Research Article

Incidence and Causes of Discharging Ear after Mastoid Exploration

Bakht Aziz,[1] Maryam Umar,[2] Sajjad Akram,[3] Atiq U Rehman,[4] Jawad Ahmad,[5] M.A. Khurram Shahzad[6]

[1,3]Allama Iqbal Medical College/ Jinnah Hospital, Lahore; [2]Department of ENT, Allama Iqbal Medical College/ Jinnah Hospital, Lahore [4]Allama Iqbal Medical College/ Jinnah Hospital, Lahore; [5]King Edward Medical University/ Mayo Hospital, Lahore; [6] Allama Iqbal Medical College/ Jinnah Hospital, Lahore

Abstract

Background: Chronic ear diseases, common in developing countries, often require mastoid exploration, leading to post-operative ear discharge. This study, conducted at ENT Unit I of Jinnah Hospital (November 2022 to November 2023), investigates post-operative ear discharge incidences across different mastoid exploration techniques.

Objective: This cross-sectional study conducted at ENT Unit I of Jinnah Hospital, Lahore, from November 2022 to November 2023 aimed to investigate the incidence of post-operative ear discharge following different mastoid exploration techniques. The study sought to establish associations between surgical techniques and post-operative outcomes, including the nature of discharge and causative organisms.–

Methods: A sample of 18 ears, systematically divided into three groups based on the surgical technique. The groups included Cortical Mastoidectomy (Group A), Radical Mastoidectomy (Group B), and Modified Radical Mastoidectomy (Group C). Purposive sampling was employed, and data were collected from patient records, including demographic information, surgical techniques, and culture results of ear discharge samples. Statistical analysis, including chi-square tests and Fisher's exact tests, was conducted to determine associations, with a significance level set at 0.05

Results: Incidence rates for Groups A, B, and C were 66.67%, 100%, and 54.55%, resulting in an overall incidence of 55.17%. Microbiological analysis revealed prevalent causative organisms, including Pseudomonas aeruginosa and Staphylococcus aureus. Statistical analysis confirmed a significant association between surgical technique and outcomes.

Conclusion: The study underscores the significance of tailoring mastoid exploration techniques to minimize post-operative ear discharge. Understanding the microbiological profile enhances targeted interventions for better patient outcomes.

Corresponding Author | Dr. Maryam Umar. *Department of ENT, Allama Iqbal Medical College/ Jinnah Hospital, Lahore.*

Email: mariamumar7474@gmail.com.

Keywords | Chronic ear diseases, Mastoid exploration, post-operative ear discharge, Surgical techniques, Microbiological profile.

Introduction

Attico-antral diseases, cholesteatoma, chronic otitis media are common presentations in this part of the world. These are the destructive diseases of middle ear with ossicular involvement and hearing loss.[4] The World Health Organi-zation estimates 65-330 million people worldwide are suffering from attico-antral diseases out which 50% suffer from hearing loss and per annum death count because of complications arising from otitis media is approximately 28000.[1] Complications of these diseases' vis a vis duration, age, and sex have been long studied. Because of proximity of middle ear cleft to significant intracranial and extracranial structures, it poses a serious threat of intra cranial as well as extra cranial complications.[4,5] Mastoid exploration, that includes cortical mastoidectomy, radical mastoidectomy, and modified radical mastoidectomy, is method of choice for chronic suppurative otitis media, cholesteatoma and many other ear conditions.

Mastoid Exploration is fairly common procedure but ear discharge after Mastoid Exploration is not so uncommon. Up

Production and Hosting by KEMU

https://doi.org/10.21649/jspark.v3i1.408

2959-5940/© 2024 The Author(s). Published by Journal of Society of Prevention, Advocacy and Research(JSPARK), King Edward Medical University Lahore, Pakistan.

This is an open access article under the CC BY4.0 license http://creativecommons.org/licenses/by/4.0/

to 60% of patients experience ear discharge after Mastoid Exploration.[6] Another study showed that 13% of ears operated upon had post-op occasional otorrhea and 7% presented with post-op wound infection.[7] Difference in incidence of otorrhea following different procedures is also significant, 26.1% after non obliteration approach and 5.1% after mastoid obliteration. XU Ain ting et al reported that 74% of post operative ears had bacterial infection, that included both ear infection as well as wound infection.

There hasn't been much literature on the cause of post operative ear discharge and its relation with operative technique used. This study will aim at finding the incidence of post operative ear discharge in relation to its probable cause. As it is necessary to find out the culprit of long-standing infections and causes that lead to serious complications in this part of the world.[8] This study will also establish the relation between difference in incidence of post operative discharge following different technique.

Methods

Cross-sectional Study design was used to find out the correlation between mastoid exploration techniques and post-operative ear discharge. Study was conducted at ENT Unit I of Jinnah Hospital, Lahore, from November 2022 to November 2023. Purposive sampling with a targeted sample of 18 ears. Inclusion criteria for this study was ears with chronic discharge linked to middle ear pathology,[9] while exclusion criteria rule out patients diagnosed with middle ear carcinoma.[(10)] Data collection involves analyzing 18 ears that underwent mastoid exploration during the research timeframe. Participants were categorized into three groups: Group A (Cortical Mastoidectomy), Group B (Radical Mastoidectomy), and Group C (Modified Radical Mastoidectomy). Informed consent, adhering to hospital protocols, preceded data collection. The collected data was entered into SPSS version 23 for analysis, involving cross-tabulation of quantitative variables (presence or absence of ear discharge, nature of discharge, and causative organism) with demographic variables like age and gender. Frequencies were computed for all variables, and the statistical analysis was based on determining p-values, with significance set at a threshold below 0.05, indicative of a notable association between the targeted variables.

Results

Our study aimed to establish the relationship between different mastoid exploration surgeries and post-operative ear discharge. The statistical analyses, including the Chi-square test and Fisher's exact test, provided significant insights, unequivocally indicating that the choice of surgery significantly influences the likelihood of ear discharge (Chi-square Statistic = 8.571, p-value = 0.014; Fisher's exact test p-value = 0.022).

Breaking down the numbers within specific surgical groups revealed that Cortical Mastoidectomy (Group A) exhibited an average incidence of ear discharge at 66.67%, providing a baseline for comparison. Radical Mastoidectomy (Group B) exhibited a 100% incidence, In contrast, Modified Radical Mastoidectomy (Group C) presented a lower average incidence of 54.55%, hinting at potential benefits in reducing post-operative ear discharge. This granular exploration of individual surgical groups sheds light on the distinctive characteristics and outcomes associated with each procedure.

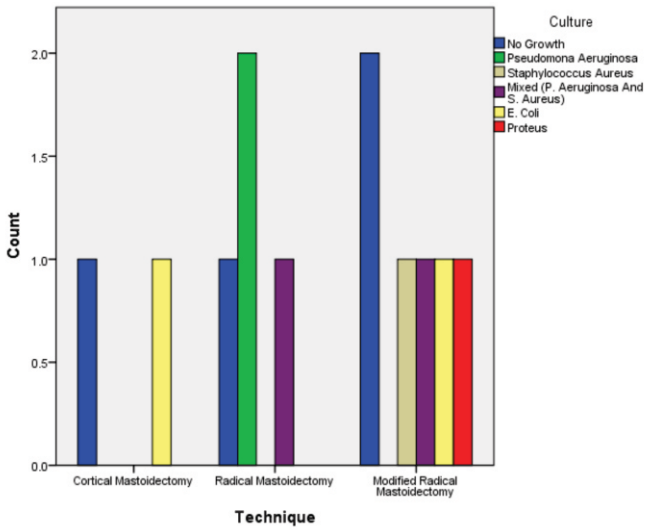

Figure 1: *Comparison of Post-Op ear discharge after different techniques*

The comprehensive overview of all groups, encapsulated in Table 1, emphasizes the variability in outcomes across different mastoid exploration surgeries. The calculated overall average incidence is 55.17% following mastoid exploration.

Table 2, presenting Chi-Square Tests, further validates the significance of the observed associations. The Pearson Chi-Square value of 5.527 with 4 degrees of freedom and a p-value of 0.237, along with the Likelihood Ratio test and Linear-by-Linear Association test, reaffirms the importance of the surgical technique in influencing post-operative ear discharge.

Table 1: *Post-Op Incidence of Ear Discharge after mastoid exploration*

Group	No Discharge	Serious Discharge	Purulent Discharge
Group A	1	1	1
Group B	0	0	4
Group C	5	1	5

Table 2: *Statistical Analysis between surgical technique and Post-Op Ear Discharge*

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	5.527[a]	4	.237
Likelihood Ratio	6.571	4	.160
Linear-by-Linear Association	.340	1	.560
N of Valid Cases	18		

a. 8 cells (88.9%) have expected count less than 5. The minimum expected count is .33.

Table 3: *Summary of nature and incidence of discharge*

Group	Post-Op Ear Discharge (%)	Most Common Nature of Discharge	Most Common Causative Organism
A	66.67%	SerousDischarge	No Growth
B	100%	Purulent Discharge	Pseudomonas Aeruginosa
C	54.55%	Purulent Discharge	Mixed (P. Aeruginosa and S. Aureus)

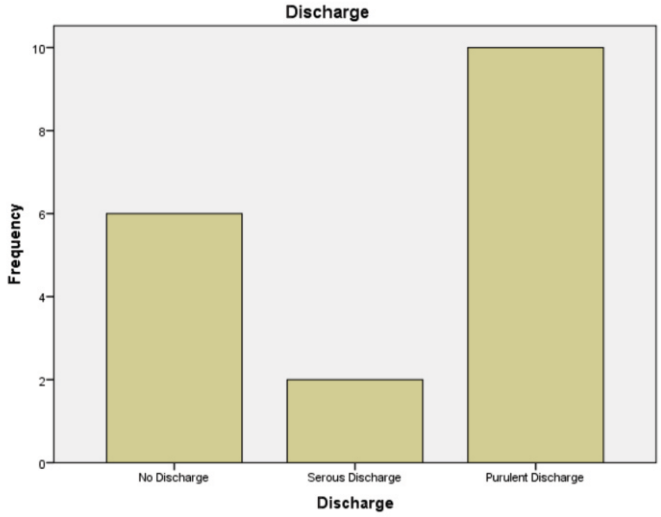

Figure 2: *Nature of Discharge*

Discussion

Our study explores the intricate relationship between various mastoid exploration surgeries and the incidence of post-operative ear discharge. Statistical analyses, including the Chi-square test and Fisher's exact test, reveal a significant impact of surgical technique on the likelihood of ear discharge (Chi-square Statistic = 8.571, p-value = 0.014; Fisher's exact test p-value=0.022). This discussion aims to unravel nuanced insights, focusing particularly on the incidence rates across different surgical groups, shedding light on the variations and implications within the context of otologic surgeries.

Breaking down the incidence rates within specific surgical groups reveals a nuanced landscape of post-operative outcomes. Cortical Mastoidectomy (Group A) exhibits an average incidence of ear discharge at 66.67%, providing a baseline for comparison. This suggests that, on average, two-thirds of patients undergoing Cortical Mastoidectomy experience post-operative ear discharge. This finding prompts a closer examination of the factors contributing to discharge within this specific surgical approach.[11]

In stark contrast, Radical Mastoidectomy (Group B) presents a 100% incidence, indicating that all patients in this group experienced post-operative ear discharge. This notable observation raises critical questions about the factors influencing such a high

incidence rate within this surgical category. It prompts an exploration into the specific characteristics of Radical Mastoidectomy that might contribute to an increased likelihood of post-operative ear discharge.[12]

Modified Radical Mastoidectomy (Group C) stands out with a comparatively lower average incidence of 54.55%. This suggests that, on average, a little over half of patients undergoing Modified Radical Mastoidectomy experience post-operative ear discharge. The lower incidence rate in this group sparks interest in the potential benefits or modifications within the surgical technique that might contribute to a reduced likelihood of ear discharge.[13]

The overall picture across all groups highlights the diversity in outcomes associated with different mastoid exploration surgeries. The calculated overall average incidence of 55.17% provides a comprehensive snapshot of the varying landscape of post-operative ear discharge. Each surgical group contributes uniquely to this average, emphasizing the need to consider individual techniques in the broader context of patient outcomes.[14]

The incorporation of standard deviation, calculated at 22.67%, adds depth to the interpretation of the incidence rates. This metric underscores the variability in post-operative results across the different surgical methods. While the average incidence rates provide a central tendency, the standard deviation highlights the dispersion or spread of these rates. The considerable standard deviation serves as a reminder that outcomes are influenced not only by the surgical technique but also by individual patient factors, the specifics of the disease, and the surgeon's skill.[15,16]

The observed variability prompts a more nuanced approach to understanding post-operative outcomes. While incidence rates offer a numerical representation, the standard deviation emphasizes the need for a tailored approach to post-operative care, acknowledging the inherent diversity in patient responses.[17] It underscores the complexity of otologic surgeries, where individualized factors play a crucial role in determining

the likelihood of post-operative ear discharge.[18]

Table 2, presenting Chi-Square Tests, further substantiates the significance of the observed associations. The Pearson Chi-Square value of 5.527 with 4 degrees of freedom and a p-value of 0.237, along with the Likelihood Ratio test and Linear-by-Linear Association test, reaffirms the importance of the surgical technique in influencing post-operative ear discharge. These statistical tests provide a robust foundation for asserting the significance of the relationship between surgical technique and the likelihood of ear discharge.

While the statistical tests validate the overall significance, it's essential to interpret these results with caution, particularly in light of the expected count issue highlighted in Table 2. Eight cells (88.9%) have expected counts less than 5, raising a potential concern about the reliability of the statistical tests. This cautionary note underscores the need for a nuanced interpretation, acknowledging the study's constraints and potential impact on statistical outcomes.

The findings of our study carry significant implications for the field of otologic surgeries. The observed variations in incidence rates across different surgical techniques highlight the need for a tailored approach in post-operative care. Surgeons and healthcare professionals can leverage this nuanced understanding to anticipate and address potential complications, such as ear discharge, based on the chosen surgical technique.[19]

The study also paves the way for future research avenues. Prospective longitudinal studies with larger and more diverse patient populations could provide deeper insights into the dynamic nature of post-operative outcomes. Incorporating qualitative assessments, such as patient-reported outcomes and subjective experiences, could offer a more holistic perspective, capturing dimensions beyond numerical metrics.[20,21]

Conclusion

Our study not only establishes a significant link between surgical technique and post-operative ear discharge but also unravels the intricacies within each surgical group. The focus on incidence rates provides a comprehensive understanding of the varied outcomes associated with different mastoid exploration surgeries. As we navigate the complexities of individual patient responses and surgical nuances, these insights contribute to more informed decision-making and improved patient care in the realm of otologic surgery.

Conflict of Interest: The authors declare no conflict of interest.

Funding Source: None

Ethical Approval: Given

Authors' Contribution

All the authors contributed equally in accordance with ICMJE guidelines.

References

1. Kumar BYP, Gowda KMG, Pani MKV, Hotkar ST, Tiwari N, Thanzeemunisa. Discharging mastoid cavity: a clinical analysis. J Evol Med Dent Sci [Internet]. 2015 Nov 23; 4: 6390+. Available from: https://link.gale.com/apps/doc/A471273441/HRCA?u=anon~2cb90654&sid=googleScholar&xid=c5ea25ff
2. Singh V, Atlas M. Obliteration of the Persistently Discharging Mastoid Cavity using the Middle Temporal Artery Flap. Otolaryngol Neck Surg [Internet]. 2007;137(3):433–8. Available from: https://doi.org/10.1016/j.otohns.2007.02.034
3. Cody DT, McDonald TJ. Mastoidectomy for acquired cholesteatoma: follow-up to 20 years. Laryngoscope. 1984; 94 (8):1027–30.
4. Black B. Mastoidectomy Elimination: Obliterate, Reconstruct, or Ablate? Otol Neurotol [Internet]. 1998;19(5). Available from: https://journals.lww.com/otology-neurotology/ fulltext/1998/09000/mastoidectomy_elimination__obliterate,.4.aspx
5. Mosher HP. A method of filling the excavated mastoid with a flap from the back of the auricle. Laryngoscope [Internet]. 1911;21(12):1158–63. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1288/00005537-191112000-00007
6. Smyth GD. Surgical treatment of cholesteatoma: the role of staging in closed operations. Ann Otol Rhinol Laryngol. 1988; 97(6 Pt 1):667–9.
7. Merchant SN, Wang P, Jang CH, Glynn RJ, Rauch SD, McKenna MJ, et al. Efficacy of tympanomastoid surgery for control of infection in active chronic otitis media. Laryngoscope. 1997;107(7):872–7.
8. Ramsey MJ, Merchant SN, McKenna MJ. Postauricular periosteal-pericranial flap for mastoid obliteration and canal wall down tympanomastoidectomy. Otol Neurotol Off Publ Am Otol Soc Am Neurotol Soc [and] Eur Acad Otol Neurotol. 2004;25(6):873–8.
9. Palva T. Surgical treatment of chronic middle ear disease. III. Revisions after tympanomastoid surgery. Acta Otolaryngol. 1988;105(1–2):82–9.
10. Morris DP, Luff DA, Hargreaves SP, Rothera MP. Bones of contention. The supply of temporal bones for dissection: the legalities, problems and solutions. J Laryngol & Otol. 1998;112(12):1138–1141.
11. Linthicum FHJ. The fate of mastoid obliteration tissue: a histopathological study. Laryngoscope. 2002; 112(10): 1777–81.
12. O'Sullivan PG, Atlas MD. Use of soft tissue vascular flaps for mastoid cavity obliteration. Laryngoscope. 2004; 114(5):957–9.
13. Kim BG, Kim HJ, Lee SJ, Lee E, Lee SA, Lee JD. Outcomes of Modified Canal Wall Down Mastoidectomy and Mastoid Obliteration Using Autologous Materials. Clin Exp Otorhinolaryngol. 2019;12(4):360–6.

14. Akula S, Reddy LS, Rani TM, Reshma B, Vaishnavi B. Surgical Efficacy of Mastoidectomy in Chronic Otitis Media: Squamosal Type. Indian J Otolaryngol head neck Surg Off Publ Assoc Otolaryngol India. 2023;75(Suppl 1): 250–4.
15. East CA, Brough MD, Grant HR. Mastoid obliteration with the temporoparietal fascia flap. J Laryngol Otol. 1991; 105(6):417–20.
16. Cheney ML, Megerian CA, Brown MT, McKenna MJ. Mastoid obliteration and lining using the temporoparietal fascial flap. Laryngoscope. 1995;105(9 Pt 1):1010–3.
17. Meuser W. Permanent obliteration of old radical mastoid cavities combined with tympanoplasty. J Laryngol Otol. 1984;98(1):31–5.
18. Duckert LG, Makielski KH, Helms J. Management of anterior epitympanic cholesteatoma: expectations after epitympanic approach and canal wall reconstruction. Otol Neurotol Off Publ Am Otol Soc Am Neurotol Soc [and] Eur Acad Otol Neurotol. 2002;23(1):8–13.
19. Yung MM, Karia KR. Mastoid obliteration with hydroxyapatite--the value of high resolution CT scanning in detecting recurrent cholesteatoma. Clin Otolaryngol Allied Sci. 1997;22(6):553–7.
20. Vadiya SI, Makwana P, Mehta N, Khetani S. Comparison of Different Techniques of Meatoplasty After Canal Wall Down Mastoidectomy. Indian J Otolaryngol head neck Surg Off Publ Assoc Otolaryngol India. 2022 ;74(Suppl 1): 589–92.
21. Smyth GD, Singh R, Hassard TH. Postoperative cholesteatoma: are claims for the canal wall down technique justified? Otolaryngol neck Surg Off J Am Acad Otolaryngol Neck Surg. 1980;88(4):473–6.