

# Microdebrider-Assisted Turbinoplasty and Submucosal Diathermy for Inferior Turbinate Hypertrophy: A Randomized Clinical Trial

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## Abstract

**Introduction:** Nasal obstruction is a common presenting problem that can lead to symptoms like sleep disturbances, mouth breathing, and oral cavity dryness. The hypertrophied inferior turbinate is a common cause of nasal obstruction. The study aimed to compare two surgical techniques in terms of their outcomes assessed by relief of nasal obstruction and post-operative complications.

**Material and Method:** This randomized clinical trial was conducted at the Department of ENT, Benazir Bhutto Hospital, Rawalpindi. One hundred and twenty patients were randomized to undergo either MAT or SMD, with 60 patients within each group. The nasal obstruction symptom evaluation score system (NOSE) was used to assess relief from obstruction. Data was entered and analyzed in SPSS 22. Chi-square and Fisher exact tests were used to assess the difference in the outcome variables.

**Results:** Both the groups were comparable for age and gender. After 3 months of treatment, all 60 (100%) patients in the MAT group and 51 (85%) patients in the SMD group were completely relieved off nasal obstruction. At two weeks follow up 37 (61.57%) patients in the MAT group had grade 0 obstructions compared with 14 (23.33%) in the SMD group and this difference was significant (p-value <0.001). At one month follow up 55 (91.67%) patients in the MAT group while 46 (76.67%) in the SMD group had been completely relieved off nasal obstruction and this difference was found significant (p-value 0.024). Crust formation was the most common complication in both the groups, more with the SMD group at two weeks follow up which responded to treatment by alkaline nasal douches and crust removal.

**Conclusion:** MAT gives better results in terms of nasal obstruction relief and fewer complications than the SMD procedure.

**Keywords:** Microdebrider; Diathermy; Turbinates; Nasal obstruction.

## Introduction

Nasal cavities offer transmission, warmth, humidification, filtration, and chemosensation of air which is mostly done through mucosa and interaction with the turbinate.<sup>1</sup> About 20-30% of the population suffers from disturbance of airflow through the nose.<sup>2</sup> The inferior turbinate is 50-60 mm long, 3.8 mm wide, and 7.5 mm in height and is a dominant structure of the inferior nose.<sup>3</sup> Turbinates are composed of a pseudostratified columnar ciliated epithelium with a thick, vascular and erectile glandular tissue layer.<sup>4</sup> The inferior turbinate is the largest turbinate and is a separate bone.<sup>5</sup> The inferior turbinate submucosa is rich in cavernous tissue and anatomizing venules so that it is capable of changing its size due to swelling or shrinkage of the cavernous tissue.<sup>6</sup>

Inferior turbinate enlargement is a common cause of nasal obstruction. It is usually observed in patients with persistent allergic rhinitis, idiopathic rhinitis, and long-standing septal deviation.<sup>7</sup> Chronic inflammation of the nasal mucosa seen in allergic or vasomotor rhinitis leads to the deposition of collagen in the submucosal tissue of the turbinate and remodeling of turbinate bone. This leads to the development of Inferior Turbinate Hypertrophy (ITH).<sup>8</sup> Initially, symptoms may be responsive to medical management, as Topical decongestants, Antihistamines, and steroids, which form the mainstay of treatment of ITH. Surgical reduction of inferior turbinate to relieve the symptoms is usually done for the cases refractory to the medical treatment. There are different techniques for the surgical reduction of inferior turbinate like total or partial turbinectomy, turbinoplasty, chemical cautery, submucosal diathermy, cryosurgery, laser turbinate reduction (LTR).<sup>9</sup> Most of these techniques provide satisfactory results for a variable period and associated with different complications. However, the issue of optimal surgical technique is still open, because although most techniques have been extensively reviewed in comparative studies, the results are still controversial.<sup>10</sup>

Submucosal diathermy has been one of the popular procedures. The subsequent scarring fibrosis and obliteration of the venous sinusoids leads to a decrease in volume of turbinate mucosa and relief of airway obstruction.<sup>11</sup>

In the late 1990s, a new instrument was introduced in the field of partial inferior turbinoplasty: microdebrider was employed with the hope of achieving satisfactory turbinate reduction without sacrificing normal functions of the turbinate tissue.<sup>12,13</sup>

The significance of this study is to compare the efficacy of Microdebrider assisted turbinoplasty and submucosal diathermy in the management of inferior turbinate hypertrophy in relieving nasal obstruction and post-operative complications.

## Materials and Methods

This randomized controlled trial was conducted in the department of ENT in Benazir Bhutto Hospital, Rawalpindi. Patients complaining of nasal obstruction due to inferior turbinate hypertrophy were assessed for inclusion. Additional criteria considered were; failure to respond to medical therapy for at least 6 months for relief of nasal obstruction. Patients having infective rhinitis, marked septal deviation, nasal polyps or sinusitis, enlarged middle turbinates, previous nasal surgery, and postnasal pathology, pregnant or lactating females and with having systemic diseases like diabetes were excluded from the study. After fulfilling the selection criteria patients were asked to fill written consent forms. One hundred and twenty patients who participated were selected by lottery method in the study that was randomized into two groups.

Patient's demographic data along with registration numbers were entered on a Performa. After the informed consent, patients were randomly assigned into two groups. We used computer-based randomization by generating a list of random numbers until 120 that were selected for each patient by the operating surgeon. Every odd number underwent Microdebrider assisted turbinoplasty (MAT) while even ones underwent submucosal diathermy (SMD). Group A underwent MAT and group B underwent SMD. A complete ENT examination was done prior to the initiation of the procedure. Routine investigations e.g. complete blood count, clotting time, bleeding time, Hepatitis profile were carried out for the fitness for anesthesia in patients per protocol for General Anesthesia.

In the SMD group, submucosal diathermy was performed under general anesthesia. The needle tip was passed against the anterior end of the inferior turbinate and activated for a short period giving a devascularized zone to reduce the bleeding. The needle was then introduced through the submucosa through this zone submucosally to the posterior end of the inferior turbinate. The diathermy was then turned on whilst the needle was slowly withdrawn over a period of 10 to 15 seconds. This procedure was

repeated at three multiple sites of the anterior end of the inferior turbinate.

In the MAT group, after creating an anteroinferior submucosal pocket on the inferior turbinate, the microdebrider unit was set at 3000-rpm oscillating mode. With an "inferior turbinate 2 mm blade", the inferior turbinate size was reduced especially from the anterior head, taking great care to stay in the submucosal plane. A Merocel® nasal pack was done in both cases, placed postoperatively in both the groups.

Standard care of nasal surgery was given to all patients for the first 24 hours of surgery. Patients were discharged in stable condition on alkaline nasal douches three times daily and topical nasal steroids. Follow up visits were planned at 2 weeks, 01 months, and 03 months intervals. At each visit nasal suction & clearance, crust removal, and any adhesion was seen were divided.

Subjective symptoms of nasal obstruction were assessed 2 weeks, 1 month, and 3 months after the surgery. Nasal obstruction was evaluated by using four points grading system:

- Grade 0: No nasal obstruction
- Grade 1: Mild nasal obstruction
- Grade 2: Moderate nasal obstruction
- Grade 3: Severe nasal obstruction

Patients were also questioned about any complications faced by them during the post-operative follow-up.

**Statistical Analysis:** The data were entered in SPSS 22 and analyzed. Age was presented as mean  $\pm$  standard deviation. Gender and the number of patients with relief from nasal obstruction were presented as percentages. Both the surgical techniques were compared to each other in terms of outcomes which were assessed by relief from nasal obstruction. Chi-square and Fisher exact test calculators were used. 95% confidence level was taken for statistical significance in the study.

## Results

The two groups were comparable for age and gender (p-value>0.05). The mean age of patients in group A was  $28.91 \pm 7.23$  and in group B was  $28.13 \pm 6.12$  and this difference was not significant (p-value=0.737). Most of the patients were in the age group 21-30 years, 31(51.57%) patients in group A and 28 (46.67%) patients in group B. Most of the patients 78 (65%) were males while 42 (35%) were females. Overall there was no statistical significant difference in age (p-value=0.464) and gender (p-value=0.251) between two groups.

Pre-operatively all patients had a nasal obstruction, with the majority of patients having grade 2 and grade 3 obstruction in both groups. Two weeks after surgery 37 (61.67%) patients in group A, and 14 (23.3%) in group B had been completely relieved off nasal obstruction grade 0 (Table 1). Other patients showed improvement in obstruction score, with no patient from the MAT group had grade 3 obstruction while only 7 (11.6%) patients in the SMD group had grade 3 level obstruction. After one month's follow-up marked improvement in the MAT group was seen with 55 (91.67%) patients had grade 0 obstructions while the remaining 5 patients had grade 1 obstruction. These 5 patients achieved grade 0 at the 3rd month follow up. While in the SMD group at one month follow up 46 (76.67%) achieved a grade 0 obstruction score. Of the remaining 14 patients, 11 had grade 1 obstruction and 3 patients had grade 2 obstructions. At 3rd month follow up 51 (85%) achieved grade 0, of the remaining 9 patients, 7 had grade 1 and 2 patients had grade 2 obstruction. (Table 1)

**Table 1: Preoperative and post-operative grades of nasal obstruction**

Nasal Obstruction Grades	Pre-operative		Post-operative					
	MAT	SMD	Two Week		One Month		Three Months	
			MAT	SMD	MAT	SMD	MAT	SMD
Grade 3	15 (25%)	20	0	7 (11.67%)	0	0	0	0
Grade 2	36 (60%)	24 (40%)	12 (20%)	13 (21.67%)	0	3 (5%)	0	2 (3.33%)
Grade 1	9 (15%)	16 (26.67%)	11 (18.33%)	26 (43.33%)	05 (8.33%)	11 (18.33%)	0	7 (11.67%)
Grade 0	0	0	37 (61.67%)	14 (23.33%)	55 (91.67%)	46 (76.67%)	60 (100%)	51 (85%)

Our findings showed that there was a significant difference between the two groups at follow-up periods in terms of relief in nasal obstruction. The MAT group patients showed more improvement compared with SMD group patients.

**Table 2: Comparing no of subjects who completely resolved nasal obstruction between two groups**

		MAT N=60	SMD N=60	P-value
Two weeks	Grade 0	37 (61.67%)	14 (23.33%)	0.0000
	Others	23 (38.33%)	46 (76.67%)	
One month	Grade 0	55 (91.67%)	46 (76.67%)	0.024
	Others	5 (8.33%)	14 (23.33%)	
3rd month	Grade 0	60	51 (85%)	0.028
	Others	0	9 (15%)	

In terms of post-operative complications, both the groups have the formation of crust which was more in the SMD group (n=26, 43.3%) while relatively less in the MAT group (n=14, 23.3%) and this difference was statistically significant, (p=0.022).

## Discussion

Inferior turbinate hypertrophy is the most common cause of nasal obstruction.<sup>3</sup> The best optimal treatment of inferior turbinate hypertrophy remains controversial. Surgical treatment of inferior turbinate hypertrophy includes many complications like synechiae formation, crusting, bleeding, and atrophic rhinitis<sup>14</sup> and is advised in patients who don't respond to medical treatment. In the last two decades, many new procedures have been introduced that have reduced these complications. The most thriving treatment of inferior turbinate hypertrophy needs a reduction in the size of turbinate with mucociliary function preservation.<sup>15</sup> These different surgical modalities have variable results. Warwick Brown and Marks have reported in a study of submucosal diathermy of inferior turbinate hypertrophy that results have declined from 82% to 41% in a month follow up.<sup>15</sup> Taneja and Taneja compared monopolar cauterization, bipolar cauterization, and diathermy. All three techniques led to significant improvements in the quality of life but the results were not long-lasting.<sup>16</sup> In the present study two popular techniques, Microdebrider assisted turbinoplasty and submucosal diathermy were compared in the term of relief of nasal obstruction and post-operative complications. Microdebrider assisted turbinoplasty is a relatively new and popular technique for turbinate reduction. It is a mucosal sparing technique with minimal post-operative complications. Lee et al. treated 60 patients with inferior turbinate hypertrophy, 30 of who were treated with radiofrequency coblation, and the remaining 30 with microdebrider. In the two groups, symptom improvement scores and acoustic

rhinometry results were found to be significantly better in the microdebrider group.<sup>17</sup> A study conducted by Kumar. K and Garg S showed a significant decrease in nasal obstruction and sneezing postoperatively by microdebrider assisted turbinoplasty and there was no recurrence of symptoms after 6 months.<sup>18</sup> In Microdebrider assisted turbinoplasty group, 61.6% of patients have relief of nasal obstruction after two weeks follow up and 91.6% relief of nasal obstruction after one month, and 100% relief of nasal obstruction at three months follow up. In the submucosal diathermy group, 23.33% relief of nasal obstruction after two weeks, 76.66% patients have relief of nasal obstruction after one month and 85% patients have relief of nasal obstruction after three months follow up. 9 patients in the SMD group have persistent nasal obstruction after 3 months follow up. Similar to our results, a study by Ragab et al concluded that MAT was superior to SMD as there was complete relief from obstruction was achieved in 40% vs 12% at 1 week (p-value=0.01), 60% vs 42% at 1 month (p-value=0.025) and 68% vs 36% at 2 months (p-value=0.049) in MAT and SMD groups respectively.<sup>19</sup> In addition to this, a study done at the University of Baghdad showed that intergroup comparison showed a significant difference between MAT and SMD in relieving nasal obstruction at the 3rd postoperative month, (p-value=0.021), making MAT a relatively superior technique.<sup>20</sup> However, a study conducted in Egypt concluded that although MAT was superior in terms of relief of obstruction (p-value=<0.001), mucociliary clearance (p-value=<0.01), and post-operative complications (p-value=0.024), it was still inferior in terms of bleeding during the procedure (p-value=0.032).<sup>21</sup>

We recommend that Microdebrider assisted turbinoplasty is a better and superior technique in the treatment of inferior turbinate hypertrophy as compared to submucosal diathermy.

## Conclusion

Microdebrider assisted turbinoplasty is a better technique in the treatment of inferior turbinate hypertrophy when compared to submucosal diathermy. It effectively maintains the mucosal integrity of the nasal mucosa without damaging its surface. So we conclude that Microdebrider assisted turbinoplasty is a superior technique in relieving nasal obstruction, reducing sneezing, and has a minimum side effect.

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