Outcome of Endoscopic Sinus Surgery in Patients with Symptomatic Chronic Rhinosinusitis with Minimal Changes on Computerised Tomography

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Abstract This study was designed to assess the efficacy of functional endoscopic sinus surgery (FESS) in chronic rhinosinusitis (CRS) patients with minimal radiological findings, and based on one centre, prospective randomized controlled study, conducted in the Department of Otorhinolaryngology, Lady Hardinge Medical College, New Delhi. All the CRS out-patients (>18 years) refractory to 3 weeks of medical therapy were radiologically evaluated with computerised tomographic scan (CT) of nose and paranasal sinuses. These patients were grouped based on CT scoring (Lund Mackay staging system): group A (CT score 0–6) and group B (CT score 7–24); with 35 patients in each group. All the patients underwent FESS using Messerklinger technique. Symptom scoring of all the patients was done using visual analog scale preoperatively and postoperatively at 1-, 3-, 6- and 12-month follow-up. CRS patients with minimal evidence of disease on CT showed statistically significant improvement in symptom scores after FESS. There was no significant difference noted in the overall symptom score improvement as well as for improvement in specific symptoms in both the groups. Further, there was no correlation between the pre-operative symptoms and CT scores. A good subjective outcome in terms of symptom improvement can be obtained with FESS in patients with CRS with minimal evidence of disease on CT.

Keywords Chronic rhinosinusitis · Functional endoscopic sinus surgery · Computed tomography · Visual analog scale · Lund mackay staging system · Outcome

Introduction

Chronic Rhinosinusitis (CRS) is a very common chronic ailment which negatively affects quality of life of patients [1]. The epidemiological studies focusing CRS in Indian population are sparse in published literature. Though the quantum of this clinical entity in India is very high, the exact incidence and prevalence figures are not available. Surgery in the form of functional endoscopic sinus surgery (FESS) is the procedure of choice for patients who fail to respond to medical treatment [2].

Computerised tomography (CT) scan of the paranasal sinuses is invariably indicated prior to surgery [3]. Although CT of paranasal sinuses has emerged as the preferred radiological test for confirming the disease and for planning sinus surgery, imaging is neither sufficiently sensitive nor sufficiently specific [4, 5]. Symptomatic CRS patients without significant radiological evidence of disease on CT scan is a commonly encountered clinical situation. The otolaryngologist is in a dilemma to proceed with surgical intervention in such cases after failed medical treatment. Recent studies also demonstrated that the radiographic (CT) staging of CRS does not predict the severity of symptoms nor does it efficiently predict symptomatic improvement after FESS [6, 7].

Review of available literature does not show much research work being done on this challenging topic from our region. The present study attempts to evaluate the outcome of FESS in patients with symptomatic CRS with minimal changes in CT scan and also to correlate pre-operative CT and symptom scores.

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Material and methods

Chronic rhinosinusitis patients attending rhinology clinic of our hospital were given medical therapy comprising of antibiotic—Co-amoxycylav (amoxicillin 500 mg + clavulanate 125 mg twice daily) for 3 weeks, anti-histaminic and oral decongestant (cetirizine 5 mg + pseudoephedrine 30 mg once daily) for 7 days, topical decongestant (Xylometazoline 0.1% 2 drops both nostrils twice daily) for 7 days and topical nasal corticosteroid (Fluticasone 100 mcg both nostrils once daily) for 3 weeks. The patients refractory to the medical management were radiologically evaluated with CT of paranasal sinuses (3 mm coronal and axial slices). All the patients were above 18 years of age and both the sexes were included in the study (mean age = 29 years). Patients with frank nasal polyposis, allergic rhinosinusitis, marked septal deviation, significant inferior turbinate hypertrophy and those having history of previous FESS were excluded from the study. These patients were grouped based on CT scoring (Lund Mackay staging system [8]): group A (CT score 0–6) and group B (CT score 7–24); with 35 patients in each group. All the patients underwent FESS by Messerklinger technique [9]. The extent of endoscopic sinus surgery was decided by pre-operative radiological assessment and per-operative findings for the individual patient. Post operatively all the patients were given short course of antibiotic—Co-amoxycylav (amoxicillin 500 mg + clavulanate 125 mg twice daily) for 5 days and anti-histaminic and oral decongestant (cetirizine 5 mg + pseudoephedrine 30 mg once daily) for 5 days. Nasal saline douchings and topical nasal corticosteroid (Fluticasone 100 mcg both nostrils once daily) were given for 6 weeks post-operatively. During followup period nasal suctioning was done and the crusts were removed, and nasal cavity was examined for any synechiae formation. Symptom scoring of all patients was done with visual analog scale [10] preoperatively and postoperatively at 1-, 3-, 6- and 12-month follow-up. Scoring was done for five symptoms: facial pain, headache, nasal blockage/congestion, nasal discharge and olfactory disturbance which included hyposmia and anosmia. Olfactory assessment was done only by subjective assessment, no objective tests were applied. Diagnosis of CRS in this study was based on the criteria led down by the rhinosinusitis task force and endorsed by the American Academy of Otolaryngology [11].

Results

Symptomatology

Total study population included 71% males and 29% females (mean age = 29 years). Most common symptom in group A was nasal obstruction (100%), while nasal

Table 1 Symptom prevalence in percentage

Symptoms	Group-A (%)	Group-B (%)	P value
Nasal obstruction	100	88	0.237
Nasal discharge	90	92	1.00
Headache	63	63	1.00
Facial pain	23	15	0.746
Olfactory disturbance	26	34	0.778

discharge was the most common symptom in group B (92%). In both the groups, 63% patients had complaint of headache, olfactory disturbance (26/34%) and facial pain (23/15%). Table 1 shows the distribution of various symptoms in group A and B. Post nasal drip was seen in 50 and 60% cases, respectively, in group A and B; however, this symptom was not included in assessing the symptom score of patients. The mean symptom score for group A and B was 22.4 ± 6.5 and 24 ± 7.0832 , respectively. Majority of patients had symptom score in the range of 21–30 and the highest symptom score was 45. There was no statistically significant difference in the symptom scores of the two groups (Table 1; Fig. 1).

Computed tomography scores

The mean CT score on Lund Mackay staging system in group A and B was 3 and 13, respectively. Maxillary sinus was the most commonly affected sinus in group A patients (42%) whereas in group B the ethmoid was the commonly involved sinus (95%). The osteomeatal complex of one or both sides was found to be blocked in 53% patients in group A and in all the patients in group B. Sphenoid sinus was least commonly involved.

Correlation between CT scores and pre-operative symptom scores

There was no statistically significant correlation between computed tomographic scores and symptom scores in both the groups (Fig. 2). The correlation failed to achieve

Fig. 1 Bar chart showing symptom prevalence in group A and B

Fig. 2 Scatter diagram showing computed tomography scores and symptom scores in group A and B

statistical significance by pearson r correlation analysis ($r = 0.37$, $P = 0.358$). These results suggest that a higher symptom score does not predict demonstration of more extensive disease on CT scans.

Improvement in symptom Scores

The evaluation of outcome of surgery was done at 1, 3, 6 and 12 months follow up and was termed as significant ($\geq 75\%$), some ($<75\%$ to $\geq 25\%$) and no improvement ($<25\%$) in symptom scores. The patients who left the study in between were not included in the statistical analysis.

Group A

The over-all symptom score improvement was 83% at the end of 1 year follow up for Group A cases. Table 2 shows the improvement in scores for the individual symptoms after surgery at 6 and 12-months follow up. All the 35 cases showed 100% improvement in the complaint of facial pain, 87% patients had relief in the complaint of olfactory disturbance and 80% cases showed significant improvement for nasal obstruction. Nasal discharge and headache were the symptoms which showed comparatively less improvement. It was noted that 50% of the patients had complaint of postnasal drip when they first presented to the hospital and only 60% showed improvement in this symptom after surgery.

Group B

The overall symptom score improvement was seen in 90% at 1 year follow up. All the cases showed 100% relief in the complaint of facial pain, 89% showed marked improvement in the complaint of headache, 83% noted significant improvement in the complaint of nasal obstruction. There was significant improvement in olfactory disturbance in 70% patients while nasal discharge improved in 63% cases only (Table 2). We also noted that 70% patients had complaint of postnasal drip when they first presented to the

hospital and only 60% showed improvement in this symptom after surgery.

The statistical evaluation of difference in the outcome of FESS in group A and group B patients was done using chi-square test. There was no statistically significant difference noted in the overall symptom score improvement as well as for specific symptoms at the end of 1 year follow up (Table 3).

Discussion

The literature regarding the evaluation of outcome of FESS in patients with minimal evidence of disease on CT scan is very sparse. Our study was designed primarily to assess the same. CT is considered to be the radiologic examination of choice for confirming suspected CRS. CT scan has been shown to accurately describe the anatomy of the paranasal sinuses and the disease. However, many patients with the clinical diagnosis of sinusitis may have no demonstrable CT evidence of disease [5]. In this prospective study we found that 83% patients with symptomatic CRS refractory to medical management showing minimal changes on CT had significant improvement ($>75\%$) in the overall symptom score after FESS at the end of 12-month followup. So FESS does have a beneficial role in symptomatic CRS in patients with minimal CT changes.

Review of literature shows very few similar studies; Gheriani [12] conducted a similar study at St. Vincent's University Hospital, Ireland published in 2006. The study included 78 patients. The study population was divided according to the degree of disease involvement into 2 groups based on the median score 6. He observed that 80% patients with symptomatic CRS having minimal CT changes reported 75% improvement in the overall symptoms after FESS. Further he noted that 92% of the patients had improvement in nasal obstruction, 76% had relief in the complaint of headache. The symptomatic improvement after FESS for specific symptoms in our study was nearly similar to that conducted by Gheriani. Our observations

Table 2 Percentage of cases showing improvement for various symptoms in follow-up after surgery

Post-op month	Group	Nasal obstruction			Nasal discharge			Headache			Facial pain			Olfactory disturbance		
		Significant	Some	None	Significant	Some	None	Significant	Some	None	Significant	Some	None	Significant	Some	None
6	A	80	10	10	74	15	11	79	5	16	100	0	0	62	0	38
	B	83	10	7	74	18	8	80	10	10	100	0	0	70	0	30
12	A	80	10	10	64	25	11	74	0	26	100	0	0	87	0	13
	B	83	10	7	63	30	7	89	0	21	11	100	0	70	0	30

Significant improvement reported improvement of $\geq 75\%$ Some improvement reported improvement of <75 to $\geq 25\%$ No improvement $<25\%$ Improvement or worsening of symptoms**Table 3** Comparison of outcome in both the groups

Symptoms	Improvement in % in group A	Improvement in % in group B	P value
Nasal obstruction	80	83	0.881
Nasal discharge	64	63	0.935
Headache	74	89	0.407
Facial pain	100	100	–
Olfactory Disturbance	87	70	0.254

suggest that a good subjective outcome in terms of symptom improvement can be obtained with FESS in patients with CRS with minimal evidence of disease on CT scan. Symptomatic improvement was seen post FESS regardless of the CT scores. We also noticed wide variation of symptom scores in patients with similar CT score. No significant correlation was found between computed tomographic scores and symptom scores in both the groups. Similar conclusion has been given by Bhattacharyya [13] in a study conducted on 221 patients at Washington School of Medicine.

We advocate that patient symptomatology and clinical assessment should be given due importance along with CT scan changes for the decision making before subjecting a patient to FESS. Thus, their combination can provide an ideal way to help surgeons understand and grade the disease severity in patients and thus prioritise them for surgery. However, a larger patient pool and a longer follow-up will be required to make this statement more substantial.

Conflict in interest None.

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