

# Management of Tympanic Membrane Perforation with Cartilage Tympanoplasty in Relation to Temporalis Fascia Graft Technique

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## Abstract

An Observational Study was undertaken at Department of Otorhinolaryngology,. The aim of this study was to observe the outcome of cartilage tympanoplasty for tubotympanic type of CSOM. All the patients attending ENT OPD at SIMS within the age group of 11-60 years, irrespective of sex with tubotympanic CSOM either unilateral or bilateral were included in this study. In our study of 80 patients, 40 patients had graft uptake after disease clearance and 8 had failure of graft uptake without chronic otorrhoea and 2 had failure with chronic otorrhoea. Through this study we concluded that cartilage tympanoplasty for tubotympanic type of CSOM is an excellent technique for complete removal of disease especially from inaccessible areas of middle ear cleft.

**Keywords:** Tympanoplasty, Temporalis fascia, Endoscopic Tympanomastoidectomy, Pure tone audiometry, Impedence audiometry.

## Introduction

The Tympanic Membrane (TM) plays a significant role in the physiology of hearing as well as in the pathophysiology of chronic inflammatory middle ear diseases. The TM perforations significantly impair the quality of life for millions of patients.

<sup>(1)</sup> The term 'chronic ear disease' includes a wide range of clinical entities, including chronic otitis media, chronic suppurative otitis media (with and without cholesteatoma), chronic mastoiditis, tympanosclerosis, and cholesterol granuloma.<sup>(2)</sup>

The term **Tympanoplasty** was introduced in 1953 by Wullstein to describe surgical techniques for

reconstruction of the middle ear hearing mechanism that has been impaired or destroyed by chronic ear disease. In 1953, the Zeiss operating microscope became available commercially and, in the same year, Wullstein and Zöllner launched their tympanoplasty methods with a split-thickness skin graft.<sup>(7)</sup> In 1956, Zöllner successfully used autologous fascia lata.<sup>(8)</sup>

Heermann was the first to introduce the cartilage palisade technique, in 1962.<sup>(4,5)</sup>

In the Heermann's technique of palisade tympanoplasty, the cartilage strips with perichondrium preserved on the outer surface were placed parallel to the malleus until the middle-

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ear cavity was covered.<sup>(4,9)</sup>Six groups of cartilage tympanoplasty have been proposed in the literature by Mirko Tos. The choice of technique is determined by the surgeon's preference, size of the perforation, integrity of the ossicular chain, and the presence of cholesteatoma.

### Aim:

1. To compare success rate between type 1 cartilage tympanoplasty and type 1 temporalis fascia tympanoplasty within the period of October 2021 to September 2022.
2. To compare post-operative failures using both these techniques
3. To compare post-operative hearing status using both these techniques

### Material and Methods

The study was carried out in the Department of Otorhinolaryngology, SARASWATHI INSTITUTE OF MEDICAL SCIENCES, Hapur (U.P). Total of 80 Patients were evaluated who attended the OPD of ENT during the period of October 2020 to September 2022. The cases for the study were selected on the basis of following criteria -

All the patient attending the Department of Otorhinolaryngology in Saraswathi Institute of Medical Sciences, Hapur (U.P) with chronic ear disease.

### Criteria for Patients Selection

#### Inclusion Criteria

- 1) Chronic otitis media
- 2) Small, medium, large, subtotal, total and attic perforations
- 3) Traumatic perforations
- 4) Atelectatic ear
- 5) Tympanosclerotic patches
- 6) Retraction pockets
- 7) Patient willing to participate in the study

#### Exclusion Criteria

- 1) Acute otitis media
- 2) Otosclerosis

- 3) Congenital hearing disorder
- 4) Chronic otitis media with predominant sensorineural hearing loss
- 5) Isolated serous otitis media
- 6) Active intracranial complication of chronic otitis media
- 7) Patients with history of diabetes mellitus, HIV and TB
- 8) Radical mastoidectomy
- 9) Patients who did not turn up regularly for follow up.

**Study design** Hospital-based, two arm, prospective, comparative study

### Results

The study consists of 80 patients with tubotympanic chronic suppurative otitis media who were analysed taking into consideration a number of parameters.

The following are the observations made during our study:

In our study patient age varied from 11 yrs. to 40 yrs. as shown above in table. The maximum incidence was 43 percent in the third decade than 31 percent in second decade and followed by 26 percent in the fourth decade. The mean age in this study was 24 years.

In our study the most common symptom encountered was otorrhoea in 86% patients for which we managed conservatively and managed, followed by impaired hearing in 82%. Otagia and tinnitus were seen in 17% and 11.5% patients respectively. Vertigo was seen in 11.5% patients.

In our study 46% patients had CSOM in the active stage with persistent ear discharge. 42% patients presented with occasional discharge and 11.5% presented with no discharge, we treated conservatively for discharging ear for 3 weeks before operating.

44/50 patients presented with complaints of discharge. Out of these 44 patients, 39 presented with some degree of hearing impairment. As shown in table longer duration of otorrhoea more is the severity of the disease and more the hearing impairment.

In our study complete visualization of the tympanic membrane without any manipulation was possible in 50% of the cases and visualization after manipulation was possible in 34% of the cases. However partial visualization even after manipulation was seen in 17% cases.

18 patients showed perforation in more than one quadrant and out of these 11 patients (22%) showed medium size while 7 patients (14%) showed total perforation.

In 55% of the cases the diseased ear showed retracted pars tensa with the TM. 14% patients showed same side central perforation and 31% showed normal TM. On the contralateral side retraction was noticed in 40% of the cases, perforation in 9% and about 51% had normal TM.

Out of 50 cases B/L sclerosis was noted in about 31% and U/L sclerosis on the affected side in 37%. B/Lly Pneumatized mastoid was noted in 26%. The cavitory mastoid diagnosed in only 6%.

Pure CHL implies > 25db air conduction loss and A-B gap > 20db and in the mixed variety the bone conduction loss > 25db and A-B gap > 20db. In our study 66% showed Pure conductive hearing loss and 33% showed mixed hearing loss.

The disease was seen extending to the attic and aditus as well in 26% of the cases, spreading further to mastoid antrum in 26% of the cases and involving both the posterior mesotympanum and aditus ad antrum was seen in 40% of the cases.

On the basis of extent of the disease different surgical procedures were used, 100% cortical mastoidectomy with tympanoplasty.

While assessing the post-operative graft uptake it was observed that successful graft uptake was seen in 94% cases while graft uptake was unsuccessful in 6% cases after 6 months of follow up. At routine follow ups of 1, 3 and 6 months it was observed that the chances of graft uptake decreased as the post op time period increased ( $p < 0.05$ ).

While assessment of post op chronically discharging ear it was observed that only 2% of the cases had chronic discharge at 6 month follow up period. The above table shows that chronically discharging ear is negatively associated with post operative time period ( $p < 0.005$ ). As time progresses the rate of chronically

Degree of hearing improvement is from 10-14dB in 36% of cases and 15-19 dB in 34% of the cases and 20-25 dB in 2% of the cases and 25- 30 dB in 1% of the cases at the end of the study period. When the degree of hearing improvement was compared at 1, 3 and 6 months follow up it was observed that endoscopic tympan mastoidectomy had a positive effect on post operative degree of hearing improvement ( $p \text{ value} < 0.05$ ).

## Discussion

The management of CSOM is one of the most challenging tasks in otologic surgery as the chances of residual disease and the morbidity of the conventional procedures involved in treatment are high. With incorporation of endoscopes in the otologic field much of the recidivism and morbidity of the procedures has been reduced.

As stated by Takahashi (2000) middle ear pressure is maintained by two routes, the Eustachian tube and the middle ear mucosal gas exchange. Ventilation through Eustachian tube is quick and active mechanism that helps in adapting to transient fluctuations in middle ear pressure. The middle ear mucosal gas exchange is passive and constant phenomenon, that functions even during sleep v/s the Eustachian tube which closes during sleep, helps in continuous maintenance of middle ear pressure. In our present study apart from the eradication of disease and reconstruction of the middle ear much importance has been given to the preservation of middle ear cleft mucosa and restoration of ventilation of middle ear and mastoid.

Jacob and Sade (1992) stated that CSOM ears usually possess poorly pneumatized or non pneumatized temporal bones, in our study about 67% of our patient had sclerosed mastoid, that reduces the middle ear buffering capacity.

In our study we have not used silicon sheets in any of the patients instead we used cartilage in the middle ear to augment the myringoplasty versus Takashi in 2000 who used tympanostomy tube in patients and 0.5mm silicon sheets in the tympanic cavity and found no significance in the recovery of mastoid aeration with tympanostomy tubes.

Advantages of the cartilage tympanoplasty is that it helps in restoration of the middle ear air space enabling the drainage of blood clot and other collection from attic, aditus, antrum, anterior epitympanum via the middle ear into the Eustachian tube to the pharynx. The tympanic membrane gets perforated when

cartilages other than handle of malleus comes into direct contact with it but in cartilage tympanoplasty where the composite cartilage placed between the ossicular graft and tympanic membrane overcomes this disadvantage.

So far in our 6month follow up we have not encountered any residual, recurrent disease just 1 chronically discharging ear, also the healing time (period for complete epithelization of cavity) was also less in 27+/-10 days compared to Takahashi 2000 where it was 31.5+/-19days. All our procedures were done exclusively with endoscopes where the need for bone removal for accessing is less compared to the Takahashi (2000) procedures which were done exclusively with microscopes, excessive bone and mucosal.

### Conclusion

The success of Tympanoplasty in terms of graft uptake and hearing improvement is better in patients with lesser duration of disease, less pre-operative Air bone gap and with medium sized perforations when compared to subtotal perforations.

The success of cartilage tympanoplasty in terms of graft uptake and hearing improvement is better in patients with lesser duration of disease and less pre-operative Air bone gap.

In post-operative evaluation of patients with unilateral hearing loss, application of Belfast rule of thumb enables the actual hearing benefit of the patient.

**Ethical clearance:** taken from ethical committee of institute

**Consent:** taken from of patients

**Conflict of interest:** no

**Source of funding:** self

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