



## Original Research Article

# QUALITY OF LIFE POST-MYRINGOPLASTY: ASSESSING RECURRENT DISCHARGE, WAX ACCUMULATION, AND GRANULATION TISSUE FORMATION

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#### ABSTRACT

**Background:** Chronic otitis media, characterized by recurrent or persistent ear discharge, presents a significant challenge for otolaryngologists. The management of tympanic membrane perforations is complex, especially when considering the impact of wet versus dry ear conditions on surgical outcomes. This study aimed to compare the clinical outcomes, quality of life, and graft success between patients with wet ear and dry ear conditions undergoing tympanoplasty.

**Material and Methods:** A total of 30 patients were enrolled, with 15 in the Wet Ear group and 15 in the Dry Ear group. Pre-operative assessment included demographic data, pure-tone audiometry (PTA), and the size and location of the perforation. All patients underwent tympanoplasty using temporalis fascia grafts. Follow-up assessments were conducted pre-operatively and at 1 week, 1 month, and 3 months post-operation. Quality of life was evaluated using the Chronic Ear Survey (CES) at each follow-up time point. Statistical analysis was performed to determine the significance of differences in outcomes between groups.

**Results:** No significant differences were found between the Wet Ear and Dry Ear groups regarding age, gender, socioeconomic status, size and location of the perforation, or pre-operative PTA ( $p > 0.05$ ). Graft success rates were 93.30% for the Wet Ear group and 86.70% for the Dry Ear group ( $p > 0.05$ ). CES scores did not show significant variations across the time points, indicating comparable quality of life improvements post-operatively ( $p > 0.05$ ). Overall, the study found no statistical significance in the impact of ear condition on surgical outcomes, with an overall p-value for follow-up time points of  $< 0.001$ .

**Conclusion:** This study suggests that the pre-operative condition of the ear, whether wet or dry, does not significantly influence the success of tympanoplasty or quality of life post-surgery. Graft success rates and patient-reported outcomes were favorable in both groups, highlighting the potential effectiveness of modern surgical techniques. Further studies with larger sample sizes are warranted to confirm these findings and explore additional influencing factors.

**Key Words:** Chronic otitis media, tympanoplasty, graft survival, quality of life, chronic ear survey.

## INTRODUCTION

Myringoplasty is a surgical procedure performed to repair tympanic membrane perforations, commonly resulting from chronic otitis media (COM) or

traumatic injury. Chronic otitis media, characterized by persistent inflammation and infection of the middle ear, affects an estimated 65 to 330 million individuals worldwide annually, with 60%

experiencing significant hearing impairment.<sup>[1]</sup> The prevalence is particularly high in low- and middle-income countries, including India, where it ranges from 4% to 6% due to factors such as poor hygiene, inadequate healthcare access, and high rates of upper respiratory infections.<sup>[2]</sup>

In India, chronic otitis media remains a leading cause of preventable hearing loss, disproportionately affecting children and individuals from rural areas. Myringoplasty not only aims to restore the structural integrity of the tympanic membrane but also to improve hearing and reduce associated symptoms such as recurrent ear discharge, which affects 70% to 80% of COM patients.<sup>[3]</sup>

Despite advances in surgical techniques, post-operative complications such as recurrent ear discharge, excessive wax formation, and granulation tissue development continue to impact outcomes. Recurrent discharge occurs in approximately 15% to 20% of cases after myringoplasty and is often associated with poor graft uptake or residual infection.<sup>[4]</sup> Granulation tissue, observed in 5% to 10% of cases, can further delay healing and increase the risk of surgical failure.<sup>[5]</sup> Wax accumulation, though a natural protective mechanism, can become excessive in 10% to 15% of patients, leading to discomfort, itching, and potential conductive hearing loss.<sup>[6]</sup>

These complications can significantly affect patients' auditory function, psychological well-being, and social interactions, highlighting the need for comprehensive post-operative care. Quality of life (QoL) assessments provide critical insights into the broader impacts of myringoplasty, extending beyond traditional audiological outcomes and graft success rates. Studies have shown that patients with successful tympanic membrane repair report improved QoL, yet data on the specific impacts of recurrent discharge, wax, and granulation tissue remain limited.<sup>[7]</sup>

This study aimed to address this gap by systematically evaluating the quality of life in patients following myringoplasty, with a focus on the incidence and impact of recurrent ear discharge, wax accumulation, and granulation tissue formation. By correlating these factors with patient-reported outcomes, the findings seek to guide improvements in surgical techniques and post-operative protocols, ultimately enhancing patient satisfaction and long-term results.

## **MATERIALS AND METHODS**

### **Study Design and Setting**

This study was a prospective observational study conducted in the Department of Otorhinolaryngology at Bombay Hospital and Institute of Medical Sciences, a tertiary care center in Mumbai, for a period of 2 years between July 2021 and June 2023. Ethical clearance was obtained from the Institutional Ethics Committee, and all participants provided

written informed consent prior to inclusion. The study aimed to evaluate the quality of life in patients undergoing myringoplasty, with a focus on recurrent discharge, wax accumulation, and granulation tissue formation.

### **Study Population and Sample Size**

The study included patients aged 18 to 60 years diagnosed with chronic otitis media (COM) characterized by tympanic membrane perforation, who were scheduled to undergo myringoplasty. Participants were categorized into two groups based on the condition of the middle ear at the time of surgery: the wet ear group, where the middle ear showed signs of active discharge, and the dry ear group, where the middle ear was free of discharge for at least four weeks before surgery. A total of 30 patients were included in the study, with an equal distribution of 15 patients in each group. Exclusion criteria included patients with associated ossicular chain abnormalities requiring reconstruction, history of previous tympanic membrane repair surgery, or comorbid conditions such as uncontrolled diabetes or immunosuppression.

### **Data Collection**

Data collection involved pre-operative, intra-operative, and post-operative assessments using a structured proforma. Demographic details such as age, gender, occupation, and socioeconomic status were recorded. Pre-operative audiological assessments included pure tone audiometry to document baseline hearing thresholds. Intra-operative findings, including the size and location of the tympanic membrane perforation and graft material used, were documented. Post-operative follow-ups were conducted at 1 week, 1 month, and 3 months. During these visits, the presence or absence of recurrent ear discharge was documented, wax accumulation was assessed through otoscopic examination and categorized as normal or excessive, and granulation tissue was graded as mild, moderate, or severe based on its extent. Additionally, the quality of life was assessed using the Chronic Ear Survey (CES), a validated questionnaire adapted to the local language and cultural context [8]. The CES scores were recorded at each follow-up to monitor changes over time.

### **Surgical Technique**

All patients underwent myringoplasty under local or general anesthesia based on clinical indications and patient preference. The procedure began with harvesting a temporalis fascia graft. The edges of the tympanic membrane perforation were meticulously freshened to promote graft adherence. An underlay technique was employed, where the graft was placed medial to the remnant tympanic membrane and secured in position. For the wet ear group, middle ear discharge was carefully suctioned and aural toileting was performed intra-operatively to ensure a dry operative field before graft placement. Post-operatively, the ear canal was packed with gel foam soaked in antibiotic drops, and systemic antibiotics and analgesics were prescribed as per institutional

protocol. Patients were advised to avoid water exposure to the operated ear until complete healing was confirmed.

### Statistical Analysis

Data were analyzed using SPSS software (version 25.0). Continuous variables such as age and CES scores were summarized as mean  $\pm$  standard deviation, while categorical variables such as the presence of recurrent discharge and granulation tissue were expressed as frequencies and percentages. Pre- and post-operative CES scores were compared using paired t-tests to evaluate changes in quality of life. Comparisons between the wet ear and dry ear groups for post-operative outcomes were made using independent t-tests for continuous variables and chi-square tests for categorical variables. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

The demographic and clinical characteristics of the Wet Ear and Dry Ear groups were similar. The mean age was  $45.53 \pm 15.67$  years for the Wet Ear group and  $46.67 \pm 15.29$  years for the Dry Ear group ( $p > 0.05$ ). Gender distribution showed no significant difference, with 33.33% males in the Wet Ear group and 40.00% in the Dry Ear group ( $p > 0.05$ ). Socioeconomic status, side of affected ear, and pre-operative PTA values also showed no significant differences between groups ( $p > 0.05$ ). [Table 1] The analysis of perforation characteristics showed no significant differences between the Wet Ear and Dry Ear groups. The size of the perforation was small in 26.67% of the Wet Ear group and 33.33% of the Dry Ear group ( $p > 0.05$ ). Large perforations were more common, with 73.33% in the Wet Ear group and 66.67% in the Dry Ear group. The location of the perforation was anterior in 53.33% of the Wet Ear group and 46.67% of the Dry Ear group ( $p > 0.05$ ), while posterior location was observed in 46.67% of the Wet Ear group and 53.33% of the Dry Ear group.

Graft material used was exclusively temporalis fascia in both groups (100%). [Table 2]

The outcomes observed between the Wet Ear and Dry Ear groups did not show significant differences. Recurrent discharge was seen in 13.33% of the Wet Ear group and 6.67% of the Dry Ear group ( $p > 0.05$ ). Excessive wax accumulation was reported in 20.00% of the Wet Ear group and 13.33% of the Dry Ear group ( $p > 0.05$ ), with normal wax levels in 80.00% and 86.67%, respectively. Granulation tissue formation was mild in 66.67% of the Wet Ear group and 73.33% of the Dry Ear group, moderate in 26.67% and 20.00%, and severe in 6.67% of both groups. The graft success rate was 93.30% in the Wet Ear group and 86.70% in the Dry Ear group ( $p > 0.05$ ). [Table 3]

The follow-up time points in the Chronic Ear Survey (CES) showed no significant differences between the Wet Ear and Dry Ear groups. The mean pre-operative follow-up was  $18.7 \pm 3.2$  days for the Wet Ear group and  $19.1 \pm 3.5$  days for the Dry Ear group ( $p > 0.05$ ). At 1-week post-operation, the mean values were  $20.5 \pm 2.8$  for the Wet Ear group and  $21.0 \pm 3.0$  for the Dry Ear group ( $p > 0.05$ ). One-month post-operation, the Wet Ear group had a mean of  $25.6 \pm 3.0$ , while the Dry Ear group had  $26.3 \pm 3.4$  ( $p > 0.05$ ). At 3 months post-operation, the mean scores were  $30.2 \pm 3.5$  for the Wet Ear group and  $31.1 \pm 3.7$  for the Dry Ear group ( $p > 0.05$ ). The overall p-values for follow-up time points were  $<0.001$ , indicating significant variation in CES scores between groups over time. [Table 4]

The analysis of odds ratios revealed no significant associations for the variables assessed. The odds of the outcome were 1.25 times higher for individuals with a dry ear condition compared to those with a wet ear condition (95% CI: 0.75–2.10), but this was not statistically significant ( $p > 0.05$ ). Similarly, individuals with a large perforation had 1.60 times higher odds of the outcome compared to those with a small perforation (95% CI: 0.90–2.80), which also did not reach statistical significance ( $p > 0.05$ ). [Table 5]

**Table 1: Baseline Demographic and Clinical Characteristics of Participants**

Variable	Wet Ear Group (n=15)	Dry Ear Group (n=15)	p-value
	Frequency (%) / mean $\pm$ SD		
Age (years)	$45.53 \pm 15.67$	$46.67 \pm 15.29$	$>0.05$
Gender			
Male	5 (33.33%)	6 (40.00%)	$>0.05$
Female	10 (66.67%)	9 (60.00%)	
Socioeconomic Status			
Lower	8 (53.33%)	9 (60.00%)	$>0.05$
Middle or upper	7 (46.67%)	6 (40.00%)	
Side of Affected Ear			
Right	7 (46.67%)	6 (40.00%)	$>0.05$
Left	8 (53.33%)	9 (60.00%)	
Pre-Operative PTA (dB)	$40.67 \pm 11.00$	$43.53 \pm 9.67$	$>0.05$

**Table 2: Intraoperative Findings of Participants**

Variable	Wet Ear Group (n=15)	Dry Ear Group (n=15)	p-value
	Frequency (%)		
Size of Perforation			
Small	4 (26.67%)	5 (33.33%)	$>0.05$

Large	11 (73.33%)	10 (66.67%)	
<b>Location of Perforation</b>			
Anterior	8 (53.33%)	7 (46.67%)	>0.05
Posterior	7 (46.67%)	8 (53.33%)	
<b>Graft Material Used (Temporalis Fascia)</b>	15 (100.00%)	15 (100.00%)	-

**Table 3: Post-Operative Outcomes at Follow-Up**

Outcome	Wet Ear Group (n=15)	Dry Ear Group (n=15)	p-value
	Frequency (%)		
<b>Recurrent Discharge</b>	2 (13.33%)	1 (6.67%)	>0.05
<b>Wax Accumulation</b>			
Excessive	3 (20.00%)	2 (13.33%)	>0.05
Normal	12 (80.00%)	13 (86.67%)	
<b>Granulation Tissue Formation</b>			
Mild	10 (66.67%)	11 (73.33%)	>0.05
Moderate	4 (26.67%)	3 (20.00%)	
Severe	1 (6.67%)	1 (6.67%)	
<b>Graft Take-Up (Success Rate)</b>	14 (93.30%)	13 (86.70%)	>0.05

**Table 4: Quality of Life (Chronic Ear Survey Scores) of Participants**

Follow-Up Time Point	Wet Ear Group (n=15)	Dry Ear Group (n=15)	p-value
	mean ± SD		
<b>Pre-Operative</b>	18.7 ± 3.2	19.1 ± 3.5	>0.05
<b>1 Week Post-Op</b>	20.5 ± 2.8	21.0 ± 3.0	>0.05
<b>1 Month Post-Op</b>	25.6 ± 3.0	26.3 ± 3.4	>0.05
<b>3 Months Post-Op</b>	30.2 ± 3.5	31.1 ± 3.7	>0.05
<b>p- value</b>	<0.001	<0.001	-

**Table 5: Factors Associated with Post-Operative Outcomes (Logistic Regression Analysis)**

Variable	Odds Ratio (95% CI)	p-value
<b>Middle Ear Condition (Dry vs Wet)</b>	1.25 (0.75–2.10)	>0.05
<b>Size of Perforation (Large vs Small)</b>	1.60 (0.90–2.80)	>0.05

## DISCUSSION

The current study aimed to evaluate the outcomes associated with the Wet Ear and Dry Ear groups, with particular emphasis on clinical characteristics, surgical outcomes, and quality of life metrics. The analysis did not reveal statistically significant differences in age, gender distribution, or pre-operative pure-tone audiometry (PTA) between the groups, which is consistent with findings from other studies examining perforated eardrum repairs.<sup>[9,10]</sup> For instance, a study by Li et al., highlighted that demographic factors such as age and gender did not significantly influence the success of tympanoplasty outcomes, suggesting that surgical outcomes are more dependent on pathological factors than patient demographics.<sup>[11]</sup>

In terms of middle ear conditions, the study found that the odds ratio for Dry vs. Wet ear conditions was 1.25 (95% CI: 0.75–2.10), indicating no significant risk difference. This aligns with similar findings by Mukara et al., who reported that while chronic ear conditions are thought to affect middle ear physiology, their impact on surgical outcomes may be overstated.<sup>[12]</sup> On the other hand, the odds ratio for perforation size was 1.60 (95% CI: 0.90–2.80), reinforcing the notion that larger perforations are potentially more challenging to repair, but not statistically significant in the context of success rates. This concurs with the research by Agrawal et al., who observed that large perforations often require more

advanced surgical techniques, yet these may not always correlate with a higher failure rate.<sup>[13]</sup>

Notably, the results from the CES (Chronic Ear Survey) indicated that there were no significant differences in quality of life between the Wet and Dry Ear groups across various follow-up points. The mean scores at pre-operative, 1-week, 1-month, and 3-month post-operative assessments did not differ significantly, reinforcing the idea that initial clinical conditions might not impact patient-reported outcomes as much as other variables like post-operative care and individual healing capacity.<sup>[14]</sup> A similar conclusion was drawn in a study by Batni et al., where quality of life outcomes were found to be more closely related to the presence of complications such as recurrent discharge or graft failure rather than the initial ear condition.<sup>[15]</sup>

However, the current study's findings on graft take-up rates (93.30% in the Wet Ear group and 86.70% in the Dry Ear group) are intriguing. Although the differences were not statistically significant, these figures suggest that wet ear conditions may not pose an inherently greater risk for graft failure, contrary to some earlier studies that showed a higher failure rate associated with chronic wet ear environments.<sup>[16,17]</sup> This could be attributed to advances in surgical techniques, such as the use of temporalis fascia grafts, which may mitigate adverse outcomes even in higher-risk patient groups.<sup>[18]</sup>

Statistically, the study observed an overall p-value for follow-up time points of <0.001, indicating significant variation in outcomes over time. This



aligns with existing literature that emphasizes the importance of long-term follow-up in evaluating surgical success and quality of life post-tympanoplasty.<sup>[19,20]</sup> The incremental improvements in CES scores from pre-operative to 3-month post-operative assessments imply that, regardless of initial conditions, surgery yields a positive impact on patients' perceived well-being and hearing-related quality of life.<sup>[21]</sup>

### Limitations

The limitations of this study include a relatively small sample size, which may limit the generalizability of the findings. Future studies with larger cohorts and multi-center data collection could provide more robust comparisons and better-powered statistical analyses. Additionally, it would be beneficial to further investigate potential confounding variables such as patient compliance with post-operative care and the presence of additional risk factors like recurrent infections or comorbidities.

## CONCLUSION

In conclusion, while there were no statistically significant differences between the Wet and Dry Ear groups in terms of demographic characteristics, perforation size, or graft success, the findings suggest that surgical outcomes and quality of life improvements post-tympanoplasty are achievable, irrespective of initial ear conditions. The results align with recent literature that highlights advancements in surgical practices and post-operative care as key determinants of successful outcomes.

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