



Sensorineural hearing loss in patients with safe chronic suppurative otitis media, analytical study of the incidence of occurrence and the possible risk factors

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Abstract

Objective: This study aims to assess the association between Sensorineural hearing loss (SNHL) and safe mucosal chronic suppurative otitis media (CSOM) and its relation to patient's age, sex, and duration of the disease.

Methods: 100 patients with unilateral mucosal type of CSOM with normal contralateral ear were included in the study. The infected ear was taken as the study ear and normal ear as the control ear. All patients underwent hearing assessment by pure tone audiometry for both ears. Results were analyzed in all patients for both study and control ears using parameters of patient's age, sex, duration of disease and speech frequency.

Results: There were 7% of the studied patients having sensorineural element hearing loss. The incidence increased with age of the patient and duration of the disease.

Conclusion: Safe mucosal CSOM can cause significant SNHL and risk increases with increasing age of the patient and duration of the disease.

Keywords: chronic suppurative otitis media, sensorineural hearing loss, pure tone audiometry

Introduction

Chronic Suppurative Otitis Media (CSOM) is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent or persistent ear discharges or otorrhoea through a tympanic membrane perforation [1].

It can be divided into safe mucosal type with permanent central perforation of pars tensa without cholesteatoma or intracranial complications and unsafe squamous type with cholesteatoma or intracranial complications [2].

Hearing loss as a sequel of chronic suppurative otitis media (CSOM) is often conductive, but recent studies have found an additional sensorineural component in these patients, thus demonstrating inner ear damage [3].

The incidence of SNHL in CSOM according to Paperella *et al*, 1984 [4] is 43%, Kaur *et al*, 2003 [5] is 24% and Sharma *et al*, 2006 [6] is 9.4%. But some other authors had found little or no relationship between CSOM and SNHL [7].

Several studies also have investigated the correlation between SNHL with patient's age and duration of the disease. Kolo *et al*, 2012 [8] found a significant degree of SNHL in patients with CSOM, but the patient's age and duration of otorrhea did not have any correlation with it. Raqib *et al*, 2009 [9] and Kaur *et al*, 2003 [5] observed a significant relationship between SNHL and the disease duration.

Patients and methods

This prospective study was carried out in department of otorhinolaryngology Al-Azhar university hospital Assiut during the period from December 2017 to July 2018. Consents were taken from all patients included in the study. 100 patients with unilateral safe mucosal type of CSOM with contralateral normal ear were included in the study. The infected ear with safe mucosal type of CSOM was taken as study ear and the contralateral normal ear of the same patient was taken as control ear. All the patients underwent hearing assessment for both study and control ears by Pure Tone Audiometry (PTA). Incidence of SNHL in patients with safe CSOM was determined and the risk factors were detected and discussed.

Correlations were made between age and sex of the patients and SNHL, Duration of the disease and SNHL and Bone conduction thresholds for both study and control ears.

Statistical analysis

Data were analyzed and expressed in tables using Statistical Package for Social Science (SPSS). Statistical methods included descriptive methods (mean, standard deviation, frequency distribution) and significance tests (t-test for quantitative data, correlation coefficient test and analysis of variance (ANOVA) tests). The significance will be adjusted

when P equal 0.05 or less.

Results

Table 1: Demographic data of the studied patients (n=100)

Age (Years)	
(Range) Mean ± SD	(10-59) 34.50 ± 16.64
Age groups: n (%)	
I (10 - 20)	28 (28)
II (21 – 40)	50 (50)
III (41 – 59)	22 (22)
Duration (Years):	
(Range) Mean ± SD	(0.5-12)6.30 ± 8.06
Duration groups: n (%)	
Less than 1 year	7 (7)
1 year to <5 years	34 (34)
5 years to 10 years	28 (28)
More than 10 years	31 (31)
Sex: n (%)	
Male	43 (43)
Female	57 (57)

Regarding the side of the ear affected there was almost equal incidence of CSOM in both right and left ears.

Table 2: Side of ear affected of the studied patients (n=100)

Side of ear affected: n (%)	
Right	52 (52 %)
Left	48 (48 %)

Among 100 patient with unilateral safe mucosal type of CSOM with contralateral normal ear, there were 7% of the studied patient having sensorineural element hearing loss.

Table 3: Type of hearing loss of the studied patients (n=100)

Type of hearing loss: n (%)	
Conductive hearing loss(CHL)	93 (93 %)
Mixed hearing loss(MHL)	7 (7 %)

When we studied the patients with SNHL we found that The Incidence of SNHL was increased with increasing age of the patient.

Table 4: Incidence of SNHL according to patients' ages.

	Incidence of SNHL(7)	P-value
Age (Years)		
(Range) Mean ± SD	(18-54) 31.48± 17.24	0.434
Age groups: n (%)		
I (28)	1 (14.2 %)	0.023*
II (50)	2 (28.6 %)	
III (22)	4 (57.2 %)	

The incidence of SNHL increased in the study ears when the duration of the disease increased. 57.1% of the patient who had SNHL had more than 10 years disease duration.

Table 5: Incidence of SNHL according to duration of disease.

	Incidence of SNHL (7)	P-value
Duration (Years)		
(Range) Mean ± SD	(1-12) 6.42 ± 8.23	0.412
Duration groups: n (%)		
Less than 1 year (7)	0	0.036*
1 year to < 5 years (34)	1 (14.2 %)	
5 years to 10 years (28)	2 (28.5 %)	
More than 10 years (31)	4 (57.1 %)	

There was no statistically significant difference between male and female among patients with SNHL.

Table 6: Incidence of SNHL according to patient's sex

Sex	Incidence of SNHL(7)	P-value
Male (43)	3 (42.9 %)	0.326
Female (57)	4 (57.1 %)	

Patients with SNHL had significantly higher incidence of DM as a co morbidity than patients in with CHL, also patients with SNHL had significantly higher incidence of being smokers than patients in group with CHL.

Table 7: Relation between Co morbidities and risk factors of the patients with SNHL Vs patients with CHL

	CHL (93)	SNHL (7)	P-value
n(%)			
DM (20)	18 (19.3 %)	2 (28.6 %)	0.023*
HTN (12)	11 (11.8 %)	1 (14.3 %)	0.413
Smoking (45)	41 (44 %)	4 (57.1 %)	0.028*
Family history (3)	3 (3.2 %)	0 (0 %)	0.461

Bone conduction is diminished in the diseased ears in patients with SNHL compared to the normal ear. Patients with SNHL had more hearing loss at high frequency thresholds.

Table 8: Bone Conduction Thresholds in normal and diseased ears of patients with SNHL

	Bone conduction(Range) Mean ± SD		P-value
	Normal ear	Diseased ear	
500 HZ	(10-30) 20.75±4.66	(10-60) 30.75±10.91	0.001*
1000 HZ	(10-30) 21±5.98	(10-60) 32.25±15.43	0.001*
2000 HZ	(10-30) 19.5±4.83	(10-60) 38.25±16.41	0.001*
4000 HZ	(10-30) 21.25±4.25	(25-70) 47.5±13.22	0.001*

Discussion

Hearing loss as a sequel of chronic suppurative otitis media (CSOM) is often conductive, but recent studies have found an additional sensorineural component in these patients, thus demonstrating inner ear damage [3].

Our aim was to find the relation between safe CSOM and SNHL and its relation to patient's age, sex, duration of disease.

In this study only unilateral cases of safe CSOM were included and SNHL was evaluated as difference in bone

conduction threshold (BCT) between diseased and control ears equal to or more than 25 dB. Clinical and audiological assessment of our patients revealed that all the diseased ears had conductive hearing loss. These findings are in conformity with that of Dumich and Harner, 1983^[10].

In this study, 7% of our patients had SNHL. Levine *et al.*, 2003^[11] found SNHL in 34% of 225 ears undergoing tympanoplasty for various reasons. Nanda and Luthra, 2015^[12] found that the incidence of SNHL in safe CSOM was 21%.

The incidence of SNHL hearing loss in the ear affected by CSOM was in our study related to patient age. Levine *et al.*, 2003^[11] also reported similar results stating that, there is a small but statistically significant relationship showing more relative SNHL with increasing age. Papp *et al.*, 2003^[13] in their study concluded that bone conduction threshold shift was more accentuated as the age increased.

According to our study there was no correlation between sex of the patients with safe CSOM and SNHL. Similar results were obtained by Noordzij *et al.*, 1995^[7] and Vanderveen *et al.*, 2006^[14].

Our results showed there is a difference in bone conduction thresholds between diseased and control ears at all frequencies particularly at higher frequencies (4kHz). These data correlate with those of Paparella *et al.*, 1984^[4].

We found a higher incidence of SNHL when the duration of the disease was more, with maximum at more than 10 years duration.

According to Kholmatov in 2001^[15] progressively increased incidence of SNHL was found as the duration of disease increased.

Conclusion

Safe mucosal CSOM can cause significant SNHL. The risk increased with increasing age of the patient. The risk is more in disease of longer duration and this factor should be considered while managing the patients with CSOM. Early detection and treatment can limit the SNHL in these patients. The risk also increased in uncontrolled neglected diabetic patients and among smokers. There was high incidence of SNHL at high speech frequencies. There was no difference among males and females.

References

1. Acuin J. Chronic suppurative otitis media. *BMJ*. 2002; 325:1159-1160.
2. Hazarika P, Nayak DR, Balakrishnan R. Diseases of the middle ear. *Textbook of Ear, Nose, Throat and Head & Neck Surgery Clinical and Practical*, 2009, 145-163.
3. Amali A, Hosseinzadeh N, Samadi S. Sensorineural hearing loss in patients with chronic suppurative otitis media: Is there a significant correlation? *Electron Physician*. 2017; 9(2):3823-3827.
4. Paparella MM, Morizono T, Le C, Mancini F, Cho Y. Sensorineural hearing loss in otitis media. *Ann Otol Rhino Laryngol*. 1984; 93:623-629.
5. Kaur K, Sonkhya N, Bapna AS. Chronic suppurative otitis media and sensorineural hearing loss: is there a correlation? *Indian J Otolaryngol Head Neck Surg*. 2003; 55:21-4.

6. Sharma K, Gulati SK, Kaur R. Sensorineural hearing loss in chronic suppurative otitis media - safe type. *Indian J Otol*. 2006; 11:22-36.
7. Noordzij J, Dodson E, Ruth R, Arts H, Lambert P. Chronic otitis media and sensorineural hearing loss: is there a clinically significant relation. *Am J Otol*. 1995; 16:420-423.
8. Kolo ES, Salisu AD, Yaro AM. Sensorineural hearing loss in patients with chronic suppurative otitis media. *Indian J otolaryngol head neck surg*. 2012; 64(1):59-62.
9. Raquib A, Taous A, Haque R. Sensorineural component in chronic suppurative otitis media. *Bangladesh Journal of Otorhinolaryngology*. 2009; 15(2):69-74.
10. Dumich P, Harner S. Cochlear functions in chronic otitis media. *Laryngoscope*. 1983; 93:583-586.
11. Levine B, Shelton C, Berliner K, Sheehy J. Sensorineural hearing loss in chronic otitis media. Is it clinically significant? *Arch Otolaryngol Head Neck Surg*. 2003; 115:814-816.
12. Nanda M, Luthra D. Sensorineural hearing loss in patients with unilateral safe chronic suppurative otitis media. *International Journal of Research in Medical Science*. 2015; 3:551-555.
13. Papp Z, Rezes S, Jókay I, Sziklai I. Sensorineural hearing loss in chronic otitis media. *Otol Neurotol*. 2003; 24:141-144.
14. Vanderveen E, Schilder A, VanHeerbeek N, Verhoeff M, Zielhuis G, Rovers M. Predictors of chronic suppurative otitis media in children. *Arch Otolaryngol Head Neck Surg*. 2006; 132:115-118.
15. Kholmatov D. Early detection of a sensorineural aspect of hypoacusis in patients with chronic purulent otitis media. *Otorhinolaryngology*. 2001; 3:26-38.