

Impact of Combining fess (Functional Endoscopic Sinus Surgery) with Septoplasty**Arjunsing Vijaysing Samorekar¹, Bheemsingh Samorekar², Vikramadityasingh V Samorekar³**¹Department of ENT, Naraina Medical College and Research Centre, Kanpur, India²Orthopaedics, K H Patil Institute of Medical Sciences, Gadag, India³Orthopaedics, Dr B S Kushwah Institute of Medical Sciences, Kanpur, India

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Corresponding author: Arjunsing Vijaysing Samorekar

Conflict of interest: Nil

Abstract**Objectives:** To know the outcomes of functional endoscopic sinus surgery combined with septoplasty.**Methods:** Study Design. Population based study. Study conducted in medical college department of ENT and Orthopaedics. The patients who underwent FESS for chronic rhinosinusitis were considered in this study. These patients were divided into 2 groups: the control group FESS alone and the study group FESS combined with septoplasty.**Results:** In total, 100 patients who had undergone FESS were studied in this study. The number of patients who underwent revision FESS were 50. In our study, out of 100, 80 patients received FESS alone, whereas 20 patients underwent septoplasty during FESS. The revision rates of these 2 groups were different (11% vs 8%, respectively; P = .015). Male patients and younger patients were found to have higher revision rates.**Conclusions:** According to this study there is an association between FESS combined with concurrent septoplasty and less incidence of revision rate of FESS. Those patients having allergic rhinitis and asthma have higher risk of need for surgery again.**DOI:** 10.25258/ijcpr.18.9.91

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Introduction

Chronic rhinosinusitis (CRS) is a disease characterized by the inflammation of the paranasal sinus mucosa for a duration of at least 12 consecutive weeks.¹ Data from the 2007 Medical Expenditure Panel Survey medical conditions file and linked to the consolidated expenditures file of the United States showed that CRS is one of the most frequently diagnosed chronic diseases, affecting 4.9% 6 0.2% of the population. Because of this high prevalence rate, the overall expenditure for CRS has been recognized as a socioeconomic burden in the United States. The estimated direct cost was \$8.6 billion.² Nasal obstruction is one of the most common reasons for nasal surgery. Deviated nasal septum is the most common cause of nasal obstruction.³ In England and Wales, over 23,500 people were diagnosed with deviated nasal septum in 2008-2009.^{4,5} Septal surgery is one of the most common procedures in ENT practice, with more than 20,000 submucosal resections (SMRs) and septoplasties performed in England and Wales in 2008-2009.^{6,7} However, the benefits of this form of surgery have been questioned.⁸ Functional endoscopic sinus surgery (FESS) has been the most common surgery for rhinosinusitis for those with

failed maximal medical treatments. Published success rates for FESS range from 76% to 98%.⁹ Common failure factors associated with FESS include inappropriate surgical technique, poor operative field or visualization, and inadequate postoperative care. Initially, limited septoplasty was recognized as a type of SMR and was primarily used only when the deviation of the septum limited the ability of the surgeon to accomplish his or her surgical goals.¹⁰ A prospective, multicenter study revealed that concurrent SMR was performed in 27% of ESS procedures for medically refractory CRS.¹¹ From the available published articles, there are no clear answers for whether concurrent SMR improves the outcomes of FESS or the revision rates of FESS. Our study was designed to ascertain the outcomes of FESS combined with SMR/septoplasty in reducing FESS revision rates

Materials and Methods

This study was conducted in a medical college in the the department of Otorhinolaryngology and also the patients from department of orthopaedics who had nasal bone fracture with un displaced distal radius fracture which was managed conservatively by

below elbow post cast application were considered from May 2025 to April 2026. The National Health Insurance (NHI) program in Taiwan, launched in 1995, has successfully provided universal and quality health care to patients at affordable costs and provides coverage to 99.6% of Taiwan's 23 million residents.¹² The National Health Insurance Research Database (NHIRD) contains the medical claim history for the entire insured population, allowing us to compare the postoperative outcomes of our 2 patient groups.

Study Subjects: In our study out of 100 patients with chronic rhinosinusitis are considered

during the period of May 2025 to April 2026. Patients who had undergone previous septoplasty were excluded. In order to avoid confounding our sampling, we had excluded that the patients underwent SMR at revision FESS. These patients were divided into 2 groups: the control group ie, FESS alone and the study group FESS combined with septoplasty. The index date for each patient was defined by the date that the patient received the surgery. The primary outcome was the revision operative rate. Minimal period of 3 months between when the patient was operated and when the revision operation happened was allotted to determine recurrence.

Statistical Analysis: Fisher's exact test for continuous variables to assess the differences in baseline demographic characteristics between the control and study groups. A logistic regression was used to predict the outcomes of the independent variables. A P value $\leq .05$ was considered to indicate statistical significance; all tests were 2-tailed. All statistical analyses were performed with the statistical package SAS for Windows.

Results

In total, 100 patients, with mean age of 45, who had undergone FESS were recruited into this. The number of patients who had undergone revision FESS was 42. There were 1892 patients (42.19%) who had received surgeries in a medical center, 1793 (39.97%) in a regional hospital, and 799 (17.84%) in a district hospital. Of these patients, 1171 (26.12%) had asthma, 3457 (77.1%) had allergic rhinitis, and 426 (9.5%) had atopic dermatitis (Table 1).

Three thousand, six hundred and eight patients (80.46%) who received FESS alone were in control group, whereas 876 patients (19.54%) who underwent concurrent SMR/septoplasty during FESS were in study group. Two thousand, one hundred and forty-nine (67.24%) and 589 cases (59.56%) were male in the control group and study group, respectively. The mean ages of the patients were 43.89 and 39.79 years old in the control and study groups. Regarding the comorbidities, 964 patients (26.71%) in the control group and 207

patients (23.63%) in the study group had asthma, 2765 patients (76.64%) in the control group and 692 patients (79.0%) in the study group had allergic rhinitis, and 343 patients (9.51%) in the control group and 83 patients (9.47%) in the study group had atopic dermatitis.

There were no significant differences between these 2 groups regarding hospital level and comorbidities (Table 2). The revision patients were 446 (12.36%) and 82 (9.36%) in the control and study groups. The revision rates of these 2 groups were significantly different ($P = .016$) (Table 3). Moreover, a logistic regression analysis found that patients in the control group had a higher revision rate than those in the study group (odds ratio = 1.404, $P = .008$). Regarding gender, male patients had higher revision rates than female patients (odds ratio = 1.211, $P = .0499$). Older patients had less revision rates than younger patients (odds ratio = 0.993, $P = .078$).

There was no significance difference between the hospital levels. In addition, patients with asthma or allergic rhinitis had higher revision rates compared with those patients without these 2 comorbidities (odds ratio = 1.441, $P = .000$, and odds ratio = 1.629, $P = .000$, respectively), but patients with atopic dermatitis had no significant findings between study and control groups (Table 4).

Discussions

The predisposing factors of sinusitis are multitudinous, including anatomic abnormalities, air pollution, cigarette smoking, allergy, or genetic factors. Anatomic abnormalities were once recognized as a significant factor in the pathogenesis of rhinosinusitis. Septal deviation has been among those anomalies examined in multiple studies, and conflicting results have been reported. Some reports have described a correlation between septal deviation and the presence of rhinosinusitis, and an approximately equal number of reports have not found any such correlation. Most of these studies were rather small or examined this association indirectly, such as by investigating the role of a concha bullosa in rhinosinusitis.

Primary FESS failure is most often associated with reconstruction in the area of the ostiomeatal complex. The cause of revision FESS can be divided into systemic and local factors. The local factors focus on various anatomic problems.

According to previous studies, a severely deviated nasal septum is one of the most common causes of revision endoscopic sinus surgery.^{13,14} The most common anatomic factors associated with primary surgery failure have been the lateralization of the middle turbinate (78%), incomplete anterior ethmoidectomy (64%), scarred frontal recess (50%), incomplete posterior ethmoidectomy (41%), and middle meatal antrostomy stenosis (39%). In

addition, retained agger nasi and retained uncinate process were identified in 49% and 37% of patients, respectively. Other factors such as persistent sphenoid disease and sphenoid ostium stenosis were less frequent.⁹ Septal deviation is a common anatomical variation. Its role in the pathogenesis of chronic rhinosinusitis remains unclear.¹⁵

The prevalence of septal deviation increases with age. In infants, the prevalence of bilateral nasal septal deviation is 27% and that of unilateral deviation is 31%. The prevalence of septal deviation in adults is 79%.¹⁶ Of patients about to undergo septoplasty, 27% showed sinus abnormality in plain radiology assessment.⁹ In addition, sinus pathology was found in 50% of 150 patients who had rhinomanometrically proven nasal septal deformity and obstruction.¹⁷ Some studies have suggested that a deviation of the nasal septum may interfere with proper airflow, potentially predisposing one to sinus disease.^{18,19} However, Yousem et al²⁰ concluded that the most critical factor in the development of sinusitis may be an intrinsic defect in mucociliary clearance. Anatomical narrowing or tortuous passageways may further compound the problem.

The association demonstrated herein still suggests that septal deviation may play a role in rhinosinusitis. Interestingly, Bayiz et al²¹ found that septoplasty alone can be adequate for the treatment of CRS with septal deviation. Three possible mechanisms may explain the pathophysiology of how septal deviation may cause chronic rhinosinusitis. First, the stenosis of the ostiomeatal complex due to either the anatomical configuration or edematous mucosa may cause the obstruction and stagnation of secretions, which may subsequently become infected or perpetuate infection.²² The second potential mechanism involves aerodynamics: Septal deviation leads to an increase in nasal airflow velocity, which may cause mucosal desiccation and diminished mucociliary function.^{23,24} Third, changes in maxillary sinus pressure and ventilation in the region of the ostiomeatal complex due to septal deviations may cause chronic rhinosinusitis.²⁵ Decreased antral pressure is correlated with posterior septal deviations.

Regarding the angle of deviation, a higher incidence and severity of sinus disease were associated with an increased severity in septal deviation in the region of the ostiomeatal complex.^{20,26,27} Elahi et al²⁸ reported that patients with increasing degrees of nasal septal deviations were associated with higher incidences of osteo-meatal complex obstruction. The incidence and severity of sinus disease increased with the severity of septal deviation.²⁸ In a review study, septal deviation was not only found to be strongly associated with rhinosinusitis, but the study also found a statistical association between the degree of septal deviations and rhinosinusitis,

especially in patients with a septal deviation angle greater than 10 degrees.²⁹ However, not all reports supported the relationship between DNS and sinusitis. In 1 study, 500 consecutive patients underwent CT scanning of their paranasal sinuses for possible chronic sinus disease. Harar et al³⁰ did not find any significant difference between chronic rhinosinusitis and septal deviation.

Additionally, Yasan et al³¹ claimed that a mild to moderate degree of deviated nasal septum was not a risk factor for chronic sinus disease. Only the gross deviation of the nasal septum is a risk factor for the development of CRS. Collet et al¹⁵ reviewed published literature and concluded that a definite role cannot be attributed to the nasal septum, either as the pathogenesis of chronic sinusitis or as a contributing factor. No relationship could be proven between septal surgery combined with sinus surgery and chronic sinusitis. A postoperative prognosis for the subjective comfort of patients has been demonstrated. Thus, performing septoplasty only aims to relieve complaints of nasal obstruction or improve surgical access to the ethmoid sinus.¹⁵ Due to the recent appreciation that the pathogenesis of rhinosinusitis is likely multifactorial, it is appropriate to reexamine its possible anatomic etiologies. A systematic analysis of septal deviation and rhinosinusitis was therefore performed to better define this association and describe the possible etiologic mechanisms.²⁹ To optimize nasal patency and improve surgical access, SMR or septoplasty is commonly performed during FESS.³ So far, there have been limited publications reporting the outcomes of concurrent SMR for FESS.

Our results showed that patients who received FESS alone had higher revision rates than patients who received FESS combined with SMR. Concurrent SMR during FESS had better outcomes in our data set. These findings may have been observed because concurrent SMR can provide better surgical field, reduce postoperative narrowing or synechiae of middle meatus, expand nasal space for sinus drainage and ventilation, and increase the convenience of postoperative care. In our results, higher revision rate was revealed in the male patients. This finding may attribute to higher smoking rate of men in Taiwan, which is a critical factor in the recurrence of rhinosinusitis. On the other hand, decreased revision rate can be found in the older patients (odds ratio = 0.993, $P = .078$). This phenomenon may be associated with the age distribution of atopic diseases. Epidemiologic, genetic, immunologic, and clinical studies show a close relationship between rhinosinusitis and atopic diseases (allergic rhinitis, asthma, and atopic dermatitis).³³ In our study population, 25% had asthma, 73% had allergic rhinitis. Results from logistic regression showed patients with comorbidities of asthma or allergic rhinitis had

higher revision rate. These results divulged if patients had rhinosinusitis with comorbidity of atopic diseases (asthma or allergic rhinitis), concurrent SMR/septoplasty during FESS might be considered. Patients also need to be informed preoperatively for higher recurrence rates and closer postoperative follow-up. First, because this Septoplasty would be used on more difficult cases to access the frontal recesses better. If the severity of disease could be controlled between the 2 study groups, a difference or an even greater change in the outcome of interest could be presented. Third, it might be different outcomes between the distributions of surgeons (rhinologists or those who that perform FESS intermittently). Thus, this would be an experience or surgeon's ability confounder.

Conclusions

This study showed an association between FESS combined with concurrent SMR/septoplasty and less incidence of revision rate of FESS. To reduce the possibility of failed FESS, concurrent SMR should be considered in primary FESS. Patients with asthma or allergic rhinitis may also require more revision surgeries after FESS.

References

1. Benson V, Marano MA. Current estimates from the National Health Interview Survey, 1995. *Vital and Health Statistics*. 1998;10:1-428.
2. Mantovani M, Minetti A, Torretta S, et al. The velouvulo-pharyngeal lift or "roman blinds" technique for treatment of snoring: a preliminary report. *Acta Otorhinolaryngol Ital*. 2012;32:48-53.
3. Lindberg E, Theorell-Haglow J, Svensson M, et al. Sleep apnea and glucose metabolism: a long-term follow-up in a community-based sample. *Chest*. 2012;142:935-942.
4. D'Elia E, Vanoli E, La Rovere MT, et al. Adaptive servo ventilation reduces central sleep apnea in chronic heart failure patients: beneficial effects on autonomic modulation of heart rate. *J Cardiovasc Med (Hagerstown)*. 2013;14:296-300.
5. Stow NW, Sale PJ, Lee D, et al. Simultaneous tonsillectomy and nasal surgery in adult obstructive sleep apnea: a pilot study. *Otolaryngol Head Neck Surg*. 2012;147:387-391.
6. Roblin DG, Eccles R. What, if any, is the value of septal surgery? *Clin Otolaryngol Allied Sci*. 2002;27:77-80.
7. Musy PY, Kountakis SE. Anatomic findings in patients undergoing revision endoscopic sinus surgery. *Am J Otolaryngol*. 2004;25:418-422.
8. Cantrell H. Limited septoplasty for endoscopic sinus surgery. *Otolaryngol Head Neck Surg*. 1997;116:274-277.
9. Smith TL, Litvack JR, Hwang PH, et al. Determinants of outcomes of sinus surgery: a multi-institutional prospective cohort study. *Otolaryngol Head Neck Surg*. 2010;142:55-63.
10. Faria AC, da Silva-Junior SN, Garcia LV, et al. Volumetric analysis of the pharynx in patients with obstructive sleep apnea (OSA) treated with maxillomandibular advancement (MMA). *Sleep Breath*. 2013;17:395-401.
11. Moses RL, Cornetta A, Atkins JP, Jr., et al. Revision endoscopic sinus surgery: the Thomas Jefferson University experience. *Ear Nose Throat J*. 1998;77:190, 193-195, 199-202.
12. Khalil HS, Eweiss AZ, Clifton N. Radiological findings in patients undergoing revision endoscopic sinus surgery: a retrospective case series study. *BMC Ear Nose Throat Disord*. 2011;11:4.
13. Collet S, Bertrand B, Cornu S, et al. Is septal deviation a risk factor for chronic sinusitis? Review of literature. *Acta Otorhinolaryngol Belg*. 2001;55:299-304.
14. Gray LP. Deviated nasal septum. Incidence and etiology. *Ann Otol Rhinol Laryngol Suppl*. 1978;87:3-20.
15. Matschke RG, Fiebach A. [Septum deviation and concomitant sinusitis]. *HNO*. 1985;33:541-544.
16. Stallman JS, Lobo JN, Som PM. The incidence of concha bullosa and its relationship to nasal septal deviation and paranasal sinus disease. *AJNR Am J Neuroradiol*. 2004;25:1613-1618.
17. Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. *Laryngoscope*. 1991;101:56-64.
18. Yousem DM, Kennedy DW, Rosenberg S. Ostiomeatal complex risk factors for sinusitis: CT evaluation. *J Otolaryngol*. 1991;20:419-424.
19. Bayiz U, Dursun E, Islam A, et al. Is septoplasty alone adequate for the treatment of chronic rhinosinusitis with septal deviation? *Am J Rhinol*. 2005;19:612-616.
20. Stammberger H, Posawetz W. Functional endoscopic sinus surgery. Concept, indications and results of the Messerklinger technique. *Eur Arch Otorhinolaryngol*. 1990;247:63-76.
21. Blaugrund SM. Nasal obstruction. The nasal septum and concha bullosa. *Otolaryngol Clin North Am*. 1989;22:291-306.
22. Danese M, Duvoisin B, Agrifoglio A, et al. [Influence of nasosinus anatomic variants on recurrent, persistent or chronic sinusitis. X-ray computed tomographic evaluation in 112 patients]. *J Radiol*. 1997;78:651-657.
23. Bachert C. [Experimental studies of the effect of nasal respiratory obstruction on ventilation of the maxillary sinus]. *Laryngol Rhinol Otol (Stuttg)*. 1986;65:250-255.

24. Calhoun KH, Waggenpack GA, Simpson CB, et al. CT evaluation of the paranasal sinuses in symptomatic and asymptomatic populations. *Otolaryngol Head Neck Surg.* 1991;104: 480-483.
25. Elahi MM, Frenkiel S. Septal deviation and chronic sinus disease. *Am J Rhinol.* 2000;14:175-179.
26. Elahi MM, Frenkiel S, Fageeh N. Paraseptal structural changes and chronic sinus disease in relation to the deviated septum. *J Otolaryngol.* 1997;26:236-240.
27. Orlandi RR. A systematic analysis of septal deviation associated with rhinosinusitis. *Laryngoscope.* 2010;120:1687-1695.
28. Harar RP, Chadha NK, Rogers G. The role of septal deviation in adult chronic rhinosinusitis: a study of 500 patients. *Rhinology.* 2004;42:126-130.
29. Yasan H, Dogru H, Baykal B, et al. What is the relationship between chronic sinus disease and isolated nasal septal deviation? *Otolaryngol Head Neck Surg.* 2005;133:190-193.
30. Benninger MS, Ferguson BJ, Hadley JA, et al. Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology. *Otolaryngol Head Neck Surg.* 2003;129:S1-S32.
31. Bhattacharyya N. Incremental health care utilization and expenditures for chronic rhinosinusitis in the United States. *Ann Otol Rhinol Laryngol.* 2011;120:423-427.
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