

## Original Research Article

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# A comparative study to evaluate the postoperative results between tympanoplasty alone and tympanoplasty with cortical mastoidectomy in chronic suppurative otitis media

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## ABSTRACT

**Background:** Chronic suppurative otitis media (CSOM) is a common ear disease presenting to the ENT OPD. It's the most common cause of hearing dysfunction in our country. Most of these cases requires surgery but still controversial. In the surgical management of CSOM even well experienced otologist have the dilemma whether to combine mastoidectomy with tympanoplasty or not. Objectives of the study was to study and evaluate whether the additional mastoidectomy procedure helps in the outcome in the surgical treatment of CSOM in terms of graft uptake, perforation closure, improvement in hearing, disease eradication and recurrence.

**Methods:** The 40 patients of age group 12 to 65 years diagnosed with CSOM of tubotympanic type in inactive or quiescent stage was taken as study group. Tympanoplasty alone was done in 20 cases and tympanoplasty with cortical mastoidectomy was done in 20 cases. Hearing gain following surgery and factors influencing the outcome were measured. Study done was prospective comparative study.

**Results:** Graft uptake was seen in 17 cases (85%) in tympanoplasty alone group and 15 cases (75%) in Tympanomastoidectomy group at the end of 2nd month. Graft uptake was found to be same in terms of significance in both groups. Post-operative hearing gain was observed in 75% of patients in each group

**Conclusions:** Hearing improvement, graft uptake were statistically incomparable in two groups. Combining cortical mastoidectomy with tympanoplasty will not give additional benefits in terms of hearing gain, graft uptake and disease eradication if the middle ear mucosa is healthy.

**Keywords:** CSOM, Central perforation, Tympanoplasty, Cortical mastoidectomy, Pure tone audiometry

## INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic inflammation of mucoperiosteal lining of middle ear cleft which is composed of Eustachian tube, hypotympanum, mesotympanum, epitympanum, aditus and mastoid air cells.<sup>1</sup> It is characterized by recurrent ear discharge and tympanic membrane perforation. Incidence of CSOM is higher in poor socioeconomic group, poor nutrition and lack of health education in rural population. In India,

prevalence rate is 7.8% which is very high. In Britain, 0.9% of children and 0.5% of adults have CSOM with no difference between the sexes.

The surgical treatment of CSOM is still controversial. It is well accepted that the main purpose of operation is to obtain a permanently dry ear and close the perforation. The goal of otologist performing middle ear surgery to correct conductive hearing loss is to improve hearing as well as provide a functional benefit to the patient. Tympanoplasty with mastoidectomy has been identified

as an effective method of treatment of chronic ear infection resistant to antibiotic therapy, but the effect of mastoidectomy on patients without evidence of active infectious disease remains highly debated and unproven. There are three opinions in this issue. The first is that mastoidectomy is useful for both infected and dry ears. The second is that mastoidectomy is useful for infected ears, but not for dry ears. The third is that mastoidectomy is not useful for either infected or dry ears.

As long as there is infection in as well as 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 the every tympanoplasty.

Hence this study is done to compare the results of tympanoplasty alone and tympanoplasty with cortical mastoidectomy in CSOM in selected patients in terms of graft uptake, perforation closure, improvement in hearing, disease eradication and recurrence.

## METHODS

Forty patients with CSOM of tubotympanic type in inactive or quiescent stage with perforation without any complications and comorbidities and without any history of previous ear surgery was taken as study group at Adichunchanagiri institute of medical sciences. This study was done from September 2018 to August 2019, i.e., for a period of 12 months. Approval from the institutional ethical committee was taken before commencing the study. They were randomized into two groups of 20 each by a method of double-blind randomization. The first group (Group A-tympanoplasty) will comprise of patients underwent tympanoplasty alone (without cortical mastoidectomy), the second group (Group B-tympano-mastoidectomy) underwent tympanoplasty with cortical mastoidectomy. All post-operative cases were followed on 15<sup>th</sup> day, 1<sup>st</sup> month, 2<sup>nd</sup> month and 3<sup>rd</sup> month. Pure tone audiometry was done on 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> month follow ups. Study done was Prospective comparative study.

### Inclusion criteria

Patients with CSOM of tubotympanic type in inactive or quiescent stage with perforation were included in the study.

### Exclusion criteria

Patients with any complications of CSOM and any comorbidities and any history of previous ear surgery were excluded from the study.

Analysis was done by using appropriate statistical tests like Chi-square test, Fisher exact test and student-t test. A  $p<0.05$  was considered as significant.

## RESULTS

Right sided ear was found to be affected in 22 cases (55%), left ear affected in 16 cases (40%) and both ears affected in 2 cases (5%).

**Table 1: Incidence of the side affected.**

Side affected	Treatment group, N (%)		Total, N (%)
	Group A	Group B	
<b>Left CSOM</b>	8 (40)	8 (40)	16 (40)
<b>Right CSOM</b>	11 (55)	11 (55)	22 (55)
<b>B/L CSOM</b>	1 (5)	1 (5)	2 (5)
<b>Total</b>	20	20	40

**Table 2: Ear discharge status.**

Ear discharge status	Treatment group, N (%)		Total, N (%)
	Group A	Group B	
<b>Inactive</b>	8 (40)	9 (45)	17 (42.5)
<b>Quiescent</b>	12 (60)	11 (55)	23 (57.5)
<b>Total</b>	20	20	40

**Table 3: Hearing impairment degree.**

Hearing impairment degree	Treatment group, N (%)		Total, N (%)
	Group A	Group B	
<b>Mild</b>	10 (50)	8 (40)	18 (45)
<b>Moderate</b>	7 (35)	7 (35)	14 (35)
<b>Moderately severe</b>	3 (15)	2 (10)	5 (12.5)
<b>Severe</b>	0 (0)	3 (15)	3 (7.5)
<b>Total</b>	20	20	40

**Table 4: Graft uptake follow-up.**

Graft uptake	At 1 <sup>st</sup> month, N (%)		At 2 <sup>nd</sup> month, N (%)	
	Group A	Group B	Group A	Group B
<b>Present</b>	18 (90)	17 (85)	17 (85)	15 (75)
<b>Absent</b>	2 (10)	3 (15)	3 (15)	5 (25)
<b>Total</b>	20	20	20	20
<b>P (Fisher exact test)</b>	>0.999 (Not significant)			

Paired t test has been conducted to check whether each surgical intervention is effective or not. In group A mean PTA was 41.95 at baseline and it was 36.93 at 2 months. Mean PTA difference was observed 5.02 and which is statistically significant as  $p\leq 0.0001$ . In group B mean PTA was 44.66 at baseline and it was 39.53 at 2 months. Mean PTA difference was observed 5.13 and which is statistically significant as  $p\leq 0.0001$ . With statistically significant mean differences, both the surgical interventions are effective in terms of hearing improvement and graft uptake.

**Table 5: Pure tone audiometry evaluation in pre- and post-operative follow-up.**

PTA (dB)	At pre-op, N (%)		At 2 months (post-op), N (%)	
	Group A	Group B	Group A	Group B
<30	5 (23.81)	4 (19.05)	7 (33.33)	5 (23.81)
30-40	5 (23.81)	5 (23.81)	7 (33.33)	6 (28.57)
40-50	5 (23.81)	4 (19.05)	4 (19.05)	4 (19.05)
≥50	6 (28.57)	8 (38.1)	3 (14.29)	6 (28.57)
<b>Total</b>	21	21	42	21
<b>P (Fisher exact test)</b>	0.949 (Not significant)			

**Table 6: Statistical analysis of the results.**

PTA	N	Mean±SD	Mean diff.	Std. error	P	Result
PTA at (pre op)	20	41.95±12.785				
PTA at 2 months (post op)	20	36.93±12.334	5.02	0.780	<0.0001	Significant
PTA at pre-op	20	44.66±17.067				
PTA at 2 months (post-op)	20	39.53±14.645	5.13	0.881	<0.0001	Significant

## DISCUSSION

CSOM represents the most common disease of the middle ear cleft. Tympanoplasty with or without cortical mastoidectomy is performed to eradicate the disease in middle ear and reconstruct the conductive hearing mechanism. Cortical mastoidectomy with tympanoplasty in cases of active CSOM is performed to clear the mastoid reservoir of infection, but its role in inactive and quiescent disease is questionable.

The present study comprises of total 40 patients of CSOM with central perforation came with status of inactive or quiescent stage. In our study, right sided ear was found to be affected in 22 cases (55%), left ear affected in 16 cases (40%) and both ears affected in 2 cases (5%). This predominance of right side can be explained as majority of them were right-handed persons and ear picking as a cause can be attributed to the side predominance. Our study was in correlation with the study conducted by Nagale.<sup>2</sup> In a study done by Mahmud et al the perforation was more commonly found on the left side which was in contrast to our study.<sup>3</sup>

In our study majority of subject presented with complaints of ear discharge since childhood (40%) which signifies that childhood recurrent upper respiratory tract infection due to immature immunity, under developed eustachian tube causing acute otitis media in children which later on become COM. Our study is substantiated by study done by Chonmaitree et al higher prevalence of common cold is responsible for recurrent AOM.<sup>4</sup>

In our study majority of cases which we operated were quiescent i.e., 23 cases (57.5%) remaining were in inactive ear i.e., 17 (42.5%), which does not have any statistical significance, in our study we try to analyse the surgical outcome in quiescent and inactive ear. In study done by Naderpour et al hearing improvement and graft

uptake was similar in dry ear and wet ear group so it was not statistically significant.<sup>5</sup> In our study majority of cases had mild to moderate conductive hearing loss 32 cases (80%) most of them had hearing loss in range of 41-50 dB which correlates with the literature and other study because of TM perforation alone or along with ear ossicle erosion will result in moderate conductive hearing loss.

In our study middle ear mucosa was normal in 100% of patients and no pathology like aditus block was found in antrum. In a study by Rickers middle ear mucosa was normal in 11% patients, polypoidal in 4%, oedematous in 36% and granulation tissue was found in 57% of patients.<sup>6</sup> In a study by Krishnan et al middle ear mucosa was normal in 37% patients, polypoidal in 21% and granulations were found in 20%. In patients with granulations tissue in the middle ear antrum was filled with granulations in 80% patients, patients having polypoidal middle ear mucosa had granulations in antrum in 75% of cases hence reflecting the fact that middle ear pathology reflects the antral pathology.<sup>7</sup> Hence preoperatively patients can be assessed whether cortical mastoidectomy is beneficial by looking at the status of the middle ear mucosa.

End point of the study was considered by two points first post-operative graft uptake at the end of two months, and second post-operative hearing improvement. In present study perforation closure success rate were of 75% with tympanomastoidectomy and 85% with tympanoplasty alone which is statistically insignificant ( $p=0.695$ ) and post-operative hearing gain (AB gap was more than 10 dB HL) was observed in 75% of patients in each group which were also statistically insignificant. These results correlate with the study by Tawab et al, Girde et al, Krishnan et al, Mishiro et al and Agrawal et al and many other studies shows similar results. In a study by Krishnan et al post-operative hearing gain was 75% in both groups. In a retrospective study by McGrew et al showed identical

perforation closure success rates of 91% in each group and hearing differences also were statistically insignificant.<sup>7-12</sup>

The main limitation of the study was its inability to prove that cortical mastoidectomy added a significant surgical advantage for the tubotympanic otitis media patients.

## CONCLUSION

This study studied usefulness of cortical mastoidectomy in tubotympanic CSOM patients. The factors influencing healing and hearing outcome were better eustachian tube function. Incidence of upper respiratory tract infection has adverse effect on healing and hearing outcome. Combining cortical mastoidectomy with tympanoplasty will not give additional benefits in terms of hearing gain, graft uptake and disease eradication if the middle ear mucosa is healthy.

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