

Clinical Records

Tympanic membrane ossification

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Abstract

Ossification of the tympanic membrane after myringoplasty is recorded for the first time. Myringoplasty was performed for closure of a perforation which followed the surgical treatment of otitis media with effusion and had included the insertion of a long-term T-tube.

Key words: Otitis media with effusion; Ventilation tubes

Introduction

Otitis media with effusion (OME) in childhood can result in permanent sequelae with a small number of cases developing atelectasis and attic erosion. Ossicular damage may also occur.

The treatment of OME with ventilation tubes can also result in complications with scarring and some degree of tympanosclerosis occurring in 40 to 50 per cent of cases (Maw, 1991). In a very small number of cases tympanic membrane perforation occurs but this is significantly more frequent if long-term T-tubes are inserted (Bulkley *et al.*, 1991).

This case study reports ossification of the tympanic membrane following myringoplasty which had been performed to repair a perforation which itself had followed insertion of conventional ventilation tubes and a long-term T-tube. This has not been recorded previously.

Case report

A patient (P.S.) was treated with bilateral ventilation tube insertion for recurrent otitis media and persistent middle ear effusions when aged four. Three years later a right-sided Goode T-tube was inserted and adenoidectomy performed on account of persistent disease. She then moved to Bristol and suffered a further episode of right-sided otalgia and otorrhoea which settled rapidly with a course of systemic antibiotics.

At this time it was noted that the T-tube was still in situ but that there was a small perforation of the tympanic membrane at the base of the tube with one limb of the tube clearly visible. A pure tone audiogram revealed mean thresholds at 0.5, 1, 2 and 4 kHz of 13.75 dB on the right side (Fig. 1) and 12.5 dB on the left. In view of further infection, at the next out-patient appointment, the T-tube was removed.

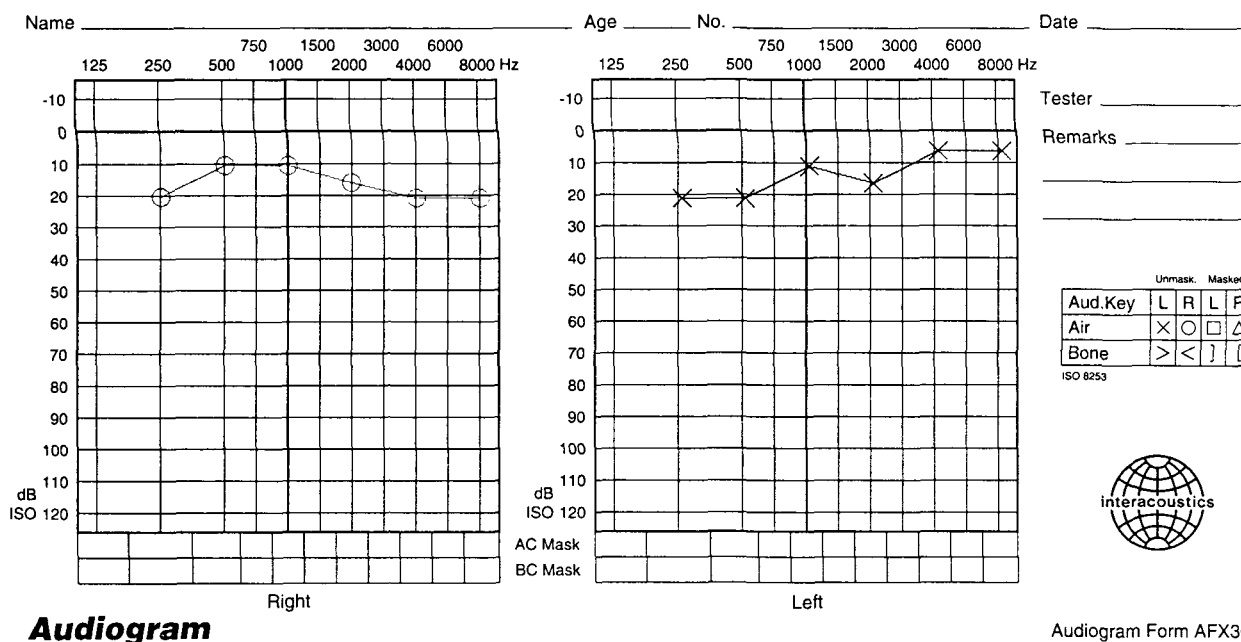


FIG. 1
 Initial pure tone audiogram (T-tube in situ).

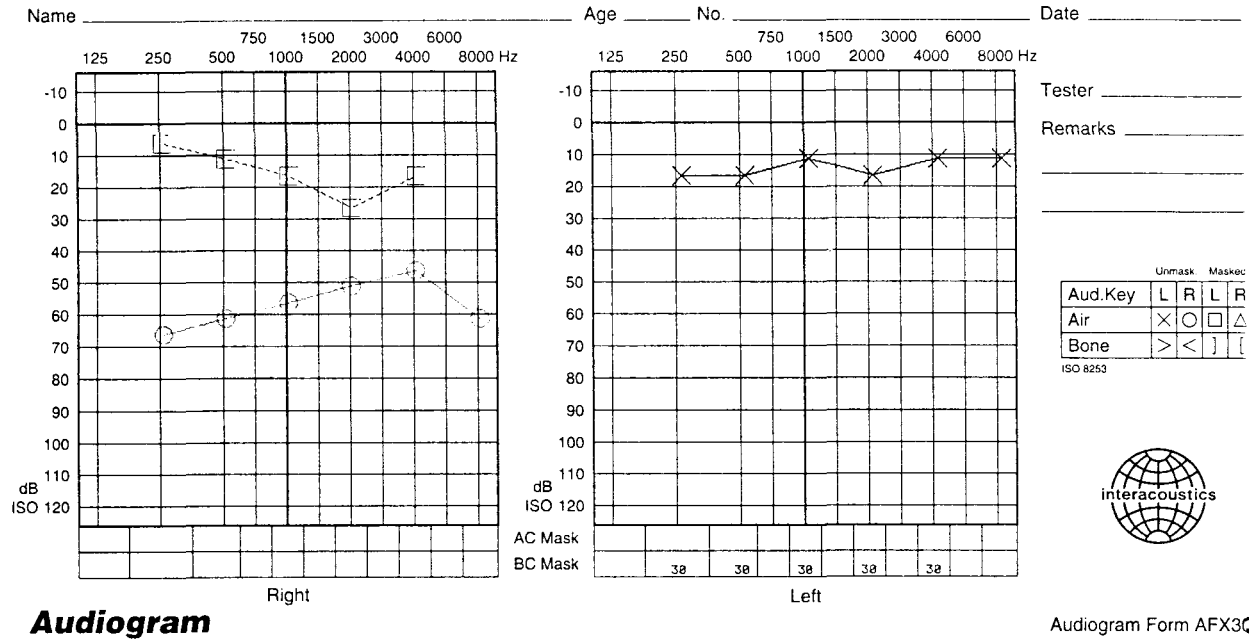


FIG. 2

Pure tone audiogram, eighteen months post-tympanoplasty.

The antero-inferior perforation failed to close spontaneously. Subsequently eight months after tube removal a myringoplasty was performed via a postaural approach using temporalis fascia as an underlay graft. During the procedure the edge of the perforation was removed and the tympanic membrane remnant was elevated from the malleus handle. The ossicular chain was intact and mobile. Two months later the grafted drum was intact but

there was no change in pure tone audiometric thresholds at similar frequencies.

Eighteen months later the child reported increasing right-sided hearing difficulty and occasional otalgia. Otomicroscopic examination revealed pallor and thickening of the postero-inferior quadrant of the drum. Audiometry showed a significant deterioration in the mean threshold at the same frequencies on

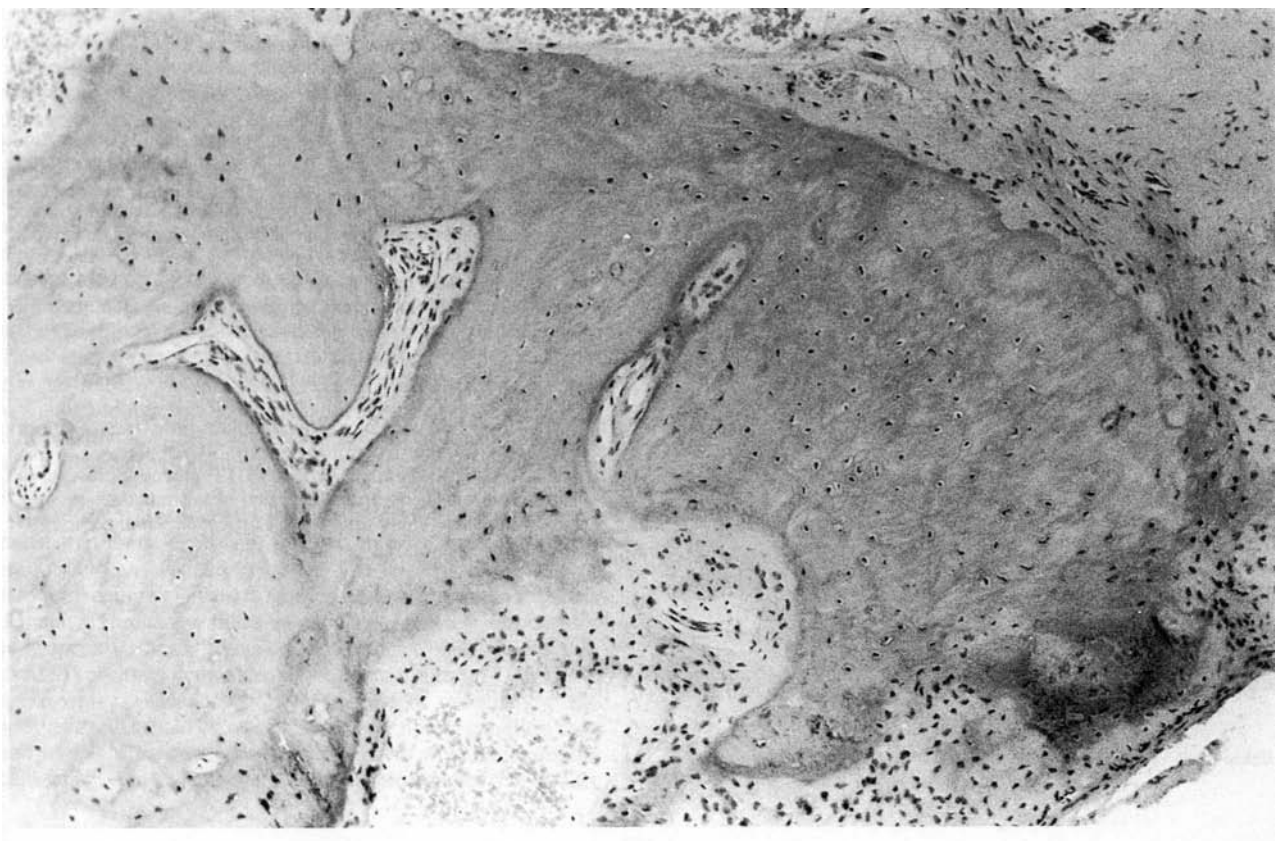


FIG. 3

Section showing bone and fibrous tissue within the tympanic membrane (H&E).

the right side to 52.5 dB (Fig. 2). At subsequent otomicroscopy under anaesthesia, the suggestion of bony hardness of the postero-inferior quadrant was confirmed. A post-operative CT scan did not identify any significant intratympanic abnormality.

One year later, because of suspicion of intratympanic cholesteatoma, at the site of the original perforation, she was readmitted for exploratory tympanotomy. At operation a large bony plate was found within the layers of the tympanic membrane in the postero-inferior quadrant. The plate was continuous with and extended from the annulus and was attached to the lower part of the malleus handle. Amputation of the tip of the malleus handle was necessary in order to regain mobility of the ossicular chain. A further underlay temporalis fascia graft was used to repair the resulting tympanic membrane defect. Two months post-operatively, the tympanic membrane was intact although once again the posterior half appeared thickened. There was no significant improvement in her audiogram.

A year later, post-operatively, as the hearing remained poor, she was readmitted for another tympanotomy. Another bony plate, again apparently continuous with the annulus, had reformed and the tip of the already shortened malleus handle was tethered to this plate by fibrous tissue. Once again the plate was removed and the ossicular chain mobilized.

Post-operatively there was no change in either air or bone conduction thresholds but the drum was intact and mobile. Histological analysis of the bony plate revealed sclerotic bone with some associated fibrous tissue (Fig. 3).

Discussion

This case illustrates a complication of myringoplasty. The perforation which required surgical repair followed the surgical treatment of OME with conventional ventilation tubes and later with a T-tube.

The formation of a bony plate after myringoplasty is not described in either the large series reported by Tos (1974) or that of Halik and Smyth (1988). Ossification can occur in plaques of tympanosclerosis which is a special form of fibrosis often encountered in cases of chronic otitis media and represents the long-term, irreversible result of continued inflammation in the middle ear cleft. It has been shown (Tos *et al.*, 1983; Slack *et al.*, 1984; Maw, 1991) that the presence of a ventilation tube in the tympanic membrane is associated with the early development of tympanosclerosis which increases with time until approximately 40 to 50 per cent of ears are affected to some degree. The commonest site for plaques of tympanosclerosis after ventilation tube insertion is in the postero-inferior quadrant. Pathologically, tympanosclerosis is the end result of a healing process in which the collagen in fibrous tissue hyalinizes and becomes fused into a homogeneous mass. Hence, microscopically the material is composed of hyaline collagen, which stains with acid aniline dyes and is birefringent. Deposits of calcium salts, appearing as basophilic dust-like areas, are irregularly distributed through the collagen and calcification and even ossification can occur to a variable extent. Invariably, there is a plane of separation between the tympanosclerotic plaque and the annulus.

Although the site of the bony plate described in this case is that favoured by tympanosclerosis, the uniform and complete ossification, as well as the continuity of the plate with the bony annulus raises the possibility that this was a bony outgrowth from the annulus rather than bone that has been produced after calcification of a tympanosclerotic plaque.

Bulkley *et al.* (1991) studied a group of cases treated with

Goode T-tubes and also reviewed the literature on this form of treatment. They report a perforation rate of between 8.7 and 30 per cent in those cases where the tube was extruded or was removed by the clinician. This compares with a perforation rate of between 0.5 and 2.9 per cent for conventional short-stay ventilation tubes. Studies have also reported a high rate of otorrhoea after Goode T-tube insertion, an example being the figure of 29 per cent reported by Brockbank *et al.* (1988). It is clear that these complications must be considered when choosing from the available management options in this group of patients.

In the repair of central tympanic membrane perforations, the use of temporalis fascia as an underlay graft is the commonest method employed in the United Kingdom. The technique used in this patient involved placement of the graft lateral to the malleus handle from which any remnant of epithelium had been carefully dissected. This is a technique that has been used successfully for many years, by the senior author, in children (Blanshard *et al.*, 1990) and has recently been reported by Stage and Bak-Pederson (1992) although these authors preferred a 'swinging-door' technique for exposure of the middle ear.

Summary

This case describes the formation of a bony plate after myringoplasty and attempts to explain its pathogenesis. The article also discusses the risk of perforation after ventilation tube insertion and raises the questions of whether the increased risk of perforation justifies the use of a Goode T-tube in uncomplicated cases of OME.

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