



TO EVALUATE THE RESULTS OF COMPLETE EXENTERATION OF MASTOID AIR CELL TRACTS UNDERLYING CHOLESTEATOMA WITH CANAL WALL DOWN MASTOIDECTOMY

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ABSTRACT

Chronic Suppurative Otitis Media (CSOM) is long standing infection of mucoperiosteal lining of middle ear cleft. CSOM is classified into Tubotympanic or Safe and Atticoantral or Unsafe type. Atticoantral type involves the pars flaccida and is characterized by formation of a retraction pocket in which keratin accumulates to produce cholesteatoma. Mainstay of the management of atticoantral disease is surgery of mastoid and middle ear. Majority of otolaryngologists find the Canal wall down, open cavity operation with wide access to be the safest and simplest means of managing middle ear cholesteatoma. In present study, results of complete exenteration of mastoid air cell tracts underlying cholesteatoma with canal wall down mastoidectomy are studied.

KEYWORDS : cholesteatoma, complete exenteration, mastoidectomy, canal wall down

Introduction –

CSOM is not only a common disease in India but also extracts a major chunk of efforts of otolaryngologists in terms of sheer numbers. Also important is its potential to cause serious complications, more with Atticoantral type, leading to significant morbidity. Primary objectives of various treatments of atticoantral disease are ; to render the ear safe, to remove diseased bone, disorganized mucosa, granulations and cholesteatoma and to afford such drainage that extension of disease to vital structures is rendered impossible.¹ There is no single surgical treatment of choice for cholesteatoma. The extent of cholesteatoma, the extent of cholesteatoma, the amount of pre-operative bone destruction and the size of mastoid pneumatization should guide the surgeon in choosing the type of operation for a particular ear.² The evolution of mastoid surgery can be divided into 3 distinct periods : the first consisting of the conversion of nearly all cholesteatomas into radical cavities ; the second dominated by the enthusiasts of intact canal wall technique and the third finding quite a few otologists returning to canal wall down procedures.³ The main aim of cholesteatoma surgery are removal of disease and the creation of a dry, safe ear. The technique must prevent recurrent or residual disease and reconstruct the ossicular chain. Intact canal wall procedures do render a dry ear, but are potentially unsafe because of a higher incidence of recurrent and residual cholesteatoma. This fact is remarkably well elucidated by the enormously variable recurrence rates reported in literature from 3% to 62%.^{4,8}

The lasting success of modern mastoid surgery is dependent upon the complete eradication of disease both of the middle ear and mastoid cavity. The wide access open mastoidectomy approach involves exenteration of all diseased air cell tracts and exteriorize the resultant cavity for periodic inspection. In the present study, results of complete exenteration of mastoid air cell tracts underlying cholesteatoma with canal wall down mastoidectomy are studied in terms of attainment of dry cavity and improvement in hearing.

Material and methods –

The present study was conducted in the Department of Otorhinolaryngology of a tertiary care hospital. A total of 50 patients were selected on the basis of following criteria –

- Patients of either sex of age group 15-45 years.
- Patients having evidence of attico-antral type of disease in middle ear cleft, confirmed on CT scan also.

A detailed history was taken, general physical examination, systemic and local examination was done and patients were investigated in form of Pure Tone Audiogram, HRCT temporal bones and all relevant investigations for pre-anaesthetic checkup (PAC).

Canal wall down mastoidectomy with complete exenteration of mastoid air cell tracts underlying cholesteatoma was performed in all patients via the post aurial approach.

All patients were followed up in OPD for a minimal period of 3 months. Healing of cavity and any associated problems were assessed. Hearing assessment by PTA was done at 3 months.

Observations -

In the present study, maximum number of cases, 64% were in age group 15-24 years followed by 20% in age group of 25-34 years. 64 of the cases were males and 36% were females.

92% of cases presented with decreased hearing. All patients had foul smelling ear discharge. Vertigo was present in 8% cases only. On otoscopic examination 72% cases had cholesteatoma while 28% had both cholesteatoma and granulations.

Tuning fork tests were done in all cases followed by Pure Tone Audiometry (PTA). 84% cases had conductive hearing loss while 16% had mixed hearing loss

TABLE 1: PREOPERATIVE HEARING LOSS

AIR BONE GAP	No. of cases	Percentage
0-20 dB	04	08 %
21-30 dB	16	32%
31-40 dB	16	32%
41-50 dB	06	12%
51-60 dB	08	16%
More than 60 dB	0	0

No complication was recorded in the patients preoperatively. CT scan bilateral temporal bones was done in all cases. All cases showed presence of soft tissue mass in middle ear and mastoid suggestive of cholesteatoma. There was no evidence of any other complication.

Modified radical mastoidectomy with complete exenteration of all mastoid air cell tracts was done followed by tympanoplasty. Cholesteatoma was found to be the pathology in 60% of cases and 40% had both cholesteatoma and granulations.

TABLE 2 : EXTENT OF DISEASE

STRUCTURE/ SITE	INVOLVED	PERCENTAGE
Epitympanum	50	100%
Mesotympanum	20	40%
Hypotympanum	16	32%
Aditus	50	100%

Underlying air cells	44	88%
Anterior attic	16	32%
Dural plate	04	8%
Sinus plate	02	4%
Facial nerve dehiscence	14	28%

TABLE 3: FINDINGS IN THE MIDDLE EAR PEROPERATIVELY

Structure	Findings	No. of cases	Percentage
Mucosa	Epithelised	16	32%
	Hypertrophied	34	68%
Ossicles necrosed	Incus only	24	48%
	Incus and malleus	20	40%
	Incus, malleus and stapes suprastructures	04	8%
	Chain intact	02	4%

Tympanoplasty was done in all cases using remodeled incus or cartilage.

All the cases were followed up in OPD for 3 months. In one case facial paresis (grade III) was present which recovered partially on follow up to Grade I. In one case, residual perforation was present, requiring revision surgery. In 92% of cases , cavity healed well , in 4% granulations were present in cavity which were cauterized and the cavity healed subsequently. Rest 4% cases required revision surgery.

TABLE 4: THE POSTOPERATIVE HEARING LOSS IN THE PATIENTS

AB gap	No. of cases	Percentage
0-20 dB	28	56%
21-30 dB	08	16%
31-40 dB	10	20%
41-50 dB	04	8%
51-60 dB	0	0
More than 60 dB	0	0

Discussion -

One of the major illnesses prevalent in our country is CSOM. It leads to loss of hearing and ear discharge , which contributes to its morbidity. The patient approaches the otologists with the belief that surgery will cure him of his problems of ear discharge and hearing loss and also for the treatment of any complications arising from the disease. With this aim a mastoidectomy is advised keeping the goal of providing a safe and dry ear and reconstruct any hearing if possible. The most common form of surgery thus done is a canal wall down modified radical mastoidectomy.

The outcome of the canal wall down mastoidectomy is often hampered by problems of persistent ear discharge , deafness and dependence on otologists. The principal factor responsible for these problems is the buried mucosa of the mastoid air cell tracts underlying the disease, even though all disease has been removed. Hence from the patient's viewpoint the objectives of the surgery are not achieved.

The present study was undertaken to provide a solution to this dilemma. In this study complete exenteration of mastoid air cell tracts underlying cholesteatoma with canal wall down mastoidectomy was done and results of surgery were assessed in terms of attainment of dry mastoid cavity and improvement in hearing.

Majority of cases in present study were in age group of 15-24 years. This shows that CSOM is more common in young individuals though no age is exempt. Friedman emphasized that there is no age bar to this disease⁹.

In our study males outnumbered the females. This is in accordance with study conducted by Reude¹⁰.

In the present study , hearing loss was present in 92% of cases. This shows that hearing loss is significantly related to unsafe disease. In study by Edelstein et al hearing loss was present in 85% of the cases. In our study 165 cases had mixed hearing loss. In a study by Ignace et al 10% had mixed hearing loss.

Foul smelling ear discharge was present in all the cases which shows its significant correlation with the unsafe disease. Vertigo was present in 8% of cases. Incidence of vertigo was low in the present study, similar to study by Edelstein et al (8%). On otoscopic examination, cholesteatoma was present in 72% of cases which shows that cholesteatoma is the usual pathology in unsafe CSOM. In study by Meyerhoff et al , cholesteatoma was encountered in 83% of cases¹¹. In 28% of cases , granulation tissue was also present along with cholesteatoma which is due to osteitis resulting from unsafe disease.

Audiometric assessment showed that in the present study , 84% of the cases had conductive hearing loss. 40% of the cases in the present study had AB gap of <30 dB while 60% had AB gap of >30 dB preoperatively. The present study showed that hearing loss was more in the cases in which ossicles were necrosed as compared to those where ossicular chain was intact.

CT scan bilateral temporal bones was done in all cases revealing soft tissue mass in mastoid cavity in all cases with ossicular chain necrosis in 92% of cases.

Preoperatively cholesteatoma was found in antrum in 60% cases and in 40% cases both cholesteatoma and granulation tissue were found. The study shows that cholesteatoma is the usual pathology in unsafe disease. The disease extended to epitympanum in all the cases. Hypotympanum was involved in 32% of cases. Anterior attic was involved in 32% of cases.

In the present study, mastoid air cells underlying cholesteatoma were found to be diseased in 88% of cases. In our study in majority of cases, perifacial, retrofacial , retrolabyrinthine and cells of sinodural angle and mastoid tip were found to be diseased. In study by Nadol JB Jr., cells of sinodural angle and mastoid tip were found to be diseased in 40% of cases¹². In study by Becvarovski et al , retrolabyrinthine, supralabyrinthine and retrofacial cells were found to be diseased in majority of cases and were routinely exenterated¹³.

In our study, dural plate was dehiscent in 8% of cases and sinus plate was found dehiscent in 4% of cases. In our study , facial nerve was found to be exposed in 28% of cases , 16% in tympanic portion , in 4% vertical portion was exposed and in 8% of cases , it was exposed in both tympanic and vertical portions. In 4% cases , there was facial paresis (grade III) in the immediate postoperative period which improved to grade I with conservative management.

In the present study, ossicular chain necrosis was present in 96% of cases which is in agreement with Costa's observations¹⁴. The study showed that incus was necrosed in all these case either alone (40%) cases , or with malleus (32%) cases , or with stapes suprastructure. This is in agreement with observations made by Dumich et al¹⁵.

In our study , a dry healed cavity was obtained in 92% of cases. In study by Kos et al , a dry and self healing cavity was obtained in 95% of the cases¹⁶.

In the present study, hearing results have been calculated by postoperative reduction in AB gap as compared to preoperative level. In the present study , 72% of patients reported improvement in hearing. In studies by Prucha and Padhola¹⁷ and Bacvarovski et al ¹³, 71% patients had improvement in hearing threshold.

So it can be concluded that the complete exenteration of mastoid air cell tracts underlying cholesteatoma with canal wall down mastoidectomy results in attainment of self cleaning and problem free mastoid cavity along with improvement in hearing.

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