PATENCY OF ADITUS AD ANTRUM IN CHRONIC OTITIS MEDIA MUCOSAL TYPE UNDERGOING TYMPANOPLASTY

Anuj Devkota,[1] Bishow Tulachan,[2] Anup Acharya,[3] Roshan Acharya[2]

ABSTRACT

INTRODUCTION

Chronic otitis media (COM) mucosal type is a prevalent condition characterized by chronic inflammation of the middle ear, often leading to persistent ear discharge and tympanic membrane perforation. This study aimed to evaluate the patency of the aditus ad antrum in patients undergoing tympanoplasty and assess various factors influencing its blockage. Understanding these factors will help optimize surgical outcomes and reduce the need for repeat procedures.

MATERIAL AND METHODS

A prospective observational study was conducted at the Universal College of Medical Sciences (UCMS), Bhairahawa, Nepal. Sixty patients with COM mucosal type undergoing tympanoplasty after optimal medical management were evaluated based on various factors. These factors included age, site and size of tympanic membrane perforation, duration of the disease, contralateral tympanic membrane status, middle ear mucosa status, and mastoid pneumatization. The patency of the aditus ad antrum was assessed intraoperatively, and data were collected using otoscopic examination and intraoperative findings. Statistical analysis was performed to identify associations between these variables and the blockage of the aditus ad antrum.

RESULTS

Sixty patients were enrolled in the study, comprising 44 males and 16 females, with a mean age of 43.82 years (range: 28-60 years). The average disease duration was 19.93 months (range: 8-60 months). Middle ear mucosa status showed 50% normal, 30.0% edematous, and 20.0% myringosclerosis. The patency status of the aditus ad antrum was not significantly associated with gender, disease duration, contralateral TM status, or mastoid pneumatization, with *p*-values of 0.243, 0.424, 0.084, and 0.273, respectively. A significant association was found with the middle ear mucosa status. These results indicate that middle ear mucosa status is a significant factor influencing aditus ad antrum patency ($p = 0.038$).

CONCLUSION

The findings suggest that the necessity of mastoidectomy in tympanoplasty for COM mucosal type should be based on specific middle ear mucosa findings, rather than being a standard procedure for all patients.

KEYWORDS

Aditus ad antrum, Patency, Dry tympanic membrane perforation, Otitis media

1. Department of ENT-Head and Neck Surgery, Institute of Medicine, Kathmandu, Nepal
2. Department of ENT-Head and Neck Surgery, Universal College of Medical Sciences, Bhairahawa, Nepal
3. Department of ENT-Head and Neck Surgery, Lumbini Medical College, Palpa, Nepal

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For Correspondence
Dr. Anuj Devkota
Department of ENT-Head and Neck Surgery
Institute of Medicine
Maharjgunj, Kathmandu, Nepal
Email: anujdevkota@gmail.com

INTRODUCTION

Chronic otitis media (COM) mucosal type is a common ear disease that describes prolonged infection of the middle ear and mastoid cavity causing frequent discharge from the perforated ear drum. This kind of COM involves an permanent perforation in tympanic membrane that may or may not be associated with an inflamed mucosa and purulent discharge.[1] These cases are managed surgically by tympanoplasty, after a period of medical management using oral antibiotics and ear drops to control mucopus and inflammation. However, if left untreated, disease within the mastoid antrum can cause incomplete treatment and suboptimal surgical outcomes.[2]

The middle ear cleft is made up of the middle ear space, mastoid air cells, and eustachian tube, all of which are connected both embryologically and functionally. This system helps buffer pressure changes in the middle ear by increasing its volume. Therefore, having an aerated mastoid can reduce the impact of significant pressure changes on the middle ear and eardrum.[3] There is an ongoing debate about whether mastoidectomy should be done to make the aerated mastoid along with tympanoplasty for treating COM mucosal type. Supporters of mastoidectomy in COM mucosal type believe that it improves mastoid aeration and ensures the patency of the aditus ad antrum.[4] However, opponents highlight the potential risks of mastoid surgery, such as damage to the incus, dura, sinus, or facial nerve, which might outweigh the benefits.[5]

This study aims to evaluate the patency of the aditus ad antrum in patients undergoing tympanoplasty for COM mucosal type and to identify the factors that contribute to its blockage. Variables such as age, the location and size of the tympanic membrane perforation, the duration of the disease, the condition of the other ear's tympanic membrane, the status of the middle ear mucosa, and the extent of mastoid pneumatization were analysed. Understanding these factors will help guide decisions about whether an mastoidectomy is needed during tympanoplasty, ultimately improving surgical outcomes and reducing complications.

MATERIAL AND METHODS

The current study was a hospital-based prospective observational study conducted at Universal College of Medical Sciences (UCMS), Bhairahawa, Nepal. The study was approved by the Institutional Review Committee with registration number UCMS/IRC/188/22 prior to commencement. Both verbal and written consents were obtained from all participants. Patients diagnosed with chronic otitis media (COM) mucosal type based on their medical history, symptoms, and otoscopic examination confirming tympanic membrane perforation were included in the study. Exclusion criteria comprised patients with previous middle ear surgeries, revision tympanoplasty cases, cholesteatoma cases and those who did not consent to participate.

Data were collected from 60 patients with COM mucosal type undergoing tympanoplasty at Universal College of Medical Sciences (UCMS) from December 2022 for a period of 12 months. An otoscopic examination was conducted to document the presence, size and location of the perforation. Patients scheduled for tympanoplasty typically had a waiting period of 1 to 3 months for surgery at UCMS. During this time, from their initial presentation until the day of surgery, all patients received optimal medical treatment, including ear drops containing betamethasone and neomycin and oral antibiotics. Patients were admitted for the operation. Even if there was minimal discharge and edematous mucosa in the middle ear, patients were still taken for tympanoplasty. Patients from remote areas often sought immediate surgery due to travel costs, limited healthcare access, economic pressure and fear of losing the early dates for surgery. On the day of the operation, patients were re-evaluated based on factors such as age, location and size of the tympanic membrane perforation, duration of the disease, status of the opposite tympanic membrane, condition of the middle ear mucosa, and mastoid pneumatization based on Xray findings. All patients underwent tympanoplasty using a postauricular approach. The relative size of tympanic membrane perforations was categorized into three groups: small perforation, involving less than one-fourth of the tympanic membrane; medium perforation, involving less than one-half of the tympanic membrane; and large perforation, involving more than one-half of the tympanic membrane. To assess the patency of the aditus ad antrum, an antrostomy was performed. A hole was drilled in McEwen's triangle, large enough for the largest burr to fit through, and drilling continued until the antrum was reached. Patency was confirmed by flushing the middle ear with normal saline and observing its free flow into the antrum, which moved freely during suction. If the saline flowed freely, drilling was stopped. If the aditus ad antrum was blocked, it was opened by removing any obstructing edematous mucosa or myringosclerosis and performing cortical mastoidectomy as required.

Data collection included age, sex, and other relevant clinical details, which were systematically recorded in preformed proformas. All data were entered into Microsoft Excel and analyzed using the Statistical Package for the Social Sciences (SPSS) version 27. Statistical significance was determined with appropriate tests, maintaining a significance level of $p < 0.05$.

RESULTS

Sixty patients were enrolled in the study, which included 44 male and 16 female patients. The mean age of the study population was 43.82 years, with a maximum age of 60 years and a minimum age of 28 years.

The average duration of the disease among patients was 19.93 months (SD 8.83), ranging from a minimum of 8 months to a maximum of 60 months. In terms of the size of perforation, 33.3% of the patients had small perforations, 35.0% had medium perforations, and 31.7% had large perforations. Regarding the middle ear mucosa status, 50% of patients had normal mucosa, 30.0% had edematous mucosa, 20.0% had myringosclerosis. Figure 1 shows that 'Patency Present' is more common in normal mucosa status, while 'Patency Absent' occurs more frequently in edematous and myringosclerosis status.

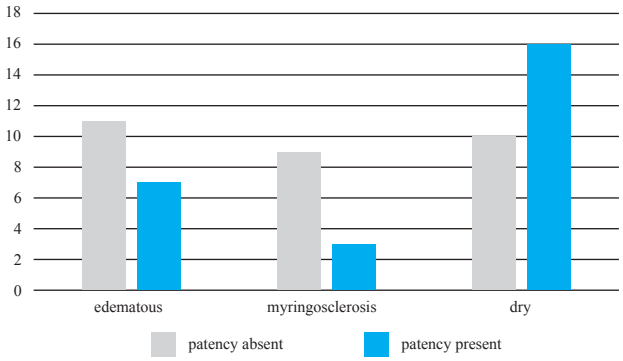

Figure 1. Number of patients with status of patency by middle ear mucosa status

In our study, the patency status of the aditus ad antrum showed no significant associations with gender, size of perforation, duration of disease, contralateral TM status, or mastoid pneumatization. Specifically, the chi-square tests indicated p-values of 0.243 for gender, 0.146 for size of perforation, 0.424 for duration of disease, 0.084 for contralateral TM status, and 0.273 for mastoid pneumatization in relation to patency status. However, the distribution of patency (0 = absent, 1 = present) in relation to edematous, myringosclerosis, and normal mucosa conditions, along with a Chi-Square analysis showing 3 degrees of freedom and a *p*-value of 0.038, indicates a significant relationship between patency status and the type of mucosa, as shown in table 1. This indicates that gender, size of perforation, and other ear conditions do not have a significant impact on the patency of the aditus ad antrum, except for the status of the middle ear mucosa.

Table 1. Association between patency of aditus ad antrum and middle ear mucosa status

Patency of Aditus ad Antrum	Edematous	Myringosclerosis	Normal	Total	Chi-Square Value	df	*p*-value
0 ('Patency absent')	11	9	10	30	Pearson	3	0.038
1('Patency present')	7	3	20	30	Chi-Square		
Total	18	12	30	60			

DISCUSSION

Tympanoplasty is a primary surgical intervention for chronic otitis media (COM) mucosal type. The potential benefits of combining tympanoplasty with mastoidectomy have been explored, particularly in high-risk scenarios such as revision surgeries and cases with persistent ear drainage. The rationale behind mastoidectomy lies in its potential to enhance the middle ear environment by removing diseased mucosa and improving ventilation through the mastoid system. The mastoid air cell system is believed to buffer changes in middle ear pressure, thereby stabilizing pressure fluctuations.[6]

Despite these theoretical advantages, the routine necessity of mastoidectomy in all tympanoplasty cases remains a topic of debate. Holmquist and Bergstrom suggested that mastoidectomy could improve outcomes in patients with poor Eustachian tube function or a contracted mastoid by enhancing aeration.[7] Conversely, studies by Balyan et al and others have indicated that routine mastoidectomy may not be essential for all patients undergoing tympanoplasty for chronic otitis media mucosal type.[8] Balyan et alrecommended reserving mastoidectomy for specific cases with congested, polypoidal, moist, or discharging ears. Their findings align with the observation that mastoid pneumatization does not significantly correlate with the patency of the aditus ad antrum, as supported by Sade's[9] work and our findings (*p*-value = 0.273). However, Ruhl and Pensak advocated for selective mastoidectomy, particularly in cases of failed tympanoplasty or when preoperative imaging reveals poor mastoid pneumatization or soft tissue in the mastoid or epitympanum.[10] Additionally, we observed no significant association between disease duration and aditus patency (*p*-value = 0.424), which contrasts with Mohammed Bhagat's findings.[11]

Identifying a blocked aditus ad antrum preoperatively can be challenging, as middle ear mucosal changes do not always correlate with aditus obstruction. Interestingly, our study found a significant correlation between middle ear mucosal status and aditus patency (*p*-value = 0.038), suggesting that specific pathological findings, such as edematous or myringosclerosis tissue, may serve as reliable indicators for aditus obstruction and guide the decision for mastoidectomy. Garg et al further stated that the identification and management of mucosal disease blocking aditus improves the outcome and reduces the need of revisions.[12] Ruchis et al also highlighted middle ear mucosal status is a more reliable predictor of aditus patency.[13] Lower revision rates have been observed in patients undergoing mastoidectomy in failed tympanoplasty cases as advocated by Ruhl and Pensak.[10] Based on our findings, if significant middle ear mucosal changes, such as edematous or myringosclerosis tissue, are present, it is advisable to evaluate the patency of the aditus ad antrum and consider mastoidectomy accordingly. This selective approach minimizes unnecessary surgical interventions and associated risks, aligning with recommendations to limit mastoidectomy to cases most likely to benefit.

CONCLUSION

Our study adds to the ongoing debate about whether mastoidectomy is always needed in tympanoplasty for chronic otits media mucosal type. We found that factors like gender, size of perforation, and duration of the disease do not significantly affect the patency of the aditus ad antrum. However, the presence of edematous or myringosclerosis tissue in the middle ear mucosa does significantly correlate with aditus patency. This suggests that the decision to perform mastoidectomy should be based specific middle ear mucosa findings rather than a standard procedure for every tympanoplasty cases for chronic otitis media mucosal type.

CONFLICT OF INTEREST

None

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