

Clinical Records

Medial displacement of grommets: an unwanted sequel of grommet insertion

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Abstract

Grommet insertion is one of the commonest surgical procedures performed in the UK. We have come across three cases in which grommets have displaced medially in the middle ear after establishing a satisfactory post-insertion position. We suggest that an abnormally long myringotomy incision and improper placement of the grommet are responsible for this unwanted outcome.

Key words: Otitis media with effusion; Middle ear ventilation, complications

Introduction

Otitis media with effusion is one of the commonest otological conditions affecting children between three to seven years of age.¹ Grommet insertion is perhaps the most common surgical procedure performed in the UK. Grommets are associated with a number of complications, however, migration of grommets medially into the middle ear after locating them *in situ* on the ear drum has not been reported. We have come across three such cases and, in all of them, grommets were initially found to be *in situ* approximately six months post-operatively. Subsequently grommets were seen medially displaced and lying inside the middle ear. The possible mechanism for this phenomenon is discussed.

Case reports

Case 1

A six-year-old boy had a history of bilateral grommet insertion 30 months ago. Both grommets were noted *in situ* at six weeks and six months post-operatively. At review, a year after grommet insertion, the left grommet was seen lying in the ear canal but the right one was noted missing. Both ear drums were intact and normal. Subsequently the child developed bilateral recurrent otitis media with effusion and a revision myringotomy was performed on both sides. Surprisingly a Shah grommet was seen inside the right middle ear and was removed.

Case 2

An 11-year-old boy had a history of grommet insertion seven years ago. Both grommets were seen in place in the ear drum during the first two post-operative visits at two months and six months after the operation. The child later developed ear infection on the right side on two occasions which required treatment with antibiotic drops. During a subsequent visit both grommets were noted to be missing.

A small central perforation was noted in the right tympanic membrane but the left ear drum looked intact. Since then the child has been followed up every year to observe the perforation. During his recent visit to the clinic a microscopic examination of the ear was carried out and a shadow of the grommet was seen through the right ear drum. This was then discussed with the parents of our patient and they were given an option either to have the grommet removed as a day case or to leave it inside the middle ear. Later the grommet (Shah) was removed under general anaesthesia as per the wish of the patient's parents.

Case 3

A 48-year-old lady had a left Shepherd grommet insertion performed two years previously for a unilateral glue ear. She developed four episodes of left ear infection during the first six months after grommet insertion and was treated with antibiotic ear drops. The grommet was found to be in place at the six months review. At review more than a year after the operation a central perforation was noted in the anterior quadrant of the left ear drum through which the tip of the grommet was seen. It was suggested to the patient that the grommet was unlikely to be the cause of persistence of perforation of the tympanic membrane. However, the patient developed further episodes of left ear infections and the possibility of the grommet acting as a foreign body was considered. We removed the grommet under general anaesthesia as a day case.

Discussion

The prevalence of otitis media with effusion in the UK is as high as 17 per cent in five-year-old children.² Myringotomy and grommet insertion is one of the commonest operations performed in the UK. Otorrhoea, scarring, tympanosclerosis, residual perforation, peritubal drum atrophy and granulation tissue formation are the best documented

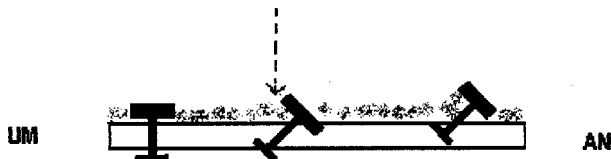


FIG. 1

Mechanism of extrusion of grommets.³ Um = Umbo; AN = Annulus. The arrow points to the keratin accumulation under the outer rim of the grommet.

complications associated with grommet insertion. The mean duration stay of grommets *in situ* is between nine to 12 months. Cases have been noted where grommets have stayed much longer than the expected time.

A number of studies have been carried out to find out the underlying mechanism of extrusion of grommets. The most accepted hypothesis is based on the pattern of epithelial migration.³ Pathways of movement of dye marking on the tympanic membrane have been described by several authors. Alberti⁴ observed that the dye moved away from the malleus towards the periphery. Michaels *et al.*⁵ also confirmed this observation and noted that the movement of epithelium was centrifugal in all directions from the edge of the handle of the malleus. The overall rate of migration of epithelium in an adult was found to be 70 μm per day as compared to 131 μm per day in children.^{4,6} The migration of epithelium is restricted to the upper layers of the stratum corneum. This is a physiological mechanism for the removal of keratin from the tympanic membrane and is thought to be partially responsible for the extrusion of grommets (Figure 1). Keratin accumulates in the grooves of the ventilating tube and by a pushing or pulling movement, the grommet may be twisted out of the ear drum.³

In our three patients grommets were seen *in situ* six months post-operatively. Later on in these patients grommets were found lying in the middle ear. The established theories of grommet extrusion do not explain the displacement of the grommets medially. We propose one of the possible mechanisms of this unusual phenomenon of medial displacement of grommets is an abnormally long myringotomy incision. This could result in the outer rim of the grommet lying partially inside the ear drum at the time of insertion and the submerged rim of the ventilation tube prevents the keratin from being collected in its groove, the normal mechanism for extrusion of grommets. In addition the centrifugal migration of the epithelium could push the grommet medially and, as in our first case, the ear drum could even heal completely over the grommet within the middle ear. Recurrent ear infection during the post-operative period could also interfere with the normal healing of the ear drum. Two of our patients had recurrent ear infections after the insertion of the grommets. Infection could change a myringotomy opening into a perforation with epithelium extending around the edge of the hole to the medial surface of the drum head. This may result in a loosely fitting grommet slipping into the middle ear. Two of our patients had Shah grommets and the third one had Shepherd grommets inserted all by different surgeons. This suggests that medial displacement is possible with either type of grommet. It is generally accepted that an asymptomatic grommet inside the middle ear does not require removal but there is little supportive evidence in the literature.

A literature review showed previous incidences of 'T tubes' slipping into the middle ear cleft.⁷ The same authors suggested that this could be due to an abnormally deep

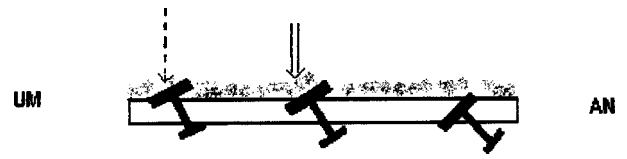


FIG. 2

Mechanism of medial displacement of grommets. UM = Umbo; AN = Annulus. Single arrow points to the submerged rim of the grommet preventing keratin from accumulating under it. Double arrow shows how migrating epithelium and keratin pushes the grommet medially.

tubotympanic cleft. It has to be noted that a 'T tube' is different from a grommet in that it does not have an outer rim and this explains why 'T tubes' are not extruded by themselves. The absence of an outer rim also increases the possibility of a 'T tube' slipping into the middle ear. However the length of the 'T tube' prevents this from happening and in normal circumstances the base of the 'T tubes' rests on the promontory. Hence it is reasonable to assume that a short 'T tube' as well as a long middle ear cleft are factors responsible for displacement of 'T tubes' medially into the middle ear.

Medial displacement of grommets after being seen *in situ* at least six months post-operatively appears to be an extremely rare phenomenon and to our knowledge this has not been reported before. We assume that the right size of the myringotomy incision and placement of grommets with the whole of its outer rim lying lateral to the ear drum should avoid the risk of this unwanted sequel of grommet insertion. If the grommet has not been seen during its extrusion at any stage, the possibility, although rare, of its medial displacement into the middle cleft should be thought of.

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