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Comparative study between partial inferior turbinectomy and submucosal diathermy for treatment of inferior turbinate hypertrophy due to allergic rhinitis

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ABSTRACT

Background: Nasal obstruction due to inferior turbinate hypertrophy is one of the most common symptoms of Allergic rhinitis (AR) which causes significant debility. Surgery is one of the modalities of treatment to relieve patients of nasal obstruction. Objective of the study was to evaluate the efficacy of submucosal diathermy (SMD) and partial inferior turbinectomy (PIT) in the treatment of hypertrophied inferior turbinate.
Methods: Sixty patients with allergic rhinitis and hypertrophied inferior turbinates were randomised into two groups with thirty patients each (group I underwent SMD and group II underwent PIT). They were assessed for relief of nasal obstruction by subjective and objective methods.
Results: Nasal obstruction due to hypertrophy of inferior turbinate was the main symptom with 45 (75%) patients having severe obstruction and 15 (25%) patients moderate obstruction. Both the surgical procedures were effective in reducing nasal obstruction & other symptoms of AR. Though the total symptom score was significantly reduced by both the methods (p=0.001) SMD was superior in relieving nasal obstruction at 3months follow up while PIT was more effective at 6 months follow up.
Conclusions: SMD is an easier, less invasive method with lesser postoperative discomfort and complications as compared to PIT. Our study recommends SMD as an effective technique for relief of nasal obstruction in allergic rhinitis.

Keywords: Allergic rhinitis, Hypertrophied inferior turbinate, Partial inferior turbinectomy, Submucosal diathermy

INTRODUCTION

Allergic rhinitis is an inflammatory disease of the upper airways and one of the most common problems seen in outpatient practice affecting approximately 20% of the population.[1] It leads to development of sequelae such as chronic rhinosinusitis, nasal polyps, serous otitis media, bronchial asthma, orthodontic problems and other ill effects of prolonged mouth breathing, especially in children due to nasal obstruction.[2] Inferior turbinate hypertrophy due to venous sinusoid engorgement is a major contributing factor to obstruction at nasal valve level as well as inferior part of nose. Avoidance of allergen triggers, though the definitive treatment, is at times impractical. Pharmacotherapy provides symptomatic relief but does not cure the disease. Immunotherapy modifies the allergic response but does not always afford protection from an overwhelming antigen exposure. Therefore other modalities of treatment which can reduce the symptoms mainly nasal obstruction, preserve the functional efficacy of nasal mucosa and avoid complications are required.[3] The main determinants of nasal resistance are the anterior and inferior portions of the lower turbinates which can be dealt with surgically.

The physiological basis on which reduction of inferior turbinate rests is the Poiseulle's Law which states that the laminar flow rate of air along a pipe is proportional to the fourth power of its radius and hence a small change in the inferior turbinate will dramatically affect the nasal airflow.[4] Surgical intervention improves the dynamic competence of the nasal airway by addressing the fixed obstruction and alleviates symptoms by reducing the effects of edematous mucosa.[4] This study was taken to clinically compare the efficacy of submucosal diathermy and partial inferior turbinectomy in treatment of inferior turbinate hypertrophy in allergic rhinitis patients.

METHODS

This prospective randomised clinical study was conducted in a tertiary care hospital between October 2014 to May 2016 on sixty allergic rhinitis patients with hypertrophied inferior turbinates. Patients between 18-55 years of age with symptoms of nasal obstruction, sneezing, itching sensation in the nose, watery nasal discharge and hypertrophied inferior turbinates on examination, who were willing for surgery were included in the study. Patients with medical co morbidities like diabetes mellitus, hypertension, bleeding disorders and cardiac disease, past history of nasal surgery and nasal polyposis on presentation were excluded from the study.

All patients were evaluated by detailed history taking, complete ENT examination with cold spatula test, cotton wisp test, cottles test and diagnostic nasal endoscopy and systemic examination. Patients were counselled regarding the treatment options, surgical procedure proposed, its nature and associated advantages and disadvantages of both. Preoperative as well as postoperative subjective and objective scores were recorded based on Tables 1 – 5 in the symptom diary provided to each patient at weekly and monthly intervals during the first to sixth month postoperative period. Subjects were sequentially randomised to undergo submucosal diathermy (group I) and partial inferior turbinectomy (group II). Results were tabulated and analysed.

Table 1: Symptom score.

1	Absent	0	No symptoms
2	Mild	1	Symptoms present but not troublesome
3	Moderate	2	Symptoms frequently troublesome but not disturbing daily activity
4	Severe	3	Symptoms disturbing daily activity

Statistical methods

Descriptive statistical analysis has been carried out in the present study. Multivariate test like ANOVA was used to compare the symptom scores [subjective & objective]. Chi square tests were used to study the patient demographics. Statistical significance was accepted for p value <0.005.

Table 2: Nasal secretion score.

Score	Average number of nose blowing per day
1	Absent
2	1 to 5
3	6 to 10
4	11 or more

Table 3: Nasal smear cytology score.

1	-	<5% Eosinophils	No eosinophilia	Normal
2	+	>5% Eosinophils	Slight eosinophilia	Doubtful
3	++	<50% Eosinophils	Moderate eosinophilia	Pathological
4	+++	>50% Eosinophils	Marked eosinophilia	Pathological

Table 4: Nasal obstruction score.

Score	Features
1	Inferior turbinate occupying <25% of nasal fossa
2	Inferior turbinate occupying 25 to 50% of nasal fossa
3	Inferior turbinate occupying 51 to < 100% of nasal fossa
4	Inferior turbinate touching the nasal septum-100% of nasal fossa

Table 5: Post-operative subjective scores.

Scores	Improvement	
1	Significant improvement	Symptom free
2	Moderate improvement	Symptoms persists but not troublesome
3	Mild improvement	Symptoms persists and frequently troublesome but not disturbing daily activity
4	No improvement	Symptoms persist & disturbing daily normal activity

RESULTS

In this study age of patients ranged from 18 to 55 years. Maximum number of cases were between 26-35 years (42%) followed by 18-25 years (32%) with mean age of 33.69 years. Male predominance was observed accounting for 37(61%) patients. Based on the ARIA guidelines there were 35 (60%) patients with persistent symptoms and the remaining 25(40%) with intermittent symptoms. 38 patients (64%) had positive family history of allergic rhinitis. The subjective and objective parameters studied were tabulated and interpreted as shown in Tables 6 – 8. On comparison in between the groups it was found that SMD was significantly superior [p=0.001] when compared to PIT.

Table 6: Mean and SD of parameters studied.

Sl no	Scoring category	Features	Parameters	G I	G II	Total
1	Nasal obstruction score					
		Before treatment	Mean	3.63	3.87	3.75
			SD	0.49	0.35	0.43
		3 months post surgery	Mean	1.57	1.67	1.62
			SD	0.5	0.45	0.49
		6 months post surgery	Mean	1.67	1.4	1.53
			SD	0.47	0.45	0.5
2	Nasal discharge score					
		Before treatment	Mean	3.4	3.73	3.57
			SD	0.49	0.45	0.5
		3 months post surgery	Mean	2	1.93	2
			SD	0.5	0.58	0.55
		6 months post surgery	Mean	2.13	1.8	1.97
			SD	0.57	0.66	0.63
3	Nasal itching score					
		Before treatment	Mean	3.27	3.37	3.32
			SD	0.45	0.49	0.46
		3 months post surgery	Mean	2.23	2.53	2.28
			SD	0.43	0.5	0.49
		6 months post surgery	Mean	2.17	2.57	2.37
			SD	0.37	0.5	0.48
4	Sneezing score					
		Before treatment	Mean	3.4	3.4	3.4
			SD	0.49	0.49	0.49
		3 months post surgery	Mean	2.2	2.67	2.43
			SD	0.4	0.47	0.5
		6 months post surgery	Mean	2.13	2.6	2.37
			SD	0.34	0.49	0.48
5	Headache score					
		Before treatment	Mean	2.17	3.07	2.62
			SD	0.83	0.69	0.88
		3 months post surgery	Mean	1.67	1.83	1.75
			SD	0.47	0.59	0.54
		6 months post surgery	Mean	1.6	1.87	1.73
			SD	0.49	0.57	0.54
6	Objective nasal obstruction score					
		Before treatment	Mean	3	3.73	3.37
			SD	0	0.45	0.48
		3 months post surgery	Mean	1.53	1.73	1.63
			SD	0.5	0.45	0.48
		6 months post surgery	Mean	1.67	1.67	1.67
			SD	0.47	0.47	0.47
7	Nasal smear score					
		Before treatment	Mean	3	2.5	2.7
			SD	0.71	0.57	0.69

Sl no	Scoring category	Features	Parameters	G I	G II	Total
		3 months post surgery	Mean	1.63	2	1.83
			SD	0.49	0.55	0.55
		6 months post surgery	Mean	1.6	1.87	1.73
			SD	0.48	0.68	0.6
8	Total score analysis					
		Before treatment	Mean	21.83	23.83	22.83
			SD	1.34	1.36	1.67
		3 months post surgery	Mean	12.9	14.4	13.6
			SD	1.58	1.4	1.66
		6 months post surgery	Mean	13.03	13.73	13.38
			SD	1.29	1.33	1.35

Table 7: Post operative assessment.

	Nasal obstruction	Nasal discharge	Nasal itching	Sneezing	Headache
3 months post submucosal diathermy					
Significant improvement	13	1			10
Moderate improvement	17	16	23	24	20
Mild improvement		13	7	6	
No improvement					
6 months post submucosal diathermy					
Significant improvement	10	3			12
Moderate improvement	20	20	25	26	18
Mild improvement		7	5	4	
No improvement					
3 months post partial inferior turbinectomy					
Significant improvement	10	6			8
Moderate improvement	20	20	14	10	19
Mild improvement		4	16	20	3
No improvement					
6 months post partial inferior turbinectomy					
Significant improvement	18	10			7
Moderate improvement	12	16	13	12	20
Mild improvement		4	17	18	3
No improvement					

Table 8: Postoperative complications.

Immediate		Group I	Group II
	Haemorrhage	1	6
	Crusting	10	28
At 1 month postop	Crusting	4	10
	Adhesions	-	4
At 3 months postop	Adhesions	-	2

DISCUSSION

Nasal obstruction is the hallmark complaint in AR accounting for one of the most common reasons for OPD visits. Hypertrophy of inferior turbinate has long been established as the central cause of symptomatic nasal obstruction in these patients. Chronic nasal obstruction is not life threatening but can cause prolonged respiratory infection, secondary sinus involvement, hyposmia and sleep disorders leading to significant morbidity.[3] Allergic inflammation causes vasoreactive engorgement of the turbinate tissue & the associated inflammation of the mucosal lining. The mucosal epithelium of the inferior turbinate has been regarded as the central site for IgE mediated reaction & nasal eosinophilia. The first point of contact for allergen is the inferior turbinate & deposition

in these areas results in localized inflammation stemming from submucosal structures.[4]

The goal of surgery of inferior turbinate is to minimise allergen effect by reducing bulky inflammatory tissue or inducing scar formation, while enhancing patency of nasal fossa by reducing the size of the inferior turbinate but preserving the physiological function of the turbinate such as humidification & temperature regulation of inspired air.[4,5,6] SMD is reported to be easier technique with few complications.[7]

In our study the most common and severe symptom was nasal obstruction. Forty five [75%] patients presenting with severe symptom and remaining fifteen [25%] with moderate obstruction. This was followed by nasal discharge with 60% & 40%, nasal itching 33% & 67%, sneezing 40% & 60% and headache 15% & 50% in the severe and moderate groups respectively.

At 3 months postoperatively, in the SMD group there was improvement in nasal obstruction, nasal discharge, itching, sneezing and headache as shown in table 7 similar to results observed by Fradis et al and jones et al.[8,9] The size of the inferior turbinate was grade I [<25%] in 13 patients and grade II [25-50%] in 17 patients at 3 months, while 10 patients had grade I and 20 patients had grade II at 6months follow up.

PIT was found to be effective in reducing nasal obstruction, nasal discharge, itching & headache in all 30 patients as shown in Table 6 and 7 similar to other studies by Rakover and Rosen.[10]

There were 5 cases with recurrence of nasal obstruction from no symptom to mild symptom at 6months in SMD group while no cases of recurrence was observed in the PIT group at 6 months indicating better effectiveness on long term similar to the results showed by Smithachandra et al in their study of 132 patients.[11] All the surgical methods aim mainly in reducing the size of turbinate to relieve nasal obstruction. But few studies have shown that surgical methods are known to reduce nasal discharge, improve hyposmia and decrease the attacks of asthma and sneezing.[12]

Our study had postoperative complications comparable to the study by Rakover and Rosen who had post op bleeding in 12% patients and adhesions in 4% of patients with PIT.[10] Elwany and Harrison also observed post op bleeding in 5% patients & high incidence of postoperative discomfort and headache.[13] A study by Gomma et al showed SMD to be better than PSIT regarding nasal pain and intra-nasal crustations after two weeks, but both techniques were equally effective in improving of nasal obstruction and degree of tissue healing.[14] These results were similar to our study results. The results we obtained were also shown by Imad et al in a study conducted in 50 patients where they found submucosal diathermy to be safe and better procedure in respect of bleeding, pain, crusting and healing than partial inferior turbinectomy.[15]

CONCLUSION

Surgical techniques like submucosal diathermy and partial inferior turbinectomy are not only effective in reducing the nasal obstruction in allergic rhinitis due to hypertrophied inferior turbinates but also other symptoms like rhinorrhoea, sneezing, itching and headache. Submucosal diathermy was more effective in reducing the total symptoms score with fewer complications as compared to partial inferior turbinectomy but the latter was more effective in reducing nasal obstruction and nasal discharge on long term basis.

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