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An unusual case of presumed perilymph fistula

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Abstract
Perilymph fistulae have been described for over 30 years and yet there are no universally accepted diagnostic criteria or treatment regimes for them. This paper describes an unusual case of a presumed traumatic perilymph fistula and discusses its treatment and prognosis in relation to previous studies.

Key words: Fistula; Vestibular diseases; Hearing loss, sensorineural

Introduction

A perilymph fistula can be defined as an abnormal opening between the inner ear and the external surface of the labyrinth capsule which allows the escape of perilymph (Kohut, 1992). Perilymph fistulae following stapedectomy have been increasingly recognized over the last three decades but have also been described following trauma, be it acoustic, barometric, blunt or sharp to the ear or following physical exertion. They have been shown to occur secondarily to bony erosion (cholesteatoma, neoplasm) and much controversy still exists regarding spontaneous perilymph fistulae and the role of temporal bone abnormalities. At present, diagnostic criteria have not been established for perilymph fistulae as virtually any degree of vertigo and hearing loss may be present. An unusual case of perilymph fistula is described, with discussion of the treatment and prognosis.

Case report

A 23-year-old male construction worker presented to casualty having fallen from a 3 metre high wall onto the bonnet of his van. The radio aerial of the van had penetrated his left ear and on presentation he complained of left-sided otalgia and hearing loss but not of vertigo. On examination he had clotted blood in his ear canal and a central perforation of his tympanic membrane. No nystagmus was noted. He was seen 72 hours later in an otolaryngology clinic at which time he still complained of impaired hearing in his left ear and also of tinnitus and vertigo and of a persistent aural discharge. On examination the central perforation was noted with the presence of clear fluid in his external auditory meatus. He had third degree nystagmus and a pure tone audiogram demonstrated a mixed loss of 25 to 35 dB in the lower frequencies and a high tone loss of 70 dB (Figure 1). He underwent an exploratory tympanotomy the same day at which time no active leak was seen but he was noted to have a fractured stapes suprastructure. The oval window was plugged with fat and the perforation repaired with temporalis fascia. Three months post-operatively his vertigo had resolved, the graft was intact and he was left with quiet tinnitus in his left ear and a residual high tone sensorineural hearing loss (Figure 2). The conductive element had improved in the lower frequencies.

Discussion

Perilymph fistulae following penetrating trauma to the ear have been reported previously. Cases have been described following instrumentation to remove aural foreign bodies and also due to slag injuries in welders (Goodhill, 1980). In other series the major cause of traumatic perilymph fistulae has been the over-enthusiastic use of cotton buds (Kubo, 1993). This case is unusual in the method of injury and the severity of the force causing it. By the time the patient was seen in clinic he had developed symptoms and signs of loss of hearing, vertigo, tinnitus, nystagmus and a discharging ear, which strongly suggested a perilymph fistula. The diagnosis is not often so clear-cut,

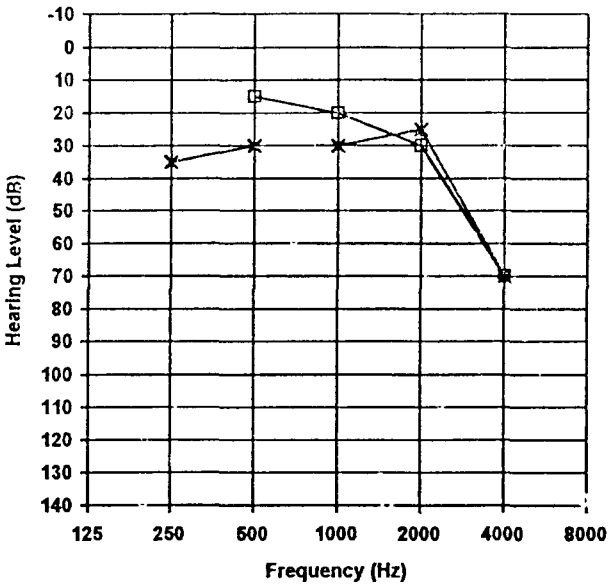

Fig. 1
Pre-operative audiogram.

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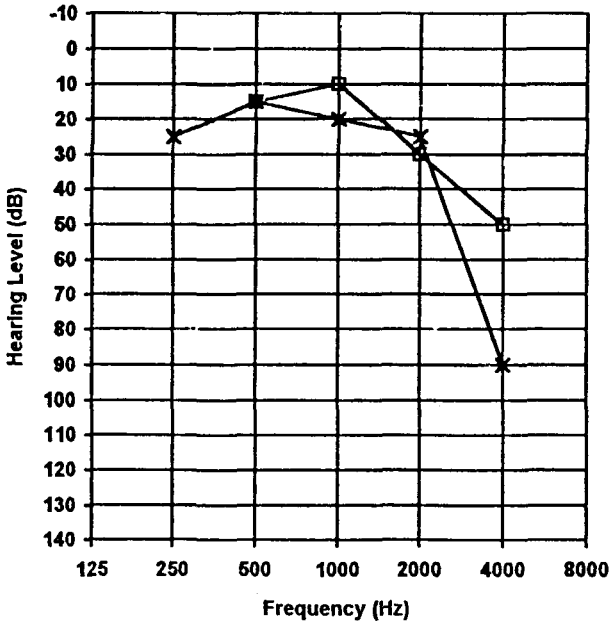

FIG. 2
Post-operative audiogram.

and vestibular testing, audiometry and radiography are often of little help (Narula and Marks, 1985; Vartianen *et al.*, 1991). One suggestion for criteria for surgical exploration following trauma is persistent audiovestibular symptoms which have not subsided during a period of enforced bedrest with the head elevated 30 degrees for 48–72 hours (Goodhill, 1980). Others (Calhoun and Strunk, 1992) suggest that patients with a perilymph fistula after penetrating trauma usually benefit from surgery. Identification of a perilymph fistula at tympanotomy can be difficult, especially if it is in the region of the round window (Vartianen *et al.*, 1991) or if it is intermittent (Kohut, 1992), and in this case no active leak was identified. Various attempts have been made to facilitate the identification of a leak when no fistula or leakage can be seen. Drilling of the bony overhang was performed but subsequently abandoned by some because of fear of damage to the inner ear (Vartianen *et al.*, 1991). Jugular vein compression has been said to increase perilymph fistula flow (Goodhill, 1980) but others have found it to be of no help (Vartianen *et al.*, 1991). Fluorescein injected into cerebrospinal fluid has been advocated for perilymph fistula identification but results have been unreliable (Arenberg *et al.*, 1993). Currently no easily usable, reliable, objective intra-operative test for the identification of a perilymph fistula is available.

A number of substances have been used to seal the fistula, such as fat, perichondrium, fascia and vein graft, but Seltzer and McCabe (1986) advise against using fat as it is easily absorbed following grafting. Recurrences, however, tend to be more likely in idiopathic perilymph fistula and in perilymph fistula following physical exertion than in those of traumatic origin (Gyo *et al.*, 1994).

For any type of perilymph fistula a good prognosis for vestibular symptoms has been reported by many authors (Althaus, 1973; Healy, 1976; Seltzer and McCabe, 1992) and this was the experience in this case. Conflicting results regarding the improvement in hearing post-operatively have been reported. Some authors have found that the hearing threshold improved across all frequencies and have concluded that both the initial hearing level and period of time until the start of treatment exerted a strong influence on the final hearing levels (Kubo, 1993). Others have found that most ears did not show any improvement post-operatively (Vartianen *et al.*, 1991), and that hearing is usually stabilized and equilibrium is improved. In this case hearing from 500 Hz–2000 Hz was improved, although at 4 kHz no improvement was seen. The improvement was largely conductive and could be attributable to the successful grafting of the tympanic membrane. Should the crura of the fractured stapes suprastructure slip in the future then there would be a subsequent conductive deficit. The role of antibiotics has not been commented on in previous publications and the patient in this case did not receive antibiotic cover. Studies looking at the role of prophylactic antibiotics following traumatic cerebrospinal fluid leakage have not supported their use routinely (Dunn and Foy, 1994; Choi and Spann, 1996).

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