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# Prevalence and clinical implications of high anterior septal deviation on sinus access: a retrospective cross-sectional study

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## Abstract

**Background** High anterior septal deviation is an underreported anatomical variant that can influence the decision to conduct septoplasty throughout FESS and to facilitate after-surgery care.

**Objective** To assess the prevalence and clinical implications of HASD on sinus access.

**Methods** This retrospective, cross-sectional research was performed on patients with symptoms of DNS and CRS who were prepared for FESS. CT scan PNS coronal sections have been requested with three measurements: distance to the septum (SDD), distance to lateral nasal wall (LNW), and septal deviation angle (SDA).

**Results** One-hundred fifty-seven patients were included; 73 of them received septoplasty. There is significant increase in SDD (mm), LNW (mm), SDD/LNW, and SDA (degree) in septoplasty group with significant AUC that predict the need of septoplasty. Characteristic cutoffs were SDD more than or equal 2.55 mm, SDD/LNW more than or equal 0.239, and SDA more than or equal 8.95°. There is significant decrease in polyps and edema in septoplasty group post-operatively compared to preoperative.

**Conclusion** Septoplasty during FESS allows room for endoscopic instrumentation, provides adequate visualization of the surgical field and throughout postoperative care, and can reduce the possibility of failed FESS.

**Keywords** Septoplasty, CRS, DNS, FESS

## Background

Nasal septal deviation is described as an asymmetry of nasal septum. It can result from traumatic deviation as well as growth-related abnormalities of the septum and causes significant airway obstruction and cosmetic deformities.

Septal deviation has been strongly correlated with sinus illness, particularly osteomeatal complex disease and anterior and posterior ethmoid disease [1, 2].

Air flow restriction causes low oxygen pressure, impairs paranasal sinus, reduces ciliary motion motility, and ultimately encourages bacterial growth [3].

High anterior septal deviation is an anatomical variation that can significantly limit intraoperative sinus access and the simplicity of postoperative debridement due to its severity and specific location opposite middle turbinate axilla [4].

To achieve the greatest surgical outcomes without needing a second operation, a very thorough examination of the septal angulation is essential [5].

Nowadays, CT is a simple tool for diagnosis of diseases of the paranasal sinuses. Therefore, it offers an endoscopic sinus surgeon a precise and trustworthy preoperative roadmap [3, 5].

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## Aim of work

The current research aims to evaluate the prevalence and clinical implications of high anterior septal deviation on sinus access.

## Methods

This is a retrospective, cross-sectional research performed on adult cases with symptoms of DNS and chronic rhinosinusitis, who attended the otorhinolaryngology department of Benha University hospital from November 2022 to November 2023 and who fulfilled the specified inclusion and exclusion criteria.

### Inclusion criteria

Adults of both genders exhibiting symptoms of DNS and chronic rhinosinusitis, such as headache, nasal blockage, nasal discharge, hyposmia, or face discomfort. Individuals who have undergone a thin-sectioned CT sinus image guidance protocol have been enrolled for investigation.

The earliest thin-sectioned CT images of the sinuses have been chosen for patients who had duplicate imaging throughout numerous years.

### Exclusion criteria

1. Cases suffered from acute sinusitis, allergic sinusitis, and asthma.
2. Patients with bulky nasal cavity or large nasal polyps or skull base tumor
3. Patients who have experienced previous trauma that has caused changes to the anatomy of their natural sinuses
4. Individuals with extensive mucosal illness obstructed the tissue planes, hindering the sight of landmarks necessary for assessment.
5. Patients with cystic fibrosis, immune deficiency, metabolic diseases, or malignancy
6. Children below 8 years of age

### Data collection

Following the acquisition of informed consents, patients were presented with signs and symptoms of DNS (deviated nasal septum) and CRS (chronic rhinosinusitis), which were then verified by endoscopic examination. Then, the patients were prepared for functional endoscopic sinus surgery, performed by the same surgeon. The variables recorded encompassed age, gender, ethnicity, reason for surgery, past sinus surgery, and whether the patient received septoplasty to enhance intraoperative sinus access. The indication for septoplasty was established by reviewing the operation record or consulting with the surgeon if the reason was ambiguous.

Measurements were taken of the anterior part of the nasal septum using the horizontal plane right in front of the anterior end of the middle turbinate. Three measures were taken: distance to the septum (SDD), distance to lateral nasal wall (LNW), and septal deviation angle (SDA). SDD was defined as the horizontal distance from the centerline to the lateral edge of the bony septum. LNW quantified the horizontal distance between the midline and the medial bony edge of the lateral nasal cavity. The SDA denotes the angle formed between the midline and the roof of the sinonasal cavity towards the septal bone. The measurements were taken at the vertical level of the inferior orbital rim. The SDD/LNW was computed as a measure of fixed obstruction.

In order to assess the efficacy of combining septoplasty with FESS, the results of FESS were compared between two groups using the Sino-Nasal Outcome Test (SNOT-22) and Lund-Kennedy (LK) endoscopic score before and after the surgery. The patient's symptom history was obtained by the use of the Sino-Nasal Outcome Test (*SNOT-22 questionnaire, a derivative of the SNOT-20 developed by Hopkins* et al. [6]. The symptom severity was assessed using a scale ranging from 0 to 5, and then statistical analysis included an evaluation of the variability. The numerical scores of all questions in the pre- and postoperative forms were gathered for the purpose of comparison, and a percentage change in score was calculated.

Using rigid nasal endoscopy, the sinonasal cavity is examined for the presence of discharge, mucosal edema, and polyps and is staged using the Lund-Kennedy (LK) endoscopic score. In the case of nasal polyps, values of 0 indicated the absence of polyps, 1 mentioned polyps confined to the middle meatus, and 2 discussed polyps that extended into the nasal cavity. A value of 0 was assigned in the absence of edema, 1 denoted mild to moderate edema, and 2 indicated polypoid degeneration. In the context of discharge, values of 0 indicated the absence of discharge, 1 indicated hyaline discharge, and 2 indicated thickened and/or mucopurulent discharge (Fig. 1).

### Statistical methods

The collected data underwent revision, coding, and tabulation and was then inputted into a PC using the Statistical Package for Social Science (*IBM Corp., released in 2017*). The software used is IBM SPSS Statistics for Windows, specifically Version 25.0. It is developed by IBM Corp. and is based in Armonk, NY, USA. The data were displayed and analyzed appropriately based on the specific type of data gathered for each parameter.

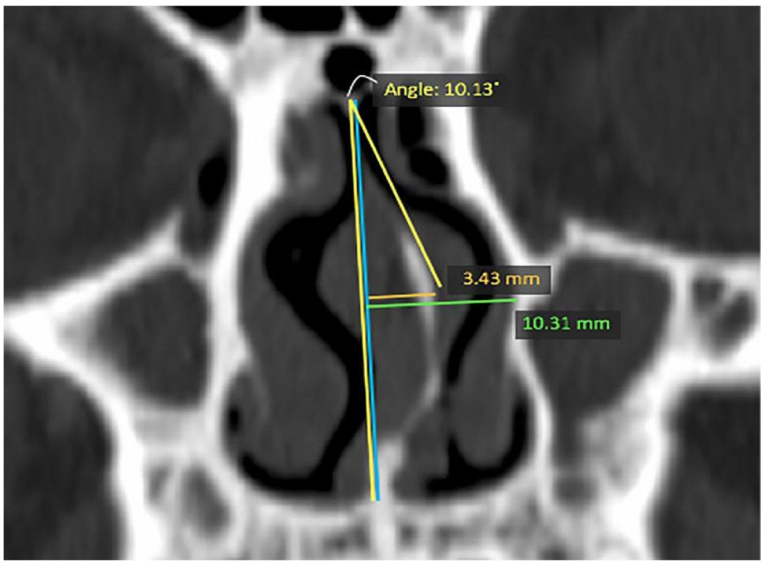


**Fig. 1** Computed tomography of the sinuses depicts a large magnitude of anterior septal deviation. The following measures were taken with regard to the midline (blue): septal deviation distance (SDD; orange), distance to lateral nasal wall (LNW; green), and septal deviation angle (SDA; yellow). This example computed tomography of the sinuses depicts a large magnitude of anterior septal deviation

#### *Normality of data*

The Kolmogorov–Smirnov test was employed to assess normality. If the significance level exceeds 0.05; it is inferred that the data follows a normal distribution.

#### *Descriptive statistics*

Parametric numerical data was represented using the mean ± standard deviation (SD), and nonparametric numerical data was represented using the median and range. Nonnumerical data was analyzed using frequency and percentage.

#### *Analytical statistics*

The statistical significance of the difference between the means of two research groups was assessed using the *Student T-Test*. The *Mann–Whitney Test (U-test)* was employed to evaluate the statistical significance of the disparity in a nonparametric variable between the two research groups. The *chi-square test* (also known as *Fisher's exact test or Monte Carlo test*) was employed to analyze the association between two or more categorical variables. The study employed the *marginal homogeneity test* to analyze the association between two dependent groups characterized by qualitative factors.

#### *Level of significance (P-value)*

In all applied tests, the *P*-values associated with test statistics indicated the significance level at which the null hypothesis (the hypothesis of no difference) was rejected, and it was set at 0.05 so that a *P*-values ≥ 0.05 are statistically non-significant, *P*-values < 0.05 are significant, and *P*-values < 0.01 are highly significant.

This table reveals that there is no significant variance among studied cases regarding age, gender, and previous sinus surgery (Table 1).

Regarding indications of surgery, 22 (26.2%) patients had chronic rhinosinusitis without nasal polyposis in Group A and 24 (32.9%) cases in Group B, 36 (42.9%) patients had chronic rhinosinusitis with nasal polyposis in Group A and 18 (24.7%) cases in Group B, 5 (5.9%) patients had CSF rhinorrhea in Group A and 2 (2.7%) cases in Group B, 9 (10.7%) patients had concha bullosa in Group A and 12 (16.4%) cases in Group B, and 12 (14.3%) patients had compensatory inferior turbinate hypertrophy in Group A and 17 (23.3%) cases in Group B (Table 2).

This table reveals that there is significant increase in SDD (mm), LNW (mm), SDD/LNW, and SDA (degree) in septoplasty group when compared to nonseptoplasty group (Figs. 2, 3, 4, 5) (Table 3).

*SDD* can significantly predict the need of septoplasty ($P < 0.001$ and $AUC = 0.861$) at cutoff > 2.55 mm with 80.8% sensitivity, 61.7% specificity, 70.4% PPV, and 76.3% NPV.

*LNW* can significantly predict the need of septoplasty ($P = 0.008$ and $AUC = 0.623$) at cut ff > 10.55 mm with 74% sensitivity, 41.5% specificity, 58.3% PPV, and 65.2% NPV.

**Table 1** Analysis of the demographic data and history in both study groups

| | | Groups | | | | Test of significance |
|---|---|---|---|---|---|---|
| | | Group A (no septoplasty) (*N* = 84) | | Group B (septoplasty) (*N* = 73) | | |
| **Age (years)** | | **50.18 ± 16.84** | | 49.49 ± 18.64 | | $t = -0.696$<br>$P = 0.486$ |
| **Gender** | Males | 46 | 54.8% | 43 | 58.9% | $\chi^2 = 0.273$<br>$P = 0.601$ |
| | Females | 38 | 45.2% | 30 | 41.1% | |
| **Previous sinus surgery** | No | 69 | 82.1% | 53 | 72.6% | $\chi^2 = 2.052$<br>$P = 0.152$ |
| | Yes | 15 | 17.9% | 20 | 72.4% | |

Continuous data are expressed as mean ± SD. Categorical data expressed as number (%). $\chi^2$, chi-square test. *t* independent samples *t*-test

*P* probability

**Table 2** Analysis of the indications of surgery in both research groups

| | Groups | | | | Test of significance |
|---|---|---|---|---|---|
| | Group A (no septoplasty) (*N* = 84) | | Group B (septoplasty) (*N* = 73) | | |
| **CRSsNP** | 22 | 26.2% | 24 | 32.9% | $P = 0.359$<br>$\chi^2 = 0.843$ |
| **CRSwNP** | 36 | 42.9% | 18 | 24.7% | $P = 0.017^*$<br>$\chi^2 = 5.733$ |
| **Additional findings:** | | | | | |
| **CSF rhinorrhea** | 5 | 5.9% | 2 | 2.7% | $^{FE}p = 0.451$ |
| **Concha bullosa** | 9 | 10.7% | 12 | 16.4% | $\chi^2 = 0.946$<br>$P = 0.293$ |
| **Inferior turbinate hypertrophy** | 12 | 14.3% | 17 | 23.3% | $\chi^2 = 1.104$<br>$P = 0.147$<br>$\chi^2 = 2.102$ |

*FE* Fisher exact, $\chi^2$ chi-square test, *p P*-value for comparing among examined groups

* Statistically significant at *p* below or equal 0.05

*SDD/LNW* can significantly predict the need of septoplasty ($P < 0.001$ and $AUC = 0.833$) at cutoff > 0.239 with 80.8% sensitivity, 62.5% specificity, 72.1% PPV, and 74.7% NPV.

*SDA* can significantly predict the need of septoplasty ($P < 0.001$ and $AUC = 0.857$) at cutoff > 8.95 with 82.2% sensitivity, 65.3% specificity, 72.7% PPV, and 78.4% NPV (Fig. 6) (Table 4).

This table reveals that there is significant decrease in polyps and edema both in septoplasty and nonseptoplasty groups postoperatively when compared to preoperative (Table 5).

Though no significant variance was noted regarding discharge in postoperative when compared to preoperative in both groups.

Discharge showed significant increase in nonseptoplasty group both preoperatively and postoperatively when compared to septoplasty group. Though, no

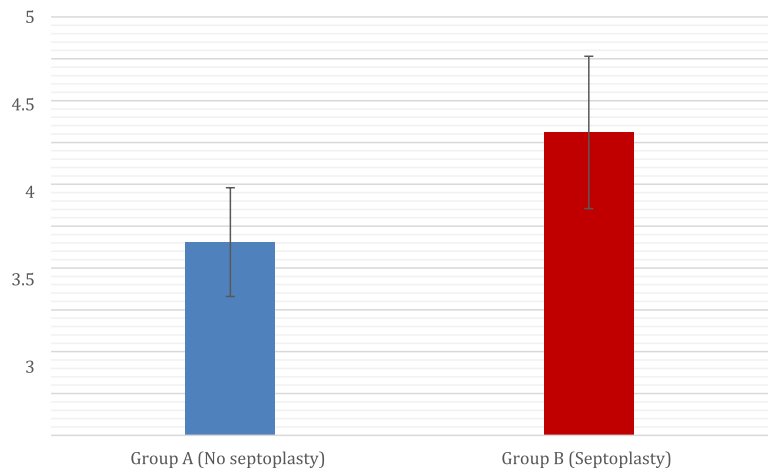


**Fig. 2** SDD in the two study groups

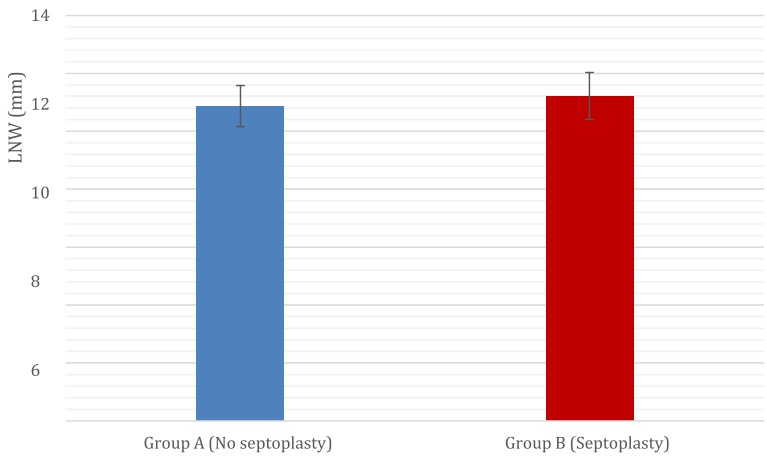


**Fig. 3** LNW in the two study groups

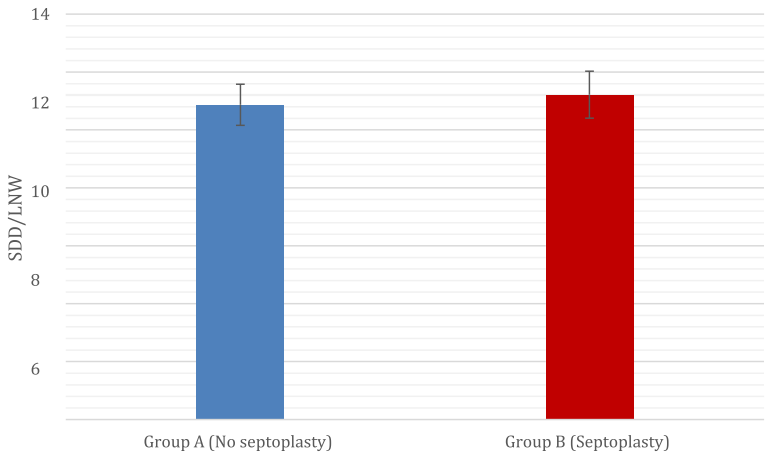


**Fig. 4** SDD/LNW in the two study groups

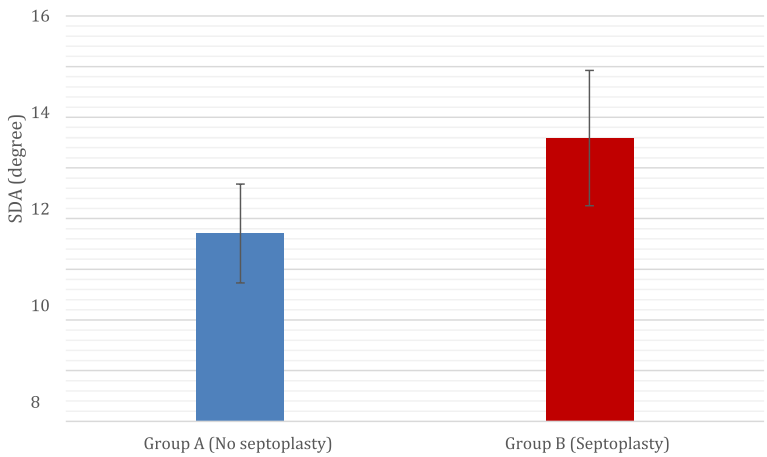


**Fig. 5** SDA (degree) in both study groups

**Table 3** Analysis of the radiological measurements in both study groups

| | Groups | | Test of significance |
|---|---|---|---|
| | Group A (no septoplasty) (*N* = 84) | Group B (septoplasty) (*N* = 73) | |
| **SDD (mm)** | 2.31 ± 0.65 | 3.62 ± 0.91 | *t* = − 10.794 *P* = 0.001* |
| **LNW (mm)** | **10.87** ± 0.**71** | 11.22 ± 0.81 | *t* = − 2.915 *P* = 0.004* |
| **SDD/LNW** | **0.21** ± 0.**06** | 0.32 ± 0.08 | *t* = − 9.317 *P* = 0.001* |
| **SDA (degree)** | **7.41** ± **1.95** | 11.18 ± 2.67 | *t* = − 10.206 *P* = 0.001* |

Continuous data are expressed as mean ± SD

*P* probability

*t* independent samples *t*-test

* Statistically significant ($P \leq 0.05$)

significant variance was noted regarding polyps between 2 groups.

Edema showed significant increase in nonseptoplasty group postoperatively when compared to septoplasty group. However, no significant variance was noted between two groups preoperatively.

Percent of change of need to blow nose between preoperative and postoperative was 44.8%; sneezing 42.9%; runny nose 38%; nasal obstruction 32.1%; loss of smell or taste 30.3%; cough 50%; post-nasal discharge 45.3%; thick nasal discharge 51.5%; ear fullness, dizziness, and ear pain 0%; facial pain/pressure 37.3%; difficult falling asleep 64.2%; walking up at night 76.1%; lack of good night sleep 77.3%; walking up tired 77.6%; fatigue 52.9%; reduced productivity 68%; reduced concentration 77.5%; frustrated/restless/irritable in 61.9%; sad 42.6%; and embarrassed 48.1% in Group A (no septoplasty) (Table 6).

Percent of change of need to blow nose between preoperative and postoperative was 59.2%; sneezing 50%; runny nose 42.3%; nasal obstruction 23.7%; loss of smell or taste 2.9%; cough 66.7%; post-nasal discharge 60%; thick nasal discharge 30.6%; ear fullness, dizziness, and ear pain 100%; facial pain/pressure 38.2%; difficult falling asleep 37.5%; walking up at night 43.9%; lack of good night sleep 51.7%; walking up tired 65.6%; fatigue 64.4%; reduced productivity 50%; reduced concentration 50%; frustrated/restless/irritable in 19.5%; sad 52.1%; and embarrassed 80.8% in Group B (septoplasty).

## Discussion

High anterior septal deviation (HASD) is an anatomical variation that has not been well researched, possibly because there are few concomitant anomalies in the skull base [7]. Nevertheless, the severity of the condition and its specific location opposite to the middle turbinate axilla might significantly limit the ability to enter the

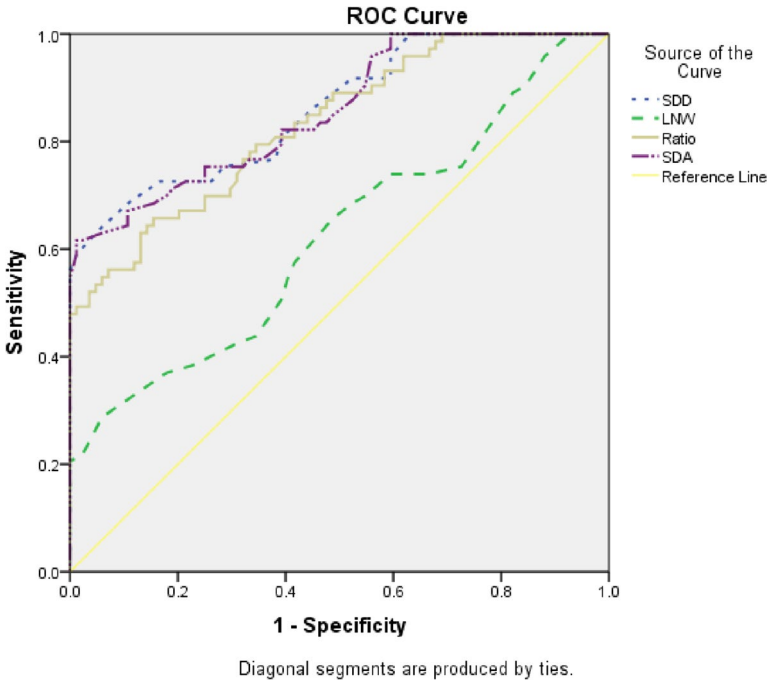


**Fig. 6** ROC curve of radiological measurements in prediction of the need of septoplasty in the included cases

**Table 4** Diagnostic value of radiological measurements in prediction of the need of septoplasty in the included cases

| Diagnostic criteria | SDD (mm) | LNW (mm) | SDD/LNW | SDA (degree) |
|---|---|---|---|---|
| AUC | 0.861 | 0.623 | 0.833 | 0.857 |
| Cutoff point | > 2.55 | > 10.55 | > 0.239 | > 8.95 |
| Sensitivity | **80.8%** | **74%** | **80.8%** | **82.2%** |
| Specificity | **61.7%** | **41.5%** | **62.5%** | **65.3%** |
| NPV | **76.3%** | **65.2%** | **74.7%** | **78.4%** |
| PPV | **70.4%** | **58.3%** | **72.1%** | **72.7%** |
| Accuracy | **72.6%** | **54.8%** | **70.8%** | **80.4%** |
| *P* | < 0.001* | *0.008** | < 0.001* | < 0.001* |

*AUC* area under the curve, *NPV* negative predictive value, *PPV* positive predictive value, *P* probability

* Significant *P*-value (< 0.05)

sinuses during surgery and make postoperative cleaning more difficult.

The current research demonstrated that there is significant variance among examined groups concerning CT findings with increase concha bullosa and compensatory inferior turbinate in septoplasty group when compared to non-septoplasty group. This can be elucidated turbinate expansion encompasses not only the mucosal components but also the conchal bone [8]. Given the potential irreversibility of these alterations, it may be necessary to repair them with septal surgery in order to avoid postoperative nasal obstruction on the non-deviating side [9].

Furthermore, the extent of hypertrophy in the inferior turbinate is directly correlated with the severity of nasal septal deviation, whereas it is inversely correlated with the height of nasal septal deviation [10].

Günbey et al. advised doing a CT scan before septoplasty surgery, particularly in complicated cases with significant deviation that hinders examination of the posterior nasal region or where there is suspicion of sinus illness. This can assist in the preoperative planning of septoplasty [11].

*Our research showed that there was a higher indication for surgery mostly in cases of HASD with CRSsNP (32.9%), followed by CRSwNP (24.7%); the indication for surgery in cases with inferior turbinate hypertrophy was 23.3% and then with concha bullosa (16.4%) and CSF rhinorrhea was (2.7%).*

The current research stated that there is significant increase in SDD (mm), LNW (mm), SDD/LNW, and SDA (degree) in septoplasty group when compared to nonseptoplasty group.

**Table 5** Analysis of the endoscopic Lund-Kennedy score in the two study groups (preoperative and postoperative)

| | Group A (no septoplasty) (*N* = 84) | | | | Group B (septoplasty) (*N* = 73) | | | | Comparison between both groups |
|---|---|---|---|---|---|---|---|---|---|
| | Preoperative | | Postoperative | | Preoperative | | Postoperative | | |
| **Polyps** | | | | | | | | | |
| **Absent** | 17 | 20.2% | 74 | 88.1% | 14 | 32.6% | 66 | 90.4% | P1 = 0.106 P2 = 0.426 |
| **Retracted to MM** | 33 | 39.3% | 10 | 11.9% | 36 | 49.3% | 7 | 9.6% | |
| **Extending to nasal cavity** | 34 | 40.5% | 0 | 0% | 23 | 31.6% | 0 | 0% | |
| **Comparison preoperative versus Postoperative** | ***P* < 0.001*** | | | | ***P* < 0.001*** | | | | |
| **Edema** | | | | | | | | | |
| **Absent** | 19 | 22.6% | 58 | 69% | 0 | 0% | 65 | 89% | P1 = 0.183 P2 = 0.042* |
| **Mild-moderate edema** | 65 | 77.4% | 26 | 31% | 65 | | 8 | 11% | |
| **Polypoid degeneration** | 0 | 0% | 0 | 0% | 8 | 11% | 0 | 0% | |
| **Comparison preoperative versus Postoperative** | ***P* < 0.001*** | | | | ***P* < 0.001*** | | | | |
| **Discharge** | | | | | | | | | |
| **Absent** | 25 | 29.8% | 24 | 28.6% | 43 | 58.9% | 36 | 49.3% | **P1 < 0.001* P2 < 0.001*** |
| **Hyaline** | 41 | 48.8% | 43 | 51.2% | 21 | 28.8% | 21 | 28.8% | |
| **Thickened and/or muco-purulent** | 18 | 21.4% | 17 | 20.2% | 9 | 12.3% | 16 | 21.9% | |
| **Comparison preoperative versus postoperative** | 0.286 | | | | 0.106 | | | | |

Categorical data expressed as number (%)

P1, comparison between the preoperative results in both groups

P2, comparison between the postoperative results in both groups

*P* probability

* Significant *P*-value (below 0.05)

**Table 6** Analysis of sinonasal outcome test (SNOT22) score in both groups (preoperative and postoperative)

| Symptoms | Group A (no septoplasty) (*N* = 84) | | | Group B (septoplasty) (*N* = 73) | | |
|---|---|---|---|---|---|---|
| | Preoperative | Postoperative | Percent of change | Preoperativ e | Postoperative | Percent of change |
| **Need to blow nose** | 58 | 32 | 44.8% | 49 | 20 | 59.2% |
| **Sneezing** | 42 | 24 | 42.9% | 28 | 14 | 50% |
| **Runny nose** | 50 | 31 | 38% | 26 | 15 | 42.3% |
| **Nasal obstruction** | 84 | 57 | 32.1% | 55 | 42 | 23.7% |
| **Loss of smell or taste** | 33 | 23 | 30.3% | 35 | 34 | 2.9% |
| **Cough** | 16 | 8 | 50% | 21 | 7 | 66.7% |
| **Post-nasal discharge** | 75 | 41 | 45.3% | 50 | 20 | 60% |
| **Thick nasal discharge** | 66 | 32 | 51.5% | 49 | 34 | 30.6% |
| **Ear fullness** | 8 | 8 | 0% | 7 | 0 | 100% |
| **Dizziness** | 0 | 0 | 0% | 27 | 0 | 100% |
| **Ear pain** | 8 | 8 | 0% | 7 | 0 | 100% |
| **Facial pain/pressure** | 51 | 32 | 37.3% | 55 | 34 | 38.2% |
| **Difficult falling asleep** | 67 | 24 | 64.2% | 48 | 30 | 37.5% |
| **Walking up at night** | 67 | 16 | 76.1% | 57 | 32 | 43.9% |
| **Lack of good night sleep** | 66 | 15 | 77.3% | 62 | 30 | 51.7% |
| **Walking up tired** | 67 | 15 | 77.6% | 64 | 22 | 65.6% |
| **Fatigue** | 68 | 32 | 52.9% | 73 | 26 | 64.4% |
| **Reduced productivity** | 50 | 16 | 68% | 28 | 14 | 50% |
| **Reduced concentration** | 40 | 9 | 77.5% | 26 | 13 | 50% |
| **Frustrated/restless/irritable** | 42 | 16 | 61.9% | 41 | 33 | 19.5% |
| **Sad** | 54 | 31 | 42.6% | 73 | 35 | 52.1% |
| **Embarrassed** | 51 | 25 | 48.1% | 73 | 14 | 80.8% |

Categorical data expressed as number (%)

*The SDD/LNW value of 0.23 could distinguish between the two groups with 74% sensitivity and 72.1% specificity. This can accurately determine both the degree of displacement from midline and the limitation of working space around the deflection.*

Moreover, the present research observed that *SSD* > 2.55, *LNM* > 10.55, *SDD/LNW* > 0.239, and *SDA* (degree) > 8.95 showed significant AUC that predict the need of septoplasty.

*So measurement of the aforementioned parameters in our retrospective research would help in predicting the need of septoplasty with FESS preoperatively in the future.*

Lee et al. demonstrated, consistent with our results, that patients undergoing septoplasty would have higher SDD and SDA, as well as a higher SDD/LNW ratio in the septoplasty cohort. They opposed our findings, however, on the grounds that there were no discernible differences in LNW among the comparison groups. Furthermore, they illustrated that an SDD of 2.43 mm or greater, an SDD/LNW of 0.25 or greater, or an SDA of 7.6° or greater may signify a clinically significant deflection that necessitates thought of septoplasty for access during sinus surgery [4].

On the contrary, a recent investigation conducted by Rowan et al. explored the correlation between concomitant septoplasty during ESS and the surgical determination to perform septal deviation as measured by radiological means. An investigation was conducted on the angle of deviation just anterior to the optic nerve at the coronal level of the anterior aspect of the nasal bone, the head of the inferior turbinate, and the crista galli. However, no statistically significant correlation was observed between the measurements taken and the decision to conduct septoplasty. They recognized that this could have been the result of their inability to comprehend the surgeon's justification for conducting septoplasty [12].

According to a comprehensive study by Moore et al., septoplasty was found to enhance nasal patency, as indicated by objective measurements. Therefore, it has positive benefits on individuals who have septal surgery [13]. Hsu et al. monitored patients for 1 year prior to and subsequent to septoplasty in their retrospective cohort study

by employing active anterior rhinomanometry, the NOSE score, and VAS. A substantial amelioration of symptoms was observed in the patients throughout the course of 1 year [14].

In line with our results, Srinivasan et al. observed that when comparing parameters from baseline to 6 months, the septoplasty group exhibited a statistically significant improvement in the VAS, SNOT-22, NOSE, and PNIF scores. Additionally, parameters in the nonsurgical management group exhibited a substantial improvement from their initial values after a duration of 6 months. A notable disparity in symptom scores and PNIF values was observed when comparing the improvement in scores between the two groups from baseline to 3 and 6 months. Septoplasty demonstrated superior effectiveness in mitigating nasal obstruction compared to nonsurgical management [15].

In line with our findings, nasal obstruction (30%), loss of smell or taste (25%), thick nasal discharge (50%), difficulty falling asleep (62%), waking up at night (75%), lack of good night sleep (75%), waking up tired (75%), reduced productivity (67%), reduced concentration (80%), and frustrated/restless/irritable (60%) had improved in patients undergone FESS without septoplasty, while need to blow nose (57%), sneezing (50%), runny nose (50%), cough (67%), postnasal discharge (57%), ear fullness (100%), dizziness (100%), ear pain (100%), facial pain/pressure (37.5%), fatigue (60%), sad (50%), and embarrassed (80%) had improved in patients undergone FESS with limited septoplasty [16].

## Conclusion

Septoplasty provides space for endoscopic instruments during FESS and ensure clear visibility of the surgical field, both during the procedure and in the postoperative period. Additionally, it can decrease the likelihood of unsuccessful FESS and impact some CRS symptoms outcomes.

Measurement of SSD, LNM, SDD/LNW, and SDA (degree) is useful as they can aid preoperative planning as their increase is associated with need of septoplasty.

## Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s43163-024-00607-3.

**Supplementary Material 1.**

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Not applicable.

**Authors' contributions**
All authors of this research paper have directly participated in this study. Dr. MM participated in planning and execution of the study and analysis of patient data. Dr. AM participated in patient examination and execution of the surgical procedures and was a major contributor in writing the manuscript. Dr. PY performed the collection and analysis of patient's data and participated in the surgical procedures and postoperative care and writing the manuscript. All authors of this paper have read and approved the final version submitted.

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**Availability of data and materials**
Not applicable.

## Declarations

**Ethics approval and consent to participate**
An approval from Research Ethics Committee of Benha Faculty of Medicine has been obtained. An informed written consents from all patients before participation have been obtained; it included data about aim of work, research design, site, time, subject and methods, and confidentiality. An official permission from the administrators of Benha University Hospitals to conduct this research has been obtained.

**Consent for publication**
Informed and written consent to publish the patient's clinical details was obtained from the participant in this study.

**Competing interests**
The authors declare that they have no competing interests.

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