

# INSIDIOUS SENSORINEURAL HEARING LOSS IN CHRONIC SUPPURATIVE OTITIS MEDIA

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## ABSTRACT

**Background:** Sensorineural hearing loss may be one of the outcome of chronic suppurative otitis media. **Objective:** To evaluate the association of chronic suppurative otitis media with sensorineural hearing loss and also to find out whether the disease duration had any impact on hearing. **Methodology:** This was a cross sectional study conducted at Aga Khan University Hospital. Charts of all patients who underwent surgery for chronic suppurative otitis media from 1<sup>st</sup> January 2004 to 31<sup>st</sup> December 2009 were reviewed. One hundred and fifty five patients out of 562 met our inclusion criteria and were included in the study. The contralateral ear was taken as control. History record and audiograms were reviewed from the patient charts for the duration of disease and evidence of SNHL at three speech frequencies ((500, 1000, and 2000 Hz). The data was entered and analyzed by SPSS version 16. **Results:** Of 155 patients, 46 (29.6%) had SNHL. In a group of patients with epithelial disease(cholesteatoma) 16 out of 45 patients had SNHL whereas in the group of patients with mucosal disease (formerly known as tubotympanic type) 30 out of 110 patients had SNHL. This hearing loss found to be worsening with the duration of disease in both groups ( $p=0.000$ ). **Conclusion:** A significant association of SNHL was found with CSOM and disease duration. Early surgical treatment should be offered in order to prevent irreversible SNHL.

**Key Words:** Otitis Media, Hearing Loss, Chronic Suppurative Otitis Media, Sensorineural.

## INTRODUCTION

Middle ear infections is a health problem mainly in the developing world.<sup>1,2</sup> Chronic Suppurative Otitis Media (CSOM) is highly prevalent worldwide and is a cause of hearing loss among children.<sup>3,4</sup> Chronic Suppurative Otitis Media is divided into mucosal disease and epithelial disease. The later type of CSOM is often associated with cholesteatoma which in turn may give rise to several other complications including facial nerve paralysis and intracranial extension of disease with grim consequences.<sup>5</sup> In contrast the former type of CSOM is not associated with cholesteatoma and due to this reason there is general inclination on part of treating physicians well as patients to perceive it as a safe disease and consequently delay the surgical repair.<sup>6</sup> Therefore, treatment with conservative approach using antibiotics at the time of active infection is commonly practiced. Recurrent chronic infection in the middle ear affect the inner ear hearing mechanism,<sup>7</sup> leading to sensorineural hearing loss.<sup>8</sup> In the present study we evaluated the association of chronic otitis media with sensorineural hearing loss (SNHL) and also assessed whether the disease duration had any impact on hearing.

## METHODOLOGY

This was a cross sectional study conducted on one

hundred and fifty-five patients which were selected from 562 patients, who were treated at our hospital for CSOM from 1<sup>st</sup> January 2004 to 31<sup>st</sup> December 2009. Our inclusion criteria was as follows:

1) Patients with a diagnosis of CSOM and Patients who had normal opposite ear with record of Audiogram. Patients with history of any of the following diseases were excluded from the study: Head injury, Post-traumatic tympanic membrane perforation Meningitis or neurosurgical procedure that involved drilling and Coexisting otologic condition of either ear. The opposite normal ear was taken as control. Data was collected for age, gender, duration of disease and hearing status. Pre-operative pure tone audiograms were reviewed for threshold of bone conduction (BC) at three speech frequencies including 500Hz, 1000Hz, and 2000Hz. Mean of these frequencies (mean BC threshold) was calculated. If the mean was found > 25db it was taken as SNHL present. Software SPSS version 16 was used for data analysis. Mean BC threshold was compared in all diseased and normal ears with t-test. ANOVA was applied to compare mean bone conduction disease in different duration groups and severity of SNHL.

## RESULTS

There were 72 males and 83 females. Mean age was 27 years (range 14 – 48). Forty five patients had atticofacial disease and 110 patients had tubotympanic disease. Overall 46 patients out of 155

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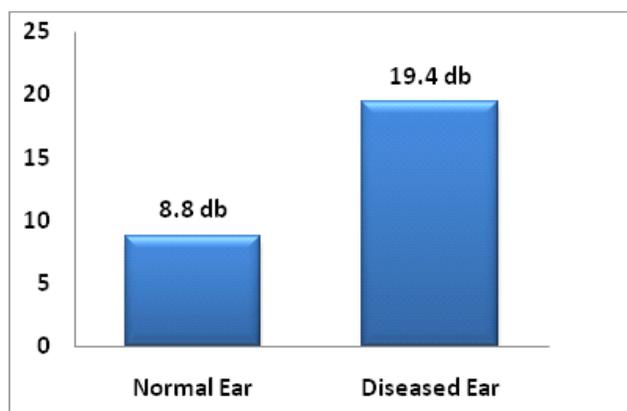
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were found to have their bone conduction threshold above 25 db i.e. SNHL was associated in 29.6% of our patients. In atticotympanic group 16 patients out of 45 had SNHL (35%) whereas in tubotympanic group 30 out of 110 (27%) had SNHL. Comparison of mean BC threshold was performed between normal and diseased ears of all patients. The mean BC threshold in normal ears was 8.8 db whereas in diseased ears it was 19.4 db. This difference was statistically significant ( $P = 0.0001$ ). (Figure I)

**Figure I: Bone conduction in normal and diseased ear.**



Patients were divided into 4 groups to compare mean bone conduction of SNHL with duration. All patients were included in this analysis so as not to overlook the gradual rise in the BC threshold even within a normal range of disables. There were 57 patients with 1 year of disease duration, 40 patients with 2 years of duration, 25 patients with 3 years of duration and 33 patients with duration of 4 years or more. Mean bone conduction threshold of these four groups were found to be 13.7, 20.2, 26.2, and 32.3 respectively. When these groups were compared using ANOVA the difference among the groups was significant. ( $P = 0.0001$ )

## DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is a common condition seen in otolaryngology clinics and the surgical treatment is mostly not carried out early in the developing world. In general, CSOM is well known for its conductive hearing loss which is often a chief complaint of patients besides recurrent otorrhea. The conductive hearing loss develops secondary to tympanic membrane perforation and erosion of ossicular chain. Subsequent studies also evaluated the

speech frequencies for presence of SNHL in chronic middle ear infections.<sup>9</sup> Conductive hearing loss is treated partially by surgery, SNHL is permanent controlled by use of hearing aids. The results of various studies regarding SNHL affecting speech frequencies in CSOM were not duplicated consistently. Some studies showed no significant SNHL whereas others recommend early treatment due to significant SNHL loss.<sup>10</sup>

We found a significant proportion of our patients had SNHL. These results are comparable with Yoshida et al,<sup>10</sup> who compared the bone conduction threshold of diseased ears with that of normal individuals and found significant difference at 250, 500, 1000, 2000, and 4000 Hz. In addition they also found that percentage of SNHL progressively increased with age. Similar study from India by Kaur et al,<sup>11</sup> showed SNHL at 1K, 2K and 4K and also observed that the more the duration of CSOM the higher the incidence of SNHL.

In this study, when the duration of disease was taken into account it was found that bone conduction threshold progressively increased with duration of disease. Similar findings duration of disease and SNHL were reported by da Costa.<sup>12</sup> On the other hand, MacAndie et al,<sup>13</sup> and de Azevedo,<sup>14</sup> did not find any correlation of SNHL with duration of disease. The pathogenesis of SNHL may be a result of recurrent ear infections due to perforated ear drums. The toxins and organism can cross through a semipermeable round window membrane. Schachern and others demonstrated a severe changes in the inner ears of animals after inoculating with bacteria.<sup>8</sup>

Another study by Cureoglu et al, performed on human temporal bones of unilateral CSOM found inner ear damage to be more severe than in the contralateral ear.<sup>15</sup> A critique that can be made on our study, and several others,<sup>7,9,13</sup> is that we were unable to exclude patients who used topical antibiotics, particularly aminoglycosides. Use of these medications is fairly common during episodes of otorrhea. The ototoxicity of topical antibiotics remains the subject of debate. Lundy and Graham,<sup>16</sup> reported that most of the patients can have irreversible cochlear damage. Moreover, the micro perforations and thickening of the mucous membrane due to inflammation and presence of secretions may affect the absorption of drugs through the oval and round windows.<sup>17,18</sup> Our present observation on patients with CSOM revealed that significant proportion of our patients had associated

SNHL which was found to be progressively worsening with time.

## CONCLUSION

There is significant association of sensorineural hearing loss with chronic suppurative otitis media. Early surgical treatment should be offered to patients in order to prevent irreversible sensorineural hearing loss.

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