



ORIGINAL ARTICLE

# A study of middle ear reconstruction, the degree of functional restoration and causes of graft failure following chronic ear disease



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## KEYWORDS

Chronic suppurative otitis media;  
Mastoid;  
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Eustachian tube;  
Hearing gain

**Abstract** *Aims and objectives:* To determine the results of various types of tympano-ossiculoplasties and the degree of functional restoration following surgery.

*Materials and methods:* This prospective study comprises 51 consecutive patients with chronic suppurative otitis media (CSOM) – tubotympanic disease (TTD) and atticointral disease (AAD), who presented to the academic department of Otorhinolaryngology – Head & Neck Surgery, in a tertiary care hospital in South India. All patients underwent a thorough examination and appropriate investigations. Eustachian tube function (ETF) was assessed preoperatively by methylene blue dye test and saccharin test. The size of the mastoids was measured by using a graph paper, on which the X-ray film of the mastoid taken in the lateral oblique view (Law's view) was superimposed. Patients with CSOM (TTD) with less than 3 months of dry ear and small size mastoids on X-ray were subjected to cortical mastoidectomy and type I tympanoplasty; whereas patients with dry ear more than 3 months underwent type I tympanoplasty alone. Type III tympanoplasty was carried out in those with erosion of incus/malleus by placing temporalis fascia over the stapes superstructure. Patients with AAD underwent modified radical mastoidectomy (MRM) and ossicular reconstruction was carried out depending on the remnant of the ossicles. Partial Ossicular Replacement Prosthesis (PORP) made of plastipore was used for Austin's type b ossiculoplasty; while Plastipore/Gold was used as Total Ossicular Replacement Prosthesis (TORP) in type d ossiculoplasty.

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Patients were reviewed after 15 days, 1 and 3 months post-operatively for a clinico-audiological assessment of the operated ear to evaluate the graft status and hearing improvement. The postoperative audiograms were recorded on the 2nd and 3rd visit.

*Results and observations:* Of the 51 patients with CSOM; 37 had TTD and 14 had AAD. Of the 37 patients with TTD, 35 patients had normal ETF and 2 of them had partial dysfunction. With normal ETF, the graft uptake rate was 80% compared to partial ETF which had only 50%. Patients with large and medium size mastoids had 89% of graft uptake. Patients with small and medium size perforations had 100% graft uptake; whereas large and subtotal perforations had 75% and 71.43% respectively. A total number of 34 tympanoplasties and 17 ossiculoplasties were done. Of these; 29 were type I and 5 were of type III. Out of 17 ossiculoplasties, 3 were type b and 14 cases were of type d. We used 7 Gold and 7 Plastipore TORP for the type d ossiculoplasty and PORP in 3 of the cases. Using temporal fascia as graft material 34 patients underwent tympanoplasty in whom the graft uptake was 79.41%, while 17 patients underwent ossiculoplasty using temporalis fascia as graft, the graft uptake was 88.23%. Tympanoplasty done for small and medium size perforations had 100% hearing improvement with A–B gap < 20 dB but patients who had large or subtotal perforations had 80% and 67% respectively. Hearing improvement to an A–B gap < 20 dB was noted in 91% and 60% following type I and type III tympanoplasty respectively. Hearing improvement to an A–B gap < 20 dB was noted in all the cases of type b ossiculoplasty and with type d ossiculoplasty (42%).

*Conclusion:* Patients with normal Eustachian tube function, large and medium size mastoids, small and medium size perforations of the tympanic membrane would have a good rate of graft uptake with tympano-ossiculoplasties thereby returning to normal hearing postoperatively.

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## 1. Introduction

Chronic suppurative otitis media (CSOM) is an inflammation of the mucoperiosteal lining of the middle ear cleft. Infection of the middle ear has been a problem encountered in the human race and is as old as humanity itself. Chronic middle ear disease is a major problem in India especially in the rural areas. It is estimated that 6% of Indian population suffers from chronic ear disease.<sup>1</sup> This is significantly higher than the incidence reported in Western countries which is about 1.8%.<sup>2</sup> To complicate matters, in India, there is a general lack of awareness of the disease per se and also regarding the complications of the disease. We have seen that most of our patients have neglected ear diseases that come to us at a very advanced stage. Apart from this, people especially in rural India are not aware of the functional benefits of tympanoplasty/ossiculoplasty and they generally are contented to live with the discharge and residual hearing loss. It would be possible to do primary reconstruction along with disease clearance in primary sittings if the patients come to us before the complications take over.

It is our endeavour to provide our patients with near normal level of hearing by middle ear reconstruction. This reconstruction is done by tympanoplasty type I with/without mastoid surgery, or type III with or without mastoid surgery or primary/secondary ossiculoplasty using biomaterial prosthetic implants TORP/PORP (Total/Partial ossicular replacement prosthesis) which are made up of Gold/Plastipore along with temporalis fascia. Because of good technical skills in tympano-ossiculoplasty, good graft materials, less intra-operative and post-operative complications we can expect a good functional restoration following surgery which will lead to a good quality of life index.

## 2. Aims and objectives

To determine the results of various types of tympanoplasties and ossiculoplasties, the degree of functional restoration after surgery, to study the post-operative graft uptake after different types of tympanoplasties, to study the post-operative graft uptake after different types of ossiculoplasties, to compare the extent of hearing improvement following different modalities of middle ear reconstruction, to know the causes of graft failure in different modalities of treatment.

## 3. Materials and methods

This prospective study comprises of 51 consecutive patients with CSOM – TTD (quiescent stage and inactive stage) and AAD. All were informed about the procedure and they consented to participate in the study. This study was approved by the local ethical committee. All the cases were operated in the department of Otorhinolaryngology – Head and Neck Surgery, Kasturba Medical College, Mangalore and Government District Hospital, Mangalore both are tertiary care hospitals in the coastal area of South India. Inclusion criteria: all patients with CSOM – TTD in quiescent/inactive stage, all patients with CSOM – AAD, patients who had only conductive hearing loss. Exclusion criteria: active discharge, patients with sensorineural hearing loss, uncontrolled diabetes and immunocompromised status, cleft palate and others, CSOM with complications. A detailed proforma was filled for each patient with regard to history, complete general physical, systemic and ENT examination. In all the patients a routine blood examination, X-ray mastoids, CT scan of temporal bone in case of AAD, examination under microscope and pure tone audiometry were done. Eustachian tube function was assessed preoperatively by

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