



STUDY OF OSSICULAR CHAIN DEFECTS IN PATIENTS OF CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT

The study was conducted to find out the status of ossicular chain in case of chronic suppurative otitis media. 85 patients of chronic suppurative otitis media who underwent tympanomastoid surgery for the same were included in the study and their intra operative ossicular chain status was noted. Out of total 85 patients 65(83.33%) cases were found to be atticointral disease and 20(11.36%) cases to be tubotympanic disease. Malleus was found to be the most resistant ossicle for erosion. It was involved in 20(30.77%) in cases of atticointral disease and 6(30%) in cases of tubotympanic disease. Incus was the most common ossicle to be involved in either variety of CSOM. Long process of Incus was most commonly eroded part of Incus 42(64.46%) in atticointral disease. It was followed by body of Incus 15(23.08%) and erosion of entire Incus 12(18.46%). Stapes was not involved in any case of tubotympanic disease in our study while in atticointral disease Stapes suprastructure was partially eroded in 14 (21.54%) cases and suprastructure was absent in 10 (15.38%) cases. Thus destruction of ossicular chain was more common in patients with chronic suppurative otitis media with atticointral disease as compared to chronic suppurative otitis media with tubotympanic disease. Incus was found to be most susceptible while malleus was least susceptible to erosion.

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INTRODUCTION

Chronic suppurative otitis media implies permanent abnormality of the pars tensa or the pars flaccida which is most likely a result of acute otitis media or negative middle ear pressure or otitis media with effusion. The importance of chronic suppurative otitis media lies in the fact that it is associated with high morbidity due to deafness associated with it and at times mortality due to complications of the disease. Overcrowding, poor living conditions, hygiene and nutrition are the basis of widespread prevalence of CSOM in developing countries (Slattery WH 2003, Mills RP 1997). Chronic suppurative otitis media (CSOM) has been traditionally classified into two groups – tubotympanic and atticointral variety. Latest classification classifies CSOM into mucosal and squamous types. Atticointral or the squamous type is considered dangerous or unsafe because of higher risk of complications (Proctor B 1964). Destruction of ear ossicles is common in atticointral disease but can also occur in the tubotympanic disease. Infection, inflammation, pressure and keratin leads to elaboration of a variety of molecular factors like IL-1, IL-6, TNF, prostaglandins, nitric oxide and growth factors. These factors lead to recruitment, development and activation of osteoclast. Regardless of what initiates the cascade, the final common pathway is activation of osteoclasts

and resorption of bones (Deka RC 1998, Sade J, 1991). Hearing loss in case of simple perforation of tympanic membrane is proportional to size of perforation with a mean of about 38.3dB whereas hearing loss in perforation of tympanic membrane with ossicular interruption is about 50dB. But more severe hearing loss 55-60dB occurs when there is ossicular interruption with an intact tympanic membrane (Bjorab DI, Balough BJ 2003, Merchant SN 2003)

MATERIAL AND METHOD

The present study was prospective study conducted on 85 patients of chronic suppurative otitis media who were admitted in the department of Otorhinolaryngology and underwent tympanomastoid surgery for the same during the period of one year. Patients of both sex and age between 11 years to 60 years suffering from chronic suppurative otitis media willing to undergo complete clinical evaluation and surgical treatment were included in this study. Uncooperative, mentally retarded, patients having sensory neural hearing loss, history of previous ear surgery, history of congenital deafness or ear anomaly, suffering from any form of metabolic disorder, patients with history of prolonged intake of ototoxic drugs were not included in this study. Complete ENT examination of patient was done with particular attention to note the finding of TM

regarding presence of cholesteatoma, granulation, perforations, retraction pocket, any polyps or erosion in attic area. Whenever needed microscopy and otoendoscopy was done. Complete hearing test was done to find out hearing status. Intra operative findings including ossicular chain status, erosion of individual ossicle were noted. The statistical analysis done on SPSS version 16.0 software. Values were represented in number, percentage and mean and standard deviation. The Chi square test and Student 't' test were used to test the significance of the data. $p < 0.05$ was considered as statistically significant.

Observations

Out of 254 patients operated for chronic suppurative otitis media, 78 were of atticoantral disease and 176 were of tubotympanic disease. Ossicular chain erosion was seen in 65 (83.33%) cases of atticoantral disease and in 20 (11.36%) cases of tubotympanic disease which was significantly higher ($p < 0.001$) in Atticoantral disease. Maximum number of patients 77(90.59%) were in the age group of 11-30 years. Among atticoantral disease 67.69% pts were male and 32.31% were female while among Tubotympanic disease 60% were male and 40% were female. 69.23% and 55% ($X^2=1.38, p=0.24$) patients were from rural areas in atticoantral disease and tubotympanic disease respectively suggesting CSOM is relatively more common in rural areas where people are poor and live in overcrowded environment.

Mucopurulent discharge was the most common type of discharge which was seen in 64.62% patient of atticoantral disease and 60% patients of tubotympanic disease ($X^2=2.35, p=0.030$). Scanty discharge was seen in significantly higher number of patients (61.54%) with atticoantral disease while majority (50%) of patients with tubotympanic disease had profuse discharge ($X^2=24.80, p < 0.001$). The most common clinical finding associated with the ossicular chain defect in case of atticoantral disease was the cholesteatoma(41.54%) followed by postero-superior quadrant retraction (20%), granulation (18.46%), pars flacida retraction with attic erosion (12.31%), perforation (12.31%) and polyp (7.69%) while in case of tubotympanic disease it was large central perforation (60%) and perforation with retracted remnant of tympanic membrane (40%). During surgery significantly higher number of cases of atticoantral disease found to have cholesteatoma with or without granulation (76.92%) as compare to granulation only (23.08%).

Table 1 Relative frequency of involvement of different ossicles

| Ossicles involved | Atticoantral disease(n=65) | | Tubotympanic disease (n=20) | |
|-------------------|----------------------------|-------|-----------------------------|-----|
| | No. of observation | % | No. of observation | % |
| Malleus | 20 | 30.77 | 6 | 30 |
| Incus | 65 | 100 | 20 | 100 |
| Stapes | 24 | 36.93 | - | - |

$X^2= 6.96 p=0.031$

Incus was the most common ossicles to be involved in either variety of CSOM. It was affected in significantly higher ($p=0.031$) number of cases as compare to Malleus and Stapes. Stapes was the 2nd most common ossicles to be involved in atticoantral disease in our study but it was not involved in any case of tubotympanic disease (Table 1).

Table 2 Pattern of involvement of malleus in atticoantral and tubotympanic variety of disease

| Parts of malleus to be involved | Atticoantral disease (n=65) | | Tubotympanic disease (n=20) | |
|---------------------------------|-----------------------------|-------|-----------------------------|----|
| | No. of observation | % | No. of observation | % |
| Handle | 10 | 15.38 | 6 | 30 |
| Head | 9 | 13.85 | 0 | - |
| Totally absent | 3 | 4.62 | 0 | - |

$X^2=5.73 P=0.05$

Handle of Malleus was involved in 15.38% cases of atticoantral disease and 30% cases of tubotympanic disease. Head was eroded in 13.85% cases of atticoantral disease but in our study it was not involved in any case of tubotympanic disease (Table 2).

Table 3 Pattern of involvement of incus in atticoantral and tubotympanic variety of disease

| Parts of incus involved | Atticoantral disease (n=65) | | Tubotympanic disease (n=20) | |
|-------------------------|-----------------------------|-------|-----------------------------|-----|
| | No. of observation | % | No. of observation | % |
| Long process | 42 | 64.62 | 20 | 100 |
| Body | 15 | 23.08 | 0 | 0 |
| Totally eroded | 12 | 18.46 | 0 | 0 |

Long process of Incus was most commonly eroded part of Incus (64.46%) in atticoantral disease. It was followed by body of Incus (23.08%) and erosion of entire incus (18.46%). In cases of tubotympanic disease only long process of Incus was involved in all cases and in none of the case erosion of body of incus or total erosion of Incus was noticed (Table 3).

Table 4 Pattern of involvement of stapes in atticoantral and tubotympanic variety of disease

| Part of stapes involved | Atticoantral disease (n=65) | | Tubotympanic disease (n=20) | |
|--|-----------------------------|-------|-----------------------------|---|
| | No. of observation | % | No. of observation | % |
| Partially eroded Stapes suprastructure | 14 | 21.54 | 0 | 0 |
| Stapes suprastructure absent | 10 | 15.38 | 0 | 0 |

Stapes was not involved in any case of tubotympanic disease in our study while in atticoantral disease Stapes suprastructure was partially eroded in 14 (21.54%) cases and suprastructure was absent in 10 (15.38%) cases (Table4).

Table 5 Frequency of Type of defects in atticoantral and tubotympanic disease (Type of defects as per Austin's classification)

| Type of defect | Atticoantral disease(n=65) | | Tubotympanic disease(n=20) | |
|----------------|----------------------------|-------|----------------------------|----|
| | n | % | n | % |
| A | 31 | 47.69 | 14 | 70 |
| B | 14 | 21.54 | 0 | - |
| C | 10 | 15.38 | 6 | 30 |
| D | 10 | 15.38 | 0 | - |

$X^2= 10.56 p=0.014$

Type A defect was the most common defect to be encountered in either variety of CSOM. It was seen in 47.69% cases of atticoantral disease and 70% case of tubotympanic disease. It was significantly higher ($p=0.014$) as compare to incidence of other defects. Type-C defect was second most common defect in either variety of disease. B & D type of defect were exclusively seen in atticoantral disease (Table 5).

DISCUSSION

The study was conducted on patients of chronic suppurative otitis media who were underwent tympanomastoid surgery for the same. A total of 85 patients were studied out of which 65(83.33%) cases were found to be atticofacial disease and 20(11.36%) cases to be tubotympanic disease. Maximum numbers 52(61.18%) of patients were in the age group of 11-20 years as observed by various other studies. The early age group presentation may be due to increased awareness, difficulty in hearing affecting the day to day life, leading patients and parents to seek early medical treatment. In atticofacial disease, male patients were 44 (67.69%) in comparison to female patients 21 (32.31%), the ratio being 2.1:1. In tubotympanic disease male patient were 12 (60%) in comparison to female patient 8(40%). Previous studies also show similar sex ratio with 165 (69.92%) male patients (Udaipurwala IH, Iqbal K 1994, De Vas C, Gersedorff JM 2007). Male predominance in this study may be due to most of the outdoor activity. Majority of our patients belonged to rural population. They live in overcrowded place, access to health care facility is difficult and above all they are not much health conscious. These could be the causes of higher incidence of the disease in rural areas. The duration of hearing loss was less than the duration of ear discharge because of having difficulty in appreciating minor degrees of hearing loss by the patients and adaptation to unilateral deafness to take place with loss of awareness of deafness as a symptom. The hearing loss is noticed only when disease has progressed to such extent to cause significant hearing impairment by perforation or ossicular erosion.

Malleus was found to be the most resistant ossicle for erosion. It was involved in 20 (30.77%) in cases of atticofacial disease and 6(30%) in cases of tubotympanic disease. Handle of Malleus was involved in 10 (15.38%) cases of atticofacial disease and 6(30%) cases of tubotympanic disease. Head of Malleus was eroded in 9(13.85%) and Malleus was completely eroded in 3(4.62%) cases of atticofacial disease consistent with the findings of Sade J, Berco E *et al* 1971.

Incus was the most common ossicle to be involved in either variety of CSOM. Long process of incus was most commonly eroded part of incus 42(64.46%) in atticofacial disease. It was followed by body of incus 15(23.08%) and erosion of entire incus 12(18.46%). In cases of tubotympanic disease only long process of Incus was involved in all cases and in none of the case erosion of body of incus or total erosion of Incus was noticed (Udaipurwala *et al* 1994). had a similar incidence of erosion of Incus. Stapes was not involved in any case of tubotympanic disease in our study while in atticofacial disease stapes suprastructure was partially eroded in 14 (21.54%) cases and suprastructure was absent in 10 (15.38%) cases.

CONCLUSION

Chronic suppurative otitis media commonly affects younger age group with male preponderance as compare to female. Patients from rural area are affected more commonly as compare to those from urban area. Defects of ossicular chain occur more commonly in atticofacial variety as compare to tubotympanic variety of chronic suppurative otitis media. Type-A defect is the most common type of defect encountered in either variety of chronic suppurative otitis media while Type B and D defects are seen exclusively in atticofacial type of chronic suppurative otitis media. It is needed to reconstruct ossicular chain defect to improve the postoperative hearing status of the patients.

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