

Original Research Article

Partial inferior turbinectomy versus submucosal diathermy in hypertrophied inferior turbinates

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ABSTRACT

Background: The study aims to compare the efficacy of submucosal diathermy and partial inferior turbinectomy in terms of improvement in nasal obstruction, pain, haemorrhage, crusting and wound healing.

Methods: A prospective sequentially randomized comparative study involving fifty patients, divided into two groups of 25 patients each. Group A consists of patients who underwent SMD and group B consists of patients who underwent PIT. Post-operative assessment was done at day 1, 2 weeks, 1 month, 3 months and 6 months.

Results: Post-operative improvement in nasal obstruction was seen in both groups. 80% showed significant improvement in SMD and 32% in PIT group at the end of second week. By sixth month, 40% in SMD group and 80% in PIT group showed significant improvement. Mild pain was observed in 12% of PIT group at 2 weeks. In SMD group, 8% developed reactionary haemorrhage. In PIT group, 24% developed minimal soakage and 12% developed moderate soakage. Severe nasal crusting was seen in 64% of the cases in PIT group and in 40% of the cases in SMD group at second week. By 1 month, 44% in PIT group and 12% in SMD group showed severe crusting.

Conclusions: Short term complications like pain, obstruction and haemorrhage was noted to be higher with PIT. On long term evaluation, PIT showed better results in terms of improvement in nasal obstruction scores.

Keywords: SMD, PIT, Inferior turbinate hypertrophy, Nasal obstruction

INTRODUCTION

Nasal obstruction is a common symptom encountered by otorhinolaryngologist and hypertrophied inferior turbinate is found to be a major cause in many of these cases.^{1,2,3}

Inferior turbinate serves an important role in filtration, warming and humidification of inspired air and in regulation of nasal airflow.^{4,5} Hypertrophy of inferior turbinate can be due to perennial allergic rhinitis, vasomotor rhinitis or deviated nasal septum (leading to compensatory hypertrophy).^{2,6,7} This can be caused by dilatation of sub-mucosal venous sinusoids which regulate the mucosal thickness or due to increase in the

size of underlying bone.⁶ Hypertrophied inferior turbinate can interrupt normal nasal cycle, in turn altering pulmonary function and leading to an impaired quality of life.³

Initially, medical management is tried with nasal decongestants, antihistaminic, topical and systemic corticosteroids and immunotherapy.⁸ Surgery is reserved for cases refractory to medical treatment. Surgery finds its significance from Poiseuille's law which states that laminar air flow rate along a pipe is directly proportional to fourth power of its radius.⁹ Hence, reduction in the size of the inferior turbinate leads to significant improvement in nasal airflow.

Reduction in the size of the turbinate can be achieved by techniques such as submucosal diathermy, partial or total inferior turbinectomy, turbinoplasty (submucous resection, out-fracture), radio-frequency ablation, laser ablation, cryotherapy and ultrasound assisted reduction.^{4,9} This study strives to evaluate the effect of sub- mucosal diathermy (SMD) versus partial inferior turbinectomy (PIT) on nasal obstruction, pain, haemorrhage, crusting and wound healing.

METHODS

A prospective sequentially randomized comparative study consisting of 50 patients who presented to ENT OPD, with complaints of nasal obstruction due to inferior turbinate hypertrophy, during the period of October 2018 to March 2020 were included in the study. The patients were categorized into two groups with group A consisting of patients who underwent submucosal diathermy (SMD) and group B consisting of patients who underwent bilateral partial inferior turbinectomy (PIT).

The inclusion criteria were: patients in the age group of 18-55 years who gave written informed consent for the surgical intervention, nasal obstruction symptom score of 2 or 3 (symptomatic with moderate/severe interference with daily activities), pre-operative assessment score (based on size of inferior turbinate) of 3 or 4, and following up till 6 months post-operatively.

Patients with nasal obstruction secondary to other causes, previous nasal surgeries and other co-morbidities like bleeding diathesis, uncontrolled hypertension and diabetes mellitus were excluded from the study.

Detailed history taking was carried out for all the patients. The symptom of nasal obstruction was graded (Table 1). Only those with score 2 or 3 were selected for surgical intervention. Anterior nasal rhinoscopy was done, inferior turbinates assessed and graded (Table 2).

Table 1: Nasal obstruction score.

Nasal obstruction score	Grade	Symptom
0	Absent	Asymptomatic
1	Mild	Symptomatic with minimal interference with daily activities
2	Moderate	Symptomatic with moderate interference with daily activities
3	Severe	Symptomatic with severe interference with daily activities

Surgical intervention was reserved for those with a score of 3 or 4. A detailed examination of nose, ear and throat

was done for all cases to look for any other pathologies. X-ray PNS was done. Routine blood investigations were done pre-operatively.

Table 2: Grading based on inferior turbinates assessment.

Grade	Size of inferior turbinate
1	IT occupying < 25% of nasal fossa
2	IT occupying 25- 50% of nasal fossa
3	IT occupying 51-75% of nasal fossa
4	IT occupying 75- 100% of nasal fossa

Both the procedures were done under general anaesthesia. In both the groups, bilateral nasal cavities were packed with ribbon gauze impregnated with 4% lignocaine with adrenaline. For SMD, diathermy needle was introduced into submucosa at the anterior end of inferior turbinate and needle was advanced up to the posterior end, paying attention to stay close to the bone. Then using monopolar diathermy, a coagulation current of 70 W was applied, and the needle was gradually withdrawn. This procedure was repeated two to three times, until mucosal blanching and shrinkage of the turbinate was noted.⁸

In PIT, medial one-third of anterior end of inferior turbinate was resected along with the bone using turbinectomy scissors.⁴ Bilateral anterior nasal packing was done with ointment soaked ribbon gauze which was removed after 48 hours. Both set of patients were under the cover of antibiotics and analgesics for 5 days post-operatively. Saline nasal drops were administered in the first week following nasal pack removal, which was replaced with saline nasal wash from second week onwards and continued for a month.

Post-operative evaluation using history taking, anterior rhinoscopy and diagnostic nasal endoscopy was done at second week, first month, third month and sixth month. Pain was assessed using VAS scoring (Table 3).

Table 3: Assessment of pain using VAS score.

Pain score	Grading of pain	VAS score
0	No pain	0
1	Mild pain	1-3
2	Moderate pain	4-7
3	Severe pain	8-10

Nasal crusting was evaluated by nasal endoscopy and was graded as: grade 0: no crusting noted, grade 1; mild crusting, crusts partially filling the nasal cavities and grade 2; severe crusting, crusts completely filling the nasal cavities. Nasal obstruction was scored as: score 0; no improvement, score 1; partial improvement and score 2; significant improvement

Statistical analysis

In the current study Chi Square test was used for statistical analysis.

RESULTS

The study was done on 50 patients, of which 27 were males and 23 were females. The age of the cases ranged from 19 to 55 years.

Following SMD, 16% (N=4) had mild pain and were relieved of the complaint by 2 weeks. In the group that underwent PIT, 44% (N=11) developed pain (28% had mild pain and 16% complained of moderate pain) based on visual analogue scale (VAS) score.⁶ By second week, there was significant reduction in the pain score, with only 4 patients complaining of mild pain.

Pain scores on first post-operative day are shown in (Table 4). On comparison of pain scores at Week 2 between SMD and PIT groups, we obtain a p value of 0.03706. Observed p value was <0.05 at 5% level of significance, thus it can be concluded that there is significant difference between the means. By comparing the pain scores at 1 month, group I and II shows similar results (Figure 1).

Table 4: VAS scoring for pain.

VAS score	SMD	PIT
	N (%)	N (%)
0	20 (80)	14 (56)
1	4 (16)	7 (28)
2	1 (4)	4 (16)

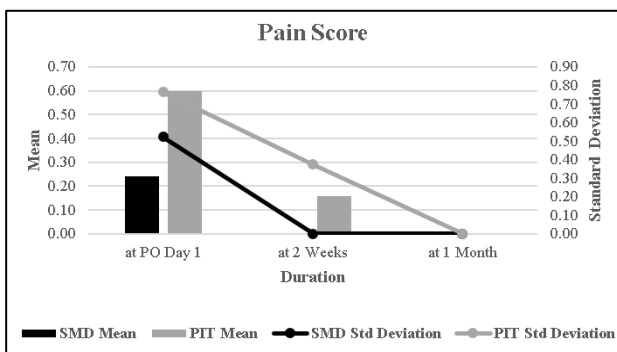


Figure 1: Mean pain score with standard deviation.

Headache was a complaint in 24% of cases who underwent PIT and did not persist beyond 2 days in these 6 cases. This complaint was absent in group I (SMD cases). In SMD group, 92% had no haemorrhagic episodes and 8% developed minimal soakage of the anterior nasal pack. This was significantly higher in the PIT group where 24% (n=6) developed minimal soakage

and 12% (n=3) developed moderate soakage requiring change of the outer dressing of the nasal pack.

Haemorrhage assessed on post-operative day one is depicted in (Table 5). Vestibular skin burn was noted in 1 case (4%) in the SMD group on first post-operative day, due to the handling of cautery. The burn wound healed on assessment at second post-operative week.

Table 5: Grading for haemorrhage.

Score	Grading	Change of outer dressing of nasal pack	SMD	PIT
			N (%)	N (%)
0	No soakage	-	23 (92)	16 (64)
1	Minimal soakage	Not required	2 (8)	6 (24)
2	Moderate soakage	Required	0 (0)	3 (12)

Improvement in nasal obstruction was evaluated at two weeks, 1 month, 3 months and 6 months post surgery based on visual analogue scale (VAS).⁶ Both groups showed improvement. At the end of 2 weeks, 20 patients (80%) showed significant improvement in SMD group and 20% reported partial improvement. In comparison, in PIT group, significant relief from nasal obstruction was seen in 32% (n=8) and 68% (n=17) showed partial relief (Table 6).

Table 6: Assessment of nasal obstruction.

Duration	Score for nasal obstruction	SMD	PIT
		N (%)	N (%)
Second Week	0	0 (0)	0 (0)
	1	5 (20)	17 (68)
	2	20 (80)	8 (32)
First Month	0	0 (0)	0 (0)
	1	7 (28)	14 (56)
	2	18 (72)	11 (44)
Third Month	0	0 (0)	0 (0)
	1	9 (36)	10 (40)
	2	16 (64)	15 (60)
Sixth Month	0	0 (0)	0 (0)
	1	15 (60)	5 (20)
	2	10 (40)	20 (80)

There was a gradual improvement in nasal obstruction scores in PIT group so that both the groups achieved similar results by the end of third month (significant relief noted in 64% of SMD group and 60% in PIT

group). By sixth month follow up, nasal obstruction in PIT group was 20% achieving partial relief and 80% achieving significant relief. In SMD group, 40% showed significant improvement and 60% achieved partial improvement due to recurrence of symptoms. Recurrence was not noted in PIT.

For nasal obstruction, comparison of SMD and PIT groups at 6 months gives a p value of 0.003892. As p value <0.05 at 5% level of significance, it indicated that there is significant difference between the means. The graph shows a sharp increase over 6 months in means of group II as compared to group I. Therefore, the study reveals that partial inferior turbinectomy is superior compared to sub mucosal diathermy for nasal obstruction (Figure 2).

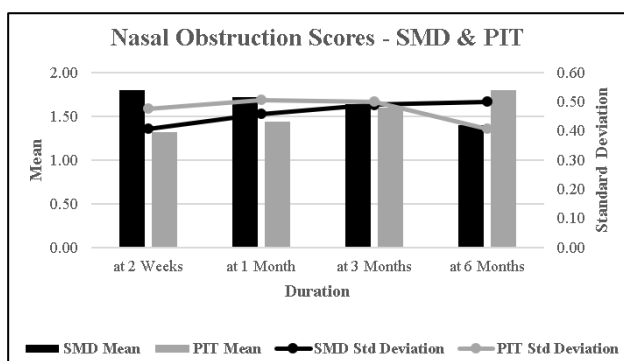


Figure 2: Mean nasal obstruction score with standard deviation.

Nasal crusting was higher in PIT group at the end of second post-operative week and first month, with severe crusting noted in 64% and 44% respectively. Whereas in SMD group, 40% and 12% respectively showed severe crusting at second week and 1 month post-operatively. This difference became insignificant by the end of third month (Table 7).

Table 7: Assessment of nasal crusting.

Duration	Score for nasal crusting	SMD	PIT
		N (%)	N (%)
Second Week	0	0 (0)	0 (0)
	1	15 (60)	9 (36)
	2	10 (40)	16 (64)
First Month	0	14 (56)	6 (24)
	1	8 (32)	8 (32)
	2	3 (12)	11 (44)
Third Month	0	22 (88)	21 (84)
	1	3 (12)	4 (16)
	2	0 (0)	0 (0)

On comparison of crusting scores at 1 month between SMD and PIT groups, p value of 0.02053 was observed. Since p<0.05 at 5% level of significance, it was concluded that there is significant difference between the means. With respect to crusting SMD shows better results in the initial period. However, results become similar by 3 months (Figure 3).

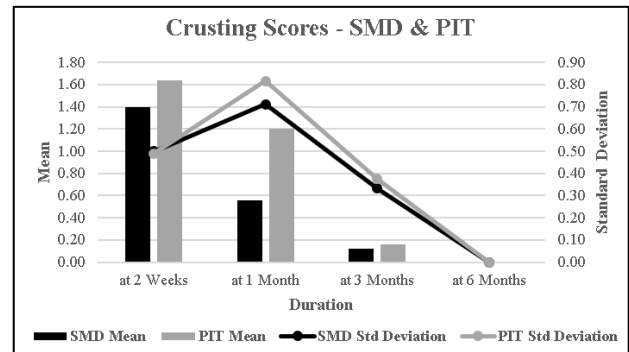


Figure 3: Mean nasal crusting with standard deviation.

Tissue healing was assessed at first and third month post-operatively based on Lund and Kennedy endoscopic scoring. The results were similar in both the groups (Table 8).

Table 8: Endoscopic scoring for wound healing.

Duration	Lund and Kennedy endoscopic score	Grade	SMD	PIT
			N (%)	N (%)
First Month	3	Good	18 (72)	17 (68)
	2	Moderate	7 (28)	8 (32)
	1	Poor	0 (0)	0 (0)
Third Month	3	Good	22 (88)	21 (84)
	2	Moderate	3 (12)	4 (16)
	1	Poor	0 (0)	0 (0)

Post-operative formation of synechiae was a complication seen in PIT group with 2 cases developing 2 synechiae and 1 case developing 1 synechiae. This complication was not seen in any patient who underwent SMD.

Though PIT is known to be associated with atrophic changes of the nasal mucosa, no such case was reported in this study.

DISCUSSION

Nasal obstruction is a common complaint of patients presenting to ENT, OPD. Inferior turbinate hypertrophy is a common finding for the same. The etiology of hypertrophied inferior turbinates is multifactorial. It can

be secondary to allergic rhinitis, vasomotor rhinitis, deviated nasal septum or due to the enlargement of the bone itself.^{7,10}

Hypertrophy of inferior turbinate is stated to be due to engorgement of submucosal venous sinusoids which leads to obstruction at the level of inferior part of the nasal cavity, leading to reduction in nasal airway.^{7,10} There is hypertrophy of lamina propria consisting of inflammatory cells, venous sinusoids and submucosal glands. There is also associated oedema of mucosa in case of allergic rhinitis.⁷ Bony hypertrophy of inferior turbinate can also have a contributory role.⁷

Initial management using nasal decongestants and antihistaminics is tried. Surgical intervention is planned only when symptoms are not relieved by medical means. Various surgical interventions are tried with variable success rates like Partial inferior turbinectomy (PIT), submucosal diathermy (SMD), inferior turbinoplasty (IT), cryoturbinectomy (CT) and laser turbinectomy (LT).¹¹ The basis for surgery is removal of mechanical obstruction such as hypertrophied turbinate reduces resistance to nasal airway.² Studies have also shown that it leads to improvement of nasal acuity as well.² Also, removal of the oedematous mucosa contributes to reduction of obstructive symptoms.⁶

In a study by Akbar et al, significant improvement in nasal obstruction was seen in 92% of PIT and 80% of SMD at second post-operative week.^{7,12} By the end of one month, complete obstruction was seen in 88% in PIT group and 76% in SMD group, and hence PIT showed better scores till first month. By third month after the procedure, this difference became insignificant with both groups showing 88% complete improvement.^{7,13}

In a study by Vishnu and Rajamma, it was concluded that relief from obstructive symptoms was higher in PIT group in the long run, though initial short term complications were also found to be higher in the PIT group.¹⁴

In our study, at the end of two weeks, better improvement in terms of nasal obstruction scores was seen in SMD group (80% versus 32%). This difference became almost even by 3rd post-operative month (SMD; 64% versus PIT; 60%). By sixth month, there was a significant improvement in the obstruction score in PIT group (80%) in comparison to SMD group (40%). This might be due to increase in nasal crusting seen in the PIT group (64% reported severe crusting) at second post-operative week in contrast to lower rates of crusting noted in SMD group (40% reported severe crusting). By third month, both groups had similar obstruction scores. The efficacy of SMD procedure reduced by 6 months with 40% showing significant improvement and 60% showing partial improvement. This was in agreement with studies by Fradis et al and Kafle et al.^{15,16}

This study showed higher pain scores on first post-operative day in PIT group (44%) in comparison to SMD group (20%). This was consistent with most of the other studies and can be attributed to the more invasive nature of the procedure of partial inferior turbinectomy. 24% of cases developed headache in the PIT group which was relieved on removal of the anterior nasal pack.

Post-operative haemorrhagic tendency was higher in the PIT group when evaluated on first post-operative day (36%, n=9), with 3 cases needing a change of outer nasal dressing. Only two cases from SMD group developed bleeding, which was minimal. This was in agreement with the findings of study conducted by Vishnu et al. Injury to vestibular skin was relatively rare, being noted in 1 case of SMD (4%) due to use of monopolar cautery.

Tissue healing was assessed endoscopically using Lund and Kennedy endoscopic scoring⁷; good healing; rapid mucosal re-epithelialisation, minimal crusting, no nasal synechiae, patient feels relief from symptoms. Moderate healing; mucosal re-epithelialisation normal, with mild to moderate crusting, nasal synechiae present, patient feels relief of nasal symptoms. Poor healing; delayed mucosal re-epithelialisation, severe crusting, synechiae present, with persistence of inflammation or infection, patient doesn't experience any relief from symptoms.

Healing was found to be optimal in both the groups (88% in SMD and 84% in PIT at 3 months). Synechiae developed in 3 cases of PIT. No cases of SMD developed this complication. This finding was consistent with synechiae rate of 5% noted by Elwany et al for PIT, though majority of other studies showed no synechiae formation.

No exacerbation of bronchial asthma in allergic rhinitis patients was seen following PIT in this study though some studies postulate an exacerbation following turbinectomy due to increased direct exposure of the mucosa of lower respiratory tract to the allergens. This can be attributed to partial reduction of turbinate which helped retain the filtration function of the turbinate mucosa. Though atrophic rhinitis is a complication following inferior turbinectomy, no such cases were reported in our study possibly due to preservation of posterior two-thirds of mucosa and bone in partial reduction of turbinate.

CONCLUSION

In this study, short term complications were found to be higher with PIT. The PIT group had higher pain and haemorrhage scores during initial post-operative period. Though initially improvement in obstruction scores was higher with SMD, on long term evaluation, PIT delivered better results.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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