Otitis media with effusion in children: current management

Peter J Robb
Ian Williamson

Abstract

Otitis Media with Effusion (OME, 'glue ear') is the commonest cause of childhood hearing loss. Because the condition fluctuates, initial management of otitis media with effusion is audiometric confirmation and quantification of any hearing loss involved, explanation to parents or carers and watchful waiting with continued audiometric monitoring.

Commonly used medical treatments and "complementary or alternative" treatments have not been proven to be effective in the management of otitis media with effusion. However, nasal balloon auto inflation appears a promising technique with some evidence of benefit in selected, older children. Insertion of ventilation tubes (grommets) for children over three years of age with a bilateral hearing impairment associated with otitis media with effusion, who have failed watchful waiting, is effective in restoring hearing thresholds. The hearing returns to normal almost immediately. While normal auditory thresholds are the surrogate marker following surgical intervention, improvement in quality of life, social and educational performance are recognized but so far not well measured in trials, and not customary in routine clinical service.

Where adenoidectomy can additionally be justified in persistent OME, the combination of ventilation tubes and adenoidectomy in such children is broadly beneficial to terms of hearing, respiratory and related health and to development. This benefit is sustained for over 2 years after intervention and is cost-effective.

For children with persistent glue ear under the age of 3 years, there is very limited evidence from clinical trials on which to base decision-making. There is also lack of evidence for the benefits of surgical intervention for children with unilateral effusion and hearing loss, even if persistent. Clinical experience from adults with unilateral glue ear suggests that in a normally hearing individual, sudden reduction in hearing from one ear is unexpectedly disabling.

Grommets may also be helpful for younger children with frequent, recurrent acute otitis media and perforation, refractory to prophylactic antibiotic treatment. In this situation the primary intention of surgery is not to improve hearing, which is usually not affected in a persistent way, but to protect the tympanic membrane from repeated, and sometimes, permanent perforation.

Keywords management; otitis media with effusion; paediatric ENT

Peter J Robb ***BSc (Hons) MB BS FRCS FRCSEd*** *is Consultant ENT Surgeon at Epsom & St Helier University Hospitals NHS Trust, Epsom, UK and Honorary Senior Lecturer at Middlesex University, London, UK. Conflict of interest: none.*

Ian Williamson ***MD FRCSEd FRCGP*** *is Associate Professor at the University of Southampton School of Medicine, Primary Care & Population Sciences, Southampton, UK. Conflict of interest: none.*

Introduction

OME is the current disease name for presence of fluid in the middle ear, varying from serous to thick and mucoid, causing a temporary, reversible hearing loss. Middle ear fluid (MEF) is a non-diagnostic term used to describe the state when avoiding the implications of a serious form or a long history. "Glue ear", traditionally (and still in North America retained for an extreme non-resolving form), has become the dominant popular and to an extent clinical name in the UK. While bacteria may remain present in the fluid, (probably as part of a biofilm infection), glue ear is usually not associated with the acute otalgia, fever or malaise characteristic of acute otitis media (AOM), which can precede or follow OME. Instead, the concerns are about behaviour, language development, cognitive performance and quality of life.

While OME was recognized by Hippocrates, the first formal myringotomy was not described until 1649 and only much later, in 1801, did Sir Astley Cooper report to the Royal Society that myringotomy could improve hearing. It was not until 1965 that Teflon® became widely available as a suitably inert material for eardrum ventilation tubes ('grommets', tympanostomy tubes). Since then, surgical intervention for OME has increased rapidly and disproportionately across different countries with 715,000 insertion operations reported in the United States in 2006. In the UK, (where the rate has always been much lower), the numbers and regional variations in surgical intervention rates attracted the attention of public health physicians and health economists, leading them to hypothesize ENT surgeons were inserting VTs largely to placate middle-class parents whose children were underperforming at school and to fill a surgical activity void left by the reduction in tonsillectomy rates; A public health physician in the 1980's coined a tabloid-style headline, *'Glue Ear – The New Dyslexia'*, and followed on with *"….The need of surgeons to fill the vacuum caused by the decline in the number of adenotonsillectomies, and the fact that a diagnosis of glue ear legitimises the continued use of these operations, [grommets], ……..may have contributed to the current epidemic of surgery for glue ear in children……."* Ten years later, the same author took a more reflective view, stating, *"The waning of the epidemic should come as no surprise. Most health technologies go through a diffusion cycle of adoption, widespread use, over enthusiastic application, before a period of more appropriate use when more stringent criteria are adopted."*

In the last 20 years, the management of OME has remained both politically and economically contentious. The annual VT intervention rate in England and Wales has steadily fallen from 40,000 in 1995, to 25,000 in 2005. In England and Wales, the rate remains much lower than in other developed countries with extant data at 2/1000 children, compared to 8/1000 in Canada and 20/1000 in the Netherlands. Nevertheless, VT surgery continues to feature high on commissioners' agendas as a 'low priority procedure' of 'limited clinical effectiveness'. The 2012 Atlas of Variation for England reported an 8.5-fold variation in surgical rates for glue ear in different areas of the country. In part, this variation must be accounted for by how intensively local commissioners manage access to treatment. The 2012 Annual Report of the Chief Medical Officer of England concluded that

commissioners and clinicians should ensure that the reduction in rates of ventilation tube insertion was warranted and was not delivering under-provision with poor long-term outcomes for these children.

When, in 2006, the Department of Health directed the then National Institute for Health and Clinical Excellence (NICE), to develop a suite of short guidelines of '*Ineffective Practice Reviews*', including grommet surgery as one of the first, audiologists, paediatricians and ENT surgeons uniformly expressed concern. NICE then apologized unreservedly to these professionals for this biased misnaming of the heading under which the initiative had been launched. In due course, NICE produced a high quality guideline without a partisan agenda, reflecting the conservative, effective practice to which most clinicians were already adhering. Recent published evidence reports 87% of children now having grommets inserted in accordance with NICE guidelines, although only 32.2% comply with core criteria, suggesting, *"clinicians are personalising the treatment to each individual child"*.

Furthermore, analysis from NICE in 2011 concluded that the drive to disinvest from *low value* [sic] clinical interventions is unlikely to deliver the huge anticipated and predicted cost savings for the tightened NHS budget.

Aetiology

Otitis media with effusion is the most common cause of hearing impairment in children. About 85% of children will experience an episode of otitis media with effusion during childhood. There is a bimodal peak of incidence at 2 and 5 years of age, with 50% of episodes of OME resolving spontaneously within 3 months. Not feeding infants breast milk and attendance at day care increase the likelihood of OME, and there is a small gender effect with males more affected. A seasonal variation in persistence of effusion means that children presenting with OME in the autumn have a lower chance of spontaneous resolution — it tends already to have endured longer. Of all the compounding factors, the most important management issue is advice against smoking by parent and carers.

Traditional teaching described the development of OME as a loss of ventilation and pressure equalization in the middle ear due to adenoidal hypertrophy and blockage of the Eustachian tube but the importance of these factors in physical anatomy is now considered minor. Emerging evidence indicates that, following upper respiratory tract infection biofilm activity in the adenoid produces a cascade of immune mediators, causing inflammation and up regulation of mucin genes in the middle ear mucosa, with associated reduction of ciliary function and clearance. It is likely that middle ear ventilation helps disrupt the biofilm infection by increasing and maintaining a high middle ear oxygen tension for this to persist at least while the ventilation is maintained. Allergic rhinitis is significantly more frequent in children with OME and the likelihood of allergic rhinitis and asthma is higher in children with serous rather than mucoid effusion.

Assessment

Hearing loss is by no means the dominant concern and trigger for presentation to primary care. Instead, poor speech and language development, inattentiveness in class, behavioural concerns and reduced or poor social interaction with other children are commonly reported. In younger children, parents sometimes report poor balance. The signs and symptoms aggregate across these and further dimensions to influence the child and family's quality of life.

It is important to confirm a normal pregnancy, delivery and neonatal period, and that neonatal hearing screening was performed and reported as normal. (A very small number of children may pass neonatal hearing screening and have, or develop a sensorineural hearing loss during infancy. Whilst too rare to support trial information, these reasonably justify earlier and more attentive surgical management of OME if concern exists about a mixed hearing loss). Children with comorbidities (e.g. Down's syndrome, cleft palate) are more commonly affected by OME, and this is usually more persistent.

An experienced otoscopist will usually detect middle ear effusion with a bright, halogen otoscope (see Figure 1). In primary care, the diagnosis is most often based on historical features such as recurrent episodes of otitis media or developmental concerns, with subsequent confirmation made by audiometric assessment. Children under the age of 4 years should be referred to a community paediatric audiology (second tier) clinic; age-appropriate hearing assessment, (Figure 2) combined with tympanometry is confirmatory (Figure 3a—c). Children of 4 years age and above, in the absence of cognitive or behavioural co-morbidity, can be assessed in a general hospital paediatric ENT clinic, where both audiometry and clinical assessment should be carried out at the same visit.

When OME is confirmed, active monitoring of hearing over a three-month period is recommended. Depending on local access to secondary care children's ENT services, it is prudent to make the referral to ENT at the beginning of the watchful waiting period, so that if resolution fails to occur, surgical intervention will be timely in minimizing disability from hearing loss. The NICE benchmark for hearing loss due to bilateral OME is hearing

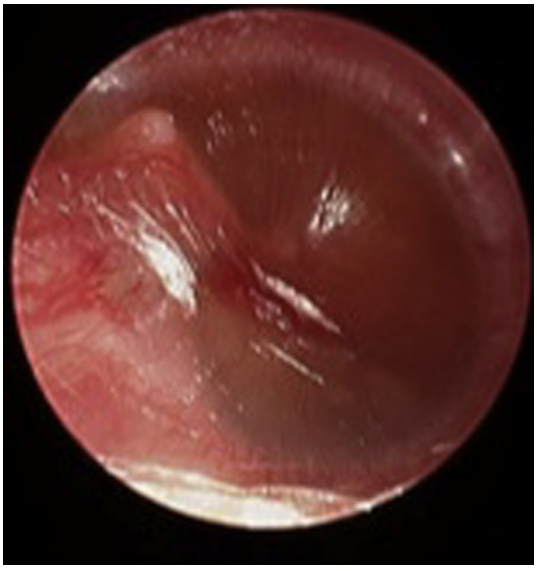

Figure 1 Otoscopy: otitis media with effusion. (Courtesy of Mr Michael Saunders).