DOI: 10.14260/jemds/2014/2055

# ORIGINAL ARTICLE

## OSSICULAR DEFECTS AND AUDIOLOGICAL PROFILE OF CHRONIC OTITIS MEDIA

Sathyaki D. C[1], Jyothi Swarup R[2], Mohan M[3], Mamatha Rani Rout[4], Anu P. K[5], Manjunath K[6]

**HOW TO CITE THIS ARTICLE:**
Sathyaki D. C, Jyothi Swarup R, Mohan M, Mamatha Rani Rout, Anu P. K, Manjunath K. "Ossicular Defects and Audiological Profile of Chronic Otitis Media". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 07, February 17; Page: 1763-1768, DOI: 10.14260/jemds/2014/2055

**ABSTRACT: BACKGROUND:** CSOM is a common disorder which causes hearing deficit. It can be due to perforation of tympanic membrane or ossicular erosion. **AIM:** To study the ossicular erosion and audiological profile in patients with CSOM. **MATERIALS AND METHODS:** A total of 30 patients with CSOM who underwent surgery were included in the study. **RESULTS:** Hearing loss was significantly higher in males and in patients with ossicular erosion. **CONCLUSION:** Ossicular erosion can give rise to hearing loss of more than 60dB.

**KEYWORDS:** Ossicular defects, Audiological profile, Chronic otitis Media.

**INTRODUCTION:** CSOM, a common condition in otorhinolaryngology, is characterized by chronic, intermittent or persistent discharge through a perforated tympanic membrane. Poor living conditions, overcrowding, poor hygiene and nutrition have been suggested as the basis for the wide spread prevalence of CSOM in developing countries.

Both types of CSOM, tubotympanic which is considered safe, as well as atticoantral which is considered unsafe, may lead to erosion of the ossicular chain. This propensity for ossicular destruction is much greater in cases of unsafe CSOM, due to the presence of cholesteatoma and/or granulations. 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 hypervascularisation, osteoclast activation and bone resorption causing ossicular damage. TNF-alpha also produces neovascularisation and hence granulation tissue formation. CSOM is thus an inflammatory process with a defective wound healing mechanism. This inflammatory process in the middle ear is more harmful the longer it stays and the nearer it is to the ossicular chain.

Pathologies that interrupt the ossicular chain result in increase in percentage of hearing losses. Complete disruption of the ossicular chain can result in a 60 dB hearing loss[1]. In this study we present the pre-operative hearing loss and the intra-operative ossicular chain status of 30 patients of CSOM who underwent surgery at our institution over a 12 month period.

**MATERIALS AND METHODS:** This was an observational study carried out in the department of otorhinolaryngology, Sri Siddhartha Medical College, Tumkur, Karnataka from July 2012 to June 2013. A total of 30 patients were included in this study.

Patients aged more than 16 years, diagnosed with CSOM and posted for tympanoplasty were included. Patients who had malignancy of temporal bone, otitis externa and previous history of ear surgery were excluded.

The selected patients were subjected to a detailed history and clinical examination. The ears were examined by otoscopy initially and later subjected to microscopy to establish a pre-operative

DOI: 10.14260/jemds/2014/2055



diagnosis of safe or unsafe disease. All patients underwent a pre-operative pure tone audiometry to find out the hearing status. They also underwent X-ray mastoid (bilateral Schuller's view) to assess the pathology and the surgical anatomy of mastoid air cell system. Intra-operative middle ear findings including ossicular chain status, erosion of ossicles and continuity of incudo-malleal and incudo-stapedial joint were noted.

Ossicular chain status and its influence on the hearing impairment was analyzed using analysis of variance (ANOVA).

**OBSERVATION:** In our study of 30 cases the age of the patients was varying between 18 years and 60 years. The correlation of the audiological profile with that of the age was as follows.

| Age in years | PTA levels | | | | | |
|---|---|---|---|---|---|---|
| | **<25 dB** | **25-40 dB** | **40-55 dB** | **55-70 dB** | **70-90 dB** | **>90 dB** |
| 18-20 | 0 | 3(50.0%) | 2(16.7%) | 0 | 0 | 0 |
| 21-30 | 0 | 0 | 5(41.7%) | 3(42.9%) | 1(25.0%) | 1(100.0%) |
| 31-40 | 0 | 3(50.0%) | 4(33.3%) | 2(28.6%) | 1(25.0%) | 0 |
| 41-50 | 0 | 0 | 1(8.3%) | 0 | 0 | 0 |
| 51-60 | 0 | 0 | 0 | 2(28.6%) | 2(50.0%) | 0 |
| **Total** | **0** | **6(100.0%)** | **12(100.0%)** | **7(100.0%)** | **4(100.0%)** | **1(100.0%)** |

Highest number of patients had moderate hearing loss, followed by moderate-severe hearing loss and mild hearing loss. Age group of 21-30 years and 31-40 years had the highest number of patients followed by 18-20 years.

Mean PTA levels according to the age group was as follows.

| Age in + years | No. of patients | Mean PTA±SD | p-value |
|---|---|---|---|
| 18-20 | 5 | 38.00±10.95 | 0.017 |
| 21-30 | 10 | 60.00±17.95 | |
| 31-40 | 10 | 48.50±12.26 | |
| >40 | 5 | 65.00±12.75 | |
| **Total** | **30** | **53.33±16.53** | |

**Sex distribution:** In our study 16 patients were females and 14 patients were males. The mean PTA levels according to the sex distribution were as follows.

| Gender | No. of patients | Mean PTA±SD | p-value |
|---|---|---|---|
| Male | 14 | 59.64±17.92 | 0.048 |
| Female | 16 | 47.82±13.42 | |
| **Total** | **30** | **53.33±16.53** | |

DOI: 10.14260/jemds/2014/2055



**Diagnosis:** In our study 27 patients had safe type of chronic suppurative otitis media and 3 patients had unsafe type.

**Type of hearing loss:** In our study 22 patients had conductive hearing loss and 8 patients had mixed hearing loss. 20 patients having safe CSOM had conductive hearing loss and the rest had mixed hearing loss. 2 patients having unsafe CSOM had conductive hearing loss and another had mixed hearing loss.

**Status of ossicular chain:** In our study 16 patients had normal ossicular chain. Incus was eroded in 13 patients, malleus was eroded in 5 patients, stapes was eroded in 4 patients and stapes was fixed in one patient. All the three ossicles were eroded in patients who had unsafe CSOM.

| Ossicles | No. of Patients (n=30) | % |
|---|---|---|
| 1. Normal ossicular chain | 16 | 53.3 |
| 2. Incus eroded | 13 | 43.3 |
| 3. Malleus eroded | 5 | 16.7 |
| 4. Stapes eroded | 4 | 13.3 |
| 5. Stapes fixed | 1 | 3.3 |

The mean PTA levels according to ossicular erosion are as follows:

| Ossicular erosion | No. of patients | Mean PTA±SD | p-value |
|---|---|---|---|
| No | 16 | 45.00±12.52 | 0.002 |
| Yes | 14 | 62.86±15.65 | |
| **Total** | **30** | **53.33±16.53** | |

In patients with safe CSOM lenticular process of the incus was eroded in 10 cases. The whole of incus was eroded in patients with unsafe CSOM. Handle of the malleus was eroded in 2 cases of safe and 3 cases of unsafe CSOM. Stapes superstructure was eroded in 3 cases of unsafe and one case of safe CSOM. Stapes footplate was fixed in one case of safe CSOM.

**DISCUSSION:** In developing countries such as India people ignore ear disease (particularly discharging ear) due to reasons like poverty, illiteracy, lack of awareness and insufficient access to health care. Chronic suppurative otitis media is a common source of morbidity in rural India. It is the most important cause of treatable deafness and occupies considerable amount of time in the clinic and for surgery. The present study audiological profile and the status of the ossicular chain were examined.

In our study incus was the most commonly eroded ossicle. 13 cases (43.3%) had erosion of the same followed by malleus (16.7%) and stapes (13.3%). Normal ossicular chain was noted in 16 cases (53.3%). Most of the patients who had normal ossicular chain had mild (25-40dB) or moderate

DOI: 10.14260/jemds/2014/2055



(40-55dB) hearing impairment (6 cases each). Erosion of ossicles were noted the most in patients with moderate hearing loss (55-70dB) followed by moderately (70-90dB) severe hearing loss.

Varshney et al in their study of 150 cases found intact ossicular chain in 92 cases. Incus was the most commonly eroded ossicle followed by stapes and malleus. They noted significantly higher incidence of ossicular erosion in unsafe CSOM[1].Albera et al in noted ossicular erosion in 115 of 140 patients with unsafe CSOM[2]. Incus was eroded in 109 cases, followed by stapes (41 cases) and malleus (28 cases). Vijayendra et al noted ossicular erosion and ossicular fixation in 200 of the 500 cases in their study[3].

Kasliwal et al noted significant presence of sensorineural component of hearing loss in their study. Factors associated were duration of the disease, presence of cholesteatoma and erosion of ossicles. Higher frequencies were more affected than lower frequencies[4].Kaur et al in their study noted mixed hearing loss in 24 of the 100 cases[5]. Siampara et al in their study noted mixed hearing loss 19 of the 75 cases[6]. Kolo et al in their study noted significant degree of mixed hearing loss in patients with CSOM[7]. In our study 8 (26.7%) of the 30 cases had mixed hearing loss. It was comparable with the existing literature.

Our study showed significantly higher hearing loss in patients in the age group of 21-30 years and in males. This may be due to frequent exposure to the external environment leading to frequent upper respiratory tract infections and thus frequent acute exacerbations of CSOM leading to repeated insult to the middle ear cleft causing ossicular erosion. This factor has not been addressed in the previous studies.

**CONCLUSION:** Our study concluded that there was significant difference in hearing loss between the patients with intact ossicular chain and with ossicular erosion. Most commonly eroded ossicle was incus. Unsafe CSOM had more tendency for ossicular erosion. Ossicular erosion can give rise to a hearing deficit of more than 60dB.Our study showed significantly higher hearing loss in patients with the age group of 21-30 years and in males.

**BIBLIOGRAPHY:**

1. Varshney S, Nangia A, Bist SS, Singh RK, Gupta N, Bhagat S. Ossicular chain status in chronic suppurative otitis media in adults. Indian Journal of Otolaryngology and Head and Neck Surgery. 2010 Oct; 62(4):421-6.
2. Albera R, Canale A, Piumetto E, Lacilla M, Dagna F. Ossicular chain lesions in cholesteatoma. Acta Otorhinolaryngologica Italica. 2012; 32:309-13.
3. Vijayendra H, Parikh B. Bone conduction improvement after surgery for conductive hearing loss. Indian Journal of Otolaryngology and Head and Neck Surgery. 2011 Jul; 63(3):201-9.
4. Kasliwal N, Joshi S, Pareek SM. Determinants of sensorineural hearing loss in chronic middle ear disease. Indian Journal of Otolaryngology and Head and Neck Surgery. 2004 Oct; 56(4):269-74.
5. Kaur K, Sonkhya N, Bapna AS. Chronic suppurative otitis media and sensorineural hearing loss: Is there a correlation. Indian Journal of Otolaryngology and Head and Neck Surgery. 2003 Jan; 55(1):21-4.
6. Siampara L, Mann SBS, Panda NK, Mehra YN. Audiovestibular profile in unilateral chronic suppurative otitis media. Indian Journal of Otolaryngology and Head and Neck Surgery. 1997 Apr; 49(2):107-11.

DOI: 10.14260/jemds/2014/2055



7. Kolo ES, Salisu AD, Yaro AM, Nwaorgu OGB. Sensorineural hearing loss in patients with chronic suppurative otitis media. Indian Journal of Otolaryngology and Head and Neck Surgery. 2012 Jan; 64(1):59-62.

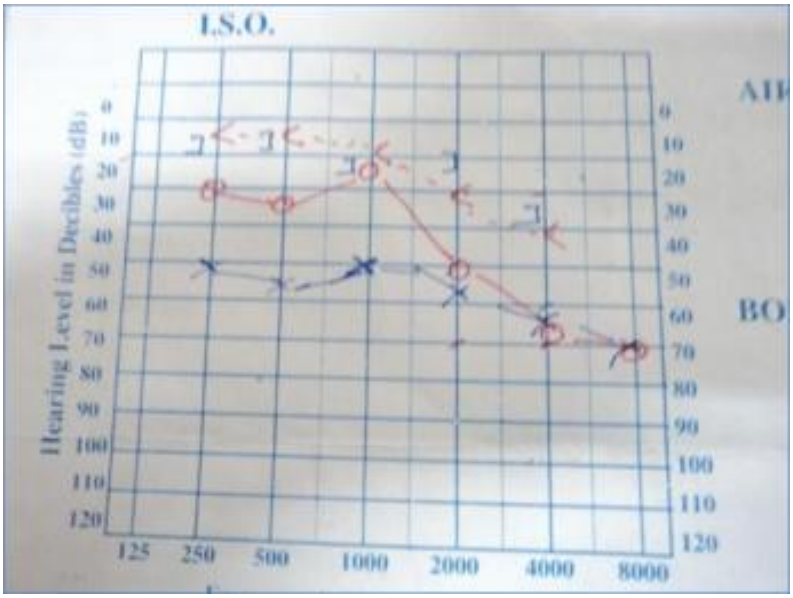


**Figure 1: pure tone audiogram**

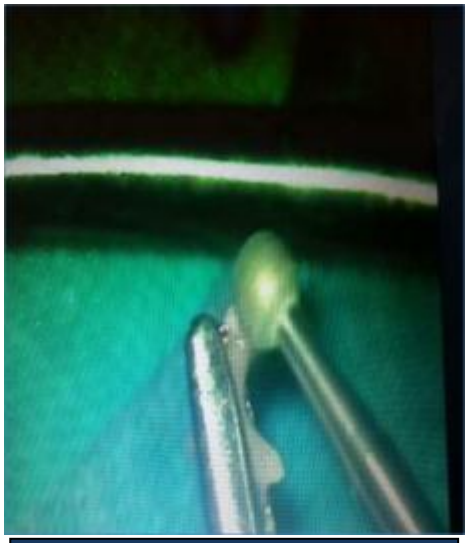

**Figure 2: re-shaping of incus**

**Figure 3: tympanic membrane perpforation**

DOI: 10.14260/jemds/2014/2055

# ORIGINAL ARTICLE

**AUTHORS:**

1. Sathayaki D. C.
2. Jyothi Swarup R.
3. Mohan M.
4. Mamatha Rani Rout
5. Anu P. K.
6. Manjunath K.

**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.
2. Associate Professor, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.
3. Professor, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.
4. Junior Resident, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.
5. Junior Resident, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.
6. Junior Resident, Department of E. N. T, Sri Siddhartha Medical College, Tumkur.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Sathyaki D. C,
Department of E. N. T,
Sri Siddhartha Medical College,
Agalakote, B. H. Road,
Tumkur – 572107.
E-mail: sathyaki_dc@yahoo.co.in

Date of Submission: 23/01/2014.
Date of Peer Review: 24/01/2014.
Date of Acceptance: 31/01/2014.
Date of Publishing: 15/02/2014.