

# An approach to chronic otitis media with effusion – the pros and cons of grommets

**Grommets or not? This reviews the indications for grommets.**

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Otitis media (OM) is an inflammatory (possibly infectious) condition of the middle ear, together with fluid behind an intact tympanic membrane. OM may be classified in relation to the effusion composition, i.e. serous (SOM), mucoid (MOM), or purulent (POM). However, these three entities are just different stages of a dynamic process – SOM progresses to MOM, and POM, as it resolves, usually progresses to SOM. OM is better classified by clinical stage.<sup>1</sup>

Acute OM (AOM) is usually characterised by the rapid onset of otalgia and erythema of the tympanic membrane in the presence of a middle-ear effusion. AOM is principally a sequel of a viral upper respiratory tract infection (URTI). Erythema of the tympanic membrane without a middle-ear effusion is called acute myringitis, often mistaken for AOM.

## **COME was almost an unknown entity before antibiotic therapy began in the 1940s.**

Chronic suppurative OM (CSOM) is characterised by chronic otorrhoea (discharge) through a long-standing perforation of the tympanic membrane and may be associated with a cholesteatoma.

Chronic OM with effusion (COME), however, refers to the collection of inflammatory fluid behind an intact tympanic membrane without other signs of infection and inflammation, such as otalgia and fever.

This form of OM is the most diagnosed of all and is confusingly described in the literature by many different names, such as glue ear, chronic secretory OM, SOM, persistent OM, and silent OM.

COME was almost an unknown entity before antibiotic therapy began in the 1940s.

Currently the insertion of ventilation tubes (VTs or grommets) (Fig.1) is the most common surgical procedure performed in children worldwide.<sup>2</sup>

### *Pathophysiology*

The eustachian tube has three main functions, i.e. protection, clearance and pressure equalisation of the middle ear, that are



*Fig.1. Different types of tympanostomy tubes (grommets).*

crucial for a well-ventilated middle ear. Clearance of secretions results mainly from ciliary action and a viral URTI causes transient dysfunction of these cilia. Cilia paralysis leads to fluid accumulation, which leads to thick viscous fluid formation that secondarily occludes the eustachian tube. A similar effect is seen in children (and adults) exposed to passive smoking. Current evidence supports the theory that: (i) secretory changes in the middle ear in COME are histological sequelae of chronic infection, rather than a separate pathological disorder; (ii) the majority of cases of COME begin as acute infections of the middle ear; (iii) post-inflammatory alterations in the middle-ear mucosa and eustachian tube (e.g. goblet cell metaplasia and hypersecretion) lead to persistent effusion; and (iv) dysfunction of the eustachian tube is an important part of the process.

### *Diagnosis*

OM in its different stages is primarily a clinical diagnosis. COME is usually asymptomatic and commonly detected incidentally during well-child visits to the paediatrician. Direct visualisation of the tympanic membrane with an otoscope is mandatory for diagnosis. Tympanometry combined with otoscopy increases the sensitivity and specificity of the diagnosis of COME to more than 90%.

The standard recommendation, according to the literature<sup>1</sup> on COME, is the use of pneumatic otoscopy as the primary diagnostic method, with tympanometry reserved as a confirmatory test.

## Treatment

The current Agency for Health Care Policy and Research (AHCPR) guidelines – updated 2004 – recommend observation of COME (not AOM) for 3 months in non-risk children (no speech, language or hearing problem risks).<sup>3</sup> At-risk children should undergo treatment earlier at the discretion of the clinician. Children with a conductive hearing loss of 20 dB or more (i.e. with a Rinne negative test on tuning forks) are surgical candidates.

### Antibiotics

It is not uncommon to see children with persistent COME who have received four or more courses of antibiotics in a 3-month period. Antimicrobial therapy is still the standard treatment for AOM in South Africa. Rosenfeld and Post found that antimicrobials have only a slight benefit in COME and are probably ineffective.<sup>4</sup>

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### Steroids

It has not been shown that the long-term benefits of corticosteroid therapy outweigh the risks when used as treatment for COME.<sup>5</sup> (AHCPR does not recommend the use of corticosteroids as a treatment option for COME.<sup>3</sup>)

### Topical and systemic decongestants and antihistamines

Antihistamines and decongestants are ineffective treatments for COME.<sup>1</sup>

There is no evidence in the literature or randomised trials that demonstrate any benefit of these treatments for COME; however, most patients with COME receive at least one of the above forms of treatment.

### Grommets

Several prospective randomised clinical trials over the past two decades have validated the efficacy of surgical treatment, i.e. VTs (commonly called grommets).

The current indication for surgery is failed conservative management of COME<sup>3</sup> (not resolved within 3 months). A myringotomy (incision in the eardrum) will close spontaneously within 72 hours, but reversal

of the middle-ear pathophysiology is only accomplished with time. The placement of a grommet maintains the opening and prevents premature closure of the myringotomy (temporarily).<sup>6</sup>

Maw noted that an average duration of an effusion lasting longer than 90 days in an untreated ear was 7.8 years.<sup>7</sup> Correction of the hearing loss to avoid delayed speech is a necessary consideration in COME.

Gates looked at performing an additional adenoidectomy together with VT insertion compared with VT insertion alone, and found no significant differences in the outcome variables.<sup>8</sup> The decision to remove the patient's adenoids is based on the severity and chronicity of the middle-ear disease and the recurrent URTI profile.<sup>9</sup>

### Pros of grommets

- The VT serves as an artificial eustachian tube helping to ventilate and equalise the middle-ear pressure.
- The VT has another very beneficial function in that it serves as a portal for topical delivery of medications to the middle-ear space, and subsequently via the eustachian tube to the nasopharynx.
- Otitis-prone children are often perceived as being unhealthy, which affects their family relationships.<sup>1</sup> Parents (and patients) are advised that surgical therapy for OM is generally not curative, but it does correct the hearing loss and generally reduces the incidence and severity of subsequent infections.
- The cost-effectiveness of VT placement for COME is high.<sup>1</sup>

### Cons of grommets

- The size of the lumen of the VT and the length of the tube are the two main factors that increase the length of 'stay' of a VT in the tympanic membrane. These two factors will also make it more probable that the VT forms a persistent perforation of the tympanic membrane.
- Some possible complications that result from VTs include persistent perforation of the tympanic membrane, granulation tissue around the tube (granular myringitis), chronic otorrhoea, blocking of the lumen of the VT, medial migration of the VT, and severe myringosclerosis.

## Postoperative management of VTs

This is a common problem for most family physicians.

Firstly we need to dispel four myths about VTs.

**Myth 1.** Chronic otorrhoea in a child with VTs is normal – WRONG!

This indicates a middle-ear cleft inflammation or infection, currently called AOM with tympanostomy tubes (AOMT). Initially, after the new placement of VTs for COME, a small amount of otorrhoea is acceptable (for up to 72 hours). Thereafter, the ears should be dry. New drainage might indicate a completely new infection. Therefore, VTs must not regularly drain, as ventilation and protection is their primary function and only in the initial phases is drainage acceptable.

**Myth 2.** Patients with patent VTs in position must wear ear plugs at all times when in contact with water, e.g. when swimming and bathing – WRONG!

Numerous published articles<sup>10</sup> have shown no statistically significant reduction or increase in the incidence of otorrhoea from the use of barrier devices or from the avoidance of swimming.

**Myth 3.** Grommets always 'fall out' (extrude from the tympanic membrane) on their own – WRONG!

More than 95% of VTs ('standard' grommets) placed would have extruded by 36 months. 'Standard' needs to be classified as 'wide-flange grommets'; larger grommets and t-tube VTs are intended to stay in place much longer.

A recent study by Azadarmaki *et al.*<sup>11</sup> suggested that there might be a genetic mechanism for delayed epithelial migration in some patients, which could explain the fact that VTs might need to be removed from a tympanic membrane after an extended period of time. The longer they stay the higher the risk of permanent perforation.

**Myth 4.** Myringosclerotic plaques always damage hearing – WRONG!

The white sclerotic areas (chalk patches) of the collagen layer of the tympanic membrane are common sequelae of VTs (40 - 50% of all cases). A large plaque very rarely causes a partial ossicle fixation, but no available studies have proved any hearing loss related to the myringosclerotic plaques in and of themselves.<sup>1,12</sup>

### Three common problems after VT insertion and how to treat them

**Ongoing otorrhoea after VT placement** is called, as mentioned above, AOMT. This condition is different from AOM, as

**Antihistamines and decongestants are ineffective treatments for COME.**

*Staphylococcus aureus* and *Pseudomonas aeruginosa* play a larger microbiological role in AOMT. Post-tympanostomy tube otorrhoea is the most common complication of VTs, with a reported incidence of 3.4 - 74%.<sup>12</sup>

The traditional treatment for AOM (not COME) has been antibiotics, while in AOMT there is a portal for delivery directly to the middle ear so that a local antibiotic and cortisone drop combination can be adequately administered – giving a much higher dose of antibiotic to the affected area.

## The decision to remove the patient's adenoids is based on the severity and chronicity of the middle-ear disease and the recurrent URTI profile.

Ongoing studies have shown far superior cure rates with local treatment than with systemic medication in AOMT.<sup>13,14</sup> Dry mopping before instillation of the ear drops is of paramount importance in every draining ear – *always!* In rare cases of ongoing otorrhoea, removal of the VT is necessary to avoid chronic 'biofilm' formation and to stabilise the ear before further treatment is initiated.<sup>15</sup>

## Otitis-prone children are often perceived as being unhealthy, which affects their family relationships.

Granulation tissue surrounding the grommet (the most common reason for blood in the external ear canal) is another problem. The hyper-vascularity

of the granulation tissue is usually due to a localised infection on the tympanic membrane. Again, treatment with a local antibiotic/cortisone drop combination should resolve it very quickly (with dry mopping, of course). Beware of drops that can potentially cause ototoxicity, such as Sofradex, Covomycin-D and other aminoglycoside topical preparations.

**Blockage of the ventilation tube with re-accumulation of fluid in the middle ear.** Here Mistabron 'drops' (ampoule placed in a dropper container) could 'dissolve' the blockage and allow the middle ear to drain again, and can then be combined with a combination drop to further treat the condition. However, unblocking of this tube usually needs to be addressed by an ENT specialist.

### References

1. Sautter N, Hirose K. Otitis media. In: Pensak M and Hughes G, eds. *Clinical Otolaryngology*. 3rd ed. New York: Thieme.
2. Allen J, Morton RP, Ahmad Z. Early post-operative morbidity after tympanostomy tube insertion. *J Laryngol Otol* 2005; 119(9): 699-703.
3. Stool SE, and Otitis Media Guideline Panel. Otitis media with effusion in young children. *Clinical Practice Guideline* No.12. Rockville, Md.: Department of Health and Human Service, Public Health Service, Agency for Health Care Policy and Research, 1994 (revised 2004).
4. Rosenfeld RM, Post JC. Meta-analysis of antibiotics for the treatment of otitis media with effusion. *Otolaryngol Head Neck Surg* 1992; 106: 378-386.
5. Butler CC, Van Der Voort JH. Oral or topical nasal steroids for hearing loss associated with otitis media with effusion in children. *Cochrane Database Syst Rev* 2002; 4: CD001935.
6. Bonding P, Tos M. Grommets versus paracentesis in secretory otitis media. *Am J Otol* 1985; 6(6): 455-460.
7. Maw R. *Glue Ear in Childhood*. Cambridge, England: Cambridge University Press, 1995.
8. Gates G. Acute otitis media and otitis media with effusion. In: Cummings CW, ed. *Otolaryngology, Head and Neck Surgery*. 3rd ed. St Louis: Mosby.
9. Matilla PS. Adenoidectomy and tympanostomy tubes in the management of otitis media. *Curr Allergy Asthma Rep* 2006; 6(4): 321-326.
10. Parker GS, Tomi TA, Maddox MR, Wilson JF. The effects of water exposure after tympanostomy tube insertion. *Am J Otolaryngol* 1994; 15(3):193-196.

11. Azadarmaki R, Gaughan JP, Issacson G. Failed tube extrusion is not a random event in children or their siblings. *Laryngoscope* 2008; 118(7): 1248-1252.
12. Hochman J, Blakley B, Abdoh A, Aleid H. Post tympanostomy tube otorrhea: a meta-analysis. *Otolaryngol Head Neck Surg* 2006; 135(1): 8-11.
13. Roland PS, Parry DA, Stroman DW. Microbiology of acute otitis media with tympanostomy tubes. *Otolaryngol Head Neck Surg* 2005; 133(4): 585-595.
14. Dohar J, Giles W, Roland P, et al. Topical ciprofloxacin/dexamethasone superior to oral amoxicillin/clavulanic acid in acute otitis media with otorrhea through tympanostomy tubes. *Pediatrics* 2006;118(3):1252-1253.
15. Vlastarakos PV, Nikolopoulos TP, Korres S, et al. Grommets in otitis media with effusion: the most frequent operation in children. But is it associated with significant complications? *Eur J Pediatr* 2007; 166(5): 385-391.

### In a nutshell

- COM is very different from AOM.
- Correct diagnosis requires accurate otoscopy to differentiate subtypes of OM.
- The key to this disease is restoring the function of the eustachian tube.
- Systemic antibiotics have no proven benefit in COME.
- A non-resolved COME that is present for more than 90 days is treated surgically.
- AHCPR does not recommend the use of oral corticosteroids in COME.
- VTs (grommets) are not without complications.
- Adenoidectomy together with VTs can be beneficial in selected cases.
- Chronic otorrhoea in a patient with VTs is abnormal.
- Strict water avoidance is not essential for patients with VTs in place.
- VTs do not always extrude on their own from the tympanic membrane.
- Myringosclerotic plaques on the tympanic membrane do not necessarily indicate a hearing impairment.
- Family physicians can play an important role in postoperative VT management.