ORIGINAL ARTICLE

Functional Endoscopic Sinus Surgery Outcomes Assessed by the Sinonasal Outcome Test-22: A Prospective Cohort Study from a Single Institution in Rawalpindi

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ABSTRACT

Objective: Using the Sinonasal Outcome Test-22 (SNOT-22), this study aimed to evaluate the effectiveness of Functional Endoscopic Sinus Surgery (FESS) in improving symptoms and quality of life among patients with chronic sinusitis.

Study Design: Prospective cohort study.

Place and Duration of Study: The study was conducted at the Department of ENT, Combined Military Hospital (CMH), Rawalpindi, Pakistan from 1st September 2023 to 1st September 2024.

Methods: A single-arm prospective cohort study assessing surgical outcomes was performed on 50 patients diagnosed with chronic rhinosinusitis to evaluate the impact of FESS on quality of life. Participants completed the SNOT-22 questionnaire before surgery and at 1-, 3-, 6-, and 12-month postoperative intervals. Patients were categorized as having chronic rhinosinusitis with lesions, without lesions, or fungal sinusitis. Pre- and postoperative SNOT-22 scores were compared using an independent t-test; *P*-values <0.001 were considered significant.

Results: The mean age of participants was 34.5 ± 5.45 years (range 25–50 years). Of the total, 30% had chronic rhinosinusitis without lesions, 50% lesions, and 20% had fungal sinusitis. Recurrence occurred in 12% of cases, and 8% required revision surgery. Asthma was present in 24% of patients. Postoperative SNOT-22 scores showed a highly significant reduction ($P < 0.001$), indicating marked symptom improvement. Patients with lesions demonstrated greater improvement in sinonasal outcomes and quality of life following surgery.

Conclusion: Functional Endoscopic Sinus Surgery significantly improves symptoms and overall well-being in patients with chronic rhinosinusitis. The substantial decrease in SNOT-22 scores after surgery confirms its effectiveness, especially among patients with lesions, by enhancing disease control and quality of life.

Keywords: *Endoscopic Surgical Procedure, Sinonasal Outcome Test, Sinusitis.*

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Introduction

Rhinosinusitis involves inflammation of the mucous membrane in the nasal cavity and one or more of the paranasal sinuses. While it does not increase mortality, it can significantly affect the quality of life (QoL). Chronic rhinosinusitis (CRS) in adults is among the most widespread health conditions that prompt individuals to seek medical attention, leading to substantial direct medical expenses.[1] It is a predominant disorder that leads to considerable symptoms for those affected, imposing a burden on healthcare resources and resulting in productivity loss.[2] Chronic Rhinosinusitis (CRS) comprises a range of conditions marked by persistent inflammation of the mucous membrane in the nasal passages and paranasal sinuses that lasts for 12 weeks or longer.[3]

The distinctive symptoms consist of two or more indicators, at least one of which is connected to nasal

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blockage, obstruction, congestion, or discharge (anterior/posterior nasal drip); those may or may not be accompanied by facial pain or pressure; additionally, those may or may not be accompanied by a decrease in or loss of smell that lasts longer than twelve weeks.[2] A less invasive procedure called functional endoscopic sinus surgery is frequently suggested for persistent rhinosinusitis. Patients are typically not systematically assessed for functional or clinical improvements following surgery, despite its use.[4]

Functional endoscopic sinus surgery (FESS) is a standard procedure conducted at our tertiary care hospital, with patients regularly attending clinic appointments for endoscopic examination of the nasal cavity. However, until now, patients have not been specifically questioned about symptom improvement after surgery using disease-specific questionnaires. Therefore, the objective of this study is to evaluate symptom improvement and quality of life (QoL) following functional endoscopic sinus surgery (FESS).[5] The SNOT-22 is a validated instrument used to evaluate the severity of symptoms and the impact on health-related quality of life (QoL) in sinonasal disorders. Its reliability, validity, responsiveness, and user-friendliness have been thoroughly examined and documented in previous research. Quality of life measures have evolved to understand better the effect of diseases on a patient's well-being. This study aims to assess clinical results and QoL in patients with CRS following FESS.[6]

Methods

The study was conducted at the Department of ENT, Combined Military Hospital (CMH), Rawalpindi from 1st September 2023 to 1st September 2024 after taking approval from the Ethical Review Committee of the hospital vide letter no: 672, dated: 22nd August 2023. After meeting the requirements for enrolment, a total of 50 patients were added. All enrolled participants gave their informed consent after being given an explanation in their native tongue. Every patient had a comprehensive examination. Data collection was done using a predesign questionnaire. The statistical analysis was conducted using SPSS Version 25.

The statistical significance of the pre-operative SNOT scores was evaluated using a one-sample t-test, which yielded a *P*-value of < 0.0001. The postoperative SNOT scores at 1, 3, 6, and 12 months were assessed using the paired-sample t-test, yielding a *P*-value of < 0.001 for all time points. A highly significant statistical difference (*P*-value < 0.001) was found between pre-operative and post-operative SNOT scores, using the independent t-test.

Inclusion Criteria: Patients aged 18 to 50 years, regardless of gender or race, with available pre-op CT scans and a history of failure to respond to medical therapy, were included to focus on adults undergoing FESS for chronic sinusitis.

Exclusion Criteria: The patients excluded from this study were those under the age of 18 years or above 50 years, pregnant females, immunodeficient patients and those without pre-op CT scans.

SNOT-22 questionnaire: The Sino Nasal Outcome Test-22, or SNOT-22, is an authenticated measure of CRS-related standardized living patterns. A score of 0 shows no problems, a score of 1 suggests very few difficulties, a score of 2 points out slight or minor difficulties, a score of 3 specifies modest difficulties, a score of 4 directs considerable challenges, and a score of 5 represents the worst-case scenario. When the SNOT-22 score is greater, the severity of the disease or its symptoms increases. The possible range for the sum of the scores is between 0 and 110.

Results

This study included a total of 50 patients comprising of 56 % males (N = 28) and 44 % female (N=22). The mean age was reported 34.5 ± 5.45. Half of the patients were diagnosed with CRS with polyp while 30 % were indicated with CRS without polyp and the rest of the 20% were diagnosed with allergic fungal sinusitis. Only 12 % of them have shown recurrence while the rest of them did not show any recurrence. 8 % (N=4) have undergone recurrent surgery. 76 % of patients did not show any indication of asthma. (Table 1).

The findings indicated that preoperative SNOT ratings were on a higher level, but that after FESS, there was a significant decrease in those ratings at 1, 3, 6 and 12 months after surgical procedure as shown in the figure below. (Figure. 1). Table 2 demonstrates the mean SNOT score in the preoperative phase and during postoperative follow-up visits at 1, 3, 6, and 12 months.

Patients reported that nasal obstruction or

Table 1: Demographic and clinical variables of patients

Parameters		N	%
Gender	Male	28	56%
	Female	22	44%
Diagnosis	CRS without polyp	15	30%
	CRS with polyp	25	50%
	Allergic fungal sinusitis	10	20%
Recurrence	Yes	6	12%
	No	44	88%
Recurrent surgery	Yes	4	8%
	No	46	92%
Presence of asthma	Yes	12	24%
	No	38	76%
Age (Years)	Mean, SD	34.5 ± 5.45	-

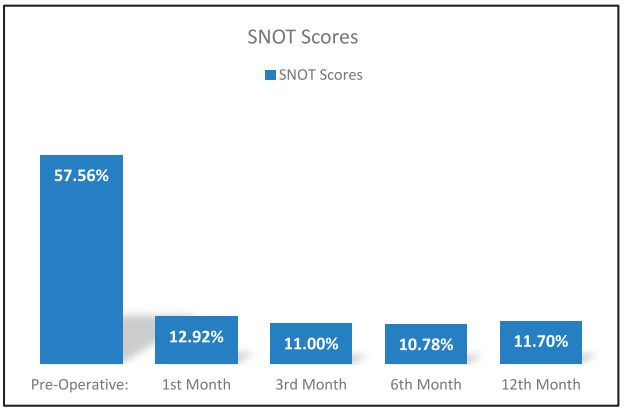

Fig.1: Sinonasal Outcome Test (SNOT) Score pre-op and post-op

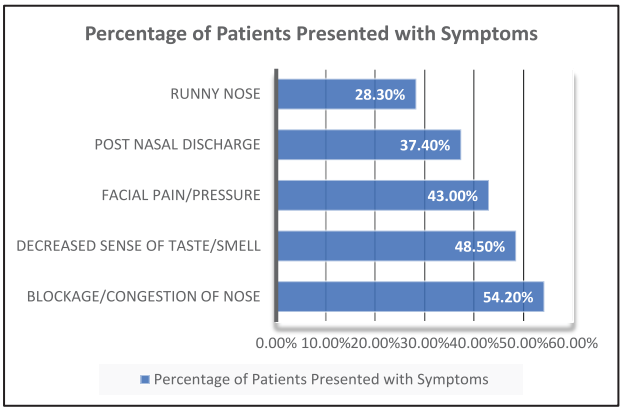

Fig.2: Percentage of patients presenting with symptoms

Table 2: Mean Sinonasal Outcome Test-22-Scores: Pre-Operative and Post-Operative Outcomes (1, 3, 6, and 12 Months)

Patient Data	Pre-op Score	Post-op 1 Month	Post-op 3 Months	Post-op 6 Months	Post-op 12 Months
Total number of Patients	N=50	N=50	N=50	N=50	N=50
Mean SNOT-22 scores	57.56	12.92	9.92	10.78	11.70
Standard Deviation	4.39	3.61	2.63	2.03	2.39

congestion was the most bothersome symptom of their condition. The survey identified thatfacial discomfort or pressure, post-nasal drip, and rhinorrhea were the fourth and fifth most common symptoms, respectively. Additionally, anosmia or hyposmia was noted as the second most troubling symptom associated with chronic rhinosinusitis. A bar graph illustrates these findings on the vertical axis. (Figure. 2).

Discussion

Chronic rhinosinusitis is a condition that leads to considerable patient morbidity and imposes a substantial burden on healthcare resources.[7]

Chronic Rhinosinusitis is now the most widespread conditions globally. While the majority of patients respond well to medical therapy, those who do not improve with medication can be treated with Endoscopic Sinus Surgery.[8] Functional Endoscopic Sinus Surgery (FESS) has long been recognized as an effective treatment for chronic rhinosinusitis (CRS) to reduce mucosal inflammation and improve visualization of sinuses.[9] Inflammation is physiological in nature, and conditions like CRS and other similar diseases arise only when inflammation persists.[10]

Historically, computed tomography (CT) scans and

nasal endoscopy were employed to evaluate therapeutic outcomes.[11] However, the study indicates a lack of correlation between patient symptoms and radiographic or endoscopic findings.[12] This discrepancy has led clinicians to place greater emphasis on subjective assessments to gauge surgical outcomes better. Several assessment tools, including endoscopic scoring systems and CT evaluations, are available to assess response to various treatment approaches.[13] Several disease-specific questionnaires have been created to assess the quality of life in patients, including the Sino-Nasal Outcome Test, the Sino-Nasal Assessment Questionnaire 11, the Chronic Sinusitis Survey and the Rhinosinusitis Disability Index. Among these, the SNOT-22 (Sino-Nasal Outcome Test-22) is the most extensively used and validated instrument for assessing postoperative quality of life and the effects of surgical interventions on patients.[11]

Bezerra TF et al. investigated patients aged 18.4 to 85.3 years, with an average age of 49 years.[14] Deal and colleagues studied individuals aged 18 to 80 years. Fokkens WJ et al. led a five-year study on patients aged 16 to 88 years, finding an average age of 50 years.[2] Crump RT et al. studied individuals aged 40 to 70 years in 2016.[15] The average age in our study was 34.5 years, aligning with previous findings. In a recent study, patients aged 18 to 60 years, with a mean age of 28.76 ± 8.47 years.[16] Each of the earlier studies encompassed a broader age range than ours, resulting in an average age group older than 35 years. The majority of research participants were aged between 20 to 40 years. Given the wide age range, it remains unclear how patients' ages have an influence on the effect of CRS on the quality of life. Our study affirmed the predominance of males (56%). Five of the ten studies analyzed had a higher proportion of female participants, and five had a higher proportion of male participants, suggesting that gender does not significantly affect rhinosinusitis treatment outcomes. Our study included 56% male participants, consistent with other studies, indicating a slight male predominance.[5]

The most common symptom reported in our study was blockage of nose 54.2% followed by Decreased sense of taste/smell 48.5%, Facial pain/pressure 43.0%, Post nasal discharge in 37.4% and runny nose in 28.3%, in a study conducted by Verma P et al. stated that Nasal obstruction was the most common symptom, reported in 32 (80%) patients, followed by rhinorrhea (75%), then headache (72.5%) and facial pain (72.5%), sneezing (70%), and hyposmia (37.5%) being the least observed symptom. The results showed that preoperative SNOT scores were initially high, but there was a significant reduction in these scores at 1, 3, 6, and 12 months following the FESS procedure, the mean preoperative score was 53.10.[6]

Our research included participants with allergic fungal rhinosinusitis (AFRS) and chronic rhinosinusitis with and without nasal polyps. Most studies did not compare the AFRS group with the other two major categories.[17] Masterson L et al. analyzed the three groups and found noteworthy improvement in the AFRS group over one year.[18] Our data indicated that the five most bothersome symptoms were, in descending order nasal congestion, followed by reduced sense of smell or taste, then facial pain, post-nasal drip and rhinorrhea being the last. Damm M et al. also identified nasal obstruction as the most common complaint (94%). This information helps identify the most common subjective complaints, allowing for prioritization in treatment.[19]

The SNOT-22 is an updated version of the SNOT-20 and the 31-item Rhinosinusitis Outcome Measure (RSOM-31). It expands on the original 20-item tool by including two additional parameters: nasal obstruction and alterations in the sense of taste and smell.[20]

However, the SNOT-22 has been assessed as a prediction tool for a number of disorders more recently. This scoping review's goal is to find out how often SNOT-22 is used in this fashion and provide doctors with an understandable presentation of the data.[21] Surgeons can collect pre- and post-operative SNOT-22 data from patients. This will require a benchmark in order to evaluate their progress.[22] With its versatility, the SNOT-22 can be used to predict a range of diagnoses, outcomes, and patient preferences. Applying these predictions to clinical practice, however, requires caution because more study is needed to validate them based on SNOT-22 responses.[21]

The study's limitation is that it was conducted at a single institution, but its strength is that it measured

the quality of life of individuals with all primary subtypes of prolonged rhinosinusitis. Using this information, one may determine which subjective concerns are more common and should be handled first

Conclusion

This study demonstrated that FESS significantly improved symptoms in patients with chronic rhinosinusitis, as evidenced by a notable reduction in SNOT-22 scores at 1, 3, 6, and 12 months postoperatively. The majority of patients did not experience recurrence or require further surgery, indicating the procedure's effectiveness in managing CRS.

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REFERENCES

1. Mandal S, Sharma A. Effect on quality of life of patients before and after functional endoscopic sinus surgery. Indian Journal of Otolaryngology and Head & Neck Surgery. 2019; 71: 2065-71. doi: 10.1007/s12070-018-1471-8
2. Fokkens WJ, Lund VJ, Hopkins C, Hellings PW, Kern R, Reitsma S, et al. European position paper on rhinosinusitis and nasal polyps 2020. Rhinology. 2020; 58: 1-464. doi: 10.4193/Rhin20.600
3. Vaid L, Khanna S, Singh PP. Impact of nasal polyps on quality of life of chronic sinusitis patients. Indian Journal of Otolaryngology and Head & Neck Surgery. 2007; 59: 136-41. doi: 10.1007/s12070-007-0040-3
4. Migha KP, Vasu RK, Reynolds AM. Effect of functional endoscopic sinus surgery on functional and symptomatic outcomes in patients with chronic rhinosinusitis: a cross sectional study. Indian Journal of Otolaryngology and Head & Neck Surgery. 2023; 75: 3326-31. doi: 10.1007/s12070-023-03953-5
5. Qadeer S, Akhtar S, Junaid M, Halim MS. Quality of life after functional endoscopic sinus surgery in patients with chronic rhinosinusitis. International Journal of Otolaryngology and Head & Neck Surgery. 2018; 7: 189-198.
6. Verma P, Rawat DS, Aseri Y, Verma PC, Singh BK. A prospective longitudinal study of clinical outcome and quality of life assessment in patients with chronic rhinosinusitis after functional endoscopic sinus surgery using sino nasal outcome test-22. Indian Journal of Otolaryngology and Head & Neck Surgery. 2022; 74: 792-9. doi: 10.1007/s12070-020-01847-4
7. Sharma A, Raghuwanshi N, Gupta Y, Upadhyay A, Mundra R. Snot-22 a Predictive and Assessment Tool for Subjective Improvement After Fess in Patients of Chronic Rhinosinusitis. Indian Journal of Otolaryngology and Head & Neck Surgery. 2023; 75: 1062-8. doi: 10.1007/s12070-023-03582-y.
8. De Corso E, Settimi S, Tricarico L, Mele DA, Mastrapasqua RF, Di Cesare T, et al. Predictors of disease control after endoscopic sinus surgery plus long-term local corticosteroids in CRSwNP. American Journal of Rhinology & Allergy. 2021; 35: 77-85. doi: 10.1177/1945892420936196
9. Prithviraj SM, Anbarasan S, Sankar S, Haritha S. Role of Functional Endoscopic Sinus Surgery in Patients with Chronic Rhinosinusitis and Laryngopharyngeal Reflux: A Prospective Study. Indian Journal of Otolaryngology and Head & Neck Surgery. 2024; 76: 5505-12. doi: 10.1007/s12070-024-05020-z.
10. Fan HL, Han ZT, Gong XR, Wu YQ, Fu YJ, Zhu TM, et al. Macrophages in CRSwNP: Do they deserve more attention? International Immunopharmacol. 2024; 134: 112236. doi: 10.1016/j.intimp.2024.112236.
11. Khan AH, Reaney M, Guillemin I, Nelson L, Qin S, Kamat S, et al. Development of Sinonasal Outcome Test (SNOT-22) domains in prolonged rhinosinusitis with nasal polyps. Laryngoscope. 2022; 132: 933-41. doi: 10.1002/lary.29766
12. Caliaperoumal VB, Dharanya GS, Velayutham P, Krishnaswami B, Krishnan KK, Savery N, et al. Correlation of clinical symptoms with nasal endoscopy and radiological findings in the diagnosis of chronic rhinosinusitis: A prospective observational study. Cureus. 2021; 13: e16575. doi: 10.7759/cureus.16575
13. Sellami M, Abdi S, Boudjenah F. Effect of endoscopic sinus surgery on quality of life among the patients of chronic rhinosinusitis with nasal polyposis. The Egyptian Journal of Otolaryngology. 2023; 39: 164. doi: 10.1186/s43163-023-00528-7
14. Bezerra TF, Piccirillo JF, Fornazieri MA, Pilan RR, Pinna FD, Padua FG, et al. Avaliação da qualidade de vida após sinusectomia endoscópica para rinossinusite crônica. Brazilian Journal of Otorhinolaryngology. 2012; 78: 96-102. doi: 10.1590/s1808-86942012000200015
15. Crump RT, Liu G, Janjua A, Sutherland JM. Analyzing the 22-item Sino-Nasal Outcome Test using item response theory. InInternational Forum of Allergy & Rhinology. 2016; 6: 914-20. doi: 10.1002/alr.21770
16. Nair S, Dutta A, Rajagopalan R, Nambiar S. Endoscopic sinus surgery in chronic rhinosinusitis and nasal polyposis: a comparative study. Indian Journal of Otolaryngology and Head & Neck Surgery. 2011; 63: 50-5. doi: 10.1007/s12070-011-0119-8
17. Champagne JP, Antisdel JL, Woodard TD, Kountakis SE. Epidemiologic factors affect surgical outcomes in allergic fungal sinusitis. Laryngoscope. 2010; 120: 2322-4. doi: 10.1002/lary.21127
18. Masterson L, Egro FM, Bewick J, Erskine SE, Clark A, Javer AR, et al. Quality-of-life outcomes after sinus surgery in allergic fungal rhinosinusitis versus nonfungal chronic rhinosinusitis. American Journal of Rhinology & Allergy. 2016; 30: e30-5. doi: 10.2500/ajra.2016.30.4280

19. Damm M, Quante G, Jungehuelsing M, Stennert E. Impact of functional endoscopic sinus surgery on symptoms and quality of life in chronic rhinosinusitis. The Laryngoscope. 2002; 112: 310-5. doi: 10.1097/00005537-200202000-00020
20. Prajwal Gowda PR, Bai JS, Naik SM, Abhilasha S. Evaluation of Improvement in Chronic Rhinosinusitis After Endoscopic Sinus Surgery Using Sino-Nasal Outcome Test-22 (SNOT22) Symptom Score. Indian Journal of Otolaryngology and Head & Neck Surgery. 2023; 75: 3337-43. doi: 10.1007/s12070-023-03929-5.
21. Fu Y, Liu D, Huang W, Wang Z, Zhang Y. A Systematic Review and Meta-analysis of SNOT-22 Outcomes After Sinus Surgery. Ear, Nose & Throat Journal. 2023: 1455613231187761. doi: 10.1177/01455613231187761
22. Liu M, Liu J, Weitzel EK, Chen PG. The predictive utility of the 22-item sino-nasal outcome test (SNOT-22): a scoping review. International forum of allergy & rhinology. 2022; 12: 83-102. doi: 10.1002/alr.22888

Author Contributions

MA: Conception and design of the work
SA: Validation of data, interpretation, and write-up of results
UH: Revising, editing, and supervising for intellectual content
HA: Data acquisition, curation, and statistical analysis
TA: Manuscript writing for methodology design and investigation
FB: Writing the original draft, proofreading, and approval for final submission