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POSTOPERATIVE OUTCOMES OF MASTOID CAVITY OBLITERATION USING POSTAURICULAR COMPOSITE BONE WITH PERIOSTEUM FLAP FOLLOWING CANAL WALL DOWN MASTOIDECTOMY

Otorhinolaryngology

Dr Ameya Nazar* Junior Resident, GMCH, Nagpur, Maharashtra, 440003*Corresponding Author
Seema Patel Associate Prof), Dept of ENT, GMCH Nagpur
Devendra Mahore Prof & Head), Dept of ENT, GMCH Nagpur,
Ashish Keche Assistant prof), Dept of ENT, GMCH Nagpur

ABSTRACT

Background: Canal wall down (CWD) mastoidectomy remains a reliable surgical technique for eradicating cholesteatoma in chronic suppurative otitis media (CSOM). However, the resulting open mastoid cavity is frequently associated with long-term morbidity such as persistent otorrhea, debris accumulation, vertigo, and difficulty in hearing aid use. Mastoid cavity obliteration has been advocated to overcome these drawbacks and improve postoperative outcomes. Objectives: To evaluate the surgical and hearing outcomes of mastoid cavity obliteration using a postauricular composite bone with periosteum flap following CWD mastoidectomy in patients with CSOM. Materials and Methods: This prospective study included patients with atticoantral type CSOM undergoing CWD mastoidectomy with mastoid cavity obliteration using a postauricular composite bone–periosteum flap. Patients were followed up clinically and audiologically. Surgical outcomes were assessed based on cavity status, epithelialization, presence of otorrhea, and complications. Hearing outcomes were evaluated using pure tone audiometry. Results:Most patients achieved a well-epithelialized, dry, and self-cleaning mastoid cavity. A significant reduction in postoperative cavity-related problems was observed. Audiological assessment demonstrated improvement in air-bone gap in a substantial proportion of patients.**Conclusion:**Mastoid cavity obliteration using a postauricular composite bone with periosteum flap following CWD mastoidectomy is an effective technique that reduces cavity-related morbidity while providing satisfactory hearing outcomes.

KEYWORDS

Chronic Suppurative Otitis Media; Cholesteatoma; Canal Wall Down Mastoidectomy; Mastoid Cavity Obliteration; Postauricular Periosteum Flap; Hearing Outcome.

INTRODUCTION

Chronic suppurative otitis media (CSOM) with cholesteatoma is a destructive inflammatory disease of the middle ear cleft characterized by progressive bone erosion and a high risk of extracranial and intracranial complications.[1] [2] Surgical management remains the cornerstone of treatment, with canal wall down (CWD) mastoidectomy providing reliable and complete disease eradication, particularly in extensive or recurrent cholesteatoma.[3] Despite its effectiveness, the creation of an open mastoid cavity is frequently associated with long-term morbidity, including persistent otorrhea, accumulation of epithelial debris, water intolerance, caloric-induced vertigo, and difficulty in hearing aid rehabilitation, adversely affecting quality of life.[4] [5] Mastoid cavity obliteration has been advocated to mitigate these problems by reducing cavity size, enhancing epithelialization, restoring external auditory canal anatomy, and improving postoperative comfort while maintaining effective disease control and satisfactory hearing outcomes.[6] [7]

MATERIALS AND METHODS

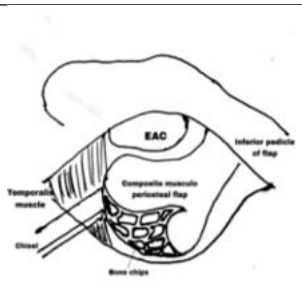
This was a hospital-based interventional study conducted in the Department of Otorhinolaryngology at a tertiary care teaching hospital in Central India over the study period corresponding to the academic years 2023–2025. Sixty patients diagnosed with chronic suppurative otitis media (CSOM) and fulfilling the inclusion criteria were enrolled after obtaining written informed consent and ensuring willingness for regular follow-up.

Inclusion criteria

included patients with cholesteatoma following complete disease extirpation, CSOM with extensive granulation tissue, and recurrent cholesteatoma. Patients with CSOM associated with intracranial complications were excluded.

All patients underwent detailed history taking, complete ENT examination, otomicroscopic evaluation, pure tone audiometry, and bilateral mastoid radiography (Schüller's view). High-resolution computed tomography of the temporal bone was performed when indicated.

All surgeries were performed under general anesthesia using a postauricular Wilde's incision. Temporalis fascia was harvested for tympanic membrane reconstruction. A pedicled postauricular composite flap, pedicled inferiorly, comprising periosteum with attached thin cortical bone lamellae (<1 mm) was harvested and used for mastoid cavity obliteration following standard canal wall down mastoidectomy. Meatoplasty was performed in all cases.



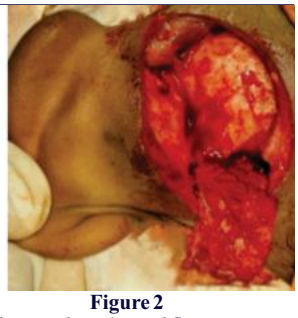


Figure 1 **Figure 2**

Figure 1 : Schematic of compound musculoperiosteal flap
Figure 2 : Intra-operative image of flap

Postoperatively, patients received antibiotics, analgesics, and antihistamines for one week and were followed up at 2 weeks, 1 month, and 3 months after surgery. Primary outcome was cavity status assessed using Merchant's grading system.[6]

Grade 0—No episode of otorrhea, and no pus or granulation tissue on otologic examination

Grade 1—One episode of otorrhea of <2 weeks duration in a 1 year period or no otorrhea but a subjective feeling of wetness in the ear

Grade 2—More than one episode of otorrhea in a 1 year period, or an episode of otorrhea lasting >2 weeks, or demonstration of localized granulation tissue/pus that was promptly cured with antibiotic drops, curettage or tri-chloro-acetic acid application

Grade 3—Constant purulent otorrhea on a daily basis, or examination showing extensive granulation tissue, or need for a revision procedure to control infection.

Secondary outcome was hearing improvement evaluated by comparing pre- and postoperative air-bone gaps on pure tone audiometry.

Statistical analysis was done using Fischer exact test.

RESULTS

A total of 60 patients underwent CWD mastoidectomy followed by mastoid cavity obliteration using the composite bone–periosteum flap.

Age range was 7–61 years with mean age of 30.36 years, with a higher proportion of females (60%) than males (40%).

Clinically, ear discharge was the most common symptom (100%), followed by hearing loss (86.6%). Intraoperatively, all patients demonstrated extensive disease, with 100% involvement of the antrum/aditus, epitympanum, and ossicular chain. Incus erosion was present in all patients, while stapes and malleus involvement occurred in 80% and 56.6% of cases, respectively.

The status of mastoid cavity was graded post operatively using the Merchant et al scale.

Table 1 : Status of mastoid cavity of patients at 1st, 2nd and 3rd followup

Merchant et al grades	1st follow up	2nd follow up	3rd follow up	Summary Grades
Grade 0	51(85%)	54(90%)	51(85%)	51(85%)
Grade 1	7(12%)	5(8%)	7(11.7%)	7(11.7%)
Grade 2	2(3%)	1(2%)	2(3.3%)	2(3.3%)
Grade 3	0(0%)	0(0%)	0(0%)	0(0%)

The mean preoperative air-bone gap (ABG) was 39.67 ± 13.04 dB, which improved to 31.58 ± 10.51 dB postoperatively. This difference was found to be statistically significant with p value of 0.0003.

DISCUSSION

Canal wall down (CWD) mastoidectomy remains the gold standard for the eradication of extensive cholesteatoma, particularly in cases where hidden recesses, anatomical variations, and poor mastoid pneumatization hinder complete disease clearance. Despite its effectiveness, the open mastoid cavity created by CWD mastoidectomy is associated with significant long-term morbidity, including recurrent otorrhea, accumulation of debris, caloric-induced vertigo, and difficulty in maintaining hygiene. Mastoid cavity obliteration has therefore gained acceptance as an adjunctive procedure to reduce cavity-related complications while preserving the advantages of complete disease eradication.

In the present study, 60 patients with unsafe chronic suppurative otitis media (CSOM) underwent mastoid cavity obliteration using a postauricular composite bone with periosteal flap following CWD mastoidectomy. The demographic profile of patients was comparable with previously published studies, with an age range of 7–61 years and a mean age of 30.36 years. A slight female predominance (male:female ratio 0.6:1) was observed, similar to that reported by Cevat Uçar and Shah et al., indicating consistent demographic trends across different populations.

Symptoms

Ear discharge was the most common presenting symptom in all patients, followed by hearing loss, which was present in more than 85% of cases. These findings are in concordance with studies by Smith et al. and Deshmukh et al., both of whom reported universal ear discharge among cholesteatoma patients. The relatively lower incidence of vertigo, tinnitus, and otalgia observed in the present study is consistent with observations by Shah et al. and Wadhwa et al., suggesting that these symptoms are less frequent despite extensive disease.

Clinical findings

Otoscopic examination revealed attic perforation, posterosuperior quadrant retraction, and combined lesions in proportions similar to those reported in earlier studies. Granulation tissue and aural polyps were less commonly encountered, reinforcing the reproducibility of clinical patterns of cholesteatoma across different series.

Preoperative Hearing Threshold:

Preoperative audiological assessment predominantly demonstrated moderate to moderately severe conductive hearing loss, reflecting extensive middle ear involvement and ossicular damage, a finding consistent with reports by Deshmukh et al. and Wadhwa et al.

Intraoperative Findings:

All patients demonstrated extensive cholesteatoma involving the antrum, aditus, epitympanum, and ossicular chain, highlighting the aggressive nature of disease in unsafe CSOM. Mesotympanic involvement was identified in over 40% of cases, comparable to previous reports. Ossicular erosion was universal, with the incus being the most commonly affected ossicle, followed by the stapes and malleus. This pattern mirrors findings reported by Deshmukh et al., Wadhwa et al., Shah et al., and Mangal Singh et al. Facial nerve dehiscence was identified in approximately one-fourth of patients, underscoring the importance of meticulous surgical technique and careful intraoperative assessment.

Post Operative Results of Dry Mastoid Cavity

Postoperative outcomes were favorable, with all patients achieving a dry mastoid cavity at three months. Grade 0 cavity status was achieved in 85% of patients, and no Grade 3 cavities were observed, indicating excellent infection control and cavity stability. These results are comparable to those reported by Wadhwa et al., Mangal Singh et al., Deshmukh et al., Cevat Uçar, and Chang Woo Kim. The consistently high dry cavity rates reported in studies utilizing composite bone and periosteal-based obliteration techniques support the superiority of these methods over soft-tissue-only obliteration. Studies reporting lower success rates often relied solely on soft tissue flaps, which may lack the structural stability provided by composite techniques.

Table 2 : Comparison of mastoid cavity status at 3rd followup in various studies

Study	Grade 0 (%)	Grade 1 (%)	Grade 2 (%)	Grade 3 (%)
Present Study (2025)	85	11.7	3.3	0
Wadhwa et al. (2022)	84	12	4	0
Mangal Singh et al. (2021)	83	11	6	0
Deshmukh et al. (2019)	82	13	5	0
Cevat Uçar et al. (2017	83	12	5	0
Chang Woo Kim et al. (2009)	82	12	6	0

Hearing Outcomes

In the present study demonstrated a statistically significant improvement in hearing, with a meaningful reduction in mean air–bone gap. This improvement is consistent with findings reported by Wadhwa et al., Deshmukh et al., Chang Woo Kim et al., Myung Koo Kang et al., and Maniu et al., all of whom utilized autologous obliteration materials. The vascularized periosteal component likely facilitates better healing and epithelialization, while the bone component provides long-term cavity stability and maintains anatomical contour.

Overall, mastoid cavity obliteration using a postauricular composite bone with periosteal flap effectively restores mastoid and middle ear anatomy, promotes epithelialization, minimizes cavity-related morbidity, and provides satisfactory hearing outcomes. The technique combines structural support with vascularity, overcoming the limitations of non-vascularized grafts and making it a reliable and effective adjunct to CWD mastoidectomy in the management of unsafe CSOM.

CONCLUSION :

The technique demonstrated excellent outcomes, achieving a dry, stable, and self-cleaning mastoid cavity with no residual or recurrent disease and minimal postoperative complications. A significant postoperative improvement in hearing was also observed, as evidenced by the reduction in the mean air–bone gap. These results confirm the effectiveness of this approach in reducing cavity-related morbidity and enhancing functional hearing outcomes, thereby supporting its role as a preferred technique for mastoid obliteration.

REFERENCES (Vancouver Style)

1. Browning GG, Merchant SN, Kelly G, Swan IRC, Canter R, McKerrow WS. Chronic otitis media. In: Gleeson M, editor. *Scott-Brown's Otorhinolaryngology, Head and Neck Surgery*. 7th ed. London: Hodder Arnold; 2008. p. 3395–445.
2. Bluestone CD, Klein JO. *Otitis Media in Infants and Children*. 4th ed. Hamilton: BC Decker; 2007.
3. Glasscock ME, Shambaugh GE. *Surgery of the Ear*. 6th ed. Hamilton: BC Decker; 2010.
4. Jackler RK, Santa Maria PL. Cholesteatoma pathogenesis and complications. *Otolaryngol Clin North Am*. 2015;48(6):963–75.
5. Dornhoffer JL. Surgical management of cholesteatoma. *Otolaryngol Clin North Am*. 2006;39(6):1087–110.
6. Smyth GDL. Canal wall up and canal wall down mastoidectomy. *J Laryngol Otol*. 1985;99(7):617–24.
7. Vartiainen E. Ten-year results of canal wall up and canal wall down mastoidectomy. *Arch Otolaryngol Head Neck Surg*. 1998;124(10):1153–6.
8. Merchant SN, Wang P, Jang CH, Glynn RJ, Rauch SD, McKenna MJ. Efficacy of mastoid obliteration in achieving a dry ear. *Otol Neurotol*. 1998;19(5):553–60.
9. Yung M, Smith P. Mastoid obliteration with autologous materials. *Otolaryngol Head Neck Surg*. 2007;137(6):906–12.
10. Mosher HP. A method of filling the excavated mastoid with a flap from the back of the auricle. *Laryngoscope*. 1911;21:1158–63.
11. Mehta RP, Harris JP. Mastoid obliteration. *Otolaryngol Clin North Am*. 2006;39(6):1129–42.
12. Ramsey MJ, Merchant SN, McKenna MJ. Postauricular periosteal-pericranial flap for mastoid obliteration. *Otol Neurotol*. 2004;25(6):873–8.