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Audiometric Evaluation of Type 1 Tympanoplasty - At Teritiary Health Center

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Abstract

Background: Chronic suppurative otitis media is one of the leading causes of hearing loss affecting 65-330 million people worldwide and out of which minimum of 50 percent of the population are suffering from the hearing loss. It is a chronic inflammatory process of middle ear characterized by recurrent episodes of ear discharge and hearing loss due to permanent tympanic membrane perforation. Our study is aimed to known the improvement in hearing threshold after endoscopic type1 tympanoplasty with objectives-1) Selection of patients of chronic suppurative otitis media with conductive hearing loss to undergo endoscopic tympanoplasty 2) calculate the hearing threshold pre operatively by pure tone audiometry 3) Calculate the hearing threshold post operative and compare with the pre operative hearing threshold by pure tone audiometry in patients who underwent endoscopic type 1 tympanoplasty. **Material and Methods:** This is a prospective observational study conducted on 25 ears of 24 patients with chronic suppurative otitis media mucosal type who attended ENT OPD at kamineni institute of medical sciences, Narketpally from December 2020 – November 2022. **Results:** All the patients who underwent endoscopic type 1 tympanoplasty, it is observed that there is a gain of 10.7dB in hearing threshold at the end of one month post operatively when compared to the pre operative hearing threshold. **Conclusion:** It is concluded that type 1 tympanoplasty is an effective treatment for CSOM patient mucosal type with intact ossicular chain.

Keywords: Chronic suppurative otitis media (CSOM) mucosal type, hearing threshold, pure tone audiometry, endoscopic type 1 tympanoplasty.

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Introduction

Chronic otitis media is an inflammatory process in the middle ear space that results in the long term or more often permanent changes in the tympanic membrane which can be perforation. Permanent perforation margins are lined by squamous epithelium. It is of two type chronic otitis media mucosal type and squamosal type. Chronic otitis media is divided in to active stage- where there is inflammation and production of pus, inactive is where there is not but have the potential to become active at some time, inactive stage with frequent reactivation- here although the middle ear mucosa is inflamed but not continuously active, frequent flare ups are present.[1]

According to WHO it is estimated that 65-330 million people worldwide are affected with COM out of which minimum of 50 percent of the population are suffering from the hearing loss. Permanent perforation should be treated surgically which is called Tympanoplasty.[2]

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Tympanoplasty is a procedure to eradicate the middle ear disease and to reconstruct the hearing mechanism. Was introduced in 1953 by Wullstein who divided the types in to 5 types focused on the type of ossicular chain reconstruction (OCR) needed. Type 1 indicates all the ossicles are intact and no need of ossicular chain reconstruction.[3]
The aim of this study is to know the improvement hearing threshold by pure tone audiometry after endoscopic type 1 tympanoplasty in chronic suppurative otitis media. This observational study is focused on the improvement in the hearing threshold in patients with chronic suppurative otitis media mucosal type with last episode of discharge 6 weeks back & who underwent endoscopic type 1 tympanoplasty. Pre operative hearing threshold is assessed and post operatively the hearing threshold is assessed at the end of 1 month by pure tone audiometry.

Material and Methods
This study includes a total of 25 ears of 24 patients of age group 15 – 50 years presenting to ENT OPD in Kamineni institute of medical sciences, Narketpally between December 2020 to November 2022.

Inclusion criteria
1. Age - 15 to 50 years of age including both genders.
2. Type of otitis media – Chronic Suppurative Otitis Media (Safe Type).
3. Inactive stage of CSOM
4. Type of perforation - central
5. Duration of dry ear before surgery- 6 weeks
6. Audiogram showing only conductive deafness

Exclusion Criteria
1. Type of otitis media: Chronic Suppurative Otitis Media of Unsafe type.
2. Type of perforation: Marginal.
3. Active stage of CSOM.
4. Audiogram showing Sensorineural hearing loss or Mixed hearing loss
5. Patients with Diabetes, Hypertension, Tympanic membrane with tympanosclerosis.
6. Noise induced hearing loss.
7. Audiogram showing air bone gap more than 40dB.

All the patients with complaints suggesting of chronic otitis media mucosal type inactive stage are subjected to complete ENT examination including tuning fork tests using 256, 512 and 1024Hz, pure tone audiometry and oto endoscopy was done. Post operative pure tone audiometry was performed at the end of 1 month in the patients who underwent endoscopic type 1 Tympanoplasty with temporalis fascia and compared with the pre operative hearing threshold by pure tone audiometry.

RESULTS

In the present study, total 24 patients are studied as 1 of them had bilateral disease (20year old female), 17 had left sided disease and 6 had right sided disease.

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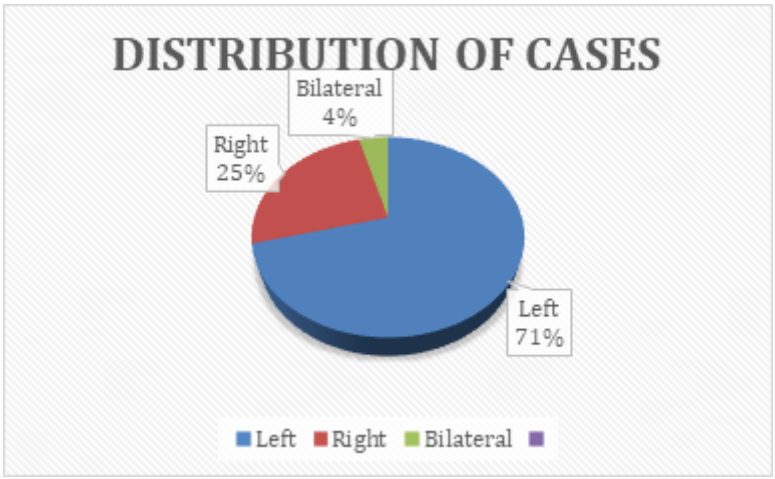

Figure 1: Distribution of cases based on the side involves

In the present study out of 24, total 15 patients are females and 9 are males.

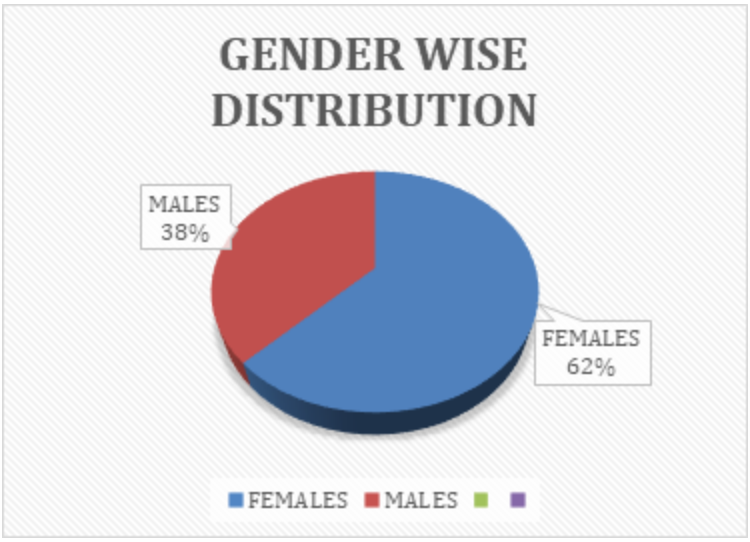

Figure 2: Gender wise distribution of cases

In the present study out of the 25 ears studied 7 had anterior quadrant-based perforation, 8 had posterior quadrant-based perforation and 9 had mixed quadrant perforation.

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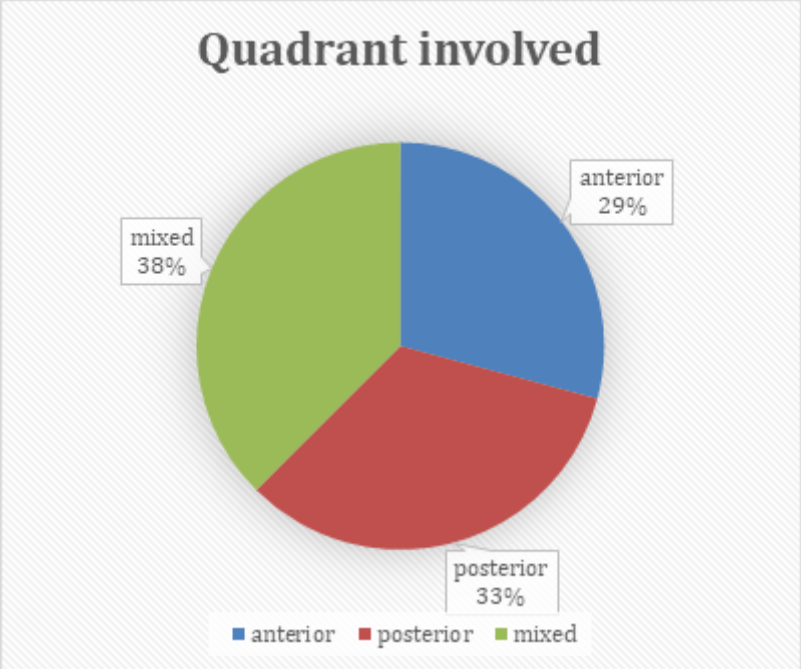

Figure 3: Distribution based on quadrant involves

All the 24 patients underwent endoscopic type 1 tympanoplasty, the mean preoperative hearing threshold is 38.4db and mean post operative hearing threshold at the end of one month is 27.7dB with an average hearing gain of 10.7dB hearing threshold.

Table 1: Gain in hearing threshold

S.no	Operative status	Mean hearing threshold
1	Pre operative	38.4dB
2	Post operative (after 1 month)	27.7dB
Hearing threshold gain		10.7dB

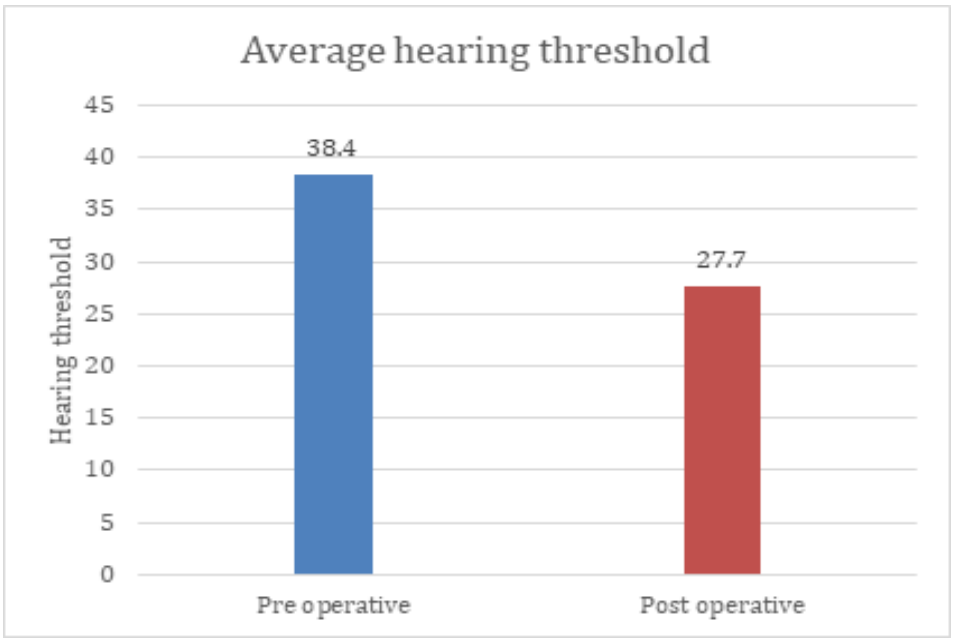

Figure 4: Hearing threshold pre operatively and post operatively at the end of one month

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DISCUSSION

The World Health Organisation (WHO) defines CSOM as ‘‘Chronic mucosal inflammation of the middle ear and mastoid cavity with tympanic membrane perforation and persistent or intermittent otorrhea for a minimum of 2-6 weeks”.[4]

Tympanic membrane protects the middle ear cavity from infections and also acts as a shield to the round window, thus preventing the impact of sound waves on round window and oval window simultaneously which helps in maintain the phase difference which is lost in tympanic membrane perforations, the perforation also decreases the pressure gradient across the medial and lateral surface of tympanic membrane which decreases the effectiveness of sound transmission to the ossicles.[5]

Type 1 tympanoplasty is a safe and effective technique to improve the quality of the patients with chronic suppurative otitis media by avoid recurrent infections and by improving the hearing threshold. It is defined as an operation which involves eradication of the middle ear and visualization of ossicular chain and repair of the tympanic membrane without repair of the ossicles.[6]

In this study, it is observed that the majority of the patients i.e., 56% had conductive hearing loss between 30- 40dB which is consistent with other studies like Deep jyoti et al.[7]

It is observed that in the present study posterior based perforation and large central perforation have higher degree of hearing loss when compared to their counterparts anterior based perforation and small & medium sized perforation which is in consistent with other studies like Manzoor Ahmad Latoo et al.[8]

Comparison with other studies

Table 2: Comparison of present study with other studies

S. No	Study	Year	Sample size(n)	Gain in hearing
1	Present Study	2022	25	10.7dB
2	Deep Jyoti et al.,	2019	88	14dB
3	Mallikarjun S. Tegnoor et al.,	2017	50	13dB
4	Sachin Gupta et al.,	2013	50	9dB
5	Homoe P et al	2008	177	15dB

It is observed that the hearing gain in the present study is 10.7dB and other studies conducted by Deep Jyot et al,[7] Mallikarjun S. Tegnoor et al,[6] Sachin Gupta et al,[9] and Homoe et al,[10] different but comparable.

CONCLUSION

It is concluded that type 1 tympanoplasty is an effective technique in patients with perforated tympanic membrane and intact ossicular chain to improve the hearing threshold significantly thus decreasing the morbidity of the patient.

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