Histopathological study of hypertrophic inferior turbinate

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Aim of Work
In the present study, indications, outcomes, and complications of partial inferior turbinectomy were studied, along with histopathological analysis of the resected turbinate.
Methods
A total of 20 patients with inferior turbinate hypertrophy were evaluated before and after surgery.
Results
Clinical evaluation of partial turbinectomy showed that 100% of patients were relieved of their symptoms either completely or partially. None of the patients experienced a worsening of their symptoms after surgery. Complications of this surgery are also fewer and patients can be managed conservatively either by regular follow-up or through proper postoperative instructions. Histopathological evaluation of the turbinate specimens revealed both mucosa and bone as being contributors toward hypertrophy in allergic rhinitis patients more than in patients with inferior turbinate hypertrophy with a deviated nasal septum.

Keywords:
histopathology, inferior turbinate hypertrophy, chronic hypertrophic rhinitis.

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Perceived nasal obstruction resulting from inferior turbinate hypertrophy (ITH) is a common complaint in otorhinolaryngology practice. Significant hypertrophic changes of the IT may be the outcome of several factors, including perennial allergic rhinitis and nonallergic rhinitis. In addition, the clinical observation of compensatory contralateral IT enlargement in patients with septal deviations is supposed to be common [1].

The decision of inferior turbinectomy should be based not only on the clinical presentation but also on the histopathological features of the organ. However, data on the latter are scarce and, when available, investigated as a side topic. The present study was undertaken exclusively to provide quantitative and qualitative information on various soft tissue and bony constituents of the hypertrophic IT [2].

Perceived nasal obstruction resulting from ITH is a common complaint in otorhinolaryngology practice. Significant hypertrophic changes of the IT may be the outcome of several factors, including perennial allergic rhinitis and nonallergic rhinitis. In addition, the clinical observation of compensatory contralateral IT enlargement in patients with septal deviations is supposed to be common [1].

Patients are usually offered conservative therapy with antihistamines, systemic decongestants, topical nasal steroid sprays, and mast cell stabilizers. When these means do not provide adequate relief for the patient, surgery is suggested [1].

Over the years, a variety of reduction techniques have been introduced with the goal of increasing nasal airway passages, preserving the function of the organ, minimizing postoperative hemorrhage, and long-term complications such as excessive nasal dryness, crusting, fetor, and the phenomenon known as the 'empty nose syndrome' [3].

A wide variety of surgical procedures such as partial resection, submucous resection, electrocautery, submucous diathermy, cryosurgery, laser ablation, and endoscopic resection have been performed, but results have been universally unsatisfactory [3].

As there are many conditions causing hypertrophy of the IT, there is a need to measure the thickness micrometrically and study histopathological changes in ITH. Such data can help surgeons determine whether to add turbinectomy as a standard procedure for surgical treatment of conditions causing ITH and which type of surgery to choose [2].

Aim of the work

This study was undertaken to provide quantitative and qualitative information on various soft tissue and bony constituents of the hypertrophied IT. Results of its surgical management using partial inferior turbinectomy and the resulting complications of the surgery were studied.

Methods

Source of data

Data for this study were collected from patients attending the Department of Otolaryngology in Kasr Al-Ainy Hospital, Cairo University, during the period from January 2011 to January 2012. This study was approved by the ethical committee of the Department of Otolaryngology, Faculty of Medicine, Cairo University.

Type of study

This is a prospective, nonrandomized, morphometric study that was conducted on 20 patients.

Inclusion criteria

(1) Presence of nasal obstruction due to ITH with or without deviated nasal septum.
(2) Nonresponse to medical therapy.

Exclusion criteria

(1) Age 12 years.
(2) Presence of fungal sinusitis, sinonasal polyposis, granuloma, or neoplasm of the nose and paranasal sinuses.
(3) Patient refusal or being unfit for surgery (Figs. 1 and 2).

Method of data collection

A total of 20 patients who presented with nasal obstruction due to ITH were chosen for the study. All cases were diagnosed after taking a detailed history regarding nasal obstruction and associated symptoms such as nasal discharge, headache, and sneezing.

Figure 1

Computed tomography scan shows deviated nasal septum.

All patients underwent a clinical examination. Severity of nasal obstruction was assessed subjectively. Only patients who were diagnosed to have ITH secondary to deviated nasal septum and allergic or non-allergic rhinitis, not resolving after medical therapy with antihistamines, nasal decongestant drops, or intranasal steroids, were included in the study.

Patients older than 35 years were then subjected to various investigations like routine preoperative investigations, computed tomography scan of paranasal sinuses, and ECG. Patients' fitness for surgery was determined by consultation with physicians whenever necessary. Written informed consent was taken from the entire patient group undergoing the surgery.

All patients underwent endoscopic partial inferior turbinectomy under general anesthesia with or without septoplasty. Turbinectomy included the posterior two-thirds of the turbinate, and all layers were excised during the procedure. During the procedure, the turbinate architecture was preserved by gentle handling, and care was taken not to damage the mucosal layer. The specimen was then preserved in 10% formalin solution and sent for histopathological examination (Fig. 3).

The turbinate specimens were processed in a standard manner in the Department of Pathology, and slides were prepared, taking care to include all three layers of the turbinate.

The slides were examined microscopically with a micrometer attached to the eyepiece of the microscope. Each layer of the turbinate was measured, the architecture of the venous sinuses was studied, and the presence or absence of inflammatory cells was determined (Fig. 4).

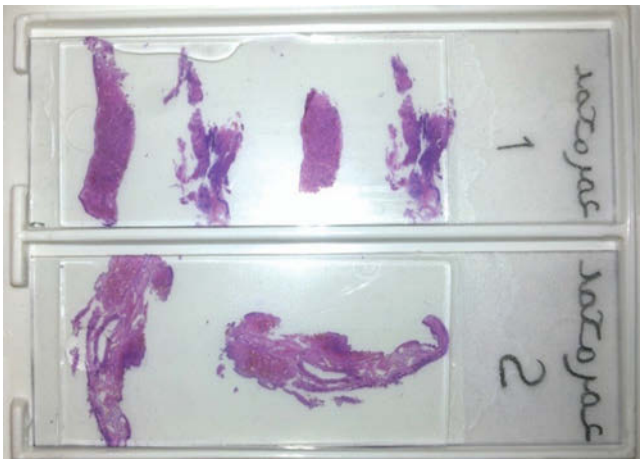
Figure 2

Computed tomography scan of nose shows bilateral inferior turbinate hypertrophy.

Figure 3

Posterior two-third of both turbinate after endoscopic turbinectomy.

Figure 4



Slides are formed from the specimen ready for microscopic examination.

The patients who underwent turbinectomy were postoperatively assessed for complications like hemorrhage, crusting, synechia, and infection. The patients answered a questionnaire on the subjective improvement of their symptoms of nasal obstruction (free breathing, significant improvement, mild improvement, and no improvement).

Results

Preoperative

In the present study all the patients (100%) presented with nasal obstruction. Nasal discharge was present in 10 patients (50%), headache was present in six patients (30%), and sneezing and itching were present in 10 patients (50%) (Chart 1).

In the present study 10 patients (50%) were diagnosed to have hypertrophied IT secondary to deviated septum (compensatory hypertrophy). Ten patients (50%) had allergic rhinitis and associated ITH. No patient (0%) had nonallergic rhinitis (Chart 2).

In the present study none of the patients were able to breathe freely (no difficulty). Two of the patients (10%) had mild difficulty on effort, whereas seven patients (i.e. 35%) had marked difficulty on effort. Eleven patients (55%) experienced difficulty at rest (Chart 3).

Postoperatively

In the present study all patients showed an improvement in breathing after 2 weeks: 16 patients (80%) reported significant improvement in breathing, whereas mild improvement was noted in four patients (i.e. 20%) (Chart 4).

In the present study all patients showed an improvement in breathing after 2 months: 18 patients (90%) reported significant improvement in breathing, whereas mild improvement was noted in two patients (10%) (Chart 5).

In present study all patients showed an improvement in breathing after 6 months: 18 patients (90%) reported significant improvement in breathing, whereas mild improvement was noted in two patients (10%) (Chart 6).

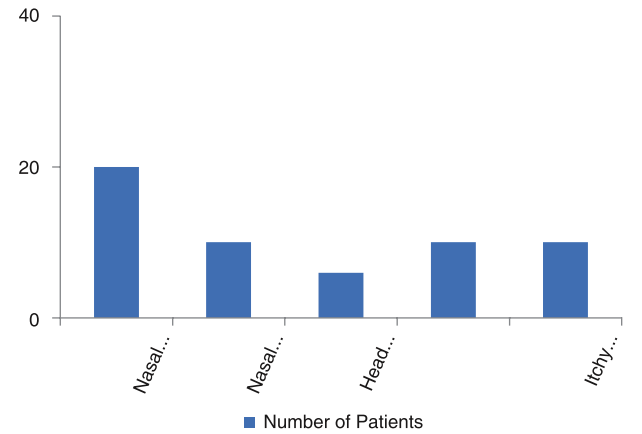
In the present study the mean total thickness of the IT in ITH patients with a deviated nasal septum was 25 ± 7 mm and in the allergic rhinitis group it was 21 ± 8 mm (Chart 7 and Table 1).

In the present study the mean thickness of the medial mucosal layer in ITH patients with a deviated nasal septum was 8.5 ± 3.5 mm, whereas its thickness in the allergic rhinitis group was 9.5 ± 3.5 mm. Thickness of the bony layer was 11.25 ± 2.75 and 5.5 ± 2.5 mm in ITH patients with a deviated septum and in the allergic rhinitis group, respectively. Mean thickness of the lateral mucosal layer was 6.25 ± 2.25 mm in the deviated septum group and 7.5 ± 3.5 mm in the allergic rhinitis group.

In the present study, along with the thickness of the ITH the condition of venous sinusoids in each group was also studied. Both groups showed congested venous sinusoids.

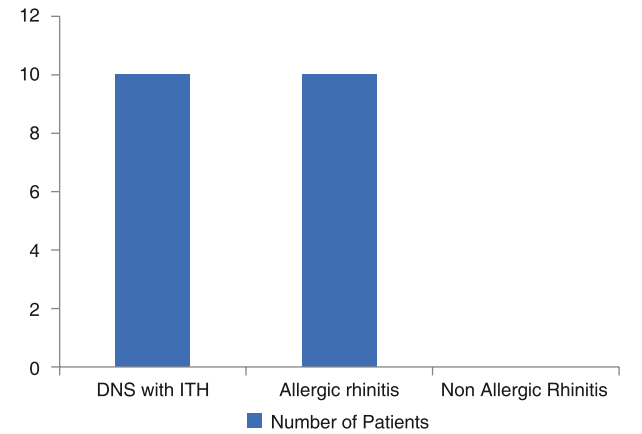
Lymphocytes and plasma cells and eosinophils were the prominent inflammatory cells in the allergic rhinitis group, whereas in the ITH group with a deviated nasal septum lymphocytes and plasma cells were prominent inflammatory cells and mast cells were uncommonly

Chart 1



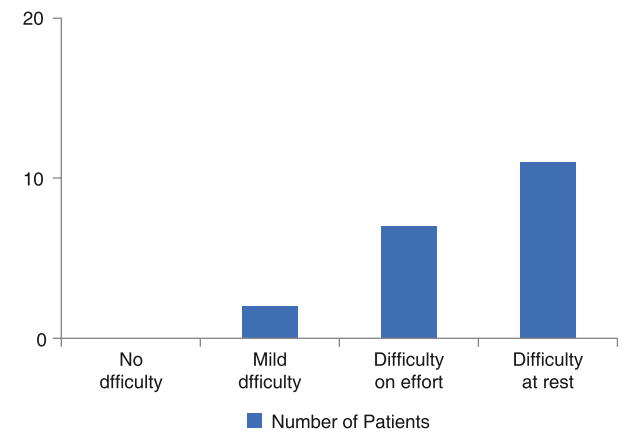
Patients' complaints.

Chart 2



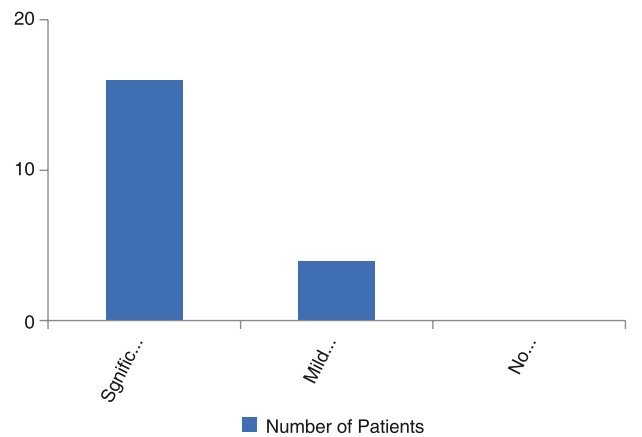
Clinical diagnosis.

Chart 3



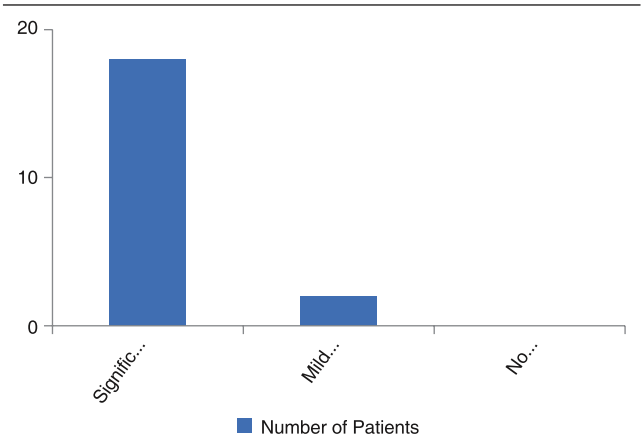
Subjective estimate of nasal obstruction preoperatively.

Chart 4



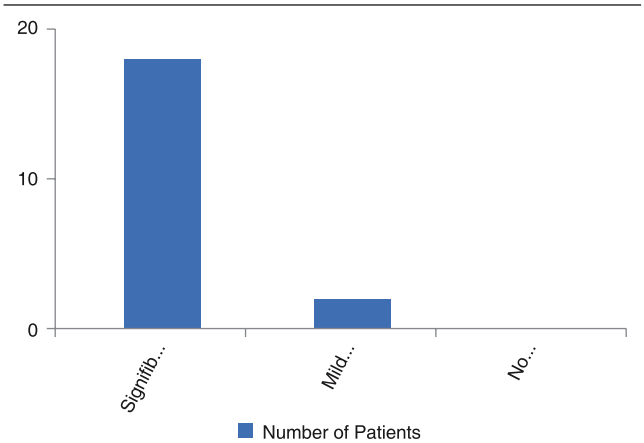
Subjective estimate of nasal obstruction 2 weeks postoperatively.

Chart 5



Subjective estimate of nasal obstruction 2 months postoperatively.

Chart 6



Subjective estimate of nasal obstruction 6 months postoperatively.

encountered. With regard to blood sinusoids, patients with allergic rhinitis showed an increased number of blood sinusoids with associated rupture and hemorrhage. None of the specimens examined in this study showed dysplasia, malignant changes, or chronic granulomatous changes (Figs. 5–9).

Discussion

Nasal obstruction caused by ITH has different etiologies for its onset – for example, allergic rhinitis, vasomotor rhinitis, deviated nasal septum, etc. [4].

Most cases respond to medical therapy in the form of anti-allergic drugs, oral and local decongestants, and topical and systemic steroids, but some cases require surgery [1].

In the present study a total of 20 patients with ITH were selected and the study group comprised 12 women (60%) and eight men (40%). The ages ranged from 24 to 36 years.

All 20 patients (100%) in our study presented with nasal obstruction. Nasal discharge was present in eight patients (40%).

Six patients (30%) suffered from headaches, and sneezing and itching were present in 10 patients in this study (50%).

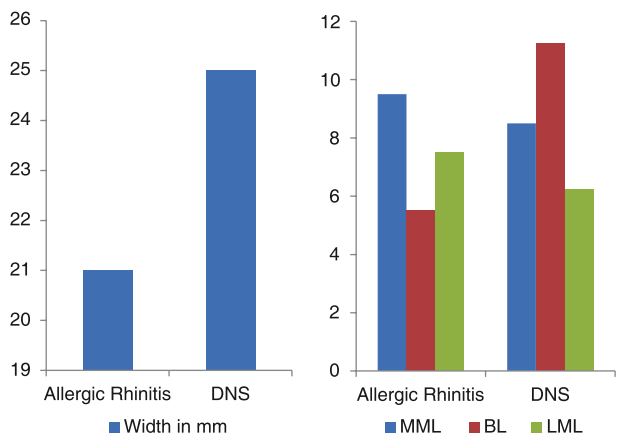
In this study, 14 patients (70%) presented with bilateral ITH, and six patients (30%) presented with unilateral ITH.

Table 1 Mean length of layers of HIT under different pathologies

Pathology causing HIT	Medial mucosal layer (mm)	Bony layer (mm)r	Lateral mucosal layer (mm)
Allergic rhinitis	9.5 ± 3.5	5.5 ± 2.5	7.5 ± 3.5
Compensatory ITH in deviated nasal septum	8.5 ± 3.5	11.25 ± 2.75	6.25 ± 2.25

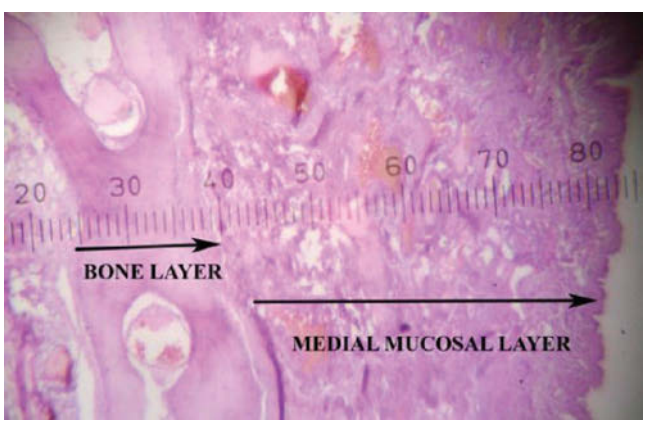
ITH, inferior turbinate hypertrophy.

Chart 7



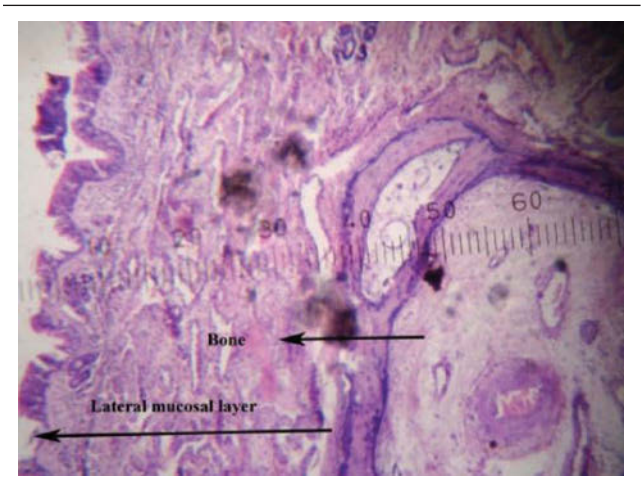
Total mean width of hypertrophied inferior turbinate (HIT) in different conditions.

Figure 5



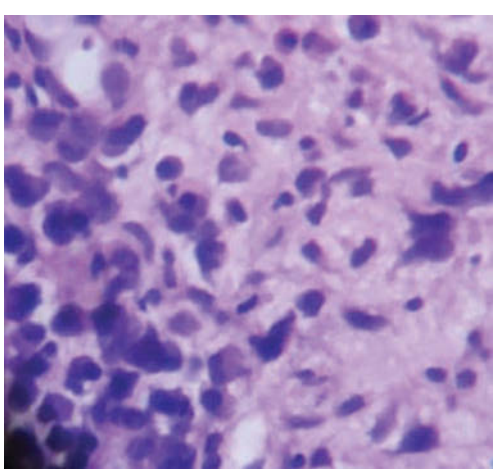
Archived image shows thickened bony layer and the medial mucosal layer in inferior turbinate hypertrophy.

Figure 6



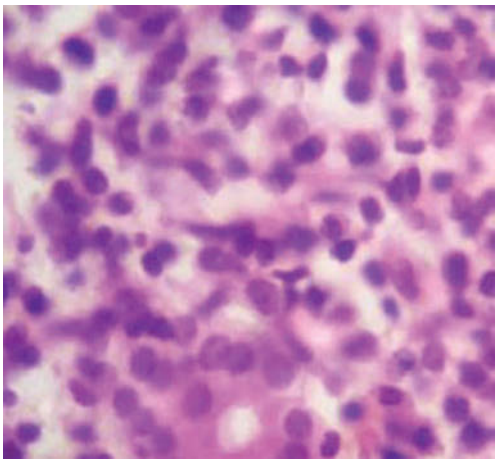
Archived image shows thickened bony layer and the lateral mucosal layer.

Figure 7



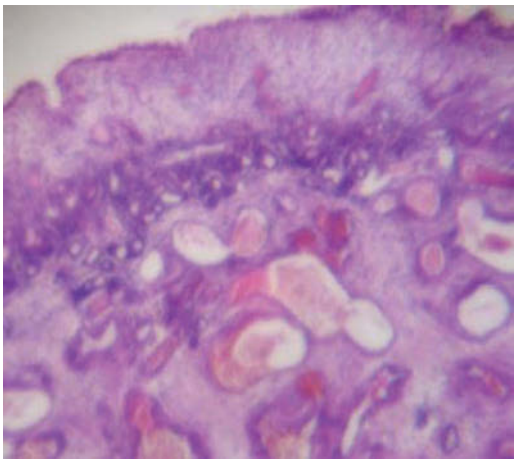
Archived image shows plasma cell infiltrate in turbinate mucosa in allergic rhinitis.

Figure 8



Archived image shows lymphocytic infiltrate.

Figure 9



Archived image shows increased number of congested venous sinusoids.

In our study 11 patients (55%) experienced difficulty in nasal breathing at rest preoperatively, seven patients (35%) experienced difficulty in nasal breathing on exertion, and two patients (10%) presented with mild nasal breathing on exertion.

Septoplasty with unilateral inferior turbinectomy was performed in six patients (30%), and 14 patients (70%) underwent only bilateral inferior turbinectomy without septal correction.

Postoperatively, the nasal airflow improved after 2 weeks. Sixteen patients (80%) experienced significant improvement, whereas moderate improvement was seen in four patients (20%).

Postoperative subjective assessment was carried out again after 2 months. Eighteen patients (90%) experienced significant improvement, whereas two patients (10%) showed moderate improvement.

The patients were again followed up 6 months after surgery and subjectively assessed with respect to their state of nasal obstruction; the results were the same as those seen on the 2-month postoperative assessment.

Postoperative complications were assessed. Crusting was seen in two patients (10%). Patients were advised to use nasal alkaline douching. One patient (5%) showed synechia at the site of turbinectomy. Synechia was released under local anesthesia.

The overall success rate of partial inferior turbinectomy in the present study was 100%. All patients reported complete or partial relief from nasal obstruction by the end of 6 months.

Histopathology

In the present study the mean total thickness of the IT was 21 ± 8 mm in the allergic rhinitis group and 25 ± 7 mm in patients with a deviated septum. Difference in total thickness in both conditions was insignificant.

In the present study the mean thickness of the medial mucosal layer in ITH patients with a deviated septum was 8.5 ± 3.5 mm, whereas its thickness in the allergic rhinitis group was 9.5 ± 3.5 mm. Thickness of the bony layer was 11.25 ± 2.25 and 85.5 ± 2.5 mm in ITH patients with a deviated nasal septum and the allergic rhinitis group, respectively. Mean thickness of the lateral mucosal layer was 6.25 ± 2.25 mm in ITH patients with a deviated septum and 7.5 ± 3.5 mm in the allergic rhinitis group.

This study showed that both bony layers contribute significantly to the turbinate in cases of compensatory ITH due to a deviated nasal septum.

In the present study thickness of the mucosal layers in the allergic rhinitis group and thickness of the mucosal layers in patients with ITH with a deviated nasal septum showed an insignificant difference.

In the present study along with the thickness of the ITH, the condition of the venous sinusoids in each group was also studied. Both groups showed congested venous sinusoids. Patients with allergic rhinitis showed an increased number of congested venous sinusoids with associated rupture and hemorrhage.

Lymphocytes and plasma cells and eosinophils were prominent inflammatory cells in the allergic rhinitis

group, whereas in the ITH group with deviated nasal septum lymphocytes and plasma cells were prominent inflammatory cells and mast cells were uncommonly encountered.

Conclusion

In this study, indications, outcomes, and complications of partial inferior turbinectomy were studied. It was found that partial inferior turbinectomy for cases of ITH secondary to deviated nasal septum and allergic rhinitis is effective in relieving symptoms of nasal obstruction. Complications arising from this procedure are fewer and can be managed effectively with good postoperative follow-up and good patient education on nasal douching and hygiene. This procedure is safe and effective in the treatment of ITH when medical therapy fails to relieve the patient's complaint.

In this study, along with clinical outcome, histopathological features of the ITH in deviated nasal septum as well as allergic rhinitis were also studied. Results of the micrometric analysis showed significant hypertrophy of the bony layer of IT in the deviated nasal septum group compared with the allergic rhinitis group. With these results we conclude that bone should be a target of surgery in the treatment of ITH due to deviated nasal septum.

Acknowledgements

Conflicts of interest

None declared.

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