

Analysis of Modified Radical Mastoidectomies Cavity Results in a Tertiary Care Hospital

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ABSTRACT

Background: Discharging Modified Radical Mastoidectomy cavity is a troublesome and frustrating problem both for the operating surgeon and patient. Etiology of discharging MRM cavity is multifactorial. Knowing and addressing the etiological factors at the time of surgery is important to provide dry and safe ear to the patient.

Objective: To evaluate the post-operative status of mastoid cavity after modified radical mastoidectomy.

Material and Methods: This prospective Cross sectional study was conducted among 450 patients who came for open mastoidectomies in ENT Department, Saidu Group of Teaching Hospitals, Saidu Sharif Swat, Khyber Pakhtunkhwa, Pakistan. The study duration was from January 16, 2012 to December 09, 2019. Patients were postoperatively followed according to protocol and evaluated for residual cholesteatoma and post mastoidectomy cavity status. The evaluation was conducted with endoscope and microscope. Data was obtained on pro-forma and SPSS 22 was used for analysis.

Results: Out of 450 patients 109 (24.3%) were having recurrent persistent discharging mastoid cavities and 341 (75.7%) were having dry mastoid cavity. Multiple factors contributed to be the cause of discharging mastoid cavity with high facial ridge (89.9%) being the most common. More than one etiological factor in individual patients were also identified to be the cause for wet mastoid cavities.

Conclusion: We concluded that complete exenteration of cholesteatoma with lowered facial ridge, adequate meatoplasty and regular follow up is necessary to avoid post-operative mastoid cavity problems.

Key words: Modified Radical Mastoidectomy, Mastoid Cavity, Cholesteatoma.

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INTRODUCTION

Chronic Supportive Otitis Media (CSOM) is a distinct disease entity in ENT practice. CSOM is classified into mucosal, squamosal and healed types. Squamosal type is either associated with Cholesteatoma or granulation and complications are more common with granulation.¹

Middle ear cholesteatoma is defined pathologically as the abnormal existence of keratinized squamous epithelium in the middle ear cavity, leading to bone destruction of middle ear structures and their surroundings.¹ Modified radical mastoidectomy (MRM) is a well-known surgical technique for the management of chronic active squamosal otitis media or cholesteatoma.¹ The main aim of MRM surgery is complete removal of disease; to reduce the risk of recurrence and to make the ear dry, safe and self-cleaning.¹

Modified radical mastoidectomy (MRM) permits tremendous visualization of disease with proportionally good chance of complete removal.²

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The mastoid and middle ear can be readily inspected in the follow up period in the outpatient setting and second look surgery is usually not required.²

On the other hand, in CWD some disadvantages may be present. The most common limitations are accumulation of keratin debris and need for frequent cleaning, higher susceptibility to infection with water exposure, risk of sudden dizziness associated with change of temperature in the external auditory canal and hearing aid discomfort.³

After modified radical mastoidectomy, large mastoid cavities are created which continue to discharge for long time and is quite troublesome for both the patient and operating surgeon. Different international studies have reported 26 to 32% discharging cavities while in local studies the range is 20 to 24%. Similar different causes have been described in the literature which contribute to problems arising from modified radical mastoidectomy.^{4,5}

Due to lacunae in the local literature, this study was carried out with the rationale to generate knowledge in our local population regarding post MRM mastoid cavities specifically in terms of cholesteatoma eradication, factors contributing to cholesteatoma recurrence and with emphasis on

discharge from operated mastoid cavity. This study will help to increase the level of understanding of local otorhinolaryngologists and will enable them to manage patients with chronic active squamous otitis media more efficiently.

MATERIAL AND METHODS

The present study entitled as,analysis of Modified Radical Mastoidectomies (MRM) cavity results in a tertiary care hospital” was a prospective cross sectional study which was conducted in the Department of ENT Saidu Teaching Hospitals Saidu Sharif Swat. The study duration was from January 16, 2012 to December 09, 2019.

The study was approved by hospital ethical committee. Study subjects included patients admitted in the ENT department during the study period with cholesteatoma who were surgically treated with modified radical Mastoidectomy¹ which is a single stage procedure with open cavity in which the posterior canal wall is drilled down to the level of facial canal, so that the floor of the mastoid cavity becomes continuous with the floor of external auditory canal. Hence a common cavity is created from the three namely mastoid cavity, epitymapnum and external auditory canal.¹ Patients of either gender having age 5 to 65 years with clinically and radiologically confirmed cholesteatoma were included in the study. Clinically cholesteatoma was defined as purulent otorrhea, tympanic membrane perforation, and/or hearing loss with collection of keratinized squamous epithelium trapped within the middle ear seen by otoscopy and microscopy.¹⁶

Radiologically cholesteatoma was confirmed on HRCT as a non-dependent or completely opacifying polypoidal soft tissue densities in the middle ear cavity and antrum with associated expansion, smooth erosion of the walls, blunted or eroded scutum tip and ossicular erosions.^{14,15} Patients with preexisting intracranial complications and those lost to follow up postoperatively or not willing to be included in the study were excluded. Informed written consent was taken from all the included patients with focus on disease, its management, need of follow up and purpose of the study.

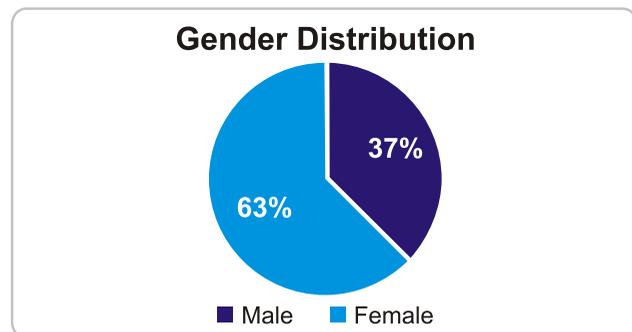
Preoperatively a detailed history with focus on ear discharge, clinical examination including otoscopy, examination under microscope and high resolution CT scan was obtained to confirm the findings. In all patients baseline investigations

before surgery were done along with assessment for general anesthesia. All surgeries were performed by ENT consultants qualified from College of Physician and Surgeons of Pakistan having additional experience in otological surgeries.

Postoperatively the patients were followed and ears were inspected after wound healing initially at six weeks and later after interval of 3, 6 and 12 months. The patients were assessed by otoendoscopy with 4mm rigid 0° and 30° Hopkin rods and microscopy. A special attention was made to asses the mastoid cavity for discharge, debris and persistence of disease i.e cholesteatoma. The data was collected on a pre-structured pro-forma. SPSS version 22 was used for data analysis. Mean ±SD was calculated for numerical variables like age. Frequencies and percentages were calculated for categorical variables like gender, discharge and recurrence.

RESULTS

The study sample comprised of 450 patients. One Hundred and sixty six (37%) were male and 284 (63%) were female as shown in pie chart below.



Age ranged between 5 and 65 years (Mean 26± 8). The youngest patient was 5 years and the oldest patient was 65 years with female predominance. The male to female ratio was 1 to 1.5. Most of the patients had unilateral disease. 10 % had bilateral disease. Right ear was involved in 68% and left ear in 32%. Out of 450 patients recurrent disease was seen in 109 (24.3%) and 341 (75.7%) were having dry mastoid cavity as shown in Table No 1.

Table No.1

Postoperative mastoid cavity status		N=450
Recurrent/Residual Disease	109	24.3%
Dry Cavity	341	75.7%

Multiple factors were identified to be the cause of discharging mastoid cavities. High facial ridge (89.9%) remained the most common factor. Other factors are outlined in Table No 2.

Table No.2

Anatomical factors contributing to recurrence and post mastoid cavity discharge		
Anatomical Factor	No	%
High Facial Ridge	98	89.9%
Inadequate Meatoplasty	78	71.5%
Residual Cholesteatoma	32	28.3%

Site of cholesteatoma was also analyzed and sinus tympani was the most frequent site of cholesteatoma recurrence.

DISCUSSION

Canal Wall down mastoidectomy in the form of modified radical mastoidectomy is the favored surgical method for chronic supportive otitis media which allows a better exposure and eradication of disease¹³. Although this is a well-established technique but the procedure have pitfalls in the form of discharging mastoid cavity which is a troublesome not only for the patient but also for the surgeon to manage these difficult mastoid cavities⁸.

The results of this study demonstrated that the frequency of discharging cavities was 24.3%, as 109 patients out of 450 were having post-operative mastoid cavity problems. This finding is almost similar to the study carried out by Kos et al⁴ who reported 30% cavity problems and another local study by Khan et al⁵ who evaluated the mastoid cavities after canal wall down mastoidectomy by studying 50 patients and confirmed that the incidence of cavity problem is 26.6%. Cavity problem was found primarily in the 21-30 years age group, a finding more consistent with the study of Vartanen⁶, while Rajan D et al.⁷ in their study had shown maximum incidence in the age group of 31 to 40 years followed by 11-20 years.

In our study further analysis was carried out to explore the factors which contributed to the discharging cavity and we found that 89.9% (98 out of 109) of our patients had inadequate exteriorization of MRM cavity due to high facial ridge. Kasenom⁸ reported 98% incidence of high

facial ridge as a cause of discharging mastoid cavity. Similarly Ayubi et al⁹ and Praven⁸ had reported a high facial ridge in 69.23% and 48.78% respectively. High facial ridge is an obstacle which hinders the self cleansing action resulting in accumulation of debris leading to discharge from the mastoid cavity. Fear of the injury to facial nerve is one of the most important factor and surgeons are hesitant to lower the ridge sufficiently. To overcome this problem a basic understanding of temporal bone anatomy and careful drilling and dissection is required to lower the facial ridge up to the level of vertical segment of the facial nerve but care be taken to avoid injury to the facial nerve. In our study 71.5% patients had a narrow meatal opening due to inadequate meatoplasty resulted in a post-operative discharging mastoid cavity. Contrary to our findings 20 % had been reported in an international study carried out at Al Najaf teaching Hospital Qatar.¹⁰ A similar findings in other series had reported 69 % and 57 %.^{8,9} Inadequate meatoplasty results in a small external auditory meatus which on one hand leads to poor aeration of the mastoid cavity and debris accumulation while on the other hand make it difficult for the surgeon to clean the mastoid cavity by suction at the post-operative follow up visits. This contributes to the wet cavity after mastoidectomy. To address this problem and to minimize the meatal stenosis the surgeon must create a wide meatal opening with excision of cartilage from the concha for better postoperative ventilation and care.

A considerable percentage of patients ie 28.3% had incomplete clearance in this study. This persistent/residual cholesteatoma had been mentioned as one of the important factor for post-operative mastoid cavity discharge in a study conducted at Department of Otolaryngology Ipswich hospital trust UK.¹¹ Similarly Ayubi et al⁹ in 2014 had reported residual cholesteatoma in their studies as 86.6% contrary to a low incidence of 53.9% reported by Praven et al⁸ and 37% by Pressutt et al¹². Further we also explored the site of residual cholesteatoma and found that sinus tympani followed by retro facial area and tip of mastoid to be the most common site of residual cholesteatoma. In 25% residual cholesteatoma was present in more than one site. Differing from our study Abdullah¹³ in his study found tip cells (72%) to be the most common site for cholesteatoma. Furthermore we noted multiple causes in a single patient which contributed to recurrent and residual disease.

CONCLUSION

We concluded that modified radical mastoidectomy is an optimum surgery for cholesteatoma. Discharging mastoid cavity as a potential problem of this procedure with multiple etiologies can be addressed by removal of disease from the difficult areas like sinus tympani and tip cells through careful dissection so that the facial bridge is lowered and adequate meatoplasty is carried out to prevent accumulation of debris which leads to post-operative mastoid cavity discharge.

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AUTHOR'S CONTRIBUTION

The following authors full fill authorship criteria as per ICMJE guidelines;

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|------------------------------|---|
| Ihsanullah, Khan N: | Idea conception, drafting the work, final approval, agreed to be accountable for all the work. |
| Khan SA, Usman M: | Design of the work, data acquisition, critical revision, final approval, agreed to be accountable for all the work. |
| Inayatullah, Iqbal M: | Data analysis, drafting of the work, final approval, agreed to be accountable for all the work. |
| Hussain A: | Data interpretation, critical revision, final approval, agreed to be accountable for all the work. |