SENSORINEURAL HEARING LOSS IN CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT

Objectives : A prospective study conducted in Basra General Hospital from April 2008 to March 200٩ to find the cause -effect relationship between chronic suppurative otitis media and sensorineural hearing loss .

Method : Hearing thresholds of hundred patients with chronic suppurative otitis media were determined using Pure Tone Audiometry. All subjects were less than 40 years old (to exclude Age related hearing loss) , unilateral cases selected (so as the contralateral healthy ear served as a control) . All of them presented criteria of evaluation which exclude the other possible causes of sensorineural hearing loss like : chronic medical illnesses , otological surgeries , hereditary causes , exposure to noise and exposure to systemic ototoxic drugs .

Results : The average loss in bone conduction threshold was determined between the affected and healthy ear in relation to the disease duration and in relation to the extent of the pathology .

Conclusion : We found that the longer the duration of the disease and the more complicated the pathology, the more the loss in bone conduction .This loss is mostly at the higher frequencies .

Key words : Sensorineural hearing loss , chronic suppurative otitis media ,

INTROCDUCTION

Chronic suppurative otitis media is a major health problem in developing countries , it is defined as a persistent or intermittent infected discharge through a non-intact tympanic membrane (i.e Perforation or tympanostomy tube) for a period greater than three months [1]. The hearing impairment in patients with Chronic suppurative otitis media has generally been observed to be an increase in air conduction thresholds with normal bone conduction thresholds , however , several investigator (Paparella and his co-workers) have reported disturbance in cochlear function as a sequel to the disease .[2]

Adam Politzer 1887 in the 2nd edition of his text book "*Lehrbuch der ohrenheilkunde fur practische arzte und studirende* " was the first to show the alteration in the hearing in chronic suppurative otitis media confirmed that " when the illness continues from infancy or in advanced age or when adhesive phenomena occur in tympanic cavity , the perception of sound through the bone conduction is diminished or abolished " .[3]

Hulka describe the worsening of high tones for bone conduction thresholds in chronic suppurative otitis media .[4]

Huzing recognize the presence of bone

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conduction loss in chronic suppurative otitis media .[5]

Morrison stated that " in about a quarter of case of middle ear inflammation there is sensorineural involvement " .[6]

Hache noted the increase of proteins in the perilymph in otitis media .[7]

Paparella draw the attention to the pathology of sensorineural hearing loss in patients with chronic suppurative otitis media stressing the role of the round window in transmitting inflammation from the middle ear .He hypothesized that the round window membrane permits toxic materials to enter the inner ear and biochemically alter the inner ear fluids, resulting in gradual end-organ dysfunction .

Schuknecht suggested that " a local toxic effect might accelerate the atrophic changes that normally occur in the supporting tissue in the cochlear duct , these changes could alter the mass , stiffness and friction of the spiral ligament or of the basilar membrane resulting in altered displacement of the cochlear partition in response to sound " .[9] Various animal studies have conclusively demonstrated the ability of this membrane to serve as a portal .Radioactive isotopes, labeled proteins, antibiotics, toxins and tracers have been placed on the middle ear surface of the round window membrane and later collected from perilymphatic fluids .

Paparella when studying the temporal bone autopsy have shown that the mean thickness of the round window membrane was relatively greater in patients with chronic suppurative otitis media in all age groups compared to the same age group of normal bones .[10]

MATERIALS & METHODS

The records of hundred patients attending the ENT department in Basra General Hospital for between April 2008 to December 2008 . All of them were diagnosed as having unilateral chronic suppurative otitis media (the normal ear served as a control) . The inclusion criteria are : (1) The age of the patients ranged from 18 to 40 years to exclude the presbyacusis as a cause of sensorineural hearing loss in these patients .(2) No Previous otological surgery .(3) No Chronic medical illnesses (DM , Hypertension ..etc). (4) No Family history of hearing loss .(5) No Exposure to systemic ototoxic drugs . and (6) No Exposure to hazardous noise . All of them were examined clinically by microscope and tuning fork tests (512 Hz , C_1) , then they were evaluated audiometerically (the analysis was made of the bone conduction thresholds with masking) . Patients were divided into 4 groups according to the duration of disease Also divided into 2 groups according to the presence of the squelae of otitis media like simple uncomplicated perforation and granulation tissue or polyp .

RESULTS

Table1 show :the longer the disease duration last , the greater the sensorineural hearing loss

Table2 show :the more complicated pathology (polyp or granulation tissue(, the greater the sensorineural hearing loss .

The average in Table3 concluded by comparing the average of the bone conduction of the normal (control) ear and that of the affected ear at each frequency . It shows that the higher frequencies are more affected .

The average in Table4 concluded by comparing the average of the bone conduction of the normal (control(ear and that of the affected ear at each frequency according to the duration of the disease .It

shows the longer the duration , the more the loss .

The average in table5 concluded by comparing the average of the bone conduction of the normal (control) ear and that of the affected ear at each frequency according to the Pathology of the disease . It shows the more complicated pathology , the more loss .

DISCUSSSION

The results of this study indicate that there is a definite sensorineural component to the hearing loss in cases of Chronic suppurative otitis media . Bone conduction in diseased ears is depressed to a statistically significant degree when compared to that in normal control ears . The longer the disease process and the more complicated the pathology (Polyp or granulation tissue) the greater the possibility of sensorineural hearing loss .Cusimano observed a definite and significant correlation between the duration of the disease and the sensorineural hearing loss .[11] Noordzij in his study concluded that chronic suppurative otitis media may cause sensorineural hearing loss .We share this conclusion with him , but the average loss was less and he found that there was no consistent correlation between severity of sensorineural hearing loss and the duration of disease or the severity of the pathology . [12] Probably , because our patients had a more advanced disease due to the delay in seeking proper medical advice , and this may be related to the drop in the proper health care. Virtiainen stated that " sensorineural hearing loss can occur in patients with chronic suppurative otitis media. He found that the mean bone conduction thresholds elevated with increasing age and the .hearing loss was less severe in paediatric patients than in patients over 30 years of age . This observation agree with our study regarding the duration of the disease and the pathology .[13] Blakley reported a strong association between chronic suppurative otitis media and sensorineural hearing loss .[14] Papp found a significant association with sensorineural hearing loss and the threshold shift was more accentuated as duration and age increased and seemed to be higher at 4 KHz than that at the speech frequencies .[15] Kaur found that 24 %of his patients have sensorineural hearing loss (12 %in our sample(particularly affecting the higher frequencies (like in our study) and progressively increased with the increase in the duration of the disease .[16] Kasliwal observed consistent correlation between the severity of sensorineural hearing loss and the duration of the disease , presence of more complicated pathology . [17] The reported loss was more than that in our study , but the higher frequencies reported to be more affected " just like in our study" . Feng noticed the difference in bone conduction threshold between diseased and control ear were statistically significant and associated with the duration and the higher frequencies are easier affected than the lower frequencies .[18] de Azevedo found that sensorineural hearing loss occurred in 13 %of the patients with chronic suppurative otitis media , and was correlated with older age, but not with the presence of pathology or longer duration of ear disease .The average loss was 40 dB (more than that observed in our study) . [19] Probably , because in his study included patients older than in our study . In contrary Dumich [20] and Browning [21] found no difference of bone conduction thresholds in patients with unilateral chronic suppurative otitis media between diseased and healthy (control) ears .

CONCLUSION

Sensorineural hearing loss may occur as a result of chronic suppurative otitis media and the risk of it is increased with duration of the disease and the pathology of the disease. So active medical or surgical intervention should be considered to stop the inflammatory process as soon as possible to prevent the development of sensorineural hearing loss , in addition of course to avoid the known complications of the chronic suppurative otitis media .

Table 1 : Distribution of patients according to the duration and if there is a difference in bone conduction thresholds between the control and the affected ear .

	Duration (years(	No .of Patients		
		No Loss	With Loss	Total
I	0-5	45	0	45
II	6-10	25	1	26
III	11-15	9	2	11
IV	16-20	9	9	18
Total		88	12	100

Table 2 : Distribution of patients according to the pathology :

Pathology	No .of Patients		
	No Loss	With Loss	Total
Perforation	68	3	71
Polyp or granulation tissue	20	9	29
Total	88	12	100

Table 3 : Average loss in bone conduction in Patients according to the frequency :

	Frequency in Hz			
	500	1000	2000	4000
Loss in dB	15.83	17.50	19.16	18.75

Table 4 : The average bone conduction thresholds loss with the duration of the disease :

		Frequency in Hz			
Threshold loss in dB	Duration (years)	500	1000	2000	4000
	0-5	0	0	0	0
	6-10	5	5	5	5
	11-15	15.00	17.50	20.00	17.50
	16-20	18.33	20.00	21.11	22.78

Table 5 : The average bone conduction thresholds loss with the type of the pathology.

		Frequency in Hz			
Threshold in dB	Pathology	500	1000	2000	4000
	Perforation	8.75	10	15	13.75
	Granulation or polyp	18.13	19.38	20.63	20.63

N.B : .*The tables data were entered into the computer, edited and statistically analysed using the Statistical Package for the Social Sciences version 12.0 software by independent statistics personnel .The chi-square test was used to study associations between two qualitative variables .The level of significance for the exploratory analysis was 0.05.*

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الخلاصة : دراسة مستقبلية اجريت في مستشفى البصرة العام للفترة من نيسان ٢٠٠٨ و لغاية اذار ٢٠٠٩ لايجاد العلاقة السببية بين مرض التهاب الاذن الوسطى التقيحي المزمن و فقدان السمع الحسي- العصبي .
تم قياس الشدة السمعية لمئة مريض مصاب بالتهاب الاذن الوسطى التقيحي المزمن . جميع المرضى كانوا دون الاربعين عمراً (لازالة احتمال تأثير العمر في الشدة السمعية) ، جميع الحالات كانت فيها احد الاذنين هي المصابة و الاخرى سليمة (لأستخدام الاذن السليمة كأساس لقياس الشدة السمعية لكل حالة).
جميع المرضى تم اختيارهم بحيث يستبعد احتمال وجود تأثيرات اخرى ممكنة للتسبب بحصول فقدان سمعي حسي-عصبي كالاصابة بالامراض المزمنة او اجراء جراحة سابقة في الاذن او اسباب وراثية او التعرض للضوضاء او لادوية بامكانها ان تسبب تأثيرات جانبية على الشدة السمعية .
معدل الفقدان السمعي بواسطة التوصيل العظمي تم احتسابه بين الاذن المصابة و الاذن السليمة بالمقارنة مع الفترة الزمنية للمرض و تقدم الحالة المرضية .
و من نتائج البحث لوحظ انه كلما طالت الفترة الزمنية للمرض و كلما كانت الحالة المرضية اكثر تعقيداً كلما كان الفقدان السمعي الحسي-العصبي اكثر شدة ، و ان الاصابة تكون اشد في الترددات العالية .