



Effect of Grommet Insertion With Concurrent Adenoidectomy on The Hearing of Children Having Otitis Media With Effusion

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ABSTRACT

*Objectives:*To determine the clinical profile of persistent OME with hearing impairment in children, and the effect of grommet insertion with concurrent adenoidectomy on hearing as assessed by pure tone audiometry.

*Materials and methods:*100 children aged 5-12 years,with OME and resulting unilateral/bilateral hearing impairment were included in a prospective observational study.Clinical evaluation,audiometry,tympanometry and X-ray nasopharynx were done.All subjects underwent adenoidectomy with tympanostomy tube insertion in the affected ear(s) with follow ups at 2,6 months.

*Results:*Mean age was 7.48±2.35 years.87% had bilateral hearing impairment.88% had otoscopically abnormal tympanum bilaterally. Majority(68%) had moderate hearing loss on audiometry (mean air conduction threshold of 26.78±6.94 dB).Postoperatively,statistically significant reduction in air conduction threshold was noted during the first 2 months; not between 3rd-6thmonth.

*Conclusion:*Evaluation and treatment of children with OME as outlined in the study,is useful,safe,effective and thus still relevant in current daily clinical practice.

KEYWORDS : Otitis Media with Effusion, Adenoidectomy, Middle Ear Ventilation, Hearing Loss

INTRODUCTION

Otitis media with effusion (OME) is a common otological condition¹. It is defined as the presence of fluid in the middle ear without signs or symptoms of acute ear infection². It is the most common cause of hearing loss³ and the most frequent indication for an operative procedure in children⁴.

OME may occur spontaneously because of poor eustachian tube function or as an inflammatory response following acute otitis media. The diagnosis of OME is established by the presence of a persistent middle ear effusion behind an intact tympanic membrane without other signs of inflammation⁵. Persistent middle ear fluid from OME results in decreased mobility of the tympanic membrane and serves as a barrier to sound conduction⁶. The effusion usually results in a moderate conductive hearing loss with air conduction thresholds of 25-30dB³. Most cases of OME are relatively asymptomatic with approximately 25% discovered incidentally. However the potential impact on hearing, speech, language and cognition highlights the need for timely intervention in the prevention of its morbidity and sequelae⁷.

Although the prevalence of otitis media (OM) decreases with age, parents of patients often opt for surgical treatment for prompt correction of the hearing loss and avoidance of long term sequelae⁸. The surgical procedures offered to children with recurrent or persistent OM are insertion of grommets, adenoidectomy or a combination of the two⁴. In persistent OME with hearing impairment (i.e.>3 months duration), the current standard of care is the insertion of a tympanostomy tube/grommet as the first step followed by adenoidectomy in resistant cases or when symptoms of adenoid hypertrophy are prominent. Although there are reports of a higher success rate when adenoidectomy was done routinely in OME patients, there is still no consensus on this approach⁵.

Only few studies have been conducted in the developing world which has focussed on the clinical profile and surgical management in OME with hearing impairment⁷.

This study was therefore undertaken with the aims of determining

the clinical profile (presenting features,hearing loss) in persistent OME with hearing impairment in children and to determine the effect of grommet insertion with concurrent adenoidectomy on hearing as assessed by pure tone audiometry (PTA).

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of ENT, Kempegowda Institute of Medical Sciences, Bangalore, from January 2013 to June 2014.

100 children ranging from the ages of 5 to 12 years, presenting with OME and resulting unilateral or bilateral hearing impairment determined by PTA and tympanometry, with radiographically confirmed adenoid hypertrophy were included in the study following parental consent. Children with sensorineural hearing loss, middle ear infection, allergic rhinitis, craniofacial or neurological abnormalities, OME without hearing loss and patients lost to follow up were excluded from the study.

A detailed history regarding duration of hearing loss and symptoms suggestive of adenoid hypertrophy were taken, followed by general and ENT examination including pneumatic otoscopy and posterior rhinoscopy. Investigations conducted were PTA (pure tone average air conduction thresholds over 0.5, 1 and 2 kHz), tympanometry and X-ray of the nasopharynx lateral view soft tissue.

PTA results were categorised as mild, moderate and severe hearing impairment i.e <20dB, 20-29dB and 30-39dB respectively. Tympanogram curves of "B" and "C" types suggesting low tympanic membrane compliance, were considered indicative of middle ear effusion. Airway narrowing on lateral radiograph of nasopharynx of more than 66% due to adenoids was considered diagnostic of adenoid hypertrophy.

Routine preoperative workup up was carried out for general anaesthesia. All subjects underwent adenoidectomy with tympanostomy tube insertion in the affected ear(s) under general anaesthesia. Adenoidectomy was done by curettage method and grommet was placed in the affected ear(s) after myringotomy and evacuation of glue. Post

operative care included routine antibiotic, analgesic and antihistamine therapy.

Follow up was done every fortnight for the first 2 months and monthly for the next 4 months. Subjective change in otological symptoms and extrusion of tympanostomy tube was recorded. Objective assessment of hearing was done at 2 and 6 months using PTA.

RESULTS

58 boys and 42 girls met the inclusion criteria. The mean age of the study group was 7.48±2.35 years. 87% presented with bilateral hearing impairment. The mean duration of subjective hearing loss was 12 months (range of 6 to 60 months), with majority (71%) having experienced hearing impairment for between 6 to 12 months, 19% for up to 2 years, 9% for upto 3 years and 1% for more than 3 years.

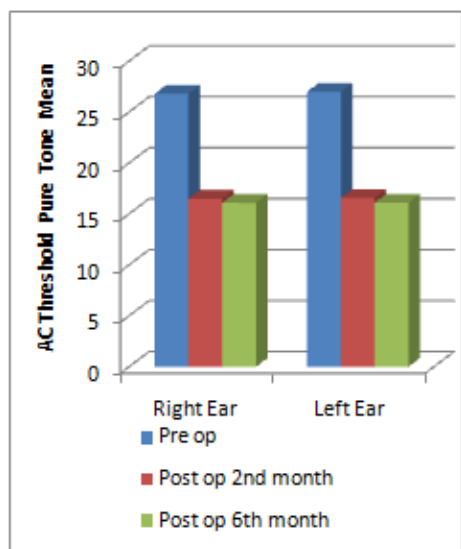
95% had symptomatic adenoid hypertrophy which was confirmed radiographically. The mean duration of these symptoms was 19 months (range 6-36 months). In the remaining 5%, adenoid hypertrophy was detected incidentally on X-ray of the nasopharynx.

Tympanic membrane abnormalities suggestive of OME, detected by otoscopy were seen bilaterally in 88% of patients and unilaterally in the remaining 12%, which was confirmed with audiometry and tympanometry. The most common finding was dull retracted tympanic membrane, seen in 73% of cases. Also seen were thinned tympanic membrane, air bubbles in the middle ear and bulged tympanic membrane.

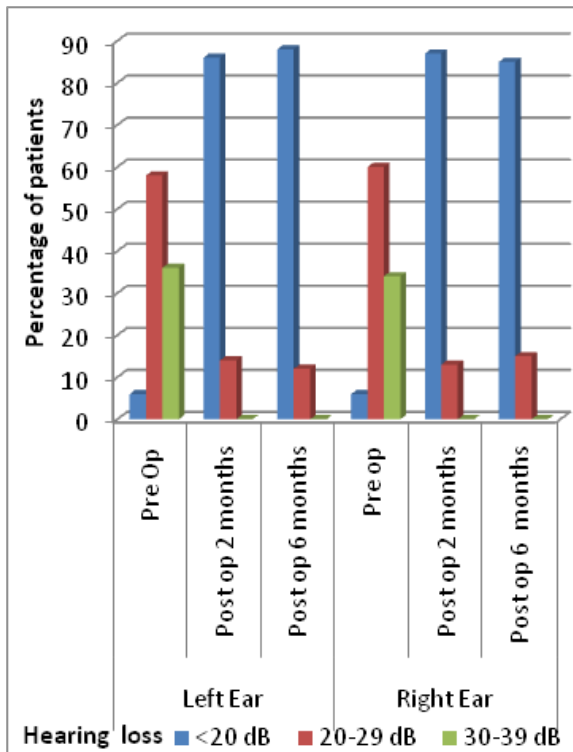
Type B curve on tympanometry was seen in 93% and type C curve in 7% of patients. Audiogram revealed mild hearing loss in 11%, moderate hearing loss in 68% and severe hearing loss in 21% of patients, with a mean air conduction threshold of 26.78±6.94 dB at 0.5, 1 and 2 kHz.

Adenoidectomy was done in all patients. 88% underwent bilateral myringotomy with grommet insertion, while this procedure was performed unilaterally in the remaining 12%. No intraoperative or post-operative complications were observed.

During the follow up period, hearing loss significantly reduced both subjectively and objectively. On analysing serial air conduction thresholds, a statistically significant (i.e. repeated measures ANOVA, P<0.001) reduction in air conduction threshold was noted during the first 2 months, but not between the third and sixth month following surgical intervention. No gender differences were noted. (Graph 1) and (Graph 2)



Graph 1- Comparison of pre and postoperative mean air conduction threshold on pure tone audiometry



Graph 2 - Effect of tympanostomy tube insertion and adenoidectomy on hearing

DISCUSSION

Of the 100 children who met the inclusion criteria in our study, 58% were males, 42% were females and the mean age of the study group was 7.48±2.35 years, which was comparable with the age and sex distribution results in a study by Apostolopoulos et.al among school children suffering from OME⁹.

A mean air conduction threshold of 26.78±6.94 dB was observed in our study, which concurred with the results of other studies by Reddy et.al¹⁰ and Tulli et.al¹¹ showing an average air conduction threshold of 27.5 dB⁴.

In our study, it was also observed that 11% had mild hearing loss, 68% had moderate hearing impairment and 21% of patients suffered from severe hearing loss, which was similar to the findings in a study by Fria T.J et.al in which 20% of patients had >35 dB (i.e. severe) hearing loss¹².

In randomised controlled trials that studied the effect of grommet insertion alone, the mean hearing levels improved by around 9dB (4-14dB) in the first six months. In similar trials studying the combined effect of grommets and adenoidectomy, the additional effect of the grommets on hearing levels was a further improvement by 2-5 dB at six months¹³.

Adenoidectomy along with tympanostomy tube insertion was done in all patients recruited in our study as it has been shown to reduce overall post treatment morbidity, as measured by hearing acuity in the most severely affected ear and the number of surgical re-treatments required⁴.

An improvement in air conduction thresholds to <20dB was noted in 90% of patients in the right ear and 88% of patients in the left ear at the end of 6 months following surgery in our study. However this improvement was mostly limited to the first 2 postoperative months with no further change over the remaining follow up visits over 6 months.

Similarly, observational studies have demonstrated that the average improvement is upto 20 dB shortly after the insertion of a grommet, with individual variation from 0-50 dB¹². The effect on hearing then

gradually diminishes because some tubes stop functioning due to clotting, infection or extubation and because the non-treated ears gradually normalise spontaneously¹³.

In a study by Dempster et.al.a higher rate of resolution of OME following surgery was seen in boys, however no gender differences were observed in our study¹⁴.

CONCLUSION

A combination of history, otoscopy, tympanometry and PTA, along with a lateral soft tissue radiograph of the nasopharynx are useful and cost effective in the diagnosis of OME and the assessment of the severity of consequent hearing impairment. Early detection and treatment of OME in children helps prevent progression of hearing impairment and its consequent sequelae in the development of the child . Adenoidectomy with concurrent tympanostomy tube insertion is a safe and effective modality of treatment of OME with conductive hearing loss. Thus the evaluation and treatment of children with OME as outlined in the study, is still relevant in current daily clinical practice.

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