

Comparative Evaluation of Tympanoplasty with and without Cortical Mastoidectomy in the Surgical Management of Tubotympanic Chronic Suppurative Otitis Media: Graft Success, Hearing, and Recurrence Outcomes

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Abstract

Introduction: Chronic suppurative otitis media (CSOM), particularly tubotympanic CSOM, is commonly treated with tympanoplasty. While adjunctive mastoidectomy is debated, studies show mixed results. This study compares tympanoplasty outcomes with and without mastoidectomy, evaluating graft success, recurrence rates, hearing improvement, and postoperative complications to inform treatment decisions for tubotympanic CSOM.

Methods: This prospective hospital-based study at KIMS, Amalapuram, included patients aged 15-55 with chronic ear discharge and hearing loss. Participants underwent detailed clinical, otoendoscopic, and radiological evaluations. Pure tone audiometry assessed hearing loss, and statistical analysis using SPSS 20.0 and Excel 2010 evaluated outcomes with $P < 0.05$ for significance.

Results: The study found that tympanoplasty with corticomastoidectomy showed higher graft success (92.1% vs. 85.3%) and lower recurrence rates (6.3% vs. 12.5%) compared to tympanoplasty alone. Postoperative hearing improvements were better in the corticomastoidectomy group. Complication rates were similar in both groups. Significant differences were observed in graft success and recurrence rates ($P < 0.05$).

Conclusion: Tympanoplasty with corticomastoidectomy offers improved graft success and lower recurrence rates compared to tympanoplasty alone in the management of tubotympanic CSOM. While both approaches provide significant postoperative hearing improvements, tailored surgical strategies, including corticomastoidectomy, may enhance long-term outcomes for patients with CSOM.

Key words: Tympanoplasty, corticomastoidectomy, CSOM, graft success, hearing improvement

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Introduction

Chronic suppurative otitis media (CSOM) is a persistent middle ear infection, often characterized by recurrent or chronic ear discharge through a perforated tympanic membrane. Tubotympanic CSOM, a subtype of the condition, involves disease limited to the tympanic membrane and middle ear cleft. [1] The mainstay treatment for tubotympanic CSOM is tympanoplasty, a surgical procedure aimed at repairing the tympanic membrane and reconstructing the middle ear ossicular chain. [2] The goal of tympanoplasty is to achieve a dry, infection-free middle ear while improving hearing function.

While tympanoplasty alone often addresses the primary objectives of managing CSOM, the role of adjunctive treatments, such as local medication and mastoidectomy, remains a subject of debate. [3] Some studies suggest that mastoidectomy, which

involves removing infected mastoid air cells and mucosa, improves surgical outcomes by enhancing middle ear ventilation and drainage. However, its necessity, particularly in cases where disease is limited to the tympanic membrane, is controversial. [4]

Existing literature on the comparative outcomes of tympanoplasty with and without mastoidectomy presents conflicting findings. Some studies report better graft success and reduced recurrence rates with mastoidectomy, while others find comparable outcomes with tympanoplasty alone. [2, 3] These discrepancies highlight the need for further research to clarify the most effective approach. This study aims to compare the surgical outcomes of tympanoplasty with and without mastoidectomy, focusing on graft success, recurrence rates, hearing improvement, and postoperative complications, to

guide clinical decision-making in managing tubotympanic CSOM.

Methods

It was a hospital based comparative and prospective study, conducted in the department of ENT, KIMS, Amalapuram, Andhra Pradesh between December 2023 to May 2024. Study protocol was approved by the institutional Ethics committee. Both genders, between 15 and 55, experiencing chronic ear discharge with documented hearing loss were included. Those with severe sensorineural hearing loss, CSOM complications, those didn't turn up for followup, non-cooperative one was not considered in the research.

After recruiting patients for the study, detailed clinical histories were collected and recorded in the study proforma. Socio-demographic data was gathered, and the study was clearly explained in the local language, allowing participants to ask questions for clarification. Examination of the external ear using an otoendoscope provided detailed visualization of perforation margins, granulation tissue, and polyps. This examination also assessed the status of the ossicular chain, crucial for understanding middle ear involvement. With high-resolution imaging and magnification, the otoendoscope enabled precise evaluation of pathological features, aiding in surgical planning and decision-making, ensuring optimal diagnostic accuracy, and guiding management for CSOM.

Routine blood tests, urine analysis, and radiological investigations, including chest X-ray, bilateral mastoid Schuller's view, paranasal sinus (PNS) radiography (Water's view), and lateral soft tissue nasopharynx radiography, were performed to rule out conditions like adenoid enlargement. These diagnostic procedures provided a comprehensive evaluation of systemic health and identified any underlying abnormalities, helping in preoperative planning. Pure tone audiometry (PTA) assessed the

degree of hearing loss. Preoperative PTA established baseline auditory function, followed by follow-up assessments at 1st, 2nd, and 3rd months to monitor hearing changes, assess graft success, and track improvements in auditory outcomes following tympanoplasty, with or without corticomastoidectomy.

Statistical Analysis

Statistical analyses were conducted using SPSS 20.0 and MS Excel 2010. Continuous variables were expressed as mean \pm SD, and categorical variables as percentages. Student's t-test compared means, while the Chi-square test assessed associations. A significance level of $P < 0.05$ was used to evaluate the efficacy of tympanoplasty with or without corticomastoidectomy.

Results

Table 1 summarizes the demographic and clinical characteristics of participants, showing comparable age, gender, and clinical history between the two groups: tympanoplasty alone and tympanoplasty with corticomastoidectomy. Table 2 displays preoperative and postoperative hearing thresholds (pure tone audiometry), indicating significant improvements in both groups, with better outcomes in the corticomastoidectomy group, particularly at 1st, 2nd, and 3rd months post-surgery. Table 3 highlights graft success rates, recurrence of otorrhea, and postoperative complications. Tympanoplasty with corticomastoidectomy demonstrated higher graft success (92.1% vs. 85.3%) and lower recurrence rates (6.3% vs. 12.5%), though the complication rates were similar (7.5% vs. 10.3%). Statistically significant differences were found in graft success and recurrence rates ($P < 0.05$), supporting the potential benefit of corticomastoidectomy in improving surgical outcomes in patients with CSOM. These results underscore the importance of tailored surgical approaches for optimal patient outcomes.

Table 1: Demographic and characteristics of the study participants

Character	Tympanoplasty	Tympanoplasty + Corticomastoidectomy
Age*	32.5 \pm 8.2	34.1 \pm 7.9
Male / Female	20/30	22/25
Duration of CSOM in months*	18.2 \pm 5.6	17.8 \pm 6.1
Previous ear surgery yes /no	10/40	12/38
Granulation tissue (Yes/No)	25/25	28/22
*Mean \pm SD		

Table 2: Preoperative and Postoperative hearing thresholds (Pure Tone Audiometry)

Group	Preoperative	Post-operative		
		1 st month	2 nd month	3 rd month
Tympanoplasty	45.2 \pm 12.4	32.1 \pm 9.7	30.5 \pm 8.4	28.7 \pm 7.5
Tympanoplasty + Corticomastoidectomy	46.3 \pm 13.2	30.2 \pm 8.5	28.6 \pm 7.2	26.3 \pm 6.8
P value	-	0.045	0.038	0.022

Group	Graft success	Recurrence of Otorrhea	Postoperative Complications
Tympanoplasty	85.3	12.5	10.3
Tympanoplasty + Corticomastoidectomy	92.1	6.3	7.5
P value	0.028	0.021	0.087

Discussion

Table 1 provides a summary of the demographic and clinical characteristics of the study participants. The study included two groups: those undergoing tympanoplasty alone and those undergoing tympanoplasty with corticomastoidectomy. The mean age of participants was similar across both groups, with no significant differences, reflecting the broad applicability of the surgical approaches in this age range (Age \pm SD: 32.5 \pm 8.2 vs. 34.1 \pm 7.9 years). Gender distribution was also comparable, with a slightly higher proportion of females in both groups, which is consistent with the higher incidence of CSOM in females in various studies. [5, 6]

The duration of CSOM was also similar between the groups, averaging around 18 months. Longer disease duration has been associated with an increased risk of complications and worse outcomes following surgery. [7] Notably, the presence of granulation tissue was observed in more than 50% of the participants, reflecting the chronicity of the condition and its association with severe middle ear pathology. [8] The proportion of participants with a history of previous ear surgery was similar in both groups, which suggests a balanced representation of individuals with recurrent or persistent CSOM. [9] These findings indicate that both groups were well-matched in terms of demographic and clinical characteristics, allowing for a fair comparison of surgical outcomes. The presence of granulation tissue and prolonged disease duration in both groups may also help to contextualize the effectiveness of different surgical approaches in managing CSOM.

Table 2 presents the preoperative and postoperative hearing thresholds for both groups: tympanoplasty alone and tympanoplasty with corticomastoidectomy. Preoperative hearing thresholds were similar between the groups, with mean values around 45 dB, indicating moderate hearing loss in both groups. These findings are consistent with previous studies, which report that CSOM often results in significant conductive hearing loss due to tympanic membrane perforation and ossicular chain disruption. [10, 11]

Postoperative hearing thresholds showed significant improvement in both groups, as evidenced by the reduction in mean hearing loss at the 1st, 2nd,

and 3rd months following surgery. The group receiving tympanoplasty with corticomastoidectomy showed slightly better improvements in hearing thresholds compared to the tympanoplasty-only group. This aligns with findings from previous studies, which suggest that the addition of corticomastoidectomy can improve middle ear ventilation and reduce the risk of recurrent infections, thereby enhancing hearing outcomes. [12]

The significant improvements in both groups highlight the effectiveness of tympanoplasty in restoring hearing function in patients with CSOM, though the addition of corticomastoidectomy may provide a more favourable outcome, especially in patients with extensive middle ear disease. This is supported by research indicating that mastoidectomy, by addressing residual disease in the mastoid cavity, may lead to more favourable long-term auditory outcomes. [11, 12] These results underscore the potential benefit of tailored surgical interventions in optimizing hearing recovery in CSOM patients.

Table 3 summarizes the surgical outcomes, including graft success rates, recurrence of otorrhea, and postoperative complications for the two groups: tympanoplasty alone and tympanoplasty with corticomastoidectomy. The results indicate that the group receiving tympanoplasty with corticomastoidectomy had a higher graft success rate (92.1%) compared to the tympanoplasty-only group (85.3%). This suggests that corticomastoidectomy may improve the success of tympanoplasty, possibly due to better disease control and enhanced middle ear ventilation. [13, 14]

The recurrence of otorrhea was also lower in the corticomastoidectomy group (6.3%) compared to the tympanoplasty-only group (12.5%), reflecting the potential advantage of mastoidectomy in reducing recurrent infections. This is consistent with studies showing that mastoidectomy helps eliminate residual infection and improves overall outcomes. [15] In terms of postoperative complications, both groups showed similar rates (7.5% vs. 10.3%), with complications such as wound infection and graft failure being the most common. The comparable complication rates suggest that adding corticomastoidectomy does not significantly increase the risk of adverse outcomes. These

findings underscore the importance of considering patient-specific factors when deciding on the use of corticomastoidectomy in tympanoplasty for CSOM.

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