# Surfer's Ear: Exostoses of the External Auditory Canal

David B. Turetsky,[1] Frederick S. Vines, and David A. Clayman

Exostosis of the external auditory canal is an entity found exclusively in humans. Although well-documented in the otology literature and briefly discussed in several medical texts, it has not been referred to or extensively discussed in radiologic journals. The clinical data and CT findings of a typical case are presented.

## Case Report

A 56-year-old white male physician presented with a 5-year history of recurrent and intermittent hearing loss. The symptoms were predominantly right-sided and were increasing in frequency. Hearing loss was interfering with his ability to perform auscultatory examinations. He was able to temporarily restore hearing with the frequent use of carbamide peroxide drops. There was no history of prior ear infections; however, his medical history was significant for prolonged exposure to cold seawater in the form of swimming and body surfing. The exposure occurred over a period of 12–15 years.

Physical examination demonstrated severe bilateral external auditory canal stenosis. Impacted cerumen was seen occluding the right external auditory canal. There were no signs of infection. Audiologic testing following disimpaction of the cerumen revealed no abnormality.

CT was performed in both axial and coronal planes at 1-mm intervals. A multinodular bony mass was seen arising from both the anterior and posterior walls of the right external auditory canal with a residual luminal diameter of 1 mm (Fig. 1A). Similar findings were demonstrated on the left, although the bony proliferation was smoother and a residual luminal diameter of 2 mm was present (Fig. 1B).

The patient underwent excision of the exostosis in the right ear, creating a 3–4 mm lumen in the external auditory canal (Fig. 1C). He made an uneventful recovery and has been symptom-free to date.

## Discussion

Exostosis is the most common tumor of the external auditory canal [1]. It is believed to be the result of chronic irritation, either physical, chemical, or thermal [2]. In the preantibiotic era, exostoses were frequently seen secondary to chronic

**Fig. 1.—*A* and *B*, CT scans of the right (*A*) and left (*B*) external auditory canals in the axial plane demonstrate marked bilateral thickening of both the anterior and posterior walls in the region of the tympanosquamous and tympanomastoid sutures.**

**C, Postoperative axial CT scan of the right external auditory canal. The external canal is clearly more patent than on the preoperative examination. Although there has only been a slight increase in the canal diameter and residual stenosis is apparent, the patient has remained symptom-free.**

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[1] All authors: Department of Radiology, University of Florida Health Science Center, 655 W. Eighth St., Jacksonville, FL 32209. Address reprint requests to D. B. Turetsky.

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infection. Currently, they are more often encountered in patients with a prolonged history of exposure to cold seawater, usually of at least 10 years duration [3]. In a series of 70 cases of symptomatic exostoses treated by DiBartolomeo [3], all patients had a history of chronic cold seawater exposure either in the form of surfing (43%), swimming (41%), or diving (16%). In the coastal regions, this increasingly common clinical condition has been referred to as "surfer's ear" [4]. Reportedly, 80% of patients with exostosis present with unilateral symptoms, although invariably bilateral disease is present. There is a strong male predilection, which may be related to the preponderance of male participation in the relevant activities. Interestingly, exostoses of the external auditory canal are not seen in blacks [2].

Exostoses arise from the tympanic ring deep to the isthmus. They most frequently occur in the region of the tympanosquamous suture anteriorly and in the region of the tympanomastoid suture posteriorly. Pathologically, they represent a localized hyperplasia of compact bone. It is suspected that prolonged vasodilatation, which follows cold-water exposure to the deep meatus, lead to new bone formation [5]. The tympanic ring is particularly vulnerable, since only a very thin layer of epithelium covers this region. Histologically, lamellar bone is laid down in layers similar to the cambium layers of a tree [6].

Presenting symptoms, which include hearing loss, ear infection, pain, and tinnitus, arise when they enlarge sufficiently to interfere with the normal self-cleansing of cerumen and desquamated keratin, leading to acute external otitis or conductive hearing loss secondary to impacted cerumen. In DiBartolomeo's series of 70 patients, only 10% presented with complete bony occlusion of the external auditory canal.

The only other entity for which exostosis may be confused is osteoma of the external auditory canal. Differentiation should be relatively easy in that osteomas arise lateral to the isthmus, tend to be unilateral, and will not have the history of chronic thermal exposure. In addition, osteomas are true benign neoplasms that occur much less commonly than exostoses [3, 7].

Initial therapy is aimed at correction of the symptoms of the disease: removal of the obstructing cerumen and/or treatment of the external otitis. Definitive treatment of the exostosis is surgical and is limited to the symptomatic side. If bilateral surgery is contemplated, it is usually performed as a two-staged procedure with a 6-week interval between operations.

The symptoms in this case are typical and only arose when the right external auditory canal became occluded by cerumen, although CT demonstrated severe bilateral stenosis. Acute external otitis was not a problem for this patient, perhaps because he was meticulous in his ear cleansing, which may have helped to prevent infection. Although postoperative CT scanning demonstrated a slight increase in the patient's canal diameter, he had been free of symptoms. The left-sided stenosis has been asymptomatic and no treatment is planned at this time.

Radiologists, especially those living in coastal regions, should be aware of this increasingly common clinical entity [3]. The typical CT findings of bilateral bony proliferation in the external auditory canals in conjunction with the history of chronic exposure to cold seawater should allow definitive diagnosis in the vast majority of cases.

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