



# Assessment of Hearing Following Tympanoplasty- A Hospital Based Study

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Received 30 June 2019;

Accepted 18 July 2019;

Published 25 July 2019

## Abstract

**Aims & Objectives:** to assess the hearing outcome in patients of chronic otitis media undergoing tympanoplasty. **Material & Methods:** A total of 100 patients between age group of 18 to 50 years attending the ENT OPD of SMGS Hospital, GMC Jammu between February 2018 and January 2019, were included in our study. Inclusion criteria for our study were patients of both safe and unsafe ears with good cochlear reserve and adequate eustachian tube function. Exclusion criteria for our study were patients with sensorineural hearing loss or mixed hearing loss, malignancy, otitis externa and any complication of chronic otitis media. **Results:** Mean pre-operative and post-operative hearing loss in all patients according to the tympanoplasty done showed that there is a gain of 14.34 dB in Type I, 19.59 dB in Type II and 18.29 dB in Type III. **Conclusion:** Tympanoplasty is an effective operation for hearing improvement and eradication of disease from middle ear.

**Keywords:** Tympanoplasty, safe, unsafe, hearing gain.

## Introduction

Chronic otitis media is a major cause of acquired hearing impairment especially in the developing world.<sup>[1]</sup> The diagnosis of chronic otitis media implies a permanent abnormality of pars tensa or flaccida, most likely a result of earlier acute otitis media, persistent negative middle ear pressure or otitis media with effusion.<sup>[2]</sup>

The term tympanoplasty was first used in 1953 by Wullstein to describe surgical techniques for reconstruction of the middle ear hearing mechanism that had been impaired or destroyed by chronic ear disease. Tympanoplasty is the culmination of over 100 years of development of surgical procedures on the middle ear to improve hearing. The first of these procedures was stapes mobilisation, followed by plastic repair of a perforated tympanic membrane and correction of congenital meatal atresia.<sup>[3]</sup>

Tympanoplasty is an operation to eradicate disease in the middle ear and to reconstruct the hearing mechanism, with or without tympanic membrane grafting. Different materials have been used to construct the tympanic membrane, the most accepted of which is temporalis fascia autograft and almost always the most favourable graft for its immunologically compatibility.<sup>[4]</sup>

Zollner and Wullstein provided a classification of tympanoplasty that focussed on the type of ossicular chain reconstruction needed. The five types of tympanoplasty they described refer to the most

lateral intact structure on which the conductive mechanism will be constructed. Type I indicates all three ossicles to be present and mobile. Type II grafts the tympanic membrane to an intact incus and stapes. Type III exists when an intact mobile stapes suprastructure is present and tympanic membrane or graft remains directly on the stapes suprastructure. Type IV describes an absent or eroded suprastructure with graft or tympanic membrane overlying a mobile stapes footplate. Type V refers to a fenestration created in horizontal semi-circular canal.<sup>[5]</sup>

The aim of present study was to assess the hearing outcome in patients of chronic otitis media undergoing tympanoplasty.

## Material and Methods

A total of 100 patients between age group of 18 to 50 years attending the ENT OPD of SMGS Hospital, GMC Jammu between February 2018 and January 2019 were included in our study.

Inclusion criteria for our study were patients of both safe and unsafe ears with good cochlear reserve and adequate eustachian tube function.

Exclusion criteria for our study were patients with sensorineural hearing loss or mixed hearing loss, malignancy, otitis externa and any complication of chronic otitis media.

All patients with complaints suggesting of chronic otitis media were subjected to detailed clinical history, general physical

examination, local ENT examination including tuning fork tests using 256, 512 and 1024 Hz frequency tuning forks, pure tone audiometry and EUM (Examination under Microscope).

Routine lab investigations – Complete Blood Count, Renal and Liver Function tests were conducted.

Informed and written consent was taken from all the patients undergoing tympanoplasty.

All patients underwent tympanoplasty under local / general anaesthesia using a microscope.

For all patients, post-aural approach was used and temporalis fascia or conchal cartilage with perichondrium was used as graft material.

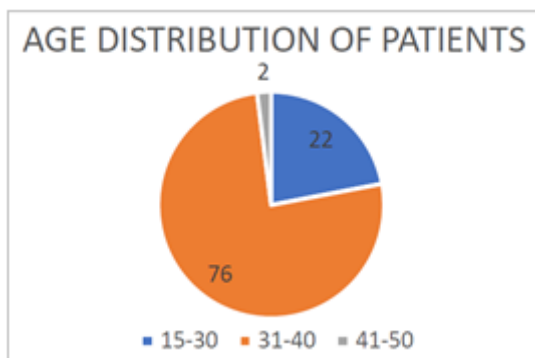
For all patients, underlay technique of myringoplasty was used.

Type of tympanoplasty was decided according to middle ear status. Patients were called for follow up- weekly for first month, fortnightly for next 2 months and at each visit, otoscopic examination was performed.

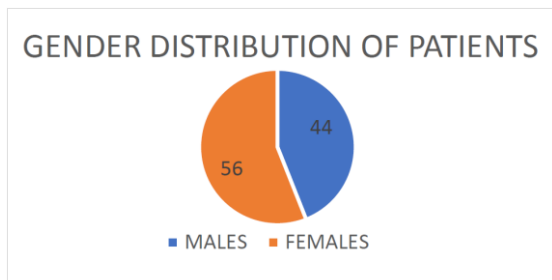
Postoperative pure tone audiometry was performed at 1st& 3rd month and functional outcome of surgery was calculated by estimating the closure of air bone gap at 0.5, 1 and 2 kHz.

**Results**

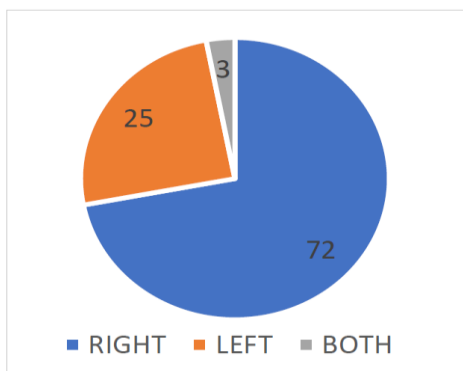
In our study, majority of patients were in the age group of 31-40 years, with mean age being 34.5 years.



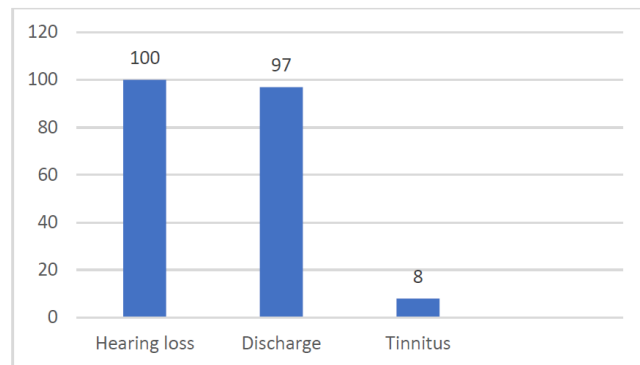
In our study, out of 100 patients, 56 were females and 34 were males.



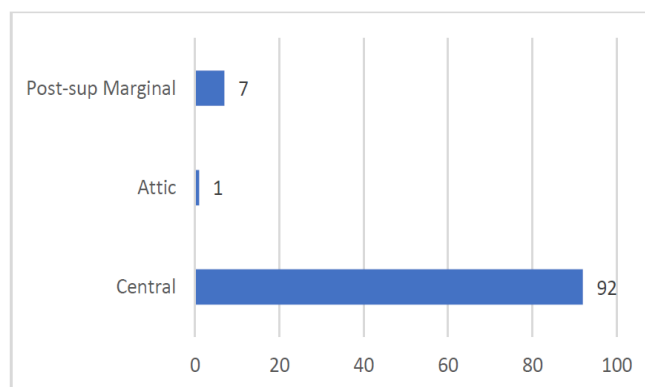
In our study, out of 100 patients, 72 had disease in right ear, 25 in left ear and 3 had bilateral ear disease.



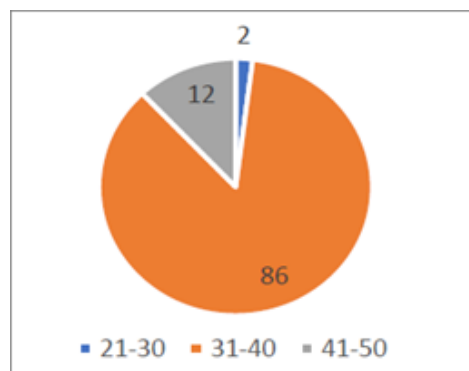
In our study, most common presenting complaint was hearing loss (100%), followed by discharge (97%), tinnitus (8%), vertigo (0), pain in ear (0).



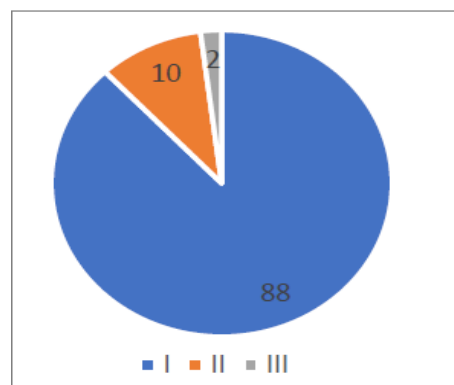
In our study, 92 patients had central perforation, 7 had postero-supero marginal perforation and 1 had attic perforation.



In the present study, majority of patients had hearing threshold between 31-40 dB (86%).



Out of 100 patients, 88 underwent Type I tympanoplasty, 10 underwent Type II tympanoplasty and 2 underwent Type III tympanoplasty. None of the patient in our study underwent Type IV or V tympanoplasty.



Mean pre-operative and post-operative hearing loss in all patients according to the tympanoplasty done showed that there is a gain of 14.34 dB in Type I, 19.59 dB in Type II and 18.29 dB in Type III.

Mean pre-operative and post-operative hearing loss in all patients according to the tympanoplasty done showed that there is a gain of 14.34 dB in Type I, 19.59 dB in Type II and 18.29 dB in Type III.

Mean Hearing Threshold	Tympanoplasty					
	TYPE I		TYPE II		TYPE III	
	PRE-OP	POST-OP	PRE-OP	POST-OP	PRE-OP	POST-OP
	36.66 dB	22.32 dB	43.67 dB	24.08 dB	45.02 dB	26.73 dB

## Discussion

From the physiology of hearing mechanism, the following principles can be deduced to restore hearing surgically.<sup>[6]</sup>

- An intact tympanic membrane to provide large hydraulic ratio between tympanic membrane and stapes footplate
- Ossicular chain to conduct sound from tympanic membrane to oval window
- Two functioning windows, one on scala vestibuli and other on scala tympani.
- Acoustic separation of two windows so that sound does not reach both windows simultaneously
- Functioning eustachian tube, to provide aeration to middle ear
- Functioning sensorineural apparatus.

In our study, majority of patients were in the age group of 31-40 years, with mean age being 34.5 years, indicating chronic otitis media to be more common in younger decade of life. In our study, out of 100 patients, 56 were females and 34 were males, indicating more predilection of CSOM in female population. The results were compared with previous studies. In one study, common age of presentation was 11-30 age group.<sup>[5]</sup>

In our study, most common presenting complaint was hearing loss (100%), followed by discharge (97%), tinnitus (8%), vertigo (0), pain in ear (0). In our study, 92 patients had central perforation, 7 had postero-supero marginal perforation and 1 had attic perforation.

In the present study, majority of patients had hearing threshold between 31-40 dB (86%). Hearing was more in the large central perforation and the perforation in posterior part of the tympanic membrane. It is observed in the previous studies that greatest hearing loss is seen in large central perforation. Hearing loss is less in anterior central perforation.<sup>[7,8]</sup> Yung reported that big central and posterior central perforations are associated with more hearing loss.<sup>[9]</sup>

Out of 100 patients, 88 underwent Type I tympanoplasty, 10 underwent Type II tympanoplasty and 2 underwent Type III tympanoplasty. None of the patient in our study underwent Type IV or V tympanoplasty.

Mean pre-operative and post-operative PTA (at 3 months) in all patients according to the tympanoplasty done showed that there is a gain of 14.34 dB in Type I, 19.59 dB in Type II and 18.29 dB in Type III. Hearing results after different types of tympanoplasty in the previous studies show different but comparable results.

Homoe P et al., in their study showed 15dB and 12 dB gain in hearing threshold after tympanoplasty type I at 1 and 2 years respectively.<sup>[10]</sup>

Sasaki T, et al., in their study showed a 13.6 dB hearing gain following Type III tympanoplasty.<sup>[11]</sup>

## Conclusion

Tympanoplasty is an operation to eradicate disease in the middle ear and to reconstruct hearing mechanism. It can be concluded from our study that there is a gain in hearing threshold of patients with chronic otitis media, which is different for different type of tympanoplasty.

## Acknowledgement

Nil

## Conflict of interest

Nil

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