

Complications of Mastoid Surgery: A Descriptive Study from a Tertiary Care Centre, Assam, India

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ABSTRACT

Introduction: Mastoidectomy is a surgical procedure that removes infection, along with cholesteatoma, from the mastoid and middle ear. Cholesteatoma, a progressive disease that erodes bone when left untreated, leads to complications.

Aim: To ascertain the most common mastoidectomy-related intraoperative and postoperative complications.

Materials and Methods: This study was a retrospective descriptive study of patients who underwent mastoidectomy over one year at a tertiary care hospital in Assam, India between April 2022 to March 2023. All the patients planned for mastoidectomy were evaluated for intraoperative complications like facial nerve injury or postoperative complications immediately after the postoperative period (e.g., wound dehiscence) or between 1-3 months (e.g., Sensorineural Hearing Loss (SNHL), dead ear, etc.). The data collected was tabulated in a Microsoft Excel Worksheet, and the categorical variables were summarised as proportions and percentages.

Results: A total of 62 patients underwent mastoidectomy and were reviewed over the one-year period retrospectively. Out

of these, 28 (45.16%) developed complications. Two out of 62 patients (3.2%) experienced facial nerve injury intraoperatively. One patient (1.6%) with a high jugular bulb experienced massive bleeding intraoperatively while raising the tympanomeatal flap. Labyrinthine injury, dural plate injury, and sigmoid sinus injury were each found in one patient (1.6%). Eight out of 62 patients (12.9%) developed persistent otorrhea. Additionally, five patients (8%) had wound dehiscence and were treated with antibacterials, antiseptic dressing, and secondary suturing when needed. Two patients (3.2%) experienced SNHL; preoperatively, they had mild conductive hearing loss which postoperatively converted to mild to moderate mixed hearing loss. Postoperative dead ear was observed in one patient (1.6%). There was one patient (1.6%) with an unfavourably displaced pinna, and two patients (3.2%) had recurrent cholesteatoma. Vertigo was seen in two cases of radical mastoidectomy and one case of modified radical mastoidectomy.

Conclusion: With proper planning and sound surgical techniques, avoidance of mastoidectomy complications can be achieved.

Keywords: Cholesteatoma, Mastoidectomy, Otorrhea, Wound dehiscence

INTRODUCTION

The two main goals of surgery for cholesteatoma and Chronic Suppurative Otitis Media (CSOM) are to preserve or improve hearing and to eradicate the disease to create a dry, stable, and safe ear. Total removal of the disease has traditionally been achieved by radical surgery, which facilitates good visualisation and surgical access to all parts of the middle ear and mastoid air cell system [1]. Meatoplasty is an essential part of traditional Canal Wall Down Mastoidectomy (CWDM). However, a typical issue with conventional CWDM treatments in conjunction with meatoplasty is the possibility of changing the middle ear and mastoid anatomy and physiology, which could result in recurrent mastoid cavity problems such as a draining ear followed by the accumulation of keratin debris [2].

Using the posterior to anterior technique, a modified radical mastoidectomy was the conventional way to remove cholesteatomas. Usually, this leaves a large cavity behind. Large cavities may cause problems: many do not self-clean, and even if they are well epithelialised, they still discharge, therefore frequent clinic visits are necessary to remove wax and squamous debris from the cavity. The anterior to posterior technique is known as small cavity mastoidectomy or atticostomy, which is gaining in popularity [3]. Because canal wall-down surgery has lower rates of cholesteatoma recurrence (5-15%), second-look operations are rarely necessary, and recurrences can usually be identified in the outpatient clinic with ease. After mastoid surgery, a significant portion of individuals (20-25%) continues to have sporadic or persistent otorrhea [3].

The benefit of canal wall-up mastoidectomy (Combined Approach Tympanoplasty-CAT) is that there is no mastoid cavity, and it leaves the external auditory canal intact. However, because recurring and persistent cholesteatomas are common (20-50%), most individuals require second-look procedures after 12-18 months [3].

This study aimed to ascertain the most common mastoidectomy-related intraoperative and postoperative complications in a Tertiary Care Hospital.

MATERIALS AND METHODS

This was a hospital-based retrospective descriptive study conducted in the Department of Ear, Nose and Throat (ENT) Assam Medical College and Hospital, Dibrugarh, Assam, India from April 2022 to March 2023. Data analysis was done in April and May 2023. Institutional Ethics Committee (No. 2023/AMC/EC/11066) approval was obtained.

Inclusion criteria:

- 1) Cases of squamous chronic otitis media.
- 2) Cases of mucosal chronic otitis media with mastoiditis where a dry ear could not be achieved in three months.

Exclusion criteria:

- 1) Patients who did not give consent for the surgery.
- 2) Chronic otitis media patients with intracranial complications.

All the patients with CSOM who attended the Department of ENT, Assam Medical College and Hospital during the study period form

the sample size. A total of 62 patients met the inclusion criteria and were included in the study.

Study Procedure

Patient information regarding age and sex was recorded. Detailed history, general examination, systemic examination, required blood investigations, otoscopic examination, audiometry, and radiological investigations like X-ray mastoid, High Resolution Computed Tomography (HRCT) temporomastoid were recorded, where necessary. All patients underwent mastoidectomy and were evaluated for intraoperative complications like facial nerve injury or postoperative complications immediately after the postoperative period (e.g., wound dehiscence) or between 1-3 months (e.g., SNHL, dead ear).

STATISTICAL ANALYSIS

The collected data was tabulated in a Microsoft Excel worksheet, and computer-based analysis was performed using Microsoft Excel 2010. The categorical variables were summarised as proportions and percentages.

RESULTS

There were three children under the age of 10 years. A total of 17 patients were between 11 to 20 years old and had undergone the mastoid operation [Table/Fig-1]. There were 29 (46.8%) female patients and 33 (53.2%) male patients who underwent mastoid surgery. Distribution of mucosal and squamosal is shown in [Table/Fig-2].

The distribution of squamous type chronic otitis media and mucosal type chronic otitis media shown in [Table/Fig-3].

| Age (years) | n (%) |
|-------------|-----------|
| 0-10 | 3 (4.8) |
| 11-20 | 17 (27.4) |
| 21-30 | 21 (33.9) |
| 31-40 | 11 (17.8) |
| 41-50 | 7 (11.3) |
| 51-60 | 3 (4.8) |
| >60 | 0 |

[Table/Fig-1]: Age distribution of the patients.

| Type of disease | n (%) |
|-------------------------------------|-----------|
| Mucosal type chronic otitis media | 15 (24.2) |
| Squamosal type chronic otitis media | 47 (75.8) |

[Table/Fig-2]: Type of disease.

| Type of mastoid surgery | n (%) | |
|--|---------------------------------------|-----------|
| Canal Wall Down Mastoidectomy (CWDM) | Modified radical mastoidectomy (MRM) | 37 (59.7) |
| | Radical mastoidectomy | 8 (12.9) |
| Intact Canal Wall Mastoidectomy (ICWM) | Combined Approach Tympanoplasty (CAT) | 2 (3.2) |
| | Cortical mastoidectomy | 15 (24.2) |

[Table/Fig-3]: Type of mastoid surgery.

Two out of 62 patients (3.2%) experienced facial nerve injury intraoperatively. Out of these, horizontal segment (tympanic) injury was found in one case, which was due to facial nerve dehiscence. This traumatic facial nerve injury was immediately managed with a high dose of systemic steroids followed by oral steroids. Facial nerve recovery was achieved within three months. The other patient had postoperative taste disturbance (metallic taste) due to injury to the chorda tympani nerve. One patient (1.6%) with a high jugular bulb experienced massive bleeding intraoperatively while raising the tympanomeatal flap.

Haemorrhage control was achieved through suction, applying gelfoam, adrenaline pack, and surgical. After the haemorrhage subsided, a temporalis fascia graft was placed. Labyrinthine injury, dural plate injury, and sigmoid sinus injury were found in one patient (1.6%) each. Each labyrinthine injury was in extensive cholesteatoma, and the sigmoid sinus injury was due to its anteposed location [Table/Fig-4].

| Intraoperative complications | n (%) |
|--|---------|
| Facial nerve injury | 2 (3.2) |
| High jugular bulb injury with bleeding | 1 (1.6) |
| Labyrinthine injury | 1 (1.6) |
| Dural plate injury | 1 (1.6) |
| Sigmoid sinus injury | 1 (1.6) |

[Table/Fig-4]: Intraoperative complications.

A total of eight out of 62 patients (12.9%) developed persistent otorrhea. Five out of 37 patients who underwent modified radical mastoidectomy had persistent otorrhea. In four cases, Examination Under Microscope (EUM) showed granulation tissue, and in one case, EUM showed granulation tissue with residual cholesteatoma. Three out of eight cases who underwent radical mastoidectomy had persistent otorrhea, and EUM showed granulation tissue. All these postoperative otorrhea cases were treated with diluted acetic acid, antibiotic-steroid ear drops, and repeated suction clearance. Another five patients (8%) had wound dehiscence and were treated with antibacterials, antiseptic dressing, and secondary suturing when needed. Two patients (3.2%) experienced sudden SNHL; preoperatively, they had mild conductive hearing loss, which postoperatively converted to mild to moderate mixed hearing loss. Postoperative dead ear was seen in one patient (1.6%). There was one patient (1.6%) with an unfavourably displaced pinna, and two patients (3.2%) had recurrent cholesteatoma on subsequent CT scans, seen after eight and nine months of surgery [Table/Fig-5].

| Postoperative complications | n (%) |
|--|----------|
| Persistent otorrhea (after three months) | 8 (12.9) |
| Wound dehiscence | 5 (8) |
| Vertigo | 3 (4.8) |
| Recurrent cholesteatoma | 2 (3.2) |
| Sensorineural Hearing Loss (SNHL) | 2 (3.2) |
| Dead ear | 1 (1.6) |
| Unfavourably displaced pinna | 1 (1.6) |

[Table/Fig-5]: Postoperative complications.

DISCUSSION

The greatest proportion of patients in this study was in the age group of 21-30 years (33.9%). It can be compared to a previous study by Varshney S et al., where the most commonly affected age group was between 16-25 years [4]. Kim MB et al., found the mean age to be 40.1 years (range, 6 to 66 years) in their study [5]. In another study by Saleem MW et al., the mean age was 39.95±12.57 years [6]. Saraf A et al., found the mean age to be 21-30 years (56%) in their study [7]. Shrestha IB et al., in their study, found a mean age of 9.32±5.33 years (one to 18 years) [8]. In present study, male to female ratio was 33:29, comparable to a previous study by Varshney S et al., where male to female ratio was 72:78 [4]. In a previous study by Kim MB et al., 97 patients were males, and 74 patients were females [5]. In another study by Saleem MW et al., the male to female ratio was 42:23 [6]. In a previous study by Saraf A et al., 17 patients (68%) were males, and eight patients (32%) were females [7]. Shrestha IB et al., in their study, found the male to female ratio to be 1.6:1 [8]. In a

previous study by Bhat SM and Vuppala R, 27 patients (54%) were male and 23 patients (46%) were females [9].

In present study, vertigo was seen in three patients (4.8%). In a study by Alam M and Chandra K, vomiting and vertigo were seen in nine patients (9%) [10]. A previous study by Kos MI et al., found that four patients (1.5%) complained of persistent vertigo [11]. Another study by Saleem MW et al., showed vertigo in three patients (15%) [6]. In a study by Saraf A et al., one patient (11%) had postoperative persistent vertigo [8]. Bhat SM et al., found postoperative vertigo in two patients (4%) [9].

Following mastoidectomy in present study, two patients (3.2%) had facial nerve injury. In a study by Alam M and Chandra K, three patients (3%) had postoperative facial nerve paralysis following tympano-mastoidectomy [10]. Migirov L et al., reported vertigo, tinnitus, and facial nerve paralysis in 1.7-4% of patients following mastoidectomy [12]. Kos MI et al., found one case of facial paralysis (0.3%) [11]. Walker PC et al., reported facial nerve injury in four patients (1.4%) following mastoidectomy [13]. Saleem MW et al., noted facial palsy in five patients (20%) [6]. Syms MJ and Luxford WM, found that six patients (1.2%) had exposure to the facial nerve but no facial paresis [14]. Garap JP and Dubey SP observed facial nerve paralysis in eight patients (9.8%) [15]. Bhat SM and Vuppala R reported facial nerve palsy after surgery in three patients (6%) [9].

In present study, postoperative otorrhea was observed in eight patients (12.9%). This finding was consistent with a study by Migirov L et al., where taste disturbances along with postoperative discharging ear were seen in 1.7-59% of patients [12]. Migirov L et al., also reported postoperative discharging ear in two patients (7.4%) [16]. Saleem MW et al., documented postoperative discharging ear in 19 patients (95%) [6]. Abdullah AB et al., found postoperative persistent otorrhea in 19% of cases in their study [17]. Saraf A et al., observed postoperative persistent otorrhea in eight patients (88%) in their study [8]. Bhat SM et al., found postoperative persistent discharge in one patient (2%) [9].

In present study, two patients (3.2%) had recurrent cholesteatoma following mastoidectomy. Migirov L et al., concluded that 5-66% of patients had post-mastoidectomy recurrent cholesteatoma [12]. In a previous study by Migirov L et al., recurrent cholesteatoma was observed in one patient (3.7%) [16]. Kos MI et al., found recurrent cholesteatoma in 6.1% of their cases [11]. Abdullah AB et al., discovered recurrent cholesteatoma in 3% of their cases [17]. In present study, none of the patients had mastoid cutaneous or mastoid canal fistula. Migirov L et al., found that 7-23% of patients had a retroauricular defect or fistula, stenosis, or atresia of an external auditory canal [12]. A similar observation was made by Syms MJ and Luxford WM, where none of the patients had a postoperative mastoid canal fistula [14]. In present study, two patients (3.2%) had SNHL. Kos MI et al., found that SNHL of more than 60 dB at all frequencies occurred immediately after the operation in two cases (0.7%) [11]. Another study by Migirov L et al., showed postoperative deafness in two patients (7.4%) [16]. In a previous study by Walker PC et al., one patient (0.4%) developed profound SNHL postoperatively [13]. Saraf A et al., found that three patients (33%) had a complaint of hearing impairment [8]. In present study, five cases (8%) experienced wound dehiscence. A similar observation was made by Saleem MW et al., and they found it in 10% of their patients [6]. In present study, in one case (1.6%), intraoperative dural plate injury was observed. In a previous study conducted by Syms MJ and Luxford WM, 27 patients (5.6%) encountered dural plate exposure intraoperatively [14].

In present study, none of the patients had a Cerebrospinal Fluid (CSF) leak following mastoidectomy. However, a previous study by Walker PC et al., showed that 14 patients (4.9%) had CSF leaks following mastoidectomy [13]. In present study, none of the patients presented with postoperative otomycosis. However, a previous study by Bhat MS and Vuppala R showed that two patients (4%) had postoperative otomycosis [9]. After tympanomastoid surgeries, there appears to have been a lower chance of serious iatrogenic problems due to the invention of the surgical microscope, otologic drill, and, more recently, facial nerve monitoring systems. However, these issues could have a significant effect on patients' social lives as well as medicolegal matters [18].

Limitation(s)

A retrospective hospital-based study was the inherent limitation. This study did not compare the complications in different types of mastoidectomies like CWDM or Canal Wall Up Mastoidectomy (CWUM).

CONCLUSION(S)

Mastoidectomy provides excellent intraoperative exposure of the middle ear and mastoid and reduces the incidence of recurrent disease. All patients, regardless of whether they have cholesteatomas or not, should undergo a single procedure.

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