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QUALITY OF LIFE OUTCOMES FOLLOWING SUBMUCOSAL DIATHERMY VERSUS COBLATION TURBINOPLASTY: SNOT-22 GUIDED STUDY

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ABSTRACT **Background:** Inferior turbinate hypertrophy is a common cause of chronic nasal obstruction and adversely affects quality of life. In patients refractory to medical management, surgical reduction of the inferior turbinate is indicated. Submucosal diathermy and coblation turbinoplasty are commonly performed procedures, but comparative quality of life outcomes using the SNOT-22 questionnaire are limited in the Indian population. **Objectives:** To assess quality of life in patients with inferior turbinate hypertrophy and to compare post-operative improvement following submucosal diathermy and coblation turbinoplasty using the SNOT-22 questionnaire. **Methods:** This prospective longitudinal observational study was conducted in the Department of Otorhinolaryngology, Mandya Institute of Medical Sciences, Mandya. Seventy patients with inferior turbinate hypertrophy refractory to medical treatment were included and divided into two groups: submucosal diathermy (n=35) and coblation turbinoplasty (n=35). Quality of life was assessed pre-operatively and post-operatively using the SNOT-22 questionnaire. Statistical analysis was performed using SPSS software, and a p-value <0.05 was considered statistically significant. **Results:** Baseline demographic characteristics and pre-operative total SNOT-22 scores were comparable between the groups. Both surgical techniques showed statistically significant improvement in all symptoms and total SNOT-22 scores post-operatively ($p<0.0001$). The mean total SNOT-22 score reduced from 57.03 ± 7.44 to 30.97 ± 6.11 in the submucosal diathermy group and from 59.17 ± 6.39 to 26.37 ± 6.38 in the coblation group. Post-operative comparison showed a significantly lower total SNOT-22 score in the coblation group ($p=0.003$). **Conclusion:** Both submucosal diathermy and coblation turbinoplasty significantly improve quality of life in patients with inferior turbinate hypertrophy, with coblation showing superior overall SNOT-22 outcomes.

KEYWORDS : Inferior turbinate hypertrophy; Submucosal diathermy; Coblation turbinoplasty; SNOT-22 questionnaire; Quality of life.

INTRODUCTION:

The nasal turbinate is an organ that regulates airflow within the nasal cavity and plays an essential role in respiration as part of the nasal valve. Owing to its large mucosal surface area, it is prone to inflammation and irritation from external antigens [1]. Inferior turbinate hypertrophy (ITH) refers to enlargement of the turbinate involving the mucosa and/or bone and is commonly associated with septal deviation, allergic rhinitis, vasomotor rhinitis, and chronic hypertrophic rhinitis [2]. Patients with ITH often present with chronic nasal obstruction, pain, reduced sense of smell, and sleep disturbances, which adversely affect daily activities, social interactions, and overall quality of life [3].

Initial management of inferior turbinate hypertrophy includes medical therapy with antihistamines, systemic or topical decongestants, and corticosteroids aimed at symptom control [4]. However, in patients who are refractory to medical management, surgical intervention becomes necessary. Surgical treatment involves tissue-volume reduction of the inferior turbinates by targeting both the mucosa and underlying bone. Submucosal fibrosis limits turbinate congestion, while reduction in bony volume increases intranasal space, thereby improving nasal airflow [5].

Submucosal diathermy (SMD) reduces hypertrophied turbinate tissue by delivering thermal energy to the submucosal layer, resulting in tissue contraction and fibrosis, which leads to long-term reduction in turbinate size and improved nasal patency [6,7]. Coblation turbinoplasty uses radiofrequency energy in a saline medium to create a plasma field, minimizing thermal damage to surrounding tissues. This technique reduces turbinate volume by soft tissue vaporization and produces sustained fibrosis, anchoring the mucosa to the periosteum and preventing further hypertrophy [8].

The Sino-Nasal Outcome Test-22 (SNOT-22) is a validated questionnaire used to assess the impact of nasal and sinus disorders on quality of life. It consists of 22 items covering nasal, ear/facial, quality-of-life, and psychological domains, scored on a scale of 0 to 5, with a total score ranging from 0 to 110. Higher scores indicate greater symptom burden and poorer quality of life [9]. Although initially developed for chronic rhinosinusitis, SNOT-22 has been widely applied to evaluate outcomes following septal and turbinate surgeries and in patients with obstructive sleep apnea [10].

The questionnaire has four main categories.

Table 1: Various parameters assessed in SNOT-22 Questionnaire.

CATEGORIES	SYMPTOMS
Nose Related	Need to blow nose, Sneezing, Runny nose, Nasal obstruction, Loss of smell/taste and Post nasal drip.
Ear/facial Related	Ear fullness, Dizziness, Ear pain, Facial pain and pressure
Quality Of Life- Related	Difficulty falling asleep, wake up at night, wake up tired, Fatigue, Reduced productivity and Reduced concentration
Psychologically Related	Frustrated/ Restless, Sad and Embarrassed.

While SNOT-22 has been validated internationally, data assessing its use in evaluating surgical outcomes for inferior turbinate hypertrophy in the Indian population remain limited. This study aims to evaluate and compare the effectiveness of submucosal diathermy and coblation turbinoplasty in improving quality of life using the SNOT-22 questionnaire, thereby providing regionally relevant evidence to guide clinical decision-making and patient care.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective longitudinal observational study conducted in the Department of Otorhinolaryngology, Mandya Institute of Medical Sciences, Mandya, after obtaining approval from the Institutional Ethics Committee. Study period was 6 months (March 2025 to August 2025).

Study Population and Sample Size

The study included patients diagnosed with inferior turbinate hypertrophy who were refractory to medical management and planned for surgical intervention. A total of 70 patients were enrolled and divided into two equal groups of 35 patients each. Group 1 underwent submucosal diathermy, and Group 2 underwent coblation turbinoplasty. The sample size was calculated using the formula $N = Z^2 \times p \times (1-p) / d^2$,

with Z = 1.96, p = 0.84, and d = 10% of p, yielding a sample size of 73, which was rounded to 70.

Inclusion and Exclusion Criteria

Patients aged 18 years and above with inferior turbinate hypertrophy presenting with nasal symptoms and not responding to medical management were included after obtaining written informed consent. Patients below 18 years of age, those with sinonasal polyposis, chronic rhinosinusitis, benign or malignant nasal masses, or diagnosed psychiatric illness were excluded from the study.

Preoperative Evaluation

All patients underwent a detailed clinical evaluation, including history taking and ear, nose, and throat examination. Diagnostic nasal endoscopy was performed, and non-contrast computed tomography of the nose and paranasal sinuses was reviewed to assess the grade of inferior turbinate hypertrophy and to exclude other nasal pathologies. Inferior turbinate hypertrophy was graded based on Naso endoscopic assessment as described by Camacho et al.

Table 2: Clinical grading of inferior turbinate hypertrophy based on Naso endoscopic assessment as described by Camacho et al.

GRADE	TURBINATE/TOTAL AIRWAY SPACE X 100 (%)
Grade 1	0 - 25
Grade 2	26 - 50
Grade 3	51 - 75
Grade 4	76 - 100

Surgical Procedure

The choice of surgical procedure was based on clinical assessment and surgeon discretion. Patients underwent either submucosal diathermy or coblation turbinoplasty under standard operative protocols.

Outcome Assessment

Quality of life was assessed using the Sino-Nasal Outcome Test-22 (SNOT-22) questionnaire. The questionnaire was administered preoperatively and postoperatively at the end of 3 months. The total SNOT-22 score and individual symptom scores were recorded for analysis. Patients were unaware of their preoperative scores during postoperative assessment.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS software version 27.0. Normality of data was assessed using the Kolmogorov–Smirnov test. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, and categorical variables were expressed as frequency and percentage. Comparison of continuous variables between the two groups was performed using the Independent t-test or Mann–Whitney U test based on data distribution. Within-group preoperative and postoperative comparisons were made using the Paired t-test or Wilcoxon signed-rank test. Categorical variables were analyzed using the Chi-square test or Fisher's exact test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

1. Study Population: A total of 70 patients were included in the study and divided equally into two groups:

- **Group 1:** Submucosal Diathermy (n = 35)
- **Group 2:** Coblation Turbinoplasty (n = 35)

2. Baseline Characteristics: The mean age of patients in Group 1 was 33.6 ± 10.73 years, while in Group 2 it was 37.66 ± 13.03 years. There was no statistically significant difference in age between the two groups (p = 0.160). Both groups had identical gender distribution, with 20 males (57.1%) and 15 females (42.9%) in each group (p = 1.0). The distribution of inferior turbinate hypertrophy grades was comparable between the two groups (p = 0.628).

Table 3: Comparison of Baseline Characteristics Between Group 1 and Group 2

Variables	Group 1 (n=35)	Group 2 (n=35)	p-value
Age (years)	33.6 ± 10.73	37.66 ± 13.03	0.160
Sex			
• Male	20 (57.1%)	20 (57.1%)	1.0
• Female	15 (42.9%)	15 (42.9%)	
ITH grade			
• 1	0 (0.0%)	1 (2.9%)	0.628
• 2	8 (22.9%)	6 (17.1%)	
• 3	15 (42.9%)	18 (51.4%)	
• 4	12 (34.2%)	10 (28.6%)	

3. Comparison of SNOT-22 scores Between Groups

3.1 Pre-operative Comparison

Pre-operative SNOT-22 symptom scores were comparable between the two groups for nasal block and sneezing (p > 0.05). Statistically significant differences were observed for reduced productivity (p = 0.007) and feeling frustrated (p = 0.008), with higher scores in Group 1. The mean total pre-operative SNOT-22 score did not differ significantly between the two groups (p = 0.200).

3.2 Post-operative Comparison

Post-operatively, no statistically significant difference was observed between the two groups for nasal block, sneezing, lack of sleep, reduced productivity, and frustration (p > 0.05). A statistically significant difference was noted for ear fullness, with lower scores in the coblation group (p = 0.006).

The mean post-operative total SNOT-22 score was significantly lower in Group 2 (26.37 ± 6.39) compared to Group 1 (30.97 ± 6.11) (p = 0.003).

Table 4 shows the comparison of outcome variables between the two study groups.

Variables	Group 1 (n=35)	Group 2 (n=35)	p-value
NASAL BLOCK			
Pre-op, Mean Rank	4 (4-5), 34.87	4 (4-5), 36.13	0.777
Post-op, Mean Rank	1 (1-2), 31.91	2 (1-2), 39.09	0.118
SNEEZING			
Pre-op, Mean Rank	4 (3-4), 33.27	4 (4-5), 37.73	0.322
Post-op, Mean Rank	1 (1-2), 35.1	2 (1-2), 35.9	0.856
EAR FULLNESS			
Pre-op, Mean Rank	2 (1-3), 39.66	1 (1-2), 31.34	0.078
Post-op, Mean Rank	1 (0-2), 41.76	0 (0-1), 29.24	0.006*
LACK OF SLEEP			
Pre-op, Mean Rank	4 (3-4), 39.1	3 (3-4), 31.9	0.123
Post-op, Mean Rank	2 (1-2), 37.44	1(1-2), 33.56	0.362
REDUCED PRODUCTIVITY			
Pre-op, Mean Rank	4 (3-4), 41.7	3 (2-4), 29.3	0.007*
Post-op, Mean Rank	1 (1-2), 35.0	1 (1-2), 36.0	0.817
FRUSTRATED			
Pre-op, Mean Rank	4 (3-4), 41.67	3 (2-4), 29.33	0.008*
Post-op, Mean Rank	1 (1-2), 35.71	1 (1-2), 35.29	0.922
TOTAL SNOT-22 SCORE			
Pre-op	57.03 ± 7.442	59.17 ± 6.387	0.2
Post-op	30.97 ± 6.109	26.37 ± 6.385	0.003*

4. Within-Group Comparison of Pre-operative and Post-operative Scores

4.1 Group 1: Submucosal Diathermy

In Group 1, a statistically significant reduction was observed in median scores of nasal block, sneezing, ear fullness, lack of sleep, reduced productivity, and frustration following surgery (p < 0.0001). The mean total SNOT-22 score reduced significantly from 57.03 ± 7.44 pre-operatively to 30.97 ± 6.11 post-operatively (p < 0.0001).

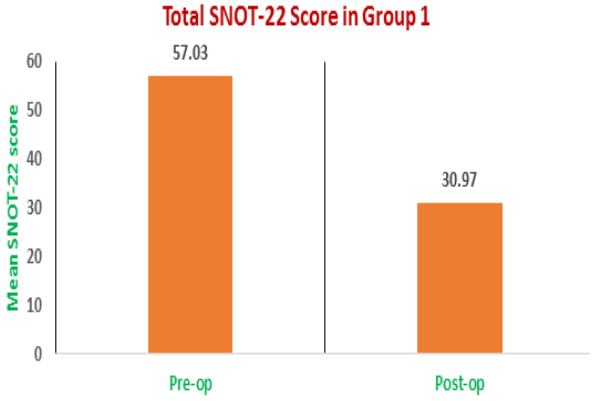

Figure 1: Bar diagram showing comparison of mean pre-operative and post-operative total SNOT-22 scores in Group 1

4.2 Group 2: Coblation Turbinoplasty

In Group 2, all individual symptom scores showed a statistically significant reduction following surgery (p < 0.0001). The mean total SNOT-22 score decreased significantly from 59.17 ± 6.39 pre-operatively to 26.37 ± 6.39 post-operatively (p < 0.0001).

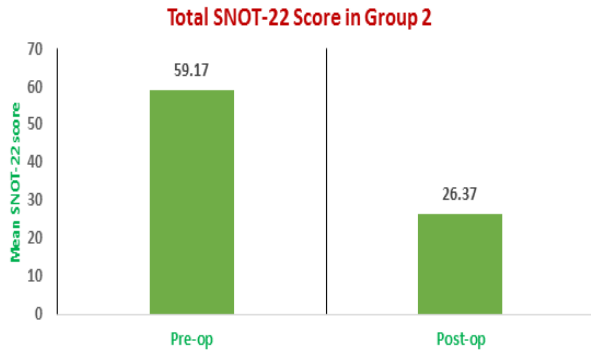

Figure 2: Bar diagram showing comparison of mean pre-operative and post-operative total SNOT-22 scores in Group 2

5. SUMMARY OF RESULTS

Both submucosal diathermy and coblation turbinoplasty resulted in statistically significant improvement in SNOT-22 scores within each group. On between-group comparison, coblation turbinoplasty demonstrated significantly lower post-operative total SNOT-22 scores compared to submucosal diathermy.

DISCUSSION

Inferior turbinate hypertrophy is a common cause of chronic nasal obstruction and has a significant impact on patients' quality of life by affecting sleep, daily activities, and psychological well-being. When medical management fails, surgical reduction of the inferior turbinate becomes necessary. Various surgical techniques have been described, each aiming to reduce turbinate volume while preserving mucosal function [2]. The present study compared submucosal diathermy and coblation turbinoplasty with respect to improvement in quality of life using the SNOT-22 questionnaire.

In the present study, both treatment groups were comparable at baseline with respect to age, sex distribution, and severity of inferior turbinate hypertrophy. This comparability ensured that the observed post-operative outcomes were attributable to the surgical intervention rather than baseline differences. Similar baseline matching has been emphasised in previous comparative studies on turbinate surgery to minimise confounding factors and allow valid outcome comparison [2,11].

Both submucosal diathermy and coblation turbinoplasty resulted in statistically significant improvement in quality of life scores within their respective groups. Significant reduction was observed in all assessed symptom domains and in the total SNOT-22 scores following surgery. These findings are consistent with earlier studies that have demonstrated the effectiveness of turbinate reduction procedures in relieving nasal obstruction and improving patient-reported outcomes [11,12,13]. Taneja et al. and Gomaa et al. reported significant symptomatic improvement following turbinate surgery, supporting the role of surgical intervention in refractory inferior turbinate hyper-trophy [11,12].

Submucosal diathermy has been widely used due to its simplicity, cost-effectiveness, and ease of performance. In the present study, patients undergoing submucosal diathermy showed significant improvement in nasal block, sneezing, sleep-related symptoms, productivity, and psychological symptoms, as reflected by a substantial reduction in total SNOT-22 scores. These findings are in agreement with studies by Shinde et al. and Gomma et al., which demonstrated significant post-operative improvement in nasal symptoms and quality of life following submucosal diathermy [6,12]. The mechanism of action of submucosal diathermy involves controlled thermal injury to the submucosal tissue, leading to fibrosis and reduction in turbinate volume, thereby improving nasal airflow [6,11].

Coblation turbinoplasty also showed statistically significant improvement across all assessed parameters in this study. Patients in the coblation group demonstrated a greater reduction in post-operative total SNOT-22 scores when compared to the submucosal diathermy group. Similar findings have been reported by Lee et al. and Abdullah et al., who observed effective symptom control and favourable post-operative outcomes with coblation-based turbinate reduction [1,8]. Coblation technology utilises radiofrequency energy in a saline medium to create a plasma field, allowing tissue ablation at relatively lower temperatures, thereby minimising collateral thermal damage and preserving mucosal integrity [8].

Although both surgical techniques were effective, coblation turbinoplasty demonstrated superior overall improvement in quality of life scores on between-group comparison. This observation aligns with previous comparative studies that have suggested coblation offers better post-operative outcomes due to reduced tissue trauma and improved mucosal preservation [1,5]. However, it is important to note that the improvement observed with submucosal diathermy was also clinically significant, reaffirming its continued relevance as a treatment option, particularly in settings with limited resources [6,12].

In the present study, six selected SNOT-22 items were emphasized and analysed individually along with the total SNOT-22 score. These items nasal block, sneezing, ear fullness, lack of sleep, reduced productivity, and frustration—were chosen as they were the most commonly reported and clinically relevant symptoms among the study population. This focused approach enabled a clearer assessment of symptoms that directly affected patients' daily functioning and quality of life. Similar selective symptom-based analyses have been adopted in earlier studies evaluating outcomes of turbinate surgeries [11,12,13].

The total SNOT-22 score was used as the primary outcome measure in this study as it provides a comprehensive assessment of physical, functional, and psychological aspects of sinonasal disease. The significant reduction in total SNOT-22 scores observed in both groups supports the validity of the SNOT-22 questionnaire as a reliable tool for evaluating quality of life outcomes following turbinate surgery. This is consistent with findings by Hopkins et al., Abdelazim and Alsobky, and Choi et al., who demonstrated the responsiveness and clinical relevance of the SNOT-22 questionnaire in assessing post-surgical improvement [14,15,16].

The strengths of the present study include its prospective design, use of a validated quality-of-life instrument, and equal sample size in both treatment groups. However, certain limitations should be acknowledged. The follow-up period was limited to three months, and longer follow-up would be useful to assess long-term outcomes. Objective assessments such as acoustic rhinometry or rhino-manometry were not included.

CONCLUSION

Both submucosal diathermy and coblation turbinoplasty are effective surgical options for the management of inferior turbinate hypertrophy refractory to medical treatment. In the present study, both procedures resulted in statistically significant improvement in quality of life as assessed by the SNOT-22 questionnaire. However, coblation turbinoplasty demonstrated superior post-operative quality-of-life outcomes when compared to submucosal diathermy. Despite this difference, submucosal diathermy remains a reliable and effective treatment modality, particularly in resource-limited settings. Further studies with longer follow-up are recommended to assess long-term outcomes.

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Conflict Of Interests: Nil

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