

A Study of Clinicoaudiological Profile of Ossicular Status in Chronic Suppurative Otitis Media Patients: A Prospective Study

Amit Kumar Sharma¹, Mahesh Kumar², Paresh Chavan³

¹Assistant Professor, Department of ENT, Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna, Bihar, India

²Assistant Professor, Department of ENT, Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna, Bihar, India

³Associate Professor, Department of ENT, Dr. D.Y Patil Medical College, Pune

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Corresponding author: Dr Mahesh Kumar

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Abstract

Background: COM is a common disorder which causes hearing deficit. It can be due to perforation of tympanic membrane or ossicular erosion.

Aim: To find out ossicular profile in COM and to correlate it clinically with hearing status.

Material and Methods: A total of 137 patients with COM who underwent surgery were included in the study.

Results: Hearing loss was significantly higher in males & in patients with ossicular erosion.

Conclusion: Ossicular erosion can rise to hearing loss of more than 60dB.

Keywords: Chronic Otitis Media (COM), Ossicular Defects, Audiological Profile

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Background

Chronic otitis media (COM) is a common & prevalent condition in otorhinolaryngology in developing & developed countries. It is characterized by chronic, intermittent or persistent discharge through a perforated tympanic membrane. In cases in which the tympanic membrane, malleus & incus are lost, like COM, the conductive hearing loss is of the order of 40 to 50db. Poor living conditions, overcrowding, poor hygiene, Eustachian tube dysfunction, environment, autoimmune diseases, immune deficiency & nutrition have been suggested as the basis for the widespread prevalence of COM in developing countries [1,2].

The proposed mechanism for erosion in chronic middle ear inflammation as a result

of overproduction of cytokines-TNF alpha, IL-2, fibroblast growth factor & platelet derived growth factor, which promote hypervascularisation, osteoclast activation & bone resorption causing ossicular damage. TNF-alpha also produces neovascularisation & hence granulation tissue formation [3].

CT scanning in both coronal & axial planes of the temporal bone is preferred rather than conventional radiology or MRI. Although tympanomastoid surgery for COM is successful in controlling infection with success rates in excess of 80 to 90%. When the ossicular chain has to be reconstructed, the air-bone gap to <20db occurs in only 40 to 70% of cases when the stapes superstructures is missing. Complete

disruption of the ossicular chain can result in a 60db HL [4,5]. This study was conducted to assess types of ossicular defects in cases of COM & middle ear ossicles state of ear that required surgery for COM.

Material & Methods: This prospective study in the period from Dec 2020 to Nov 2021. All the COM patients attending in ENT OPD & fulfilling the inclusion criteria were enrolled for the study.

Inclusion criteria

- All COM cases between 15 to 40 years of age.
- Informed consent & willing for surgery.
- Regular follow up.

Exclusion criteria

- Age < 15years, to exclude noncompliance & age > 40 year to exclude presbycusis.
- Complication of COM
- Previous history of ear surgery.

All COM diagnosed case were complete ENT examination along with audiological assessment was done. The clinical examination of ears was done by otoscope & subsequently by endoscope. All patients underwent preoperative PTA was done to find out the hearing status. Intraoperatively middle ear findings including ossicular chain status, erosion of the individual ossicles & continuity of the malleo-incudal & incudo-stapedial joint were noted.

The ossicular chain status were compared statistically. Chi square test was used to

evaluate the level of significance & the p value < 0.05 was considered as significant.

Results

A total of 137 cases were selected for this study. Only 9.2% of COM patients were age group of 15 to 40 years. The number of cases in the 15-20 years age group was 71(51.8%) & this is the largest group in the study. The number of male & female patients was 71(51.8%) & 66(48.18%). Thus, a male to female ratio is 1.08:1. The primary complaints of the patients were ear discharge, seen in 30.66% of the cases between 1-5 years.

Duration of hearing loss varied from, 51.82% had moderate hearing loss, 29.93% had mild HL, 16.06% had severe HL & 2.19% had normal hearing. In ear with normal hearing all the ossicles were intact. In mild HL, malleus was eroded in 29.27%, incus in 26.83% & stapes in 3.7% ears. In moderate HL, malleus was eroded in 52.11% incus in 53.52% & stapes in 12.67% ears. In severe HL, malleus was eroded in 77.28%, incus in 72.73% & stapes in 40.91% case.

Intraoperative findings

Based on findings, the patients were 56.2% had neither granulation nor cholesteatoma. 16.06% had cholesteatoma, 14.6% had both cholesteatom & granulations & 13.14% had only granulations present. Ossicular disruption was seen in 9 Mucosal COM cases (12.16%) & 62 Squamosal COM cases (98.41%). Overall, 71 COM cases (51.82%) showed ossicular disruption.

Ossicular status:

Table 1

Status of Malleus	Mucosal	Squamosal	Total
Intact	67	4	71
Head Necrosed	-	22	22
Handle of Malleus Necrosed	7	22	29
Handle & head necrosed	-	3	3
Absent	-	12	12
Total	74	63	137

In mucosal COM, 67(90.54%) of the cases had an intact malleus while in 7(9.46%) cases the handle of malleus was found necrosed. In squamosal, 4(6.35%) of cases was found intact malleus, 22(34.92%) necrosed & absent in 12(19.05%) cases.

Table 2

Incus	Mucosal	Squamosal	Total
Intact	70	2	72
Body necrosed	0	5	5
Long process necrosed	1	2	3
Lenticular process necrosed	3	7	10
Long & lenticular process necrosed	0	14	14
Body & lenticular process	0	4	4
Body , long & lenticular process necrosed	0	10	10
Absent	0	19	19
Total	74	63	137

In mucosal COM, the incus was found intact in 70(94.59%), eroded/necrosed in 3(4.05%) & absent in nil. In squamosal COM, the incus was found intact in 2(3.17%), necrosed in 42() & absent in 19(30.16%) cases. Lenticular process(along or with other parts of incus) was the most common part eroded in incus(27.74%), followed by long process(19.71%).

Status of stapes

Table 3

	Mucosal	Squamosal	Total
Intact	74	44	118
Supra structures necrosed	0	14	14
Absent	0	5	5
Total	74	63	137

Stapes had intact in 118 (86.13%) cases while in 14 (10.22%), the suprastructure necrosed by the disease. In mucosal COM, 74(100%) of the cases had an intact stapes & rest had no suprastructure necrosed or absent. In squamosal, 44 (69.84%) cases had an intact stapes & 14 (22.22%) cases showed suprastructure necrosed & 5 (7.94%) cases had an absent stapes.

Status of ossicular chain

In mucosal COM, 65(87.84%) cases had an intact chain, 9 cases (12.16%) has ossicular disrupted. In squamosal 1(1.59%) case had an intact chain, 62 (98.41%) has ossicular disrupted.

Discussion

In this study, we study a total of 137 patients of COM to assess the ossicular status intra-operatively. In our study 51.82% cases were found to be in age group

of 15-20 years. Nayak et.al (2016) found 39.52% in age group 11-20 year. Varshney *S et al.* (2010) found 51.33% in age group of 16-25 years. Anglitoiu *et al.* (2011) found 76.58% patients in 18 -30 year age group. The ratio of male to female patients was 1.08:1. Similar findings have been reported by several other authors [6-8].

Early presentation of COM can be attributed to increased awareness about the disease. Varshney *et al.* (2010) found discharge in 26% & Nayak *et al.* (2016) in 27.55% cases. In ear with discharge less than 1year, there are fewer incidences of ossicular chain erosion, malleus (33.33%), incus (23.81%) & stapes (9.52%). More erosion was seen in ear with history of discharge more than 10year i.e malleus & incus (55% each) & stapes (17.5%) thus more duration of discharge, increased incidence of ossicular chain.

Normal PTA was seen in 2.19% COM in our study & moderate hearing loss was seen in 51.82%. Sathyaki *et al.* (2014) observed moderate loss in 40% ears. The incidence of mucosal COM was found to be 54.01% & squamosal COM to be 45.99% in this study. Varshney *et al.* (2010) found 60% mucosal & 40% squamosal disease, 47.02% mucosal & 52.98% squamosal type of COM by Anglitoiu *et al.* (2011).

In mucosal disease with ossicular erosion, malleus was eroded in 77.78% & incus in 44.44% whereas in squamosal disease with ossicular erosion, malleus was eroded in 95.16%, incus 98.39% & stapes 30.65%. Rout *et al.* (2015) observed malleus to be eroded in 26.5%, incus in 94.7% & stapes in 26.3% in mucosal COM. Varshney *et al.* (2010) found malleus to be eroded in 28.57%, incus in 100% & stapes in 14.29% in mucosal disease & in squamosal disease, malleus was found to be eroded in 52.94%, incus in 100% & stapes in 60.78%.

Malleus was found to be the most resistant ossicle & was found intact in 66(48.18%) cases & necrosed in 71(51.82%) cases in our study. Malleus was eroded in 7(9.46%) cases in mucosal COM, whereas in 59(93.65%) cases in squamosal COM. Sathyaki *et al.* (2014) found 7.4% of mucosal COM & 100% of squamosal type COM to have malleus erosion. Rout *et al.* (2015) found malleus erosion in 5% of mucosal disease. Mathur *et al.* (1991) observed malleus eroded in 80% of squamosal type COM. Nayak *et al.* (2016) observed malleus was eroded in 14.97% & absent in 47.31% of squamosal type of COM.

In this study, incus was found to be erosion in 47.54% cases out of which 13.87% cases showed complete erosion. The most common part eroded was lenticular process (27.74%). Swan *et al.* (2008) described that long process of incus is most common ossicular erosion encountered.

In this study incus was eroded in 5.41% mucosal & 96.83% squamosal type COM. According to Rout *et al.* (2015) found

18% incus to be eroded in mucosal disease. Mathur *et al.* (1991) found incus eroded in 84%, Udaipurwala *et al.* (1994) in 41%, Nayak *et al.* (2016) in 71.85% & Albera *et al.* (2012) in 77.86% of squamosal type COM.

In this study stapes was eroded in 13.87% (absent in 3.65%, suprastructure eroded in 10.22%). Motwani *et al.* (2005) in 30%; Anglitoiu *et al.* (2011) in 19.3%, Sathyaki *et al.* (2014) in 13.3%.

In this study stapes was intact in all mucosal type of COM & erosion showed in 30.16%. Squamosal type COM (Absent in 7.94%, suprastructure eroded in 22.22%). Lower incidence of stapes erosion in squamosal type COM also reported in same studies like 15% by Shrestha *et al.* (2006) & 21% by Udaipurwala *et al.* (1994). Mathur *et al.* (1991) found stapes intact in 16% in squamosal type COM.

Conclusion

In this study we found that the incidence of ossicular erosion was much greater in squamosal COM than COSM with mucosal disease. Malleus was the most resistant ossicle to erosion in COM & was only ossicle which was exclusively involved in squamosal disease. Incus was found to be the most susceptible. Ossicular erosion can give rise to a hearing deficit of more than 60db. Our study showed significant higher loss in patients with the age group of 15-20year & in males.

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