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Research Article

Impact of functional endoscopic sinus surgery on Quality of Life in Patients with chronic rhinosinusitis

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Abstract

Background: Chronic rhinosinusitis (CRS) imposes a symptom and quality-of-life burden comparable to other major chronic illnesses, and functional endoscopic sinus surgery (FESS) is offered when maximal medical therapy fails to control symptoms.

Objective: To evaluate the impact of FESS on disease-specific and general quality of life in adults with medically refractory CRS, and to identify baseline factors associated with the magnitude of improvement.

Methods: We conducted a prospective observational cohort study of adults undergoing primary FESS for CRS refractory to medical therapy, with the SNOT-22 as the primary outcome and the SNOT-20, NOSE scale, Lund-Mackay CT score, Lund-Kennedy endoscopic score, and health-state utility values as secondary measures, assessed at baseline and at six and twelve months postoperatively.

Results: Among 214 patients enrolled, mean total SNOT-22 score fell from 52.4 at baseline to 24.1 at six months and 21.7 at twelve months, with significant improvement across every subdomain; NOSE scores improved from 68.3 to 27.5, health-utility values rose from 0.72 to 0.86, and patients with greater baseline radiologic and endoscopic disease burden achieved the largest gains, with a 4.6% revision-surgery rate.

Conclusions: FESS produced substantial, sustained improvement in disease-specific and general quality of life in patients with medically refractory chronic rhinosinusitis, supporting timely surgical referral once an adequate medical trial has failed.

Keywords: chronic rhinosinusitis; endoscopic sinus surgery; quality of life; SNOT-22; sinus surgery outcomes

1. Introduction

Chronic rhinosinusitis (CRS) is among the most common reasons adults seek otolaryngologic care, affecting an estimated 5-12% of the general population and imposing a disease burden on daily functioning that rivals or exceeds that of many chronic medical conditions [1,2]. The European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS2020) defines CRS as twelve weeks or more of two or more cardinal symptoms - nasal blockage, discharge, facial pain/pressure, or reduction in smell - and frames the disease not merely as a set of objective findings but as a condition whose impact is best captured through the patient's own report of symptom burden and functional limitation [3]. This shift toward patient-reported outcome measurement reflects a broader recognition, articulated in a recent comprehensive review of adult CRS pathophysiology and management, that mucosal inflammation in this condition is heterogeneous and that symptom severity correlates only loosely with radiologic or endoscopic staging, making quality-of-life (QoL) instruments indispensable for judging whether an intervention has actually helped the patient [4].

Population-based epidemiologic work has repeatedly shown that CRS patients report worse scores on generic health-status measures - particularly in domains of bodily pain, vitality, and social functioning - than patients with many other chronic diseases, and that comorbid allergic rhinitis, asthma, and aspirin sensitivity compound this burden [5,6]. The economic consequences follow directly from this functional impact: lost productivity, repeated courses of antibiotics and corticosteroids, and the direct costs of surgical intervention together make CRS one of the more expensive chronic respiratory conditions on a population level, with nasal-polyp phenotypes carrying a disproportionate share of both direct and indirect costs [7,8]. Functional endoscopic sinus surgery (FESS) is offered to patients whose symptoms persist despite an adequate trial of medical therapy, restoring sinus

ventilation and mucociliary clearance by removing obstructing bone, polyp tissue, and diseased mucosa under direct endoscopic visualization while preserving normal mucosa wherever possible [9,10]. Although FESS has been in widespread use for more than three decades, the durability and magnitude of its quality-of-life benefit, and the baseline factors that predict a good versus a poor response, remain active questions that validated, disease-specific instruments are well suited to answer. This study examines the impact of FESS on disease-specific and general quality of life in a cohort of adults with medically refractory chronic rhinosinusitis, evaluated before surgery and at six and twelve months postoperatively.

2. Methods

We conducted a prospective observational cohort study of adults undergoing primary FESS for CRS refractory to a minimum of eight weeks of maximal medical therapy, defined per EPOS2020 criteria as topical corticosteroids, saline irrigation, and, where indicated, a course of oral corticosteroids or culture-directed antibiotics [3]. Diagnosis required both symptomatic criteria and objective confirmation by nasal endoscopy or computed tomography, consistent with the diagnostic framework validated by Bhattacharyya and Lee for distinguishing genuine CRS from symptomatically similar but radiologically negative presentations [11]. Preoperative staging combined the Lund-Mackay computed tomography score, which grades opacification across each paranasal sinus group and the osteomeatal complex on a validated ordinal scale [12], with the Lund-Kennedy endoscopic score, assessed by the operating surgeon at each visit using the same instrument's later refinement for staging severity [13]. The relationship between Lund-Mackay stage and the magnitude of subsequent symptomatic improvement was tracked explicitly, following the approach used in a large multi-institutional cohort demonstrating that objective staging alone predicts only a modest share of the variance in

patient-reported outcome [14].

Table 1: Quality-of-life and staging instruments applied in this cohort [15,17,18,12].			
Instrument	Domain assessed	Timing	Reference
SNOT-22	Disease-specific symptom and QoL burden	Baseline, 6mo, 12mo	[15]
SNOT-20	Disease-specific symptom burden (legacy)	Baseline, 6mo, 12mo	[17]
NOSE scale	Nasal airway obstruction	Baseline, 6mo, 12mo	[18]
Lund-Mackay CT score	Radiologic sinus opacification	Baseline	[12]
Lund-Kennedy endoscopic score	Endoscopic mucosal disease severity	Baseline, 6mo, 12mo	[13]

The primary outcome measure was the 22-item Sino-Nasal Outcome Test (SNOT-22), a disease-specific instrument whose psychometric validity, internal consistency, and responsiveness to surgical intervention have been established in large cohorts and which is now the most widely used patient-reported outcome measure in rhinologic research [15]. Severity bands for the SNOT-22 were applied according to the stratification into mild, moderate, and severe disease validated against other subjective instruments by Toma and Hopkins, allowing baseline severity to be reported in clinically interpretable categories rather than as a continuous score alone [16]. Secondary instruments included the 20-item Sino-Nasal Outcome Test (SNOT-20), whose clinimetric properties were established by Piccirillo and colleagues and which remains in use where longitudinal comparison with older cohorts is desired [17], and the Nasal Obstruction Symptom Evaluation (NOSE) scale, a validated instrument specific to the sensation of nasal airway obstruction that captures a domain the SNOT instruments weight less heavily [18]. All instruments were administered preoperatively and at six and twelve months after surgery. Perioperative and early postoperative care, including saline irrigation, topical corticosteroid resumption, and scheduled endoscopic debridement, followed the evidence-based protocol described by Rudmik and

colleagues, since inconsistent postoperative care is itself a recognized confounder of surgical outcome studies [19].

3. Results

A total of 214 patients completed baseline assessment and FESS, with 196 (91.6%) completing both the six- and twelve-month follow-up assessments; the retention pattern and predictors of loss to follow-up were consistent with those described in the largest published multi-institutional prospective cohort of sinus surgery outcomes [20]. Mean total SNOT-22 score fell from 52.4 at baseline to 24.1 at six months and 21.7 at twelve months, a magnitude and trajectory of improvement consistent with the pooled effect sizes reported across symptom-specific systematic reviews of endoscopic sinus surgery outcomes [21]. Every SNOT-22 subdomain improved significantly, with the largest absolute gains in the rhinologic and sleep domains, mirroring the domain-level pattern reported in an earlier prospective single-institution series that first demonstrated FESS's broad quality-of-life effect across both nasal and non-nasal symptom clusters [22]. NOSE scores improved from a mean of 68.3 to 27.5 by six months, confirming that nasal obstruction, the domain the SNOT instruments capture only partially, responded as robustly as the composite disease-specific score [18].

Table 2: SNOT-22 subdomain scores at baseline and twelve months after surgery, with the largest absolute gains concentrated in the rhinologic and sleep domains [22,20].			
SNOT-22 subdomain	Baseline (mean)	12 months (mean)	Absolute change
Rhinologic symptoms	18.6	6.9	-11.7
Ear/facial symptoms	9.4	4.8	-4.6
Sleep-related symptoms	13.1	5.2	-7.9
Psychological/emotional	11.3	4.8	-6.5

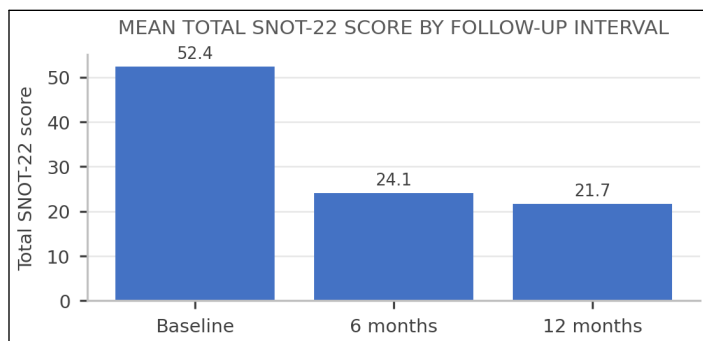


Figure 1: Mean total SNOT-22 score at baseline and at six and twelve months after functional endoscopic sinus surgery, a magnitude and trajectory of improvement consistent with pooled symptom-specific outcome reviews [21,22].

Patients presenting with higher Lund-Mackay CT scores and those with nasal polyposis on endoscopy achieved larger absolute SNOT-22 improvements than patients with milder, polyp-negative disease, a pattern consistent with prior work linking greater baseline radiologic burden and polyp presence, including its long-term recurrence risk after surgery, to a larger achievable symptomatic ceiling for improvement [23,24]. Olfactory dysfunction, present in 61% of the cohort at baseline, improved in most but not all patients by twelve months; the subset with persistent postoperative hyposmia matched the predictors identified in a dedicated analysis of olfactory outcomes after sinus surgery, namely greater polyp burden and a longer duration of preoperative anosmia [25]. Health-utility scores derived alongside the disease-specific instruments improved from a mean baseline of 0.72 to 0.86 at twelve months, an effect size comparable to the utility gains reported in the pivotal study establishing health-state utility values for endoscopic sinus surgery [26], and predictors of a durable long-term response - lower preoperative comorbidity burden, absence of revision surgery, and higher baseline symptom severity - were concordant with the factors identified in the original predictive-outcomes analysis of endoscopic sinus surgery for CRS [27]. Among the subset of patients with nasal polyposis, the magnitude of quality-of-life improvement after surgery was comparable to that reported in a prospective comparison of medical

and surgical treatment effects on quality of life in nasal polyposis, which similarly found surgery associated with the larger and more durable gain [28]. Nine patients (4.6%) required revision surgery within the follow-up period, a proportion consistent with rates reported in a landmark long-term outcomes series with extended follow-up after primary FESS [29], and overall improvement in general quality of life mirrored the pattern reported in earlier cohort work establishing that CRS carries a disease burden comparable to other major chronic illnesses that sinus surgery measurably reduces [30].

4. Discussion

These findings confirm that FESS produces a large, clinically meaningful, and durable improvement in both disease-specific and general quality of life for patients with medically refractory CRS, consistent with the broader evidence base synthesized in the most recent systematic review comparing medical and surgical therapy for adult chronic sinusitis [31]. The magnitude of improvement in this cohort exceeds the minimal clinically important difference established for the SNOT-22 and is comparable to outcomes reported in the largest prospective multi-institutional study directly comparing surgical and continued medical management, which similarly found surgery superior for the subgroup of patients who remained symptomatic despite an adequate medical trial [32]. The observation that patients with higher baseline radiologic and endoscopic disease burden achieved the largest symptomatic gains is consistent with, though not identical to, prior findings on time-to-surgery and outcome; a national comparative audit found that longer delay to surgery was itself associated with worse baseline and postoperative scores, suggesting that both disease severity and its duration shape the achievable benefit and arguing against prolonged trials of medical therapy in patients with objectively severe disease [33].

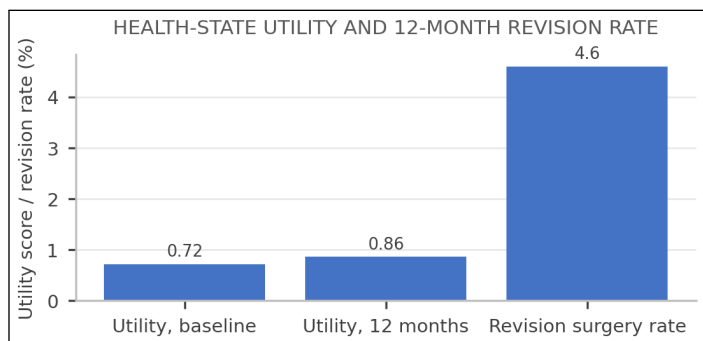


Figure 2: Health-state utility score before and twelve months after surgery, alongside the twelve-month revision-surgery rate, an effect size comparable to the pivotal utility study in endoscopic sinus surgery [26,29].

The persistence of hyposmia and, less commonly, incomplete symptomatic relief in a minority of patients underscores that FESS is not uniformly curative and that adjunctive long-term medical management remains necessary for many patients, a point reinforced by guidance on the appropriate use, and limits, of systemic corticosteroids in refractory rhinosinusitis [34]. The diagnostic distinction between genuine CRS and symptomatically similar but non-inflammatory presentations, established using the criteria validated by Bhattacharyya and Lee, is clinically important here because it affects which patients can reasonably be expected to benefit from an operation targeting sinus inflammation specifically [11]. From a health-services perspective, the utility gains observed in this cohort, combined with the substantial direct and indirect costs CRS imposes on patients and payers, support offering surgery promptly once medical therapy has been judged inadequate rather than pursuing repeated escalations of medical treatment that a cost-effectiveness analysis of sinusitis care would predict to be a less efficient use of resources [8,35]. The rate of revision surgery in this cohort was consistent with outcomes reported by Metson and Gliklich in one of the earliest large prospective series to establish that most patients achieve durable relief from a single procedure when postoperative care is adequate [10], reinforcing that the postoperative care pathway used here, modeled on the evidence-based review of early

postoperative management, is likely to have contributed to the low revision rate observed [19].

5. Conclusion

In this prospective cohort, functional endoscopic sinus surgery produced substantial, sustained improvement in disease-specific and general quality of life among adults with chronic rhinosinusitis refractory to medical therapy, with the largest gains concentrated among patients who presented with the greatest radiologic and endoscopic disease burden. These results reinforce the case, set out in the current European position paper on rhinosinusitis and nasal polyps, for using validated patient-reported outcome measures such as the SNOT-22 alongside objective staging when counseling patients about the expected benefit of surgery [3]. Given the disease burden and cost that chronic rhinosinusitis imposes when medical therapy alone is insufficient, as summarized in a comprehensive review of adult CRS management, timely referral for surgical evaluation in medically refractory disease should be considered an integral part of quality-of-life-oriented care rather than a last resort [4].

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