ASSESSMENT OF OLFACTORY FUNCTION BEFORE AND AFTER FUNCTIONAL ENDOSCOPIC SINUS SURGERY IN CHRONIC RHINOSINUSITIS

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ABSTRACT

Objective: To evaluate the olfactory function in patients with chronic rhinosinusitis before and after functional endoscopic sinus surgery.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Department of ENT, Combined Military Hospital, Rawalpindi, from Aug 2020 to Jul 2021.

Methodology: We studied a total of 59 patients suffering from chronic rhinosinusitis. Patients with previous sinus surgery and immunosuppressed states were excluded. All participants underwent evaluation with a 5-point Likert scale and the Connecticut odor identification test both pre- and post-Functional endoscopic sinus surgery at 3 months post-procedure. Data were analyzed in SPSS version 26.

Results: Our sample had a male to female ratio of 1.19:1. The mean age was 45.37 ± 14.25 years. A total of 37 (62.7%) patients reported an improvement of 19.2% in olfactory function post-FESS while 22 (37.2%) reported no difference or worsening of olfaction.

Conclusion: Functional endoscopic sinus surgery performed for chronic rhinosinusitis is associated with an improvement in olfactory function.

Keywords: Chronic Rhinosinusitis, Functional Endoscopic Sinus Surgery, Olfactory Dysfunction.

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INTRODUCTION

Research estimates that the global prevalence of chronic rhinosinusitis (CRS) ranges anywhere between 5-12%, however this might be an exaggeration as the disease is frequently mistaken for other common ailments such as allergic rhinitis.[1] Chronic rhinosinusitis is associated with a pronounced manifestation of symptoms originating from the nose and sinuses, however, the symptoms are not restricted to these two areas: the disease may be associated with more generalized and at times more problematic symptoms such as disturbed sleep, decreased cognition and diminished productivity, that is associated with low mood and crippling fatigue, which may guide the decision to opt for surgical intervention.[2]

Olfactory dysfunction is one of the many important features of chronic rhinosinusitis which greatly hampers quality of life. The prevalence of this symptom in such cases ranges between 60-80% in this disease.[3] This symptom is known to be more common in patients with nasal polyposis associated with chronic rhinosinusitis (CRSwNP) than when there are no polyps (CRS without Nasal Polyps). Disturbed olfaction is the cause of significantly low patient-reported quality of life (QOL) scores, and is associated with marked depression and loss of the pleasure of tasting food.[4]

The treatment of rhinosinusitis is focused on improving the patients symptoms but is unfortunately highly variable. Conservative management involves the use of antibiotics to control infection, corticosteroids to control inflammation, and the use of mucolytics, saline irrigation, and decongestants to reduce blockage and local tissue oedema.[6] Functional endoscopic sinus surgery (FESS) is performed in patients in whom medical therapy is unsuccessful in the control of symptoms.[5] FESS is reported to be associated with a marked improvement in quality of life, with 76% patients reporting amelioration in major symptoms which include nasal obstruction, facial pain, and post-postnasal drip.[6] However, like all surgical procedures, FESS is associated with complications such as cerebrospinal fluid leakage, hemorrhage, infections such as meningitis and orbital injuries, the reporting rate of these complications being variable, ranging from 0-2%.[7,8]

Improvement in olfactory function is a positive outcome that has been attributed to FESS for chronic sinusitis. Some studies have shown FESS to improve olfactory function in 85% of patients affected by

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dysfunction due to chronic rhinosinusitis.[9] However, this marked improvement has not been universally demonstrated. Delank *et al* demonstrated that while a majority of patients improved post-FESS, 8% actually reported a deterioration in olfactory function post-surgery.[10]

Olfaction has an important role in gustation and loss or disturbance of this function leads to a significant decrease in quality of life. Chronic sinusitis is a common condition which is hard to treat, and directly affects smell perception. There is a myriad of treatment options which have variable results. FESS is a surgical option that is commonly employed to improve symptoms, reduce disease burden, and improve quality of life. However, the results of the procedure vary from study to study. This study was conducted to contribute to the existing knowledge base regarding the improvement of olfactory function associated with FESS, as well as the occurrence of complications, to provide a better idea of the outcomes of this commonly performed surgery.

METHODOLOGY

This was a descriptive cross-sectional study conducted from August 2020 to July 2021 in the Department of ENT, Combined Military Hospital, Rawalpindi on 59 consenting patients reporting for functional endoscopic sinus surgery for chronic rhinosinusitis, chosen via non-probability consecutive sampling. We used the WHO sample size calculator to calculate the sample size keeping a confidence level of 90%, an absolute precision of 0.05, and an anticipated population proportion of 0.057.[11] Patients between the ages of 18-70 years, with diagnosed chronic rhinosinusitis (12 weeks history with characteristic computed tomography findings), who were non-responsive to medical treatment (intranasal steroids, nasal saline douches, oral montelukast sodium and ebastine) along with presence of CRSwNP and CRS without nasal polyps were included. Patients with previous history of surgery for CRS, olfactory dysfunction other than CRS (tumours, invasive pathologies like mucormycosis) and immune deficiency were excluded.

A questionnaire was filled out for each patient on the first clinical visit to collect demographic data, the presence of nasal polyps and co-morbidities. Patients were scored on a 5-point Likert scale for perceived olfactory function before surgery, as shown in Table-I. In addition, all patients underwent evaluation with the Connecticut odor identification test (Patient was made to smell ten common odors, one point was given for each odor correctly identified with a maximum score of 10) before the procedure. All patients underwent FESS, with or without concurrent endoscopic septoplasty (where the deviated nasal septum caused obstruction or impeded FESS). Subsequently, all patients were followed up at 3 months post-FESS. They were treated with broad-spectrum antibiotics for 2 weeks after surgery and continued to be treated with the standard medical treatment for CRS after surgery (inhaled nasal steroids, oral montelukast and ebastine). Patients were guided in procedure of nasal douching with a saltwater mixture and encouraged to perform this at least thrice a day. Patients were seen in routine follow up at 3 weeks and 3 months after surgery. Any observed crusting was removed under direct vision.

Table-I: 5-Point likert scale for olfactory function.

Characteristic	Score
Normal	5
Slightly reduced	4
Reduced, but only for light odors	3
Markedly reduced, can only smell strong odors	2
No smell perception	1

At second visit (after 3 months) a re-evaluation of olfactory function using the same 5-point Likert scale and the Connecticut odor identification test to determine change in olfactory function was done.

Data were analyzed using SPSS-26. Mean and SD was calculated for quantitative variables like age, duration of CRS, pre-surgery Likert score, pre-surgery Connecticut odor identification test score, post-surgery Likert score, post-surgery Connecticut odor identification test score, change in Likert score and change in Connecticut odor identification test score. Qualitative variables like gender and change in olfactory function post-FESS were recorded in terms of frequency and percentage. Chi square test was applied to all qualitative variables for comparison with change in olfactory outcome post-FESS and with quantitative variables being stratified before application of the test. The *p*-value of ≤0.05 was considered significant.

RESULTS

We studied a total of 59 patients with a male to female ratio of 1.19:1. The mean age of the sample was 45.37 ± 14.25 years. Patient characteristics and outcomes according to gender are shown in Table-II. The mean duration of chronic sinusitis in our study was 30.39 ± 9.22 weeks. The mean pre-operative Likert score was 2.44 ± 1.01 points, which improved to 3.46 ± 1.18 points, post-procedure. The mean pre-operative Connecticut odor identification test score 4.68 ± 2.77 points

which rose to 6.49 ± 2.63 points. A total of 37 (62.7%) patients reported an improvement of 19.2% in olfactory function post-FESS while 22 (37.2%) reported no difference or worsening of olfaction.

Table-II: Patient characteristics and comparison with olfactory outcome.

Variable	Male	Female	*p*-value
Total	27 (45.8%)	32 (54.2%)	0.264
Age (years)	47.96 ± 12.75	43.19 ± 15.25	0.024*
Duration of sinusitis (weeks)	29.30 ± 8.47	31.31 ± 9.84	0.03*
Pre-surgery likert score	2.26 ± 0.90	2.59 ± 1.07	
Post-surgery likert score	3.44 ± 1.09	3.47 ± 1.27	
Pre-surgery connecticut odor identification test score	4.56 ± 2.87	4.78 ± 2.72	
Pre-surgery connecticut odor identification test score	6.07 ± 2.49	6.84 ± 2.73	
Olfactory Function Status			
Improved	19 (70.4%)	18 (56.3%)	
Same/Worsened	8 (29.6%)	14 (43.7%)	

DISCUSSION

We found that the olfactory function showed definite improvement in patients who underwent FESS for chronic rhinosinusitis post-surgery, as evidenced by the improvement in the Connecticut odor identification score and Likert score post-surgery. Perry *et al* also concurred with our findings and reported a statistically significant correlation between improved olfactory dysfunction scores post-surgery (p<0.001).[12] Ennhage *et al* studied the improvement of olfaction in asthma patients with polyps and sinusitis and also found an objective improvement in olfactory function post-FESS.[13] These findings were echoed by Pade *et al* who reported 23% patients developing an improvement, while no change or a decline in olfactory function was seen in 77%.[14]

These results are in contrast to Jiang *et al* who showed that 74.3% had olfactory dysfunction before FESS and this number only improved to 68.6% post-procedure, the author concluding that FESS did not produce a statistically significant improvement in olfactory function.[11] We attribute the variation in the results of the aforementioned studies to differences in sample selection wherein cases with poor olfactory recovery likely had chronic sinusitis for prolonged periods before reporting to healthcare. In our study, we saw that patients with a disease history of greater than 30 weeks had a lesser degree of olfactory function recovery, p= 0.03. In addition, studies have shown that a severe dysfunction pre-procedure did not result in significant improvements, as shown by Delank *et al*.[15] However, these findings were in contrast to Litvack *et al* who showed that olfactory improvement after FESS was greater in anosmic patients than in hyposmic patients.[16] We attribute this discrepancy to the way olfactory function was assessed in patients i.e. via a questionnaire, which may have introduced bias (Figure).

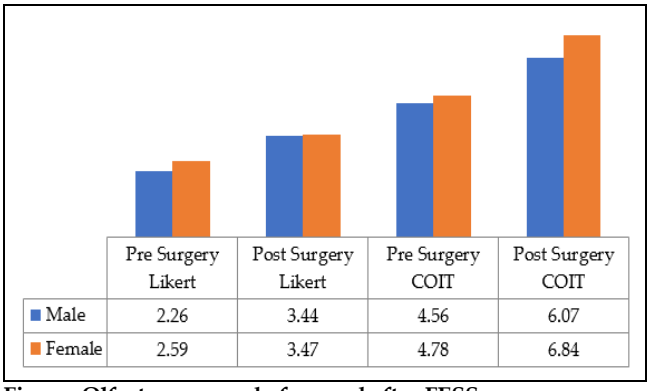

Figure: Olfactory scores before and after FESS.

In our study, advancing age was seen to be a risk factor for poor olfactory outcome post-FESS. Litvack *et al* also noted advancing age to have a poor effect, in addition to smoking, nasal polyposis and asthma, while gender was not seen to have any effect, as in our study.[17] However, Pade *et al* reported that age had no significant effect on the outcome of FESS in terms of olfactory function,[14] and Minovi *et al* also noted that asthma and previous surgical procedures had no statistically significant effect on post-operative olfaction.[18] Studies have shown that severity of inflammation on computed tomography may correlate well with olfactory dysfunction (p<0.001).[19] Computed tomography to assess severity of inflammation as well as the presence of nasal polyps or septal deviation is, therefore, a useful predictor of whether a patient will see improvement in olfaction post-FESS.

CRS is a frequently encountered problem in our population, especially in patients with asthma and history of nasal allergy. Functional endoscopic sinus surgery is a very useful minimally invasive procedure that can be employed for treatment of CRS. This study was conducted to review the outcome of olfactory function with this procedure in such cases, as the literature available appeared conflicted, with some studies suggesting an improvement in outcome while other claiming the opposite. Our study showed that there was a 19.2% improvement in olfactory scores. In addition, prolonged disease and advancing age were associated with poorer functional olfaction outcomes. Disadvantages of FESS include a requirement for specialized equipment and expert surgeons. Our study had a short follow up

period and there was no control arm. Further research is required to determine whether FESS is superior to conservative treatment as well as other forms of surgical treatment.

CONCLUSION

Functional endoscopic sinus surgery is a useful weapon in the repertoire of ENT surgeon. It is minimally traumatic to the patient and associated with an improvement in subjective olfactory outcomes. Early surgery favours good post operative smell perception, thus improving quality of life.

Conflict of Interest: None

Author's Contribution

THR: Direct, intellectual conception, AH: Design, analysis conception, MA: Analysis, interpretation, conception, MR: Data analysis, MJ: Interpretation of data, SAN: Proof reading.

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