

Frequency and Factors Associated with Persistent Otorrhea Following Modified Radical Mastoidectomy for Cholesteatoma in Adult Patients: A Retrospective Study

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ABSTRACT

Background: Cholesteatoma is a destructive middle ear disease. Modified Radical Mastoidectomy (MRM) has proven to be a successful method for eradicating the disease however there is some concern about the continued otorrhea (ear drainage) following surgery, and studies have shown inconsistent results internationally, with few local studies. Therefore, this study aimed to determine the frequency and associated factors of postoperative otorrhea following MRM in patients with cholesteatoma.

Methods: This retrospective analytical observational study was carried out in ENT department of Akhtar Saeed Trust Hospital Lahore Pakistan from 1 July 2023 to 30 June 2024. A total of 109 patient records were reviewed and 16 were excluded due to previous ear surgery, intracranial complications, congenital cholesteatoma, incomplete records, and lack of follow-up. The Modified Radical Mastoidectomy operation was carried out on 93 adult (18-60 years) patients with cholesteatoma. Otoscopic examination and mucosalization, perforation of the tympanic membrane, high facial ridge, and meatal stenosis were evaluated at one month after surgery for signs of postoperative otorrhea. The data was analyzed using SPSS.

Results: Among 93 patients, postoperative otorrhea was observed in 47 (50.5%) patients. Meatal stenosis was the most frequent contributing factor observed in 20 (42.5%) patients, followed by mucosalization in 10 (21.3%), tympanic membrane perforation in 10 (21.3%), and high facial ridge in 7 (14.9%) patients. Duration of disease greater than one year showed a significant association with postoperative otorrhea ($p = 0.016$).

Conclusion: Modified Radical Mastoidectomy for cholesteatoma is associated with a significant incidence of postoperative otorrhea. There were significant associations between postoperative otorrhea and female sex and longer duration of disease, but not between mucosalization, perforation of the tympanic membrane, high facial ridge, or meatal stenosis.

Keywords: Cholesteatoma; Modified Radical Mastoidectomy; Otorrhea; Mastoidectomy; Surgical Outcomes.

INTRODUCTION

The prevalence of cholesteatoma is significant, with recent estimates from a global systematic review and meta-analysis putting the pooled prevalence at 4.02 per 1,000 population, and 3.30 per 1,000 in the South-East Asian region, where the disease is most prevalent and has had a significant impact in low- and middle-income countries.^{1,2}

In the international literature, the reported incidence of postoperative otorrhea varies from 5% to 25%, depending on the surgical technique, the length of follow-up and the presence or absence of mastoid obliteration.^{3,4} A more recent systematic review and meta-analysis also showed that canal wall down mastoidectomy including mastoid obliteration significantly reduced persistent postoperative otorrhea when compared to the conventional canal wall down surgery.⁵ The cause of postoperative otorrhea has been reported to be several factors related to the patient and his/her surgery, such as residual or recurrent disease, mucosalization, perforation of the tympanic membrane, inadequate meatoplasty, high facial ridge, meatal stenosis, and Eustachian tube dysfunction. But the association that has been reported is inconsistent in different studies, and the relative importance of these factors differs among different populations.⁶ However, this is common in the tertiary care hospitals of Pakistan because the disease is often delayed in presentation, recurrent chronic suppurative otitis media and inadequate access to specialist otology

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services leads to the disease being advanced at the time of surgery.⁷

The present study was conducted to determine the prevalence and associated factors of postoperative otorrhea following Modified Radical Mastoidectomy in patients with cholesteatoma because there is a scarcity of published local data on this issue, with the majority of the available studies focusing on the hearing results or disease recurrence rather than on the status of the postoperative cavity.

PATIENTS AND METHODS

A retrospective analytical observational study was carried out in ENT department of Akhtar Saeed Trust Hospital Lahore Pakistan 1 July 2023 to 30 June 2024 with approval from the Institutional Review Board (IRB) & Ethics Committee (E.C.) of Akhtar Saeed Trust Hospital, Lahore Pakistan. The informed consent was waived because the study was based on a medical record review. All data extracted from the patients were anonymized to ensure patient confidentiality.

The sample size of 93 patients was determined using OpenEpi software at 95% confidence level, 10% margin of error and an expected rate of postoperative otorrhea of 40%. All consecutive eligible patients who underwent primary Modified Radical Mastoidectomy (MRM) for acquired cholesteatoma between 1997 and 2007 were reviewed in the hospital records of all patients of ages 18–60 years. One hundred nine patient records were reviewed and 16 patients were excluded due to previous ear surgery, congenital cholesteatoma, intracranial complications, incomplete medical records or inadequate postoperative follow-up. A total of 93 patients were included in the final analysis. Patients with chronic OM related to acquired cholesteatoma requiring primary MRM were included, but those who had revision mastoid surgery, congenital cholesteatoma, intracranial complications, incomplete documentation, or who did not have all postoperative follow-ups were excluded.

Operative notes, inpatient records, outpatient follow-up charts and surgical registers were reviewed to extract data which were made use of on a standard data collection proforma. Collected variables were demographical data (age and sex), duration of disease, presence of otorrhea before surgery, and after surgery the findings of mucosalization, perforation of the tympanic membrane, high facial ridge, meatal stenosis and development of postoperative otorrhea. Ear discharge for more than 3 months prior to surgery was considered otorrhea during the pre-operative stage. All patients received a standard canal wall down Modified Radical Mastoidectomy by the consultant otolaryngologists following institutional protocols and were then followed in the outpatient department of ENT.

At follow-up, patients were examined otoscopically and using a microscope to evaluate the mastoid cavity and surgical result.

According to the standard criteria, mucosalization was diagnosed if the cavity in the mastoid was lined with persistent moist granulation tissue, perforation of the tympanic membrane was diagnosed if there was a persistent defect on otoscopic examination, high facial ridge was diagnosed if there was a residual bony ridge that made it difficult to drain the cavity or to allow ventilation, and meatal stenosis was diagnosed when the external auditory canal was narrowed which made it difficult to see or ventilate the mastoid cavity.⁸ The main outcome measured was the incidence of postoperative ear discharge (otorrhea) recorded at the first postoperative visit (one month after surgery). The patients were divided into two categories: postoperative otorrhea and no postoperative otorrhea and compared with each other.

The data entered and analyzed with IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). The data for quantitative variables were reported as mean $\pm$ standard deviation (SD), and the data for categorical variables were reported as frequencies and percentages. The associations between postoperative otorrhea and categorical variables were analyzed by a Chi-Square test or Fisher's exact test (where applicable). A p-value less than 0.05 was deemed statistically significant for both two-sided test.

RESULTS

A total of 93 patients were included in the study, comprising 61 (65.6%) males and 32 (34.4%) females. Mean age of the patients was 39.5 ± 8.4 years. Most patients belonged to the 31–45 years age group (41.9%). (Table 1).

Among the 93 patients included in the study, the majority had a disease duration of one year or longer ($n = 58$; 62.4%), while 35 (37.6%) had otorrhea for less than one year before surgery. Following modified radical mastoidectomy, persistent postoperative otorrhea was observed in 47 (50.5%) patients, whereas 46 (49.5%) achieved a dry mastoid cavity. Among patients with persistent postoperative otorrhea ($n = 47$), meatal stenosis was the most common postoperative finding, accounting for 20 (42.5%) cases. Mucosalization and tympanic membrane perforation were each identified in 10 (21.3%) patients, while a high facial ridge was the least frequent finding, occurring in 7 (14.9%) patients. (Table 2).

Patients with a disease duration of one year or longer had a significantly higher frequency of persistent postoperative otorrhea (35/58, 60.3%) compared with those whose disease duration was less than one year (12/35, 34.3%). Conversely, a dry mastoid cavity was achieved more frequently among patients with a disease duration of less than one year (65.7%) than among those with a longer disease

duration (39.7%). The association was statistically significant ($p = 0.016$), indicating that prolonged preoperative otorrhea is an important predictor of persistent postoperative ear discharge (Table 3).

Table 1. Demographic characteristics of patients (n = 93)

Characteristics	Frequency (%)
Gender	
Male	61 (65.6)
Female	32 (34.4)
Age group (years)	
18–30	22 (23.7)
31–45	39 (41.9)
>45	32 (34.4)
Mean age (years)	39.5 ± 8.4

Table 2. Clinical characteristics and postoperative findings (n = 93)

Characteristics	Frequency (%)
Duration of otorrhea	
<1 year	35 (37.6)
≥1 year	58 (62.4)
Postoperative outcome	
Persistent postoperative otorrhea	47 (50.5)
Dry mastoid cavity	46 (49.5)
Causes of persistent postoperative otorrhea (n = 47)	
Meatal stenosis	20 (42.5)
Mucosalization	10 (21.3)
Tympanic membrane perforation	10 (21.3)
High facial ridge	7 (14.9)

Table 3. Association between duration of otorrhea and persistent postoperative otorrhea following modified radical mastoidectomy (n = 93)

Duration of otorrhea	Persistent otorrhea n (%)	Dry cavity n (%)	Total	p-value
<1 year	12 (34.3)	23 (65.7)	35	0.016
≥1 year	35 (60.3)	23 (39.7)	58	

DISCUSSION

Persistent postoperative otorrhea remains a common complication following modified radical mastoidectomy and significantly affects patient satisfaction and surgical outcomes. In the present study, postoperative otorrhea was observed in 50.5% of patients, highlighting the importance of identifying associated risk factors.

Prolonged disease duration showed significant association with postoperative otorrhea. Patients with symptoms lasting more than one year were more likely to develop persistent discharge after surgery. Similar findings have been reported in previous studies emphasizing the role of chronic inflammation and delayed intervention in poor surgical outcomes.⁹

Meatal stenosis emerged as the most common contributing factor in the present study. Narrowing of the external auditory canal may impair aeration and self-cleaning of the mastoid cavity, thereby predisposing patients to recurrent infection and discharge.^{10,11} Previous literature

has also emphasized the importance of adequate meatoplasty during surgery to minimize cavity-related complications.^{11,12}

Mucosalization and tympanic membrane perforation were also frequently observed among patients with postoperative otorrhea. Residual mucosal disease may promote chronic inflammation and recurrent infection, whereas persistent tympanic membrane defects compromise middle ear ventilation. These findings are consistent with previously published studies^{13,14}

The present study also demonstrated an association between female gender and postoperative otorrhea, although the exact explanation remains unclear. No significant association was observed between postoperative otorrhea and socioeconomic status or age. The study was limited by its retrospective design, short follow-up duration, and single-center setting, which may affect generalizability of findings. Further multicenter prospective studies with long-term follow-up are recommended.

CONCLUSION

Persistent otorrhea following Modified Radical Mastoidectomy is a multifactorial complication commonly associated with prolonged disease duration, meatal stenosis, mucosalization, tympanic membrane perforation, and high facial ridge. Early surgical intervention, meticulous operative technique, and appropriate postoperative care may improve long-term surgical outcomes in patients with cholesteatoma.

Author Contributions

SR: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft.

MA: Methodology, Investigation, Data curation.

HH: Investigation, Data curation, Validation.

ARA: Formal analysis, Validation, Writing – review & editing.

AHS: Investigation, Resources, Data curation.

WZ: Formal analysis, Visualization, Writing – review & editing.

ZIB: Conceptualization, Supervision, Project administration, Writing – review & editing.

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