Objective: To investigate a rare anomaly of the internal auditory canal known as a patulous canal and its relationship to hearing impairment.

Methods: High-resolution computed tomographic scans of the temporal bones of patients who presented between August 2001 and August 2002 were reviewed. The patients' medical charts were evaluated for age, sex, and hearing impairment, and the computed tomographic scans were examined for the presence of a patulous canal.

Results: The study group included 645 patients who underwent high-resolution computed tomography of the temporal bones for various reasons, including sensorineural hearing loss (50% of patients). A patulous canal without any associated anomaly of the labyrinth was the only finding in 2 patients. Both patients had chronic middle ear disease along with conductive hearing loss.

Conclusion: Patulous canal is a rare anatomical variant of the internal auditory canal (0.3%), and its association with inflammatory ear disease accompanied by conductive hearing impairment appears to have been incidental in both cases in the present study.


Original Article

Dilated internal auditory canals (IACs) have been found in association with impaired hearing in patients without evidence of acoustic neuromas. In the present study, an anatomical variant of the IAC known as patulous canal and its relationship to hearing loss were investigated. This anomaly is almost invariably bilateral and is characterized by increased height at the midportion of the IAC.

METHODS

High-resolution computed tomographic (CT) scans of the temporal bones of patients who presented between August 2001 and August 2002 were reviewed. The patients' medical charts were evaluated for age, sex, and hearing impairment, and the CT scans were examined for the presence of a patulous canal.

RESULTS

The study group consisted of 645 patients who had undergone CT scans of the temporal bones for various reasons, including sensorineural hearing loss (50% of patients). The age of the patients ranged from 1 month to 73 years. A patulous canal without any associated anomaly of the labyrinth was the only finding in 2 men (Figure). One of them had a prolonged history of bilateral chronic secretory otitis media and mild conductive hearing loss. The other one underwent tympanoplasty and correction of the lateralized eardrum in both ears. The chronic ear disease in the latter patient was accompanied by mild conductive hearing impairment.

COMMENT

High-resolution CT of the temporal bone is an important modality for the evaluation of bony abnormalities of the ear. In 1964, Valvassori concluded that a normal IAC ranges from 2.0 to 9.0 mm in diameter, with less than 2 mm of difference between 2 sides. To my knowledge, there is not a lot of information about the patulous canal. This anomaly is characterized by a bilateral, usually symmetrical, increase in height at the midportion of the IAC. The patulous canal differs from dilatation that results from acoustic neuromas because of the presence of cortical margins of the canal and the absence of any destruction of the crista falciformis. The significance of a dilated IAC in the pathogenesis of hearing impairment is questionable.
Swartz and Harnsberger found a strikingly wide IAC in both ears of an elderly patient with profound sensorineural hearing loss that had begun very early in life. The nerves appeared somewhat small on an air cisternographic study. The reason for this striking development variation was not known. Davis and Rumbaugh reported that patulous canals may appear in patients with a sensorineural hearing loss of undefined etiology. Jensen reported that among 62 deaf children, the CT scans of 2 brothers, 1 with retinitis pigmentosa, revealed extreme dilatation in the lateral portion of the IAC. Jensen also described 3 boys who had an enlarged vestibule, an irregularly dilated cochlear lumen, a dilated lateral end of the IAC, and an associated mixed hearing loss of about 60 dB. Phelps found that a dilated and dysplastic labyrinth, with a wide medial end of the internal acoustic meatus, may be associated with spontaneous cerebrospinal fluid fistulae and an absence of cochlear function in the affected ears. Weinberg et al described 3 patients with enlarged IACs and normal hearing. They suggest that the height increase of the posterior medial aspect of the canal is due to a congenital developmental variant of the temporal bone.

In the present study, a patulous canal was found in 2 (0.3%) of 645 patients who underwent high-resolution CT scans of the temporal bones for various reasons, and the shape of the canal was not associated with any anomaly of the labyrinth. A patulous canal accompanied by sensorineural hearing loss was not found. The patulous canal is a rare anatomical variant of the IAC, and I suggest that in the 2 cases described herein its association with inflammatory ear disease and related conductive hearing impairment was incidental.

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REFERENCES


High-resolution computed tomographic scan of the temporal bones shows a patulous canal (arrowheads) in both ears.