Original Article

Comparative Effectiveness of Head Bandages Versus No Head Bandages in Preventing Postoperative Complications After Ear Surgery

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Abstract

Objective: Head bandages are routinely used after mastoid surgery to prevent complications, but their benefit remains uncertain. This study compared postoperative outcomes with and without head bandages.

Methods: In this prospective observational cohort study, 100 patients undergoing mastoid surgery were divided into two groups: head bandage (n=50) and no head bandage (n=50). Outcomes included surgical site infection (SSI), hematoma, seroma, wound dehiscence, vertigo, and tinnitus. Statistical analysis was performed using SPSS v. 25.

Results: SSI was significantly lower in the head bandage group (8% vs. 26%, p=0.017). No significant differences were observed in hematoma (12% vs. 18%, P =0.401), wound dehiscence (14% vs. 20%, P =0.424), seroma (12% vs. 12%, P =1.000), vertigo (12% vs. 10%, P =0.749), or tinnitus (8% vs. 10%, P =0.727). Preoperative infection was strongly associated with wound dehiscence (35.7% vs. 3.4%, P < 0.001).

Conclusion: Head bandages may reduce SSI after mastoid surgery without affecting other complications. Preoperative infection is a key predictor of wound dehiscence. Larger multicenter studies are needed.

Keywords: Mastoidectomy; Otitis Media, Suppurative; Surgical Wound Infection; Postoperative Complications; Bandages, Pressure; Wound Dehiscence.

Introduction

Postauricular head bandages, also known as mastoid pressure dressings (MPDs), have been used for decades after mastoid and middle ear surgeries. Traditionally, they were believed to prevent hematoma and seroma formation, protect grafts, reduce dead space, and stabilize the auricular position. Modern surgical techniques, improved hemostasis, and enhanced perioperative care have led many to question the necessity of routine MPDs in contemporary otologic practice. Recent randomized controlled trials have provided strong evidence against their routine use in patients with TBI. Deco et al. compared 1-day versus 5-day mastoid bandages in patients undergoing mastoid surgery for chronic suppurative otitis media.[1] Prolonged bandaging significantly increased pressure-related problems, including skin maceration and ulcers, although complication rates were similar between groups. Tabaru et al. demonstrated in a randomized trial involving various otologic procedures that MPDs increased discomfort and skin complications without significantly reducing wound infection or hematoma rates.[2]
Evidence from pediatric populations mirrors the findings in adults. Shinnawi et al. reviewed 135 mastoidectomy cases in children and reported no difference in wound complications between those with and without MPDs, but less postoperative pain in the no-MPD group.[3] Practice surveys reveal variability; Amanian et al. found that Canadian pediatric cochlear implant surgeons differed markedly in MPD usage, reflecting uncertainty regarding their benefit and growing recognition of potential harm.[4] When dressings are applied, modifications can reduce complications: Liao et al. showed that foam dressings significantly lowered the auricular pressure injury risk compared with conventional gauze bandages.[5] Concerns about auricular protrusion have also been cited to justify prolonged compression. However, a recent literature review by Mokhatrish

found no evidence that extended MPDs are required to maintain the auricular position after post-auricular approaches, supporting selective short-duration use.[6] Advances in minimally invasive transcanal endoscopic ear surgery (TEES) have further reduced the need for post-auricular incisions and, consequently, for MPDs.[7]

Importantly, the risk of postoperative infection often depends more on surgical technique, cavity management, and obliteration materials than on external dressings. Viberti et al. reported low infection rates in mastoid obliteration procedures regardless of the material used, suggesting that internal surgical factors outweigh dressing type in determining outcomes.[8] Tympanoplasty research now prioritizes graft success and hearing results over extended postoperative compression, with studies by Alosaimi et al. and Bianconi et al. reflecting a broader shift toward minimally invasive, patient-centered care.[9,10] Collectively, recent evidence supports a selective approach: applying MPDs for short durations in specific situations, such as immediate postoperative protection, while avoiding routine prolonged use that adds discomfort without clear clinical benefit. This study aimed to contribute further by directly comparing postoperative complications between patients undergoing mastoid surgery with and without head bandages, focusing on outcomes such as surgical site infection, hematoma, seroma, wound dehiscence, and vestibular or auditory symptoms.

Materials And Methods

This observational cohort study evaluated the incidence of postoperative complications in patients undergoing mastoid surgery with and without head bandages. The study was conducted at the Department of Otorhinolaryngology, Benazir Bhutto Hospital, Rawalpindi, from June 2023 to June 2025, according to the STROBE guidelines.

The sample size was calculated based on the incidence of surgical site infection (SSI) reported in the preliminary institutional data. Using a two-proportion comparison formula with a 95% confidence level ($\alpha = 0.05$) and 80% power ($1 - \beta = 0.80$), the minimum required sample size was 45 participants per group**.** Accounting for a 10% potential dropout rate, the final sample size was adjusted to 50 participants per group, totaling 100**.**

The inclusion criteria were as follows: patients aged ≥12 years who underwent mastoid surgery (cortical mastoidectomy, modified radical mastoidectomy, or radical mastoidectomy) for chronic suppurative otitis media (CSOM) or cholesteatoma, no active systemic infection at the time of surgery, and willingness to provide informed consent and comply with follow-up visits.

The exclusion criteria were as follows: patients undergoing revision mastoid surgery, patients undergoing concurrent ear surgery unrelated to mastoid disease (e.g., cochlear implantation), those with immunocompromised status (e.g., HIV, chemotherapy), those with uncontrolled diabetes mellitus or other significant comorbidities affecting wound healing, and those with a history of keloid formation or hypertrophic scarring.

All surgeries were performed under general anesthesia by experienced otologic surgeons. Meticulous hemostasis was achieved in all cases, and any recurrent bleeding points were controlled before closing the wound. The wound was closed in layers with absorbable sutures for the subcutaneous tissue and nonabsorbable sutures for the skin.

Postoperatively, patients were assigned to one of two groups based on surgeon preference: the Head Bandage Group, in which a standard MPD with sterile gauze and a circumferential elastic bandage was applied for 24 h, or the No Head Bandage Group, in which only a small sterile dressing was placed over the incision without circumferential compression.

Data were collected at standardized time points:

- **Preoperative:** Demographics, comorbidities, preoperative infection status, diagnosis, and planned surgical type.
- **Intraoperative:** Type of mastoid surgery, duration of surgery, estimated blood loss, and additional procedures (tympanoplasty, ossiculoplasty, mastoid obliteration).
- **Postoperative:** Pain scores (VAS) immediately after surgery and on day 7, presence of hematoma, wound dehiscence, seroma, SSI, vertigo, tinnitus, and other complications.

Follow-up assessments were performed on postoperative day 7 and at 1 month.

Primary Outcome:

1. Incidence of SSI within 1 month postoperatively.

Secondary Outcomes:

1. Incidence of hematoma, wound dehiscence, seroma, vertigo, and tinnitus.
2. Postoperative pain scores (VAS) at immediate recovery and day 7.
3. Association of preoperative infection status with postoperative complication rates.

Data were analyzed using SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation (SD) or median (IQR), depending on normality, and were compared using independent t-tests or Mann–Whitney U tests. Categorical variables are expressed as frequencies (%) and were compared using the Chi-square or Fisher's exact tests. Statistical significance was set at $P < 0.05$.

This study adhered to the principles of the Declaration of Helsinki and Good Clinical Practice (GCP) guidelines. Ethical approval was obtained from the Institutional Review Board of the Rawalpindi Medical University. All participants provided informed consent before their enrolment. Data confidentiality was maintained through anonymization, and only authorized research staff had access to the identifiable information.

Results

A total of 100 patients were enrolled and allocated to one of two groups: the Head Bandage group (n = 50) and the No Head Bandage group (n = 50). No patients were lost to follow-up or consent withdrawal during the study period. All 100 enrolled participants completed the study protocol and were included in the final analysis.

Table 1: Baseline characteristics of the study population (N = 100)

Characteristic	N = 100
Patient Demographics	
Age, years — mean ± SD	29.96 ± 9.64
Sex	
Male	50 (50%)
Female	50 (50%)
Comorbidities	
No comorbidities	77 (77%)
Diabetes Mellitus	6 (6%)
Smoking	11 (11%)
Hypertension	5 (5%)
Ischemic Heart Disease	1 (1%)
Preoperative Status	
Preoperative infection present	42 (42%)
Surgical Indication	
CSOM squamosal	41 (41%)
CSOM mucosal	40 (40%)
Cholesteatoma	19 (19%)
Surgical Procedures Performed	
Mastoidectomy type	
Cortical	19 (19%)
Modified radical	59 (59%)
Radical	22 (22%)
Tympanoplasty	38 (38%)
Ossiculoplasty	17 (17%)
Mastoid obliteration	42 (42%)
Intraoperative Data	
Duration of surgery, min — mean ± SD	92.56 ± 23.97
Blood loss, mL — mean ± SD	91.34 ± 53.65
Postoperative Pain (VAS)	
Immediate postoperative	6.58 ± 1.70
Day 7	3.36 ± 1.49

Data expressed as n (%) or mean ± SD. CSOM = chronic suppurative otitis media; SD = standard deviation; VAS = visual analogue scale

Baseline characteristics of the study population are summarized in Table 1. The mean age was 29.96 ± 9.64 years, with equal sex distribution (50% male, 50% female). The majority of patients had no comorbidities (77%); among those with comorbidities, smoking was most prevalent (11%), followed by diabetes mellitus (6%), hypertension (5%), and ischemic heart disease (1%). Preoperative infection was present in 42% of patients. The most common surgical indication was CSOM squamosal (41%), followed by CSOM mucosal (40%) and cholesteatoma (19%). Modified radical mastoidectomy was the predominant procedure (59%), with tympanoplasty, ossiculoplasty, and mastoid obliteration performed in 38%, 17%, and 42% of cases, respectively. Mean surgical duration was 92.56 ± 23.97 minutes with a mean blood loss of 91.34 ± 53.65 mL. The two groups were comparable across all baseline variables.

The primary outcome, the incidence of SSI within one month of surgery, was significantly lower in the Head Bandage group than in the No Head Bandage group (8% [95% CI, 0.5%–15.5%] vs. 26% [95% CI, 13.8%–38.2%]; absolute risk difference −18.0% [95% CI, −32.3% to −3.7%]; P = 0.017). No statistically significant between-group differences were observed for any of the secondary outcomes. The full results are presented in Table 2.

No serious adverse events were observed in either group. Postoperative pain scores were comparable between the groups at both the immediate postoperative assessment (6.46 ± 1.84 [95% CI, 5.95–6.97] vs. 6.70 ± 1.54 [95% CI, 6.27–7.13]; P = 0.482) and day 7 (3.46 ± 1.42 [95% CI, 3.07–3.85] vs. 3.26 ± 1.58 [95% CI, 2.82–3.70]; P = 0.506). Surgical duration and blood loss were comparable between the groups (Table 3).

Preoperative infection was identified as a significant independent risk factor for wound dehiscence, with rates of 35.7% [95% CI, 21.2–50.2%] in infected patients versus 3.4% [95% CI, 0.0–8.1%] in non-infected patients (absolute risk difference 32.3% [95% CI, 17.0–47.5%]; P < 0.001). No other outcomes were significantly associated with the preoperative infection status (Table 4).

Table 2: Comparison of postoperative complications between groups

Outcome	Head Bandage (n = 50)	No Head Bandage (n = 50)	P-value
Primary Outcome			
Surgical site infection	4 (8% [95% CI, 0.5–15.5%])	13 (26% [95% CI, 13.8–38.2%])	0.017
Wound Complications			
Hematoma	6 (12% [95% CI, 3.0–21.0%])	9 (18% [95% CI, 7.4–28.6%])	0.401
Wound dehiscence	7 (14% [95% CI, 4.4–23.6%])	10 (20% [95% CI, 8.9–31.1%])	0.424
Seroma	6 (12% [95% CI, 3.0–21.0%])	6 (12% [95% CI, 3.0–21.0%])	1.000
Neurosensory Symptoms			
Vertigo	6 (12% [95% CI, 3.0–21.0%])	5 (10% [95% CI, 1.7–18.3%])	0.749
Tinnitus	4 (8% [95% CI, 0.5–15.5%])	5 (10% [95% CI, 1.7–18.3%])	0.727

Data expressed as n (% [95% CI]). Chi-square or Fisher's exact test is used as appropriate.

Table 3. Comparison of continuous variables between groups

Variable	Head Bandage (n = 50)	No Head Bandage (n = 50)	P-value
Postoperative Pain (VAS) — mean ± SD [95% CI]			
Immediate postoperative	6.46 ± 1.84 [5.95–6.97]	6.70 ± 1.54 [6.27–7.13]	0.482
Day 7	3.46 ± 1.42 [3.07–3.85]	3.26 ± 1.58 [2.82–3.70]	0.506
Intraoperative Parameters — mean ± SD [95% CI]			
Duration of surgery, min	89.96 ± 25.64 [82.85–97.07]	95.16 ± 22.13 [89.03–101.29]	0.280
Blood loss, mL	91.12 ± 53.86 [76.19–106.05]	91.56 ± 53.98 [76.60–106.52]	0.968

Independent samples t-test. VAS = visual analogue scale; SD = standard deviation.

Table 4. Association of preoperative infection status with postoperative outcomes

Outcome	Preoperative Infection (n = 42)	No Preoperative Infection (n = 58)	P-value
Wound Complications			
Wound dehiscence	15 (35.7% [95% CI, 21.2–50.2%])	2 (3.4% [95% CI, 0.0–8.1%])	**<0.001**
Hematoma	6 (14.3% [95% CI, 3.7–24.9%])	9 (15.5% [95% CI, 6.2–24.8%])	0.865
Seroma	5 (11.9% [95% CI, 2.1–21.7%])	7 (12.1% [95% CI, 3.7–20.5%])	0.980
Surgical site infection	6 (14.3% [95% CI, 3.7–24.9%])	11 (19.0% [95% CI, 8.9–29.1%])	0.539
Neurosensory Symptoms			
Vertigo	6 (14.3% [95% CI, 3.7–24.9%])	5 (8.6% [95% CI, 1.4–15.8%])	0.372
Tinnitus	2 (4.8% [95% CI, 0.0–11.2%])	7 (12.1% [95% CI, 3.7–20.5%])	0.208

Data expressed as n (% [95% CI]). Chi-square or Fisher's exact test is used as appropriate.

The type of mastoidectomy performed did not significantly influence the complication rate. A marginal trend toward higher wound dehiscence was observed with modified radical and radical procedures than with cortical mastoidectomy (22.0% [95% CI, 11.5%–32.6%] and 18.2% [95% CI, 2.1%–34.3%] vs. 0%; P = 0.083), although this did not reach statistical significance (Table 5).

Table 5. Association of mastoidectomy type with postoperative outcomes

Outcome	Cortical (n = 19)	Modified Radical (n = 59)	Radical (n = 22)	P-value
Wound Complications				
Wound dehiscence	0 (0%)	13 (22.0% [95% CI, 11.5–32.6%])	4 (18.2% [95% CI, 2.1–34.3%])	0.083
Hematoma	3 (15.8% [95% CI, 0.0–32.2%])	7 (11.9% [95% CI, 3.6–20.1%])	5 (22.7% [95% CI, 5.2–40.2%])	0.474
Seroma	2 (10.5% [95% CI, 0.0–24.3%])	8 (13.6% [95% CI, 4.8–22.3%])	2 (9.1% [95% CI, 0.0–21.1%])	0.839
Surgical site infection	4 (21.1% [95% CI, 2.7–39.4%])	9 (15.3% [95% CI, 6.1–24.4%])	4 (18.2% [95% CI, 2.1–34.3%])	0.831
Neurosensory Symptoms				
Vertigo	0 (0%)	9 (15.3% [95% CI, 6.1–24.4%])	2 (9.1% [95% CI, 0.0–21.1%])	0.172
Tinnitus	0 (0%)	7 (11.9% [95% CI, 3.6–20.1%])	2 (9.1% [95% CI, 0.0–21.1%])	0.291

Data expressed as n (% [95% CI]). Chi-square or Fisher's exact test is used as appropriate. Zero events in the cortical group preclude CI estimation.

Discussion

Our study demonstrated a clear difference in SSI rates between the head bandage group and the no head bandage group, with infections occurring in 8% and 26% of patients, respectively (P = 0.017). This 18-percentage-point reduction is comparable to that reported by Rajput et al., who reported SSI in 7% of patients receiving MPD versus 23% without after cortical mastoidectomy.[11] The parallel magnitude of reduction in both studies suggests that postoperative MPD may create a transient protective barrier that limits early wound contamination in the hair-bearing post-auricular region. Chen et al. found a smaller but still significant difference (6% versus 18%) after cholesteatoma surgery, reinforcing the notion that dressings are most beneficial in reducing superficial bacterial entry during the immediate postoperative period.[12] Conversely, Patel et al. found no statistically significant difference (5% vs. 8%), possibly due to their routine extended prophylactic antibiotic use in both groups, which could have masked the protective effect of the bandage[13].

In contrast, our findings for hematoma revealed no statistically significant difference between the two groups, with rates of 12% in the head bandage group versus 18% without (P = 0.401). These results closely mirror those of Zhao et al., who found hematomas in 10% of patients with a drain compared to 14% without, and Lee et al., who reported rates of 13% and 17%, respectively.[14,15] All three studies, including ours, suggest that hematoma formation is primarily influenced by intraoperative factors such as quality of hemostasis, control of small venous bleeders, and maintenance of a dry surgical field rather than by the presence of an MPD.

The incidence of seroma was also nearly identical between the groups, occurring in 12% of both (P = 1.000). Singh et al. reported seroma in 11% of dressed patients and 12% of undressed patients after cortical mastoidectomy, while Nguyen et al. observed rates of 9% versus 10%.[16,17] This consistent lack of difference suggests that seroma is less responsive to superficial pressure and more dependent on the extent of subcutaneous dissection, the presence of dead space, and lymphatic disruption. Our surgical technique emphasized layered closure and obliteration of the dead space, likely minimizing seroma formation across both arms.

Taken together, these comparisons show that while our SSI data align closely with several contemporary studies demonstrating the benefit of bandage use, our hematoma and seroma results are consistent with the majority of recent literature indicating no meaningful impact of MPDs. In revision mastoidectomy cases, Becker et al. also found no reduction in hematoma or seroma rates with MPD (hematoma: 15% vs. 18%; seroma: 13% vs. 14%), reinforcing our findings in a different surgical context.[18] A possible explanation for the discrepancy between SSI outcomes and fluid-related complications lies in the mechanism of action. MPDs limit environmental exposure and reduce inadvertent manipulation of the wound, which can lower the risk of bacterial contamination; this is a plausible mechanistic explanation consistent with the SSI trends observed across multiple studies in this series. Their ability to prevent fluid accumulation is limited; hematomas and seromas form in potential spaces beneath the skin, where pressure from a surface bandage may be insufficient to counteract tissue fluid dynamics, especially once swelling begins after anesthesia.

Our study's SSI reduction also held despite short-term (24-hour) bandage application, suggesting that the most critical protective window is immediately after surgery. Multiple studies have shown that prolonged head bandaging can introduce patient discomfort, skin maceration, and hygiene challenges without additional benefit in SSI prevention, supporting the notion that short, targeted application is adequate.[1,2] Strengths of our study include its adequate sample size powered for the primary outcome (SSI) and standardized surgical techniques. We also directly measured and compared the SSI, hematoma, and seroma, allowing for integrated interpretation. Limitations include the single-centered and observational study design, which may limit generalizability; the short follow-up, which might not capture late infections; and exclusion of revision surgeries, which are often higher-risk for complications. Variability in postoperative home care, although minimized by instructions, may also influence infection rates.

We recommend the selective use of head bandages for SSI prevention, particularly in patients at a higher risk of infection or undergoing extensive dissection. The routine use of drains solely for hematoma or seroma prevention is not supported by current evidence. Future multicenter studies should investigate the optimal bandage duration, cost-effectiveness, and patient comfort outcomes, and should include higher-risk revision populations.

Conclusions

This study demonstrates that applying a head bandage following mastoid surgery significantly reduces the incidence of surgical site infections without increasing the risk of hematoma, seroma, wound dehiscence, vertigo, or tinnitus. Simultaneously, the absence of adverse effects on other complications and comparable pain trajectories suggests that head bandaging offers a net benefit rather than harm. Importantly, preoperative infection emerged as a major risk

factor for wound dehiscence, underscoring the need to optimize surgical timing and infection control measures. Given these findings, the judicious use of MPDs, particularly after extensive mastoid surgery, can be recommended to enhance SSI prophylaxis without compromising patient comfort or recovery.

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