ORIGINAL ARTICLE

Comparison of Outcome of Myringotomy with and without ventilation tube in glue ear

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ABSTRACT

Aim: To compare the outcome of myringotomy with/ without ventilation tubes in children of glue ear.
Methods: Both ears (100) from fifty (50) children fulfilling the inclusion criteria were selected from the OPD and ward. Cases were diagnosed on the basis of history, physical examination and investigations (pure tone audiometery, tympanometery). After informed consent twenty five patients were allotted in the group A for myringotomy with ventilation tube insertion and twenty five were allotted in-group B for myringotomy without ventilation tube insertion. Cases were followed post operatively for hearing improvement on 15th, 30th and 45th day by subjective evaluation and pure tone audiometery.
Results: In group A out of 50 ears, 44 showed marked improvement in the hearing status after following the cases for one month (88%). In group B out of 5 ears, only 17 cases showed marked improvement in the hearing status after following the cases for one month. (34%)
Conclusion: Myringotomy with ventilation tube insertion has a better outcome in children of glue ear (88.0%) as compared to myringotomy without ventilation tubes (34%).
Keywords: Tympanometry, myringotomy, glue ear, audiometery

INTRODUCTION

Glue ear also known as otitis media with effusion is a condition in which fluid builds up behind the tympanic membrane in the middle ear without the signs of acute inflammation[1].

Glue ear usually occurs in both ears and may be difficult to detect, since it doesn't cause acute symptoms of ear infection. It is due eustachian tube dysfunction that connects the middle ears to the nasopharynx. The eustachian tube normally plays an important role in maintaining equal air pressure between the outside and inside of the middle ear. When the tube becomes obstructed the air in the middle ear becomes absorbed, and the resulting vacuum draws fluid into the middle ear cavity from lining of middle ear. Initially the fluid is thin and watery but eventually it becomes thick and tenacious, hence, the name "Glue Ear". Because the middle ear is now filled with fluid rather than air, the hearing is muffled. Obstruction of the tube may be due to repeated bacterial and viral upper respiratory tract infections, enlarged adenoids or nasal allergy. It is important to note that in children the eustachian tube is more horizontal and smaller than in adults and this is one of the reasons why glue ear is relatively common in children[2].

Glue ear has two peaks of increased incidence during childhood, the first peak, around one to two years of age, is associated with beginning day care, and the second peak, around five years of age and coincides with the start of schooling. There is prevalence of 10% to 30% between the ages of one and three years and a cumulative incidence of 80% at the age of four years. It usually resolves spontaneously or with use of antibiotics. Resolution takes longer if the child has frequent upper respiratory infections, siblings with glue ear, or a mother who smokes tobacco[3,4].

There are several lifestyle issues related to high rates of middle ear infection. One of the most serious is parental smoking. One study of the effects of passive smoking on children's health estimated that as many as 165,000 of the myringotomies performed each year on American children are related to the use of tobacco in the household. Another risk factor is daycare placement. A 1997 study at the University of North Carolina found that 31% of the children in daycare required myringotomy with tube insertion as compared to 11% of cared for at home. In addition, the children in daycare who had ventilation tubes had to have the tubes reinserted three times as often as the children in home care with ventilation tubes. A third factor that affects a child's risk of recurrent middle ear infection is breastfeeding. Researchers at the University of Arizona reported in 1993 that infants who had been breastfed exclusively for at least four months had significantly fewer episodes of otitis media with effusion as toddlers[8].

The functional effect of otitis media with effusion is a conductive hearing loss of about 25 to 30 dB[3]. The outcome of otitis media with effusion in children is generally good. Most cases of glue ear resolve spontaneously or with use of systemic antibiotics, but

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those, which persist, require surgery in the form of myringotomy with or without ventilation tube[6,7].

Myringotomy is a surgical procedure in which a small incision is made in the tympanic membrane and fluid in the middle ear is drained out. Ventilation tubes are small tubes open at both ends that are inserted into the incisions in the tympanic membranes after myringotomy. Ventilation tubes can be inserted into the incision during myringotomy and left there. The eardrum heals around them, securing them in place. They usually fall out on their own in six to 12 months or are removed by a surgeon. Most myringotomies in children are performed in children between one and two years of age. Ventilation tube treatment is recommended for children with otitis media with effusion. Parents often report that children talk better, hear better, are less irritable, sleep better, and behave better after myringotomy with the insertion of ear tubes[8,9]. Progressive hearing improvement was demonstrated from 2 weeks to 6 to 10 weeks postoperatively. We recommend testing no fewer than 6 weeks after tympanostomy tube insertion. Earlier audiometry underestimates the degree of hearing improvement[10].

However the benefits of ventilation tubes in children appear small. The effect of ventilation tubes on hearing improvement tends to be diminished. Potentially adverse effects on the tympanic membrane are common after grommet insertion. Therefore an initial period of watchful waiting seems to be an appropriate management strategy for most children with otitis media with effusion[3].

MATERIALS AND METHODS

As it was a hospital based study, subjects were selected according to inclusion criteria from ward and outpatient department of otolaryngology and were entered in the study. Operative procedures were conducted in the operation theatre of the department of otolaryngology and the assessment of main outcome measure was done during the postoperative stay at the ward and on follow up visits. The study was completed within period of 9 months. Both ears (100) of fifty patients fulfilling the inclusion criteria were included in the study with the diagnosis of glue ear. It was non probability purposive technique of sampling. Patients selected for study were between the ages of 5-10 years, with more than 20 db conductive hearing loss on pure tone audiometery, having flat curve on tympanometery and having no history of adenoidectomy and myringotomy with or without ventilation tube. Study design was Interventional: Quasi-Experimental Study.

Data collection procedure: Patients of glue ear were selected from ENT OPD and ward. Patients were randomly divided in two groups using random number sheet table. Group A included patients with glue ear would undergo myringotomy with ventilation tube insertion and group B included patients would undergo myingotomy without ventilation tube insertion. An informed consent was taken from the parents of each patient. A detailed history of the patients was taken pre-operatively with special regard to presenting complaints and hearing status. A thorough examination of the ear and tympanic membrane of the patient by ear speculum and otoscope was done. Hearing status of the patient was checked with voice test individually for each ear. Pure tone audiometery was performed to assess the hearing status. Tympanometery was performed to assess the middle ear status objectively. Confounding variables were controlled by strictly following the exclusion criteria. Both ears of the patients underwent surgery. Post operative follow up of the hearing status was done with voice test and pure tone audiometery on 7th, 15th and 30th day after the procedure. At the completion of the study all individual data was entered in questionnaire. The collected data was analyzed by using SPSS version 11. Quantitative variables were age and degree of conductive hearing loss. These variables were presented as mean±standard deviation. Qualitative variables were sex, presenting complaints, examination (both tympanic membranes) and outcome (hearing status). These were presented as percentages.

Outcome variables were hearing improvement in terms of subjective evaluation (voice test) and patient's response pure tone audiometery. The comparison of outcome variables between two groups were through chi-square test. $P \leq 0.05$ was significant.

RESULTS

The study on patients with glue ear was carried out. Hundred (100) ears of fifty (50) patients were included in this study. During follow up no patient was dropped out or missed. Patients selected for study were divided in 2 groups. There were 50 ears of 25 patients (50%) in group A who underwent myringotomy with ventilation tube insertion, on the other hand 50 ears of 25 patients (50%) were included in group B, underwent myringotomy without ventilation tube insertion. All the patients in group A and B underwent adenoidectomy as well.

In my study 50 patients were included, among them 27(54%) patient were male and 23(46%) were female. Among 25 patients in group A 14(56%) were male and 11(44%) were female. In group B 13(52%) patients were male and 12(48%) were female.

Among 50 patients 34(68%) presented with decreased hearing, 7(14%) with ear blockage,

6(12%) with nasal obstruction and 3(6%) presented with sore throat. On examination of 100 ears from 50 patients selected for the study, 66(66%) ears showed retracted tympanic membrane, 24(24%) showed bulging tympanic membrane, 8(8%) showed dull looking tympanic membrane and 2(2%) ears showed normal looking tympanic membrane. The ages of the patients were between 5-10 years with mean age 7.42 years with 1.774 years standard deviation. The degree of hearing loss associated with glue ear was between 20-45 db with mean hearing loss 29.20 db with standard deviation 5.566 db.

Group A underwent myringotomy with VT insertion and Group B underwent myringotomy without VT insertion. Both groups were followed for improved hearing assessed by subjective evaluation and pure tone audiometery on 7th, 15th and 30th post operative day. Both groups were evaluated by subjective evaluation and on 15th post operative day 49 (98%) ears among Group A showed improved hearing as compared to 41(82%) ears in Group B. On 30th post operative day 45(90%) ears among Group A showed improved hearing as compared to 24(48%) ears in Group B. On 45th post operative day 44(88%) ears among Group A showed improved hearing as compared to 17(34%) ears in Group B.

When both groups were evaluated by pure tone audiometery for hearing improvement, on 15th postop day 49(98%) ears among Group A showed improved hearing as compared to 41(82%) ears in Group B. On 30th post operative day 45(90%) ears among Group A showed improved hearing as compared to 23(46%) ears in Group B. On 45th post- operative day 44(88%) ears among Group A showed improved hearing as compared to 17(34%) ears in Group B.

When outcome of both groups were compared by subjective evaluation and pure tone audiometery on 15th and 30th post operative day, it was found that there is no statistically significant difference exist between two groups. But on 45th post operative day it was found that there is statistically significant difference between both groups with p value 0.014.

DISCUSSION

Glue ear also known as otitis media with effusion is a condition in which fluid builds up behind the intact tympanic membrane in the middle ear without the signs of acute infection. It usually presents as decreased hearing, ear blockage and inattentive behavior.

In my study 27(54%) patients were males and 23(46%) were females. According to the different studies male preponderance was thought to be an outcome of male dominant society. According to the study of Sheahan (2003)[11] boys were more prone to otitis media with effusion than girls.

Routine medical screening is not common in our society so most cases of glue ear were detected when it has lead to symptoms or as a part of checkup for other problems. In my study 68% patients presented with decreased hearing, 14% presented with ear blockage, 12% presented with nasal obstruction and 6% presented with sore throat as main presenting complaint. According to a study by Maw (1988)[12] 61.6% patients presented with hearing impairment, 8.7% presented with learning difficulty, 7.6% presented with language problems and 20.9% were diagnosed by routine screening tests.

In my study, upon examination, 66% ears showed retracted tympanic membrane, 24% showed bulging tympanic membrane, 8% showed dull looking tympanic membrane and 2% ears showed normal looking tympanic membrane. A study conducted by Maqbool et al. (2008)[13] showed that on examination of ears in patients with glue ear 76% had retracted tympanic membrane, 17% had bulging of tympanic membrane and 6.08% cases showed dullness of tympanic membrane with no additional features.

I have studied that the degree of conductive hearing loss in children with glue ear was between 20-45 db with mean hearing loss 29.20 db for both ears and with standard deviation 5.566.

Studies examining hearing sensitivity in children with OME report that average pure tone hearing loss at 4 frequencies (500, 1000, 2000, and 4000 Hz) ranges from normal hearing to moderate hearing loss (0–55 dB). The 50th percentile is about 25 dB hearing level (HL) and about 20% of ears exceed 35 dB HL[14,15]. It was observed that in our society children present with higher degree of hearing loss as compared to the western world. Reason behind this might be poor hygienic conditions leading to more episodes of middle ear infections, inability to receive medical care due to poverty and low educational status and parents thinking about their children as inattentive and disobedient rather than hard of hearing and not seeking medical advice.

When patients were evaluated by subjective evaluation on 7th post operative day 98% ears among those treated with myringotomy with ventilation tube (group A) showed improved hearing as compared to 82% ears treated with myringotomy without ventilation tube (group B). On 15th post operative day 90% ears of group A showed improved hearing as compared to 48% ears in group B. On 30th post operative day 88% ears among group A showed improved hearing as compared to 34% ears in group B.

When both groups were evaluated by pure tone audiometery for hearing improvement, on 15th post operative day 98% ears among group A showed improved hearing as compared to 82% ears in group B. on 30th post operative day 90% ears among group

A showed improved hearing as compared to 46% ears in group B. On 45th post operative day 88% ears among group A showed improved hearing as compared to 34% ears in group B.

When chi-square test was applied to compare the outcome between two groups evaluated by subjective evaluation and pure tone audiometery on 30th post operative day, the calculated p value was 0.014 which was statistically significant hence proving the hypothesis that myringotomy with ventilation tube insertion has better outcome as compared to myringotomy without ventilation tube insertion.

So it has been found that more patients suffering from glue ear showed improved hearing when treated with myringotomy with ventilation tube insertion as compared to patients treated with myringotomy without ventilation tube insertion on follow up for one month. This drawback is might be due to the fact that the incision usually heals within a week, whereas the underlying problem of eustachian tube dysfunction takes longer to resolve, therefore recurrences are common in patients treated with myringotomy without ventilation tube insertion.

A study conducted by Valtonen H et al (2005) showed that myringotomy with ventilation tube insertion is recommended treatment for young children with persistent otitis media with effusion[9].

Rosenfeld RM et al (2003) found that myringotomy with ventilation tubes is the recommended initial surgery because randomized trials show a mean 62% relative decrease in effusion prevalence and an absolute decrease of 128 effusion days per child during the next year[16].

Boston M et al. (2003) found that about 20% to 50% of children who have had myringotomy with ventilation tubes have OME relapse after tube extrusion that may require additional surgery[17].

Coyte PC et al. (2001) concluded that when a child needs repeat surgery for OME, adenoidectomy is recommended because it confers a 50% reduction in the need for future operations[18].

Myringotomy without tube placement is ineffective treatment or chronic otitis media with effusion because the myringotomy incision closes within days[19].

Limitations of study: Since it was a hospital based study which was not applicable to whole society and numbers of patients under study were small.

CONCLUSION

In my study of 100 ears from 50 patients with glue ear, it was found that patients who were treated with myringotomy with ventilation tube had better outcome in relation to improved hearing as compared to patients who were treated with myringotomy without ventilation tube. So it was concluded that myringotomy with ventilation tube along with adenoidectomy should be adopted as a first line of surgical treatment in patients with glue ear.

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