

## OSSICULAR EROSION IN MUCOSAL TYPE OF CHRONIC SUPPURATIVE OTITIS MEDIA IN OUR EXPERIENCE

Santhanakrishnan Kaliavaradan<sup>1</sup>, Poornima Shankar Bhat<sup>2</sup>, Muraleedharan Radha Harish<sup>3</sup>, Akshaya A. C<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Otorhinolaryngology, Sri Manakula Vinayagar Medical College, Kalitheerthalkuppam.

<sup>2</sup>Assistant Professor, Department of Otorhinolaryngology, Sri Manakula Vinayagar Medical College, Kalitheerthalkuppam.

<sup>3</sup>Postgraduate Student, Department of Otorhinolaryngology, Sri Manakula Vinayagar Medical College, Kalitheerthalkuppam.

<sup>4</sup>Postgraduate Student, Department of Otorhinolaryngology, Sri Manakula Vinayagar Medical College, Kalitheerthalkuppam.

### ABSTRACT

#### BACKGROUND

The objective of this study was to determine the incidence of ossicular chain erosions in patients suffering from chronic otitis media, mucosal type.

#### MATERIALS AND METHODS

The study group comprised 60 consecutive patients affected by COM, mucosal type. Preoperative assessment was done by thorough clinical examination, pure tone audiometry, X-ray of mastoids, etc. Tympanic membrane perforation, continuity of ossicular chain, condition of middle ear mucosa, condition of mastoid air cells and antrum, patency of a ditus was evaluated during surgery. Tympanoplasty and mastoidectomy were performed accordingly.

#### RESULTS

Ossicular chain erosions were found in 23 (38.33%) out of the 60 patients included in the overall sample. Ossicular chain erosion was found most frequently in subtotal perforation, n=19 (31.67%); in patients with bilateral disease, n=22 (36.67%) and granulation tissue in the middle ear, n=15 (25%). The incus was the ossicle most frequently affected by erosion, n= 20 (33.33%).

#### CONCLUSION

Ossicular chain erosions in patients with chronic otitis media, mucosal type are frequent and are present in 38.33% of the patients as per this study. Incus is the most common ossicle to get eroded (33.33%). Subtotal perforation, bilateral disease and granulation tissue in the middle ear can be considered as good indicators of ossicular chain involvement.

#### KEYWORDS

Chronic Otitis Media, Tympanic Perforation, Ossicular Chain, Granulation Tissue.

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#### BACKGROUND

CSOM is the most common cause of hearing loss in children and adults in our country. Incidence of chronic suppurative otitis media is high in children, it causes considerable morbidity with destruction of ossicles which leads to conductive hearing loss. When it is bilateral it causes speech and learning disabilities in children. In adults, chronic suppurative otitis media is a common cause of conductive hearing loss. Chronic suppurative otitis media with or without cholesteatoma can cause ossicular erosion/destruction which leads to conductive hearing loss.

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.<sup>[1,2]</sup>

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*Corresponding Author:*

*Dr. Santhanakrishnan Kaliavaradan,*

*Assistant Professor,*

*Department of ENT,*

*Sri Manakula Vinayagar Medical College and Hospital,*

*Kalitheerthalkuppam, Madagadipet, Pondicherry-605107.*

*E-mail: santhanakrishnan2709@gmail.com*

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Austin in 1971 classified ossicular defects into group A having malleus and stapes intact and erosion of long process of incus being the most common defect,<sup>[3]</sup> group B with only malleus and absent stapes, group C with only stapes and absent malleus, group D with absent malleus and stapes suprastructure. Kartush added three more classes to Austin classifications for intact ossicular chain but with ossicular fixation, E for ossicular head fixation with intact ossicles, F for stapes fixation with presence of all ossicles.<sup>[3,4]</sup>

#### MATERIALS AND METHODS

The patients attending the OPD of Department of ENT and also patients referred from other departments of Sri Manakula Vinayagar Medical College and Hospital formed the subjects for our study. Study was conducted for a period of one and half years from December 2014 to May 2016.

The objective of this study was to determine the incidence of ossicular chain erosions in patients suffering from chronic otitis media, mucosal type.

Patients with chronic ear discharge, diagnosed to be having COM, mucosal type belonging to all the age groups were included in the study. Patients with squamosal type of COM, otosclerosis with stapes fixation, sensorineural hearing loss, malignancy, previous ear surgeries, ear trauma were excluded from the study. A written informed consent was taken from all the patients. A detailed history taking, thorough clinical examination was done for these patients.

Investigations including pure tone audiometry, X-ray of bilateral mastoids, routine blood investigations like complete haemogram, renal function tests, HIV, HBsAg screening were done. Intraoperatively, tympanic membrane perforation, continuity of ossicular chain, condition of middle ear mucosa, condition of mastoid air cells and antrum, patency of aditus were noted using otomicroscope and endoscopes where needed. Tympanoplasty and mastoidectomy was performed accordingly.

**RESULTS**

Our study included 60 patients with mucosal type of chronic suppurative otitis media, out of which 33 were male, 27 were female.

Sex Distribution of Patients	Number of Patients (%)
Males	33 (55%)
Females	27(45%)

**Table 1. Showing Sex Distribution among the Patients**

Patients were in the range of 10 years to 58 years of age, majority of which belonged to 11-20 years age group i.e. 35 (58.33%). Out of 60 patients, 38 patients had unilateral disease, 22 patients had bilateral disease.

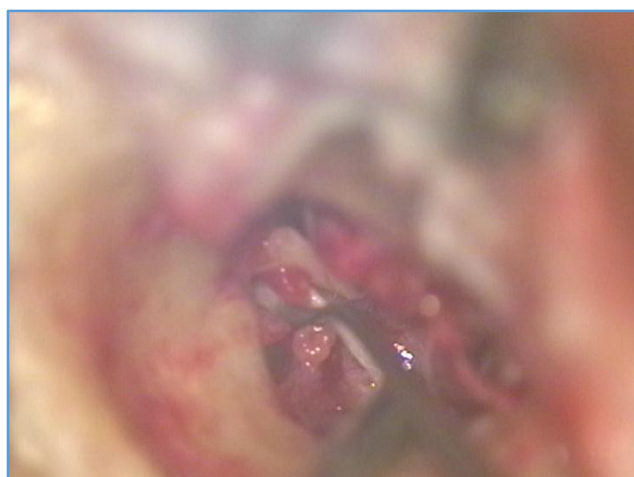
Laterality of CSOM	Number of Patients (%)
Unilateral	38 (63.33%)
Bilateral	22 (36.67%)

**Table 2. Showing Laterality of Chronic Otitis Media**

Intraoperatively, 37 patients had intact ossicular chain and 23 patients had ossicular erosion.

Ossicular Status	Number of Patients (%)
Intact	37 (61.67%)
Eroded	23 (38.33%)

**Table 3. Showing Ossicular Status**



**Figure 1. Showing Long Process of Incus Erosion**

Among 22 patients with bilateral disease, 16 patients (26.67%) had ossicular erosions in the operated ear, suggesting that patients with bilateral disease are at more risk for ossicular erosion.

Bilateral COM with Ossicular Erosion in the Operated Ear	No. of Patients (%)
Present	16 (26.67%)
Absent	6 (10%)

**Table 4. Showing Number of Patients with Bilateral Disease and Ossicular Erosions**

Among 60 patients included in the study, 35 patients had central perforation of tympanic membrane and 25 patients had subtotal perforation. Out of 23 patients with ossicular erosion, 19 patients had subtotal perforation, whereas 4 patients had smaller central perforations.



**Figure 2. Showing Subtotal Perforation**

Type of TM Perforation in Patients with ossicular Erosion	Number of Patients (%)
Small/medium/large central	4 (6%)
<b>Subtotal</b>	<b>19 (31.67%)</b>

**Table 5. Showing type of TM Perforation in Patients with Ossicular Erosion**

Incus was the most common ossicle to undergo erosion in our study i.e. 20 (33.33%) cases, followed by head of the stapes in 3 cases (5%). Malleus was not eroded in any patients in our study.

Type of Ossicular Erosion	Number of Patients (%)
Incus (Long process/lenticular process)	20 (33.33%)
Stapes suprastructure	3 (5%)

**Table 6. Showing the Type of Ossicular Erosion**



**Figure 3. Showing Eroded Long Process of Incus**

Granulation tissue was found in the middle ear in 16 patients.

Presence of Granulation Tissue in the Middle Ear	Number of Patients (%)
Present	16 (26.67%)
Absent	44 (73.33%)

**Table 7. Showing Number of Patients with Granulation Tissue in the Middle Ear**

Among 16 patients with granulation tissue in the middle ear, 15 patients had ossicular erosions.

Ossicular Erosion along with Granulation Tissue in the Middle Ear	No. of Patients (%)
Present	15 (25%)
Absent	1 (1.67%)

**Table 8. Showing Number of Patients with Ossicular Erosion along with Granulation Tissue in the Middle Ear**

We performed myringostapedioplasty in 20 patients using autologous incus, myringoplastinoplasty in 3 cases using autologous malleus and type 1 tympanoplasty in rest of the patients using autologous temporalis fascia.

Based on X-ray of mastoids and intraoperative findings, 46 patients had sclerotic mastoid, whereas 14 patients had pneumatized mastoid.

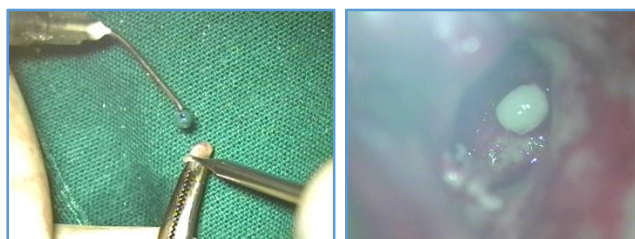
Mastoid Status	Number of Patients (%)
Sclerotic	46 (76.67%)
Pneumatized	14 (23.33%)

**Table 9. Showing Mastoid Pneumatization**

Intraoperatively, 12 cases had granulation tissue in the mastoid. Cortical mastoidectomy was performed for 50 cases and aditus patency was achieved. In 10 cases, aditus block was present due to granulation tissue and patency was achieved by intact canal wall technique.

Type of Mastoidectomy	Number of Patients (%)
Cortical mastoidectomy	50 (83.33%)
Intact canal wall technique	10 (16.67%)

**Table 10. Showing Type of Mastoidectomy done**



**Figure 4 & 5. Shows Ossicular Reconstruction**

**DISCUSSION**

In this study, 60 patients with chronic otitis media, mucosal type were evaluated for ossicular chain erosions, along with other factors like tympanic membrane perforation, presence of granulation tissue, pneumatization of mastoid, etc. Patients were of the age ranging from 10 years to 58 years, majority being in the age group of 11-20 years. Among the patients, males were affected more than females. This is in accordance with majority of studies.

Chronic otitis media causes various changes in the middle ear. These changes are seen more commonly in unsafe type, but safe type can also present with many of these changes. Among the ossicles, the long process of incus, stapes crura, body of incus and manubrium are involved in that order of frequency. The reason that the long process of incus and stapes superstructure is most frequently affected is likely to be due to their delicate structure and location, rather than their tenuous blood supply.<sup>[5]</sup>

Continuous mechanical pressure effect of the retraction pocket, granulation or cholesteatoma on the ossicles, osteoclastic enzymes released by disease activity and bacterial activity in case of associated infections may play minor roles.<sup>[6]</sup> Malleus and stapes are more resistant to necrosis.<sup>[6]</sup>

In this study, intraoperatively, condition of the ossicular chain was assessed using otomicroscope and endoscopes. Long process of incus was found to be most commonly involved ossicle, followed by stapes suprastructure. Malleus was not found to be involved in this study. Mathur et al<sup>[7]</sup> in 1991 observed erosion of incus in 22% of cases in unsafe chronic suppurative otitis media.

In a study by Rout et al,<sup>[8]</sup> involvement of incus was 25 (17%) with ossicular involvement. Saboo et al<sup>[9]</sup> noticed ossicular chain pathology in 26.6% of safe type of CSOM, incus being eroded in 17% cases. Ossicular involvement was found more commonly in patients with subtotal perforation in comparison to central perforation<sup>[9]</sup> which is in accordance with our study. In our study, among 13 patients with ossicular erosion, 19 patients (%) had subtotal perforations, whereas 4 patients (%) had smaller central perforations. G. S. N. Murthy et al<sup>[10]</sup> found ossicular necrosis only in 8% cases of CSOM. In a study by Kashyap et al,<sup>[11]</sup> ossicular pathology was found in 24% cases of tubotympanic type of CSOM.

In a study by Varshney et al<sup>[12]</sup> in safe CSOM, the incus was found intact in 92.23%, eroded in 5.55%, and absent in 2.22% cases. Lenticular process was the most commonly necrosed part of the incus and was found eroded in 5.55% cases.

In a study by Jeng FC et al<sup>[13]</sup> in the non-cholesteatoma group, perforation edges adhering to the promontory revealed a higher incidence of ossicular discontinuity.

C. Srinivas et al<sup>[14]</sup> studied various factors influencing ossicular status in mucosal chronic otitis media. Of the parameters studied, three were reliable to predict ossicular discontinuity in tubotympanic disease viz. duration of the disease, adherence of the margins of perforation to the promontory, PTA, and the ABG. The other otomicroscopic findings like myringosclerosis, polypoid middle ear mucosa, and granulation tissue on the tympanic membrane/middle ear mucosa did not have a significant correlation with ossicular discontinuity. But in our study, 16 patients (%) had granulation tissue in the middle ear and 15 of them were associated with ossicular erosion.

According to R Albera et al,<sup>[15]</sup> ossicular chain damages in patients with non-cholesteatomatous middle ear pathologies are not frequent and are present in no more than 10% of the patients, but lesions found were similar to those reported in patients with cholesteatoma.

**CONCLUSION**

Ossicular chain erosions in patients with chronic otitis media, mucosal type are frequent and are present in 38.33% of the patients as per this study. Incus is the most common ossicle to get eroded (33.33%). Subtotal perforation, bilateral disease and granulation tissue in the middle ear can be considered as good indicators of ossicular chain involvement.

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