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AN OUTCOME OF ENDOSCOPIC STAPEDECTOMY IN A TERTIARY CARE CENTRE, REWA MADHYA PRADESH

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ABSTRACT

Introduction: Otosclerosis is a primary disease of otic capsule in which irregular spongy bone replaces the dense endochondral layer of bony otic capsule, thereby fixing the footplate of the stapes. Endoscopic stapedectomy has many benefits over microscopic surgery as better visualization, and easy accessibility to the stapes, oval window niche, and facial nerve. **Material and methods:** This prospective, observational study included 10 patients aged 18-46 years diagnosed with otosclerosis who underwent endoscopic stapedectomy. This study was conducted at Shyam Shah Government Medical College, Rewa, Madhya Pradesh, during the period of two years (2022 -2024). **Results:** Out of 10 patients in our study , maximum patients belongs to second decade of life. Male to female was 1:1.5. About 70% of patients had moderately severe hearing loss with mean preoperative pure tone average was 57 dB. In our study 70% of patients had AB closure between 010 dB which is considered as successful. **Conclusion:** Endoscopic stapedectomy is technically feasible, safe, less injury to chorda tympani, excellent vision.

INTRODUCTION

Otosclerosis is characterized by focal remodelling of labyrinthine bone with a predilection to oval window niche resulting in fixation of the stapes footplate.[1] Otosclerosis commonly causes conductive deafness presenting with a normal tympanic membrane. Long standing cases can progress from stapes footplate to the oval window and towards the cochlear endosteum, can present as a neurosensory loss. The prevalence of clinical otosclerosis is around 0.04 % to 1 % in the whites[2]. Otosclerosis is an early adult – onset disease with an incidence greater in women compared to men in ratio of 2:1.[3]. Otosclerosis will eventually involve both ears in 85 to 90 % of patients. The use of an endoscope in stapes surgery has gradually increased in recent times. The microscope only provides a straight –line view while the endoscope offers a 360 ˚panoramic visualization of the middle ear anatomy and a more detailed view of the structures[4][5][6].Therefore using endoscope results in more anatomical structure preservation (i.e , scutum left intact) and less chance of injury to chorda tympani (leads to less postoperative dysgeusia [6]. Endoscopic stapedectomy has an added advantage over microscopic procedure as it is scarless surgery, patient compliance is better, hospital stay is reduced and therefore the cost.

METHODS

This study is a prospective cross-sectional observational study of patients with conductive hearing loss who were expected to undergo stapedectomy at the Department of Otorhinolaryngology of Shyam Shah Government Medical College, Rewa, Madhya Pradesh between 2022 to 2024.

Patients included in this study were those diagnosed with otosclerosis and satisfied the following criteria of having normal external ear canal, , with negative Gelle□s test and the audiograms showing conductive hearing loss, normal bone conduction thresholds at 500, 1000, 2000, and 4000 Hz, and absent stapedius reflex on impedance audiometry, negative history of past middle ear infection .Patient not fulfilling the inclusion criteria or requiring a revision surgery or surgery on the only hearing ear were excluded.

Patients with decreased hearing with intact tympanic membrane were subjected to PTA (pure tone audiometry) and Impedance audiometry. Patients with "AS" type of graph diagnosed as a case of otosclerosis .Preoperative High resolution CT (HRCT) temporal bone provides visualization of bony demineralization as hypodense/ radiolucent lesions at the fissula ante fenestrum and cochlear otic capsule. The hypodense lesions are related to active spongiotic lesions. Inactive otosclerotic lesions may have the same density as surrounding bones. HRCT also helps to foresee anatomic difficulties(i.e narrow oval window, facial dehiscence) and look for other associated diagnosis(i.e malleolar fixation, ossicular malformation)

After all routine investigations and getting pre-anaesthetic evaluation ,patients were posted for endoscopic stapedectomy .After surgery, patients were recalled in ENT OPD after 7 days . PTA repeated on 1 st and 3 rd month.

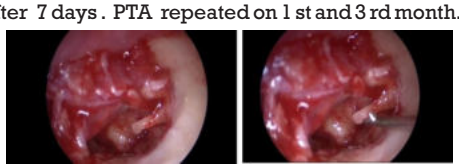


Figure 1: Endoscopic view of elevation of tympanomeatal flap during endoscopic stapedectomy

Figure 2: To aid in selection of the proper length prosthesis, the distance from the lateral surface of the incus to the footplate is being measured

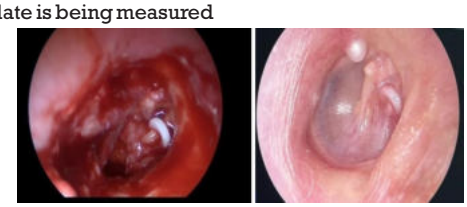


Figure 3 : Endoscopic view of piston crimpled over Long process of incus

Figure4: Endoscopic view of post operative (12 th week) stapedectomy

RESULTS

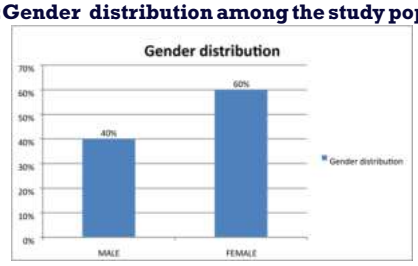
Total number of patients in the study were 10, out of which 50 % of patients were in age group of 20-30 years.According to our observation maximum number of patients were in second decade of life(50%).Minimum age of patient in the study was 18 years and maximum being 46 years.There was one patient in each age group of 15-20 , 31-35, 35-40,41-45,45-50 years respectively. (table 1)

Table 1 : Age distribution among the study subjects

Age in years	Number of patients	Percentage(%)
15-20	1	10
21-25	4	40
26-30	1	10
31-35	1	10
36-40	1	10
41-45	1	10
46-50	1	10
Total	10	100

Maximum patients in this study were female 6(60%) as compared to male 4 (40%).(table 2)

Table 2 : Gender distribution among the study population



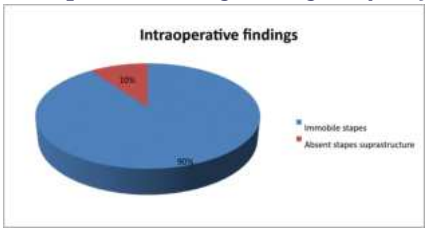
Among our cases, 2(20%) had moderate degree of hearing loss, 7(70%) had moderately severe type of hearing loss, and only 1(10%) had severe type of hearing loss 1 . None of patient had minimal, mild or profound hearing loss. Among males 1 (10%) had moderate hearing loss and 3 (30%) had moderately severe hearing loss whereas among females 1 (10%) had moderate hearing loss and 4 (40%) had moderately severe hearing loss , and 1(10%) had severe hearing loss as per pure tune audiometry.(Table 3)

Table 3: Degree of hearing loss on the basis of pure tone audiometry

Hearing loss(in Db)	Right ear (Male)	Right ear (Female)	Left ear (Male)	Left ear (Female)	Bilateral ear (Male)	Bilateral ear (Female)	Total
Minimal (15-25)	0	0	0	0	0	0	0
Mild (26-40)	0	0	0	0	0	0	0
Moderate (41-55)	1	0	0	0	0	1	2
Moderately	1	1	0	0	2	3	7
severe (56-70)							
Severe (71-90)	0	1	0	0	0	0	1
Profound (>90)	0	0	0	0	0	0	0
Total	2	2	0	0	2	4	10

9 patients (90%) had intraoperative finding of immobile stapes .Only 1 (10%) patient had intraoperative finding of absent stapes suprastructure .(Table 4)

Table 4: Intraoperative findings among study subjects



As mentioned earlier preoperative PTA and Air Bone Gap (AB) gap was 57±6.56 and ABG 39.1±5.46 .The study subjects were subjected to surgery and were evaluated at 4th and 12th postoperative week. At 4th post-operative week PTA was 49±5.16 and AB gap was 32.3±5.79 whereas at 12th post-operative week PTA and AB gap were 43.2±4.44 and 28.2 ±5.18 .These pre and post operative findings were subjected to paired t test and were found to be statistically significant ($p<0.05$) (Table 5)

Table 5 : Preoperative and postoperative Audiometric findings

	Preoperative	After 4 weeks	After 12 weeks	Paired T test results T value, sig(2 tailed)
	Mean ±SD	Mean ±SD	Mean ±SD	
PTA	57±6.56	49±5.16	43.2±4.44	9.7150, .0001
AB gap	39.1±5.46	32.3±5.79	28.2±5.18	6.3534, .0002

DISCUSSION

Out of 10 patients with otosclerosis, it is found that 50% patients were in between 21-30 years .The second decade was the most common age group of presentation. This data was not similar to a study by **Kumar et al** and **Rao et al** wherein third decade was the common age of presentation.

Male to female ratio found to be 1:1.5 , **Schmidt et al** ,**Shambhaugh et al, Nemati et al** in their study concluded male to female ratio as 1:2.Among our study subjects, 70% patients had disease in both ears whereas a study done by **Glasscock et al** , 80% of patients had disease in both ears. In our study 100% of patients had impaired hearing which is similar to a study done by **Rao et al** , 10 % of patients reported with giddiness along with impaired hearing in our study whereas **Rao et al** reported 11.6%.

All the patients in our study had intact tympanic membrane . In a study conducted by **X P Hao et al** [7], 73% of patients had symptoms of tinnitus and impaired hearing while in our study , 50% had symptoms of tinnitus and impaired hearing. As per Pure tone audiometry assessment, it is found to that 20% had moderate hearing loss (41-55 dB HL).Mean preoperative PTA, Air conduction threshold level was 57±6.56 dB hearing loss in our study; whereas in a study done by **Crompton et al** , mean air conduction threshold level was found to be 57 db, which is similar to our study.

According to Impedance Audiometry reports we observed that 90 % of patients had type As tympanogram whereas only 10% of patients A type tympanogram whereas **X P Hao et al** ,in his study observed that type A tympanogram is found in 68% of patients and AS type of tympanogram is found in 22% of patients. Mean AB gap is 39.1±5.46 dB (Mean±SD).Out of 10 patients in our study 60% patients had AB gap between 31-40 decibels similar to results of Kumar et al who reported 55.10% patients in similar range of AB gap.

Mean post operative AB gap in present study was 28.2±5.18(Mean ±SD) compared to mean post operative AB gap of 19.73±14.06(Mean ±SD) in a study done by **Ramalingam et al**.

In our study 70% of patients had AB closure between 0-10 dB which is considered as "successful" according to a grading given by Kartush. Similar results were established in studies done by Rao et al, Kumar et al, Moneir et al, Ozdak et al, Dursun et al whereas 70%,72.2%,71.4%,79%,61.3% respectively were the success rate.

CONCLUSION

The use of endoscope gives better visualization of the middle ear anatomy and a more detailed view of the structures, less scutum drilling. Endoscopic stapedectomy becomes an alternative to microscopic surgery, with comparetivly less

operative time, low complication rates and better hearing improvement. Main disadvantage of endoscopic stapedectomy is one handed work which needs high learning skill.

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