

Research Article

Ossicular Chain Defects in Tubotympanic Chronic Suppurative Otitis Media

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Abstract: This study was conducted to find out the frequency of ossicular chain pathology in cases of tubotympanic chronic suppurative otitis media. This was prospective study, carried out in the department of otorhinolaryngology, NIMS medical college, Jaipur from Jan 2014 to June 2015. One hundred fifty cases of chronic suppurative otitis media, who underwent surgery, were included and their intraoperative ossicular chain pathology finding noted. 150 patients of age group between 10 to 60 years of age were having symptoms of history of discharge and hearing loss. Ossicular involvement was found more commonly in patients with subtotal perforation in comparison to central perforation. In our study we found long process and lenticular process of incus are the most common susceptible for erosion and malleo-incudal joint more commonly involved by the tympanosclerosis. Malleus was found to be more resistant ossicle.

Keywords: chronic suppurative otitis media, ossicles.

INTRODUCTION:

Otitis media is an important and highly prevalent disease of the middle ear since prehistorical times (Gress, Steele and Holzhueter, 1965; McKenzie and Brothwell, 1967; Rathbun and Malin, 1977 ;). It is serious health problem worldwide especially in developing countries, where large percentage of population lack of specialized medical care, suffering from malnutrition and live in poor hygienic condition [1].

Both type of CSOM, tubotympanic which is considered safe, as well as atticofurcal which is considered unsafe, may lead to erosion of the ossicular chain. The proposed mechanism for erosion is chronic middle ear inflammation as a result of overproduction of cytokines- TNF alpha, interleukin-2, fibroblast growth factor and platelet derived growth factor, which promote hyper vascularisation, osteoclast activation and bone resorption causing ossicular damage. CSOM is thus an inflammatory process with a defective wound healing mechanism [2]. This inflammatory process in the middle ear is more harmful the longer it lasts and the nearer it is to the ossicular chain [3]. Pathologies that interrupt the ossicular chain result in large hearing losses. Complete disruption of the ossicular chain can result in a 60 dB hearing loss [4].

It has been a general view that hearing loss increase with the size of perforation, more so if it is in post inferior quadrant and less in an inferior quadrant.

In this study we have to use the middle ear risk index (MERI score) developed by Kartush which generate a numeric indicator of the severity of the middle ear disease and to evaluate the efficiency of MERI score in predicting outcome of tympanoplasty. With large number of patients undergoing tympanoplasty, it is important to assess ossicular status and manage accordingly.

In 1971, Austin classified ossicular chain defect in four categories up to presence or absence of malleus handle and the presence or absence of stapes suprastructures. When both malleus handle and stapes suprastructure were present, malleus/stapes assembly was done. When malleus handle was present and stapes suprastructure was absent, malleus /foot plate stapes assembly was done, membrane to head of stapes interposition was done in presence of stapes suprastructure and membrane to foot plate of stapes interposition was done in absence of stapes suprastructure.

Author classified of ossicular chain erosion was modified in to six categories as followed in present study to sum up, because the high incidence of conductive hearing loss in tubotympanic chronic suppurative otitis media caused by perforation and ossicular pathology (necrosis / fibrosis), the conflicting reports regarding the effect of perforation (subtotal and Medium or small size) and ossicular pathology on

hearing loss and tympanoplasty operation outcome, this project has been undertaken the study.

We under look this study to evaluate in tubotympanic csom, hearing loss in relation to size of perforation with ossicular pathology.

MATERIALS AND METHODS:

This was prospective study, carried out in the department of otorhinolaryngology, NIMS medical college, Jaipur from Jan 2014 to June 2015. A total case of 150 patients were included in this study.

Objective of our study:

1. Prevalence of ossicular chain defect in tubotympanic chronic suppurative otitis media
2. Type of ossicular defect
3. Hearing loss in relation to ossicular defect

Patient aged more than 10 years, diagnosed with tubotympanic chronic suppurative otitis media and posted for middle ear surgery were included.

Patients who were less than 10 year, had malignancy of middle ear, previous history of ear surgery and unsafe chronic suppurative otitis media were excluded.

OBSERVATION:

Out of 150 patients studied, 90 were male and 60 were female. All the patients were in the range of 10-60 years of age. Maximum number of patients was in the age of 11-20 years which is 65; minimum number of patients was in the age group of 51-60 years that is 12. Youngest patient in our series is 13 years and oldest is 57 years.

In this study, 110 patients were having normal ossicular chain that is 73.33%, rest 40 cases were having ossicular pathology. These patients with ossicular pathology were classified in to three categories: ossicular necrosis was found in 26 cases, ossicular fibrosis in 2 cases and tympanosclerosis of ossicle in 12 cases.

Ossicular involvement was found more commonly in patients with subtotal perforation in comparison to central perforation. Out of 40 patients with ossicular involvement, 26 patients were having subtotal perforation and 14 have central perforation. Out of 26 patients with ossicular necrosis, 20 cases were associated with subtotal perforation. Like that, 6 cases of tympanosclerosis of ossical associate with subtotal perforation and remain 6 cases with central perforation.

Out of 26 patients with ossicular necrosis, commonest ossicle involved was the long process of incus. Isolated long process of incus was found in 12

cases. Both long process of incus and stapes suprastructure involvement was found in 5 cases. Both long process of incus and melleus handle involvement in three cases. Isolated lenticular process of incus involvement was found in 3 cases. Isolated melleus handle involved in one cases and all ossicle was involved in two cases.

In present study, hearing loss associated with different type ossicular defect was evaluated. Long process of incus was associated with maximum number of cases, that is 12 and average hearing loss was 48.6 dB. Next group was having involvement of long process of incus and stapes suprastructure, that is 5 cases and hearing loss was 57.6 dB. Average hearing loss was maximum when all ossicles were absent, that is 59.4 dB in two cases. Hearing loss was minimum with isolated melleus handle involvement that is 44.6 dB.

In our present study it was found that every fourth patients have ossicular chain involvement in safe chronic suppurative otitis media and ossicular necrosis in every sixth patient.

DISCUSSION:

In this study we studied a total of 150 patients of tubotympanic chronic suppurative otitis media to assess the intraoperative ossicular status. The most commonly affected age group was between 11- 20 year, as observed various studied also show early presentation. The early presentation was due to awareness to health issue and difficulty in hearing affecting the work efficiency, leading patients and parents to seek early medical intervention. Socioeconomic status also improved in our country.

The ratio of male to female was 1.5: 1.0. Male were more affected due to the work outside the home hence more prone to atmospheric and climate changes.

The duration of ear discharge ranged from 6 month to 5 year and duration of hearing loss was in all cases found to be lesser the duration the duration of discharge. This may be attributed to difficulty in appreciating minor degrees of hearing loss by the patients. The hearing loss would be noticed only when the disease has progressed sufficiently to cause a significant impairment of hearing by perforation or ossicular destruction.

Audio logical profile in chronic suppurative otitis media cases show hearing loss 40.2 dB loss in maximum 110 cases in which no ossicular pathology was found. In which most of patients have central perforation with short history of ear discharge and hearing loss. Its indicate duration of ear discharge affect ossicular necrosis or pathology. Ossicular pathology

preoperative detected by pure tone audiometry assessment and x-ray B/L mastoid.

Audio logical profile with ossicular necrosis is evaluated. Hearing loss was minimum with isolated handle of malleus involvement and maximum when all three ossicle were absent.

The concept of modern reconstructive middle ear surgery in tubotympanic chronic suppurative otitis media with or without cholesteatoma came in to being with introduction of tympanoplasty by Mortiz (1952) Zollner (1953, 1955) and Wullstein (1953, 1956). In 1953 Zeiss operating microscope was commercially available and become a landmark in the history of otological surgery.

Mathur *et al.*; observed eroded incus in 22% of cases [5] Quarranta *et al.*; 1995 noted prevalence of eroded incus is 27% cases. Rout *et al.*:[10] shows involvement of incus was 25 (17%) with oher ossicular involvement.

Thomsun and other found bone erosion in chronic suppurative otitis media was more prevalent when cholesteatoma was present but it still occure in absence of cholesteotoma [6].

In 1971, Austin classified ossicular chain defect in four categories up to presence or abscence of malleus handle and the presence or abscence of stapes suprastructures. When both malleus handle and stapes suprastructure were present, malleus/stapes assembly was done. When malleus handle was present and stapes suprastructure was absent, malleus /foot plate stapes assembly was done, membrane to head of stapes interposition was done in presence of stapes suprastructure and membrane to foot plate of stapes interposition was done in absence of stapes suprastructure.

Author classified of ossicular chain erosion was modified in to six categories as followed in present study. Swan *et al.*; [7] describe erosion of incus is the most common ossicular pathology and middle ear disease , also reported by Varshney *et al.*; [8], Kashyap *et al.*; [9]. In present study we found erosion of incus in all 17 % cases.

Rout *et al.*; [10] in 2014 reported ossicular necrosis in 19% cases and ossicular involvement in 37% cases and G.S.N. Murthy *et al.*; [11] found ossicular necrosis in 8% cases of chronic suppurative otitis media. In present study we found ossicular chain pathology was present in 26.6 % cases. Seventeen percent cases were having various types of ossicular necrosis and 9 % cases having tympanosclerosis of ossicular joint. Kashyap et al also reported 24 % cases

of ossicular pathology in which 18 % have ossicular necrosis.

Tympanosclerosis usually involve the ossicular joint but it may also involve the other part of tympanic cavity like ossicle, round window [12], stapes footplate and lead to fixation of ossicle causing hearing loss [13]. So from the present study it was found that ossicular chain pathology may also encounter in cases of tubotympanic csom still is less as compare to cholesteatoma. The long process of incus was found to be most susceptible for erosion it's comparable to Kashyap *et al.*; 2015. The delicate ossicle with poor blood supply is susceptible for erosion as compare to other ossicles by disease process.

CONCLUSION:

Preoperative assessment of History of duration of discharge with hearing loss, type of perforation and hearing evaluation by PTA, predict ossicular involvement.

1. Subtotal perforation with hearing loss more than 45dB indicate ossicular involvement
2. Central perforation with hearing loss more than 50dB indicate ossicular involvement
3. Hearing loss less than 40dB indicate no ossicular involvement
4. Long history of ear discharge has more hearing loss and ossicular involvement irrespective of size of perforation.

The ossicular chain pathology is more common feature of cholesteatoma but it may still encounter in tubotympanic disease. The long process of incus was more commonly involved ossicle because it is delicate structure and erosion of ossicular chain causes hearing loss.

We recommended to ENT surgeon to operate as soon as possible with all precaution with complete evaluation so prevent deafness and improve quality of life in society.

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