

Effectiveness of Functional Endoscopic Sinus Surgery (FESS) in Improving Nasal Symptoms in Patients having Chronic Rhinosinusitis with Nasal Polyps (CRSWNP)

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ABSTRACT

Objective: To evaluate the effectiveness of FESS in ameliorating preoperative nasal symptoms attributable to CRS when compared with the postoperative period, particularly within a 30-day timeframe.

Methodology: A prospective observational study was conducted at the Department of Otorhinolaryngology, Dow University of Health Sciences/Civil Hospital Karachi, from January 1st, 2022, to June 30th, 2022. A cohort of 149 eligible patients participated in the study, completing the SNOT-22 questionnaire 48 hours preoperatively and 30 days postoperatively. Efficacy was assessed through improvements in postoperative nasal symptoms, quantified using SNOT-22 scores.

Results: Of the 149 patients enrolled, 121 were male and 28 were female. Significant associations were observed between preoperative and postoperative SNOT-22 scores (p-value 0.036), with notable correlations found regarding unemployment, positive family history of allergy, and patients aged 15-35 years, all demonstrating significant reduction in nasal symptoms postoperatively.

Conclusion: FESS emerged as highly efficacious in managing CRSwNP symptoms, with notable enhancements in postoperative nasal symptoms and overall quality of life. Furthermore, positive outcomes were particularly pronounced among patients with a family history of nasal allergy, individuals within the younger age group, and those unemployed.

Key words: Chronic rhinosinusitis, Functional endoscopic sinus surgery, Nasal polyps, Nasal symptoms, Rhinosinusitis.

Authors' Contribution:
^{1,2}Conception; *Literature research; manuscript design and drafting;* ^{3,4}Critical analysis and manuscript review; ^{4,5}Data analysis; *Manuscript Editing.*

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Introduction

Chronic rhinosinusitis (CRS) is an inflammatory condition of the nasal and paranasal sinuses that persists for at least 12 weeks and affects approximately 3–11% of the population. Among its subtypes, chronic rhinosinusitis with nasal polyps (CRSwNP) is characterized by persistent mucosal inflammation, significant impairment in health-related quality of life, and frequent disease recurrence despite standard medical therapy.¹⁻²

CRSwNP imposes a substantial burden on respiratory health and contributes to both direct healthcare costs and indirect socioeconomic losses.³ The cornerstone of CRSwNP management includes nasal saline irrigation and intranasal corticosteroids. In cases of refractory or exacerbated symptoms, systemic corticosteroids and antibiotics may be considered. When conventional medical therapy fails, Functional Endoscopic Sinus Surgery (FESS) and/or biologic agents are recommended as second-

line interventions.⁴⁻⁵ FESS is widely regarded as the gold standard surgical approach for CRS. Its primary objective is to restore sinus ventilation and drainage by removing anatomical obstructions, thereby enhancing mucociliary clearance. Numerous studies have demonstrated that FESS leads to marked improvements in symptom control and patient-reported quality of life. However, postoperative benefits typically emerge after three to four weeks, due to the resolution of inflammation and clearance of crusting. This delay underscores the need for adjunctive strategies that promote mucosal healing and optimize postoperative outcomes.⁶⁻⁷ Triamcinolone acetonide nasal spray is commonly employed to manage CRS-related nasal symptoms. Prior research has shown that topical triamcinolone is safe, well tolerated, and effective in reducing inflammation. Moreover, steroid-impregnated nasal packing with triamcinolone during FESS has been associated with superior endoscopic outcomes.⁸ Long-term use of aqueous triamcinolone acetonide (TAA AQ) in combination with low-dose oral clarithromycin has also demonstrated efficacy in CRS management. Patients undergoing FESS who received triamcinolone therapy showed greater symptom improvement at 8 weeks compared to those treated with saline irrigation alone.⁹ To objectively assess symptom severity and treatment response, the Sino-Nasal Outcome Test (SNOT-22) is frequently utilized. This validated questionnaire evaluates the impact of CRS on quality of life and tracks changes in nasal and sinus symptoms over time. Common CRS symptoms include nasal obstruction, rhinorrhea, facial pressure, and olfactory dysfunction. A study by Kim et al. reported a reduction in rhinologic SNOT-22 scores from a preoperative average of 17.8 to a postoperative average of 4.3, highlighting the effectiveness of surgical intervention.⁸ This study was conducted to evaluate the effectiveness of FESS in alleviating nasal symptoms in patients with CRSwNP, comparing preoperative symptom burden

with postoperative outcomes at one month. Given the high prevalence and morbidity associated with CRS, timely surgical intervention is critical to prevent complications and improve patient well-being. By analyzing changes in SNOT-22 scores, this study aims to quantify the degree of symptom relief and provide evidence for the utility of FESS in our clinical setting. The findings will offer updated local data and reinforce the role of FESS in improving nasal symptoms among CRS patients, thereby guiding future therapeutic strategies.

Methodology

This prospective observational study was carried out on 149 patients after getting approval of synopsis by CPSP and ethical review committee. Sample size was calculated using WHO sample size calculator, with a confidence level (1- α) of 95%, a desired precision (d) of 8%, and an estimated population improvement in total nasal symptom scores of 54%, based on data from the parent study.¹⁰ Patient of either gender aged between 15-80 years and having history of sinonasal polyposis (unilateral & bilateral), antrochoanal polyp, chronic fungal rhinosinusitis and/or allergic fungal rhinosinusitis were included in the study from 1st January 2022 to 30th June 2022 after taking informed consent and using non-probability sampling technique. Whereas, patient with congenital craniofacial malformation, prior nasal surgery, major complications of FESS, Cases of mucormycosis, immune-deficient state of health like pregnancy, malignancy, tuberculosis (on treatment) or patients with post cardiac surgery were excluded from the study.

A detailed history of the existing disease was taken, with particular attention to the presence or absence of symptoms i.e nasal congestion, sneezing, runny nose, nasal mucus behind the nose and thick nasal mucus. A detailed general physical examination and ENT examination (examination of the anterior part of the nose without raising the tip of the nose of the

speculum) were performed. SNOT-22⁸ questionnaire was completed by the patients 48 hours prior and after one month of surgery.

Each SNOT-22 questionnaire produced a cumulative score alongside an analysis of 22 sub-scores that corresponded to individual items. The surgical interventions followed the protocols established by Messerklinger and Stammberger, incorporating modifications proposed by Wigand. Postoperatively, all patients received a brief regimen of antibiotics, specifically amoxicillin 1 gm combined with clavulanate 125 mg, for a duration of 7 to 10 days. For one month following the procedure, patients underwent saline nasal decontamination, and 15 days after the surgery, a nasal corticosteroid (Fluticasone 100 micrograms) was administered once daily in both nostrils and continued as necessary. During the follow-up period, nasal suction procedures were performed to remove crusts, which were then examined for any irregularities over a four-week timeframe to monitor for abnormal formations within the nasal cavity.

Data were analyzed using SPSS version 26. Mean and standard deviation were calculated for quantitative variables (age, weight, SNOT-22 scores). Frequencies and percentages were reported for qualitative variables (gender, symptoms, occupation, education, socioeconomic status, family history of allergy). Pre- and post-operative SNOT-22 scores were compared using the chi-square test to assess changes in symptom severity within the same group. Effect modifiers such as age, gender, occupation, and education were controlled through stratification, and post-stratification chi-square tests were applied. A p -value <0.05 was considered statistically significant.

The Ethical approval was taken from ethical committee of the Department of Otorhinolaryngology (E.N.T.), Dow University of Health Sciences, Civil Hospital Karachi (REF: IRB-2976/DUHS/Approval/2023/246),

Results

Out of 149 patients 121 were males and 28 were females, constituting approximately 81% and 19% respectively. The mean age of the patients was 35.12 ± 20.18 years, with a mean weight of 56.24 ± 7.26 kg. Symptom evaluation revealed nasal blockade as the most prevalent complaint among patients, reported by 51 individuals, followed by runny nose (35 patients), sneezing (33 patients), postnasal dribbling (18 patients), and thick nasal discharge (12 patients), accounting for approximately 34%, 24%, 22%, 12%, and 8% of the cohort, respectively. Occupational status assessment indicated that 22 were employed, while 127 were unemployed, representing approximately 15% and 85%, respectively. Educational attainment varied among patients, with 35%, 26%, 12%, and 27% having completed primary, secondary, intermediate, and graduate education, respectively. Regarding socioeconomic status, 16% of patients belonged to the upper class, 22% to the middle class, and 62% to the lower class. Stratification by age revealed that the majority of patients (72%) fell within the 15–35 years age bracket, followed by 20% in the 61–80 years age group and 8% in the 36–60 years age group. Preoperative Sino-nasal outcomes test (SNOT22) scores indicated mild symptoms in 2% of patients, moderate symptoms in 60%, and severe symptoms in 38%. Postoperatively, 82% of patients exhibited mild symptoms, 15% moderate symptoms, and 3% severe symptoms. Evaluation of the efficacy of functional endoscopic sinus surgery (FESS) revealed a significant improvement in nasal symptoms 30 days postoperatively compared to preoperative scores, with a p -value of 0.036 (Table-II). Further analysis of preoperative versus postoperative SNOT-22 scores showed no significant gender-based difference. However, a significant association was observed between preoperative and postoperative scores and unemployment status

Table-I: Association of Demographic and Clinical Factors with Postoperative Improvement in SNOT-22 Scores Following Functional Endoscopic Sinus Surgery in CRSwNP Patients								
	Sinonasal Outcomes Test (SNOT- 22) scores postoperative	Sinonasal Outcomes Test (SNOT-22) scores preoperatively			Total	Chisquare (χ^2)	P-Value	
		Mild	Moderate	Severe				
Gender								
Males	Mild	2	64	34	100	6.908	0.141	
	Moderate	0	9	9	18			
	Severe	0	0	3	3			
	Total	2	73	46	121			
Females	Mild	1	15	6	22	3.857	0.426	
	Moderate	0	2	3	5			
	Severe	0	0	1	1			
	Total	1	17	10	28			
Occupation								
Employed	Mild	0	14	7	21	0.489	0.484	
	Moderate	0	1	0	1			
	Severe	0	0	0	0			
	Total	0	15	7	22			
Unemployed	Mild	3	65	33	101	10.582	0.032*	
	Moderate	0	10	12	22			
	Severe	0	0	4	4			
	Total	3	75	49	127			
Family history of nasal allergy								
Positive	Mild	1	53	21	75	9.602	0.048*	
	Moderate	0	10	7	17			
	Severe	0	0	4	4			
	Total	1	63	32	96			
Negative	Mild	2	26	19	47	3.979	0.137	
	Moderate	0	1	5	6			
	Severe	0	0	0	0			
	Total	2	27	24	53			
Educational status								
Primary	Mild	2	27	13	42	2.556	0.635	
	Moderate	0	6	3	9			
	Severe	0	0	1	1			
	Total	2	33	17	52			
Secondary	Mild	0	24	11	35	0.557	0.455	
	Moderate	0	2	2	4			
	Severe	0	0	0	0			
	Total	0	26	13	39			
Intermediate	Mild	0	9	6	15	3.600	0.165	
	Moderate	0	0	2	2			
	Severe	0	0	1	1			
	Total	0	9	9	18			
Graduate	Mild	1	19	10	30	5.160	0.271	
	Moderate	0	3	5	8			
	Severe	0	0	2	2			
	Total	1	22	17	40			
Socio- economic status								
Upper	Mild	0	8	10	18	1.264	0.531	
	Moderate	0	3	2	5			
	Severe	0	0	1	1			
	Total	0	11	13	24			
Middle	Mild	1	18	9	28	2.377	0.667	
	Moderate	0	2	2	4			
	Severe	0	0	1	1			
	Total	1	20	12	33			
Lower	Mild	2	53	21	76	8.787	0.067	
	Moderate	0	6	8	14			
	Severe	0	0	2	2			
	Total	2	59	31	92			
Age distribution								
15-35 years	Mild	2	56	29	87	12.669	0.013*	
	Moderate	0	5	12	17			
	Severe	0	0	3	3			
	Total	2	61	44	107			
36-60 years	Mild	0	7	4	11	0.545	0.460	
	Moderate	0	1	0	1			
	Severe	0	0	0	0			
	Total	0	8	4	12			
61-80 years	Mild	1	16	7	24	5.037	0.284	
	Moderate	0	5	0	5			
	Severe	0	0	1	1			
	Total	1	21	8	30			

Table II: - Frequency distribution of severity of Sinonasal Outcomes Test (SNOT-22) scores preoperatively versus postoperatively in patients having chronic rhinosinusitis with nasal polyps (CRSWNP)

Sinonasal Outcomes Test (SNOT-22) scores Postoperatively	Sinonasal Outcomes Test (SNOT-22) scores preoperatively			Total	Chi-square (χ^2)	P-Value
	Mild	Moderate	Severe			
Mild	3	79	40	122	10.261	0.036*
Moderate	0	11	12	23		
Severe	0	0	4	4		
Total	3	90	56	149		

Table III: Association Between Specific Nasal Symptoms and Postoperative Improvement Following Functional Endoscopic Sinus Surgery (FESS) in Patients with CRSwNP: A SNOT-22 Based Analysis

Symptoms	Sinonasal Outcomes Test (SNOT-22) scores postoperative	Sinonasal Outcomes Test (SNOT-22) scores preoperatively			Total	Chisquare (χ^2)	P-Value
		Mild	Moderate	Severe			
Runny Nose	Mild	2	20	8	30	6.056	0.195
	Moderate	0	1	2	3		
	Severe	0	0	2	2		
	Total	2	21	12	35		
Nasal Blockade	Mild	1	26	13	40	4.229	0.376
	Moderate	0	4	6	10		
	Severe	0	0	1	1		
	Total	1	30	20	51		
Sneezing	Mild	0	19	10	29	0.366	0.545
	Moderate	0	2	2	4		
	Severe	0	0	0	0		
	Total	0	21	12	33		
Postnasal Dribbling	Mild	0	9	7	16	0.028	0.867
	Moderate	0	1	1	2		
	Severe	0	0	0	0		
	Total	0	10	8	18		
Thick Nasal discharge	Mild	0	5	2	7	2.196	0.333
	Moderate	0	3	1	4		
	Severe	0	0	1	1		
	Total	0	8	4	12		

While no significant relationship was found between SNOT-22 scores and specific nasal symptoms or educational and socioeconomic status, a positive

family history of nasal allergy was associated with a significant reduction in postoperative symptoms (p -value 0.048). Notably, significant improvement in

nasal symptoms postoperatively was observed among patients aged 15–35 years (Table-I). For each symptom, the distribution of patients across mild, moderate, and severe categories is shown before and after surgery. Chi-square test was applied to assess statistical significance of postoperative changes. Although numerical improvements were observed in all symptom groups, none of the associations reached statistical significance ($p > 0.05$). The most notable shifts were seen in patients with nasal blockade and runny nose, yet these did not yield statistically significant p -values (0.376 and 0.195, respectively) as showed in Table III.

Discussion

Current treatment guidelines recommend that the initial management of chronic rhinosinusitis with nasal polyps (CRSwNP) includes the use of intranasal corticosteroids, saline irrigation, nasal decongestants, antihistamines, and oral corticosteroids or antibiotics during exacerbations. These pharmacologic agents exert broad anti-inflammatory effects and remain central to disease control. However, medical therapy alone often fails to achieve sustained symptom relief, necessitating surgical intervention. Functional endoscopic sinus surgery (FESS) plays a pivotal role in improving sinonasal ventilation and drainage, thereby enhancing quality of life (QOL). Postoperative improvements in nasal symptoms are typically immediate, and patients with CRSwNP consistently demonstrate significant and durable reductions in SNOT-22 scores following FESS.

Our study reinforces the efficacy of FESS as a therapeutic modality for CRSwNP, demonstrating significant postoperative reductions in nasal symptoms as measured by SNOT-22 scores. The majority of patients experienced improved airway function and symptom relief, with notable improvements across all domains of the SNOT-22

questionnaire, including nasal obstruction, sleep quality, and emotional well-being.¹¹⁻¹³ At 30 days postoperatively, patients showed statistically significant improvements compared to their preoperative status. The SNOT-22 instrument, validated for assessing QOL in CRS, remains indispensable for evaluating both medical and surgical treatment outcomes. The average preoperative SNOT-22 scores in our cohort ranged between 40–60, consistent with findings from international studies. The mean age of our participants was 35.12 ± 20.18 years, aligning with demographic profiles reported by Lourijzen et al (35.4 ± 14.2 years) and Elahi et al (40.7 ± 13.5 years).¹⁴⁻¹⁵

Importantly, our study identified significant associations between SNOT-22 score improvements and specific demographic and clinical variables. Unemployment status and a positive family history of nasal allergy were both significantly correlated with greater postoperative symptom reduction ($p < 0.05$).¹⁶⁻¹⁸ These findings suggest that socioeconomic and genetic factors may influence disease severity and response to surgical intervention. Age also emerged as a significant predictor of postoperative improvement, with patients aged 15–35 years demonstrating greater symptom relief compared to older age groups. This contrasts with some international studies that report more pronounced improvements in patients aged ≥ 50 years.¹⁹⁻²⁰ This discrepancy may reflect differences in disease chronicity, tissue remodeling, or healthcare-seeking behavior across age groups. Unlike previous studies that primarily reference international data, our analysis incorporates findings from local clinical practice, thereby enhancing contextual relevance. A study conducted by Khan et al. reported similar postoperative improvements in SNOT-22 scores among CRSwNP patients undergoing FESS, particularly in younger age groups and those with a positive family history of allergy.²¹ This alignment with national data strengthens the generalizability

of our findings within the regional population. Despite, its strengths, this study is limited by a relatively small sample size, geographic constraints, potential selection bias, and short-term follow-up. Additionally, reliance on self-reported data may introduce subjective variability. Nevertheless, our findings underscore the critical role of psychological factors in treatment planning and outcomes. While most patients reported improved psychological well-being postoperatively, persistent sleep and emotional disturbances in some cases suggest a multifactorial etiology, including underlying sleep disorders, chronic inflammation, and pre-existing mental health conditions. Patients with elevated preoperative psychosocial and sleep domain scores may benefit from multidisciplinary care, including psychiatric evaluation and sleep medicine referral. Addressing these comorbidities is essential for optimizing surgical outcomes and enhancing overall QOL in CRSwNP management.

Conclusion

Functional Endoscopic Sinus Surgery (FESS) demonstrated significant efficacy in improving nasal symptoms among patients with Chronic Rhinosinusitis with Nasal Polyps (CRSwNP), as evidenced by a marked reduction in SNOT-22 scores postoperatively ($p = 0.036$). Patients with severe preoperative symptoms exhibited the greatest improvement. Stratified analysis revealed significant associations with younger age (15–35 years), positive family history of nasal allergy, and unemployment status. No significant differences were observed by gender, education, or specific nasal complaints. These findings affirm FESS as an effective intervention for CRSwNP and underscore the importance of baseline symptom severity in predicting postoperative outcomes.

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