Cohort Study

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A comparison of symptoms and quality of life between medial flap and coblation turbinator of inferior turbinate reduction in endoscopic septoturbinoplasty: an analysis of 108 cases

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Introduction: The combination of septoplasty and turbinoplasty is a common surgical and accepted intervention to correct the nasal obstruction. The coblation submucosal reduction turbinator is a new surgical device, and it started to be used recently. On the other hand, the medial flap inferior turbinoplasty is not a conservative technique, but it provides a reliable and robust reduction.
Objective: This study aims to compare the symptoms as well as health-related quality of life (HQOL) in 55 patients who underwent septoplasty with concomitent medial flap inferior turbinoplasty (group 1), 53 patients who patients underwent septoplasty with concomitent coblation turbinator (group 2).
Patients and methods: The authors performed a prospective, randomized study of 108 patients who consulted the otorhinolaryngology department at the university hospital for surgery of septoturbinoplasty.
Results: Preoperatively, the two patient groups had quite similar symptoms and health-related quality of life, and the anterior width of the inferior turbinate showed significant differences between the contralateral and deviated sides but not the posterior part. The significant difference ($P < 0.05$) was noted for postoperatively improved symptom scores on visual analogue scale (VAS), nasal obstruction septoplasty effectiveness (NOSE) and better HQOL [Sino-Nasal Outcome Test-22 (SNOT-22)] in all patient groups. In addition, the NOSE and SNOT-22 scores in group 2 had significantly greater improvement than group 1 ($P < 0.05$).
Conclusions: Septoturbinoplasty treatment of septum deviation and inferior turbinate hypertrophy led to less symptoms as well as better HQOL for all two patient groups. Therefore, these techniques were an effective intervention for turbinate reduction, and they are equally efficient in the long term.

Keywords: cobation turbinator, health-related quality of life, inferior turbinate hypertrophy, medial flap inferior turbinoplasty, septum deviation

Introduction

The nasal septum deviation and the inferior turbinate hypertrophy were frequently observed in patients with nasal obstruction. Septal deviation (SD) was recorded in all races and in all ages with varying degrees of prevalence[1]. Up to 75% of the general population was estimated to exhibit some degree of nasal deformity, most commonly a SD[2]. However, each individual may experience clinical symptoms of this anatomical abnormality differently, from no symptoms to severe symptoms[1]. The best approach to SD is still controversial, and the guidelines of surgical indication and the kind of operation were not mentioned in the literature. Many studies have shown several surgical techniques,

HIGHLIGHTS

- Coblation submucosal reduction turbinator can be safely used, and it has a positive effect to reduce nasal obstruction.
- The medial flap inferior turbinoplasty provides a reliable and robust approach to volume reduction of inferior turbinate.
- The inferior turbinoplasty should be considered more for the anterior part than the posterior part.
- The symptoms in visual analogue scale (VAS), nasal obstruction septoplasty effectiveness (NOSE) and Sino-Nasal Outcome Test-22 (SNOT-22) score significantly improved in two groups undergoing septoturbinoplasty surgery.

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such as conventional septoplasty, endoscopic septoplasty, and submucosal resection. However, many complications of these procedures have been described as well, such as septal haematoma, septal perforation, and bleeding…[3,4]. The crushed septal cartilage graft proved to have many advantages, and it was applied in our study. This SD was often associated with hypertrophy of the inferior turbinate (IT), which occupied much of the opposite side of the SD[5]. Physiologically, this is explained by the SD increasing the space of the nasal cavity on the contralateral side. Accordingly, the excess airflow was through this area, and then, the IT will increase its size. The hypertrophy of the IT maintains the ratio of airflow that comes into contact with the mucosal surface to effectively humidify the additional quantities of air[6]. However, this hypertrophy will lead to significant mechanical obstruction because the IT itself plays a crucial role in the internal nasal valve. This structure is typically the narrowest point of the nasal cavity[7].

There has been much debate concerning what parts of the IT hypertrophy are erectile mucosa or conchal bone. Previous studies have shown that increased volume is associated with the enlargement of conchal bone. The authors also deduced that mucosal hypertrophy has only played a minor role[5,8]. On the contrary, the volume of erectile mucosa accounted for the enlargement of the IT in cases of rhinitis[9]. A third accepted theory claims that the enlargement involves the erectile mucosa as well as the bone[2,6]. The underlying cause possibly results in the composition of the hypertrophied IT. For example, if an inflammatory reaction such as rhinitis is responsible, mucosal hypertrophy will be more likely. On the other hand, bony hypertrophy is more significant due to the compensatory response to septal deviation.

Medical treatment was the first-line management for this condition, and surgery was reserved for the refractory case. Various surgical methods are developed for the IT hypertrophy. The ideal IT reduction procedure eradicates its obstructive nonfunctional portions while still preserving the physiologic mucosa to maintain the humidification and warming of inspired air. Medial flap inferior turbinoplasty is not only conservative but also provides a reliable and robust reduction, and this technique recontours of the IT. On the other hand, the high-frequency current of the radiofrequency IT reduction creates friction between IT ions that will lead to submucosal damage. Several devices were designed for radiofrequency, and as the technology progressed, the new devices were used for IT reduction. In our daily practice, we used IT submucosal coblation turbinator (SCT) as a new method. The SCT is the first wand designed specifically for IT surgery, and its active electrode produces the plasma field. The SCT includes integrated irrigation, bipolar and suction.

Even if objective measures are regularly used to assess nasal patency, quality of life (QOL) measures play an important role in assessing the efficacy of surgical interventions. Thus, they have been used in several sino-nasal disorders with enhancing frequency in recent years[10,11]. There are many definitions of QOL. Health-related quality of life (HQOL) was most frequently applied in epidemiological and clinical research. HQOL is subjective assessment and it also emphasizes the psychological and social consequences of diseases as well as how much improvement after the health-care interventions. A few studies have used Sino-Nasal Outcome Test-22 (SNOT-22) to explore whether sino-nasal symptoms and more general symptoms of HQOL have improved in cases undergoing septoturbinoplasty[12]. The primary aim of this study was to compare HQOL and symptoms before and after surgical intervention in two patient groups; those who underwent medial flap IT combined with septoplasty, and new wand cobation turbinator of the IT combined with septoplasty.

Material and methods

All of the patients underwent a combination of septoplasty and inferior turbinate reduction at the medical institution between September 2022 and October 2023. The diagnosis was based on the patients' symptoms combined with history, anterior rhinoscopy, nasal endoscopy and computed tomography (CT) scan. Inclusion criteria were a SD in combination with IT hypertrophy with the presenting of chronic nasal obstruction. The symptoms lasted at least3 months and were persistent after medical management. Exclusion criteria were pregnancy, cognitive problems, ongoing cancer treatment, severe cardiovascular and respiratory diseases; patients who performed other nasal surgeries such as endoscopic sinus surgery and rhinoplasty, and age younger than 18 years. The study was performed in accordance with the principles of the 1964 Helsinki Declaration. The study protocol was reviewed and approved by our equivalent Institutional Review Board (IRB) before the initiation of this study. Informed consent was obtained from all subjects included in the study. The work has been described in line with the STROCSS[13]. The patient's symptoms were shown on 100 mm visual analogue scales (VAS). 0 mm represented no symptoms, while 100 mm symbolized symptoms "as troublesome as possible". Those symptoms were nasal obstruction, nasal discharge, sneezing, facial pain, and a change in sense of smell. The symptom severity was considered mild (0–30 mm), moderate (30–70 mm) and severe (70–100 mm). The effectiveness of nasal obstruction septoplasty (NOSE) was used to assess subjective nasal symptoms. The patients were asked to complete the NOSE scale. The sum of these answers were multiplied by 5 to create the new scale for analysis (out of a 100). This scale was applied to all the patients in the preoperative evaluation and in the second month of postoperative assessment. The SNOT-22 questionnaire, which was validated in Vietnam, was used to assess HQOL. The patients graded 22 items on a scale from 0 to 5 (from no problem to problem as severe can be, respectively). The questionnaire of the SNOT-22 was divided into five subsets. The first subset was related to the rhinologic symptom. The second subset was extranasal rhinologic symptoms. The third and the fourth subsets were ear/facial symptoms and psychological dysfunction, respectively. The last one was sleep dysfunction. The mean score was computed for each of the subsets. All patients were evaluated by using a 16-slice computerized tomography scanner (Siemens SOMATOM Sensation 16, Germany). The total width of the IT of the posterior and anterior sides was assessed on the deviated and contralateral sides. Measurement of the septal deviation angle (SDA) was achieved by calculating the angle between two lines. The first line was from the maxillary crest to the junction point of the cribriform plate and the perpendicular of ethmoid bone (point A), while the second line was from point A to the most prominent point of the septum deviation. The angle was calculated using radiant software. According to the angle of the septum deviation, its severity was classified into 4 categories[14].

Type I (normal): the angle less than 5°

Type II (mild): the angle from 5° to 10°

Type III (moderate): the angle from 10° to 15°
Type IV (severe): the angle more than 15°.s

We included 108 patients in this interventional study, where 55 patients in group 1 underwent medial flap inferior turbinoplasty with nasal packing (merocel) while 53 patients in group 2 received treatment by coblation and no packing. The study is blinding in the recruitment process for the patients. The only surgeon was involved, and he was responsible for collecting the data.

Surgical procedure

Septoplasty

Under general anaesthesia, endoscopic septoplasty was performed with the intranasal hemitransfixion incision. The muco-perichondrio-periostal was elevated, and the deviated bony septum was eliminated. Any visible deviated cartilage fragments were weakened by multiple incisions. If the cartilage had severe deviation, it would have been excised on condition that the L-strut (5 mm at the top and 10 mm at the front) of the nasal septum was preserved to avoid external nose deformation after surgery. Then, these removed cartilage fragments were crushed by the crusher machine (Karl Storz Germany). The crushed cartilages were laid between the two layers of the perichondrium which was created after the septal excision. Following septoplasty, all patients underwent the quilting suture technique.

Medial flap inferior turbinoplasty (group 1)

First of all, endoscopically, the mucosa was injected with 1% lidocaine and 1:100 000 adrenaline into the anterior head of the inferior turbinate (IT) and along the IT. An incision at the head of the inferior turbinate (IT) was made by using a number 15 blade. The bone of the IT was dissected off the medial mucosa by using a freer dissector. Then, using the heymann nasal turbinectomy scissors, the incision was extended downwards as well as along the inferior border of the IT to its posterior end. This step allowed the creation of a medial flap. Resection included the anterior 2/3rd of the IT mucosa and bone (Fig. 1). The resected posterior end of IT was precisely cauterized to prevent postoperative bleeding by using bipolar forceps.

New wand cobation turbinator of the IT (group 2)

Initially, the anterior portion of the IT was incised vertically by using a scalpel. The freer elevator was used to make a mucosal pocket. The wand of the turbinator was inserted transnasally until its tip was inside the initial incision. The surgeon continued to advance the wand along the length of the IT submucosally. Once the wand was positioned at the desired depth, the active electrode was oriented toward the targeted tissue for resection (Fig. 2). The wand was activated by depressing the foot pedal, and then it was retracted through the tissue (up to 5 s).

Statistical analysis

The collected data were analyzed by using the Statistical Packages for Social Sciences (SPSS) version 22 (IBM Corp). The symptoms and the HQOL was described by the mean value ±SD. The Shapiro–Wilk test was used to identify and analyze normality. The categorical and ordinal variables were investigated using the Fisher exact or Pearson χ^2 test, which depended on the sample size. The regression analysis was applied to verify the regression

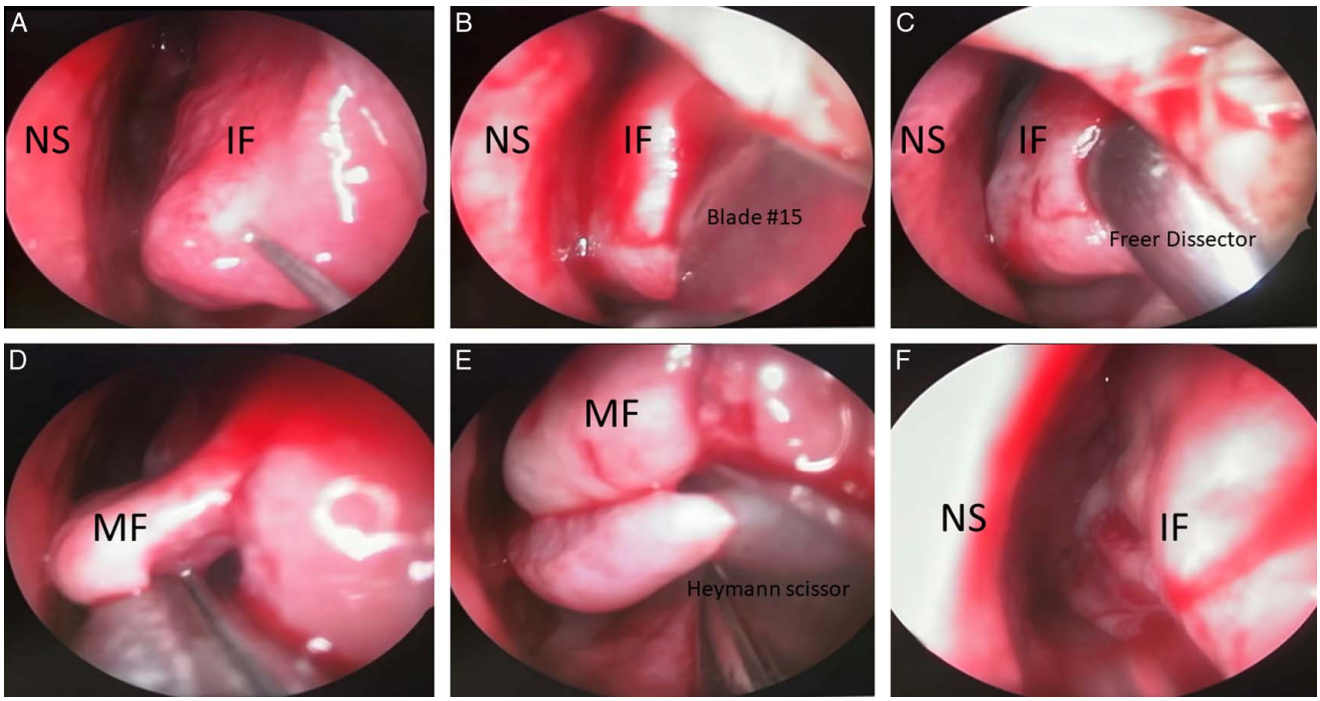

Figure 1. Left nasal cavity: (A) the solution of lidocaine and adrenaline was injected in the submucosal of the inferior turbinate (IF), (B) using blade #15 to create the window at anterior head of the IF, (C) by using the freer dissector, the IF bone was dissected off the medial mucosa of the IF, (D) the Heymann scissor was used to separate the IF bone from the mucosa, (E) and this scissor was continuously applied to remove the lateral mucosa and a part of the IF bone, (F) following the removal lateral mucosa and bone, the medial mucosa was laterally rotated to cover the residual exposed area of the IF.

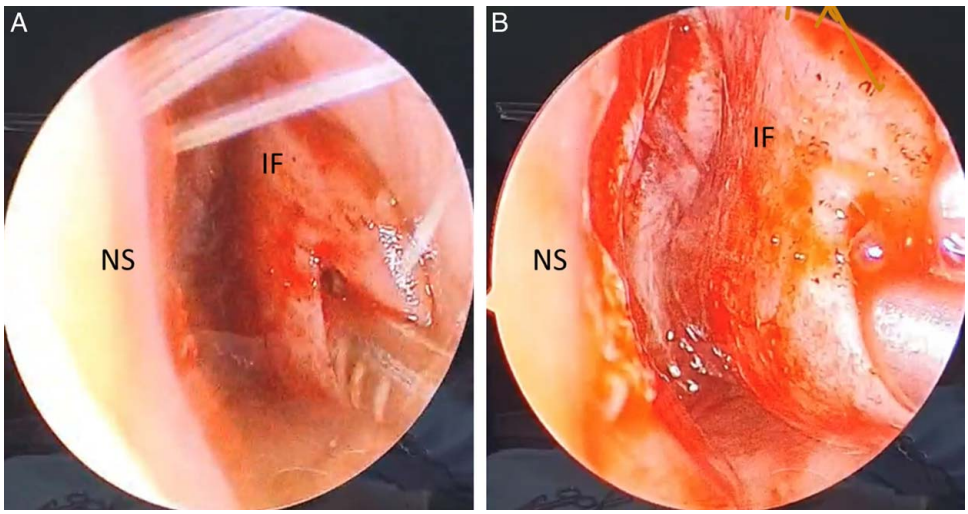

Figure 2. Left nasal cavity: (A) the tip of the turbinator wand was introduced inside the initial incision to create a horizontal channel of the inferior turbinate (IF) from anterior to posterior, (B) The activated wand was slowly retracted along the length of the IF from posterior to anterior submucosally.

relationship between the independent and the dependent variables. We used the Wilcoxon signed rank and the Mann–Whitney test to analyze the continuous variables comparatively. Linear regression analysis was used to correlate the septum deviation angle to the anterior and posterior toatal width of the IT. All study protocols were approved by our research ethics committee (decision number H2022/265) on 08 June 2022.

Results

One hundred eight patients with nasal symptoms in whom septal deviation and uni/bilateral inferior turbinate hypertrophy were enroled in this study. Among the 108 patients enroled, 70 were men and 38 women (age range, 17–70 years, 34.7 ± 12.4 years). The baseline characteristics of the group 1 (septoplasty with concomitant medial flap inferior turbinoplasty) and the group 2 (septoplasty with concomitant cobation turbinator of inferior turbinoplasty) showed no statistically significant differences. The classification of the SDA included type I (0.9%), type II (53.7%), type III (32.4%), and 14% for type IV. In addition, there was a statistically significant difference between the frequency of this classification in patients of group 1 and group 2 ($P < 0.05$) (Table 1). We analyzed the mean ± SD intergroup difference in the posterior and anterior total width of the IT. In group 1, the average anterior and posterior total width of the IT were 8.1 ± 2.2 and 10.1 ± 2 mm, on the deviated side, respectively, and 9.2 ± 2.3 and 10.2 ± 2.2 on the contralateral side, respectively. In group 2, the average anterior and posterior total width of the IT were 7.3 ± 2.5 and 8.5 ± 2.4 mm, on the deviated side, respectively, and 9.4 ± 2.4 and 10 ± 2.2 on the contralateral side, respectively. Consequently, the mean widths of the IT did not show significant intergroup differences except for the posterior width on the deviated side in group 1 than in group 2 ($P < 0.05$) (Table 1). Using linear regression, analysis showed that no correlation was identified between the SDA and the anterior and posterior width on the deviated side as well as the posterior width on the contralateral side. On the other hand, there was a positive correlation between the SDA and the anterior width on the contralateral side ($P < 0.05$) (Fig. 3).

Before surgery, the intergroup symptom scores on VAS were quite similar. Group 2 reported fewer symptoms of nasal discharge than patients in group 1 ($P < 0.05$), while the symptoms of facial pain in group 2 were more than patients in group 1 ($P < 0.05$). Nasal obstruction was the most worrisome symptom in all two groups. Six months after surgery, all patients in two groups had statistically significant improvement of all symptoms (Table 2). There was no statistical difference between two groups in the improvement in nasal obstruction, sneezing and smell (Table 3). On the other hand, the improvement in nasal discharge of group 1 was more than the patients in group 2 ($P < 0.05$), while the patients in group 1 had significantly less improvement for the symptom of facial pain than the patients in group 2 ($P < 0.05$).

Table 1

Comparison of the clinical and surgical characteristics between the group 1 and the group 2.

	Total $N = 108$	Group 1 $N = 55$	Group 1 $N = 53$
Mean age, years	34.7 (12.4)	34.7 (13.7)	34.7 (11)
Mean BMI, kg/m^2	22.1 (3.3)	21.6 (3.3)	22.6 (3.2)
Sex (M/F)	70/38	34/21	36/17
Smoke daily	15	7	8
Allergy	46	26	20
Asthma	2	1	1
Previous IT surgery	2	0	2
The classification of the SD angle			
Type I,%	0.9	0	1.9
Type II,%	53.7	63.6	43.4
Type III,%	32.4	29.1	35.8
Type IV,%	13	7.3	18.9
The anterior width of the IT			
Deviated side, mean ± SD	7.7 ± 2.4	8.1 ± 2.2	7.3 ± 2.5
Contralateral side, mean ± SD	9.3 ± 2.4	9.2 ± 2.3	9.4 ± 2.4
The posterior width of the IT			
Deviated side, mean ± SD	9.3 ± 2.3	10.1 ± 2	8.5 ± 2.4
Contralateral side, mean ± SD	10.1 ± 2.2	10.2 ± 2.2	10 ± 2.2

F, female; Group 1, septoplasty combined with medial flap inferior turbinoplasty; Group 2, septoplasty combined with new wand coblation turbinator; IT, inferior turbinate; M, male; SD, septum deviation.

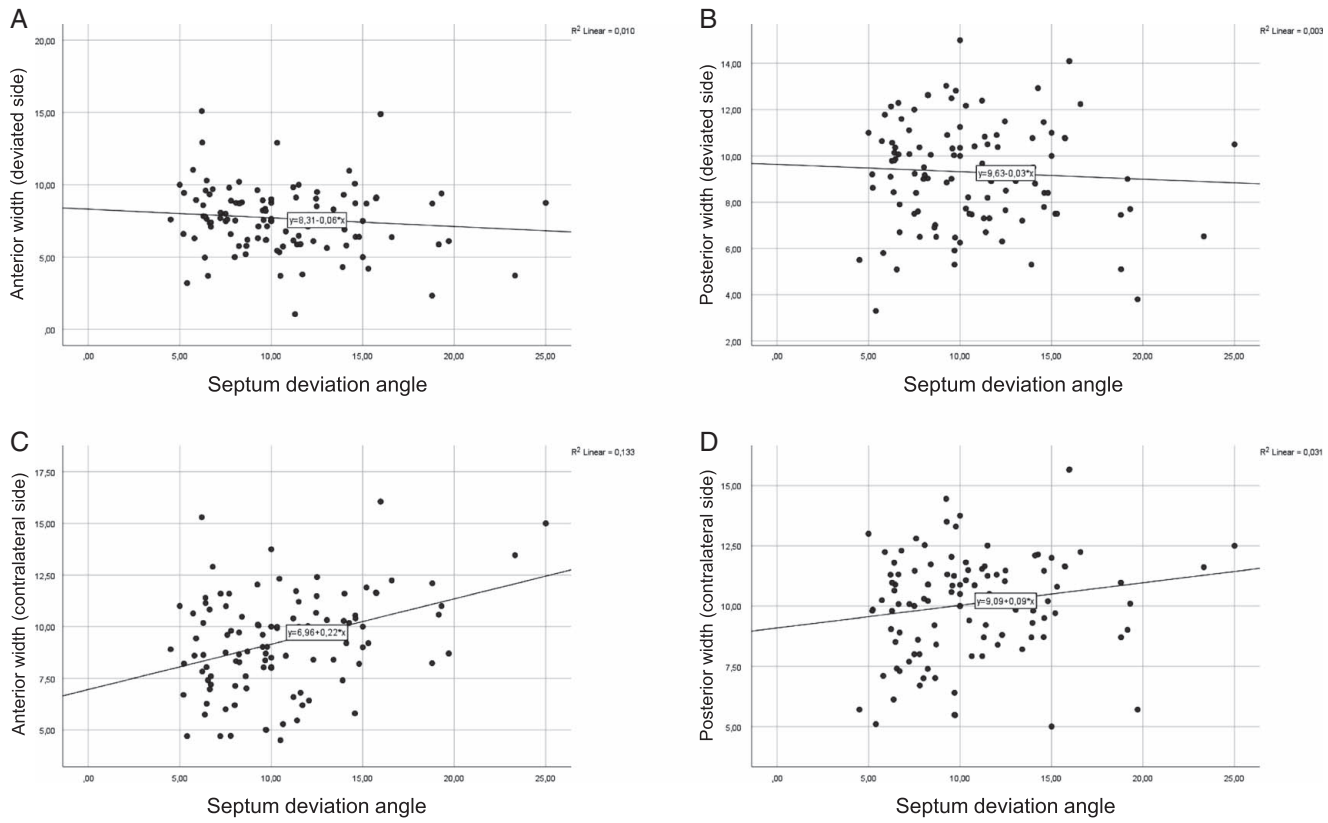

Figure 3. The linear regression analysis for the septum deviation angle and anterior width of the inferior turbinate (IF) on the deviated side (A), posterior width of the IF on the deviated side (B), anterior width of the IF on the contralateral side (C), posterior width of the IF on the contralateral side (D).

There were statistically significant differences between the preoperative NOSE questionnaire score and six months after surgery in all two groups ($P < 0.05$) (Table 2). The patients in group 2 had significantly greater improvement in NOSE score than the patients in group 1 ($P < 0.05$) (Table 3).

Preoperately, the total SNOT-22 score showed significant differences between the two groups. Nevertheless, when we analyzed the subsets of SNOT-22, the subsets of group 1 and group 2 did not differ in rhinologic symptoms, extranasal rhinologic symptoms, psychological dysfunction, and sleep dysfunction except for worse problems in the ear/facial symptoms in group 2 than group 1 ($P < 0.05$) (Table 2). Six months postoperatively, the total SNOT-22 and all subsets scores improved for all two groups (Table 2). Comparing the postoperative

Table 2

Symptoms, NOSE, HQOL-SNOT-22 preoperately and 6 months postoperatively.

	Group 1 pre $N=55$	Group 1 post $N=55$	P	Group 2 pre $N=53$	Group 2 post $N=53$	P
Symptoms—VAS (mean ± SD)						
Nasal obstruction	66.6 ± 14.6	29 ± 11.6	< 0.05	56.9 ± 30.1	15.7 ± 11	< 0.05
Nasal discharge	57.7 ± 17.9	22.5 ± 12.2	< 0.05	35 ± 13.1	11 ± 9.7	< 0.05
Sneezing	4.5 ± 2	1.4 ± 1.5	< 0.05	4.2 ± 2	1.1 ± 1	< 0.05
Facial pain	17.1 ± 24	5.8 ± 10	< 0.05	38.6 ± 14	10.7 ± 10	< 0.05
Smell	8.5 ± 15.2	1.6 ± 4.9	< 0.05	9.3 ± 15.5	5.7 ± 11.9	< 0.05
NOSE	64.4 ± 17.9	14 ± 7.6	< 0.05	71 ± 22.1	10.4 ± 8.5	< 0.05
HQOL-SNOT-22						
Total SNOT-22	45.4 ± 11.1	22.2 ± 8	< 0.05	50.2 ± 17.6	18.7 ± 10.9	< 0.05
Subset:						
Rhinologic symptoms	13.2 ± 3.9	5.1 ± 2.5	< 0.05	13.8 ± 5.4	4.9 ± 2.8	< 0.05
Extranasal rhinologic symptoms	6.7 ± 2.2	3.7 ± 2.4	< 0.05	7.1 ± 3.1	2.5 ± 1.9	< 0.05
Ear/facial symptoms	8.8 ± 3.5	3.8 ± 2.3	< 0.05	11.1 ± 4.2	3.8 ± 2.7	< 0.05
Psychological dysfunction	14.2 ± 5.6	7.5 ± 3.8	< 0.05	15.6 ± 5.4	6.2 ± 4.3	< 0.05
Sleep dysfunction	11.9 ± 4.6	5.5 ± 3.6	< 0.05	11.3 ± 3.7	4.9 ± 2.2	< 0.05

Data are shown in mean with standard deviation (SD); P values ≤ 0.05 are considered significant.

Group 1, septoplasty combined with medial flap inferior turbinoplasty; Group 2, septoplasty combined with new wand coblation turbinator; HQOL, health-related quality of life; NOSE, nasal obstruction septoplasty effectiveness; post, postoperatively; pre, preoperately; SNOT-22, Sino-Nasal-Outcome-Test-22; VAS, visual analogue scale.

Table 3

Improvement in symptoms, NOSE and HQOL-SNOT-22 6 months postoperatively.

	Improvement group 1	Improvement group 2	Comparing 1 vs. 2 *P*
Symptoms—VAS (mean ± SD)			
Nasal obstruction	37.6 ± 16.4	41.2 ± 26.3	0.3
Nasal discharge	35.3 ± 18.2	24.1 ± 15.2	0.001
Sneezing	3.1 ± 1.8	3.1 ± 1.5	0.6
Facial pain	11.3 ± 16.7	27.9 ± 14.1	0.000
Smell	6.9 ± 13	3.7 ± 8.6	0.4
NOSE	50.4 ± 17.4	60.7 ± 18.1	0.003
HQOL-SNOT-22			
Total SNOT-22	24.1 ± 7.5	31.5 ± 14.7	0.000
Subset:			
Rhinologic symptoms	8.1 ± 3.3	8.8 ± 4.8	0.223
Extranasal rhinologic symptoms	3 ± 2	4.6 ± 2.9	0.001
Ear/facial symptoms	5 ± 2.1	7.3 ± 3.8	0.001
Psychological dysfunction	6.7 ± 3.5	9.5 ± 4.5	0.000
Sleep dysfunction	6.4 ± 3.5	6.4 ± 3.6	0.8

Data are shown in mean with standard deviation (SD); *P* values ≤ 0.05 are considered significant. Group 1, septoplasty combined with medial flap inferior turbinoplasty; Group 2, septoplasty combined with new wand coblation turbinator; HQOL, health-related quality of life; NOSE, nasal obstruction septoplasty effectiveness; post, postoperatively; pre, preoperatively; SNOT-22, Sino-Nasal-Outcome-Test-22; VAS, visual analogue scale.

improvement of the symptoms between the two groups, we found that the patients in group 2 reported greater improvement in the total SNOT-22 score, extranasal rhinologic symptoms, ear/facial symptoms, and psychological dysfunction subset than the patients in group 1 ($P < 0.05$) (Table 3).

Of the patients, 15 had smoked cigarettes, 46 had allergies, 2 had asthma, 2 had previous IT surgery. The distribution of the comorbidity as well as previous IT surgery and smoking between the two groups showed no significant differences (Table 1). Subanalysis indicated no difference in VAS of symptoms, NOSE, the total SNOT-22, its subsets, and the improvement of the symptoms when we compared the preoperative and postoperative symptoms between the patients with smoking as well as allergies and the patients without these conditions.

Discussion

Coblation turbinator wand was a new technique in IT surgery using the plasma field unique to cause fibrosis and necrosis with contracture of tissue of IT without actual removal. On the other hand, medial flap inferior turbinoplasty was designed to remove the obstructive nonfunctional part of the IT while preserving its functional medial mucosa, which played an important role in the humidification and warming of inspired air. In the present study, the patients in group 1 were treated with septoplasty and medial flap inferior turbinoplasty, while the patients in group 2 were performed with septoplasty and coblation submucosal reduction turbinator. We analyzed the relationship between the SDA and unexpected IT hypertrophy in all two groups and found a positive correlation in anterior IT volume on the contralateral side but not in posterior IT volume. According to the literature, compensatory IT hypertrophy was often realized in the contralateral side to the SD in patients with SD[5,8,15]. Berger *et al.*[8] found that the IT hypertrophy involved the conchal bone rather than lateral and medial mucosal hypertrophy. On the other hand, some studies indicated that most IT enlargement was due to mucosal hypertrophy[16,17]. Our results only showed a significant correlation between the SDA and the anterior width on the contralateral side of all two groups. However, this correlation was not observed in the posterior width of IT. This significant correlation in the anterior width of the IT was able to occur because this compensatory hypertrophy of the anterior IT acted as a barrier that mainly faced the excess airflow[8]. Accordingly, we emphasize that successful surgery for nasal obstruction depends on the selected treatment of the anterior IT.

All patients in the two groups had significant improvement in the symptoms and the HQOL after surgery (Table 2). Regarding symptoms six months postoperatively, the patients in group 2 reported significantly more trouble with nasal discharge than group 1, while the improvement in facial pain was statistically significantly better for the patients in group 2 than group 1 (Table 3). We realized that the patients in group 1 and 2 had an improvement in nasal obstruction of 37.6 ± 16.4 and 41.2 ± 26.3 mm on VAS, respectively. The patient's perception of nasal obstruction was complex, and it may be affected by multiple psychological and physiologic factors such as operative technique, condition of nerve and vascular supplies, the expectations of patients from surgery, the co-existence of sino-nasal and allergy disease with septal deviation and inappropriate indication for septal surgery[18]. The last one was a critical comment on the success of septoturbinoplasty from a scientific and legal point of view. Because no objective evaluation of nasal obstruction has been validated yet, NOSE scale was a reliable and promising method to evaluate septal surgery. The previous study considered the change of VAS greater than or equal to 30 mm and NOSE greater than or equal to 30 clinically meaningful[19]. Thus, based on that criterion, the patients in all groups had nasal obstruction improvement that could be considered surgical success.

The SNOT-22 was initially used to evaluate HQOL specifically related to chronic sinusitis. Recently, it has also been used in septoturbinoplasty[20]. Preoperatively, we found statistically significant differences in the total SNOT-22 score between the two groups (Table 2). When we evaluated the subsets in SNOT-22, we recognized that the patients in group 2 indicated more problems with the ear/facial symptoms of SNOT-22 than the patients in group 1. An explanation for this difference may be the hypertrophic posterior part of the IT and more oedema of the nasal mucosa in the group 2, and these issues influenced on the middle ear ventilation. Thus, it led to ear pain or ear fullness. The preoperative SNOT-22 score showed that our patients had reduced quality of life, which was related to both general health domains and disease-specific conditions. Septoturbinoplasty led to the improvement in the overall SNOT-22, including all the subsets for the two groups. The improvement in the overall SNOT-22 score was significantly better for the patients in group 2 than the patients in group 1. The mean improvements of the total SNOT-22 score in groups 1 and 2 were 24.1, 31.5, respectively. According to the previous study, the mean change of 23.3 in overall SNOT-22 was much better in transition rating for the patients with chronic rhinosinusitis after surgery[21]. This

indicated that a septoturbinoplasty with coblation turbinator or medial flap was clinically meaningful because it improved the sino-nasal aspects of HQOL.

Strengths and limitations

The strength of the recent study was that all patient groups were operated by an experienced surgeon. In addition, the SNOT-22 was a valid and easy tool for measuring the outcome of septoturbinoplasty. The major limitations we noticed during our study are the following: higher cost of instruments (New wand cobation turbinator, endoscope, camera etc.), adequate additional training.

Conclusion

To sum up, we have found that the symptoms in VAS, NOSE and SNOT-22 scores were used to facilitate clinical practice, and they highlighted the impact of combination of septum deviation and inferior turbinate hypertrophy on the patient's quality of life. Also, we have shown that septoplasty with concomitant turbinoplasty of nasal obstruction led to improvement of symptoms and HQOL for all two patient groups.

Ethical approval

All study protocols were approved by our research ethics committee (decision number H2022/265) on June 08, 2022.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-chief of this journal on request.

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Author contribution

N.N., N.Q.N., L.N.P.T., T.M.D., N.T.N.Q.T., T.D.: data collection, manuscript writing, results discussion. N.N., N.Q.N., T. D.: manuscript writing and revision. N.N.: paper revision.

Conflicts of interest disclosure

We have no known conflict of interest to disclose.

Research registration unique identifying number (UIN)

1. Name of the registry: Health Research Ethics Committee in Hue University of Medicine and Pharmacy, Hue University, Vietnam.
2. Unique Identifying number or registration ID: H2022/265.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): N/A.

Guarantor

Nguyen Nguyen is the guarantor of the study and accept full responsibility for the work and/or the conduct of the study, had access to the data and controlled the decision to publish.

Data availability statement

The datasets generated during and/or analyzed during the current study are publicly available, available upon reasonable request.

Provenance and peer review

Not commissioned, externally peer-reviewed.

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