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ORIGINAL ARTICLE

Sensorineural Hearing Loss and its Severity in Patients Suffering from Longstanding Aural Suppuration–An Experience at a Tertiary Care Teaching Hospital

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ABSTRACT

Background: CSOM is the leading cause of hearing loss. It has usually a higher mortality rate than other forms of ear infections.

Objective: The aim of this study was to find out the frequency of Sensorineural hearing loss and its severity in patients suffering from longstanding aural suppuration.

Material and method: This prospective study was conducted at the Department of ENT, Bolan Medical College / Complex Hospital, Quetta from May 2023 to October 2023 after taking approval from the research committee of the institute. A total of 154 individuals of both sexes and different age groups (12-40 years) presented with chronic CSOM were enrolled in this study. A thorough ENT examination was conducted. The pure tone thresholds for both air and bone conduction were measured across the frequency range of 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz. The two types of hearing impairment were Sensorineural Hearing Loss (SNHL) and Conductive Hearing Loss (CHL). A proforma was used to record the data, and descriptive statistics were used to calculate the frequencies of several variables, including age, gender, the type of hearing loss, and the severity of SNHL. The age groups and length of CSOM were taken into consideration while calculating the severity of SNHL. For the analysis, SPSS 15.0 was used.

Results: A total of 154 individuals were examined in this study out of which male were 87 (56.4%) and female were 67 67(43.5%). Conductive hearing loss was diagnosed in 97(63%) individuals and Sensorineural hearing loss in 57(37%) individuals**.** When patients with persistent otorrhea presented, 37% of them had sensorineural hearing loss and 63% had conductive hearing loss**.** Moderate hearing loss was the most common among individuals with sensorineural hearing loss (18.8%).The detected cases of conductive hearing loss are not included in the severity analysis**.** The age group most frequently associated, including 40.2% of the individuals with SNHL, was 12–20 years old. According to tests of significance, a substantial proportion of CSOM patients had sensorineural hearing loss (p-value <0.05). The duration of chronic suppurative otitis media did not positively correlate with the degree of sensorineural hearing loss (p value >.05**)**

Conclusion: The current study concluded that both conductive and sensorineural hearing loss is brought on by chronic suppurative otitis media. Until SNHL complicates it, which is usually permanent, CSOM is a curable cause of acquired deafness.

Keywords: Sensorineural; Hearing loss; Severity; Longstanding aural suppuration

INTRODUCTION

Chronic suppurative otitis media (CSOM) is characterized by purulent discharge from the ear and a persistent hole in the tympanic membrane that causes substantial morbidity. This discharge is lasting more than 12 weeks or repeated with ear infections .it effect both or one ear.[1] Squamous disease and mucosal disease are the two forms of CSOM. Approximately 65–330 million individuals globally, primarily in countries that are underdeveloped, suffer from it. A significant risk factor for the development of CSOM is the estimated 50–85% of children who have at least one episode middle ear infection at the age of three years old.[2-3] According to a recent systematic study, children under the age of five considers more than half of the 7.1 million instances of acute otitis media. Of the new cases of this disease, 22.6% include children younger than five. According to the research, 30.82 out of every 1000 people had hearing loss associated with ear infection.[4] The World Health Organization estimates that it leads to 21,000 - 28,000 deaths globally. It has usually a higher mortality rate than other forms of ear infections.[5] Conductive hearing loss is the kind that results from a ruptured tympanic membrane and ossicular chain disruption. But there is new evidence that conductive hearing loss (CHL) and sensorineural hearing loss (SNHL) coexist, which may indicate cochlear injury.[6] It has been shown in earlier research that CSOM can produce both CHL and SNHL. The outer hair cell in the cochlea may sustain damage from inflammatory chemicals and bacterial toxins that infiltrate through the round window membrane. Permanent hearing loss is typically the consequence of hair cell destruction.[7-10] Although the prevalence of sensorineural hearing loss varies widely, the commonly recognized range is between 10 - 24 percent. While a study reported a frequency of 13% for SNHL, another study identified a 24% incidence in individuals with chronic suppurative otitis media.[11-12] Recent developments in surgical procedures, contemporary equipment, diagnostic facilities, and biomedical technology have all significantly decreased the incidence of complications from middle ear infections. The standard method is used to evaluate hearing loss in relation to chronic suppurative otitis media. By figuring out the pure tone thresholds for both air and bone conduction, pure tone audiometry—which is widely accessible—can identify the kind and extent of hearing loss. To determine the amount of disease-related damage, otomicroscopy and, more recently, oto-endoscopy are performed. When assessing the actual anatomical extent of a disease, its erosions, and its intracranial or extracranial extension, CT and MR imaging modalities might be useful. the aim of this study is to determine the the incidence and severity of sensorineural hearing loss in individuals with repeated episodes of chronic suppurative otitis media in relation to the length of aural suppuration.

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MATERIAL AND METHOD

This prospective study was conducted at the Department of ENT, Bolan Medical College / Complex Hospital, Quetta from May 2023 to October 2023 after taking approval from the research committee of the institute. A total of 154 individuals of both sexes and different age groups(12-40 years) presented with chronic CSOM were enrolled in this study while individual suffered from actute CSOM, suppuration due to otitis externa ,underwent mastoidectomy, myringoplasty and tympanoplasty were excluded. Participants who met the inclusion criteria were selected and written permission was obtained from each individual. Data including duration of ear

discharge, its severity, persistence, aggravating and alleviating variables, and other details were noted. Other investigations related to CSOM such vertigo, hearing impairment, tinnitus, sore throat, nasal blockage, nasal discharge, postnasal discharge, and epistaxis were recorded.A thorough ENT examination was conducted. Otoscopy, otoendoscopy, and, where necessary, otomicroscopy were used to check the ears. The state of the middle ear mucosa and tympanic membrane was observed. We looked for a cholesteatoma and observed the kind of membrane perforation. The volume, colour, consistency, and odour of the discharge were all assessed. When empirical antibiotic therapy failed, pus was sent for sensitivity testing and culture. In terms of data analysis, there was no differentiation between CSOM with and without cholesteatoma. The nose was inspected for pathology, irritation, and discharge. To feel for tenderness, the paranasal sinuses were palpated. We looked for any lumps or swollen adenoids in the nasopharynx. Mucosal, tonsil, and pharyngeal wall inflammation in the oral cavity & oropharynx was evaluated. Where necessary, x-rays of the sinuses and the nasopharynx were acquired. When problems from CSOM were suspected, further imaging tests including a CT scan and an MRI were used.When necessary, baseline hematological tests were also performed. PTA was performed on each subject to evaluate their hearing. To determine the kind and degree of hearing impairment, the pure tone thresholds for both air and bone conduction were measured across the frequency range of 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz. The two types of hearing impairment were: 1. Sensorineural Hearing Loss (SNHL); Bone Conduction greater than 25dB and no Air-Bone gap or Air-Bone gap greater than 15 dB; and 2. Conductive Hearing Loss (CHL); Normal BC curve with A-B gap comparable to or greater than 15 dB. Calculating the average bone conduction thresholds throughout the 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz frequency range allowed for the assessment of sensorineural hearing loss in the ear effected. SNHL was classified as mild, moderate, or 41-55 dB, with 0-25 dB being considered the typical bone conduction (BC) threshold. d. Profound; >91 dB c. Severe; 56-91 dB. In situations of bilateral CSOM, the ear with SNHL was taken into consideration for study if either a) both ears had SNHL or b) one ear had conductive loss while the other ear had sensorineural loss. CSOM was classified as recurrent or chronic when the patient experienced otorrhea for two to six weeks out of the year, and the length of suppuration was noted. The length of the illness was noted by the patients or, in the case of youngsters, by their parents. The disease's duration was divided into feasible categories for examination. A proforma was used to record the data, and descriptive statistics were used to calculate the frequencies of several variables, including age, gender, the type of hearing loss, and the severity of SNHL. The age groups and length of CSOM were taken into consideration while calculating the severity of SNHL. For the analysis, SPSS 15.0 was used.

RESULTS

A total of 154 individuals were examined in this study out of which male were 87 (56.4%) and female were 67 67(43.5%). The mean age of the study population was 24.22 (ranged 12-40) years and the duration of otorrhoea was 11.5years as presented in table 1. Conductive hearing loss was diagnosed in 97(63%) individuals and Sensorineural hearing loss in 57(37%) individuals as presented in figure 1. When patients with persistent otorrhea presented, 37% of them had sensorineural hearing loss and 63% had conductive hearing loss as presented in figure 1. Moderate hearing loss was the most common among individuals with sensorineural hearing loss (18.8%).The detected cases of conductive hearing loss are not included in the severity analysis as presented in table 2. The age group most frequently associated, including 40.2% of the individuals with SNHL, was 12–20 years old as described in table 3. Table 4 documents the severity of SNHL according to different age groups. Shorter-term otorrhea was frequently associated with a mild form of sensorineural hearing loss. Longer-lasting otorrhea was shown to cause a severe degree of hearing loss. According to tests of significance, a substantial proportion of CSOM patients had sensorineural hearing loss (p-value <0.05). The duration of chronic suppurative otitis media did not positively correlate with the degree of sensorineural hearing loss (p value >.05)(table 5).

Table 1: Demographic features of the study population

Features	N (%)
Sex	
Male	87(56.4%)
Female	67(43.5%)
Mean age in years	24.22 (ranged 12-40)
Mean duration of otorrhoea	11.5years

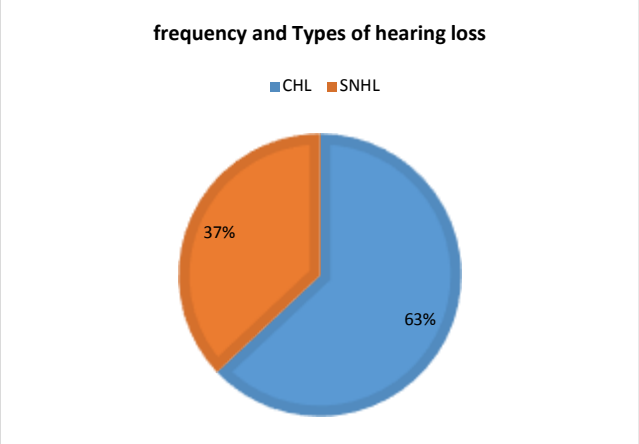

Table 2: Hearing loss severity

		Frequency (%)	Valid percentage
Valid	Mild	18(11.6%)	11.6
	Moderate	29(18.8%)	18.8
	Sever	9(5.8%)	5.8
	Profound	2(1.2	1.2
	Cases of CHL	96 (62.3%)	62.3
	Total	154 (100%)	100.0

Table 3: Age wise distribution of the study participants

Age in group in years	Frequency (%)
12-15	31(20.1%)
16-20	31(20.1%)
21-25	29(18.8%)
26-30	27(17.5%)
30-40	36(23.3%)
Total	154

Table 4: Age wise Severity of Hearing Loss Cross tabulation

Severity of CHL						Total
Age in group in years	Mild	Moderate	Sever	Profound	Cases of CHL	
12-15	1	Zero	Zero	Zero	30	31
16-20	11	1	1	Zero	18	31
21-25	2	1	1	Zero	25	29
26-30	2	12	3	Zero	10	27
30-40	1	14	3	2	16	36
Total	18	29	9	2	96	154

Table 5: Duration Range(yrs) * Severity of Hearing Loss Crosstabulation

Severity of CHL						Total
Age in group in years	Mild	Moderate	Sever	Profound	Cases of CHL	
1-5	3	2	Zero	Zero	21	26
6-10	6	2	zero	Zero	37	45
11-15	6	1	2	Zero	30	39
16-20	1	6	2	Zero	7	16
21-25	1	15	3	Zero	3	22
26-30	Zero	2	1	2	zero	4
Total	18	29	9	2	96	154

DISCUSSION

In addition to being one of the main causes of hearing loss in both adults and children, persistent suppurative otitis media can be fatal. When the ear's sound-conducting mechanism is damaged, conductive hearing loss results. Damage to the cochlea's hair cells by bacterial toxins and inflammatory mediators absorbed via the round window membrane results in sensorineural hearing loss. Sensorineural hearing loss is typically irreversible because cochlear nerve cells have a very limited capacity to heal themselves.[2] A study of the literature shows conflicting data on the kind of chronic suppurative otitis media and its relationship to SNHL, patient ages, the length of the illness, and the degree of hearing loss. Nonetheless, it appears that everyone agrees that persistent suppurative otitis media does cause sensorineural hearing loss. There are less research on this topic in our country's literature. In our study the conductive hearing loss was diagnosed in63% individuals and Sensorineural hearing loss in 37% individuals. When patients with persistent otorrhea presented, 37% of them had sensorineural hearing loss and 63% had conductive hearing loss. Moderate hearing loss was the most common among individuals with sensorineural hearing loss18.8% In a research at the Aga Khan University hospital in Karachi, Ali Zaidi SS & colleagues discovered that patients with chronic suppurative otitis media had a 52% greater prevalence of SNHL. Additionally, they discovered that as the disease's duration grew, so did the incidence of SNHL.[13] SNHL and suppurative otitis media were shown to be positively correlated in another study carried out in Islamabad by Jan A. et al. They also observed that bone conduction thresholds were raised in all fifty-three individuals over the whole frequency range examined. In their analysis, the average length of illness was 12.7 years.[14] In contrast to our findings, both of these national surveys show a greater prevalence of sensorineural hearing loss. We found that the longer the suppuration period, the more severe the sensorineural hearing loss. However, this was not statistically significant. Dekhil KR studied the relationship between chronic suppurative otitis media and sensorineural hearing loss in Iraq in 2010. He discovered that individuals with cholesteatoma had more episodes of sensory loss than those with tubotomympanic hearing loss, and that CSOM-related hearing loss involved frequency ranges in the higher range first (8000 Hz).[15] In Iran, Amali A. and associates made similar findings. The damaged ear's bone conduction thresholds were found to be noticeably lower for each frequency, rising with increasing frequency (7 dB at 500 Hz and 9.71 dB with 4000 Hz).Age and sensorineural hearing loss severity were significantly correlated, however there was no significant link between SNHL and illness duration. Additionally, there was no correlation between sensorineural hearing loss and the existence or lack of cholesteatoma or ossicular chain injury.[16] De Avezdo and associates conducted a retrospective analysis of 114 CSOM patients' data. The illness lasted twelve years and twelve months on average. They found that the damaged ears' bone conduction thresholds had increased by an average of up to 40 dB. Although there was no link with cholesteatoma or illness duration, there was a positive correlation with age.[12] Similar to our research, Kolo et al. discovered a considerable level of SNHL in CSOM patients; however, there was no relationship between the patients' age and the length of suppuration.[9] Raquib A and colleagues and Kaur K & colleagues, on the other hand, found a strong correlation between SNHL and CSOM duration.[11-17] Since choleasteatma is erosive and destructive, it is widely accepted that squamous illness is more likely to result in complications, such as SNHL. Nonetheless, SNHL was discovered in 28.57% of 105 patients with mucosal-type suppurative otitis media in a research by Malaetti S. et al. This is similar to the results of cholesteatoma disease-related suppurative otitis media. They came to the conclusion that the degree of sensorineural hearing loss was unaffected by age, gender, or length of illness. This latter view aligns with our findings as well.[18]

CONCLUSION

The current study concluded that both conductive and sensorineural hearing loss is brought on by chronic suppurative otitis media. Until SNHL complicates it, which is usually permanent, CSOM is a curable cause of acquired deafness. Therefore, sensorineural hearing impairment can be avoided with prompt and appropriate treatment of this illness.

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