



**ORIGINAL RESEARCH PAPER**

**ENT**

**A COMPARATIVE STUDY OF TYPE I TYMPANOPLASTY WITH AND WITHOUT CORTICAL MASTOIDECTOMY IN PATIENTS OF CHRONIC SUPPURATIVE OTITIS MEDIA**

**KEY WORDS:** Type I tympanoplasty, Tympanoplasty with and without cortical mastoidectomy.

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**ABSTRACT**

The surgical outcome of Type I tympanoplasty with and without cortical mastoidectomy was studied in patients of tubotympanic chronic suppurative otitis media. Patients (ears) were randomly divided into two groups of 30 each. Group I underwent type I tympanoplasty only whereas group II underwent type I tympanoplasty with cortical mastoidectomy. Two parameters were studied and compared namely graft uptake and hearing gain in between the two groups. Post operative, at the end of 3 months, group I had 21 intact grafts and 9 re-perforations where as in group II there were 23 intact grafts and 7 re-perforations. There was a mean reduction of air conduction threshold from 45.9 ± 4.99 (Mean ± SD) to 28.10 ± 2.4 dB in group I and from 44.87 ± 6.44 to 29.27 ± 2.82 dB in group II. The reduction of air conduction thresholds in each group was statistically significant. However there was no significant difference in the air conduction thresholds achieved post-operatively between the two groups. The results emphasize the fact that overall graft uptake and satisfactory hearing outcome with adequate air-bone closure can be achieved irrespective of cortical mastoidectomy in the surgical treatment of tubotympanic disease.

**Introduction**

The standard surgical treatment of tubotympanic CSOM is tympanoplasty without mastoidectomy. However, an increase in the middle ear pressure due to inflammatory process in the middle ear cleft may lead to perforation of tympanic membrane. Thus an attempt to reconstruction without treating middle ear disease (i.e. mastoidectomy) will create re-perforation of tympanic membrane. However a few authors have argued that closure of tympanic membrane perforations and elimination of chronic ear discharge can be achieved effectively when performing tympanoplasty irrespective of mastoidectomy. Thus the issue of whether mastoidectomy is needed for good surgical outcomes in CSOM remains controversial.

In this context, we conducted a comparative study of type I tympanoplasty with and without cortical mastoidectomy in patients of CSOM.

**Aims and Objectives**

To analyze the role of cortical mastoidectomy in surgical outcome of type I tympanoplasty in patients with chronic suppurative otitis media. 1.To compare the incidence of graft uptake in type I tympanoplasty with and without cortical mastoidectomy in patients with chronic suppurative otitis media. 2.To compare the hearing improvement in type I tympanoplasty with and without cortical mastoidectomy in patient with chronic suppurative otitis media.

**Materials and Methods**

60 patients of CSOM visiting the ENT department of our institute were selected for this prospective, randomized study. The patients were planned for elective surgery, after anesthesia. The study was conducted over a period of 2 years from August 2008 to July 2010, in MGM hospital. ENT department, Kamothe. Patients included in the study were, 1) Patients of either sex with age group between 18 - 50 years. 2) Patients with chronic suppurative otitis media with small and moderate size perforation of ear drum with mild to moderate conductive hearing loss, assessed by pure tone audiometry. Patients excluded from the study were, 1) Patients with unsafe ears like marginal perforation and cholesteatoma. 2) All Acute Suppurative Otitis Media (ASOM) cases. 3) Patients with otosclerosis. All the patients in the study were clinically evaluated by taking detailed history and clinical examination including Tuning fork test, as per the proforma. Pure tone audiometry was done. For all patients x-ray mastoid were taken. The patients were subjected to middle ear cleft surgery under GA or LA. Post operatively at 3 months of follow up, patient's subjective hearing

was enquired and recorded as improved, same (no change) or worse. Post operative pure tone audiometry and ear microscopy was done in every case at the end of 3 months to record the hearing and graft uptake respectively.

**Division into groups**

Selected 60 ears were randomly divided into two groups with each group comprising of 30 ears.

**Group-I-** Type I tympanoplasty

**Group-II-** Type I tympanoplasty with cortical mastoidectomy.

**Observations and Results**

**Table 1: Age wise distribution of the CSOM patients enrolled in the study in each group.**

Age Group in years	Group I	Group II
	Type I tympanoplasty	Type I tympanoplasty with cortical mastoidectomy
15- 20	2	5
20-30	11	13
30-40	12	10
40-50	5	2
Total	30	30

**Table 2: Gender distribution of CSOM patients enrolled in the study in each group**

	Mal es	Males Percentage	Fema les	Females Percentage
Group I (Type I tympanoplasty)	11	36.67%	19	63.34%
Group II (Type I tympanoplasty with cortical mastoidectomy)	19	63.34%	11	36.67%
Total = 60	30	50%	30	50%

Group I (type I tympanoplasty) there were 11 males and 19 females where as in group II (type I tympanoplasty with cortical mastoidectomy) there were 19 males and 11 females.

**Table 3: Number of ears in each group according to size of the perforation**

Size of perforation	Group I Type I tympanoplasty (number of ears)	Group II Type I tympanoplasty with cortical mastoidectomy (number of ears)
Moderate	27	29
Small	3	1
Total	30	30

In group I, 27 ears had moderate size perforation and 3 ears had small size perforation (Table 3). Where as in group II, 29 ears had moderate size perforation and one had small size perforation. Thus the two groups matched for the size of perforation.

**Table 4: Mean pre-operative air-conduction threshold and bone conduction threshold in two groups.**

	Group I Type I tympanoplasty (Mean ± SD)	Group II Type I Tympanoplasty with cortical mastoidectomy (Mean ± SD)	p value
Air conduction threshold in the involved ear	45.9 ± 4.99	44.87 ± 6.44	0.49
Bone conduction threshold in the involved ear	19.4 ± 2.93	18.53 ± 4.06	0.35
Air bone Gap	26.67± 4.24	26.33 ± 3.92	0.75

P<0.05 is considered statistically significant.

There is no significant difference in air conduction and bone conduction threshold between the two groups preoperatively.

**Operative findings in cortical mastoidectomy ears**

In group II, out of the total 30 ears, middle ear mucosa was normal in all the ears, whereas in the mastoid antrum, 20% had polypoidal changes and 6.67% had granulation tissues (Table 5). This finding along with slightly lesser number of successful outcomes in group I helps to come to the conclusion that, cortical mastoidectomy improves the success rate. But the difference was not significant statistically.

**Table 5: Operative findings in cortical mastoidectomy ears (n=30)**

Intra-operative middle ear	No.	Intraoperative mastoid antrum and aditus	No.	%
Normal	30	Normal	22	73.3
		Polypoidal	6	20
		Granulation	2	6.67

Two parameters were studied namely graft uptake and hearing gain in type I tympanoplasty with and without cortical mastoidectomy. At the end of 3 months post operatively, group I had 21 intact grafts and 9 re-perforations whereas group II had 23 intact grafts and 7 re-perforations (Table 6). The association between columns (groups) and rows (outcomes) is considered to be statistically not significant.

**Table 6: Graft outcomes at the end of 3 months post operatively.**

	Group I: Type I tympanoplasty	Group II: Type I tympanoplasty with cortical mastoidectomy
Graft intact	21 (70%)	23 (76.67%)
Reperforation	9 (30%)	7 (23.33%)

P value equals 0.5593 using chi square test, statistically not significant

There was a mean reduction of air conduction threshold from 45.9 ± 4.99 to 28.10 ± 2.4 dB in group I and from 44.87 ± 6.44 to 29.27 ± 2.82 dB in group II. (Table 7) The reduction of air conduction thresholds in each group was significant.

**Table: 7 Changes in the air-conduction threshold in both the groups, pre and post operative**

Characteristics	Group I Type I tympanoplasty (Mean + SD)	Group II Type I tympanoplasty with cortical mastoidectomy (Mean + SD)	p value
Air conduction threshold in the involved ear pre-op	45.9 ± 4.99	44.87 ± 6.44	0.49
Air conduction threshold in the involved ear post-op	28.10 ± 2.4	29.27 ± 2.82	0.08
p-value for comparison within group	0.001	0.001	

Air conduction threshold in the involved ear pre-op	45.9 ± 4.99	44.87 ± 6.44	0.49
Air conduction threshold in the involved ear post-op	28.10 ± 2.4	29.27 ± 2.82	0.08
p-value for comparison within group	0.001	0.001	

P<0.05 is considered statistically significant.

Post operatively the mean residual air-bone gap was 9.87 + 3.16 in group I and 9.43 + 3.65 in group II (Table 8). There was no statistical difference in the residual gaps between the two groups.

**Discussion**

In this prospective randomized study we have made an attempt to analyze the role of cortical mastoidectomy in surgical outcome of Type I tympanoplasty.

There are a number of studies in the literature highlighting the advantages and disadvantages of performing mastoidectomy in the surgical treatment of mucosal type of chronic otitis media. The studies support the contention that mastoid pneumatic system acts primarily as a buffer to pressure changes in the middle ear.<sup>1</sup>

Nadol in 1985 suggested that incomplete mastoidectomy was a common cause of failure in patients with or without cholesteatoma<sup>2</sup> Balyan et al. in 1997 conducted a study which analyzed the results of chronic otitis media without cholesteatoma managed by tympanoplasty with mastoidectomy and tympanoplasty without mastoidectomy.<sup>3</sup> Similar to our study they found no statistically significant difference between the groups either in graft success rate or functional hearing outcome.

Mc Grew et al. in 2004 concluded that even though mastoidectomy was not necessary for the successful repair of tympanic membrane, the procedure impacted the clinical course in patients by reducing the number of future procedures and decreasing disease progression.<sup>4</sup>

Another study was conducted by Mishiro et al. in 2009 to examine the prognostic factors predicting long-term outcomes of tympanoplasty for perforated chronic suppurative otitis media and to determine if mastoidectomy can be avoided during tympanoplasty<sup>5</sup>. Between 1987 and 2002, 213 patients with perforated CSOM underwent tympanoplasty by the same surgeon and were followed for more than 5 years. Post-operative hearing outcomes were considered successful, if the post-operative air-bone gap was within 20 dB. Closure of perforation by a single surgery was considered a successful graft. Long-term outcomes were analyzed using logistic regression analysis. They concluded that normal ossicular chain was the only factor that showed a significantly favorable relation to long-term hearing outcomes. They also confirmed that mastoidectomy was not a significant factor predicting long-term outcomes and can be regarded as an avoidable surgical procedure in tympanoplasty for perforated chronic suppurative otitis media even if the ear is infected.

These studies show similar results to that of our study, where no statistically significant difference was found in the outcome of tympanoplasty with and without mastoidectomy.

When considering the addition of a mastoidectomy to a tympanoplasty, the performing surgeon should consider not only the potential added benefit but also potential risks of operative procedures, anesthesia hazards and costs to the patient.

The results emphasize the fact that overall satisfactory hearing outcome with adequate air-bone closure can be achieved

irrespective of cortical mastoidectomy in the surgical treatment of tubotympanic disease. Our study reflects evidence that performing cortical mastoidectomy offers no advantage to the patient.

### Conclusions

As long as infection is present in and around the middle ear cleft and mastoid antrum, any attempt at reconstruction may seem futile. In this context cortical mastoidectomy seems to be an integral part of every tympanoplasty. But in this study we reached to the conclusion that Cortical mastoidectomy does not offer additional advantage over types I tympanoplasty in patients with tubotympanic chronic suppurative otitis media with moderate degree of conductive hearing loss and moderate size perforation.

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