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Hearing Assessment following Tympanostomy Tube insertion in children with Otitis Media with Effusion

KEYWORDS

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ABSTRACT *Otitis media with effusion affects the child's hearing and also his cognitive, linguistic and communicative skills. Myringotomy and tympanostomy tube insertion improves hearing and prevents atrophy of the drum. The aims of this prospective study were to highlight the efficacy of mryingotomy and tympanostomy tube insertion in the treatment of chronic otitis media with effusion and to assess the hearing improvement following tympanostomy tube insertion. A total of 55 children who presented with conductive deafness, frequent colds, mouth breathing & snoring were included in the study. 40 underwent surgery and 15 were medically treated. Following tympanostomy tube insertion 55.7 % of ears showed an improvement in hearing to normal levels (< 20 dB).The mean hearing improvement as assessed by pure tone average was 14.1 dB following surgery as compared to 10.5 dB following medical treatment.*

INTRODUCTION

Otitis media with effusion is defined as an inflammation of the middle ear in which a collection of liquid is present in the middle ear space behind an intact tympanic membrane with absence of signs and symptoms of an acute infection[1]. It can occur either as a primary disorder or as a sequel to acute otitis media. It is one of the most common causes for decreased hearing in the paediatric age group[2]. The functional effect of this is a conductive hearing loss of 25 – 30 db. Both the high incidence and the high rate of spontaneous resolution suggest that the presence of otitis media with effusion is a natural phenomenon. Notwithstanding this, some children may go on to develop structural changes like retraction pockets, erosion of ossicles cholesteatoma etc. Recurrent ear infections, a symptom commonly found in children with otitis media with effusion has been shown to be a leading cause for time missed from school leading to poor scholastic progress and parental anxiety.[3]

Among therapeutic efforts, clearing of the nose and paranasal sinuses and adenoidectomy are directed especially at the causal factors (external and internal tube occlusion) whereas myringotomy with evacuation of mucus has direct aim of improving hearing and preventing atrophy of the drum, organization of secretions and adhesive changes. The insertion of a tympanostomy tube abolishes the negative pressure in the middle ear for a long time period.

Myringotomy with tympanostomy tube insertion leads to an improvement in hearing, decreased frequencies of ear infections, decrease in the hospital visits, less time missed from school as well as an all-round improvement in the child's speech, academic and general behaviour[3].

AIMS

To highlight the efficacy of myringotomy and Tympanostomy tube insertion in the treatment of Otitis media with effusion

To assess the hearing improvement following the surgery.

MATERIALS & METHODS

Fifty-five children between 4 and 13 years of age in whom chronic middle ear effusion was suspected based upon the detailed history, clinical evaluation, otoscopy and/or examination under microscope, pure tone Audiometry and tympanometry were included in this study.

Tympanometry and Audiometry were done by a certified audiologist using Madsen Zodiac 901 Middle ear Analyzer and Madsen OB 822 Clinical Audiometer. Average air conduction thresholds were obtained for 500Hz, 1000Hz and 2000Hz. Regardless of previous therapy, each child was treated with antibiotics, antihistamines nasal decongestants and advised to perform Valsalva manoeuvre for 3 months. All these patients showed a type-B Tympanogram. Tympanostomy tube insertion was performed under general anaesthesia. Adenoidectomy and tonsillectomy were performed as indicated by the clinical history and examination.

15 of the 55 children were additionally treated with corticosteroids and not taken up for surgery. The patients were followed up with regular audiograms, tympanometry and examination of the ear under the microscope. This study was conducted prospectively in the department of ENT in Lourdes Hospital, a secondary hospital in Kerala. Date of surgery was taken as a reference point for calculation of any time period or interval. Follow up assessment was done by clinical examination, otoscopy, and/or examination under microscope, pure tone Audiometry and impedance. Surgery was performed under general anaesthesia. Myringotomy was performed using a sharp myringotomy knife and a radial incision was made in the anterior-inferior quadrant of the pars tensa and a Shah tympanostomy tube was inserted .

Statistical analysis:

Chi square test was used for test of categorical variables and Student's t test was used for comparison of continuous variables. Treatment effect is presented as a relative risk with 95% confidence interval.

RESULTS

Of the total number of patients who presented in ENT outpatient department of Lourdes Hospital, Kerala, over a 2-year period with conductive hearing loss, 1.6% were children who were diagnosed to have otitis media with effusion. Of the 55 patients studied, 43.6% were between 6-8

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years old , 30.9% between 3-5 years, 18.2% between 9-11 years and 7.3% were between 12-14 years. The youngest patient in this study was 4 years old and the oldest was 13 years old. The mean age of the patient at time of presentation was 7 years 5 months.

The study included 30 boys and 25 girls. The commonest complaint on presentation was decreased hearing seen in 61.8% patients followed by ear ache (38.2%) and frequent colds (32.7%). Of the 55 children studied, 40 children underwent surgery and 15 underwent medical treatment. 10 underwent unilateral tympanostomy tube insertions and 30 bilateral. 18 of the children studied (45%) underwent tympanostomy tube insertion and adenoidectomy whereas 15 children (37.5%) underwent Adenotonsillectomy along with tympanostomy tube insertion. In 7 children, only tympanostomy tube insertion was done. 38 tympanostomy tubes were extruded within 6 months, while 27 tympanostomy tubes extruded in 6 –12 months and only 5 lasted more than 12 months. The shortest stay for a tympanostomy tube was 2 months and longest 18 months. The tympanostomy tube was in position for a mean period of 7 months.

The magnitude of deafness in each ear pre- operatively as assessed by pure tone average (average of AC threshold in 500 Hz,1000 Hz and 2000 Hz) was between 20 – 30 dB (26 ears, 37.1%). 14.3% (10 ears) had hearing loss of 10 – 20 dB and 48.6% of ears had hearing loss of more than 30 dB. After tympanostomy tube insertion on follow up, 55.7% ears (39 ears) had improvement hearing of 20 dB or less. 20% ears (14) had hearing loss of 20-30 dB and 10% (7 ears) had a final hearing less of 30 dB or more.

The commonest complication of this procedure, with the tympanostomy tube in-situ was post-operative otorrhoea seen in 7 ears (10%). The commonest complication noted after the ventiltion tube had extruded was recurrence of otitis media with

Effusion seen in 3 ears (4.3%). Also, displacement of the ventilation tube into the middle ear was noted in one ear (1.4%). After medical treatment 6 out of 20 ears were found to have recurrence of otitis media (30%) and two ears had a perforation in the pars tensa on follow up.

DISCUSSION

In a study by Tos et al[4] 30% of the children were between 2-4 years. In the present study 30.9% children were in the 3-5 years age group. Mawson[5] reported that 73% children in his study were in the 5-8 year age group. Most of the children in this present study were in the 6 – 8 years age group (24 children). This is the age of entrance to school and children in this group are more predisposed to upper respiratory tract infections. Birck and Mravec[6] had an higher number of males in their study (59.2% males and 40.8% females). In the present study also males constituted the larger group (54.5%) as compared to females (45.5%).

Fraser et al[7] reported otalgia (82%) as the commonest presenting symptom followed by deafness (68%). They reported that children less than 4 years had otalgia as the presenting complaint as compared to older children who complained of decreased hearing. However, in the present study, the commonest complaint on presentation was decreased hearing (61.8%) followed by ear ache (38.2%). Kokko[8] performed more bilateral procedures (87.9% and 72.8% respectively) in their studies as compared to unilateral tympanostomy tube insertions (12.1% and 27.2% respectively). Bilateral tympanostomy tube insertions were performed more than unilateral procedures (85.7% bilateral and 14.3% unilateral procedures) in this present study. Mawson[5] and Kokko[8] observed that the mean duration of tympanostomy tube in position was 6.6 and 7 months. In this present study, 54.3% tympanostomy tubes extruded within 6 months and all by 18 months. Mawson[5] reported an AC threshold less than 20 dB in 6.1% ears, 21.4% ears with a loss of 20 – 30 dB and 72.4% above 30 dB, preoperatively. Following tympanostomy tube insertion, 65% had a final hearing loss of 20 dB or less, 26% a loss of 20 – 30 dB and 9% had a loss above 30 dB. In the present study prior to surgery, 37.1% ears had hearing between 20 – 30 dB, 14.3% had a hearing loss of 10 – 20 dB and 48.6% ears had a loss of more than 30 dB. Treatment with tympanostomy tube insertion resulted in 55.7% ears which had an improvement in hearing (> 20dB). 20% ears had a hearing loss of 20 – 3 dB and 10% had a loss of 30 dB or more.

Kokko[8] and Goldstein[9] reported a mean threshold of 27.1 dB and 25 dB respectively before treatment and on follow up after tympanostomy tube extrusion was 11.3 dB and 6.97 dB respectively. The mean AC threshold reported in this present study was 31.6 dB before surgery and on follow up after extrusion of the tympanostomy tube was 17.5 dB.

Fraser and colleagues[7] showed resolution of otitis media in 53 % children treated with Prednisolone. Schwarts et al[10] also reported resolution in 64 % ears as diagnosed by tympanometry. In the medically treated group in this study, antibiotics , nasal decongestants, antihistamines, corticosteroid preparations and antacid syrups were given. 60 % of the children showed resolution of otitis media with effusion.

Mandel[11] concluded that children undergoing myringotomy and tympanostomy tube insertion had better hearing than those that had no surgery. The mean hearing improvement as assessed by pure tone average was 14.1 dB following tympanostomy tube insertion as compared to 10.5 % dB following medical treatment. Mawson[5] concluded that following treatment with tympanostomy tube insertion, on follow up 65 % ears had a final hearing improvement (> 20 dB) In this present study 55.5 % ears which underwent tympanostomy tube insertion , showed an improvement in hearing (< 20dB).

CONCLUSION

The mean hearing improvement as assessed by pure tone average was 14.1 dB following tympanostomy tube insertion as compared to 10.5 dB following medical treatment. In children diagnosed with otitis media with effusion, myringotomy and tympanostomy tube insertion with or without adenoidectomy or adenotonsillectomy is more effective than medical treatment.

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