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Short communication

Water used to visualize and remove hidden foreign bodies from the external ear canal

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Abstract
Small foreign bodies lodged anteriorly in the tympanic sulcus are usually not visible, due to the curve of the external ear canal. Such objects can be seen with the aid of an otomicroscope and micromirror or with an endoscope, and removed by irrigation. If irrigation fails, epithelial migration on the tympanic membrane may remove lodged foreign bodies, although this may take months. Our new method, which uses water to locate small objects lodged in the tympanic sulcus, includes irrigation of the ear, adjustment of the water level to the middle curve of the external ear canal, and use of the water surface as a concave lens, making the tympanic sulcus visible. With otomicroscopy a curved ear probe can then be used to remove lodged foreign bodies from behind the curve.

Introduction

The 'S'-shape of the external ear canal and the oblique placement of the tympanic membrane predispose the canal to entrapment of foreign bodies. Due to the curve of the external ear canal, the tympanic sulcus is often out of sight (DeWeese and Saunders, 1977; Donaldson and Miller, 1980). Small endoscopes (Eichner, 1981; Hawke, 1982; Yangisawa and Carlson, 1987) and micromirrors (Lundborg and Linzander, 1970; Gonzalez and Bluestone, 1986) have been used to visualize the entire tympanic membrane. Hidden foreign bodies can sometimes be removed by irrigation. If this fails, epithelial migration on the tympanic membrane and ear canal may remove them, though this may take months.

We propose a new method which uses water to visualize lodged foreign bodies from the tympanic sulcus, provided the tympanic membrane is not perforated. An otomicroscope and a suction set are needed. First the ear canal is irrigated with warm water (37°C) to wash out ear wax, as the wax may later dissolve, making the water opaque. The patient lies on his back with the head tilted at 45 degrees for easy access and viewing. The external ear canal is filled with water and the water level is adjusted by suction to the middle curve of the external ear canal. The surface of the water acts as a concave lens making the anterior part of the tympanic membrane visible. An ear probe can then be used to remove any foreign body.

Case report

A 19-year-old man, who got sand in his right ear during a motor vehicle accident, managed to remove most of the sand himself. During the following month, however, he was bothered by crepitation in his right ear when speaking or eating. Otomicroscopic examination showed the ear to be normal except for some foreign bodies which were only partially visible. Two grains of sand lay near the anterior margin of the tympanic membrane and two others at the lower margin. The two grains of sand at the lower margin of the tympanic membrane were easily removed with an ear probe and suction. Due to the curve of the

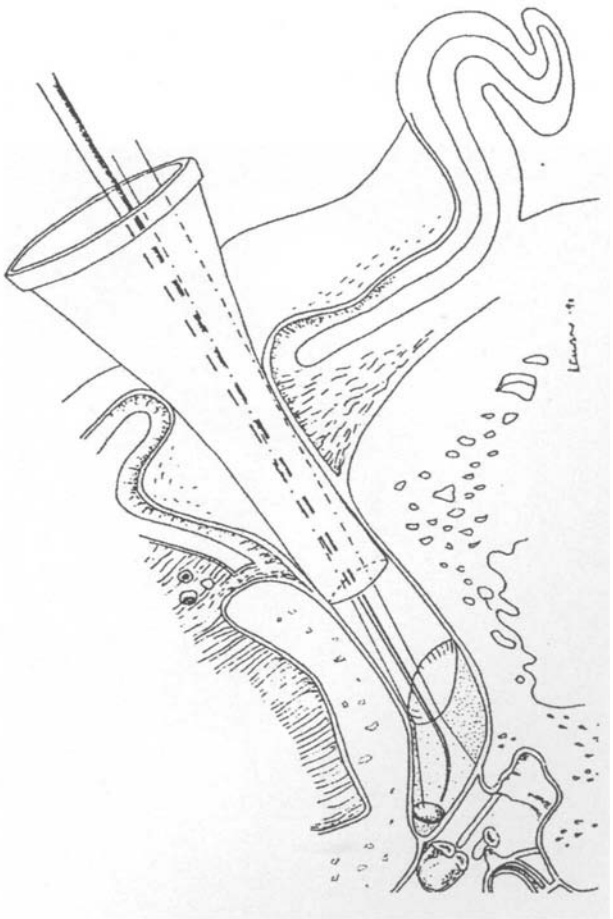

FIG. 1
Horizontal section of the ear. The surface of water acts as a concave lens bending the light beam.

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external ear canal, however, the anterior margin of the tympanic membrane could not be seen. The ear canal was irrigated three times with 100 ml of warm water, but the remaining foreign bodies were not dislodged.

Two weeks later the patient still had symptoms. On otomicroscopic examination the positions of the two remaining grains of sand were found to be exactly the same as before. Water was put into the right ear as indicated above. The tympanic sulcus as well as the three grains of sand (1.5 × 1.0 mm, 1.0 × 1.0 mm and 0.5 × 0.5 mm), the smallest of which had not been seen in previous examinations, became clearly visible. With a curved ear probe the sand grains were now dislodged one by one from behind the curve by indirect visualization through the water. Then they were easily removed from the canal with a suction tip. Since then the patient has been symptom free.

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