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ARAŞTIRMA / RESEARCH ARTICLE

Exostoses of external ear canal

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Abstract

Objectives: To evaluate (1) patients with external ear canal exostoses by age, sex and participating in water activities; (2) it's 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%), servere 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 in all (100%) cases. In 3 cases (15%) there were seen Havers canal system and in other 3 samples (15%) lamellar bone was covered with keratotic planocellular epithelium. No statistical corelation was found between the obstruction of external auditory canal and the length of time spent for water activities or hearing loss.

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.

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Introduction

To evaluate (1) patients with external ear canal exostoses by age, sex and participating in water activities; (2) it's 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 revieled 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 desease 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 correlation 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 Celsium), cold wind, moisture, ear drops, especially those that contain alcohol.[4] 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.[17] It is thouhgt that cold wether 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[4] 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.[3,11-14] 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 periosteum. 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[9] 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 diferentiation and corect 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.[17]

For all people who like water activities in cold wether it is recomended 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

1. **Altuna Mariezkurrena X, Vea Orte JC, Camacho Arrioaga JJ, Algaba Guimera J.** Surgical treatment of exostosis in the external auditory canal. *Acta Otorrinolaringol Esp* 2006; 57: 257-61.
2. **Hurst WB.** A review of 64 operations for removal of exostoses of the external ear canal. *Australian Journal of Oto-Laryngology* 2001; 4: 187-90.
3. **Arnay-de-la-Rosa M, Velasco-Vazquez J, Gonzalez-Reimers E, et al.** Auricular exostoses among the prehistoric population of different islands of the Canary archipelago. *Ann Otol Rhinol Laryngol* 2001; 110: 180-3.
4. **Wong BJ, Cervantes W, Doyle KJ, Karamzadeh AM, Boys P, Brauel G, Mushtaq E.** Prevalence of external auditory canal exostoses in surfers. *Arch Otolaryngol Head Neck Surg* 1999; 125: 969-72.
5. **Samy RN, Newcomer MT, Marple B.** External ear, benign tumors. Exostosis and osteoma. eMedicine 2006; http://www.emedicine.com/ent/topic706.htm
6. **Kacker A, Selesnick S.** External ear infections. Exostosis and osteoma. eMedicine 2005; http://www.emedicine.com/ent/topic202.htm
7. **Hanihara T, Ishida H.** Frequency variations of discrete cranial traits in major human populations. III. Hyperostotic variations. *J Anat* 2001; 199: 251-77.
8. **Leondopulos SS, Micheli-Tzanakou E.** Rapid rototyping of tissue models. 2001. http://www.soe.rutgers.edu/knight/CCD/si_2001/RPTissue4.html
9. **Fenton JE, Turner J, Fagan PA.** A Histopathologic review of temporal bone exostoses and osteomata. *Laryngoscope* 1996; 106(5 Pt 1): 624-8.
10. **DeGroot H.** III. Osteoma. 2003; http://www.bonetumor.org/tumors/pages/page12.html
11. **Kennedy GE.** The relationship between auditory exostoses and cold water: a latitudinal analysis. *Am J Phys Anthropol* 1986; 71: 401-15.
12. **Okumura MM, Boyadjian CH, Eggers S.** Auditory exostoses as an aquatic activity marker: a comparison of coastal and inland skeletal remains from tropical and subtropical regions of Brazil. *Am J Phys Anthropol* 2007; 132: 558-67.
13. **Manzi G, Sperduti A, Passarello P.** Behavior-induced auditory exostoses in imperial Roman society: evidence from coeval urban and rural communities near Rome. *Am J Phys Anthropol* 1991; 85: 253-60.
14. **Velasco-Vazquez J, Betancor-Rodriguez A, Arnay-De-La Rosa M, Gonzalez-Reimers E.** Auricular exostoses in the prehistoric population of Gran Canaria. *Am J Phys Anthropol* 2000; 112: 49-55.
15. **Kennedy K, Vrabec J, Quinn FB.** External auditory canal lesions – Exostosis. Osteoma. 1997; http://www.utmb.edu/otoref/Grnds/eac.htm
16. **Thamburaj V.** Skull tumors: osteomas. 2007; http://www.thamburaj.com/skull.htm
17. **Pulec JL, Deguine Ch.** Nonobstructing exostoses of the external auditory canal. Ear Nose Throat J 2001; Feb. http://www.findarticles.com/p/articles/mi_m0BUM

18. What is Surfer's Ear? http://www.radix.net/~hogue/mhe.htm#exostosis

19. Wang MC, Liu CY, Shiao AS, Wang T. Ear problems in swimmers. *J Chin Med Assoc* - 2005; 68: 347-52.

20. External auditory canal - benign neoplasms. http://www.utmb.edu/otoref/grnds/Temporal-Bone-040915/Temporal-bone-lesions-040915.htm

21. Childs G.V. Compact bone histology. http://www.cytochemistry.net/microanatomy/bone/compact_bone_histology.htm

22. Exostosis. http://www.pathologyoutlines.com/earpf.html#exostosis

23. Exostosis. http://www.otohns.net/default.asp?id=14632

24. Standen VG, Arriaza BT, Santoro CM. External auditory exostosis in prehistoric Chilean populations: a test of the cold water hypothesis. *Am J Phys Anthropol* 1997; 103: 119-29.

25. Diseases of external ear canal. http://www.entusa.com/external_ear_canal.htm

Conflict of interest statement:
No conflicts declared.

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