

Role of surgical septal correction in subjective improvement of chronic rhinosinusitis

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Aim

The purpose of this study was to reveal the role of septoplasty in improving the subjective outcome of chronic rhinosinusitis (CRS) in patients with significant septal deviation.

Methods

This prospective study involved 24 patients with CRS and septal deviation. The patients were randomly divided into two groups according to the applied surgical procedures. In the first and second groups, septoplasty and septoplasty plus endoscopic sinus surgery were applied, respectively. Subjective questionnaire of success rates were used to analyze the results.

Results

At 6 months follow-up period, the subjective score in group 1 dropped significantly from 57.6 to 23.1 ($P < 0.05$). In group 2 the score also dropped significantly from 64.1 to 28.4 ($P < 0.05$), with no significant difference between the 2 groups regarding the improvement of their scores.

Conclusion

We suggest that septoplasty alone can be adequate for the treatment of CRS with septal deviation.

Keywords:

septal deviation, septoplasty, SNOT-20

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Introduction

Chronic rhinosinusitis (CRS) represents an important healthcare problem in the world. CRS is defined as inflammation of the nose and paranasal sinuses characterized by two or more symptoms, one of which should be either nasal blocking, nasal discharge, facial pain, or reduction or loss of smell with endoscopic signs of polyps and/or mucopurulent discharge and the other should be computerized tomography (CT) changes showing mucosal changes within osteomeatal complex (OMC) and/or sinuses for more than 12 months [1,2]. CRS is one of the leading causes of antibiotic prescriptions among ambulatory care patients and is a frequently reported chronic disease. It is estimated that 14% of the population is affected in the USA [3,4].

Anatomic variations can lead to obstruction of OMC, which can be enhanced by inflammation and result in compromised mucociliary clearance; this may result in chronic or recurrent rhinosinusitis. The most frequent OMC anatomic variation is septal deviation, which is one of the causes of the nasal obstruction and also may affect the nasal mucociliary clearance negatively [4]. Septal deviation is usually classified into seven types. Type 1 is characterized by the vertical septal deflection in the valve area. This deformity does not interfere with the normal function of the valve. Type 2 is characterized

by the vertical septal deflection in the valve area. This deformity interferes with the normal valve function. Type 3 is characterized by the vertical septal deflection in the close neighborhood of the head of the middle turbinate. Type 4 is characterized by two vertical septal deflections, one in the valve area on one side and another in the neighborhood of the head of the middle turbinate on the opposite side. Type 5 is characterized by unilateral septal basal crest, and the opposite septal side is almost totally flat. Type 6 is characterized by unilateral, horizontal gutter in the anterior and basal septal parts. Type 7 is very variable and can consist of various combinations and is almost always bizarre [5].

This study was designed to reveal whether only septal correction is adequate to improve the subjective outcome in patients with CRS and septal deviation or other major surgeries in the form of endoscopic sinus surgery (ESS), which include opening of OMC and removal of sinus disease with minimal manipulation of surrounding normal tissues, are mandatory for treatment of CRS.

Patients and methods

This prospective study involved 24 patients with both CRS and significant septum deviation who were

classified into two groups. Group 1 included 12 patients who underwent only septoplasty. Group 2 included 12 patients who underwent septoplasty and ESS. The patients were operated upon between November 2011 and December 2012. Patients were randomly divided into two groups, taking into consideration the homogeneity of sex and age at our tertiary referral institution.

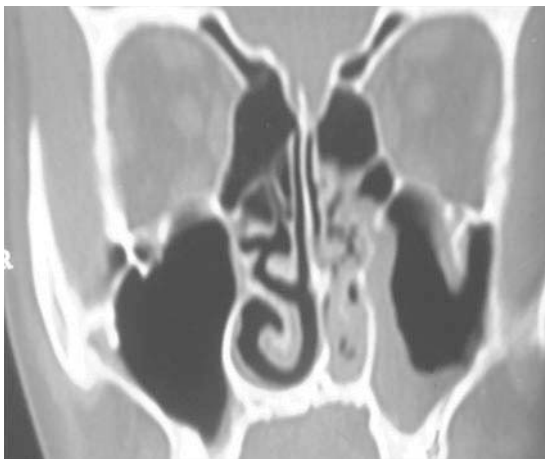
Patients criteria for eligibility

Patients were chosen from a larger sample of patients who were diagnosed to have unilateral CRS based on the criteria of the Academy of Otolaryngology – Head and Neck Surgery Rhinosinusitis Task Force [6], which include imaging modalities for confirming the diagnosis of CRS in the form of CT scan demonstrating isolated or unilateral diffuse mucosal thickening, bone changes, or air-fluid level with ongoing symptoms consistent with CRS (Figs. 1 and 2).

All patients involved in the study had significant septum deviation, defined as deformities involving cartilaginous and/or bony parts at the level of OMC. The deviations were impinged on the OMC and/or lateral nasal wall causing objective obstruction on CT scans and nasal endoscopy [5]. Mild septal deviations such as septal spurs or isolated anterior cartilaginous or posterior bony deviations were ignored.

Patients should have medically resistant CRS at the time of surgery – that is, failed maximal medical therapy for CRS to provide improvement. The maximum medical therapy was in the form of a minimum of 3 months, including 4–6 weeks of antibiotics, topical nasal steroids, and nasal saline washing.

Figure 1



Coronal computed tomography scan of one of our patients: left deviated nasal septum with left maxillary and ethmoidal sinusitis.

Any patients with previous sinonasal surgery, determined allergy and/or asthma, nasal polyps, systemic disease such as tuberculosis, sarcoidosis, or Wegner granulomatosis were excluded from the study.

Endoscopic examinations were performed by 2.7- or 4.0-mm rigid 0° or wide angle 30° endoscopes using topical decongestant (Fig. 3). CT examinations were performed in the same institution without using contrast material.

Septoplasty was performed in all patients using the Cottle technique [7]. This technique respects the dorsum nasi and allows more natural correction by respecting the osteocartilaginous nasal bridge; in addition, the Cottle technique improves the acoustic rhinometry through improving the nasal mucosal congestion and avoidance of surgical reduction of anterior end of inferior turbinate [8]. ESS was performed only in group two under general anesthesia. The extent of the surgery was determined by the extent of disease but always included uncinectomy, anterior ethmoidectomy, middle meatal antrostomy, and exploration of the posterior ethmoids; if the posterior cells were involved, surgery was continued posteriorly with posterior ethmoidectomy and, if necessary, a sphenoidotomy and opening the frontal recess. If there was a markedly pneumatized concha bullosa, the lateral mucosa and bone were usually removed. Surgeries in both groups were performed by two well-trained rhinology surgeons.

Two days of nasal packing was applied in all patients with 2 weeks of postoperative antibiotics as well as topical buffered saline solution.

Figure 2

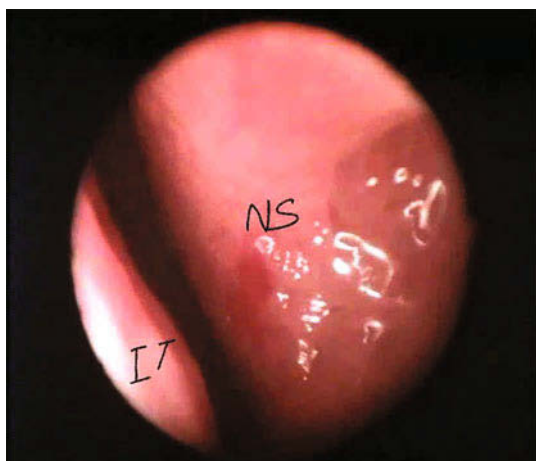


Coronal computed tomography scan of one of our patients: left deviated nasal septum with left maxillary and ethmoidal sinusitis with minimal right maxillary sinusitis.

Sinonasal outcome was assessed using the change in 20-Item Sino-Nasal Outcome Test (SNOT-20), which is a validated, self-administered, quality of life instrument specific for patients with symptoms of rhinosinusitis [9]. This instrument measures physical problems, functional limitations, and emotional consequences of sinusitis by asking participants to score 20 items. We translated the questionnaire into an Arabic one, and the filling of the questionnaires was performed by every patient assisted by the research team. The questionnaire was completed by every patient at the two time points of the study (immediately before the operation and then at 6 months follow-up visits) with the following instructions:

- (1) Patients rate the severity of their condition on each of the 20 items using a 0–5 category rating system:
 - 0 = Not present/no problem.
 - 1 = Very mild problem.
 - 2 = Mild or slight problem.
 - 3 = Moderate problem.
 - 4 = Severe problem.
 - 5 = Problem as 'bad as it can be'.
- (2) The total SNOT-20 score is calculated as the mean item score for all 20 items ranging from 0 to 5, with higher scores representing greater health-related quality of life burden.
- (3) The SNOT-20 change score is the difference between preoperative and postoperative total SNOT-20 score.
- (4) The change in SNOT-20 score from baseline was calculated for each patient to determine how much symptom improvement was achieved after surgical intervention, and the change in the mean SNOT-20 scores was computed for each patient.

Figure 3



Endoscopic picture of one of our patients: right nose. NS, nasal septum; IT, Inferior turbinate. Septal deformity is located much deeper, close to the head of the middle turbinate.

- (5) We compared the subjective improvement for the two groups at 6 months postoperative visits.

The study was approved by the Institutional Review Board at El-Minia University. As the study involved no deviation from existing standard therapy for these patients and no new drugs, individual consent was not required by the board.

Statistical analysis

Statistical analysis was performed with SPSS (SPSS Inc., Chicago, Illinois, USA). *P* values less than 0.05 were accepted as significant. Mean differences between preoperative and postoperative scores for the SNOT-20 scores were evaluated for statistical significance using the Student *t*-test for the total sample and separately for each group.

Results

Twenty-four patients were included in the study. Twelve patients (50%) were in the septoplasty only group (group I) and 12 (50%) were in the septoplasty and ESS group (group II). In the first group, of the 12 patients, 75% (9/12) were men and 25% (3/12) were women, with an average age of 25.33 years (17–38 years). In the second group, of the 12 patients, 66.7% (8/12) were men and 33.3% (4/12) were women, with an average age of 30.08 years (18–50 years). There was no significant difference between both groups with respect to sex and age (Table 1).

Change in patients' symptoms

At the preoperative point of assessment, there was no significant difference ($P > 0.05$) between the two groups with respect to their preoperative scores. During 6 months follow-up period, the SNOT score in group 1 decreased significantly from 57.6 to 23.1 ($P < 0.05$). In group 2, the SNOT score also decreased significantly from 64.1 to 28.4 ($P < 0.05$) (Table 2).

When we compared the two groups postoperatively at 6 months follow-up, there was no significant difference in the improvement of their SNOT scores.

Table 1 Patient characteristics by type of surgery

	Mean \pm SD (range)		<i>t</i>	<i>P</i> value
	Group I	Group II		
Age (years)	25.33 \pm 7.58 (17–38)	30.08 \pm 9.68 (18–50)	1.32	0.2
Male	9 (75)	8 (66.7)	0.2	0.65
Female	3 (25)	4 (33.3)		

Group I ($N = 12$), septoplasty only; Group II ($N = 12$), septoplasty and ESS.

Table 2 Change of patients' SNOT-20 at 6 months following surgery (mean \pm SD)

	Preoperative SNOT-20 scores	Postoperative SNOT-20 scores	P value
Septoplasty only (N = 12)	57.57 \pm 7.73 (42–68)	23.08 \pm 5.45 (13–33)	0.002*
Septoplasty and ESS (N = 12)	64.08 \pm 7.73 (49–73)	28.42 \pm 6.76 (13–41)	0.003*
	P value = 0.051	P value = 0.045	

ESS, endoscopic sinus surgery; SNOT-20, 20-Item Sino-Nasal Outcome Test; *P values represent significant values <0.05.

Discussion

Septal deviation is one of the most common diagnoses in the practice of otolaryngology. Although rhinometric studies can be helpful, there is no objective definition of the severity of septal deviation. The decision of septal correction is still controversial and subjective. The relationship between CRS and anatomic variations also has been a dilemma to endoscopic sinus surgeons.

The status of OME plays a key role in the pathogenesis of CRS; however, the role of septal deviation in this aspect has not been touched adequately in the literature. In our study, the severe septal deviations were included to assess whether only correcting the deviation would also cure CRS through assessing a validated subjective questionnaire. Our results supported this hypothesis and significant subjective improvement scores occurred and were similar whether or not ESS was included in the surgical treatment. Danese *et al.* [10] found that there was an association between CRS and ipsilateral deflections of uncinate process and contralateral septal watch glass-like deviation. Sun *et al.* [11] found that 47% of the patients with septal deviation had ipsilateral or bilateral OMC disease with severity correlated to the angle of deviation.

Elahi *et al.* [12] found that increasing nasal septal deviation was associated with a higher incidence of ipsilateral OMC obstruction. There also was contralateral OMC obstruction related to middle turbinate and lateral nasal wall abnormalities. Gnoy *et al.* [13] studied the role of nasal obstruction in early acute sinusitis using an infectious model in rabbits and reported that nasal obstruction may be a key factor in the cascade of events that predispose to the onset of sinus disease. Jang *et al.* [14] investigated differences in mucociliary clearance, histological characteristics, and surface structure of the bilateral nasal septal mucosa in patients with nasal septal deviation, and they concluded that concave-side septal mucosa had impaired mucociliary transport, presumably because of ciliary loss, increased inflammation, and decreased density of glandular acini. Our results match the results of the study conducted by Unal *et al.* [15] who found that septoplasty alone can be adequate for the treatment of CRS with septal deviation. Although the unilateral sinusitis raises the possibility of sinusitis due to dental origin, Pokorny and Tataryn [16] concluded in their study that the possibility of sinusitis of dental origin

raises when there is radiographic evidence of dental pathology; in addition, maxillary sinusitis with dental origin should be suspected when unilateral maxillary sinus disease is particularly associated with a patent infundibulum. None of our patients had radiographic evidence of dental pathology or patent infundibulum, which supports the possibility that nasal septal deviation is the sole cause of our patients sinusitis.

This new study, to our knowledge, is the first to use a validated subjective score to assess the results of septoplasty and to address that it can be the first choice in surgical treatment of patients with CRS and septal deviation. The aim of this study was to assess the postoperative subjective outcome only. In patients with CRS, the correlation between the symptoms scores and CT scores is significantly positive before and after ESS; hence, these patients can be properly evaluated by either parameter or by a comprehensive assessment [17]. Our study can also open a new era for further objective research and for a longer follow-up periods studies.

Summary and conclusion

OMC dysfunction may be the most important, but not the sole, factor in the pathogenesis of CRS. Septal deviation is known to be the most common reason for OMC dysfunction, nasal obstruction, and nasal mucociliary clearance alteration. Septoplasty only in the treatment of patients with CRS and septal deviation revealed similar results subjectively with septoplasty and ESS. Therefore, we suggest that septoplasty alone can be adequate for treatment of CRS with septal deviation.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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