

# Role of Impacted Wax in Hearing Loss and Effect on Removal

<sup>1</sup>Nivedha Senkuttuvan Pillai, <sup>2</sup>Raadhika Shree N

<sup>1</sup>MBBS, <sup>2</sup>MS ENT

Saveetha Medical College and Hospital

**Abstract:-** To overcome the most common problem faced of cerumen impaction, various methods exist to remove the debris and give the patient the immediate relief of hearing restoration. These methods are, Aural syringing, if the wax is clinically diagnosed to be of wet-type; suction is also used in these cases; manual removal using a Jobson's probe has been proven effective too. In cases where the wax is visualised to be extremely dry with scaly lesions, the patient is advised to follow medication in the form of drops to soften the wax in order for easy painless removal.

In this study, the hearing efficiency of the patient is measured before and after the removal of wax and correlated with each other. As an additional factor, the ear canal volume is also measured using impedance audiometry to determine any correlation with the amount of hearing loss. Patients fulfilling the inclusion criteria were subjected to a PTA (Pure tone audiometry) test in which the intensity of hearing was measured in decibels in both ears and plotted in the audiogram. The PTA threshold was determined at 250Hz, 500Hz, 1kHz, 2kHz, 4kHz and 8kHz by air conduction. Also bone conduction measurements were obtained at 500Hz, 1kHz, 2kHz and 4kHz. Following this, the patient's ear was cleaned by using various techniques like suctioning, aural syringing, or using a Jobson's probe. Once the ear canal was cleaned and confirmed by an otoscopic examination, the impedance audiometry was performed to measure the volume of the ear canal. After the removal of the wax a repeat PTA was done and plotted. The pre and post wax removal PTAs were compared and contrasted for differences in hearing loss.

The data was analysed using the two-tail factor and was found to be significant. P value was found to be  $P < 0.000000256$

Impacted wax caused a significant degree of conductive hearing loss and improvement in hearing of patients following wax removal was present.

## I. INTRODUCTION

Ear wax, or more medically referred to as Cerumen auris, is a substance that naturally occurs in every individual's ear. Its major purpose consists of cleaning, lubricating and protecting the external auditory canal (1). It typically consists of a mixture of ceruminous and sebaceous gland secretions along with the continuously shed desquamated epithelium of the external auditory canal (2). To the naked eye, usually appears brown or yellow or in some cases black or grey due to excessive desquamated keratinised epithelium (3).

The wax is both formed and expelled by natural processes. The expulsion of the wax from the EAC is usually by migration. This process is aided by general activities like eating, talking, etc which involves the movement of the jaw (1).

Due to various reasons, like a deficiency in the migration, overproduction of cerumen or the presence of a narrow ear canal could lead to impaction of the wax. This term of impaction is ideally used when the wax occludes more than 80% of the external canal making it difficult to visualise anything beyond it on an otoscopic examination (4). Although it is usually asymptomatic, it can present with discomfort, dizziness, tinnitus, chronic cough, otitis externa and most commonly hearing loss (2).

Hearing loss, in any extent, from mild to severe, has its drawbacks in social activities and how one perceives the surrounding environment. These drawbacks can range from inattentiveness during lectures and classes, communication gaps and problems with interpersonal ties (5). This therefore affects the lifestyle choices made in a present day scenario. A major hinderance is observed while performing audio logical examinations and the clinical otoscopic examination due to inadequate visualisation (10)

To overcome the most common problem faced of cerumen impaction, various methods exist to remove the debris and give the patient the immediate relief of hearing restoration. These methods are, Aural syringing, if the wax is clinically diagnosed to be of wet-type; suction is also used in these cases; manual removal using a Jobson's probe has been proven effective too (6). In cases where the wax is visualised to be extremely dry with scaly lesions, the patient is advised to follow medication in the form of drops to soften the wax in order for easy painless removal (7).

In this study, the hearing efficiency of the patient is measured before and after the removal of wax and correlated with each other. As an additional factor, the ear canal volume is also measured using impedance audiometry to determine any correlation with the amount of hearing loss.

➤ *Aim*

To study the effect of impacted wax in conduction of hearing and to observe the improvement in hearing after the removal of wax.

➤ *Objectives*

- To measure the loss of hearing due to impacted wax.
- To quantify the loss in decibels.
- To prove that removal of wax restores hearing loss.
- To measure the correlation with ear canal volume.

**II. METHODOLOGY**

**Study design:** An analytical cross sectional study

**Study setting:** Tertiary care facility, Saveetha Medical College and Hospital

**Study population:** Patients with impacted wax.

**Inclusion criteria:** All patients with impacted wax between 18 and 40 years of age.

**Exclusion criteria:** All patients with impacted wax below 18 years and above 40 years.

Patients with psychiatric illness

Patients with history of ear discharge

Patients with sensorineural hearing loss

Presence of a grommet, cholesteatoma, severe vertigo, perforation of tympanic membrane.

Sample size: 40 patients received in the ENT out- patient department fulfilling the inclusion criteria.

The study was conducted after obtaining ethical committee approval and informed consent from the patients. Strict confidentiality was maintained regarding all the information obtained.

Patients fulfilling the inclusion criteria were be subjected to a PTA ( Pure tone audiometry) test in which the intensity of hearing was measured in decibels in both ears and plotted in the audiogram. The PTA threshold was determined at 250Hz, 500Hz, 1kHz, 2kHz, 4kHz and 8kHz by air conduction. Also bone conduction measurements were obtained at 500Hz, 1kHz, 2kHz and 4kHz (8). Following this, the patient’s ear was cleaned by using various techniques like suctioning, aural syringing, or using a Jobson’s probe. Once the ear canal was cleaned and confirmed by an otoscopic examination, the impedance audiometry was performed to measure the volume of the ear canal(9).

Additional data like the type of wax (dry/wet) was also recorded along with patient demographics.

After the removal of the wax a repeat PTA was done and plotted. The pre and post wax removal PTAs were compared and contrasted for differences in hearing loss.

**III. RESULTS AND DATA ANALYSIS**

The data was analysed using the two-tail factor and was found to be significant.

P value was found to be ;  $P < 0.000000256$

Impacted wax caused a significant degree of conductive hearing loss and improvement in hearing of patients following wax removal was present. (Table 1); (Figure 1).

Analysis showed that change in mean air-bone gap before and after wax removal was found to be 21.19 db. The difference was statistically significant.

The ear canal volume measured by impedance audiometry was not an indicator of the degree of hearing loss as found by the lack of correlation between ear canal volume and mean change in air-bone gap.

Other variables like age, sex, affected side and type of wax did not show any significant association with the cerumen impaction.

Change (dB)	Ears (n) %
<10	33 (82.5)
11 to 20	6 (15)
21 to 30	1 (2.5)
>31	0

Table 1:- Change in Air Conduction Threshold Following Removal of Cerumen In 40 Ears.

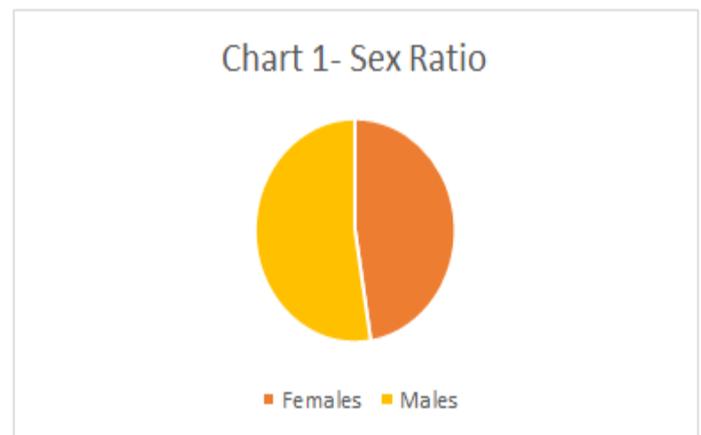


Chart 1:- Sex Ratio

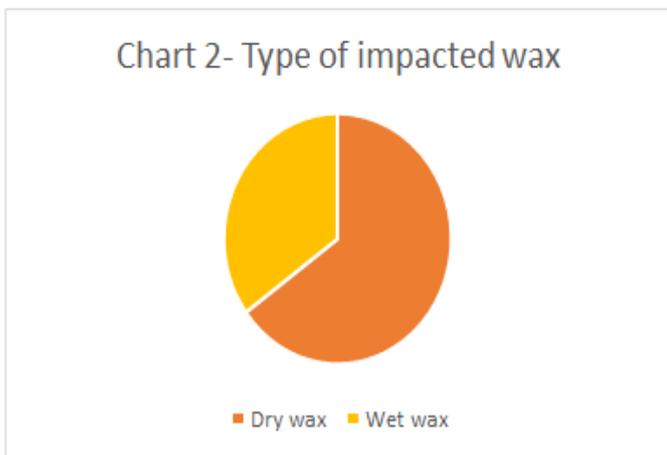


Chart 2:- Type of Impacted Wax

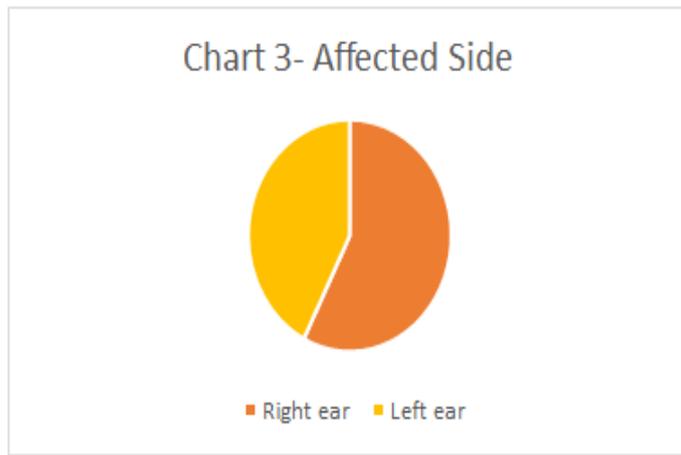


Chart 3:- Affected Side

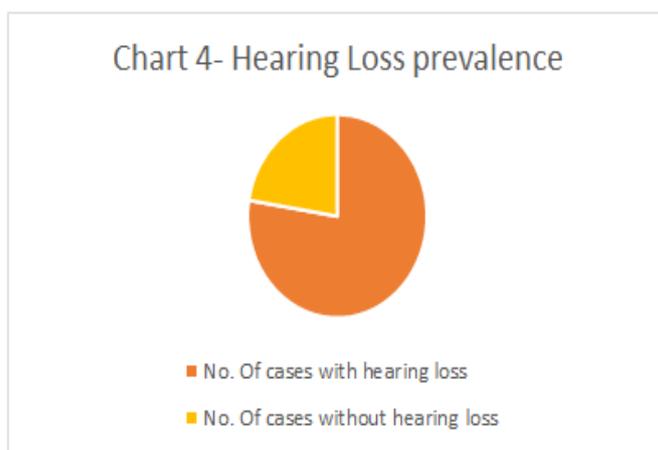


Chart 4:- Hearing Loss Prevalence

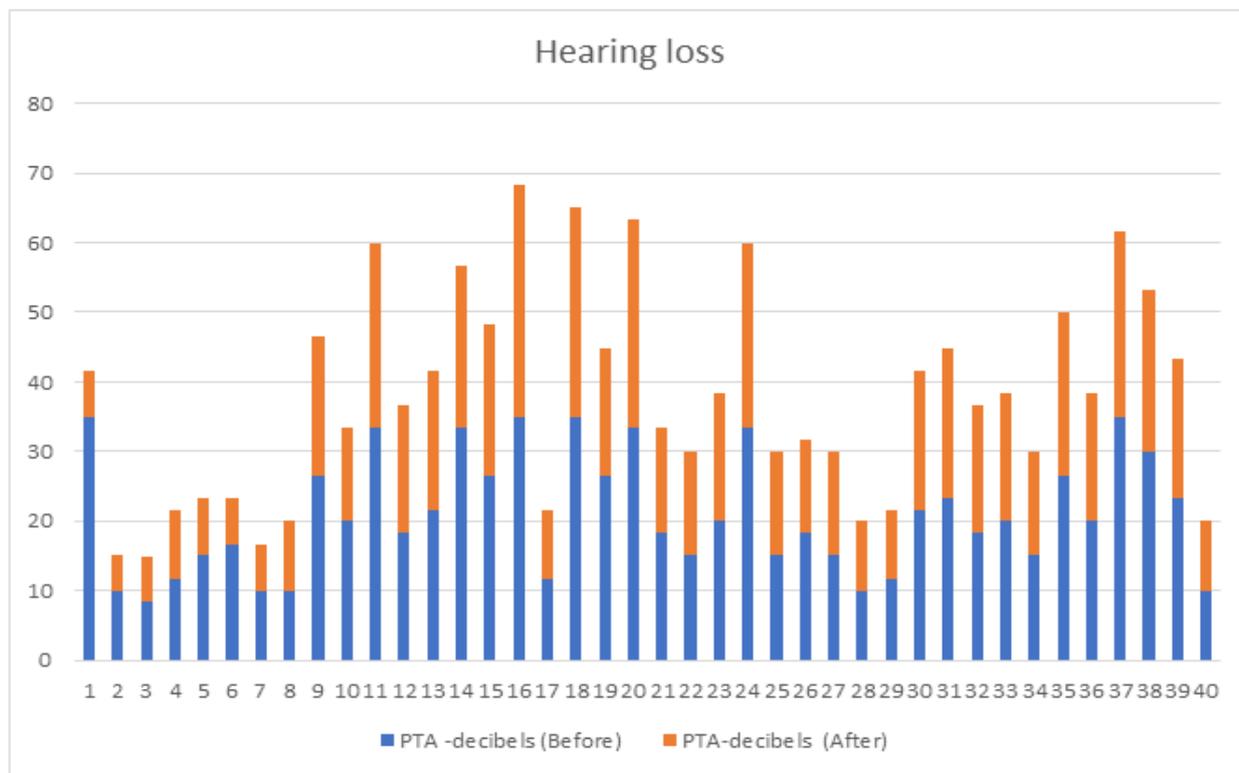


Fig 1:- Graphical Representation of PTA Measured before and after Removal of Cerumen.

#### IV. DISCUSSION

Various literatures exist revolving around cerumen impaction. The dispute on the role of impacted wax in deafness is forever ongoing. The very first of its observations were made in 1964 in which Chandler et al examined effects of ear canal occlusion on hearing loss. He measured the relationship between the degree of block and the amount of threshold shift across audiometric frequencies. His results revealed a loss of low-frequency PTA sensitivity. However, the drawback in this study was the fact that Chandler used impression materials to occlude the ear canal rather than earwax, so his results become slightly questionable (11).

Another study was conducted by Sethu T Subha et al in which they tried to determine if cerumen in the ear canal causes significant hearing loss and find any correlation between amount of cerumen and degree of hearing loss. The results of the study indicated that impacted wax does caused a significant amount of hearing loss. In addition to this they also correlated the length of cerumen plug and other variables like age, sex, ethnicity and affected side. None of these variables showed any correlation to the impacted wax (10).

Amongst the relatively recent studies, in 2006 Amer and Fatima conducted a pilot study to document audiometric changes in hearing threshold due to wax impaction. The study included the type of wax (wet/dry) as a parameter for determining relation of hearing loss after removal. Results showed that there was a greater mean improvement in hearing loss in wet impacted cerumen when compared with dry impacted cerumen (12).

#### V. CONCLUSION

In conclusion impacted wax can cause hearing loss amongst various other problematic manifestations. Therefore the careful assessment and knowledge of its effect on hearing loss is important in helping improve patient care, compliance and comfort. Further studies using larger sample sizes and other parameters may benefit the existing literature better.

#### REFERENCES

- [1]. Roeser RJ, Ballachanda BB. Physiology, pathophysiology, and anthropology/epidemiology of human ear canal anal secretions. *J Am Acad Audiol.* 1997;8:391–400.
- [2]. Lyndon S, Roy P, Grillage MG, Miller AJ. A comparison of the efficacy of two ear drop preparations ('Audax' and 'Earex') in the softening and removal of impacted ear wax. *Curr Med Res Opin.* 1992;13:21–5.
- [3]. Raman R. Impacted ear wax—a cause for unexplained cough?. *Arch Otolaryngol Head Neck Surg.* 1986;112;679.

- [4]. Prasad KS. Cardiac depression on syringing the ear. *J Laryngol Otol.* 1984;98:1013.
- [5]. Lewis-Cullinan C, Janken JK. Effect of cerumen removal on the hearing ability of geriatric patients. *J Adv Nurs.* 1990;15:594–600.
- [6]. Meador JA. Cerumen impaction in the elderly. *J Gerontol Nurs.* 1995;21:43–
- [7]. Guest JF, Greener MJ, Robinson AC, Smith AF. Impacted cerumen: composition, production, epidemiology and management. *QJM.* 2004;97:477–88.2.
- [8]. Carr MM, Smith RL. Ceruminolytic efficacy in adults versus children. *J Otolaryngol.* 2001;30:154–6.
- [9]. Seely DR, Quigley SM, Langman AW. Ear candles—efficacy and safety. *Laryngoscope.* 1996;106:1226–9
- [10]. Sethu T. Subha, Raman R. Role of impacted cerumen in hearing loss. *Nose and throat journal.* 2006 vol. 50586 pp. 603-2050
- [11]. Chandler JR. Partial occlusion of the external auditory meatus. It's effect upon air and bone conduction hearing acuity. *Laryngoscope* 1964;74:22-54
- [12]. Hydro A, Siddiqui F. Hearing loss due to different types of impacted cerumen. 2016 vol3. (2) pp. 1087