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A Study of Partial Turbinectomy and Radiofrequency Cautery for the Treatment of Inferior Turbinate Hypertrophy Causing Nasal Airway Block

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ABSTRACT

In this work, two turbinate procedures such as Partial inferior turbinectomy and Radiofrequency cautery have being taken for prospective analysis which are being done commonly. They are Patients with nasal obstruction and inferior turbinate hypertrophy not responding to medical treatment. On analyzing these two turbinate reduction procedures, the radiofrequency cautery procedure is better in relieving nasal obstruction and for reducing turbinate size with preserved mucociliary function. The overall improvement for relieving nasal obstruction and for reducing turbinate size in radiofrequency cautery is 100% and in partial turbinectomy is 85.7% by both subjective and objective assessment. On analyzing these two turbinate procedures, the radiofrequency cautery procedure is better in relieving nasal discharge. and early recovery. The overall improvement in nasal discharge is 80% in radiofrequency cautery group and 45.3% in partial turbinectomy group ,but this is not statistically significant. On analyzing these two turbinate procedures, the Radiofrequency cautery procedure provides maximum symptom free interval from sneezing and headache symptoms. After a 9 month follow up period, 85.7% patients were free from symptoms of sneezing and 75% patients were free from symptoms of headache in partial inferior turbinectomy group and 100% patients were free from symptoms of both sneezing and headache in Radiofrequency cautery group,but this is not statistically significant .Postoperative complications are less with Radiofrequency cautery. Postoperative recovery is early with Radiofrequency cautery.

OPEN ACCESS

Key Words
Maxilla, nasal valves, turbinate size grading-grade, radiofrequency cautery, equipment, computed tomography of empty nose syndrome

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INTRODUCTION

Nasal obstruction is one of the most common complaint among patients presenting to otolaryngologists. Although nasal obstruction is not a serious condition but disturbs the quality of life of the patient. The inferior turbinate has an erectile tissue with high vascularity in the form of venous sinusoids, which results in nasal obstruction due to sub mucosal or mucosal hypertrophy[1]. The commonest site of enlargement in various condition like reactivity to allergens, temperature, humidity and increase in air flow pressure is the anterior end of inferior turbinate and it is the narrowest part of nasal airway, which causes significant nasal obstruction[2]. Conservative treatment is the first line treatment for inferior turbinate hypertrophy[3]. Conventionally, hypertrophied inferior turbinates are treated with drugs like antihistamines, local decongestants and topical steroids which are also effective to restore comfortable nasal breathing[4]. Surgical intervention is indicated when medical management has failed to provide optimal relief of nasal obstruction. Surgical turbinate reduction is either performed alone or as an adjunctive procedure during sinus surgery, septoplasty or rhinoplasty[4-13].

Turbinate Procedures:

- Resection techniques.
- Non resection techniques.

Resection Techniques:

- Partial Turbinectomy.
- Inferior Turbinoplasty.
- Subtotal Turbinectomy.
- Submucous Resection.
- Powered Turbinectomy.

Non Resection Techniques:

- Out fracturing of inferior turbinate.
- Steroid injection.
- Chemical cautery.
- Cryotherapy.
- Electrocautery.
- Surface electrocautery.
- Submucosal electrocautery.
- Laser treatment.
- Radio frequency cautery reduction.

In this work two turbinate procedures have being taken for prospective analysis which are being done commonly. They are

- Partial inferior turbinectomy.
- Radiofrequency cautery.

MATERIALS AND METHODS

Subjects: All patients with nasal obstruction attending OPD.

Inclusion Criteria: Patients with nasal obstruction and inferior turbinate hypertrophy not responding to medical treatment.

Exclusion Criteria:

- Nasal obstruction with inferior turbinate hypertrophy with Sino nasal polyposis.
- Fungal sinusitis.
- Neoplasms.
- chronic sinusitis.
- Nasal obstruction with inferior turbinate hypertrophy with deviated nasal septum.

Patient's age was divided into three categories, 10-30 years age group, 31-50 yrs age group and above 50 yrs age group. The following data is obtained from the Patients attending general hospital during the period of study who had features of nasal obstruction with inferior turbinate hypertrophy who had undergone these two turbinectomy procedures. Subjective assessment of nasal obstruction was done by visual analogue scale before surgery and graded in to none, mild, moderate and severe.

- None-0
- Mild-1,2,3
- Moderate-4,5
- Severe-6,7

Nasal endoscopy was done for objective assessment of inferior turbinate size and graded as I, II, III. Significant improvement is considered when grade falls from a higher grade to a lesser grade post operatively. Patients included in this study underwent these procedures by random allocation.

- Partial inferior turbinectomy
- Radiofrequency cautery

The improvement in nasal obstruction and other symptoms following surgery was assessed after three, six and nine months by complete questionnaires and size of the inferior turbinate assessed by nasal endoscopy.

Grading of Inferior Turbinate Size:

Grade I: Mild enlargement with no obvious nasal obstruction.

Grade II: The inferior turbinate occupies half of the nasal cavity with nasal obstruction.

Grade III: Complete occlusion of the nasal cavity.

Partial Inferior Turbinectomy:

Anaesthesia: Local anaesthesia is injected after the topical agent has taken effect. Most commonly 1% lidocaine with 1:1,00,000 epinephrine is used. Approximately 3-5 ml is injected for each turbinate, divided between the posterior end, anterior edge, and the medial mucosa The clamp is placed over the

anterior inferior two-thirds or, less of the turbinate. The clamp is left there for 2-3 minutes and then released. The angled turbinate scissors are then used to cut along the crush line created by the clamp. After the turbinate is resected suction cautery can be used to coagulate the raw edge. This will decrease the incidence of postoperative bleeding and obviate the need for the packing the nose. Gelfoam was kept on the raw surface.

Radiofrequency Cautery: Radiofrequency cautery is a surgical method that can be safely used for the inferior turbinate reduction. RF energy is used in order to reduce tissue volume to determine a submucosal tissue injury, leading to the reduction. The thermal probe used in this particular technique is introduced into the inferior turbinate and the radio energy released contributes to cutting some of the tissue.

Anaesthesia: The treatment starts with a topical anaesthetic applied to the inferior turbinate for 1-5 minutes, followed by a local anaesthetic injection.

Procedure: The RF needle electrode is then inserted submucosally at 1-4 different sites of the inferior turbinate up to the bone turbinate . It is important not to harm the mucosa posterior to the puncture site. After this procedure, there is no need for local treatment, but only for pressing for a few minutes a cotton ball at the puncture site. Then, the patient is capable of returning to his normal daily living. If the pain occurs, it is well managed with any analgesics. Postoperative scarring and fibrosis reduce the volume of the inferior turbinate. Although fibrotic tissue replaces the glands and venous plexuses, the nasal mucociliary function remains preserved. From the histological point of view, lack of cilia regeneration in conjunction with profuse submucosal collagen production is observed.

RESULTS AND DISCUSSIONS

No. of patients with nasal discharge pre-operatively in each group were Partial inferior turbinectomy group : 11 out of 30.

Radio-Frequency Group: 10 out of 30.
No. of patients with nasal discharge post operatively in each group after 9 months were.

Partial Inferior Turbinectomy Group: 6 out of 30.

Radio-Frequency Cautery Group: 2 out of 30.

In our opinion, there is no justification for performing a total or subtotal turbinectomy in patients with a hypertrophic inferior turbinate. Turbinectomy is not compatible with the goal of 'preservation of function'. Turbinectomy is irreversible and deprives the nose of one of its important organs. There is thus no place for this technique in modern functional nasal surgery. There are more conservative surgical methods to achieve the desired effect. Inferior turbinate surgery is advocated for relief of symptoms in patients with nasal obstruction, rhinorrhea and sneezing. In our study 60 patients with inferior turbinate hypertrophy had undergone procedures like partial Inferior turbinectomy and Radiofrequency cautery. Hence 30 patients underwent each procedure. In our study out of 60 patients, 49 patients had improved nasal obstruction after turbinectomy procedures. It is about 81.6% totally who had undergone two procedures Out of the 30 patients who underwent this procedure, subjective analysis showed 76.66% to have severe nasal obstruction preoperatively. In the postoperative period nobody had severe obstruction and only 13.34% had moderate obstruction. Nasal endoscopic examination revealed 70% to have grade III inferior turbinate preoperatively and 0% post operatively. Percentage of improvement in nasal discharge post operatively in partial inferior turbinectomy group: 5 out of 11 i.e 45.4%. Percentage of patients with sneezing free interval post operatively for 9 months in partial inferior turbinectomy group. 6 out of 7 i.e 85.7%. Most of the patients treated with Partial inferior turbinectomy took 2 months to recover from symptoms Visual analogue scoring showed 60% and 0% to have severe nasal obstruction in pre and post operative state respectively. The total improvement in nasal obstruction was 100% Nasal endoscopy showed 18% and 0% to have grade III size of inferior turbinate in pre and post operative states respectively. The total improve in nasal inferior turbinate size was 100%. Percentage of patients with sneezing free interval post operatively for 9 months in Radiofrequency Ablation group: 0 out of 5 i.e 100% The study was conducted on three groups of 45 adult volunteer patients with symptoms and signs of nasal obstruction and stuffiness related to enlarged turbinates. In group A, laser ablation was applied to the inferior turbinate on one side and partial turbinectomy to the inferior turbinate on the other side. In group B, radiofrequency tissue ablation was applied to the inferior turbinate on one side and partial turbinectomy to the inferior turbinate on the other side. In group C, patients who were not treated by any surgical techniques were the control subjects. Clinical examinations, visual analogue scales, rhinomanometry and isotopic study of nasal mucociliary transport time were used to assess treatment outcomes. In the study, it was demonstrated that radiofrequency tissue ablation to the turbinate is effective in improving nasal obstruction objectively and in preserving nasal mucociliary function. Laser ablation of the turbinate is effective in improving the nasal obstruction., however, it disturbs the mucociliary

Table 1.Objective Assessment of Inferior Turbinate Size

No. of patients with turbinate size Pre operatively						No. of patients with turbinate size Post operatively					
Grade I		Grade II		Grade III		Grade I		Grade II		Grade III	
n	%	n	%	n	%	n	%	n	%	n	%
0	0	9	30	21	70	16	53.33	14	46.67	0	0

Table 2: Objective Assessment

No. of patients with turbinate size Pre operatively						No. of patients with turbinate size Post operatively					
Grade I		Grade II		Grade III		Grade I		Grade II		Grade III	
n	%	n	%	n	%	n	%	n	%	n	%
0	0	12	40	18	60	24	80	6	20	0	0

Table 3: Objective assessment of turbinate size pre operatively and post operatively

	GRADE I		GRADE II		GRADE III	
	Preop	Postop	Preop	Postop	Preop	Postop
Partial Turbinectomy	0	16	9	14	21	0
Radiofrequency Cautery	0	24	12	6	18	0

Table: 4. Duration of recovery:

Procedure	Average duration of recovery
Partial turbinectomy	65 days
Radio-frequency cautery	45 days

Table 5.Recurrence of symptoms

	3 months	6 months	9 months
Partial turbinectomy	2	3	5
Radio-frequency cautery	0	0	1

function significantly. With the partial turbinectomy technique, results obtained were similar to the results with the radiofrequency tissue ablation technique. Postoperative improvement in nasal block by subjective assessment between the two procedures has Fisher's exact , P=0.0059 ,i.e, <0.05. so, Significant. Postoperative improvement in nasal block by objective assessment between the two procedures has Fisher's exact , P=0.0332 , i.e, <0.05. so, Significant. This means Radiofrequency cautery is better than Partial inferior turbinectomy in relieving nasal obstruction. Postoperative improvement in nasal discharge symptom between the two procedures has chi square (X2) =1.298., P=0.256,i.e., >0.05 . so, Nonsignificant. This means Radiofrequency cautery and Partial inferior turbinectomy has no statistically significant difference in relieving nasal discharge symptom. Postoperative improvement in sneezing symptom between the two procedures has Fisher's exact, P=1 ,i.e., > 0.05. This means Radiofrequency cautery and Partial inferior turbinectomy has no statistically significant difference in relieving sneezing symptom. Postoperative improvement in headache symptom between the two procedures has Fisher's exact , P=1 ,i.e., >0.05. so, Nonsignificant. This means Radiofrequency cautery and Partial inferior turbinectomy has no statistically significant difference in relieving headache symptom. Average duration of recovery is less for Radiofrequency cautery. This means patients recovered faster postoperatively in Radiofrequency cautery than Partial inferior turbinectomy. This means Radiofrequency cautery and Partial inferior turbinectomy has no significant difference in recurrence of symptoms. Complications of treatment for inferior turbinate hypertrophy are common. Infection, crusting, bleeding, adhesions and perforation have been reported to occur. Those patients who had their inferior and the middle turbinate either partially or totally resected increasingly suffered from the symptoms of an obstruction of nasal breathing and endonasal crusting and dryness. Although the intranasal air space was expanded by the resection of the turbinate, a contrary effect occurred, the so-called "paradoxical nasal obstruction".

ENS is Divided up Into three Subtypes:

- The ENS inferior turbinate (ENS-IT) refers to the situation when the inferior Turbinate has been removed.
- The ENS middle turbinate (ENS-MT) describes the condition after removal of the middle turbinate.
- ENS-both refers to the resection of all turbinates.

The ENS was therefore defined as an iatrogenically caused condition which is also referred to as secondary atrophic rhinitis mild pain is commonest one. In some of them crusting has seen. Bleeding occurred very rarely.

CONCLUSION

On analyzing these two turbinate reduction procedures, the radiofrequency cautery procedure is better in relieving nasal obstruction and for reducing turbinate size with preserved mucociliary function.The overall improvement for relieving nasal obstruction and for reducing turbinate size in radiofrequency cautery is 100% and in partial turbinectomy is 85.7% by

both subjective and objective assessment. On analyzing these two turbinate procedures, the radiofrequency cautery procedure is better in relieving nasal discharge and early recovery. The overall improvement in nasal discharge is 80% in radiofrequency cautery group and 45.3% in partial turbinectomy group, but this is not statistically significant. On analyzing these two turbinate procedures, the Radiofrequency cautery procedure provides maximum symptom free interval from sneezing and headache symptoms. After a 9 month follow up period, 85.7% patients were free from symptoms of sneezing and 75% patients were free from symptoms of headache in partial inferior turbinectomy group and 100% patients were free from symptoms of both sneezing and headache in Radiofrequency cautery group, but this is not statistically significant. Postoperative complications are less with Radiofrequency cautery. Postoperative recovery is early with Radiofrequency cautery.

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