



HEARING RESULTS FOLLOWING MODIFIED RADICAL MASTOIDECTOMY FOR CHRONIC OTITI MEDIA , SQUAMOSAL TYPE AT A TERTIARY CARE HOSPITAL. A CASE STUDY

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ABSTRACT **Aims and Objectives:** To evaluate hearing results following modified radical mastoidectomy for chronic otitis media of active squamosal type.

Methods: This is a time bound cross sectional study. This clinical study comprised of 50 patients collected randomly from patients attending dept of ENT, ASRAM medical college, from July 2014 to July 2016. Institutional ethics committee approval has been taken. All patients subjected for detailed clinical history and examination. All patients were subjected to routine preoperative investigations, HRCT scan of temporal bones and all underwent modified radical mastoidectomy.

Results: Among all the patients, 36 patients had unilateral disease, and 14 had bilateral disease. Average preoperative and postoperative air conduction thresholds were 43.21db and 34.18db respectively with a net gain of 9.03db which was also statistically significant. Average preoperative and postoperative air bone gap were 23db and 14.78db respectively with a net gain of 8.22 db which was also statistically significant.

Conclusion: The study showed that a proper modified radical mastoidectomy done for chronic otitis media of active squamosal type, gave high percentage of dry ears (80%) and this procedure showed improved hearing in 90% cases, same hearing levels in 4% cases and diminished hearing in 6% cases.

KEYWORDS : Chronic otitis media, modified radical mastoidectomy, pure tone audiometry, air bone gap, Incus autograft.

INTRODUCTION:

CSOM Atticoantral type or chronic otitis media, squamosal type, is one of the most common clinical conditions we come across in ENT OPD causing significant morbidity to patient. It has significant impact on quality of life of patient. Chronic otitis media (COM) is an inflammatory process in the middle-ear cleft that results in long-term, or more often, permanent changes in the tympanic membrane including atelectasis, dimeric membrane formation, perforation, tympanosclerosis, retraction pocket development, or cholesteatoma. Chronic otitis media results from long-term Eustachian tube dysfunction with a poorly aerated middle-ear space, multiple bouts of acute otitis media, persistent middle-ear infection, or other chronic inflammatory stimulus. Chronic otitis media can be classified as healed otitis media, active squamosal, inactive squamosal, and active mucosal and inactive mucosal.

In general, the primary symptom of COM is hearing loss, but patients may also present with otorrhea, otalgia, aural fullness, tinnitus and otorrhagia. It often results in partial or total loss of the tympanic membrane (TM) and ossicles, leading to conductive hearing loss that can range in severity up to 60db.

The term *cholesteatoma*, coined by the German physiologist Müllerin 1838, is a misnomer. As per Abramson et al Cholesteatoma can be defined as “three dimensional epidermal connective tissue structure, usually in the form of sac, confined to middle ear cleft and has progressive and independent growth at the expense of underlying bone and has tendency to recur even after removal”. Bone erosion is present in the majority of mature cholesteatomas. Initially, bone erosion is confined to the ossicular chain and scutum. As the cholesteatoma expands, erosion of the otic capsule, fallopian canal, and tegmen can occur.

The treatment of cholesteatoma remains one of the most challenging tasks for otologists today. This condition is treated with the twin objectives of eradicating the disease and reconstructing the damaged conducting apparatus, so as to provide a functioning ear.

Initially the main aim of the surgery was disease eradication and after the introduction of the operating microscope in 1921 by Nylen and Holmgren ossicular reconstruction also became an important consideration. One of the surgical modalities of treatment for this is canal wall down mastoidectomy (CWDM) which broadly means a procedure requiring removal of the posterior wall of external auditory canal. It includes both radical and modified radical mastoidectomy.

The objective of these procedures was to remove safely all bone-involving disease; create an accessible, exteriorized cavity for lifelong cleaning and care; and promote epithelialization of the cavity with healthy skin.

The advantages of this procedure include excellent intraoperative exposure of cholesteatoma facilitating eradication of disease and easy detection of recurrence postoperatively. It decreases the need for second stage operation and cost-effectiveness. The major drawback with this procedure is the cavity problems like discharging ear, granulations, wax and keratin accumulation, difficulty in prescribing hearing aids, dizziness and wide meatus encountered postoperatively. If cavity problems and the means to prevent them are identified, quality of life of patients can be improved. The ultimate aim of the surgeon is clearance of the disease as much as possible and to reconstruct ossicles so as to provide a disease free as well as a functioning ear.

The purpose of this study is to evaluate hearing results following canal wall down mastoidectomy in chronic suppurative otitis media of attico-antral type in our setting which is a tertiary care hospital.

METHODS:

Design of study: Prospective study.

With a written informed consent, all the patients diagnosed to have chronic suppurative otitis media with atticoantral disease between July 2014 and July 2016 are subjected to surgical treatment in the form of canal wall down mastoidectomy. The preoperative and postoperative hearing levels are subjected to statistical analysis.

INCLUSION CRITERIA:

Patients having chronic otitis media, squamosal type active or inactive.

EXCLUSION CRITERIA:

- Those patients with previous history of surgery for chronic otitis media, atticoantral disease.
- Those patients with severe sensorineural hearing loss.
- Congenital and Residual cholesteatoma

Fifty cases of chronic otitis media with squamosal disease irrespective of the presence or absence of complications were selected for the study.

The selected cases were subjected to detailed history taking and clinical examination. Complete examination of the ear was done.

Nose, paranasal sinuses, oral cavity and pharynx were also examined to rule out any foci of infection. Systemic diseases unrelated to the ear disease were ruled out.

The selected cases were subjected to standard preoperative investigations and screening protocols. Ear discharge was sent for culture and sensitivity. X-ray mastoids (Law's view) were taken for all cases and HRCT Scan was done for all patients. All cases underwent otoendoscopy and examination under microscope. Pure tone audiometry was done in a sound proof room using Arphi SX5 digital multiaudiometer for all cases.

All the patients admitted were operated under general anaesthesia. Temporalis fascia was the graft material taken in all cases, associated with conchal cartilage graft from in some cases. Reconstruction of the hearing mechanism was undertaken in all possible cases. A wide meatoplasty was done in all cases. Following surgery, the cavity and the external auditory canal were filled with gelfoam and mastoid bandage was applied which was taken off on the seventh postoperative day when the sutures were removed.

Postoperative intravenous antibiotics were given. All the patients were followed up weekly for one month, fortnightly for three months and then once in two or three months till the end of the study. Puretone audiometry was done at six months or after the postoperative cavity has healed, whichever was earlier.

OBSERVATIONS AND RESULTS:

This study involved 50 patients with cholesteatoma who underwent canal wall down mastoidectomy. The observations made during the course of the study are as follows.

Age distribution: In this study, 62% of our patients were in 11-30 years age group, 28% above 30 years and 10% less than 10 years.

Sex distribution of the patients: That includes 54% males and 46% females

Symptom distribution: The presenting symptoms of all the patients were analyzed and the observations are: 96% of patients had ear discharge, 92% had decreased hearing, blood stained ear discharge in 6% cases, reeling sensation in 12% of cases.

X – Ray mastoids: In all the cases X – ray of the mastoids, Law's lateral view was taken and was analysed. 52% of cases had sclerosed mastoids on both sides, 44% had sclerosed mastoids on diseased side and 4% had a cavity.

Pure tone audiometry: The patients were stratified as per WHO classification of hearing loss and were subjected to pure tone audiometry and the results are as shown in the following table:

The maximum distribution was observed in the 26 – 40 dB range, followed by 41 – 60 dB range and 61- 80 dB range.

Table - 1 Average preoperative air conduction threshold

Average air conduction	No. of cases	Percentage (%)
Upto 25 dB	-	-
26 – 40 dB	26	52
41-60 dB	20	40
61-80dB	4	8

Majority of cases had average preoperative air conduction between 26- 40dB. Mean preoperative air conduction was 43.21dB.

Average postoperative air conduction was classified according to the WHO classification and is tabulated as follows .

Table - 2 Average postoperative air conduction

Average postoperative air conduction	No. of cases	Percentage (%)
Upto 25dB	17	34
26-40dB	19	38
41-60dB	11	22
61-80dB	3	6

The majority of cases had postoperative air conduction between 26 - 40dB range. Mean postoperative air conduction was 34.18 dB.

In 68%of cases it is pure conductive hearing loss and 32% it is mixed hearing loss.

Preoperative air bone gap, was less than 20db in 44% of cases, 21-30db in 40% of cases and more than 30db in remaining 16% of cases. Average preoperative air bone gap was 24db. Post operative air bone gap, was less than 20db in 64% of cases, 21-30db in 28% of cases and more than 30db in remaining 8% of cases. Average post operative air bone gap was 14.78db.

The overall results of hearing are as follows: hearing improved in 90% of cases, 4% of cases it remained the same and 6%of cases hearing deteriorated.

The ossicular erosion pattern found intra operatively revealed long process of incus erosion in 26% of cases, erosion of long process of incus as well as stapes suprastructure in 32% of cases, both malleus and incus are eroded in 14% cases, all ossicles eroded in 10% of cases and in 18% of cases ossicles were intact.

DISCUSSION:

The treatment of cholesteatoma remains one of the most challenging aspects of Otologic surgery today. Eradication of the disease from the middle ear cleft has always been the topmost priority for the Otologic surgeon in order to prevent complications and/or recurrence. Canal wall down mastoidectomy in the form of Modified radical mastoidectomy is the preferred surgical procedure for chronic suppurative otitis media of atticofacial type. The reasons for this are poor compliance of otologic follow up and usually patients present late with extensive disease, and their hearing status during presentation being poor.

The purpose of this study is to evaluate hearing results following canal wall down mastoidectomy in chronic suppurative otitis media of atticofacial type. A total of 50 cases of canal wall down mastoidectomy procedures were conducted in the institute in between July 2014 and July 2016.

Age: The age of the patients varied between 6 and 62 years. The maximum number of patients were in the age group of 11 to 30 years which is in accordance with study conducted by Gupta et al (1998). The mean age in this study was found to be 26.81 years. In a study conducted by Eero Vartiainen(1998), the mean age was found to be 38 years while Paparella and Kim (1977) noted a mean age of 35.1 years.

Sex: Males predominated in the present study, with 54% males and 46% females showing the disease. According to the study conducted by Eero Vartiainen there were 54 female patients and 82 male patients. According to the study conducted by Ramazan Öcalan 18 were females and 28 were males .

Clinical picture: The commonest presenting symptom in this study was otorrhoea which was found in 96 % of the cases, followed by hearing loss which is found in 92% of the cases. Edelstein et al (1988) noted hearing loss in 85 % and otorrhoea in 73% of the cases. Other symptoms like otalgia, ear bleeding, tinnitus, Vertigo were found in 28%, 6%, 8% and 12% respectively.

Radiological Profile: In this study all the cases with atticofacial disease were found to have a sclerosed mastoid. Bilateral sclerosis was found in 52%cases, sclerosis on affected side in 44% cases and a cavity in 4%. Of the 26 cases that showed bilateral sclerosis, 10 of them had bilateral disease and the rest 16 had bilateral sclerosis but unilateral disease. So it is difficult to infer whether sclerosis predisposes the mastoids to cholesteatoma formation or if sclerosis is the result of cholesteatoma.

Pure tone audiometry: All the patients selected for the study were taken up for pure tone audiometry. The air bone gap (ABG) closure was calculated by taking the difference between the air conduction and bone conduction threshold. The air and bone conduction threshold was recorded both preoperatively and postoperatively. The post operative air bone gap (ABG) closure was calculated by taking the difference between the preoperative ABG and postoperative ABG of the average frequencies of 500,1000 and 2000Hz.

Preoperative audiometry:

Majority of the cases fell in the 26- 40 dB hearing loss range i.e about 52% of the cases, followed by those in the range of 41- 60 dB hearing

loss range accounting to 40% followed by those in the range of 61-80 dB range accounting to 8%. 68% showed conductive hearing loss while 32% showed mixed hearing loss.

In 48% of the cases air bone gap was in between 21 - 40 dB, while 52% of the cases had an air bone gap >41dB preoperatively.

The mean air conduction threshold is 43.21 dB in the current study. This is comparable to 39.0 dB found by Vartiainen in his second subgroup (1986-1995) and high as compared to 47.0 dB found by him in his first subgroup (1976-1985).

The median air bone gap in this series is 24 dB which is comparable to 1986-1995 subgroup of Vartiainen which is 25 dB. The second subgroup of Vartiainen, i.e 1976 to 1985 had a median air bone gap of 50 dB.

Postoperative audiometry:

In 64% of patients had less than 20 dB air bone gap, 28% of patients had an air bone gap between 21 and 30 dB. The remaining 8% patients had an air bone gap of more than 31dB.

Postoperatively the mean air bone gap was found to be 14.78 dB. This shows the improvement in hearing as compared to the preoperative mean air bone gap of 24 dB. Thus the net gain in the air bone gap was found to be 9.22 dB.

Similarly the mean preoperative air conduction threshold was 43.21 dB and the mean postoperative air conduction threshold was 34.18, thus showing a net gain of 9.03 dB.

CONCLUSION:

For COM squamosal disease, either active or inactive, modified radical mastoidectomy gives good disease eradication and hearing improvement. Presence of stapes suprastructure improves hearing better than the cases where suprastructure is absent. PORP or sculptured autograft incus or cartilage graft gives good hearing improvement in these cases.

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