

# A COMPARATIVE STUDY OF AUDIOLOGICAL ASSESSMENT IN PRE AND POST OPERATIVE PATIENTS UNDERGOING TYPE 1 TYMPANOPLASTY WITH AND WITHOUT CORTICAL MASTOIDECTOMY IN CASE OF INACTIVE (MUCOSAL) CHRONIC OTITIS MEDIA

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## Abstract

**Background:** Ear discharge is one of the most common complaints encountered by an otolaryngologist. The diagnosis of chronic otitis media implies a permanent abnormality of pars tense or pars flaccida. However, distinction remains between active mucosal chronic otitis media where there is active production of pus and inactive mucosal chronic otitis media where this is not the case though there is potential for the ear to become active. **Aim of The Study:** The purpose of this study is to ascertain whether the mastoidectomy should be combined as a standard operating procedure for closing central perforations in mucosal type of chronic otitis media or not so as to achieve acceptable functional status postoperatively and hence minimize graft failure. **Methodology:** This study comprises of 50 patients of Chronic Otitis Media (inactive mucosal disease). 25 of these cases were selected for type 1 tympanoplasty alone (Group A) and 25 cases were selected for type 1 tympanoplasty with cortical mastoidectomy (Group B). **Results:** Results were better in cases of type 1 tympanoplasty with cortical mastoidectomy as compared to type 1 tympanoplasty, but the difference was statistically not significant and hence the groups were comparable. There was an overall average hearing improvement of 10.90 dB in cases of type 1 tympanoplasty with cortical mastoidectomy and 10.19 dB in cases of Type 1 tympanoplasty. Though the hearing improvement was slightly better in cases of tympanoplasty with cortical mastoidectomy but it was not significant. **Conclusion:** A cortical mastoidectomy is an effective means of re-pneumatizing the mastoid air cell system as well as eradicating the mastoid source of infection. Our study proves that tympanic membrane reconstruction need not always be combined with cortical mastoidectomy and should only be done in cases where mastoid source of infection is suspected and supported by the above factors.

## INTRODUCTION

The diagnosis of chronic otitis media (COM) implies a permanent abnormality of pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion.<sup>[1]</sup> However the distinction remains between Active Chronic Otitis Media, where there is inflammation and active production of pus, and Inactive Chronic Otitis Media, where this is not the case though there is potential for the ear to become active at some time.<sup>[2]</sup> A third clinical entity is Healed Chronic Otitis Media, where there are permanent abnormalities of pars tensa or flaccida but ear does not have propensity to become active because the pars tensa is intact and there are no significant retractions of pars tensa or pars flaccida.<sup>[3]</sup>

The mucosal chronic otitis media carries no serious risks. Disease affects mainly the mucosa of the lower front part of the middle ear cleft so considered as tubo-tympanic.<sup>[4]</sup>

Discharge in case of mucosal variety arises from the inflamed and secreting mucosa of the middle ear and is intermittent, mucopurulent, non-foul smelling, moderate to profuse, non-blood-stained discharge and is aggravated with episodes of upper respiratory tract infection. Sometimes it may be accompanied by itching and irritation.<sup>[5]</sup>

Tympanoplasty refers to any operation involving reconstruction of the tympanic membrane and/or the ossicular chain. Myringoplasty is a tympanoplasty without ossicular reconstruction.<sup>[6]</sup> Over the years many methods have been used for closing perforations. The most widely used and accepted

method is underlay graft of temporalis fascia or sometimes perichondrium.<sup>[7]</sup>

The use of mastoidectomy as a means to re-establish drainage of mastoid antrum in mucosal or non-cholesteatomatous chronic otitis media is still controversial.<sup>[8]</sup> The opinion regarding importance of mastoidectomy along with tympanoplasty still remains divided even among the most experienced surgeons.<sup>[9]</sup> This is an issue of debate. Some surgeons state that mastoidectomy is required only in cases which are refractory to repeated and adequate antibiotic therapy.<sup>[10]</sup>

Mastoid factors which contribute to the graft failure include the extent of mastoid pneumatization and the presence of inflammatory disease in mastoid, whereas the main non mastoid causes include general disability, technical error, presence of allergy, condition of middle ear mucosa and most importantly the Eustachian tube function.<sup>[11]</sup>

Though there is little controversy regarding the non-mastoid factors, the role of mastoid is still debated for its effect on tympanic membrane reconstruction. Some advice type 1 tympanoplasty alone for central perforations regardless of the state of mastoid.<sup>[12]</sup>

The purpose of this study is to ascertain whether the mastoidectomy should be combined as a standard operating procedure for closing central perforations in mucosal type of chronic otitis media or not so as to achieve acceptable functional status postoperatively and hence minimize graft failure.

#### **Aims and Objectives**

1. To assess the hearing outcome and disease recurrence in type 1 tympanoplasty alone and when combined with cortical mastoidectomy in cases of inactive mucosal chronic otitis media.
2. To know how far the need of cortical mastoidectomy in inactive mucosal type of chronic otitis media exists.
3. To form a common consensus regarding the surgical management of chronic otitis media.

## **MATERIALS AND METHODS**

This study comprises of 50 patients of Chronic Otitis Media (inactive mucosal disease). All these cases were operated on during a period of one and a half years between December 2020 to October 2022 in the Department of ENT, Jhalawar medical college, Jhalawar (Rajasthan). 25 of these cases were selected for type 1 tympanoplasty alone (Group A) and 25 cases were selected for type 1 tympanoplasty with cortical mastoidectomy (Group B).

The study included patients both male and female and ranging from 20 to 60 years of age. The work up for these cases consisted of a detailed history and complete general, physical, systemic and ear, nose and throat examination. In all the patients a routine blood and urine examination, x-ray mastoids, audiometry and examination under microscope was done. Eustachian tube function was assessed clinically and only cases with a functioning eustachian tube status were included in the study.

Cases with only healthy middle ear mucosa and central perforation were taken for study.

Those patients with a predisposing foci of infection in nose and paranasal sinus were not included in study. Patients with concomitant morbidities like diabetes, hypertension, tuberculosis, cardiac problems, psychiatric disturbance, bleeding diathesis, active discharge, nasal allergy, otitis externa were not included in the study. All the patients prone to graft rejection, with revision tympanoplasties and the patients with immunocompromised status were excluded from the study. Informed and written consent from all the cases was taken prior to the surgery. All the cases were treated initially by a medical line of treatment, which consisted of antibiotics, oral anti-histaminics and decongestants. Preoperatively all the patients had a discharge free period of minimum 4 weeks and conductive loss within 45 dB. In Group A patients underwent type 1 tympanoplasty and only temporalis fascia was used as the grafting material.

In group B patients underwent type 1 tympanoplasty along with cortical mastoidectomy. Patients were reviewed after every subsequent week for inspection of operated ear. Assessment of the operated ear with respect to graft status and ear discharge was done on 6th post operative week. The postoperative audiograms were recorded on the 12th week for assessment of hearing post operatively.



**Figure 1: Temporalis fascia being harvested through post auricular approach**



**Figure 2: Graft placed using underlay technique**



**Figure 3:** Exposure of mastoid for cortical mastoidectomy through post auricular approach

## RESULTS

**Study Design:** Prospective Study

**First the two groups were analyzed for similarity.**

**Age distribution of patients:** Both groups regarding age distribution are statistically similar with  $p=0.553$ . The youngest patient is 20 years and oldest is 52 years of age. A total of 36 female and 14 male patients were included in the study which were statistically comparable.

**Duration of discharge in years:** Duration of discharge is statistically similar between two groups with  $p=0.463$

**Period of dryness of ear before the surgery in months:** Period of dryness is statistically similar between two groups with  $p=0.941$ . A total of 33 unilateral cases and 17 bilateral cases were included in the study. Both the groups were compared and found statistically similar with  $p=0.229$ . The chosen side of operation among the bilateral ear cases was the worse ear.

**Clinical Improvement:** Discharge was present in 2 patients postoperatively in cases of type 1 tympanoplasty and in 1 patient in cases of mastoidectomy with type 1 tympanoplasty.

**Graft Status:** Results were better in cases of type 1 tympanoplasty with cortical mastoidectomy as compared to type 1 tympanoplasty, but the difference was statistically not significant and hence the groups were comparable.

**Audiological Assessment:** In our 25 cases of type 1 tympanoplasty with cortical mastoidectomy the average hearing gain was 10.90 dB and it was 10.19 dB in the cases of type 1 tympanoplasty. The graft take up and hearing gain, both are better in cases of type 1 tympanoplasty with cortical mastoidectomy but statistically there is no difference.

**Table 1: Age Distribution of Patients**

Age in years	Type 1 tympanoplasty		Mastoidectomy with type 1 tympanoplasty	
	No.	%	No.	%
20-29	10	40.00	15	60.00
30-39	11	44.00	7	28
40-49	3	12.00	2	8.00
50-59	1	4.00	1	4.00
Total	25	100.0	25	100.0
Mean±SD	31.87±8.11		33.23±9.56	

**Table 2: Duration of Discharge In Years**

Duration of discharge	Type 1 tympanoplasty		Mastoidectomy with type 1 tympanoplasty	
	No.	%	No.	%
<1 year	3	12	4	16
1-5 years	10	40	15	60
6-10 years	7	28	3	12
>10 years	5	20	3	12
Total	25	100	25	100

**Table 3: Period of dryness of ear before the surgery in months**

Period of dryness	Type 1 tympanoplasty		Mastoidectomy with type 1 tympanoplasty	
	No.	%	No.	%
1-2 months	8	33.3	10	33.3
3-4 months	10	36.7	8	30
4-6 months	3	23.3	9	30
>6 months	4	6.7	2	6.7
Total	25	100	25	100

**Table 4: Clinical Improvement**

Clinical improvement	Type 1 tympanoplasty		Mastoidectomy with type 1 tympanoplasty	
	No.	%	No.	%
Discharge +	2	8	1	4
Discharge -	23	92	24	96
Total	25	100	25	100

**Table 5: Status of Graft Uptake**

Graft status	Type 1 tympanoplasty		Mastoidectomy with type 1 tympanoplasty	
	No.	%	No.	%

Graft taken up	23	92	24	96
Graft failure	2	8	1	4
Total	25	100	25	100
Inference	Graft status is statistically similar between two groups with p=1.000			

**Table 6: Post-Operative Audiological Assessment**

Audiological assessment	Type 1 tympanoplasty with cortical mastoidectomy	Type 1 tympanoplasty	P Value
Pre-op hearing loss	31.07±9.07	29.33±8.08	0.438
Pure tone threshold at 3rd month	25.70±9.16	24.68±8.88	0.696
Pure tone threshold at 6th month	20.44±8.36	19.81±7.03	0.766
Benefit in decibels	10.90±6.77	10.19±5.89	0.661

## DISCUSSION

Type 1 tympanoplasty is an operation in which the reconstruction procedure is limited to repair of tympanic membrane. This operation also reconfirms the mobility and integrity of the ossicular chain and rules out any middle ear disease such as infected mucosa. Exploration of the middle ear and ossicular chain is a routine part of Type 1 tympanoplasty operation. Balyan et al<sup>[13]</sup> in a similar study observed slightly better success rates in group A but concluded that there is no statistical difference between these groups in terms of graft success rates.

Our study, in similarly divided groups showed slightly better success rates with group B with 96% graft take up as compared to group A with 92% graft take up rates, but this was not significant. It is still a controversy whether tympanic membrane perforation should be repaired alone or in association with cortical mastoidectomy.

Even among failed cases of group B postoperatively the patients did not complain of ear discharge while 2 failed cases in group A complained of persistent ear discharge. This shows that cortical mastoidectomy is useful in eradicating mastoid source of infection if suspected, but the decision of doing a mastoidectomy lies in suspicion of hidden disease and other prognostic factors and need not be done in all the cases of tympanic membrane reconstruction.

### Audiological Assessment

There was an overall average hearing improvement of 10.90 dB in cases of type 1 tympanoplasty with cortical mastoidectomy and 10.19 dB in cases of Type 1 tympanoplasty. Though the hearing improvement was slightly better in cases of tympanoplasty with cortical mastoidectomy but it was not significant. This shows that the correction of mean conduction threshold is found to be almost the same irrespective of the fact whether a cortical mastoidectomy was performed or not.

## CONCLUSION

There are several factors that govern the success of graft take up, of which important are age of the patient, duration of disease, discharge free period, size of the perforation, status of the middle ear mucosa and functioning eustachian tube.

- Infection also represents a very important cause of graft failure and can result from a hidden mastoid disease.
- A cortical mastoidectomy is an effective means of re-pneumatising the mastoid air cell system as well as eradicating the mastoid source of infection.
- Our study proves that tympanic membrane reconstruction need not always be combined with cortical mastoidectomy and should only be done in cases where mastoid source of infection is suspected and supported by the above factors.

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