

# Bone Resorption in Patients of Chronic Suppurative Otitis Media (CSOM): A Prospective Study Done in a Tertiary Care Centre of Bihar

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## ABSTRACT

**Background:** Chronic suppurative otitis media (CSOM) is chronic inflammation of middle ear. This study was done to evaluate bone resorption in patients of CSOM in a tertiary care centre in Bihar, India. **Methods:** A prospective study carried out for one year in 90 patients aged more than 16 years. The patients were subjected to detailed history and complete ENT examination. Intra-operative middle ear findings were noted. **Results:** The mean age of patients was 27.8 years with SD of 12.7 years. The ratio of male to female patients 1.3:1. Hearing loss was seen in 88.9% (80/90) of cases. The number of cases with safe CSOM was 57.8% and that with unsafe CSOM was 42.2%. Erosion percentages seen in malleus, incus and stapes was 20%, 21.1% and 21.1% respectively. **Conclusion:** Malleus is the resistant ossicle to erode in cases of CSOM. The incidence of ossicular erosion was found to be much greater in unsafe CSOM than safe CSOM.

**Keywords:** CSOM, Ossicles, Bone resorption.

## INTRODUCTION

Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear including mastoid cavity which can present clinically as recurrent ear discharge or otorrhoea. Existence of CSOM has been documented since prehistoric times. The significance of ear discharge as a potent cause of infirmity and death was perhaps recognized by Hippocrates in 460 BC.<sup>[1]</sup> Incidence of CSOM varies from 0.5–2% in developed countries whereas in developing countries it varies from 3–57%. In India, incidence of CSOM is up to 30% with prevalence rate of 16/1,000 population in urban and 46/1,000 in rural areas.<sup>[2]</sup>

In the course of chronic infection in the middle ear spaces, pathologically changed connective tissue with an expanded set of vessels and the appearance of granulation tissue can be observed. This granulation tissue is modified by inflammatory factors, which are the most typical indicator of chronic middle ear infection. Granulation tissue can be the only feature of infection or it can coexist with cholesteatoma. CSOM with cholesteatoma can lead to the destruction of bone structures within the

middle ear area.<sup>[3]</sup> There are not much literature on this complication in studies done in this part of India. So, this study was conducted to evaluate bone resorption in patients of chronic otitis media in a tertiary care centre in Bihar, India.

## MATERIALS AND METHODS

This was a prospective study carried out in the Department of Otorhinolaryngology in Nalanda Medical College & Hospital, Patna, Bihar. This is a tertiary care centre in the state of Bihar. The period of study was from January 2019 to October 2019. A total of 90 patients were included in the study. Patients aged more than 16 years and diagnosed with CSOM and posted for middle ear surgery were included in the study. The exclusion criteria was as follows: patients of age less than 16 years, malignancy of middle ear, otitis externa or previous history of ear surgery. The patients who were selected were subjected to detailed history and complete ENT examination. The ears were examined by otoscopy on first visit. The later by a microscope and otoendoscope to establish a preoperative diagnosis of safe or unsafe disease. Several tests were done before surgery. Every patient underwent a preoperative pure tone audiometry. It was done to find out the hearing status and obtain documentary evidence. X-ray mastoid was done with bilateral Schueller's view to assess the pathology and surgical anatomy of the mastoid.

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Other important findings that were noted are as follows: Intra-operative middle ear findings including ossicular chain status, erosion of the individual ossicles, and continuity of the malleo-incudal and incudo-stapedial joint were noted.<sup>[4]</sup>

The descriptive data was tabulated and analyzed. The ossicular chain status in safe and unsafe ear was compared statistically. Chi square test was used to evaluate the level of significance and the P value <0.05 was considered as significant.

## RESULTS

This study included 90 cases. Cases were further divided into 'safe' and 'unsafe' CSOM bases on the history and clinical features. The study subjects were aged between 16 and 67 years. The mean age was 27.8 years with SD of 12.7 years. The number of cases in 16-25 years age group was 47 (52.2%), and

this formed the largest group according to age. The number of male cases were 51 (56.7%) and female cases were 39 (43.3%). The ratio of male to female patients 1.3:1. According to the ear affected, right ear was operated in 49 (54.4%) cases and left ear in 41 (45.6%) cases. All the cases complaints of ear discharge. Hearing loss was seen in 88.9% (80/90) of cases.

Based on the intra-operative findings, the patients were reclassified into those with safe CSOM and those with unsafe CSOM [Table 1]. The number of cases with safe CSOM was 52 (57.8%) and that with unsafe CSOM was 38 (42.2%). It was found that malleus was intact in 75.6% (68/90) cases while it was eroded/ necrosed in 20% (18/90) cases and absent in 4.4% cases. In safe CSOM, malleus was intact in 50 (96.2%) and eroded in 2 (3.8%) cases. In unsafe CSOM, malleus was intact in 18 (47.4%), eroded in 16 (42.1%) and absent in 4 (10.5%).

**Table 1: Status of bone resorption in CSOM (N=90)**

Bone	CSOM (%)	Safe (%)	Unsafe (%)	p value
<b>Malleus</b>				
Intact	68 (75.6%)	50 (96.2%)	18 (47.4%)	0.023*
Necrosed	18 (20%)	2 (3.8%)	16 (42.1%)	0.000**
Absent	4 (4.4%)	-	4 (10.5%)	-
Total	90 (100%)	52 (100%)	38 (100%)	
<b>Incus</b>				
Intact	56 (62.2%)	48 (92.3%)	8 (21.1%)	0.000**
Necrosed	19 (21.1%)	3 (5.8%)	16 (42.1%)	0.002*
Absent	15 (16.7%)	1 (1.9%)	14 (36.8%)	0.006*
<b>Stapes</b>				
Intact	71 (78.9%)	51 (98.1%)	20 (52.6%)	0.006*
Necrosed	19 (21.1%)	1 (1.9%)	18 (47.4%)	0.003*

\*Significant, \*\*Highly significant

Incus was observed to be the most common ossicle to get necrosed in cases of CSOM. In our study, incus was found intact in 56 (62.2%) cases, eroded in 19 (21.1%) cases and absent in 15 (16.7%) cases. Stapes was found intact in 71 (78.9%) cases while in 19 (21.1%), the stapes was found eroded by the disease. In safe CSOM, 51 (98.1%) of the cases had an intact stapes and only 1 (1.9%) case had erosion. In unsafe CSOM, 20 (52.6%) cases had an intact stapes and 18 (47.4%) showed erosion.

## DISCUSSION

The age group that was affected most in this study was between 16-25 years. Similar results were shown by other studies too.<sup>[5-7]</sup> The early presentation may be due to two factors. There may be increased awareness to different health issues and difficulty in hearing affecting the work efficiency that may have lead to the adult patients and parents of children to seek early medical intervention. Also, as this hospital is situated in the heart of Patna, it is easily accessible to all and people prefer to come here for early intervention.

The ratio of male to female patients was 1.3:1. Other studies found different results, females being more

affected.<sup>[8]</sup> The reason for our ratio may be due to outdoor preference of males in many activities. Also, parents seek medical intervention with a little bias toward male child.

The duration of ear discharge ranged from 6 months to 40 years (Mean duration 9.89 years). Twenty-four (26.7%) cases had duration of ear discharge between 10 and 15 years. The duration of disease in unsafe cases was generally seen to be longer. This particular finding may be a result of conversion of safe type of disease into unsafe disease over time.<sup>[9]</sup>

As expected, malleus was found to be most resistant ossicle. Malleus was intact in 75.6% cases while it was eroded/ necrosed in 20%. In safe CSOM, malleus was intact in 96.2% and eroded in 3.8% cases. In unsafe CSOM, malleus was intact in 47.4%, eroded in 42.1% and absent in 10.5%. These findings were consistent with those of Udaipurwala et al.<sup>[10]</sup> Sade et al. found a higher incidence, around 6.00%, of erosion of malleus in cases of safe CSOM. In unsafe disease they found malleus necrosis that correlates well with our finding.<sup>[11]</sup>

Incus was observed to be the most common ossicle to get necrosed in cases of CSOM. In our study, incus was found intact in 56 (62.2%) cases, eroded in 19 (21.1%) cases and absent in 15 (16.7%) cases.

Kartush found erosion of long process of incus with an intact malleus handle and stapes superstructure (type A) as the most common ossicular defect.<sup>[12]</sup> Shreshtha et al. and Mathur et al. also reported similar findings in unsafe CSOM.<sup>[5]</sup>

CSOM is basically of two types, safe and unsafe. Both have potential to cause bone resorption. The mechanism of the ossicular lesions varies according to pathology. In the normal ear the mucosa that covers the ossicle is constituted by a respiratory epithelium that rests on a basal membrane which separates it from the connective tissue. The connective tissue is constituted by collagen fibres, cell like fibrocytes, fibroblast, histiocytes, mast cells and blood vessels. When inflammation occurs in safe CSOM, this tissue is replaced by granulation tissue. The bone loses its cortical, it becomes irregular and is invaded by inflammatory tissue. The presence of the granulations, rich in lysosomes is associated with enzymatic destruction. The matrix of the collagen is degraded either by specific collagenase, either by nonspecific agents like the lysosomes or the acid hydrolase.<sup>[13]</sup>

## CONCLUSION

This study has found out that the malleus is the resistant ossicle to erode in cases of CSOM whereas incus was found to be susceptible. Although the difference is not so much significant. The incidence of ossicular erosion was found to be much greater in unsafe CSOM than safe CSOM and this difference was found to be significant.

### Recommendation

Study of bone resorption and its extent in CSOM will help surgeons to predict its extent according to different grades of CSOM. Hence preoperative radiological grading of CSOM is recommended. Also, as Otolaryngologists we must be able to do different types of ossicular chain reconstruction, either in single sitting or as second stage procedure, to provide the best hearing results to our patients. Patients should be fully informed and consented about these possible issues prior to surgery. A proper counselling of the patients in this regard is a must.

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