the study. Patients with nasal polyposis, gross deviation of nasal septum, bacterial sinusitis, and previous nasal surgery were excluded. Following an informed written consent, a detailed clinical history about particular known allergen, trigger factors, family history of allergy and asthma was obtained; and clinical examination, diagnostic nasal endoscopy to document the findings. Nasal smear for eosinophil count were performed. The severity of the disease was assessed using mini RQLQ scoring system. The patients were then subjected to bilateral submucosal inferior turbinoplasty under endoscopic guidance under local anesthesia.

Surgical Procedure

A vertical incision (Fig. 1) the anterior end of the inferior turbinate and a submucosal pocket was created on the medial surface of the bony turbinate and mucosa was elevated. (Fig. 2a). Partial removal of the turbinate bone was done with turbinectomy scissors. A 2.9 mm diameter microdebrider tip at 3000 rpm was applied to remove excess stromal tissue of the turbinate (submucosal). Care was taken to preserve the mucosal flap while using microdebrider (Fig. 2b). Mucosal flap was placed back over the remnant turbinate (Fig. 3). The nasal passages were packed with Merocel for one day. The patients were assessed again at 1 month, 3 months and 1 year following the surgery using Mini RQLQ scoring system. The pre-operative and post operative scores were compared.

Results

Mean age in our study was 34.37%. There were 21 (60%) males and 14 (40%) females. Positive family history of allergy was seen in 30 (85%) cases. Figure 4 shows the total Mini RQLQ scores at different intervals of 1 month, 3 months and 1 year of follow up.

5 patients had a reduction of symptom severity at first month of evaluation after surgery, but severity of symptoms gradually increased at 3rd month of follow up and sustained for 1 year. One patient lost follow up.

At 1 year of follow up, the symptoms which showed more than 50% improvement in severity included sleep disturbance in 22 (62.8%) patients, nasal obstruction among 31 (88.5), sneezing in 27 (77.14%), need to frequently blow nose in 29 (82.8%), watering of eyes in 20 (57.15%), regular house work in 23 (65.7%), 27 (77.14%) in recreational activity symptoms, 24 (68.5%) in need to

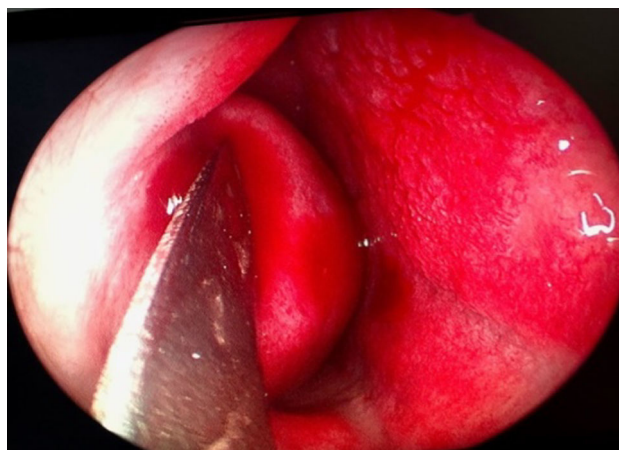
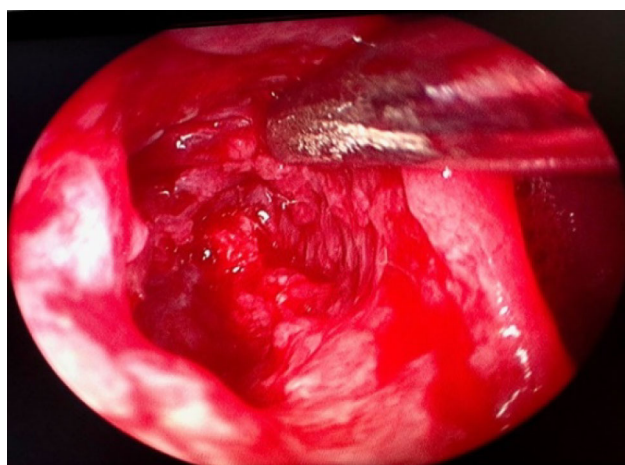


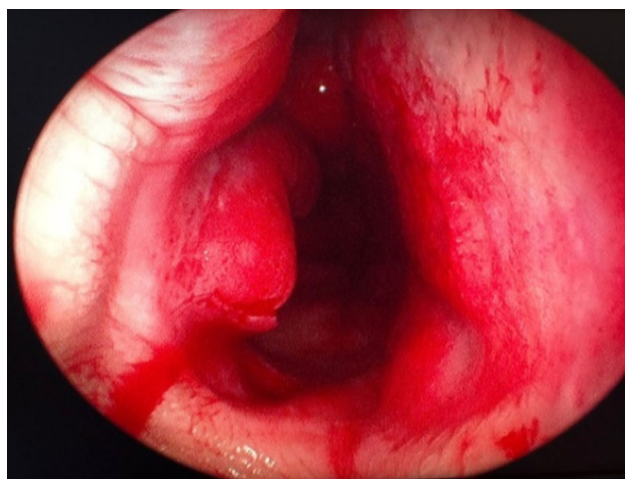
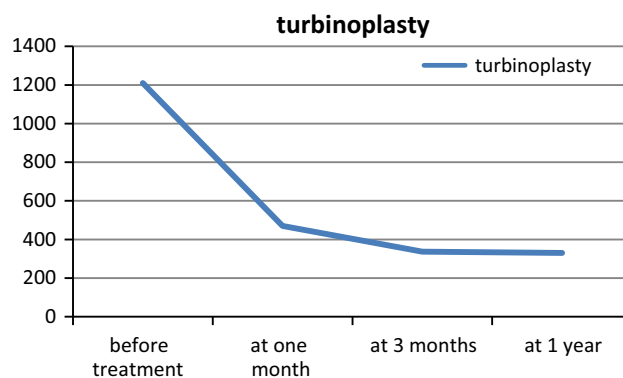
Fig. 1 Vertical incision



(a) Creation of submucosal pocket and elevation of flap



(b) Debridement of submucosal tissue using microdebrider

Fig. 2 a Creation of submucosal pocket and elevation of flap and b debridement of submucosal tissue using microdebrider**Fig. 3** Post-operative image**Fig. 4** Total symptom scores at different intervals

rub eyes, 14 (40%) in itchy eyes, 28 (80%) in sore eyes, tiredness reduced in 18 (51.4%), irritability in 27 (77.14%) and thirst in 18 (51.4%) patients (p value < 0.05). (Fig. 5).

100% improvement in symptoms were seen in 9 (25.7%) in sleep, 13 (37.14%) in need to blow nose, 18 (51.4%) in nasal discharge, 16 (45.7%) in watering of eyes, 9 (25.7%) need to rub eye, 5 (14.2%) in regular house hold work, 6 (17.14%) in recreational activities, 10 (28.5%) in itching of eyes, 12 (34.2%) in sore eyes, 16 (45.7%) in tiredness relief, 13 (37.14%) in irritability, 2 (5.7%) in thirst symptoms (p value < 0.05). Figure 6.

Discussion

The prevalence of allergic rhinitis is increasing. In India around 30% of the population is suffering from allergic rhinitis. In US allergic rhinitis affects 20–30 million people. It increases fatigability, affects social wellbeing, disturbs sleep, depression, anxiety, absence at school and reduce productivity [8]. A complete cure of the allergic symptom is difficult. There are variable options for management of allergic rhinitis.

Surgical method of treatment is more invasive when compared to medical but improves quality of life for longer duration. The main aim of submucosal inferior turbidectomy procedure is to reduce the patient's symptoms of prolonged nasal congestion and preserve the mucosa so that it does not lead to complications like atrophic rhinitis, empty nose syndrome etc. [9].

In our study, age group ranging from 21 to 30 (34.37%) years were majority. Overall mean age in this study was 29.2 years. Literature has stated that the allergic rhinitis disease affects mostly youth (21–25 years), more in males and occurs less in elderly group as aging causes atrophy of the nasal mucosa and reduces the immunity [10, 11]. There was no statistical significance in gender predisposition in our study; also the cases were equally distributed. Allergic rhinitis is known to run in families. Number of allergic first

Fig. 5 Symptom score with > 50% improvement

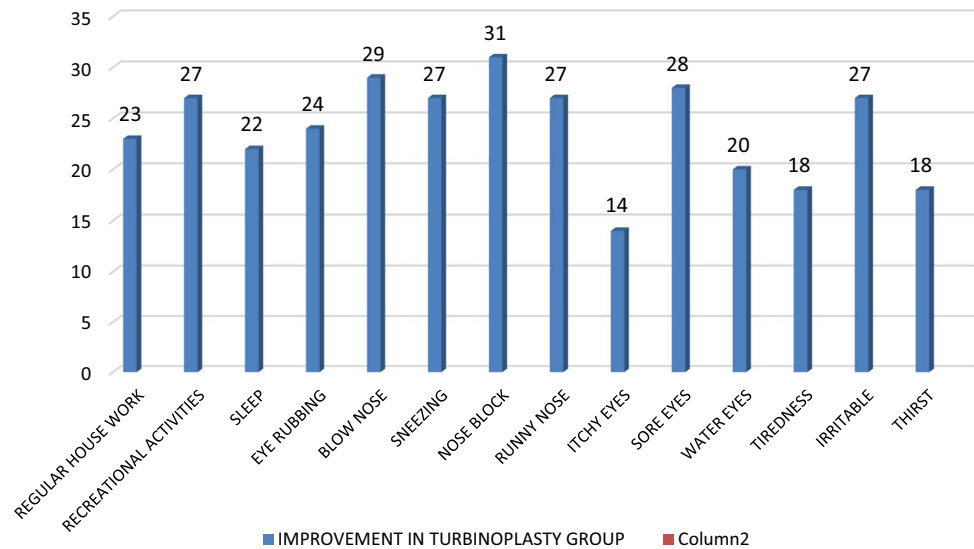
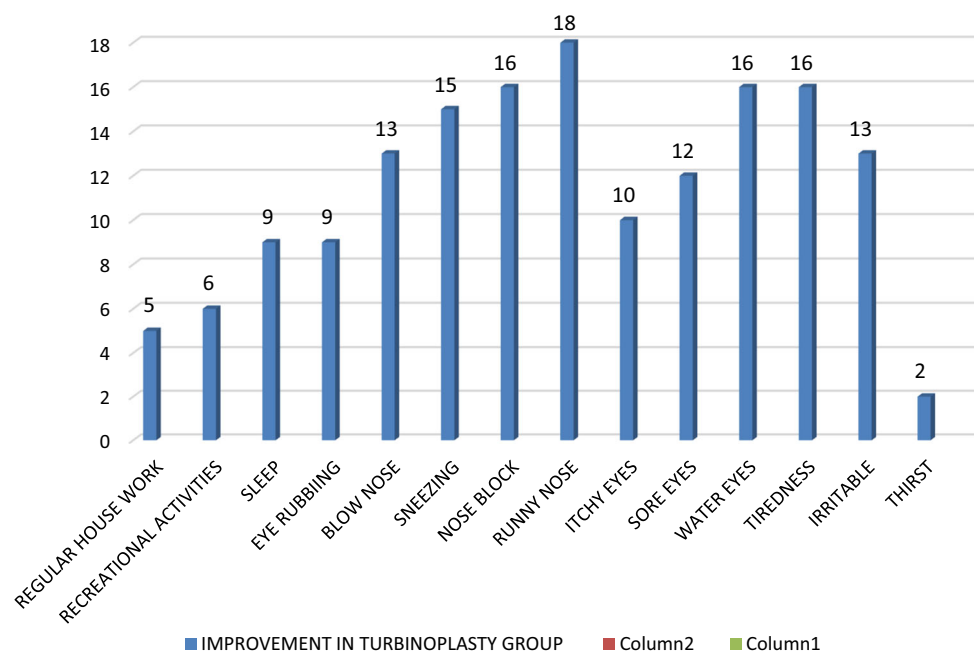


Fig. 6 Comparison of symptom score with > 100% improvement



degree relatives and its association with presence of allergic disease was studied before and has shown positive correlation. The highest risk with odds ratio 3.6 (2.9–4.6) was seen with one parent having history of allergy [12].

Majority of patients had sleep disturbance severity score: 4 in 9 (25.7%) patients. But post treatment, sleep severity symptom was only score: 1 in 15 (42.8%) patients. Considering the symptom irritability before treatment maximum frequency of patients 22 (62.5%) belonged to score: 3 category. Post treatment irritability symptoms had most number of patients with frequency 14 (40.0%) in score: 0 category with significant improvement. This may be because of reduction in mechanical obstruction, allergic trigger point over the turbinates thereby reducing dryness

of mouth associated with mouth breathing, thus a better sleep and good oxygenation.

Severity of nasal discharge score was 2 in 11 (31.42%) patients during pre-treatment. But after treatment, 20 (57.14%) patients went into score: 0 category, showing a significant improvement. Various studies have shown a symptom free period in patients with perennial allergic rhinitis in a 5 years follow up by Submucous Inferior TurbinoPlasty [13–17].

Similarly among frequency in clearing of nasal secretions symptom 9 (25.71%) patients had score: 2 category during pre-treatment period which changed to 16 (45.7%) patients occupying the score: 0 showing good outcome.

Regarding frequent bouts of sneezing even though prior to treatment, majority of patients 8 (22.8%) patients were in score: 3, post treatment 11 (31.4%) patients improved to score: 1, which showed significant improvement. Pre-treatment period soreness of eyes belonged (score: 0) category and they were 14 (40.0%) patients and it became “symptom free” (score: 0) in 26 (74.2%) patients post treatment. Other studies also showed better improvement with surgery in allergic rhinitis patients [14].

Post treatment nasal obstruction was not severe in 17 (48.5%) patients giving a very good symptom relief and improving quality of life. This is due to reduction in the erectile tissue and roominess in the nasal cavity. The patients had relief of nasal obstruction symptoms after microdebrider assisted turbinoplasty and submucosal turbinatectomy in patients with perennial allergic rhinitis with a long term follow up [15–17, 19]. So the anxiety about the effects of future can be neglected. Literature also has shown secondary hypertrophy in the inferior turbinate [17].

Watering of eyes in our patients was not severe (score: 0) in 10 (31.3%) patients at pre-treatment time and 27 (77.14%) patients post treatment, need to rub eyes symptom had been score: 2 among majority of patients 9 (25.7%) and it improved by majority 16 (46.9%) shifting to score: 1 This is due to relief of oedema and obstruction to nasolacrimal duct and also reduction in the allergic process.

Considering regular house work majority of patients i.e. 16 (46.9%) had symptom severity of being score: 3. Post treatment the symptom severity was score: 0 in 15 (45.7%) patients. 16 (45.70%) patients were in score: 3 group before treatment in recreational activities, which showed improvement and had score: 1 and score: 2 category with 12 (34.2%) patients in each category. This improvement is attributed to better relief of allergic symptoms like nasal obstruction, nasal discharge, irritation of eyes, frequent clearing of nasal discharge following surgery.

Itching of eyes symptom in 13 (37.1%) patients were in score: 0 category before treatment and post treatment 23 (65.7%) patients were in “symptom free” (score: 0) category. The persistence of symptom may be due to allergic conjunctivitis which did not resolve.

Fatigability in pre-treatment period 10 (28.5%) patients had score: 3 and post treatment 18 (51.4%) were in score: 0 category. Improvement may be due to better airway, reduction in nasal obstruction, reduced mouth breathing, reduction in possible sleep apnoea, better oxygenation during sleep, mechanical reduction in erectile tissue and better drainage of nasolacrimal duct.

Pre-treatment, thirst was score: 3 in majority of the patients 14 (40.0%). Thirst severity was in score: 1 category in 17 (48.5%) patients post treatment. Thirst symptom

improved as mouth breathing and associated dryness is reduced in turbinoplasty group.

At first month of follow up 8 (22%) patients had anosmia, 2 (5.7%) cases had empty nose syndrome, and 1 (2.85%) patient had adhesion and dry nose in 4 (11.4%) patients. None of the patients developed atrophic rhinitis. Crusting in nasal cavity is due to traumatised tissues during surgery [18]. None of our patients had post-operative bleeding. In a study with microdebrider assisted inferior turbinoplasty in patients with perennial allergic rhinitis, no epistaxis, no crusting, foul smell or atrophic rhinitis was seen [19]. Even though at immediate follow up few patients showed crusting, it did not persist for long duration and was treated with soda bicarbonate and sodium chloride nasal and sinus douching. The procedures which manipulate the usual physiology of turbinate, like in our study, tends to cause loss of turbinate function, causing crusting, adhesions, and anosmia [11]. A study on comparing power assisted partial turbinatectomy with Mometasone Furoate nasal spray for relief of nasal blockage in chronic rhinosinusitis showed epistaxis and crusting in both groups [19]. Many studies on surgery for allergic rhinosinusitis showed crusting, secondary hypertrophy and adhesion in patients on follow up [20–22]. Anaesthesia complications were minimal in our study since the mean operating time was about 10 min on each turbinate. The associated morbidities of inferior turbinate surgeries like atrophic changes, crusting and exposure of bare bone which is common in other extensive inferior turbinate procedures were minimal in submucosal debridement of inferior turbinate. Adhesion was released under local anaesthesia in the operation theatre. After releasing the adhesions did not recur and patients were symptom free. By the end of last follow up anosmia and empty nose syndrome was seen in 1 patient each.

Pre-treatment Mini RQLQ score of 1210, improved to 470 at 1 month, 337 at 3rd month of follow up and 330 at 1 year which showed a significant improvement in the symptoms.

Severity of Symptoms which showed 50% improvement were sleep disturbance, need to blow the nose, sneezing, nasal discharge, frequent rubbing of eyes, itching of eyes, sore eyes, watering of eyes, tiredness, irritability and thirst. Thus there was a greater compliance in their regular household work and recreational activities. The maximum noticeable improvement in each symptom was in the order of nasal obstruction. Least improvement was in the itching of eyes may be due to associated allergic conjunctivitis which needs to be further evaluated. As the turbinates reduce in size the major symptoms like nasal obstruction improves followed by other symptoms which can improve once the erectile tissue is removed. The scarring and fibrosis which occurs in the submucosa leads to reduction

in associated allergen trigger and inflammatory process [22].

100% improvement in symptom severity was with sleep, need to blow nose, nasal discharge, watering of eyes, need to rub the eyes, itching of eyes, sore eyes, tiredness, irritability and thirst and thus in regular household work and in recreational activities. The sleep symptom improved 100% because of significant reduction in nasal obstruction and associated sleep apnoea. Watering of eyes also reduced after decrease in size of the turbinate.

According to studies submucosal resection is better than various forms of surgery at relieving nasal obstruction, nasal discharge and sneezing. Ideal turbinate surgery is the attempt to reduce submucosal tissue with minimal reduction in the mucosal layer [12, 23]. The SIT is superior to reduce obstructive symptoms and also non-obstructive symptoms among patients with or without allergic rhinitis [20]. In this study maximum symptom relief was for nasal obstruction in 31 (88.5%) patients followed by nasal discharge 27 (77.14%) [24]. Another study with a sample size of 55 patients showed similar improvement in nasal discharge and nasal obstruction in 90% of patients with inferior turbinate surgery [25].

In a study on comparing partial inferior turbinectomy with that of intranasal topical steroid group, to reduce nasal obstruction in inferior turbinate hypertrophy, the authors concluded that turbinate surgeries are safe and reliable alternative for treating allergic rhinitis. Power-assisted turbinectomy with a microdebrider is a quick, safe, and reliable method. Turbinectomy on comparison with intranasal steroid in rhinosinusitis and in those who are unresponsive to medical therapy concluded that there is no reason to change this known strategy of therapy, unless it fails because of poor compliance or unacceptable side effects or if it does not provide adequate symptom relief [18].

SIT is a surgical procedure which inherently has its own advantages and disadvantages. Its advantages and promising results are far superior compared to medical treatment. Literatures have already proven the better long term outcome and safety of SIT. In this case we advise SIT which has promising results.

Conclusion

Allergic rhinitis is the most common immunological disease experienced by humans causing nasal obstruction, sneezing, irritation to nose and eyes etc. which can disturb sleep, work output in these individuals. There is significantly high prevalence of allergic rhinitis in our region. Symptom free period for nasal obstruction, nasal discharge, sneezing, watering of eyes, need to rub eyes, need to blow

nose, recreational activities, tiredness and irritability was seen with submucosal inferior turbinoplasty. The complications were very few and minor in this study. The relief of symptoms persisted till the end of study. The long term outcome needs to be done in long term studies involving larger sample size. All patients with allergic rhinitis with associated hypertrophied turbinates should invariably be given option of inferior turbinoplasty along with proper counselling regarding its advantages and disadvantages.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval Ethical committee approval for the study was obtained from the concerned university.

Informed Consent Written informed consent was obtained from each patient.

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