

Study on the Various Surgical Techniques of Cholesteatoma at SMC Vijayawada

T V S S N Leela Prasad¹, L Dasaradha Rao², G B Sreenivas³, Peter Mummdivarapu⁴,
K.Ravi⁵, P Ratna Babu⁶.

¹Associate Professor, Department of ENT, SMC, Vijayawada

²Associate Professor, Department of Paediatric Surgery, SMC, Vijayawada

³Assistant Professor, Department of ENT, SMC, Vijayawada

⁴Senior Resident, Department of ENT, SMC, Vijayawada

⁵Professor & HOD, Department of ENT, SMC, Vijayawada

⁶Assistant Professor, Department of ENT, SMC, Vijayawada

Received: 25-11-2023 / Revised: 23-12-2023 / Accepted: 26-01-2024

Corresponding Author: Dr. Peter Mummdivarapu

Conflict of interest: Nil

Abstract:

Introduction: This study was conducted to analyze the various techniques in surgical management of cholesteatoma.

Study Design: 1 year study from January 2023 to December 2023 in Government General Hospital-Siddhartha medical college Vijayawada.

Methods: Total of 50 patients with cholesteatoma was included based on symptomatology such as discharge from ear, hard of hearing, giddiness. Lower and upper age limit is 10 to 50 years, investigations include all hematological, radiological, and therapeutic procedures were done. All sensorineural cases excluded.

Results: Male to Female ratio observed to be 3:1 most common age group was 11 years to 20 years MRM with Columella Ty-III

Keywords: Atticotomy, Attico-aantrostomy, Radical Mastoidectomy, Cavity Obliteration.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

In ENT Practice CSOM is common disease amongst all age groups and both sexes. In children also its common, majority of the patients neglect the disease, belong to low socio-economic groups and illiterates they seek medical advice because of foul smelling discharge, defective hearing and development of complications [1].

In developing countries like India CSOM holds significant problem in low socio-economic groups. In my study an attempt is made to highlight the various surgical techniques in the management of cholesteatoma. Anticoanal disease involves the attic, antrum and the posterior tympanum, the main pathological features is the formation of cholesteatoma and the granulation tissue which causes the erosion of the bone and exposure of the adjacent structures and complications, so it is termed as dangerous type of CSOM. Marginal and attic perforations are commonly associated with cholesteatoma [2]. The management of csom cases has undergone technical advances during the past 30 years, in the light of these developments it's now possible to remove the disease meticulously

from the tympanomastoid area which enables the surgeon to achieve a dry safe and trouble-free ear.

This process may result in maintenance of existing hearing or provide surgical environment suitable for sound transformation mechanism, mastoidectomy and tympanoplasty techniques are together essential in achieving the objective of healing and hearing.

A number of various techniques have evolved in order to handle different clinical and anatomical situation, the various types of mastoidectomy vary with the management of posterior auditory canal wall (up or down) and whether tympanic membrane and ossicular chain reconstruction is required [3].

However, the elimination of the disease must always take the precedence to ensure the patients safety. There are various techniques available to the audiologist to reconstruct or obliterate the mastoid cavities so that the cavity problems are avoided. The surgeon should therefore be familiar with the range of techniques to deal with the disease.

Middle Ear Cleft: It consists of tympanic cavity, eustachian tube, aditus ad antrum, mastoid antrum and the pneumatic system of the temporal bone [4].

Cholesteatoma: It's the squamous epithelium lined pocket in the middle ear with full of inflammatory debris, it is also called keratoma cholesterol. Atticoantral diseases most commonly involve the pars flaccida and it's characterized by the formation of the retraction pocket in which keratin accumulates to produce cholesteatoma [5].

Classification: there are 2 types recognized congenital and acquired cholesteatoma, congenital cholesteatoma originates from the ectodermal cell rests this may arise in any of the cranial bones but the petrous part of temporal being the commonest.

Granulation tissue it the hallmark of the healing often develops in association with cholesteatoma.

Aims:

- To study the goals of tympanomastoid surgery with relevance disease clearance and prevention of complications.
- To evaluate the incidence and prognostic factors of the cholesteatoma in age, sex and socio-economic status.
- To reserve residual hearing, restoration of the functional hearing wherever possible and post-operative follow up.
- To evaluate the clinical history, intraoperative findings, type of disease, disease extension.

Objectives:

- Removal of whole disease from middle ear cleft.
- To prevent the recurrence of the disease.
- To prevent intracranial and extra cranial extension.
- To conserve the residual hearing and enable the patient to lead a normal life.

Materials and Methods:

Present study of various surgical techniques of cholesteatoma done at Ent department govt. general hospital, Vijayawada. JAN 2023 to DEC 2023.

During this period 50 patients of either sex with attico antral disease were selected, details of the patients to age, sex, laterality, duration of symptoms and complications and type of disease are recorded. Patient posted for tympanomastoid surgery have subjected to detailed preoperative and postoperative audiometric evaluation.

Inclusion criteria: Patients with hard of hearing, ear discharge, of age between 10 – 15 years in both sexes are included.

Exclusion criteria: Age > 50 years of age with tinnitus are excluded.

Treatment: Under general anesthesia post aural incision was given, Temporalis fascia graft harvested, Tympano meatal flap elevated, middle ear examined ossicular status identified, and decision on the mastoidectomy was made during surgery depending on the ossicular status.

All patient posted were subjected to preoperative audiometric evaluation. Meticulous postoperative care was taken and all cases were followed up to 6 months.

For the management of cholesteatoma basic procedures are Atticotomy, Attico-aanrostomy, Radical Mastoidectomy and Modified Radical Mastoidectomy these are canal wall down procedures. Canal wall up procedures like cortical mastoidectomy, combined approach tympanoplasty, mastoid tympanoplasty. Cavity obliteration and canal wall reconstruction can be done by muscle or other oblitative techniques, to convert the open cavity to closed cavity [6].

Age Distribution:

In our study it was found that majority of the cases are between 11 – 20 years.

Table 1:

| S. No | Age in years | Percentage |
|-------|--------------|------------|
| 1. | 0-10 | 16 |
| 2. | 11-20 | 46 |
| 3. | 21-30 | 28 |
| 4. | 31-40 | 8 |
| 5. | >41 | 2 |

Table 2: Sex Distribution

| S.No | Sex | Percentage |
|------|--------|------------|
| 1. | Male | 60% |
| 2. | Female | 40% |

Table 3: Side of Discharge

| S.no | Side | No of patients | Percentage % |
|------|-----------|----------------|--------------|
| 1. | Left | 18 | 36 |
| 2. | Right | 22 | 44 |
| 3. | Bilateral | 10 | 20 |

Table 4: Clinical Profile

| S.No | Symptoms | No. Of Patients | Percentage |
|------|--------------|-----------------|------------|
| 1. | Otorrhoea | 50 | 100 |
| 2. | Hearing Loss | 42 | 84 |
| 3. | Otalgia | 19 | 38 |
| 4. | Giddiness | 3 | 6 |

Table 5: Otoscope Findings

| S.no | Otoscopy findings | No of patients | Percentage |
|------|-----------------------|----------------|------------|
| 1. | Cholesteatoma | 28 | 56% |
| | PSQ – | 7 | 14% |
| | ATTIC - | 21 | 42% |
| 2. | Granulations | 10 | 20 |
| 3. | Chol + granulation | 3 | 6 |
| 4. | PSQ retraction pocket | 2 | 4 |
| 5. | Aural polyp | 7 | 14 |

Table 6: Preoperative audio logical assessment

| S.No | Air Bone Gap in dB | No of cases | Percentage (%) |
|------|--------------------|-------------|----------------|
| 1 | 10-20 | 4 | 8 |
| 2 | 20-30 | 6 | 12 |
| 3 | 30-40 | 8 | 16 |
| 4 | 40-50 | 19 | 38 |
| 5 | >50 | 12 | 24 |
| 6 | Mixed loss | 1 | 2 |

Table 7: Complications of CSOM (atitico antral disease)

| S.no | Complications | No of cases | Percentage (%) |
|----------------------|------------------------------|-------------|----------------|
| Intratemporal | | 11 | 84.6 |
| 1 | Mastoid abscess | 5 | 45.45 |
| 2 | Post aural fistula | 3 | 27.27 |
| 3 | Acute mastoiditis | 1 | 9.1 |
| 4 | Labyrinthitis | 1 | 9.1 |
| 5 | Facial palsy | 1 | 9.1 |
| Intra Cranial | | 2 | 15.4 |
| 1 | Meningitis | 1 | 50 |
| 2 | Temporoparietal lobe abscess | 1 | 50 |

Table 8: Type of Operations

| S.No | Name of surgery | No of cases | Percentages |
|------|--|-------------|-------------|
| 1 | Atticotomy (A) | 6 | 12 |
| 2 | Attico-antrostomy(AA) | 6 | 12 |
| | 1. AA with type 1 tympanoplasty | 4 | 8 |
| | 2. AA with myringomal leostapediopexy | 1 | 2 |
| | 3. AA with ossiculoplasty (incus inter position) | 1 | 2 |
| 3 | Radical mastoidectomy | 4 | 8 |
| 4 | Baffle effect (type-IV tympanoplasty) | 1 | 2 |
| 5 | MRM | 3 | 6 |
| | 1. MRM with cavity obliteration | | |
| | 2. Myringostapediopexy | 2 | 4 |
| | 3. Malleoplatinopexy | 1 | 2 |
| 6 | MRM with Columella (Ty-III) | 22 | 44 |
| 7 | ICW mastoidectomy (CAT) | 5 | 10 |

Table 9: Pathology in Middle Ear

| S.no | Pathology | No. of Cases | Percentage |
|------|-----------------------------|--------------|------------|
| 1. | Cholesteatoma alone | 10 | 20 |
| 2. | Cholesteatoma + granulation | 35 | 70 |
| 3 | Granulation alone | 5 | 10 |

Table 10: intraoperative findings

| S.no | Intraoperative findings | No of cases | Percentage |
|------|-----------------------------|-------------|------------|
| 1 | Incus erosion | 33 | 66 |
| 2 | Malleus involvement | 17 | 34 |
| 3 | Stapes suprastructure | 28 | 56 |
| 4 | Involvement of sinus plate | 7 | 14 |
| 5 | Involvement of dural plate | 6 | 12 |
| 6 | LSCC fistula | 1 | 2 |
| 7 | Involvement of facial nerve | 1 | 2 |
| 8. | involvement of ET Tube | 1 | 2 |

Table 11: Postoperative Complications

| S. No | Complications | No of cases | Percentage |
|-------|----------------------------------|-------------|------------|
| 1 | Infection of cavity | 8 | 16 |
| 2 | Granulations | 6 | 12 |
| 3 | Post aural fistulae | 2 | 4 |
| 4 | Facial nerve involvement | 1 | 2 |
| 5 | Meatal stenosis | 2 | 4 |
| 6 | Residual/recurrent cholesteatoma | 7 | 14 |
| 7 | Perichondritis | 1 | 2 |
| 8 | SNHL | 1 | 2 |

Table 12: Postoperative Audio logical Assessment

| S.No | Air bone gap in dB | No of cases | Percentage |
|------|-------------------------------|-------------|------------|
| 1 | <10 | 3 | 6 |
| 2 | 10db | 4 | 8 |
| 3 | 20db | 12 | 24 |
| 4 | 30 | 8 | 16 |
| 5 | 40 | 8 | 16 |
| 6 | No improvement | 6 | 12 |
| 7 | Worse than preoperative level | 3 | 6 |

Discussion

Commonest age involved are between the age of 11- 20 years, mean age at presentation was 19.6 years. Youngest age was 5 years and oldest was 50 years. Male to female ratio is 15:1 Disease was predominant in rural areas and lower socioeconomic status. Right ear more common than the left ear. Most common presentation was otorrhea and clinical sign was cholesteatoma. Attic perforation was the commonest type of drum defect seen on otoscopy followed by posterosuperior marginal perforation.

Primary acquired Cholesteatoma was seen in 70% of the patients, secondary attic cholesteatoma – 26% of the patients' recurrent cholesteatoma 4%. Radiological examination showed 81% of sclerotic mastoid and 4% pneumatic mastoid and 8% suggestive mastoiditis and 7% had cavity formation showed maximum loss 40 -50DB (38%), 24% of the cases showed more than 50DB loss. Higher AB gap in our series reflects the greater extent of the disease and the ossicular disruption. 4% of the patients had intracranial complications and 22% infratemporal complications, most common was mastoid abscess followed by post aural fistula 6%. The incidence of the complication was seen to be higher among 16 years of age when compared to

the adult age. The higher preop AB gap reflects the higher complication rates. Higher preop duration of symptoms and relatively high incidence of secondary acquired cholesteatoma reflects the patients' attitude of ignoring symptoms, so the risk of complications is high. Low socioeconomic status, low literacy rate, poor health consciousness has been observed to be the important factor influencing the course of chronic ear disease in our series of patients [7]. Preoperative counselling was done for all the patients and intraoperative decision was taken regarding the mastoidectomy to be performed after seeing the state of Ossicular pathology and nature of the disease in the antrum. MRM with type 3 tympanoplasty was the commonest procedure performed (44%), About 24% of the patients underwent intact canal Wall mastoidectomy with tympanoplasty & 6% of patients underwent cavity obliteration. Ossicular reconstruction was done in 10 cases with autologous incus. Cholesteatoma was usually accompanied by granulation tissue (70%) as compared to cholesteatoma alone (20%), the attic was the commonest site affected while Eustachian tube area was the least affected. Patient with attic perforation, chronic mastoiditis was found to be relatively less extensive and more commonly present in the form of smooth sac, being confined

mostly to the attic and adjacent part of the antrum when compared to the patients with posterosuperior marginal perforation. Some of the cases with recurrent cholesteatoma had previous findings of cholesteatoma with granulation tissue suggests that active csom with granulation tissue may be more difficult to control than csom with cholesteatoma. Eradication of cholesteatoma was considered complete in 94% of the cases, 4% had involved foot plate and 2% Lateral semi-circular canal. Healing was seen in 86% of patients postoperatively by 6 months. An apparent increase in healing period in children who presented with subperiosteal abscess was observed. Postop infection of the cavities was commonest complication observed (16%), followed by granulations (12%) which were treated conservatively. One patient required facial nerve decompression 24 hours after the mastoid surgery. Recurrent cholesteatoma was seen in 14% of which 5 patients underwent revision mastoidectomy and had other ear surgery in 3 months and 2 patients didn't turn up for revision procedure, 4 % of patient required revision meatoplasty which healed completely after 3 months marked SN loss was seen in one case where there was disease extension in to the labyrinthine oval window. Post-op audio logical assessment found an overall improvement of 43% (< 20 DB AB gap and worsened in 6 cases. A total failure rate of 10% was seen in canal wall down procedure while canal wall up procedure showed 3%, revision mastoidectomy was done for total of 5 cases for residual disease.

Conclusion

Canal wall down mastoidectomy without tympanoplasty is a good primary procedure in csom with cholesteatoma, a meticulous one stage procedure CWD procedure in ear with extensive cholesteatoma results in a good percentage of safe and stable ears with satisfactory function, comparable Intact canal wall up procedure. Factors, poor socioeconomic status, lack of reliability to attend for a second procedure, poor general health of patients sclerotic mastoiditis, active and extensive cholesteatoma in the majority of patients

& presence of preop complications were some of the factors which favoured an open cavity approach in the majority of patients in our series only in this way the certain need for a second look procedure within one year and further interventions subsequently to detect residual cholesteatoma will be avoided

References

1. Nshimirimana, J. P. D., & Mukara, K. B. Causes of delayed care seeking for chronic suppurative otitis media at a Rwandan tertiary hospital. *International Journal of Otolaryngology*, 2018; 1–5.
2. No date) Tympanic membrane perforations. Available at: https://hillsent.com.au/wp-content/uploads/2019/08/TympanicMembrane-Perforations-Update_Dr-Nirmal-Patel_article1.pdf (Accessed: 29 Nov. 2023).
3. Zhang, L. Therapeutic outcomes of canal wall up mastoidectomy in combination with type I tympanoplasty in otitis media, *Pakistan journal of medical sciences*. 2016. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4928399/> (Accessed: 29 Nov. 2023).
4. Tympanic cavity (no date) Tympanic Cavity - an overview | ScienceDirect Topics. Available at: <https://www.sciencedirect.com/topics/medicine-and-dentistry/tympanic-cavity> (Accessed: 29 Nov. 2023).
5. No date a) Middle ear cholesteatoma - statpearls - NCBI bookshelf. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK448108/> (Accessed: 29 Nov. 2023).
6. Mendlovic, M.L. et al. Mastoid obliteration and Reconstruction Techniques: A review of the literature, *Journal of otology*. 2021; Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8241697/> (Accessed: 29 Nov. 2024).
7. Schuh, M.R. and Bush, M.L. Evaluating equity through the Social Determinants of Hearing Health, *Ear and hearing*. 2022. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9219021/> (Accessed: 29 Nov. 2024).