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Original Research Article

Impact of functional endoscopic sinus surgery on otologic symptoms associated with chronic rhinosinusitis

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ABSTRACT

Background: The study was aimed at observing the impact of FESS on otologic symptoms associated with Chronic rhinosinusitis. Otitis media and other otologic symptoms develop frequently during the evolution of CRS. The evolution of middle ear disease in the setting of chronic rhino-snusitis possibly reflects the role of a dynamic conduit, eustachian tube, normal functioning of which, is crucial to keep the middle ear functions within physiologic limits.
Methods: The study was conducted in the Department of Otorhinolaryngology, Jhalawar Medical College and SRG hospital, Jhalawar (Rajasthan) between August 2021 and November 2022. 53 patients of CRS with associated otologic symptoms were included in the study. Patients were subjected to functional endoscopic sinus surgery and septoplasty where relevant.
Results: The majority of the study patients presented with ear discharge (72%), earache (41%) and ear fullness (41%). The most common sinusitis related symptoms were Nasal blockage (77%), frontal headache (53%) and nasal discharge (49%) with relatively lower proportion of post nasal drip (23%), facial pain (21%) and halitosis (15%). All participants were subjected to FESS which was combined with septoplasty and sub-mucous diathermy of the inferior turbinate where it was relevant. Patients were followed at 1st, 3rd and 6th week post-operatively.
Conclusions: Majority of the patients (89%) shown a statistically significant subjective improvement in the otologic symptoms following the initial optimum medical therapy for the CRS. Endoscopic sinus surgery was found to improve symptoms on a statistically significant scale.

Keywords: FESS, CRS, CT PNS, ESS

INTRODUCTION

Chronic rhinosinusitis and Chronic Otitis media possess significant proportion of the patients attending otorhinolaryngology clinic. Otitis media and other otologic symptoms develop frequently during the evolution of CRS, even when the nasal disease is well controlled. Otolaryngologists often encounter these two diseases concurrently and antibiotic treatment or surgery affect one or the other's clinical progress.[1] The evolution of middle ear disease in the setting of chronic rhino-snusitis possibly reflects the role a dynamic conduit, eustachian tube which connects the paranasal sinus and nasal mucosa with the middle ear anatomically and functionally.[2,3] The middle ear and paranasal sinuses have some common characteristics. Firstly, the paranasal sinuses and the middle ear are proximal and contiguous anatomic structures. Secondly, the middle ear, paranasal sinuses, and Eustachian tubes are lined by the same pseudo-stratified columnar epithelium. Otitis media is frequently secondary to eustachian tube dysfunction, which in turn is often a result of infections originating in the nose and the paranasal sinuses.[4,5] Studies

have reported otologic symptoms as part of broader health questionnaires, or grouped them with other symptoms into domains like "ear/facial symptoms" or "oropharyngeal symptoms" for further evaluation. But only few studies so far that has looked specifically at otologic outcomes after ESS for CRS.[6,7] Thus, it is logical to treat nasal and paranasal diseases simultaneously to achieve a positive outcome in the treatment of otitis media. Those requiring correction of the ear disease specially for the chronic/ refractory cases by means of ear surgery should have nasal and/or PNS pathology corrected first, if an ear surgery has to be successful.[8,9] Sino-nasal disease foci might affect the middle ear functions via two mechanisms. Firstly, if the pathological changes occur in the nasal and paranasal sinus mucosa, the normal secretion routes may undergo significant changes and the ciliary beat may get severely affected.[10] Secondly, it produces mucosal edema which affects the mucociliary beat.

METHODS

The study was conducted in the Department of Otorhinolaryngology, Jhalawar medical college and SRG hospital, Jhalawar (Rajasthan) between August 2021 and November 2022 and a complete enumeration of the cases done. In this prospective study total 53 patients with chronic sinusitis having associated otologic symptoms underwent FESS. All patients with clinical signs and symtoms consistent with chronic sinusitis disease for a period of more than 3 months were subjected to diagnostic nasal endoscopy with microscopic and endoscopic otological examination and were provided an appropriate medical therapy for 6 weeks.

The medical therapy consisted an empirical broad spectrum antibiotic for a period of one to three weeks along with a systemic antihistaminic agent and mucolytics and topical nasal decongestant in selective cases for a period of 6 weeks. Participants were advised to perform alkaline nasal wash two to three times and to inhale steam three to five times a day. Patients having CRSwNP were additionally provided with the fluticasone nasal spray for 6 weeks. Effect of the appropriate medical therapy on the otologic symptoms was noted in each study participants at the end of the therapy.

All patients who did not improve following the initial medical therapy or in whom the symptoms re-appeared after discontinuing the medical therapy were subjected to multiplanar NCCT PNS. All participants with endoscopic evidence of osteomeatal pathology with supporting radiological evidence of paranasal sinus disease and pathological anatomic variations were subjected to FESS using Messerklinger technique. It was also combined with the septoplasty where relevant. Each associated otologic symptom was studied pre-operatively and followed post-operatively at 1st week, 3rd week and 6th week. All study participants were subjected to the otoscopic and microscopic examination of the ear along with an endoscopic evaluation of the ET orifice. PTA and tympanometry was performed preoperatively and postoperatively at 6th week and a pure tone average for the air conduction over the mid speech frequencies was obtained. Mcnemar and the paired t-test were used for statistical analysis.

Inclusion criteria

All consenting individuals between the age group of 15 to 65 years irrespective of sex who fulfilled the EPOS-2012 criteria for CRS (with or without nasal polyposis) and had atleast one or more following otologic symptoms (unilateral/bilateral) were included in the study. Ear discharge, Ear pain, Ear fullness and Dizziness. Cases were confirmed clinically and by the nasal endoscopy and/or CT findings of the nose and PNS and those did not get cured/ shown recurrence of the symptoms with the optimum medical therapy underwent FESS.

Exclusion criteria

All patients with the age below 15 years, known cases of cystic fibrosis, ciliary dyskinesia and genetic disorders affecting the sinonasal mucosa, acute sinusitis, malignancy of the nose and PNS, sinusitis with intracranial complications, osteomyelitis of the frontal or maxillary bones, facial anomalies, congenital ear anomalies, previous nasal & ear surgery, hypertrophied adenoids & history of maxillofacial injuries were excluded.

RESULTS

A total number of 30.2% and 11.3% presented with unilateral and bilateral earache respectively which was reduced to only 2% at 6th post operative week.

Table 1: Distribution of Otologic symptoms among the study participants (n=53).

Otologic Symptoms	Earache, N (%)		Ear Discharge, N (%)		Ear Fullness, N (%)		Dizziness, N (%)	
	Pre operative	6th-post operative week	Pre operative	6th-post operative week	Pre operative	6th-post operative week	Pre operative	6th-post operative week
Absent	31 (58.5)	52 (98.1)	15 (28.3)	47 (88.7)	31 (58.5)	50 (94.3)	44 (83)	0
Unilateral	16 (30.2)	1 (2)	25 (47.2)	5 (9.4)	16 (30.2)	3 (5.7)	9 (17)	0
Bilateral	6 (11.3)	0	13 (24.5)	1 (2)	6 (11.3)	0		
Total	53 (100)	53 (100)	53 (100)	53 (100)	53 (100)	53 (100)	53 (100)	53 (100)

Table 2: Distribution of secretions over eustachian tube orifice among the study participants (n=53).

Eustachian tube orifice	Right, N (%)				Left, N (%)			
	Baseline	1st week	3rd week	6th week	Baseline	1st week	3rd week	6th week
No sectertions over ET orifice	24 (45.3)	30 (56.6)	43 (81.1)	49 (92.5)	26 (49.1)	34 (81.1)	41 (77.4)	50 (94.3)
Secretions over ET orifice	29 (54.7)	23 (43.4)	10 (18.9)	4 (7.5)	27 (50.9)	19 (35.8)	12 (22.6)	3 (5.7)

Table 3: Distribution of Status of tympanic membrane retraction among the study participants (n=53).

Status of tympanic membrane retraction	Right, N (%)				Left, N (%)			
	Baseline	1st week	3rd week	6th week	Baseline	1st week	3rd week	6th week
No retraction	42 (79.2)	42 (79.2)	44 (83)	45 (84.9)	42 (79.2)	44 (83)	47 (88.7)	48 (90.6)
Grade 1	7 (13.2)	7 (13.2)	6 (11.3)	7 (13.2)	9 (17)	6 (11.3)	6 (11.3)	5 (9.4_
Grade 2	4 (7.5)	4 (7.5)	3 (5.7)	1 (1.9)	2 (3.8)	2 (3.8)	-	-
Grade 3	-	-	-	-	-	1 (1.9)	-	-
Grade 4	-	-	-	-	-	-	-	-

Table 4: Distribution of tympanometry curve among the study participants (n=53).

Tympanometry	Right		Left	
	Baseline	6th week	Baseline	6th week
Not applicable	28 (52.8)	27 (50.9)	24 (45.3)	24 (45.3)
Type A	14 (26.4)	22 (41.5)	16 (30.2)	24 (45.3)
Type B	3 (5.7)	1 (1.9)	2 (3.8)	2 (3.8)
Type C	8 (15.1)	3 (5.7)	11 (20.8)	3 (5.7)
Type As	0	0	0	0
Type Ad	0	0	0	0

Table 5: Distribution of mean improvement in PTA from baseline to 6 weeks among the study participants (n=53).

Pure tone average		Mean difference	SD	ESM	95% CI of the difference		T value	df	P value
					Lower	Upper			
Right									
Baseline	38.36±6.92	3.21	7.20	1.25	0.66	5.76	2.56	32	0.015
6th week	35.15±11.52								
Left									
Baseline	38.66±6.52	5.13	8.83	1.64	1.77	8.49	3.13	28	0.004
6th week	33.52±13.15								

Similarly out of 51 discharging ears initially, 86% achieved dry ear at the end of 6th post-op week. Ear fullness was complained by 41.5 % participants out of which 94.3% were free of ear fullness by 6th post-op week. 9 participants had dizziness initially which disappeared in all of them post operatively.

A total number of 54.7% participants had mucopurulent or purulent secretions over at least on of the pharyngeal end of the eustachian tube orifice which reduced to 5.7% by the end of 6th post-op week. 20.8% Tympanic membranes had some degree of pars tensa retraction which reduced to 12.2% by 6th post op week. A total number 50.9% tympanic membrane were intact out of which 44.4% had abnormal curve on tympanometry which remained 16.7% by 6th post-op week and remaining ears regained a normal curve.

We can conclude that there was a statistically significant improvement in hearing following the treatment from 38.36±6.92dB to 35.15±11.52dB (p=0.02); an improvement of 3.21±7.20 dB on right ear. There was statistically significant improvement in hearing on left ear following the treatment from 38.66±6.52dB to 33.52±13.15dB (p=0.004); an improvement of 5.13 ± 8.83 dB on left ear.

DISCUSSION

Presence of the paranasal sinus and nasal disorders in the setting of middle ear disease is often overlooked. it could possibly happen due to unawareness of the patients for the nasal symptoms. Management of the ear disease without addressing the nasal pathology often leads to incomplete resolution or failure.[11] This concurred with the findings in a study by Maier et.al showing deterioration of ET function 1week after nasal surgery, which began to normalise after 6-8 weeks, thus concluding that tympanoplasty should not be performed in the same session or in the early postoperative period, but after several months only.[1] In our study around 15.1% participants were between 16-20 years, 39.6% 21-30 years, 30.2% 31-40 years, 3.8% 41-50 years, 7.5% 51-60 years and 3.8% >60 years. In a study by Teo et al mean age of the study participants was 51.6±15.6 years.[12] In a study by Damm et al the mean age was 50.7 years, ranging from 15 to 80 years.[13] In our study around 39.7% were males and 60.4% females. In a study by Teo et al 47% were males and 53% females.[14] In a study by Damm et al 103 patients were female and 176 were male patients.[15] In our study around 41.5% had earache out of those total 30.2% had unilateral earache and remaining 11.3% bilateral earache at the beginning. At 1st week postoperatively around 71.7% had no earache, 17% had unilateral earache and 11.3% had bilateral earache. At 3rd week 96.2% participants were free of earache and remaining 3.8% had only unilateral earache. by the end of the 3rd post-operative week, there was no participant who had bilateral earache. At 6th week 98.1% had no earache and only 1.9% had unilateral earache. We concluded that in our study, there was a statistically significant improvement in the earache with a p value of <0.001. Teo et al reported a statistically significant improvement in earache among 43% participants.[12] In our study, 25 participants had unilateral ear discharge and 13 had bilateral ear discharge. Remaining 15 patients had no ear discharge at the time of presentation. A total number of 51 ears (48.1%) were discharging out of 106. Out of 51 discharging ears, only 36 (33.9%) had discharge at the end of first post op week, 25 (23.5%) were still discharging by the end of 3rd post-op week. There were 7 (6.6%) ears which did not show improvement in ear discharge by the end of 6th post-op week. A total number of 44 (86.2%) patients achieved dry ear by the end of the 6th post operative week which was statistically significant. Tympanommetry detected abnormal Type B and Type C curves in 24 ears initially out of which 15 ears achieved normal type A curve by the end of the 6th post-operative week. In our study, we were able to draw an impression that middle ear disorders are often associated with CRS and every patient with persistent middle ear symptoms should be evaluated for the presence of a sino-nasal pathology and consider treating it prior to surgical interventions in the ear. However, the study couldn't obtain the comparison of the outcome of subsequent tympanoplasty in study group and non-study group. Longer post operative follow up might be required to assess the log term outcome.

CONCLUSION

Otologic symptoms (i.e. earache, ear fullness, ear discharge, dizziness), despite not being included as a major diagnostic criteria for the CRS, were commonly associated with CRS. Optimum medical therapy directed for the CRS has shown to improve the otologic symptoms significantly. Sino-nasal disease has been detected in majority of the patients with persistent/long standing cases of tubotympanic type of chronic otitis media specially in bilateral ear pathology. Functional endoscopic sinus surgery significantly improved the otologic symptoms postoperatively and majority of the ear symptoms got improved with achievement of dry ear. Improvements in the mean hearing was observed in pure tone audiometry and majority of the participants attained a normal tympanogram. However, no reduction in the size of the tympanic membrane perforation was observed. In our study, we conclude that, adult patients with persistent or recurrent otorrhoea, especially with the bilateral ear disease along with those having serous otitis media, eustachian tube dysfunction or persistent ear symptoms should routinely be evaluated for the presence of a sino-nasal disease. Endoscopic sinus surgery should be considered for the elimination of the sinus and nasal pathology prior to the ear surgery if there is clinical evidence of CRS which is supported by the endoscopic and radiological findings.

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