

RESEARCH ARTICLE

Impact of septoplasty on pulmonary function

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ABSTRACT

Background: Deviated nasal septum (DNS) is the most common cause of upper airway obstruction, and septoplasty is the surgery of choice for its correction. There seems a relationship between upper airway and lower airway. Spirometry is the easily available method to analyze pulmonary function. **Aims and Objectives:** The aims and objectives of this study were to assess the changes in pulmonary function after surgical correction of DNS for nasal obstruction. **Materials and Methods:** A total of 50 patients with DNS with the complaints of nasal obstruction underwent septoplasty were selected. Pre- and post-surgery (after 1 month) spirometry was done on these patients, and the results were analyzed using various statistical tools for difference in spirometry findings depending on age group, gender, and duration of disease. **Results:** There was an improvement in pulmonary function indices 1 month after surgery, and it was both clinically and statistically significant. The improvement was more in younger age group as compared to middle age group, and it was more in nasal obstruction of shorter duration. There was no significant difference in improvement among males and females. **Conclusion:** There is a strong correlation between treatment for nasal obstruction and improvement in pulmonary function which is more significant for younger age groups and nasal obstruction of shorter duration.

KEY WORDS: Diagnostic nasal endoscopy; Deviated nasal septum; Nasal obstruction; Pulmonary function; Spirometry


INTRODUCTION

Deviated nasal septum (DNS) is one of the most common causes of upper airway obstruction seen in a large number of population.^[1] Septoplasty is the surgery of choice for DNS. DNS leads to upper airway obstruction, but question is if it does have any effect on lower airways. Nose performs important functions such as respiration, filtration, humidification, and olfaction.^[2] DNS leads to imparting of these functions of the nose. Due to obstruction of nose seen in

DNS, dry and cold air and other particles can enter the lower airway and can cause bronchoconstriction and lower airway irritation.^[3] Hence, there seems a relation between upper and lower airways.

Spirometry is one of the simple, easily, readily available, and cheap methods using simple equipments for analyzing the pulmonary function.^[4] It gives information about the condition of lower airways by performing pulmonary function tests. It gives information whether the patient has obstructive or restrictive lung disease.

Not many studies are available regarding the improvement in pulmonary function after surgical correction of nasal septum and almost none in our region. There is a need to find a correlation between the diseases of upper and lower airways. Hence, this study was planned to assess the changes in pulmonary (lower airway) function after correction of nasal septal deviation (upper airway obstruction) by undergoing

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septoplasty.

MATERIALS AND METHODS

This study was conducted in Allergy and Asthma Clinic attached to the Department of ENT of our Medical College and Hospital from March 2018 to November 2018 after approval of the Institutional Ethics Committee. A total of 50 patients between the age groups of 18 and 60 years with DNS with the complaint of nasal obstruction and planned for septoplasty who gave consent for the study were taken up for the study. The patients with a history of allergic rhinitis, asthma, chronic obstructive pulmonary disease, chronic rhinosinusitis, and nasal polyposis, chronic smokers, and those on nasal or inhaled steroids were excluded from the study.

All the 50 patients preoperatively underwent detailed history taking and physical examination including chest and nasal examination. Nasal examination was done using 0° and 30° Hopkins nasal endoscopes. All these patients underwent spirometry. Patients were evaluated for forced vital capacity (FVC), forced expiratory volume in 1 s (FEV-1), and the ratio of both FEV-1 and FVC. The spirometer used was RMS Helios 401 spirometer.

All these patients were then taken up for surgery under general anesthesia or under monitored anesthetic control. Patients again underwent spirometry postoperatively 1 month after surgery. The results were noted and analyzed using mean and standard deviation. The statistical analysis was performed using unpaired *t*-test by means of *P* value and 95% confidence interval.

The patients were analyzed for:

- A difference in spirometry findings pre- and post-operatively.
- A difference in spirometry findings pre- and post-operatively depending on age group, gender, and duration of nasal obstruction.

RESULTS

Most of the patients were of younger age group of 18–40 years of age. There was almost equal distribution of patients among males and females [Table 1]. The maximum number of patients had nasal obstruction for 1–5 years [Figure 1].

Table 1: Age and sex distribution			
Age group (years)	Males	Females	Total
18–40	17	17	34
41–60	10	06	16
Total	27	23	50

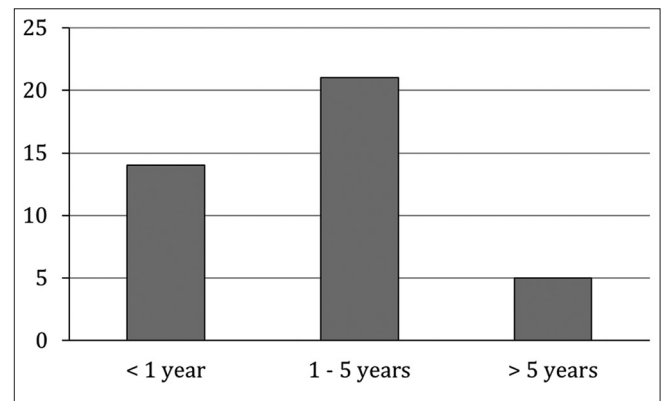


Figure 1: Duration of nasal obstruction

There was an improvement in the values of FVC% and FEV-1% 1 month after surgery. The results were also found to be statistically significant [Table 2]. The improvement in FVC% and FEV-1% was found more in younger age group as compared to the middle age group [Table 3]. There was no significant difference in the improvement of FVC% and FEV-1% among males and females [Table 4].

The improvement of FVC% and FEV-1% was more significant when the duration of nasal obstruction was <1 year. There was less improvement for duration between 1 and 5 years, whereas there was no improvement in these values for a longer duration of nasal obstruction [Table 5].

DISCUSSION

DNS is one of the major diseases encountered in ENT out patient department. According to a study by Amer *et al.*, it is commonly seen in males and in younger age group.^[5] In our study also, we found it to be more common in younger age group but almost equal incidence among males and females [Table 1].

In our study, these patients with DNS underwent septoplasty and were evaluated pre- and post-surgery for pulmonary function by spirometry. We found significant improvement in pulmonary indices 1 month after surgery and the results were both clinically and statistically significant [Table 2]. Similar results were obtained by various other studies in literature. Bulcun *et al.* also showed improvement in pulmonary function after septal surgery.^[6] Karaman *et al.* also found improvement in spirometry findings 3 months after septoplasty.^[7] Shturman-Ellstein *et al.* showed worsened lower airway function in mouth breathers with obstructed nose as compared to nasal breathers.^[8] Similar improvements were obtained by Niedzielska *et al.* after adenoidectomy^[9] and Karuthedath *et al.* after endoscopic sinus surgery.^[10]

In our study, we found improvement in pulmonary function more in younger age group as compared to middle age group [Table 3] and more in patients with shorter duration of nasal

Table 2: Pre-operative and post operative spirometry findings

Indices (%)	Pre-Operative (Mean±SD)	Post-Operative (Mean±SD)	P-value	95% (CI)
FVC	73.08±14.67	82.38±15.29	0.025	-15.2467—-3.3533
FEV-1	75.19±13.82	83.21±14.07	0.049	-13.5549—-2.4851
FEV-1/FVC	102.9±16.17	100.4±14.38	0.416	-3.5729—+8.5729

SD: Standard deviation, FVC: Forced vital capacity, FEV-1: Forced Expiratory Volume in 1 s, CI: Confidence Interval

Table 3: Pre-operative and post-operative spirometry findings according to age group

Indices	Pre-operative (mean±SD)		Post-operative (mean±SD)	
	18–40 years	41–60 years	18–40 years	41–60 years
Age group (%)	18–40 years	41–60 years	18–40 years	41–60 years
FVC	74.81±14.08	70.16±15.25	86.25±13.18	76.08±15.33
FEV-1	76.82±16.11	72.24±14.18	86.61±11.72	76.14±14.17
FEV-1/FVC	103.2±18.18	102.8±13.66	100.3±16.08	100.1±12.72

FVC: Forced vital capacity, FEV-1: Forced Expiratory Volume in 1 s

Table 4: Pre-operative and post-operative spirometry findings according to gender

Indices	Pre-operative (mean±SD)		Post-operative (mean±SD)	
	Males	Females	Males	Females
Gender (%)	Males	Females	Males	Females
FVC	76.18±15.72	69.82±12.18	85.20±13.18	77.17±15.27
FEV-1	76.23±13.79	74.17±14.07	84.18±13.82	81.91±14.36
FEV-1/FVC	100.3±15.88	105.7±16.21	99.1±15.72	103.3±14.87

FVC: Forced vital capacity, FEV-1: Forced Expiratory Volume in 1 s

Table 5: Pre-operative and post-operative spirometry findings according to duration of nasal obstruction

Indices	Pre-operative (mean±SD)			Post-operative (mean±SD)		
	<1 Year	1–5 Years	>5 Years	<1 Year	1–5 Years	>5 Years
Nasal obstructive duration (%)	<1 Year	1–5 Years	>5 Years	<1 Year	1–5 Years	>5 Years
FVC	74.16±16.18	73.32±15.09	73.68±15.28	86.38±12.73	77.17±13.22	69.82±13.18
FEV-1	76.08±14.33	76.17±15.92	74.19±14.71	86.29±11.18	81.91±13.09	74.17±15.22
FEV-1/FVC	102.1±16.28	103.2±15.97	101.4±16.34	99.8±17.17	103.3±16.83	105.7±16.29

FVC: Forced vital capacity, FEV-1: Forced Expiratory Volume in 1 s

obstruction [Table 5]. There was no difference among males and females [Table 4]. Another study also showed lesser improvement in pulmonary function after surgery in older age group and also in patients with longer duration of nasal blockage.^[11] Similar results were obtained in other studies in literature.^[12]

The limitation of our study was patients with significant pulmonary disease such as obstructive and restrictive lung disease who were not taken up in the study. Patients who have allergic complaints and who smoke were also excluded from the study. More studies are needed to analyze the impact on septoplasty on pulmonary function on such patients.

CONCLUSION

There is a strong correlation between treatment for nasal obstruction and improvement in pulmonary function. Septoplasty for correction of upper airway obstruction leads to improvement in pulmonary function. This improvement is

more marked in younger age groups and is more seen in nasal obstruction of shorter duration. There is no difference in pulmonary function improvement among males and females.

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