Abstract

Objectives: To evaluate (1) patients with external ear canal exostoses by age, sex and participating in water activities; (2) its influence to hearing loss; to determine the relationship between the obstruction of external auditory canal and (3) the hearing loss; to evaluate (4) histology of external ear canal exostoses.

Methods: Data of 20 patients that were operated for external ear canal exostoses in Hospital of Kaunas University of Medicine (Lithuania) since November 2005 to January 2007 were analyzed. Anamnesis data were correlated with otoscopic and operation findings. A simple grading system was devised, based on the degree of external auditory canal stenosis. Grades of mild, moderate, and severe corresponded to 99% to 66%, 65% to 33%, and less than 33% effective patent surface area, respectively. Eliminated bone fragments were evaluated histologically.

Results: All 20 patients (100%) were men with the mean age of 49.2 ± 8.4 years old (35-68 years). Water activities as a risk factor was indicated in 17 (85%) patients. Moderate stenosis of external ear canal was observed in 14 (70%), severe stenosis in 6 (30%) patients. 16 (80%) patients complained of hearing loss. Audiologically conductive or mixed hearing loss was confirmed in 8 (40%) patients. Histology verified remodeled concentric lamellar bony organization without intervening vascular tissue. Data of our research correspond to literature data.

Conclusion: In our research exostoses of external ear canal were common in middle-aged men, who complained of hearing loss and recurrent otitis externa. Conductive or mixed hearing loss was confirmed for the half of all patients that complained of hearing loss. A histologic examination showed remodeled concentric lamellar bony organization without intervening vascular tissue. Data of our research correspond to literature data.

Introduction

To evaluate (1) patients with external ear canal exostoses by age, sex and participating in water activities; (2) its influence to hearing loss; to determine the relationship between the obstruction of external auditory canal and (3) the hearing loss; to evaluate (4) histology of external ear canal exostoses.

Materials and Methods

Data of 20 patients that were operated for external ear canal exostoses in Hospital of Kaunas University of Medicine (Lithuania) since November 2005 to January 2007 were analyzed. Anamnesis data were correlated with otoscopic and operation findings. A simple grading system was devised, based on the degree of external auditory canal stenosis. Grades of normal, mild, moderate, and severe corresponded to 100%, 99% to 66%, 65% to 33%, and less than 33% effective patent surface area,
respectively. Eliminated bone fragments were evaluated histologically.

**Results**

All 20 patients (100%) were men with the mean age of 49.2 ± 8.4 years old (35-68 years). Anamnesis data revieved that exostoses related symptoms were 8.8 years in average (1-20 years).

**Risk factors**

Water activities as a risk factor was indicated in 17 (85%) patients. Anamnesis data showed that 5 (25%) patients has had repetative otitis externa. Otosclerosis as concomitant disease was diagnosed for 5 (25%) patients.

**Otoscopy**

Moderate stenosis of external ear canal was observed in 14 (70%), servere stenosis in 6 (30%) patients. Lession was prevalent in right ear in 7 (35%) patients, in left ear in 8 (40%) patients, equally in both ears in 5 (25%) patients.

**Audiology**

16 (80%) patients complained of hearing loss. Audiologically hearing loss was confirmed in 8 (40%) patients – in 6 (30%) cases it was conductive hearing loss and in 2 (10%) cases mixed hearing loss. Air - bone gap in average was 25.875dB, maximum 40dB (in patient with otosclerosis) and 26dB (in patient without otosclerosis).

**Histology**

Histology verified remodeled compact bone - concentric lamellar bony organization without intervening vascular tissue in all 20 (100%) cases. In 3 cases (15%) there were seen Haversian canal system and in other 3 samples (15%) compact bone was covered with keratotic planocellular epithelium.

**Statistical analysis.** For statistical data analysis Statistica 5.5 software was used. No statistical corelation was found between the obstruction of external auditory canal and the length of time spent for water activities or hearing loss.

**Discussion**

Exosteses are more predominant in men than women. In our research exostoses of external ear canal were common in middle-aged men, who complained of hearing loss and recurrent otitis externa. Conductive or mixed hearing loss was confirmed for the half of all patients that complained of hearing loss.

There are well known risk factors that promote growth of exostoses in external ear canal. They are cold water (below 17.5 degrees of Celsius), cold wind, moisture, ear drops, especially those that contain alcohol. Continuous and enduring influence of these factors induce growing of exostoses. Repeated exposure to cold water over a period of 20 years is usually required before obstruction develops. It is throught that cold weather cause chronic periostitis that is why proliferation of compact bone elements lamellae, starts. In the risk group of exostoses of external ear canal are ocean and other cold water swimmers, divers, surfers, fishermen, sailors and marines.

B. J. F. Wong et al in a cross-sectional epidemiological study of surfers determined a positive association between the amount of time individuals spend surfing and the presence and severity of exostoses of the external auditory canal. Also several anthropological studies have tested the cold-water hypothesis by looking at various prehistoric populations. It emerged that exostoses are predominant in coastal inhabitants. It is therefore suggested that auditory exostoses are behavioral rather than genetic in etiology.

According to literature data and our histological evaluation exostoses are remodeled concentric
lamellar bony organizations without Haversian Systems for vessels. Usually this remodeled bone tissue is covered by normal periosteam. Disagreement still exists as to whether external auditory canal exostoses and osteomata should be considered similar or separate histopathologic entities. Osteomata consist of fibrovascular tissues covered by a layer of disorganized bony tissue. But J. E. Fenton and J. Turner performed a chart review of 13 patients who had external auditory canal exostoses or temporal bone osteomata. The results of the study demonstrated that exostoses and osteomata of the external auditory canal cannot be reliably differentiated by routine histopathological examination. So anamnesis, otoscopic and clinical data are very important for differentiation and correct diagnosis.

No treatment is required unless the patient develops symptoms of recurrent otitis externa or inconvenient obstruction with debris or water or patient complains of hearing loss. In rare cases, a repeated removal is needed in patients who experience continual exposure to cold water. Surgical removal usually involves restoration of the external auditory canal to its normal size with drills and curets via the transcanal approach through a speculum.

For all people who like water activities in cold weather it is recommended to use ear plugs or visored caps for prevention of these entities. Further research is required to determine whether the early use of such ear protection equipment will in fact prevent this disorder.

References
Exostoses of external ear canal

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Conflict of interest statement:
No conflicts declared.

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