

## ORIGINAL RESEARCH

# To Study the Effect of Septoplasty Inrelieving Nasal Obstruction and on Quality of Life

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## ABSTRACT

**Background:**Septoplasty (surgical correction of the deviated septum) is the most frequently performed ear, nose, and throat operation in adults, but its effectiveness has long been questioned. Nasal obstruction is the most common complaint in majority of these patients. There are two potential ways to assess the outcome of surgery after septoplasty: objective and subjective measures. Subjective assessment is done in our study with Nasalobstruction symptom evaluation (NOSE) scoring. In the present study the effectiveness of septoplasty in treating nasal obstruction and its effect on quality of life was evaluated.

**Materials and Methods:** A prospective randomized study was done on 120 patients with symptomatic deviated nasal septum. Follow up was done for a period of 6 months after surgery. NOSE scoring was used to analyze the severity of symptoms both preoperatively and postoperatively and diagnostic nasal endoscopy done to compare the results and to look for residual deviations.

**Results:** Statistically significant improvement was observed in mean NOSE score during the follow up visits. The mean value increment was 48.33 and 49.8 after 3 months and 6 months respectively following surgery ( $p < 0.0001$ ). Each individual symptom score improvement was also compared which showed a significant improvement in all the four symptom scores out of five. Diagnostic nasal endoscopic evaluation also showed promising results with less residual deformity on follow up.

**Conclusion:** Septoplasty is an effective surgical procedure for deviated nasal septum which produces significant symptomatic relief for the patient. Nasal obstruction symptom evaluation (NOSE) questionnaire effectively assessed the improvement in quality of life among the symptomatic patients.

**Keywords:** Deviated nasal septum; Nasal obstruction symptom evaluation (NOSE); Nasal obstruction.

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## INTRODUCTION

Deviated nasal septum (DNS) is a widespread clinical condition that affects up to 80% of the population, as shown in various studies.<sup>[1]</sup> It is characterized by displacement of the nasal septum, which normally divides the nasal cavity into right and left nasal passages. Although it is asymptomatic in the majority of patients, the most common and troublesome symptom of DNS is nasal obstruction.<sup>[1]</sup>

Surgical correction of DNS by septoplasty is one of the most common otorhinolaryngology surgeries in adults.<sup>[2]</sup> In the current era, the major indication for septoplasty is nasal obstruction and other associated symptoms of DNS. Although septoplasty is a commonly performed surgery, its effectiveness in relieving nasal obstruction in adults with DNS has not been proven and remains indecisive. Scientific evidence from the literature on the benefits of septoplasty are not well-described.<sup>[3]</sup>

Many studies have revealed that septoplasty improves health-related quality of life significantly in the postoperative period.<sup>[4]</sup> The risk of bias is high, since all available evidence in the literature are based on studies that are only observational in nature, and randomized clinical trials are lacking.<sup>[4,5]</sup>

The beneficial effects could also be explained by additional factors like the course of the disease or additional interventions such as turbinate reduction or conchoplasty performed in these patients. The biases mentioned above make the advocated benefits of septoplasty questionable and possibly exaggerated.<sup>[6]</sup>

In the current era, the major indication for septoplasty is nasal obstruction due to deviated nasal septum (DNS). Even though septoplasty is a commonly performed surgery, its effectiveness in relieving nasal obstruction in DNS has not been proven.

The current study utilizes Nasal Obstruction Symptom Evaluation (NOSE) scale which was developed and validated by Michael G. Stewart in 2002 and it has been used by many investigators and has been translated in many languages for convenience. This scoring system uses 5 questions with answers in grading 0 – 4. Each response is multiplied by 5 have the sum of all to give total score of 100. This questionnaire can be used pre and post operatively to assess the improvement of symptoms after the surgery.

Disease-specific quality of life was measured using the Nasal obstruction symptom evaluation (NOSE).

Total NOSE scores range from 0 to 100, with lower scores indicating better outcomes. To facilitate interpretation, the direction of the NOSE was inverted so that higher scores represented better results.

The Nasal Obstruction Symptom Evaluation (NOSE) score was obtained pre- and post-operatively. Additional analyses determined whether demographics, nasal trauma, prior nasal surgery, or allergic rhinitis history affected NOSE scores.

As a separate (often comorbid) condition, allergic rhinitis is one of the more common causes of reversible, in many patients, both nasal septal deviation and allergic rhinitis can contribute to the continuum of symptoms of nasal obstruction and/or nasal congestion.

When allergic rhinitis and nasal septum deviation coexist, the patient may undergo septoplasty combined with some form of volume reduction of the inferior turbinates. When deciding on the best therapeutic strategy for patients with nasal pathology one must have a

tool for the assessment of subjective symptoms. The Nasal Obstruction Symptom Evaluation (NOSE) Scale is a disease-specific quality of life instrument for use in nasal obstruction, developed.<sup>[7]</sup>

### **Aims and objectives:**

The present study was conducted to study functional outcome and the complications associated with cemented total hip replacement using modular prosthesis. All the cases are operated by Moore's approach which is routinely used in our institution.

### **MATERIALS & METHODS**

This is a Prospective randomized study on 120 patients with symptomatic deviated nasal septum who have undergone septoplasty.

#### **Patients were selected on the basis of following criteria**

- a) All patients with symptomatic deviated nasal septum.
- b) All patients who are willing to give consent.

#### **Patients with following criteria was excluded from study**

- a) Patients below the age of 18 years.
- b) Patients with nasal polyposis.
- c) Patients with allergic rhinitis.
- d) Patients undergoing septoplasty with other nasal surgeries.
- e) Revision septoplasty.

A group of 120 patients with deviated nasal septum attending outpatient department with symptoms of nasal obstruction, underwent complete ear nose throat and general medical evaluation and assessed with NOSE questionnaire.

Diagnostic nasal endoscopy was done to assess degree of septal deviation, site of obstruction, turbinate hypertrophy, signs of sinusitis or any other pathology. Radiological investigations were done including X-ray and CT scan of the paranasal sinuses in required cases. Surgery was performed under general/local anesthesia after giving local infiltration with 1% xylocaine with 1:100000 adrenaline. Freer's incision was used and muco-perichondrial flap elevated followed by resection of deviated part of septum. Spurs if present also removed. Flaps were repositioned and sutured with absorbable suture material. After surgery both the nasal cavities were packed with medicated gauze and removed on the first postoperative day. Saline douching or pressurized saline nasal spray were started after 7 days and postoperative assessment was done in terms of symptoms relieved like nasal obstruction, headache, hyposmia, post nasal discharge. Follow-up visits were done after 3rd month and 6th month. During the follow up period, NOSE questionnaire and diagnostic endoscopy was done and it was compared with preoperative findings. The results were statistically analyzed.<sup>[2,3]</sup>

**Table 1: Nasal Obstruction and Septoplasty Effectiveness Scale**

| Criteria  | Not a Problem | Very Mild Problem | Moderate Problem | Fairly Bad Problem | Severe Problem |
|---|---------------|-------------------|------------------|--------------------|----------------|
| 1. Nasal congestion or stuffiness                                       | 0             | 1                 | 2                | 3                  | 4              |
| 2. Nasal blockage or obstruction  | 0             | 1                 | 2                | 3                  | 4              |
| 3. Trouble breathing through my nose                                    | 0             | 1                 | 2                | 3                  | 4              |
| 4. Trouble sleeping   | 0             | 1                 | 2                | 3                  | 4              |
| 5. Unable to get enough air through my nose during exercise or exertion | 0             | 1                 | 2                | 3                  | 4              |

**NOSE Scale Administration**

Have patient complete the questionnaire as indicated by circling the response closest to describing their current symptom. And Sum the answers the patient circles and multiply by 20 to base the scale out of a possible score of 100 for analysis.

**RESULTS**

**Age distribution** Age distribution of the sample population was between 18 to 48 years with mean age of 33.5 years. Majority of patients were in 3rd decade.

**Sex distribution.** Out of 120 patients 70 were males and 50 were females. The male to female ratio was 1.4 :1.

**Symptoms** The commonest symptom was nasal obstruction (52 %), followed by headache (40 %), bleeding (32 %), nasal discharge (32 %) and hyposmia (28%). All the patients presented with one or more of the following symptoms: headache, nasal obstruction, anosmia or hyposmia, bleeding, nasal discharge.

**Clinical examination**

All the patients who had symptomatic deviated nasal septum were evaluated thoroughly by anterior rhinoscopy followed by diagnostic nasal endoscopy preoperatively.

Among the 120 patients who underwent surgery, 72 patients had anterior deviation and 48 patients had posterior deviation. 32 patients had septal spur, 22 patients with inferior turbinate hypertrophy and 13 patients had high DNS.

All the patients were given NOSE score questionnaire prior to surgery and were scored accordingly.

**Follow-up:** Post surgery patients were followed up after 3rd and 6th month.

During the follow up period NOSE scoring and DNE examination was done. The comparison of pre and postoperative DNE findings is shown below. The DNE findings were consistent at both the follow up visits.

**Table 2: Preoperative and postoperative DNE findings.**

| Clinical Finding                 | Preoperative | Postoperative |
|----------------------------------|--------------|---------------|
| Anterior Deviation               | 72           | 12            |
| Posterior Deviation              | 48           | 11            |
| Septal Spur                      | 32           | 3             |
| Hypertrophied Inferior Turbinate | 22           | 7             |
| High DNS                         | 13           | 6             |

**Table 3: NOSE score before and after surgery**

| Mean NOSE score Preoperative | Mean NOSE score Postoperative (3 months) | Mean NOSE score Postoperative (6 months) | Improvement In NOSE score | P Value |
|------------------------------|--|--|---------------------------|---------|
| 63.2                         | 9.55                                     | 11.10                                    | 52.95                     | 0.0001  |

The NOSE score analysis showed preoperatively mean NOSE score value of 63.2 and postoperatively 9.55 at 3rd month and 11.10 at 6<sup>th</sup> month. The mean value increment was 49.80 and 52.95 at 3rd month and 6th month respectively. This improvement in NOSE score value is calculated and statistically analyzed using student's paired t test and the p value was calculated to be less than 0.0001 which shows the improvement in score is statistically significant.

**Table 4: Symptom scores**

| Symptoms  | Preoperative mean and SD | Postoperative mean and SD | P value | Statistical significance |
|---|--------------------------|---------------------------|---------|--------------------------|
| Nasal congestion or stuffiness                                    | 2.3(1.30)                | 1.33(1.13)                | 0.0001  | S                        |
| Nasal blockage or obstruction                                     | 3.1(0.95)                | 0.99(0.60)                | 0.0001  | S                        |
| Trouble breathing through nose                                    | 2.22(1.9)                | 1.22(1.11)                | 0.0001  | S                        |
| Trouble sleeping  | 1.83(1.24)               | 1.32(1.11)                | 0.0005  | S                        |
| Unable to get enough air through nose during exercise or exertion | 2.14(1.27)               | 2.52(2.23)                | 0.751   | NS                       |

S- Significant, NS – Not Significant

The change in NOSE score symptoms were individually analyzed statistically using paired t test and all were found to be statistically significant except the symptom of unable to get enough air through nose during exercise or exertion.

## **DISCUSSION**

Nasal obstruction or difficulty in breathing is one of the most common complaints we come across in day-to-day otorhinology practice. Nasal obstruction can be of any of the five types: Vestibular, nasal valve, attic, turbinal or choanal. Nasal septal deviation is the most common anatomical cause of nasal obstruction. The deformity of nasal septum is classified into:

- Spurs
- Deviations
- Dislocations

Spurs are sharp angulations seen in nasal septum occurring at the junction of the vomer below, with the septal cartilage and /or ethmoid bone above. It occurs mostly as a result of vertical compression forces. These fractures will produce sharp angulations and it heals by fibrosis that extends to the adjacent mucoperichondrium. This resulting fibrosis will cause difficulty in mucoperichondrial flap elevation during surgery. Deviations occurring may be C shaped or S shaped, may involve both bony and cartilaginous parts of the septum. The septal cartilage is displaced from its medial position in case of dislocations.

Nasal obstruction is mostly on the side of deviation but can also occur on the opposite side as a result of turbinate hypertrophy. The inspiratory currents are displaced and the ensuing turbulence gets concentrated over a small area producing drying and crusting. It may often produce ulceration and bleeding. The pressure produced by the sharp spurs and deviations on adjacent sensory nerves produces pain and the condition is known as anterior ethmoidal nerve syndrome or Sluder's neuralgia.

### **Cottle has classified septal deviations into three types:**

- Simple deviations: It includes mild deviation of nasal septum but no nasal obstruction.
- Obstruction: It includes more severe deviation of the nasal septum, touching the lateral wall which shrinks on vasoconstriction
- Impaction: Marked deviation of nasal septum with spur which lies in contact with lateral wall which requires surgery.

The definitive treatment for symptomatic septal deviation is septoplasty. However the benefits of the surgery as perceived by each and every patient will range from complete relief of symptoms to total failure. There are no defined parameters to assess the success of septoplasty. The diagnosis of deviated septum itself is more of a subjective conclusion. Hence it is difficult to estimate the success rate. The objective measures to quantify the success of surgery for nasal obstruction includes rhinomanometry and acoustic rhinometry.

Rhinomanometry measures the nasal resistance to air flow with the help of two measurements; nasal air flow and transnasal pressure. It is often limited to the measurement of the narrowest point of nasal airway. Acoustic manometer quantifies the cross sectional

area of the nasal cavity by generating an acoustic pulse from the reflected sound pulse which is transmitted to the nose along a tube. The accuracy of acoustic rhinometry is limited in the posterior part of septum especially if the mucosa is congested. Some tools include patient satisfaction questionnaires, physical examination, acoustic rhinomanometry and change in quantity of medications used to relieve nasal obstruction.

Disease specific quality life questionnaires are available to assess the nasal complaints: Chronic sinusitis survey (CSS), Rhinosinusitis disability index (RSDI), Sino- nasal outcome test (SNOT-22), Rhino-conjunctivitis quality of life questionnaire (RQLQ) and Allergy outcome survey (AOS). The CSS, RSDI and SNOT-22 were made to assess the chronic rhinosinusitis. Similarly RQLQ and AOS were designed for allergic rhinoconjunctivitis. The various questionnaires mentioned above are not specific for nasal obstruction. But the NOSE instrument which is used in the study is a specific quality of life questionnaire for nasal obstruction which is relatively simple and easy to answer.<sup>[8]</sup>

Self-answering questionnaires could affect the results in a different way. These questionnaires are patient's own perception of their symptoms. There could be other personal and psychological factors that could affect their perception about symptoms; hence it may not correlate well with the degree of deviation according to the clinical examination findings and rhinomanometric study values. So patients with moderate deviation with severe symptoms may get better benefit than patients with gross deviation and mild symptoms.<sup>[9]</sup>

Septoplasty is a surgical procedure to straighten the deviated nasal septum. The history of septoplasty dates back to early 19<sup>th</sup> century. But the modern era of septoplasty techniques started when both Freer and Killian described submucous resection operations. The complications and poor long-term results associated with submucous resection operation was resolved by Cottle with the practice of conservative septal resections which is the modern septoplasty technique.

Many studies have shown the success rate of septoplasty to be 43 to 85 in the long term and it depends greatly on the parameter used to measure the success.

NOSE Score is a disease specific quality of life instrument for subjective assessment of nasal obstruction.<sup>[9]</sup>

It is a form of questionnaire containing 5 symptoms with increasing severity. In 2017 Saha M, Banerjee S et al. did a prospective study assessing septoplasty outcomes using NOSE scoring which concluded this score as a parameter which helps patients themselves as a tool to assess the outcome of surgery.<sup>[10]</sup>

Other subjective assessment questionnaires like SNOT-22, Nasal surgical questionnaires and various visual analog scales were used in various other studies. In 2013 Satish H S et al. analyzed the effectiveness of septoplasty using Sinonasal outcome test - 22 (SNOT-22). It showed encouraging results to use it as a useful tool to assess the improvement of quality of life postoperatively.<sup>[11]</sup>

The study by Umihanic S et al.<sup>[12]</sup> in 2016 was regarding the discrepancy between subjective and objective findings after septoplasty on a group of 40 patients with DNS and 30 healthy adults as control group. Both subjective and objective assessment was done before and after surgery with rhinomanometry and NOSE scoring. The study concluded uncertain correlation

between rhinomanometric findings and subjective scoring similar to other studies by Zahedi FD et al,<sup>[13]</sup> and Stewart et al.

All the 120 patients in our group were in the age group of 18 to 48 years with mean age of 33.5 years.

In the study by Sam et al,<sup>[14]</sup> the average age of the patients with DNS was 34.7 years old, and in the study by Ozkul et al,<sup>[15]</sup> the average age was 32.31 years old, which were in line with our study.

Possibly, the reason for this can be that patients with DNS usually present in their 3<sup>rd</sup> decade of life with symptoms of nasal obstruction.

The male population was relatively high with a male female ratio of 1.4:1 which is consistent with other studies like Behnam H et al,<sup>[16]</sup> in 2014, Younas M et al,<sup>[17]</sup> and Rubasinghe M S et al.<sup>[18]</sup>

In the studies by Moorthy et al.<sup>[19]</sup> and by Sam et al,<sup>[14]</sup> the ratio between males and females affected by DNS was 2:1. Sam et al,<sup>[14]</sup> mentioned the increased occurrence of trauma among males as one of the reasons for the male preponderance in DNS with trauma being a common etiology for DNS.

Sam et al,<sup>[14]</sup> mentioned the increased occurrence of trauma among males as one of the reasons for the male preponderance in DNS with trauma being a common etiology for DNS.

In another study by Velsco LC et al,<sup>[20]</sup> the mean age of the sample size was 34.49 years which is higher than our study group but with a predominant male population similar to our study.

Most of the other studies showed a mean age higher than 40 years with few exceptions like study by Gandomi et al,<sup>[21]</sup> where the mean age was 22.4 years which is lower than our study. There was no age difference in symptomatic improvement score in our study unlike other studies like study by Gandomi et al where they found that the younger age group patients were benefitted better from septoplasty.

The commonest symptom was nasal obstruction (52 %), followed by headache (40 %), bleeding (32 %), nasal discharge (32 %) and hyposmia (28%). Preoperatively, diagnostic nasal endoscopy was done which showed anterior deviation as the commonest type of deviation followed by posterior deviations, septal spur, hypertrophied turbinate and high DNS. We compared the pre and postoperative DNE findings for residual deformity.

Among the 120 patients who underwent surgery, 72 patients had anterior deviation and 48 patients had posterior deviation. 32 patients had septal spur, 22 patients with inferior turbinate hypertrophy and 13 patients had high DNS.

32 patients who had septal spur were which reduced to 3 and 13 patients who had high DNS were reduced to 6 after 3 months of surgery. The diagnostic nasal endoscopy findings at 3 months and 6 months were consistent. Even though few patients had residual deformity, there was a significant symptomatic improvement for all the patients.

Both preoperatively and postoperatively, patients were given NOSE questionnaire and scoring was done accordingly.

Individual symptom in the questionnaire scores were also compared statistically both preoperatively and postoperatively. All the 5 symptom's scoring showed statistical improvement following surgery except the symptom of unable to get enough air through nose



during exercise or exertion'. NOSE scoring was more of a subjective tool and moreover other factors such as mucosal flap edema, crusting and other coexisting allergic symptoms would have influenced the scoring system postoperatively. The associated conditions along with deviated nasal septum like allergic rhinitis can affect the outcome.

In the study by Younas M et al,<sup>[17]</sup> among the 224 subjects who participated in the study, 79 patients had allergic rhinitis associated with deviated septum. The decrease in mean NOSE score was 43% in allergic as compared with 70% in non-allergic patients. The patients with allergic rhinitis had more crusting, mucosal swelling and recurrence of symptoms on stoppage of medications.

Samuel S. Becker et al,<sup>[22]</sup> in their study, collected data of 547 patients who had undergone septoplasty. Among them, about 70 patients underwent revision surgery. The main cause of nasal obstruction in majority of these patients was nasal valve abnormality. Hence even when we find a deviated nasal septum in a patient, it is very crucial to identify other causes of nasal obstruction.

The symptomatic improvement in septal deviation following septoplasty was demonstrated in many other studies also. A study on 86 patients who underwent septoplasty done by Gandomi et al,<sup>[21]</sup> in 2009 reported a significant improvement in NOSE score in 89.5% of patients at 3 months and same improvement persisted up to 6 months following surgery.

In a study by Bezerra T F et al,<sup>[23]</sup> on 46 patients, the preoperative median NOSE score was 75 and postoperative score was 10 at 3 months, which showed a statistically significant improvement.

Rubasinghe M S et al,<sup>[24]</sup> in 2012 did a prospective study on 30 patients and retrospective study on 35 subjects and calculated a mean NOSE score of 9.46 preoperatively and 0.53 postoperatively with a significant improvement.

A similar study was done by Mondina M et al,<sup>[25]</sup> in 2012 which used NOSE and RhinoQOL questionnaires as assessment tools showed a mean improvement in NOSE score by 35.2 points, 6 months postoperatively.

Allergic rhinitis present among 28% of their population was a predictive factor for less improvement. In spite of all these hindrances statistical analysis showed a significant difference in the improvement. Velsco LC et al,<sup>[20]</sup> did a prospective study on 72 patients who underwent septoplasty with or without partial inferior turbinectomy.

The patients were assessed preoperatively and on the 7<sup>th</sup>, 14<sup>th</sup>, 30<sup>th</sup>, and 60<sup>th</sup> postoperative day. The evaluation was done with a complete otorhinolaryngology examination and a questionnaire with questions on the main symptoms of nasal obstruction which was scored according to the intensity of each symptom. They also did a comparative study between patients with nasal obstruction with allergic symptoms and without allergic symptoms. The nasal obstruction had improved in 94.4% patients by 60<sup>th</sup> postoperative day and the average symptomatic score improvement in patients with and without allergic symptoms was similar on the 60<sup>th</sup> postoperative day.

In septoplasty, DNS is straightened, causing a widening of the nasal passages. This results in improved ventilation and inspiratory effort in patients with nasal obstruction. It also improves mucociliary clearance and, therefore, improves nasal breathing.<sup>[26,27]</sup>

It also alleviates other associated symptoms of DNS such as headache, epistaxis, snoring, and sleep disturbances, therefore improving quality of life.

This was evident from the improvement in subjective assessment scores in our study.

From our study, we inferred that septoplasty is not only a good surgical technique to relieve nasal obstruction but also improves the quality of life in patients with symptomatic deviated nasal septum.

## CONCLUSION

In our study of 120 patients who underwent septoplasty, majority of them were in 2nd and 3rd decade and male to female ratio was 1.4:1. Nasal obstruction was the most common symptom followed by headache, bleeding, nasal discharge and hyposmia. On diagnostic nasal endoscopy, anterior deviation was the most common abnormality followed by posterior deviation, septal spur, HIT and high DNS. Post operative follow up visits showed lesser residual deformity except in case of high DNS. Postoperatively and during subsequent visits, there was a significant statistical improvement in NOSE scoring.

Septoplasty is an effective treatment for nasal obstruction in patients with symptomatic deviated nasal septum and NOSE scoring is a useful parameter for assessing the improvement in quality of life among symptomatic DNS patients.

## Acknowledgment

The author is thankful to Department of ENT for providing all the facilities to carry out this work.

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