



Hearing and Aids in Glue Ear

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Hearing in Children

- Audiometric thresholds above 20dBHL are generally considered outside the normal range for all ages.
- No specific range of normal hearing is defined for children
- Should a post-OME average of 20dB be considered significant compared to 0dB pre-OME?
- ASHA classification is given below

Normal	0 dB to 20 dB
Mild loss	21 dB to 40 dB
Moderate loss	41 dB to 60 dB
Severe loss	61 dB to 80 dB
Profound loss	81 dB or greater

Hearing loss in Glue Ear

- Glue Ear is the commonest cause of acquired conductive hearing loss in children.
- Affects 4% of all school children.
- Conductive hearing loss is the main complication of otitis media with effusion (OME)
- The hearing loss is usually mild but may vary and these fluctuations may impact on speech and language development.
- Hearing loss may be more severe and have a significant impact on the child's development in many areas, especially when the disorder is bilateral and persists for a longer period [[Simpson et al, 2007](#)].

Assessment of hearing

- Otoscopy , Tymapanometry and Audiometry or age appropriate testing are essential for evaluation of a child with Glue ear.
- Audiometric assessment of the hearing is the gold standard that is used in secondary care to guide management but is not usually available in primary care.
- An accurate assessment of hearing is required in order to assess further referral options.
- However, subjective assessment of hearing loss in children is difficult and inaccurate in primary care, and requires specialist assessment by an audiologist.
- If OME is treated surgically, age-appropriate hearing assessment is required before and after insertion of grommets (Ahmmed et al 2003)

Hearing Assessment

- There are no national guidelines on the exact time to refer a child with OME for a hearing test as the optimum period of initial observation of a child in primary care is not defined. This depends on individual clinical assessment using all available sources of information to evaluate severity and consider any special circumstances.
- Confirmation of hearing loss by re-testing over 3 months is generally required before consideration of surgical intervention. A local guideline suggests repeating the hearing test at 6 weeks [[NHS Newcastle, 2010](#)].
- It is important to determine that hearing has not deteriorated during active observation, so the hearing test should be repeated.

Referral to ENT from Audiology

- Hearing loss is severe and may be due to other causes
- Significant hearing loss persists on two documented occasions (usually following repeat testing after 6–12 weeks).
- The level of documented hearing loss which may require surgery in bilateral OME is a hearing level in the better ear of 25–30 dB or worse, when averaged at 0.5, 1, 2, and 4 kHz, and such hearing loss persists for longer than 3 months.
- The tympanic membrane is structurally abnormal (or there are other features suggesting an alternative diagnosis).
- There is a persistent discharge
- The child has Down's syndrome or a cleft palate.
 - All such children require regular specialist monitoring for OME. If OME is suspected, active observation in primary care is not appropriate.



Early Grommet surgery of benefit?

- Two RCTs- Paradise et al (2000) and Rovers et al (2000) reported NO benefit of early intervention.
- Two studies (Maw et al 1999 and Wilks et al (2000) reported benefit in only those with language and behaviour problems but again timing not critical.
- Under 3years of age it was recommended that in those with mild-moderate hearing loss watchful waiting as good as surgery.

Scottish Intercollegiate Guidelines Network (2003) Recommendation

- Children under three years with persistent bilateral otitis media with effusion and hearing loss of 25dB or under, but no speech and language, development or behavioural problems, can be safely managed with watchful waiting.
- If watchful waiting is being considered, the child should undergo audiometry to exclude a more serious degree of hearing loss.
- Children with persistent bilateral otitis media with effusion who are over three years of age or who have speech and language, developmental or behavioural problems should be referred to an otolaryngologist.

Hearing after Grommet surgery

MRC Multicentre Otitis Media Study Group (2003)

- Subjects aged 3.5-7 years with hearing $>20\text{dBHL}$ and bilateral OME with grommet surgery
- At 3 months: post op- Hearing: AC mean $12_{\pm 4}\text{dB}$ AB gap $13_{\pm 7}\text{dB}$

Children with functioning tubes cannot be said to have NORMAL hearing

(Stenstrom et al 2005)

- At 12 months: Tubes extruded and no OME but still have hearing loss: AC mean $14_{\pm 6}$ with AB Gap $16_{\pm 9}\text{dB}$
- At 6-10 years post surgery: Hearing Thresholds worse by 2-8dB in Group with surgery compared to medical intervention

NICE on Hearing aids

- NICE based the recommendation for hearing aids from two small trials.
- In one study (48 participants), almost all parents (98%) noticed a definite and sustained improvement in the child's hearing when using a hearing aid [[Flanagan et al, 1996](#)].
- A second study (39 participants) reported improvement in the behaviour of half of all the children receiving hearing aids [[Jardine et al, 1999](#)]. Speech was reported to improve in a third of these children and concentration improved in two thirds.
- No high-quality evidence was available but hearing aids should be offered as an alternative to surgical intervention where surgery is contraindicated or not acceptable.
- Hearing aids should normally be offered to young children with Down's syndrome and OME with hearing loss.

Fitting Aids with Grommets

- Real-ear to coupler differences (RECDs) are important for the selection of appropriate amplification characteristics for hearing impaired children.
- Subjects were 32 children aged between 4 and 7 years, 16 had a patent grommets in one or both ears as confirmed by otoscopy and large equivalent ear canal volumes on tympanometry. There was no evidence of middle ear pathology in the remaining 16 who comprised the control group.
- The mean difference in RECDs between the two groups in the frequency range 0.125–0.75 kHz was 15 dB. The differences in RECDs were statistically significant ($P < 0.01$) for all frequencies below 0.75 kHz.
- Therefore individual RECD measures should be made, particularly for subjects with grommets, rather than using averaged transformation figures.
- It suggests that more low frequency gain should be given to hearing aid users with patent grommets to overcome the reduced SPL in the ear canal, due to leakage through the vented tympanic membrane.

Martin et al (1997)

Effects of Grommets on Hearing

- Evidence comes from a Cochrane systematic review which included 10 RCTs (1728 participants) evaluating the effects of ventilation tubes on hearing, duration of effusion, language development, cognition, behaviour, and quality of life, for up to 12 months [[Browning et al, 2010](#)].
- **Grommets improve hearing in children with otitis media with effusion (OME) for up to 12 months after surgery, but the effect diminishes from 6 months onwards**
- Grommets improved mean hearing levels by around 9 dB (95% CI 4 to 14) after the first 6 months, and diminished to 6 dB (95% CI 3 to 9) after 12 months
- **No evidence that language or speech development is improved.**

Hearing improvement with Grommets

- 10 trials (1728 participants) included.
- one trial that randomised children (N = 211) reported results **at three months**; the mean hearing level was **12 dB better (95% CI 10 to 14 dB)** in those treated with grommets as compared to the controls.
- Meta-analyses of three trials (N = 523) showed a benefit of **4 dB (95% CI 2 to 6 dB) at six to nine months**.
- At **12 and 18 months follow up no differences** in mean hearing levels were found.
- No effect was found on language or speech development or for behaviour, cognitive or quality of life outcomes.
- Tympanosclerosis was seen in about a third of ears that received grommets. Otorrhoea was common in infants, but in older children (three to seven years) occurred in < 2% of grommet ears over two years of follow up.
- In children with OME the effect of grommets on hearing appears small and diminishes after six to nine months by which time natural resolution also leads to improved hearing in the non-surgically treated children.
- [Cochrane Database Syst Rev.](#) 2010 Oct 6;(10):CD001801.

Hearing Aid Compliance in Glue Ear

- Forty-eight children with OME, were treated with a hearing aid instead of surgery and reviewed at 3-monthly intervals over 6–12 months.
- Seventy-one per cent reported unequivocal satisfaction with the aid.
- Sixty-five per cent used the aid continuously throughout the day whilst 35% used it only at specific times of need.
- Ninety-eight per cent noticed a definite improvement in their hearing whilst using the aid and this was confirmed audiometrically in 100%.
- Disability was considered in terms of speech development and educational achievement.
- In 66% there had been a subjective decline in these parameters prior to aid prescription.
- In all but one child significant improvement was made sufficient to alleviate parental and teachers' concern.
- No children reported significant symptoms due to OME other than deafness and there were no complications of hearing aid usage.
- At follow-up, however, 13% of children continued to use a hearing aid in an ear in which the OME had resolved.
- Flanagan et al 1996

Hearing Aids Compliance in Glue Ear

- Conservative treatment for otitis media with effusion (OME) means use of hearing aids as a way of managing the associated hearing loss.
- Thirty-nine children who had been given binaural hearing aids to manage OME were assessed at routine follow-up after six months..
- Thirty-eight parents thought the aids were easy to use and 25 (66 per cent) were completely satisfied with the management.
- Aided hearing improved by a mean of 17 dB (Range 10–30) over three frequencies, 0.5, 1.0, 2.0 kHz and all parents reported subjective hearing improvement in their children. The stigma of an aid was reported as minimal under the age of seven.
- Hearing aids provide a non-invasive way of managing the problems associated with OME which is acceptable to certain parents and children.
- **A. H. Jardine, M. V. Griffiths and E. Midgley (1999)**

Hearing Aids or more Grommets?

- A postal survey was carried out to determine the current clinical practice amongst consultant otolaryngologists in the UK, regarding re-insertion of ventilation tubes or recommendation of hearing aids in cases of recurrence of otitis media with effusion (OME) after ventilation tube extrusion.
- Amongst the 319 respondents,
 - 15 (4.70 per cent) routinely,
 - 146 (45.77 per cent) sometimes,
 - 158 (49.53 per cent) either never, or very rarely, recommend hearing aids.
- Hearing aids and ventilation tubes were both suggested to be equally good options by some consultants but they preferred surgery for a number of reasons.
- There were inconsistencies in practice and some of the reasons for re-inserting ventilation tubes are not evidence-based.
- A hearing aid is a non-invasive option and this survey shows a need for a randomized control trial of hearing aids and ventilation tubes in the management of persistent and recurrent OME.
- Ahmmed et al 2001

Down's syndrome

- Guidelines suggest that all children with Down's Syndrome have hearing testing on a regular basis.
- Barr et al (2011) study 2004-2008
- 87 preschool (aged 9 months to 6 years) children with Down's syndrome were sent appointments for the clinic.
- The prevalence of OME was 93% at age 1, falling to 68% by age 5. None had significant sensorineural hearing impairment.
- 37% were listed for surgery at some point, either adenotonsillectomy for obstructive symptoms or grommet insertion for otitis media with effusion (OME).



Hearing Aids

- These may be offered to children with persistent bilateral otitis media with effusion (OME) and hearing loss as an alternative to surgical intervention where surgery is contraindicated or not acceptable.
- Hearing aids are frequently offered to children with Down's syndrome and OME with hearing loss.