

Original Article

Is Sino-Nasal Outcome Test-22 Reliable for Guiding Chronic Rhinosinusitis Patients for Endoscopic Sinus Surgery?

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ABSTRACT

Chronic rhino-sinusitis (CRS) is a significant health problem whose incidence and prevalence is rising. An emphasis has been placed on disease-specific quality of life (QoL) as the predominant measure for most current outcome studies. Therefore a validated measure of health-related QoL in sinonasal disease is needed. The present prospective and observational study was conducted on 50 patients in the Department of ENT at Govt. Medical College and Rajindra Hospital Patiala, Punjab, India. The primary outcomes were the following: (1) the chance of attaining minimal clinically important difference (MCID) improvements of nine points at the 22-item Sino-Nasal Outcome Test (SNOT-22) after endoscopic sinus surgery (ESS) for different preoperative QoL levels, and (2) the percentage of relative improvement in SNOT-22 after ESS for different preoperative QoL levels. **Methods:** Patients with CRS who were elected for ESS were prospectively enrolled into an observational cohort study. They were categorized into 10 preoperative SNOT-22 groups based on 10-point increments beginning with a score of 10 and ending at 110. Standard protocol for all patients presenting for evaluation included completion of the SNOT-22 prior to and following surgical intervention. The scores were calculated and the data collected were compiled and analyzed. **Results:** A total of 50 patients were included in this study. Patients with a SNOT-22 score between 10 and 19 had the lowest chance of achieving an MCID. Patients with a SNOT-22 score greater than 30 had a greater than 90% chance of achieving an MCID, and there was a relative improvement of 43.3% on their preoperative SNOT-22 scores. CRS patients with polyp had better outcomes (47.1% improvement) after ESS than those without polyp (33.2% improvement). **Conclusion:** There is an increased probability of achieving an MCID at SNOT-22 score >30 and in general the percentage of relative improvement increased with an increase in preoperative SNOT score.

KEYWORDS: Chronic rhinosinusitis, endoscopic sinus surgery, nasal polyp, sino-nasal outcome test-22

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INTRODUCTION

Chronic rhinosinusitis (CRS) is a common and debilitating condition with a significant economic impact.^[1] It poses a considerable burden to the health-care providers and patient. Not all the symptoms can be precisely defined by the patient. Hence, a need arises for devising a quantifiable scale for nasal symptoms just like the visual analog scale for pain. A European position paper on rhinosinusitis and nasal polyps

[Figures 1 and 2] recommends the subjective assessment of symptoms using validated questionnaires.^[2] Ideally, both patient and physician would possess all information for the outcome of a specific intervention; thus, decisions would be made based on a complete understanding of the

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benefits, risks, and cost. Unfortunately, the reality is that patients function in health systems with an incomplete understanding of outcomes. As a result, practice patterns may be potentially driven by physician opinion rather than informed patient choice and preference. This can lead to undesired variation in practice and reduce the overall performance of a health-care system. Therefore, it is important to improve the understanding of potential outcomes from an intervention to provide patients with essential information to make an informed and rational decision. CRS refers to a condition that lasts at least 12 weeks despite being treated and shows at least two major or one major and two minor symptoms of the following:

First-line therapy for the treatment of CRS is aimed at reducing underlying inflammation and facilitating clearance of paranasal sinuses. Antibiotics, topical steroids, and systemic steroids are mainstays of treatment.^[3] The objective of this study was to evaluate the proportion of patients receiving a minimal clinically important difference (MCID) and percentage of relative improvement after endoscopic sinus surgery (ESS) based on their preoperative quality of life (QoL) level. Sino-nasal outcome test-22 (SNOT-22) covers the physical problems and functional limitations and also the emotional consequences of patients having CRS. The SNOT-22 has already been adopted by many clinicians both for assessing CRS and evaluating the outcome of treatment of nasal polyposis and in nasal septal surgery. It is vital that inappropriate surgeries in patients with CRS are avoided, and it has been suggested that the SNOT-22 may act as a robust tool for the subjective assessment of patient's symptoms.^[2]

MATERIALS AND METHODS

The present prospective, observational study was conducted at the Department of ENT, Rajindra Hospital, Patiala, Punjab, India, on 50 patients with CRS fulfilling the following inclusion and exclusion criteria:

Inclusion criteria

- Age >18 years
- Diagnosed cases of CRS who remained refractory to at least 6 weeks of medical therapy, which includes a minimum 7-day course of systemic corticosteroid, topically administered nasal steroid, and 2-week administration of a broad-spectrum systemic antibiotic
- Patient's willingness to participate in the study

Exclusion criteria

- Patient without a minimum of 3-month follow-up after ESS

- Patients who elected to continue with medical therapy as opposed to receiving sinus surgery
- Systemic granulomatous disease
- Recurrent acute rhinosinusitis
- Cystic fibrosis
- Ciliary dyskinesia
- Preoperative SNOT-22 score between 0 and 9
- Patient's refusal.

Patients with CRS were categorized into 10 preoperative SNOT-22 groups based on 10-point increments beginning with a score of 10 and ending at 110. Standard protocol for all patients presenting for evaluation included completion of the SNOT-22 before and following surgical intervention. Each participant would complete the SNOT-22 during a clinical visit by answering all questions based on 0–5 scale, where 0 defined no problems with the given symptom and 5 defined the maximum problems [Table 1]. The percentage of relative improvement for each preoperative SNOT-22 was calculated using the following formula: [(mean postoperative score) – (mean preoperative score)/mean preoperative score] × 100. The proportion of patients achieving a SNOT-22 MCID of at least nine-point improvement and the percentage of relative improvement (%) for each preoperative SNOT-22 group were calculated.

RESULTS

The mean age in this study ranged from 30.00 + 13.54–46.66 + 12.58 years [Table 2]. A maximum number of patients was in the age group of 26–40 years. There were 70% males and 30% females with 70% being nonsmokers and 30% smokers. The mean preoperative and postoperative SNOT-22 scores for the smokers were 61.06 + 19.30 and 38.33 + 15.69, respectively and those for nonsmokers were 43.20 + 18.65 and 23.88 + 7.71, respectively. Both groups had statistically significant $P < 0.001$.

The patients with depression had higher preoperative SNOT-22 score (59.54 + 12.85) and greater postoperative improvement with mean postoperative score (26.48 + 11.95); however, P was statistically significant for both the groups ($P < 0.001$).

When considering the CRS cohort as a single entity, 81% achieved an MCID improvement of nine-points after ESS, with an average of 43.3% improvement in their preoperative SNOT-22 scores. There was increased probability of achieving an MCID at SNOT-22 score >30 and percentage of relative improvement increased with increasing preoperative SNOT score. The patients with and without polyp had significant

Table 1: Symptomatic criteria of Chronic Rhinosinusitis

Major symptoms	Minor symptoms
Facial pain/pressure	Headache
Facial congestion/fullness	Fever (nonacute)
Nasal obstruction/blockage	Halitosis
Nasal discharge/purulence/dicoloration	Fatigue
Posterior drainage	Dental pain
Hyposmia/anosmia	Cough
Purulence on nasal examination	Ear pain/pressure/fullness

Table 2: Distribution of mean age of chronic rhinosinusitis patients across various 22-item sino-nasal outcome test groups

Preoperative SNOT-22 group	Mean age
10-19 (n=2)	38.50±23.33
20-29 (n=9)	38.00±16.11
30-39 (n=10)	34.10±12.31
40-49 (n=8)	46.12±12.95
50-59 (n=6)	31.50±13.95
60-69 (n=6)	33.83±15.43
70-79 (n=4)	30.00±13.54
80-89 (n=3)	46.66±12.58
90-99 (n=2)	34.00±11.31
100-109 (n=0)	

SNOT-22=22-item sino-nasal outcome test

Table 3: Probability of chronic rhinosinusitis with nasal polyp patients achieving minimal clinically important difference after endoscopic sinus surgery based on preoperative 22-item sino-nasal outcome test score group

Preoperative SNOT-22 group	Probability of patients achieved MCID (%)	Relative improvement (%)
10-19 (n=1)	0	-41.00
20-29 (n=7)	3 (42.8)	-28.81
30-39 (n=6)	6 (100)	-38.21
40-49 (n=8)	8 (100)	-40.76
50-59 (n=4)	4 (100)	-56.42
60-69 (n=5)	5 (100)	-50.46
70-79 (n=3)	3 (100)	-50.90
80-89 (n=2)	2 (100)	-32.31
90-99 (n=2)	2 (100)	-55.74
100-109 (n=0)		

MCID=Minimal clinically important difference; SNOT-22=22-item sino-nasal outcome test

improvement after ESS with $P < 0.001$ with greater decrease in score in patients with CRS with polyp group (CRSwNP) [Table 3].

The patients who had never undergone any FESS and those who underwent FESS showed significant improvement with mean postoperative scores being

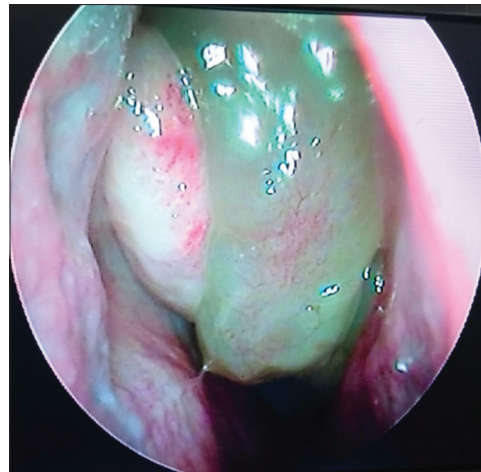


Figure 1: Polypoidal mass seen in middle meatus of chronic rhinosinusitis patient

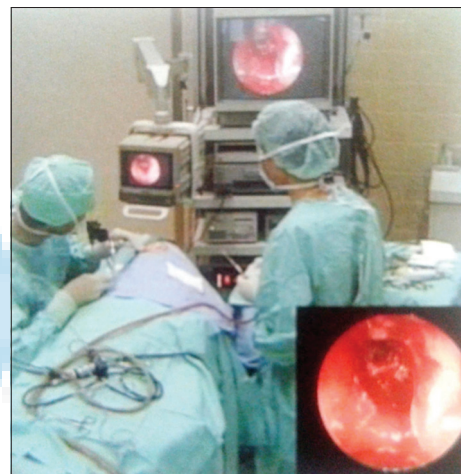


Figure 2: Intraoperative picture of endoscopic sinus surgery

28.38 + 12.86 and 25.66 + 3.51, respectively ($P < 0.001$) [Table 4].

In this study, preoperatively 68% patients had runny nose. Nasal obstruction was present in 72% of cases preoperatively; however, 74% had hyposmia and 60% had postnasal discharge, which postoperatively reduced to 18%, 16%, 42%, and 22% ($P < 0.001$, significant).

Other symptoms such as sneezing, facial pain, and ear fullness showed significant results with greater improvement postoperatively after ESS. In this study, those clusters that related to nasal and to ear and facial symptoms were significantly associated with postoperative improvement ($P < 0.05$) with the exception of cough. Some of the symptoms such as “difficulty falling asleep,” “waking up tired,” and “embarrassed” also showed significant improvement [Table 5].

Table 4: Probability of patient with chronic rhinosinusitis (with or without polyps) achieving minimal clinically important difference after endoscopic sinus surgery based on preoperative 22-item sino-nasal outcome test score group

Preoperative SNOT-22 group	Mean preoperative score	Mean postoperative score	Probability of patients achieved MCID (%)	Relative improvement (%)
10-19 (n=2)	15.00±2.82	9.50±2.12	0	-39.5
20-29 (n=9)	26.00±2.73	18.00±2.34	5 (55.5)	-30.76
30-39 (n=10)	35.00±2.35	22.30±3.43	9 (90)	-36.29
40-49 (n=8)	46.00±2.72	27.25±4.20	8 (100)	-40.76
50-59 (n=6)	55.66±3.50	27.33±8.09	6 (100)	-51.50
60-69 (n=6)	65.16±3.06	35.66±12.90	6 (100)	-45.27
70-79 (n=4)	73.00±0.81	40.00±8.16	4 (100)	-45.21
80-89 (n=3)	82.00±2.00	56.67±6.80	3 (100)	-30.89
90-99 (n=2)	91.50±0.70	40.50±17.67	2 (100)	-55.74
100-109 (n=0)				

MCID=minimal clinically important difference; SNOT-22=22-item sino-nasal outcome test

Table 5: Improvement in individual 22-item sino-nasal outcome test score categories

SNOT-22 category	Preoperative number	Postoperative number	P
Need to blow nose	40	30	0.029*
Nasal blockage	36	8	<0.001*
Sneezing	23	10	0.006*
Runny nose	34	9	<0.001*
Cough	22	19	0.542
Postnasal discharge	30	11	<0.001*
Thick nasal discharge	34	24	0.043*
Ear fullness	26	10	0.0001*
Dizziness	15	6	0.027*
Ear pain	21	11	0.032*
Facial pain/pressure	30	6	<0.001*
Decreased sense of smell/taste	32	21	0.028*
Difficulty in falling asleep	28	18	0.029*
Waking up at night	19	16	0.529
Lack of good night's sleep	24	20	0.420
Wake up tired	26	15	0.025*
Fatigue	23	21	0.687
Reduced productivity	18	16	0.673
Reduced concentration	11	8	0.444
Frustrated/restless/irritable	9	7	0.585
Sad	10	7	0.424
Embarrassed	14	5	0.22*

*Significant P value. SNOT-22=22-item sino-nasal outcome test

DISCUSSION

Accurate and sensitive measures of how interventions affect QoL are critical for our subspecialty. The rationing of national healthcare resources is inevitable. Accurately capturing the impact of an intervention on our patients will be essential in guiding an individual and societal decision on the value of any given intervention.

In this study, the mean age ranged from 30.00 ± 13.54–46.66 ± 12.58 years. Rudmik *et al.*,^[4] Sedaghat *et al.*,^[5] Vishal *et al.*,^[6] and Lange *et al.*^[7] reported the same age incidence of fourth to fifth decade of life. Savastano *et al.*^[8] conducted a study with 63.6% males and 36.4% females with a male to female ratio being 1.75:1. Cabrera-Ramirez *et al.*^[9] conducted a study with 66.7% males and 33.3% females. In this study, males were the predominant sex. This may be due to either higher prevalence of CRS in males or higher male attendance in the hospital.

Kennedy *et al.*^[11] demonstrated comparable subjective outcomes between smokers and nonsmokers after ESS in a cohort with 19% of smokers. Polley^[10] and Krzeski *et al.*^[11] also stated that there was no significant difference in the postoperative QoL scale scores between smokers and nonsmokers. This study correlated well with these studies. It means smoking status is not predictive of improvement after ESS.

Depression had worse baseline QoL scores than other patients with CRS. In this study, patients with depression experienced similar disease-specific QoL improvements from sinus surgery compared with other patients with CRS. Various studies^[12,13] have drawn the same inference although patients with depression had worse pre and postoperative health-related QoL scores.

Hopkins *et al.*^[14] stated that the CRS patients with polyps had greater improvement than CRS patients without polyp. A study by Vishal *et al.*^[6] demonstrated significant improvement in SNOT-22 scores in CRS patients with polyp (27.75 ± 2.78) as well as without polyp (21.47 ± 2.24), but scores after 3 months were much better in CRS patients with polyp. In this study, 76% patients had polyps. Both the patients with polyp and without polyp had significant improvement (47.1% vs. 33.2%, P < 0.001) after ESS with greater decrease in score in polyp group (CRSwNP).

In this study, 81% patients achieved an MCID improvement of nine-points after ESS with an average of 43.3% improvement in their preoperative SNOT-22 scores. There is increased probability of achieving an MCID at SNOT-22 score >30 and in general percentage of relative improvement increased with an increase in preoperative SNOT score. Rudmik *et al.*^[4] studied a cohort that showed 80% patients achieved MCID after ESS and on an average, patients achieved 46.4% improvement. Patients can be guided accordingly regarding relative improvement after ESS based on which they can take decisions whether to undergo surgery or not.

A study by Pade and Hummel^[15] evaluated 206 patients with an olfactory impairment who elected ESS for CRS. They demonstrated that 23% patients experienced improvement, 68% experienced no change, and the CRS of 9% got worse after ESS. The results suggested that the presence of nasal polyposis and eosinophilia predicted olfactory improvement. In contrast to the above studies, a recent study by Jiang *et al.*^[16] showed that ESS had no impact on olfactory improvement. In this study, hyposmia improved significantly with $P = 0.028$. Although the improvement was there, it was still less compared to other nasal symptoms.

Deconde *et al.*^[17] showed surgical cohort experienced greater improvement than the medical cohort across all domains ($P < 0.001$) with marginally lesser improvement in psychological and sleep domains. Savastano *et al.*^[8] described significant improvement for only four symptoms: need to blow nose, runny nose, dense nasal drip, and nasal obstruction. Due to many of the questions in the SNOT-22 cluster together, we grouped questions into main categories: nasal symptoms (need to blow nose, nasal blockage, sneezing, runny nose, thick nasal discharge, and decreased sense of smell), ear symptoms (ear fullness, dizziness, and ear pain), oropharyngeal and facial symptoms (cough, postnasal drip, and facial pain), sleep-related symptoms (difficulty falling sleep, wake up at night, lack of good night sleep, and wake up tired), and systemic symptoms (fatigue, reduced productivity, reduced concentration, frustrated, sad, and embarrassed). In this study, those clusters that were related to nasal and to ear and facial symptoms were significantly associated with postoperative improvement ($P < 0.05$) with the exception of a cough. Some of the symptoms such as “difficulty falling asleep,” “waking up tired,” and “embarrassed” also showed significant improvement. It was found that the patients with more of systemic and sleep domains score were less likely to benefit from ESS.

CONCLUSION

We believe that SNOT-22 can be used by the clinician

to obtain information about the range of problems associated with rhinosinusitis. It can help researchers in diagnosing and assessing the effect of rhinosinusitis on health status and treating patients with CRS. If routinely used, it is likely that the SNOT-22 can measure the effectiveness of treatment, including surgery, and may identify patient factors that predict maximum treatment response.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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