

A COMPARATIVE STUDY OF MYRINGOPLASTY IN DRY AND WET EAR

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Abstract

Background: Chronic Otitis Media (COM) is a persistent inflammatory condition affecting the middle ear, characterized by symptoms such as ear discharge, tympanic membrane perforation, and hearing loss. Its prevalence, particularly high in developing countries like India, is influenced by socioeconomic factors and inadequate nutrition. This study aimed to evaluate graft uptake rates and hearing improvement in COM patients undergoing myringoplasty, regardless of ear moisture status. Additionally, the study sought to assess the impact of combining myringoplasty with cortical mastoidectomy on surgical outcomes.

Methods: A prospective study was conducted at a tertiary Medical College in south India, from November 2021 to September 2023. Sixty patients with active and inactive mucosal type chronic otitis media were enrolled, with 30 patients in each group (dry and wet ears). Surgical procedures were performed based on individual patient characteristics, and outcomes were evaluated through graft uptake rates and hearing improvement.

Results: Successful closure of tympanic membrane perforations was observed in both wet and dry ears, with comparable success rates of 89.65% and 96.67%, respectively. Graft uptake rates did not significantly differ between the two groups, suggesting similar outcomes irrespective of ear moisture status. While hearing gain was slightly lower in patients with wet ears compared to those with dry ears, the difference was not statistically significant.

Conclusion: Myringoplasty remains an effective treatment for tubotympanic chronic suppurative otitis media, with comparable success rates in wet and dry ears. Factors such as age, sex, perforation size, and mastoid pneumatization did not significantly influence surgical outcomes. Cortical mastoidectomy, when warranted, may contribute to improved outcomes, particularly in cases of active disease. This study emphasizes the importance of thorough pre-operative evaluation and patient selection in achieving favorable surgical results.

Keyword: Chronic Otitis Media, Myringoplasty, Graft Uptake, Hearing Improvement, Air-Bone Gap.

Introduction

Chronic Otitis Media (COM) is a persistent inflammation of the middle ear mucoperiosteal lining, characterized by ear discharge, tympanic membrane perforation, and hearing impairment [1]. Particularly prevalent in developing countries, COM's incidence is influenced by poor socioeconomic conditions and inadequate nutrition [2]. In India, the prevalence rate is notably high, with rural areas disproportionately affected [2].

Historically, myringoplasty's success in actively discharging ears was questioned, exacerbated by a lack of disease awareness and functional benefits perception among Indians [3]. However, spontaneous healing of tympanic membrane perforations is rare, necessitating surgical intervention [4]. Several factors, such as patient age, perforation characteristics, and middle ear status, influence surgical outcomes [5].

This study addresses the controversy surrounding myringoplasty outcomes in wet ears, establishing that active discharge does not preclude successful surgery [5]. The objective is to evaluate graft uptake rates and hearing improvement in COM patients undergoing myringoplasty, regardless of ear moisture status.

Myringoplasty aims to halt middle ear discharge and restore hearing by closing tympanic membrane perforations using various grafts [6]. Temporalis fascia grafts facilitate epithelial growth, aiding perforation closure [6]. In cases of mastoid sclerosis, myringoplasty may be combined with cortical mastoidectomy to ensure adequate middle ear aeration and prevent disease recurrence [6].

This study aims to assess graft uptake success and hearing improvement in COM patients undergoing myringoplasty, considering ear moisture status. Specific objectives include evaluating graft uptake rates and Air-Bone gap reduction in both wet and dry ears. By analyzing these parameters, the study aims to enhance understanding of myringoplasty outcomes in diverse COM presentations.

Material and methods

Study Design: A prospective study was conducted at the Department of ENT, at a tertiary Medical College in south India, from November 2021 to September 2023. The study enrolled patients with active and inactive mucosal type chronic otitis media from the urban population of South India.

Study Sample Size: A total of 60 patients were included in this prospective study, selected from the daily average outpatient visits at the Department of ENT.

Inclusion Criteria:

1. Patients with active mucosal type chronic otitis media, characterized by wet ear with active mucoid discharge negative on culture and sensitivity.
2. Patients with inactive mucosal type chronic otitis media, presenting with a dry ear for at least 3 months.
3. Age range from 15 to 50 years, including both males and females.

4. Presence of central perforation, regardless of size, in both wet and dry ears.
5. Intact ossicular chain confirmed intraoperatively.
6. Patients exhibiting normal Eustachian tube function.
7. Purely conductive hearing loss of less than 40 dB.
8. Presence of cellular or sclerosed mastoid as confirmed by X-ray mastoid imaging in both wet and dry ears.
9. Absence of infection in throat, nose, and paranasal sinuses.

Exclusion Criteria:

1. Patients with squamosal type chronic otitis media.
2. Cases with sensorineural hearing loss.
3. Patients with traumatic perforation.
4. Patients with a history of previous surgery for chronic otitis media.
5. Ossicular discontinuity confirmed intraoperatively.
6. Age below 15 years or above 50 years.
7. Evidence of infection in throat, nose, or paranasal sinuses.
8. Patients with systemic illnesses such as diabetes mellitus, hypertension, or tuberculosis.
9. Surgically unfit cases.

Methodology: All 60 patients meeting the inclusion criteria were selected for the study. They were divided into two groups:

- Group 1 (Dry ear): Patients with no evidence of otorrhea within three months before surgery.
- Group 2 (Wet ear): Patients presenting with mucoid discharge negative on culture and sensitivity.

All patients underwent routine clinical examination, audiological evaluation, and pre-operative investigations. Surgical procedures, including myringoplasty with or without cortical mastoidectomy, were performed as indicated based on individual patient characteristics.

Clinical Examination: Complete ear, nose, and throat examination were conducted for all patients. Tuning fork tests including Rinne and Weber tests were performed, along with otoscopic examination and examination under microscope to confirm the diagnosis of mucosal type chronic suppurative otitis media.

Ear Swab Culture and Sensitivity: Ear swab culture and sensitivity were conducted for all cases of wet ear with mucoid discharge to rule out active infection.

Pure Tone Audiometry: Pre-operative and post-operative pure tone audiograms were performed to assess hearing gain by analyzing the reduction in air-bone gap.

Diagnostic Procedures: Diagnostic nasal endoscopy, indirect laryngoscopy, X-ray paranasal sinuses, chest X-ray, routine blood investigations, and ECG were carried out for all patients for anesthetic assessment and to rule out any systemic illnesses or coexisting sinusitis.

Surgical Procedure: All surgeries were performed under general anesthesia. Post-aural incisions (Wilde's incision) were made, and temporalis fascia grafts were harvested and placed using underlay technique. Myringoplasty with or without cortical mastoidectomy was performed based on mastoid status.

Postoperative Care: Patients were kept nil per oral for 6 hours postoperatively and received intravenous fluids, antibiotics, and analgesics for 2 days. Postoperative complications were monitored, and patients were discharged on the second postoperative day with prescribed medications. Follow-up appointments were scheduled at 1 month, 3 months, and 6 months post-surgery.

Success of Surgery: Graft uptake and hearing gain were considered as indicators of surgical success. Graft uptake was assessed by transparency and vascularity of the graft, while hearing gain was evaluated based on reduction in air-bone gap in pure tone audiometry.

Statistical Analysis: Statistical analysis was performed using chi-square test to calculate graft take-up rates and student t-test to compare air-bone gap reduction between the two groups.

Results

Among the 30 patients with a wet ear, successful closure of the tympanic membrane was observed in 26 patients. Conversely, out of the 30 patients with a dry ear, successful closure of the tympanic membrane was observed in 29 patients. One patient out of the 30 patients with an ear, who underwent myringoplasty with cortical mastoidectomy, failed to attend the follow-up appointment. In cases of wet ear, graft failure was observed in 3 patients, all of whom underwent myringoplasty alone. Conversely, in cases of dry ear, one patient who underwent myringoplasty developed a residual perforation in the post-operative period. Among the 60 patients, two patients who underwent myringoplasty with cortical mastoidectomy experienced post-aural wound infections yet exhibited successful graft uptake. Table 1

The success rate was 89.6 % and 96.6 % from the wet and dry ear group respectively. Applying chi-square test, the graft takes up showed a statistical insignificance in between both the groups ($p = 0.931$). Hence it was concluded that both the groups recorded a similar success rate. Table 2

Improvement in hearing: Hearing gain before and after surgery was compared, as showed in Fig. 21. The mean pre-operative A-B gap for dry ear was 29.45 dB and for wet ear was 28.85 dB. The mean post-operative A-B gap for dry ear was 20.11 dB and for wet ear was 21.24 dB. In patients with dry ear, the average reduction in A-B gap was 9.38 dB. In patients with wet ear, the average reduction in A-B gap was 7.61 dB. Figure 1

The mean Gain in A-B Gap was recorded as 7.61 dB & 9.38 dB for wet group & dry group respectively. To determine any statistical significance between both the groups, the student t – test for independent samples was applied. It is evident that the distribution of gain in A-B gap was statistically insignificant in the two study groups (p= 0.141). In this study, addition of cortical mastoidectomy along with myringoplasty has shown an improvement in the success rate in patients with wet ear, as compared to those who underwent myringoplasty alone. Whereas there was no significant difference in the outcome of surgery between the two groups.

Table 3

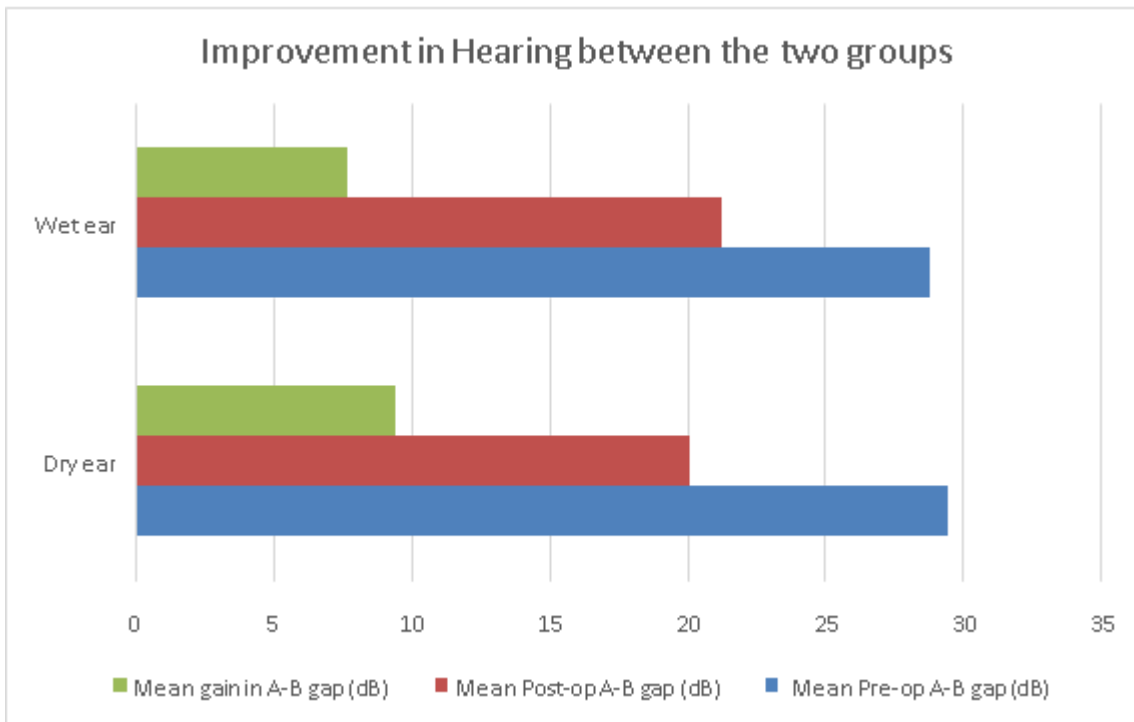


Figure - 1: Improvement in hearing between the two groups.

Table 1: Success rate after surgery

Type of ear	No. of cases	Success	Failure
DRY	30	29 (96.67%)	1 (3.33%)
WET	29	26 (89.65%)	3(10.35%)
Success rate in dry ear			
	Type of surgery	Myringoplasty	Myringoplasty with cortical mastoidectomy

	Success out of 30 patients	19	10
Success rate in wet ear			
	Success out of 29 patients	10	16

Table 2: Comparison of Graft Take up

	Graft Take up	No. of Patients	Percentage	P-Value
Wet	Success	26	89.65	0.931
	Failure	03	10.35	
Dry	Success	29	96.67	
	Failure	01	03.33	

Table 3: Comparison of Gain in A-B Gap

	Type of Ear	N	Mean	Standard Deviation	Standard Error of Mean	t - value	p- Value
Gain in A-B gap	Wet	29	7.61	2.65	0.683	1.514	0.141
	Dry	30	9.38	1.35	0.676		

Discussion

The prospective analysis conducted in this study aimed to assess the success rate of graft uptake and hearing improvement among 60 patients diagnosed with active and inactive chronic suppurative otitis media. These patients underwent myringoplasty with or without cortical mastoidectomy. The cohort was divided into two groups: 30 patients with dry ear and 30 patients with wet ear.

In addition to evaluating surgical outcomes, we examined various demographic and clinical factors, including age and sex distribution, perforation size, mastoid cellularity, and graft uptake incidence.

There exists a common belief in otology that myringoplasty should be performed in a completely dry ear to achieve optimal surgical outcomes. However, the uncertainty regarding the impact of middle ear wetness on surgical outcomes, coupled with the high number of patients presenting with wet ears on the day of surgery, prompted us to investigate the results

of myringoplasty in wet ear conditions. Cortical mastoidectomy was performed along with myringoplasty to address mastoid disease [7-10].

Age Distribution: All 60 patients included in the study ranged from 15 to 50 years of age. The majority of cases fell within the age group of 21-30 years (31 patients), followed by 31-40 years (21 patients), 15-20 years (5 patients), and 40-50 years (3 patients). The mean age of the cohort was 25.25 years.

Sex Distribution: Our series exhibited a female preponderance, with 55% females (33 females) and 45% males (27 males). This distribution aligns with findings from previous studies, suggesting a similar trend of female predominance in otitis media cases.

Perforation Size Distribution: Perforation size is generally not considered a significant factor influencing graft uptake and hearing gain. However, in our study, perforations were categorized as small, medium, or large based on the involvement of quadrants of the pars tensa of the tympanic membrane. Among the 60 patients, 32 had medium-sized perforations, 18 had large perforations, and 10 had small perforations [4-6].

Mastoid Pneumatization: X-ray mastoid was performed for all patients to assess mastoid pneumatization. Among the 30 patients with wet ear, 16 had sclerosed mastoid, and 14 had cellular mastoid. Among the 30 patients with dry ear, 10 had sclerosed mastoid, and 20 had cellular mastoid. These findings are consistent with existing literature, emphasizing the role of radiological assessment in determining mastoid pneumatization status.

Role of Cortical Mastoidectomy: The role of cortical mastoidectomy in patients with chronic otitis media remains a topic of debate. While its effectiveness in addressing active disease processes is recognized, its impact on patients with inactive disease is less clear. In our study, cortical mastoidectomy was performed in patients with sclerotic mastoid to clear mastoid infections and re-establish aditus patency [10-12].

Success Rate of Surgery: Successful closure of the tympanic membrane was observed in 26 patients with wet ear and 29 patients with dry ear, corresponding to success rates of 89.65% and 96.67%, respectively. There was no statistically significant difference in graft uptake between the two groups, suggesting comparable outcomes irrespective of middle ear wetness.

Hearing Gain After Surgery: Hearing gain was assessed by comparing the pre-operative and post-operative AB gap. While the average reduction in the AB gap was slightly lower in patients with wet ear compared to those with dry ear, the difference was not statistically significant [13-15].

Conclusion

Myringoplasty remains an effective method for managing tubotympanic chronic suppurative otitis media, leading to perforation closure and hearing improvement. Our study suggests that the success rate of myringoplasty in wet ears is comparable to that in dry ears. Factors such as age, sex, perforation size, and mastoid pneumatization did not significantly impact surgical outcomes. Cortical mastoidectomy, when indicated, may contribute to improved outcomes, particularly in cases of active disease. Overall, our findings underscore the importance of

patient selection and thorough pre-operative evaluation in achieving favourable surgical results.

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