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PREOPERATIVE AND POSTOPERATIVE OUTCOME OF FUNCTIONAL ENDOSCOPIC SINUS SURGERY IN SUBJECTS WITH CHRONIC RHINOSINUSITIS AND NASAL POLYPOSIS AS STUDIED BY SACCHARINE TRANSIT TIME

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ABSTRACT

Preoperative and postoperative outcome of functional endoscopic sinus surgery in subjects with chronic rhinosinusitis and nasal polyposis as studied by saccharine transit time.

BACKGROUND: Chronic rhinosinusitis is a common condition in otorhinolaryngology characterized by persistent Sino nasal mucosal inflammation of more than 12 weeks. The aim of this study is to evaluate the changes in mucociliary clearance in patient with chronic rhinosinusitis with nasal polyposis following endoscopic sinus surgery.

METHODS: It is an observational study of 30 patients with chronic rhinosinusitis with nasal polyposis conducted in the E.N.T department of our institution. The data was collected by filling a proforma. Preoperatively mucociliary clearance was recorded and postoperatively it was recorded at 6 weeks and 3 months interval.

RESULTS AND DISCUSSION: In our study total of 30 patients, the mean age of the group was 43 years with a range of 21-64 years. The majority of the patients were in the age groups of 30-40 years (26.6%). Males were 60% and females were 40%. Among the total patients of CRSwNP 33.3% had unilateral disease and 66.6% had bilateral disease. Mucociliary clearance was evaluated with saccharine transit time. In our study mean pre op STT was 23.23±3.28 minutes. Post operatively after 6 weeks and 3 months, it was 21.61±2.91 minutes and 16.88±2.43 minutes respectively. Both the above comparative groups were statistically significant with p value of <0.0001.

CONCLUSION: Functional endoscopic sinus surgery is an effective surgical procedure in chronic rhinosinusitis with nasal polyposis and helps regain the overall function of the nose and paranasal sinuses. It significantly improved the mucociliary clearance at 6 weeks and 3 months post operatively after FESS.

KEYWORDS

CRSwNP-Chronic rhinosinusitis with nasal polyp, STT- Saccharine transit time

INTRODUCTION

The mucociliary mechanism in the nose is one of nature's best air conditioners, which also protects the upper and lower respiratory tracts and the delicate alveoli. The mucociliary mechanism can be easily impaired by structural abnormalities in the nose or paranasal sinuses and also by upper respiratory tract diseases. This impairment can lead to stagnation of secretions and secondary infections. A permanently defective mucociliary mechanism predisposes to chronic sinusitis, bronchiectasis and chronic obstructive lung diseases.

Several methods have been used to measure the mucociliary clearance either directly by electron microscope studies or indirectly by assessing the mucous transport or clearance[1]

Andersen et al used a simple method which consisted of depositing a small particle of saccharine on the anterior end of inferior turbinate and noting the time that it took the subject to report a sweet taste[2].

Nasal nitric oxide-It is a noninvasive and easy screening test for the diagnosis of primary ciliary dyskinesia. This test requires the cooperation of the patient in breath holding for stable plateau measurements, which limits its use in children.

Mucus flow rate with radiopaque Teflon disks-In this test mucociliary transport is determined by imaging of radiopaque Teflon disks introduced into the nose using a Fluoroscope image intensifier.[3]

Hundreds of etiologies have been implicated in the pathogenesis of mucociliary dysfunction out of which the three most important causes include viral infection, Sino nasal disease (i.e. chronic rhinosinusitis (CRS) and nasal polyposis), and traumatic injury[4]. The purpose of this prospective study was to study the variation in mucociliary clearance and olfactory function in patients of chronic sinusitis with nasal polyposis and to assess any improvement in mucociliary activity and olfactory function after functional endoscopic sinus surgery (FESS).

MATERIALS AND METHODS

This was a hospital based prospective study of 30 adult patients presenting to the dept. of ENT of SGMC & RF in Venjaramoodu, Trivandrum with features suggestive of chronic rhinosinusitis with nasal polyposis were selected. The study period was 18 months from November 2018 to May 2020. Patients diagnosed for the first time with Chronic rhinosinusitis with nasal polyps confirmed with CT PNS and nasal endoscopy and patients who have previously undergone FESS/polypectomy, both were included in the study. Exclusion criteria included patients with chronic rhinosinusitis without nasal polyp, sino-nasal malignancy, invasive fungal sinusitis, smokers and patient with congenital impaired ciliary function (e.g.: Young's syndrome, Kartagener's syndrome). Patients with saccharine transit time >60 mts were also excluded.

Mucociliary transport was evaluated using the saccharine method. The procedure was initially explained to the patient and he is asked to blow the nose to remove any excessive secretions. No mucolytic agents or topical preparations were used in the nose prior to measurement of saccharine time. Saccharine powder (5 mg) is placed over the anterior end of the inferior turbinate. The time from the placement of particle to the time till the perception of sweet taste sensation by the patient is recorded in minutes and taken as the clearance time. The patient is told not to sniff, exhale deeply or sneeze during the test period. Patients who fail to register a sweet taste within 60 min will be excluded since they are empirically considered to have an impaired sense of taste or not to understand the test procedure.

Table 1: Saccharine transit time

Normal	Up to 20 minutes
Prolonged	21 to 30 minutes
Severely prolonged	31 to 60 minutes

Total of 30 patients were evaluated preoperatively. During initial visit a CT scan of PNS and diagnostic nasal endoscopy were performed. Pre-operative test of mucociliary clearance with saccharine performed during this visit.

The Pre-operative data are recorded and stored in a database for further evaluation. Patients underwent FESS and routine postoperative follow-up at weekly intervals for the first month followed by monthly intervals until 6 months. During these visit patient underwent a rigid nasal endoscopy to assess the postoperative nasal cavity and any crusts were removed. Patients also received nasal steroids for a period of 6

months. Postoperative test of mucociliary clearance with saccharine were performedat 6 weeks and end of 3rd month. The postoperative parameters are recorded and stored in a database for further evaluation.

RESULTS

In this study total of 30 patients who satisfied the inclusion criteria as per the study protocol were recruited. Pre-operative evaluation was done and reviewed postoperatively at 6 weeks and 3rd month over a period between November 2018- May 2020. Total of 30 patients 18 (60%) patients is male and 12 (40%) patients is female.

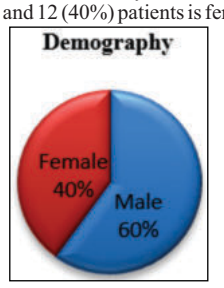

Fig 1: Percentage of gender distribution (n = 30).

Age groups ranged from 21-64 years with a mean age of 42.9 years.Most of the patients (26.6%) were came under 30-40 years age group.

Total of 67% (20) patient had bilateral disease and 33% (10) patient had unilateral disease.

Total of 67% (20) had primary surgery and 33% (10) had revision surgery.

The nasal function in terms of mucociliary clearance was evaluated with the saccharine perception test. At the beginning of study, only 20% patients had normal saccharine transit time, 76.6% patient had prolonged and 3.3% had severely prolonged STT.

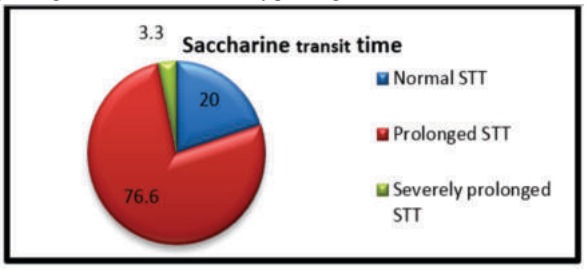

Fig 2: Percentage distribution of pre-operative saccharine transit time

The nasal function in terms of mucociliary clearance was evaluated with the saccharine perception test. At the beginning of the study, only 6 (20%) patients had normal saccharine transit time, 76.6% patient had prolonged and 3.3% had severely prolonged STT. Post operatively after 6 weeks 40% had normal and 60% had prolonged STT. Post operatively after 3 months 86.6% patient had normal STT and 13.3% had prolonged STT

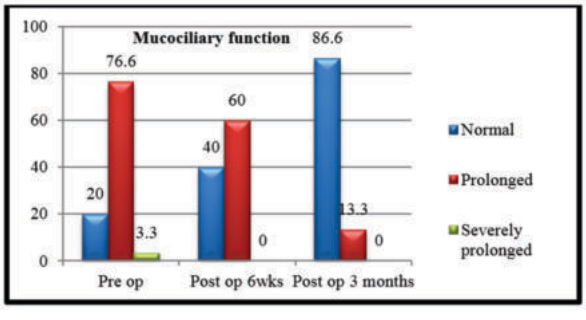

Fig 3: Comparison between pre-operative and post-operative mucociliary function.

At the beginning of study mean pre-operative saccharine transit time was 23.23 minutes with std deviation of 3.28. The mean post-operative saccharine transit time at 6 weeks was 21.61 minutes with std deviation of 2.91 and at 3 months was 16.88 minutes with std deviation of 2.43.Mean of difference in saccharine transit time at 6 weeks with initial value was 1.61 with Std. deviation of 2.21and a p value of <0.0001. This was statistically significant. Mean of difference in saccharine transit time at 3 months with initial value was 6.35 with Std. deviation of 1.92 and we get a p value of <0.0001. This value was also found to be statistically significant

DISCUSSION

In our study total of 30 patients, the mean age of the group was 43 years with a range of 21-64 years. The majority of the patients fell in the age groups of 30-40 years (26.6%). The least number comes under the age group of 50-60 years (13.7%). Males were 60% and females were 40%. Among the total patients of CRSwNP 33.3% had unilateral disease and 66.6% had bilateral disease. Among male patients 13.3% had unilateral disease and 86.6% had bilateral disease. In the case of female patients 20% had unilateral disease and 80% had bilateral disease.

Mucociliary clearance was evaluated with saccharine transit time. In our study we found that pre operatively 20% had normal STT, 76.6% had prolonged STT, and 3.3% had severely prolonged STT. Following FESS after 6 weeks 40% had normal STT, 60% had prolonged STT. One patient categorized in the severely prolonged STT become prolonged STT and 20% prolonged STT become normal STT after 6 weeks of follow up. After 3 months we got 86.6% had normal STT and 13.3% had prolonged STT, i.e. 46.6% prolonged STT become normal STT after 3 months following surgery.

Our study showed a mean pre-operative saccharine transit time was 23.23 minutes with std deviation of 3.28 and a mean post-operative STT at 6 weeks was21.61 minutes with std deviation of 2.91. During comparing change in pre-operative STT to post-operative STT at 6 weeks we found the mean 1.61 with a std deviation of 2.21. This is statistically significant with p value of <0.0001. Mean post-operative STT at 3 months was 16.88 minutes with std deviation of 2.43. During comparing change in pre-operative STT to post-operative STT at 3 months we found that mean at 6.35 with std deviation of 1.92 which is also statistically significant with a p value of <0.0001, there by suggesting an improvement of mucociliary function after functional endoscopic sinus surgery in chronic rhinosinusitis with nasal polyposis patients.

The mean pre op STT was 23.23±3.28 minutes. Post operatively after 6 weeks and 3 months it was 21.61±2.91minutes and 16.88±2.43 minutes. Both the above comparative groups are statistically significant with p value of <0.0001. In the study of K. R. V. Sakthikumar et al pre op STT was 16.20±6.33 and post operatively after 6 weeks which was found to be 10.30±3.71. This is also statistically significant with p value of <0.001[5]. Another study by Mangal Singh et al in the study group of u/l polypoidal sinusitis pre op STT was 13.45 ± 2.07 and post operatively 6 weeks, 3 months and 6 months STT was 11.23±1.77, 11.56±1.68, 9.54±1.27 respectively. Another group with b/L polypoidal sinusitis pre op STT was 21.31 ± 0.76 and post operatively 6 weeks, 3 months and 6 months STT was 17.14 ± 0.48, 16.29 ± 0.40, 13.32±2.03 respectively. Both the above comparative groups are statistically significant with p value of <0.001[6]. These results were comparable with the results obtained in our study.

CONCLUSION

Functional endoscopic sinus surgery is an effective surgical procedure in chronic rhinosinusitis with nasal polyposis. Patients undergoing FESS showed an improvement in overall function of the nose and paranasal sinuses. FESS improved significantly the mucociliary clearance at 6 weeks and 3 months post operatively. Pre-operatively most of the patients in our study had a prolonged STT who post operatively showed improved mucociliary clearance and most of them showed a normal STT. The above findings confirm the reversible nature of the chronic rhinosinusitis with nasal polyposis after FESS.

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