

Original research article

To determine the incidence of postoperative factors implicated in the aetiology of mastoid cavity problems: prospective observational study

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Abstract

Aim: The aim of the present study is to evaluate post-operative factors involved in the causation of cavity problems.

Materials and Methods: This prospective observational study was conducted in the Department of ENT, Patna Medical College and Hospital Patna, Bihar, India for 1 year. Total 135 patients who underwent canal wall down mastoidectomy were included in this study.

Results: The incidence of postoperative cavity problems in our set up is 37.04 %. Maximum incidence of cavity problem was found between 30–40 years (88%) followed by 10-20 years (22%) and 40-50 years (24%). Of the 50 patients with cavity problems, 68% were of sclerotic mastoid and 8% were of cellular mastoid and 24% were of diploic mastoid. 40 surgeries were done under general anaesthesia. Of the 50 problem cavities, 46 had prolonged discharge from mastoid cavity as the main problem (92%). Accumulation of wax in the cavity was present in 18 cases (36%). Vertigo persisting beyond the immediate postoperative period was present in 11 cases (22%). Perichondritis of pinna was found in 3 case (6%). Persistence or/development of facial palsy in post-operative period was found in 12 cases (24%) and recurrent cholesteatoma was seen in 8 cases (16%). 4 Cases had postoperative wound infection (8%). Out of 135 cases, 22 cases had a large post-operative cavity.

Conclusion: The incidence of post mastoidectomy cavity problems in this study was found to be 37.04%. Increased incidence of cavity problems was found predominantly in 30-40 age groups.

Keywords: recurrent cholesteatoma, mastoidectomy, vertigo

Introduction

Open mastoid cavity procedures are a form of surgical treatment of chronic otitis media and can be broadly defined as those procedures requiring the removal of posterior canal wall. Depending on how the middle ear and disease are managed, it can be identified by many names such as canal wall down mastoidectomy, modified radical mastoidectomy, Bondy mastoidectomy or radical mastoidectomy.¹ In 1873, Von Troltsch suggested that Schwartze's simple mastoidectomy needed to be modified to reduce persistent otorrhoea after initial surgery.^{2,3} Von Bergmann applied the term 'radical' to any procedure in which posterior and superior canal walls were removed.⁴ The rationale for a mastoidectomy combined with a tympanoplasty is that it can allow the surgical debridement of infected and devitalized tissues that can lead to persistent middle ear disease⁵, as well as reconstruction of the aerated

mastoid cavity. The mastoid air cell system acts primarily as a buffer to pressure changes in the middle ear⁶, and the presence of an aerated mastoid greatly increases the volume of the middle ear system, which can moderate pressure changes in the middle ear cavity. Thus, in a well-aerated mastoid, significant changes in the middle ear pressure will likely have little effect on the middle ear and tympanic membrane.⁶ Therefore, if surgery could increase the air volume in a poorly aerated mastoid cavity, the sequelae of chronic negative pressure, including atelectasis and cholesteatoma, could be reduced.⁷ It is very rare for any surgeon to treat cholesteatoma medically, making surgery the principle management of cholesteatoma. MRM is indicated in cases with unresectable disease, unreconstructable posterior canal wall, inadequate patient follow up and poor Eustachian tube function.⁸ The purpose of every open cavity procedure is to exteriorize the mastoid cavity for future monitoring of recurrent cholesteatoma, provide drainage for unresectable temporal bone infection and occasionally, provide exposure for difficult to access areas of temporal bone. Supporters of open cavity techniques stress upon the fact that even if some disease is left behind, it can be removed in subsequent visits and also, there is better ventilation of cavity which has a drying effect.⁹ Normally, the open cavity heals by secondary intention. Failure of healing and complete epithelisation leads to various cavity problems such as vertigo, otorrhoea, hearing impairment, wax/debris collection, dependency on doctor for repeated cleaning of cavity, difficulty in wearing hearing aids and residual/ recurrent disease.¹⁰ The aim of the study is to find incidence and causes for postoperative mastoid cavity problems after MRM.

Material and methods

This prospective observational study conducted in the Department of ENT, Patna Medical College and Hospital Patna, Bihar, India for 1 year, after taking the approval of the protocol review committee and institutional ethics committee.

Methodology

In this report, 135 patients who came in for canal wall down mastoidectomy were included, and all of them underwent the procedure. Purposive sampling was used, and all of the patients who took part in the study gave written informed consent.

According to the study's proforma, each patient was measured. They were judged mainly on the basis of their complaints, followed by a cavity examination. Per patient had a three-month follow-up at twice-weekly intervals. The full epithelialisation of an open mastoid cavity was granted a borderline healing time of 3-4 months in this report. As a result, any patient who presented with symptoms during this time was considered to have a cavity problem. The cases were reviewed depending on their psychiatric signs. For each case, any of the proven predisposing factors, was determined by cavity examination.

When required, investigations like culture and sensitivity of pus was done. Measurement of parameters like facial ridge height, size of cavity and size of meatoplasty were adopted from standard studies conducted by other authors. In this study 5 cc is taken as the volume of a large mastoid cavity, 3-5 cc, small less than 3 cc. Appropriate medical treatments like topical/systemic antibiotics, aural toilet, steroids and cauterisation were given. Chemical cauterisations of granulations were attempted on an outpatient basis. Patients were followed up at intervals of 2-3 weeks after the treatment to assess the progress. Some cases were admitted in the ward for protracted symptoms and they were given parenteral medication. Rarely cases required surgical management.

Results

135 patients who underwent canal wall down mastoidectomy were included in this study. 50 patients had postoperative cavity problems. Hence according to this study, the incidence of postoperative cavity problems in our set up is 37.04 %

Table 1: Distribution of patients on the basis of demographic profile

Gender	No. of cases	%
Male	31	62
Female	19	38
Age groups (years)		
Below 10	1	2
10-20	11	22
20-30	5	10
30-40	14	28
40-50	12	24
Above 50	7	14

Youngest patient to undergo mastoidectomy was a 8 year old boy. The youngest patient who presented with cavity problem was of 10 years. The oldest patient who presented with cavity problems was a 58-year-old female. Of the 135 cases, 90 patients were males and 45 patients were female. Of the 50 patients who presented with cavity problems, 31 patients were males (62%) and 19 patients were females (38%). Maximum incidence of cavity problem was found between 30–40 years 88% followed by 10-20 years 22% and 40-50 years was 24%.

Table 2: Pneumatisation of mastoid, type of surgery and type of anesthesia during the procedure

Mastoid Pneumatisation	No. of Cases=135	Cases with cavity problem=50	%
Sclerotic	91	34	37.36
Cellular	24	4	16.67
Diploic	20	12	60

Of the 135 cases, 91 (67.41%) had sclerotic mastoid and 24 (17.78%) had cellular mastoid and 20 (14.81%) had diploic mastoid. Of the 91 sclerotic mastoids, 34(37.36%) had post mastoidectomy cavity problems. Of the 20 diploic mastoid, 12 (60%) had postoperative cavity problems and of the 24 cellular mastoids, 4 (16.67%) had postoperative cavity problems. i.e., Of the 50 patients with cavity problems, 68% were of sclerotic mastoid and 8% were of cellular mastoid and 24% were of diploic mastoid. 40 surgeries were done under general anaesthesia. All the 135 patients underwent modified radical mastoidectomy.

Of the 50 problem cavities, 46 had prolonged discharge from mastoid cavity as the main problem (92%). Accumulation of wax in the cavity was present in 18 cases (36%). Vertigo persisting beyond the immediate postoperative period was present in 11 cases (22%). Perichondritis of pinna was found in 3 case (6%). Persistence or/development of facial palsy in post- operative period was found in 12 cases (24%) and recurrent cholesteatoma was seen only in 8 cases (16%). 4 Cases had postoperative wound infection (8%).

Table 3: Post-operative problems

Cavity problems	Number	%
Discharge	46	92
Wax	18	36
Vertigo	11	22
Perichondritis	3	6
Facial palsy	12	24
Recurrent cholesteatoma	8	16
Post-operative wound infection	4	8

Table 4: Post-operative analysis

Post-operative analysis	Number
Larger cavity	11
High facial ridge	35
Meatoplasty stenosis	6
Exposed middle ear and eustachian tube	31
Post-operative granuloma	31

According to Table 4, of the 135 cases, 22 cases had a large post-operative cavity. Hence out of the 50 postoperative mastoid cavity problems, 11 cases had large postoperative cavity, 35 cases had high facial ridge, 5 case had stenosis of meatoplasty, 31 cases had exposed middle ear and eustachian tube and 31 had postoperative granulations.

Discussion

The key to success in otological surgery is not whose technique one uses, but how well one uses it and one's own ability and judgement. A perfectly performed primary canal wall down mastoidectomy with tympanoplasty not only results in a trouble free and water tolerant ear, but also good hearing results. In the present study 50 patients had post-operative mastoid cavity problems. Hence 37.04% of the total had cavity problems, according to this study. Sade et al had 28% post mastoidectomy cavity problems and Kos et al had 30% cavity problems.^{11,12} Khan et al had 26.6% problem mastoid cavities.¹³ Hence, this study has almost comparable incidence of cavity problems to previous studies.¹³ Maximum incidence of cavity problem was found between 30–40 years 88% followed by 10-20 years 22% and 40-50 years was 24% according to this study. Vaid et al got the same findings in their study.¹⁴ But Vartianen had different observations. Vartianen had maximum incidence between 20 and 30 years.¹⁵ In the study 70% of patients with high facial ridge had cavity problems. A study conducted by Sade et al this was 80%.¹⁰ Almost same value was obtained by Vaid et.al also.¹⁴ This finding points to the need of lowering the facial ridge upto the level of floor of external auditory canal. On doing so adequate care should be taken to avoid injury to facial nerve, especially in cellular mastoids, where one can expect extensive pneumatisation onto the per facial and retro facial cell tracts with a deep mastoid tip. Exposed middle ear and eustachian tube areas were found to be a significant factor causing postoperative discharge from the cavity. This was proven by all the previous studies conducted by Sade et al and Castrellion et al, only 18.18% grafted cases had cavity problems whereas 30.35% cases had cavity problems when grafting was not done.^{11,16} Meatoplasty stenosis was found only in 12% cases. According to Sade et al, only 30% of their patients with meatoplasty stenosis attained dry cavity.¹¹ Vartianen et al had 27.8% cases of meatoplasty stenosis.¹⁵

Conclusion

In this analysis, the rate of post-mastoidectomy cavity complications was found to be 37.04 percent. Cavity issues were found to be more common in people between the ages of 30 and 40. The prevalence of cavity problems did not vary significantly depending on the form of anaesthesia (general/local). Sclerotic mastoids have significantly more cavity complications. The key cavity problem in this analysis was found to be chronic cavity discharge. The condition should be absolutely eradicated from the middle ear and mastoid. A well lowered facial ridge is a prerequisite for achieving a dry cavity.

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