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Study on Effect of Functional Endoscopic Sinus Surgery on the Symptom Profile in Patients with Chronic Rhinosinusitis

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Abstract

Background: Chronic rhinosinusitis (CRS) is a common, debilitating inflammatory disease of the nose and paranasal sinuses lasting ≥12 weeks and impairing quality of life. Functional endoscopic sinus surgery (FESS) is recommended for patients refractory to adequate medical therapy to improve ventilation.

Objectives: To evaluate changes in the symptom profile of CRS patients undergoing FESS at a tertiary care centre in Kolhapur, by comparing preoperative symptoms with postoperative outcomes up to six months.

Methodology: This 18-month hospital-based study included 50 CRS patients (allergic/infective) aged ≥12 years with symptoms ≥12 weeks and nonresponsive to ≥6 weeks of medical therapy. Exclusion criteria were age <12 years, gross deviated nasal septum, and prior nasal surgery. Eligible patients had ≥2 major symptoms or 1 major plus 2 minor symptoms. Symptoms were graded (0–3) preoperatively and followed postoperatively at serial intervals up to 6 months; analysis used SPSS v22.0.

Results: Among 50 patients, most were aged 21–30 years (34%), followed by 31–40 years (30%); males predominated (62%). Symptoms most commonly persisted for 1–5 years (62%). Preoperatively, nasal obstruction was prominent (moderate 32, severe 6), facial pain/pressure was mainly mild-to-moderate (25 and 19), and anosmia was frequent (moderate 21, severe 10); headache was the leading severe minor symptom (severe 32). Postoperatively, core CRS symptoms improved progressively across follow-up. At 6 months, nasal obstruction showed the greatest improvement, with 80% reporting "much better" ($p<0.001$); facial pain/pressure and anosmia also improved significantly (70% and 68% "much better", $p<0.001$). Post-nasal drip

and nasal discharge demonstrated moderate improvement by 6 months (54% and 34% "much better", respectively). In contrast, halitosis, dental pain, cough, and earache showed minimal/no improvement, suggesting possible non-sinonasal contributors.

Conclusion: FESS provides significant symptomatic relief in medically refractory CRS, particularly for nasal obstruction, facial pain/pressure, anosmia, headache, post-nasal drip, and acute fever over six months. Limited improvement in halitosis, dental pain, cough, and earache highlights the need for evaluation of alternate causes and counselling.

Keywords: Chronic Rhinosinusitis, Functional Endoscopic Sinus Surgery, Nasal Obstruction, Anosmia, Symptom Profile.

Introduction

Chronic rhinosinusitis (CRS) is a prevalent and debilitating condition that significantly impacts patients' quality of life [1]. Characterized by inflammation of the nasal and paranasal sinus mucosa lasting for 12 weeks or longer, CRS presents with symptoms such as nasal obstruction, facial pain or pressure, nasal discharge, and reduction or loss of smell [2]. CRS causes more significant impairment in quality of life than acute rhinosinusitis, affecting 5%–12% of the general population. Furthermore, it is linked to bronchial asthma, with a prevalence of 25% in patients with chronic rhinosinusitis, compared to 5% in the general population[3].

Functional Endoscopic Sinus Surgery (FESS) has emerged as a cornerstone in the management of CRS, particularly in cases refractory to medical therapy. FESS, a minimally invasive surgical technique, aims to restore normal sinus ventilation and drainage by removing obstructive tissues and polyps under endoscopic guidance[4]. By eliminating inflammatory tissue and impediments within the sinuses, the treatment restores normal sinus airflow and drainage, enhancing quality of life and alleviating symptoms[5].

The Middle Eastern CRS management is influenced by a number of factors. The general public's ignorance of the illness and how to handle it is one of the major contributing factors. Analysis indicates that a sizable portion of the Middle Eastern public is ignorant of CRS, which may cause delays in receiving the right care and medical attention[6]. Notwithstanding the difficulties, FESS has proven to be a successful therapy choice for CRS patients, producing consistent results. The high rate of improvement in symptoms and quality of life (QOL) was a primary outcome seen in the majority of experimental trials. 47 patients who had FESS for CRS were the subject of a research in 2006; after surgery, 87.2% of the patients reported a significant improvement in their symptoms, and 72.4% reported an improvement in their quality of life[7].

It is crucial to remember that the effectiveness of FESS is dependent on a number of variables, such as the severity of the illness, the length of surgery, and patient characteristics like postoperative care compliance and smoking status. Positive results of FESS in individuals with CRS have also been documented in studies conducted in the Middle East[8]. This study aims to evaluate the role of FESS on the symptom profile in patients with chronic rhinosinusitis who visited to the tertiary care centre, in Kolhapur.

Materials and Methods

The study was conducted in the ENT Department of a tertiary care hospital over a period of 18 months. A total of 50 Patients CRS, including those with allergic and infective etiologies, exhibiting symptoms for a

minimum of 12 weeks, patients who have been unresponsive to at least 6 weeks of medical treatment and patients aged 12 years and older, to avoid potential biases in symptom grading before and after functional endoscopic sinus surgery (FESS). Patients under the age of 12 years, gross deviated nasal septum (DNS) and with a history of previous nasal surgeries were excluded.

Following informed consent, patients exhibiting at least two major sinus symptoms or one major and two minor symptoms were considered for the study. Symptoms were preoperatively graded as mild, moderate, or severe with a score of 0 indicating no symptoms. A comprehensive history was obtained, including coexisting conditions such as bronchial asthma, aspirin sensitivity, or systemic diseases, were also recorded.

Nose: Assessment included the external nasal profile for deformities or inflammation, sinus tenderness, septum for DNS, airway obstruction using the spatula test, inferior turbinate condition, nasal mucosa appearance, and any discharge or polyps in the meatii. Posterior rhinoscopy was performed to evaluate the extent of nasal polyps. Oral Cavity & Oropharynx: Examination included the buccal mucosa, tongue, dentition, anterior pillars, tonsils, and posterior pharyngeal wall for signs of postnasal drip or chronic granular changes. Indirect laryngoscopy was performed to detect pathologies in the base of the tongue, vallecula, epiglottis, arytenoids, pyriform fossa, or glottis. Ear: The post-auricular area and pinna were examined for scars or mastoid tenderness.

X-Ray PNS (Water's View): Used to evaluate the condition of the septum, inferior turbinates, and assess for air-fluid levels, haziness, or opacification of the sinuses. Diagnostic Nasoendoscopy: Conducted under local anesthesia to examine the nasal mucosa, septum, inferior turbinates, nasopharynx, and eustachian tube openings, and to detect the presence of mucopus or polyps in the middle meatus, sphenoethmoidal recess, or nasopharynx. Any coexisting anatomical variations were noted. Non-Contrast CT Scan of Paranasal Sinuses (NCCT PNS): Used to assess the extent of the disease, the condition of the osteomeatal unit, the degree of sinus opacification, bony erosion, and the relationship of the ethmoidal roof, serving as a surgical road map.

Data analysis was performed using IBM SPSS for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). Microsoft Excel 2019 was utilized for the preparation of tables and graphs.

Results:

Table 1: Demographic Profile of the Patients:

Demographic Profile		No. of Cases	Percentage
Age Group (Years)	21-30	17	34%
	31-40	15	30%
	41-50	12	24%
	51-60	6	12%
Gender	Male	31	62%
	Female	19	38%
Duration of Symptoms	< 1Year	14	28%

	1-5 Years	31	62%
	6-10 Years	5	10%

This study analyzed 50 patients. The majority of patients belonged to the 21-30 years age group (34%, n=17), followed by 30% (n=15) in the 31-40 years age group. The majority of patients were male (62%, n=31), while 38% (n=19) were female. This distribution indicates a higher proportion of male patients in the study population. The majority of patients (62%, n=31) had symptoms lasting 1-5 years, followed by 28% (n=14) who experienced symptoms for less than 1 year. A smaller proportion, 10% (n=5), reported symptoms persisting for 6-10 years.

Table 2: Major and Minor Criteria based on Symptoms:

Symptoms		No Symptom (0)	Mild (1)	Moderate (2)	Severe (3)
Major Criteria	Nasal Obstruction	0	12	32	6
	Facial Pain	6	25	19	0
	Post Nasal Discharge	26	24	0	0
	Anosmia	13	6	21	10
	Nasal Discharge	30	5	11	4
	Fever (Acute)	38	6	4	2
Minor Criteria	Headache	9	3	6	32
	Halitosis	38	6	4	2
	Dental pain	45	3	0	2
	Cough	44	4	0	2
	Earache	46	4	0	0
	Ear Fullness	36	9	3	2
	Fever (Non-Acute)	35	8	4	3

Nasal obstruction was the most common symptom, with 32 patients reporting moderate and 6 severe obstructions. Facial pain was mild in 25 and moderate in 19, while 6 had none. Post-nasal discharge was mostly absent (26) or mild (24). Anosmia was moderate in 21, severe in 10, mild in 6, and absent in 13. Nasal discharge was absent in 30, mild in 5, moderate in 11, and severe in 4. Fever was largely absent (38) or mild (6), with only 4 moderate and 2 severe cases. Overall, nasal obstruction and anosmia predominated among moderate-to-severe symptoms, while post-nasal discharge and fever were generally mild or absent.

Headache was the most common severe minor symptom, reported as severe in 32 patients and moderate in 6, while 3 had mild and 9 had no headaches. Halitosis was mostly absent (38), with 6 mild, 4 moderate, and 2 severe cases. Dental pain was absent in 45, mild in 3, and severe in 2. Cough occurred mildly in 4 and severely in 2, absent in 44. Earache was absent in 46 and mild in 4, while ear fullness was absent in 36, mild in 9, moderate in 3, and severe in 2. Non-acute fever was absent in 35, mild in 8, moderate in 4, and severe in 3. Overall, headache predominated as the leading severe minor symptom, while dental pain, cough, and earache were mostly absent.

Table 3: Post-Operative Symptom Profile Scoring at Nasal Obstruction.

Nasal Obstruction	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	6	13	26	28	33	39	40
Better (+1)	20	27	15	13	8	1	0
No Change (0)	24	10	9	9	7	8	7
Worse (-1)	0	0	0	0	2	2	3
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative nasal obstruction showed progressive improvement. At 1 week, 12% were much better, 40% better, and 48% unchanged. By week 2, 26% were much better and 54% better, with only 20% unchanged. At weeks 3 and 4, the "much better" group rose to 52% and 56%. By 2 months, 66% improved markedly, though 4% worsened. At 4 and 6 months, 78% and 80% reported being much better, with 4–6% showing worsening. Overall, most patients had sustained symptomatic relief by 6 months, with few later deteriorations.

Table 4: Post-Operative Symptom Profile Scoring at Facial Pain/Pressure.

Facial Pain/Pressure	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	2	10	22	27	31	33	35
Better (+1)	24	26	14	10	6	4	0
No Change (0)	24	14	14	13	13	13	15
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative facial pain/pressure showed steady improvement. At 1 week, 4% were much better, 48% better, and 48% unchanged. By week 2, 20% were much better and 52% better, with 28% unchanged. At weeks 3 and 4, the "much better" group rose to 44% and 54%. By 2 months, 62% were much better, 12% better, and 26% unchanged. At 4 and 6 months, 66% and 70% reported marked improvement, with no worsening observed. Overall, most patients achieved substantial relief by 6 months, though a few remained unchanged.

Table 5: Post-Operative Symptom Profile Scoring at Post Nasal Drip.

Post-nasal Drip	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	1	6	13	17	17	29	27
Better (+1)	14	21	20	16	14	2	2

No Change (0)	35	23	17	17	17	17	17
Worse (-1)	0	0	0	0	2	2	4
Much Worse (-2)	0	0	0	0	0	0	0

Post-nasal drip improved gradually after surgery. At 1 week, 2% felt much better, 28% better, and 70% unchanged. By week 2, 12% were much better and 42% better, with 46% unchanged. At weeks 3 and 4, 26% and 34% reported marked improvement, while 34% remained unchanged. By 2 months, 34% were much better, 28% better, and 4% worsened. At 4 and 6 months, 58% and 54% reported much better outcomes, with 4–8% showing worsening. Overall, symptoms improved steadily, with most patients relieved by 4–6 months, though a few showed no change or deterioration.

Table 6: Post-Operative Symptom Profile Scoring at Anosmia

Anosmia	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	0	5	10	16	26	31	34
Better (+1)	16	24	24	18	8	3	0
No Change (0)	34	21	14	14	14	14	14
Worse (-1)	0	0	2	2	2	2	2
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative anosmia showed steady improvement. At 1 week, 32% felt better and 68% unchanged, with no patients much better. By week 2, 10% were much better and 48% better, while 42% remained unchanged. At weeks 3 and 4, “much better” responses rose to 20% and 32%. By 2 months, 52% were much better, 16% better, 28% unchanged, and 4% worsened. At 4 and 6 months, 62% and 68% reported much better outcomes, 28% remained unchanged, and 4% worsened. Overall, anosmia improved progressively, with most patients showing substantial recovery by 6 months.

Table 7: Post-Operative Symptom Profile Scoring at Nasal Discharge.

Nasal Discharge	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	0	1	5	6	10	15	17
Better (+1)	14	18	14	13	9	2	0
No Change (0)	36	31	31	31	30	30	30
Worse (-1)	0	0	0	0	1	3	3
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative nasal discharge showed slow, gradual improvement. At 1 week, 28% felt better and 72% unchanged. By week 2, 2% were much better, 36% better, and 62% unchanged. At weeks 3 and 4, “much better” responses rose to 10% and 12%, though 62% remained unchanged. By 2 months, 20% were much better, 18% better, and 2% worsened. At 4

and 6 months, 30% and 34% reported much better improvement, with about 60% unchanged and 6% worsened. Overall, improvement was gradual, with many showing limited change and a few worsening over time.

Table 8: Post-Operative Symptom Profile Scoring at Fever (Acute)

Fever (Acute)	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	2	11	23	25	30	37	37
Better (+1)	30	26	18	16	5	0	0
No Change (0)	18	13	9	9	13	11	11
Worse (-1)	0	0	0	0	2	2	2
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative acute fever showed steady improvement. At 1 week, 4% were much better, 60% better, and 36% unchanged. By week 2, 22% were much better and 52% better, with 26% unchanged. At weeks 3 and 4, “much better” responses rose to 46% and 50%. By 2 months, 60% were much better, 4% worsened, and 26% unchanged. At 4 and 6 months, 74% reported significant improvement, 22% remained unchanged, and 4% worsened. Overall, fever symptoms improved markedly, with most achieving near-complete relief by 6 months.

Table 9: Post-Operative Symptom Profile Scoring at Headache.

Headache	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	2	11	23	25	30	37	37
Better (+1)	30	26	18	16	5	0	0
No Change (0)	18	13	9	9	13	11	11
Worse (-1)	0	0	0	0	2	2	2
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative headache showed consistent improvement over time. At 1 week, 4% were much better, 60% better, and 36% unchanged. By week 2, 22% were much better and 52% better, with 26% unchanged. At weeks 3 and 4, “much better” responses rose to 46% and 50%. By 2 months, 60% were much better, 10% better, and 4% worsened. At 4 and 6 months, 74% reported marked improvement, 22% remained unchanged, and 4% worsened. Overall, headache symptoms improved steadily, with most patients achieving near-complete relief by 6 months.

Table 10: Post-Operative Symptom Profile Scoring at Halitosis.

Halitosis	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	6	7	9	9	11	11	12

Better (+1)	3	2	3	3	1	1	0
No Change (0)	41	41	38	38	38	38	38
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative halitosis showed only minimal improvement across follow-up. At 1 week, 12% were much better, 6% better, and 82% unchanged. By week 2, 14% were much better, 4% better, and 82% unchanged. At weeks 3 and 4, 18% were much better, 6% better, and 76% unchanged. By 2 months, 22% were much better, 2% better, and 76% unchanged. At 4 and 6 months, 22% and 24% reported much better improvement, while 76% remained unchanged and no patients worsened. Overall, only a small proportion experienced significant relief, with most reporting persistent halitosis throughout follow-up.

Table 11: Post-Operative Symptom Profile Scoring at Dental Pain

Dental Pain	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	3	3	5	5	5	5	5
Better (+1)	2	2	0	0	0	0	0
No Change (0)	45	45	45	45	45	45	45
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative dental pain showed very limited improvement. At 1 week, 6% were much better, 4% better, and 90% unchanged; this pattern persisted unchanged at week 2. By weeks 3 and 4, 10% were much better, none reported feeling merely better, and 90% remained unchanged. At 2, 4, and 6 months, 10% continued to report much better symptoms, with no worsening at any time point. Overall, only a small proportion experienced meaningful relief, while the majority reported persistent dental pain without change.

Table 12: Post-Operative Symptom Profile Scoring at Cough:

Cough	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	4	4	4	4	4	4	4
Better (+1)	2	2	2	2	2	2	2
No Change (0)	44	44	44	44	44	44	44
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative cough scores remained static from 1 week through 6 months. At every follow-up, 8% of patients reported being much better, 4% better, and 88% unchanged, with no cases of worsening symptoms. This pattern indicates minimal to no improvement in cough, with persistent symptoms in the majority throughout the follow-up period.

Table 13: Post-Operative Symptom Profile Scoring at Earache.

Earache	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	2	2	2	2	4	4	4
Better (+1)	2	2	2	2	0	0	0
No Change (0)	46	46	46	46	46	46	46
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative earache showed very limited improvement. At 1 week, 4% were much better, 4% better, and 92% unchanged; this pattern persisted through week 4. By 2 months, 8% were much better and 92% unchanged, as the 4% who were previously “better” shifted to no change. At 4 and 6 months, 8% continued to report much better symptoms and 92% no change, with no worsening at any point. Overall, only a small minority experienced relief, while the vast majority reported persistent earache throughout follow-up.

Table 14: Post-Operative Symptom Profile Scoring at Ear Fullness.

Ear Fullness	1st week	2nd week	3rd week	4th week	2nd month	4th month	6th month
Much Better (+2)	10	10	10	8	10	12	12
Better (+1)	4	4	6	8	6	4	4
No Change (0)	36	36	34	34	34	34	34
Worse (-1)	0	0	0	0	0	0	0
Much Worse (-2)	0	0	0	0	0	0	0

Post-operative ear fullness showed slow and modest improvement. At 1 week, 20% were much better, 8% better, and 72% unchanged. This pattern persisted through weeks 2 and 3, with “better” responses rising slightly to 12% by week 3. At week 4, 16% were much better, 16% better, and 68% unchanged. By 2 months, 20% were much better, 12% better, and 68% unchanged. At 4 and 6 months, 24% reported much better improvement, 8% better, and 68% unchanged, with no worsening at any point. Overall, only a small subset achieved meaningful relief, while most continued to report persistent ear fullness.

Discussion

Functional Endoscopic Sinus Surgery (FESS) is widely accepted as an effective surgical intervention for chronic rhinosinusitis (CRS), especially in patients unresponsive to prolonged medical therapy. The current study assessed 50 patients with CRS and analyzed symptom

severity before and after FESS over a six-month follow-up period.

Demographic Distribution

The demographic analysis revealed that most individuals with chronic rhinosinusitis (CRS) were aged 21–30 years (34%), followed by those aged 31–40 years (30%), indicating higher prevalence among younger adults. Similar patterns were reported by Verma et al. (2022)[9], emphasizing the disease burden during productive years, possibly due to exposure to environmental irritants and urban pollution. A male predominance (62%) was observed, consistent with Behiry et al. (2019)[10] and Jiang et al. (2021)[11], who also reported higher male-to-female ratios. Occupational exposure and gender-related behavioral or anatomical factors may contribute to this disparity. Overall, younger males appear more affected, highlighting the need for early diagnosis and management to reduce chronic morbidity.

Preoperative Symptomatology

Symptom evaluation revealed nasal obstruction as the most frequent and disabling complaint, affecting 76% of patients, reflecting the role of mucosal edema and impaired sinus ventilation in CRS. Romano et al. (2020) [12] similarly highlighted nasal blockage as a major symptom impacting airflow and sleep. Anosmia was reported by 62% of patients, consistent with Verma et al. (2022)[9] and Jiang et al. (2021)[11], who associated olfactory loss with inflammatory and anatomical alterations. Headache was a common minor symptom, observed in 64% of patients, likely due to sinus pressure and neurogenic inflammation. Facial pain and pressure were also frequent, underscoring symptom overlap noted by Verma et al. (2022)[9]. Less common symptoms included halitosis, dental pain, and earache, usually mild in severity. Overall, the pattern reflects the obstructive and inflammatory basis of CRS, reinforcing the role of comprehensive preoperative assessment using standardized tools like the SNOT-22.

Postoperative Symptom Improvement

A marked postoperative improvement was noted in major CRS symptoms. After six months, nasal obstruction showed the greatest relief, with 80% of patients reporting being “much better” ($p<0.001$). Facial pain and anosmia also improved significantly (70% and 68% respectively, $p<0.001$), while post-nasal drip and nasal discharge showed moderate improvement (54% and 34%, respectively). These findings align with Romano et al. (2020)[12] and Behiry et al. (2019)[10], who documented significant postoperative SNOT-22 score reductions. Similar benefits were reported by Verma et al. (2022)[9] and Jiang et al. (2021)[11], both noting improved nasal patency and olfactory function following FESS. Overall, these results reaffirm the effectiveness of surgical intervention in alleviating the symptomatic burden of CRS.

Persistent and Minimally Improved Symptoms

Despite overall postoperative improvement, certain symptoms such as halitosis, dental pain, cough, and earache showed minimal change. At six months, 76% of patients with halitosis, 90% with dental pain, and 88% with cough reported persistent symptoms ($p>0.05$). These results suggest that such complaints may originate from non-sinonasal causes. Dental pathology, GERD, and eustachian tube dysfunction are potential contributors. Hopkins et al. (2006)[13] similarly noted persistence of ancillary symptoms despite resolution of core sinonasal complaints, while Jiang et al. (2021)[11] reported limited improvement in oropharyngeal symptoms post-FESS. This underscores the multifactorial nature of CRS-related complaints and the

need for comprehensive evaluation, counseling, and interdisciplinary management to address non-sinonasal etiologies and set realistic expectations.

Gustatory Function and FESS

Symptom-focused studies indicate that FESS can significantly improve olfactory function, particularly in eosinophilic CRS and in patients with nasal polyps, with marked gains in endoscopic scores and smell identification tests such as UPSIT, reflecting mucosal recovery and better airflow across the olfactory cleft. Jiang et al. (2021)[11] further demonstrated that while overall SNOT-22 and endoscopic parameters improved after FESS, gustatory changes were variable, depending on CRS phenotype, inflammatory pattern, and test modality. In their cohort, some patients—especially those without nasal polyps—showed improved sweet taste on regional tongue testing, whereas bitter and salty scores did not consistently improve and, in noneosinophilic CRS, salty taste scores on whole-mouth testing even declined postoperatively. These findings suggest that gustatory outcomes do not uniformly parallel olfactory recovery or symptom score improvement and may be differentially modulated by disease subtype and testing method.

In relation to the present study, which did not directly assess taste, the available evidence supports the view that FESS has a multidimensional impact, with robust benefits for olfaction but variable effects on taste, particularly across different CRS phenotypes. This aligns with Jiang et al.'s[11] conclusion that chemosensory outcomes after FESS are domain-specific and influenced by underlying inflammatory patterns, underscoring the need for individualized preoperative counseling in patients presenting with chemosensory complaints.

Overall Clinical Impact

Functional endoscopic sinus surgery (FESS) in the present study was associated with marked improvement in multiple symptom domains at six months, with most patients experiencing substantial relief in key symptoms such as nasal obstruction, facial pain, and anosmia, indicating a high clinical success rate. These outcomes are consistent with Hopkins et al. (2006)[13], who demonstrated significant and sustained SNOT-22 improvement up to 36 months, supporting the durable efficacy of FESS in appropriately selected CRS patients. Behiry et al. (2019)[10] similarly reported significant reductions across all SNOT-22 domains including rhinologic, extra-nasal, ear/facial, psychological, and sleep-related symptoms within three months, emphasizing the broad therapeutic impact of FESS on overall quality of life.

Romano et al. (2020)[12] further corroborated these findings by documenting notable postoperative improvement in nasal blockage, facial pressure, and olfactory dysfunction, alongside high patient satisfaction and better quality-of-life indices. Verma et al. (2022)[9] also observed consistent reductions in symptom severity and SNOT-22 scores at 3 and 6 months postoperatively, reinforcing the value of patient-reported outcome measures in evaluating surgical success. Collectively, existing evidence and the findings of the present study indicate that the benefits of FESS extend beyond anatomical disease clearance to meaningful gains in functional well-being, sleep, psychosocial functioning, and overall patient satisfaction, thereby supporting its continued use as a central component of comprehensive CRS management.

Conclusion

Functional Endoscopic Sinus Surgery (FESS) significantly improves the symptom profile in patients with chronic rhinosinusitis who are unresponsive to medical therapy. The procedure led to marked and statistically significant relief in core CRS symptoms such as nasal obstruction, facial pain/pressure, anosmia, headache, post-nasal drip, and acute fever, with the majority of patients reporting substantial improvement by six months postoperatively.

These findings reaffirm the effectiveness of FESS in addressing the primary obstructive and inflammatory components of CRS. Conversely, symptoms like halitosis, dental pain, cough, and earache showed minimal or no improvement, suggesting these may arise from non-sinonasal causes or represent chronic sequelae less amenable to surgical intervention. This highlights the importance of careful preoperative evaluation and patient counseling regarding expected outcomes.

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