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School performance and behaviour change after adenoidectomy with myringotomy in children suffering from otitis media with effusion

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ABSTRACT

Background & objective: Otitis media with effusion (OME) is a common condition in children, where sticky fluid accumulates in the middle ear. Although, the fluid usually resolves without treatment, it may persist and cause prolonged hearing loss followed by impaired language development and behavioural problem. Adenoidectomy and/or myringotomy is done in children with persistent OME in order to improve hearing and language development. However, dubious claims about the success of the procedure have been made by the investigators. The present study was done to assess the outcomes after adenoidectomy and/or myringotomy in children with OME.

Materials& Method: The present interventional study was undertaken to determine the role of adenoidectomy along with myringotomy in children having OME. The study was conducted at ENT Out-patient Department, Dhaka Shishu (Children) Hospital over a period of 2 years from January 2006 to December 2007. Children with OME of > 4 months duration or of any duration with risk of structural damage and impaired language development were included in the study. Adenoidectomy with bilateral or unilateral myringotomy was the operative procedure performed. The outcome measures were hearing and school performance after the procedure.

Result: The mean age of the children included in the study was 5.4 years with male to female ratio roughly 1:1. The children were predominantly belonged to poor and middle class family. More than two-thirds of the patients presented after 6 months of the onset of symptoms. Poor attention, unexplained sleep disturbance and co-existent recurrent acute otitis media were almost invariably complained by the parents. Impaired speech performance in noise and poor academic performance were no less. Delayed language development and behavioural problem were less common. More than three-quarter (76.7%) exhibited moderate hearing loss. Adenoidectomy with bilateral myringotomy was the main operative procedure (70%). Around three-quarters of the children exhibited improved speech perception in noise and improved academic performance six months after intervention. Language development, academic achievement and behavioural problem all were observed to be better than those before intervention.

Conclusion: Adenoidectomy with myringotomy in children with OME improves hearing and academic performance. Complications of the operative procedure are rare.

Key words: *Otitis media with effusion, adenoidectomy with myringotomy, hearing and academic performance.*

ORIGINAL ARTICLE

INTRODUCTION

Otitis Media with Effusion (OME) is defined as fluid in the middle ear without signs or symptoms of acute ear infection. The tympanic membrane is often cloudy with distinctly impaired mobility,[1] and an air-fluid level or bubble may be visible in the middle ear. OME is highly prevalent in young children. Screening surveys of healthy children ranging in age from infancy to 5 years old show a 15-40% point prevalence of middle-ear effusion.[2-6] Among children examined at regular intervals for a year, 50-60% of child care center attendees[4] and 25% of school-aged children[7] were found to have a middle-ear effusion at some time during the examination period, with peak incidence during the winter months.

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In 40-50% of cases of OME, neither the affected children nor their parents or caregivers describe significant complaints referable to a middle-ear effusion.[8,9] In some children, however, OME may have associated signs and symptoms, such as, mild intermittent ear pain, fullness, or 'popping', secondary manifestations of ear pain in infants, which may include ear rubbing, excessive irritability, and sleep disturbances. Failure of infants to respond appropriately to voices or environmental sounds, such as not turning accurately toward the sound source, hearing loss, even when not specifically described by the child, suggested by seeming lack of attentiveness, behavioral changes, failure to respond to normal conversational-level speech, or the need for excessively high sound levels when using audio equipments or viewing television, recurrent episodes of Acute Otitis Media (AOM) with persistent OME between episodes, problems with school performance, balance problems, unexplained clumsiness, or delayed gross motor development[10–13] and delayed speech or language development are often reported.

Asymptomatic OME or OME likely to resolve spontaneously need not intervention even if it persists for more than 3 months. Children with long-standing OME or chronic OME are at risk for sequelae like structural damage of the tympanic membrane[14] and surgical intervention is indispensable.

Diagnosing OME correctly is fundamental to proper management. Management decisions in children with OME depend on effusion duration and laterality plus the nature and severity of associated symptoms. Surgical candidacy for OME largely depends on hearing status, associated symptoms, the child's developmental risk, and the anticipated chance of timely spontaneous resolution of the effusion. Candidates for surgery include children with OME lasting 4 months or longer with persistent hearing loss or other signs and symptoms, recurrent or persistent OME in children at risk regardless of hearing status, and OME and structural damage to the tympanic membrane or middle ear. Other physical symptoms of OME that, if present and persistent, may warrant surgery include otalgia, unexplained sleep disturbance, and coexisting recurrent AOM.

Adenoidectomy with concurrent myringotomy is the preferred surgical intervention. The benefit of adenoidectomy is apparent at 2 years old15 greatest for children 3 years old or older, and independent of adenoid size.[16,17] Myringotomy plus adenoidectomy is effective for children 4 years old or older,[16] but tube insertion is advised for younger children, when potential relapse of effusion is to be minimized (eg, children at risk) or pronounced inflammation of the tympanic membrane and middle-ear mucosa is present.

METHODS

The present interventional study was intended to evaluate the role of adenoidectomy along with myringotomy in children of otitis media with effusion (OME). The study was conducted at ENT Out-patient Department, Dhaka Shishu (Children) Hospital over a period of 2 years from January 2006 to December 2007. Enrollment criteria for surgery included children with OME lasting 4 months or longer with persistent hearing loss or other signs and symptoms, recurrent or persistent OME in children at risk regardless of hearing status, and OME and structural damage to the tympanic membrane or middle ear. Adenoidectomy with bilateral or unilateral myringotomy was the main operative procedure. The outcome measures were hearing and school performance after the procedure. Data were analysed using descriptive statistics.

RESULTS

The demographic characteristics of the children showed that over half (53.3%) of the children was male and 5 or < 5 years old. The mean age was 5.4 years. The children were predominantly belonged to poor and middle class family (43.3% and 40% respectively). More than two-third (66.7%) of the patients at presentation had been suffering from the disease for more than 6 months and majority (83.3%) have had both ears involved (Table 1).

TABLE I : Distribution of respondents by demographic characteristics (n = 30).

Demographic characteristics	Frequency	Percentage
Age* (years)		
≤ 5	16	53.3
> 5	14	46.7
Sex		
Male	16	53.3
Female	14	46.7
Socioeconomic status		
Poor	13	43.3
Middle class	12	40.0
Rich	5	16.7
Duration of OME (months)**		
≤ 6	10	33.3
> 6	20	66.7
Involved ear		
Right	2	6.7
Left	3	10.0
Both	25	83.3

** Mean age = (5.4 ± 1.0) years; range: 3.5 - 7 years.*
*** Mean duration of OME = 7.4 months; range: 5 - 11 months*

Poor attention was invariably complained by the parents with majority had unexplained sleep disturbance (93.3%) and co-existent recurrent acute otitis media (96.7%). The next predominat complaints were impaired speech performance in noise (80%) and poor academic performance (70%). Delayed language development and behavioural problem were less commonly complained (66.7% and 53.3% respectively) (table II). In terms of severity, more than three-quarter (76.7%) exhibited moderate and 20% mild hearing loss (Fig. 1). Adenoidectomy with bilateral myringotomy was the main operative maneuver (70%) followed by adenoidectomy with unilateral myringotomy (Table III). Six months after intervention around three-quarter of the children exhibited improved speech perception in noise and improved attention to academic activities as compared to their baseline figures ($p < 0.001$). Language development, academic achievement and behavioural problem all were observed to be significantly better than those of their preoperative status. ($p = 0.020$, $p = 0.037$ and $p = 0.013$ respectively) (table IV).

TABLE II : Distribution of respondents by demographic characteristics (n = 30).

Presenting complaints	Frequency	Percentage
Poor attention	30	100.0
Co-existent recurrent AOM	29	96.7
Unexplained sleep disturbance	28	93.3
Impaired speech perception in noise	24	80.0
Poor academic performance	21	70.0
Delayed language development	20	66.7
Behavioural problem	16	53.3
Persistent loss of hearing	03	10.0

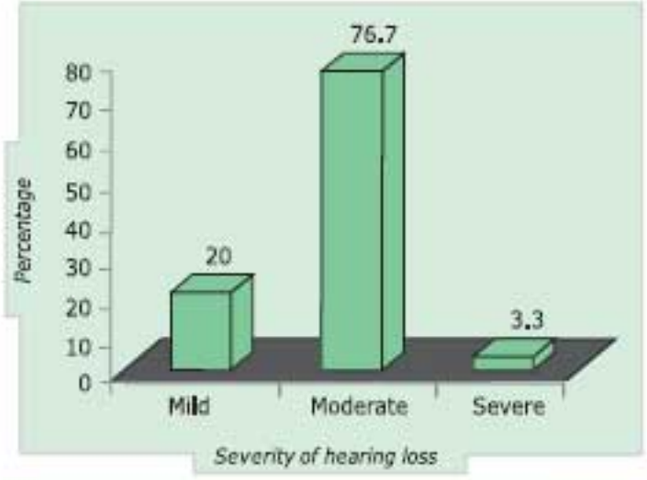

FIGURE I : *Showing severity of hearing loss.*

TABLE III : Distribution of respondents by type of operation (n = 30)

Type of operation	Frequency	Percentage
Adenoidectomy with bilateral myringotomy	21	70.0
Adenoidectomy with unilateral myringotomy	09	30.0

TABLE IV : Comparison of outcome with that of baseline status of the children.

Outcome variables	Group		p-value
	Before intervention (n =30)	After intervention (n =30)	
Impaired speech perception in noise	24(80.0)	7(23.3)	< 0.001
Poor attention to academic activities	30(100.0)	8(26.7)	< 0.001
Delayed language development	20(66.7)	11(36.7)	0.020
Poor academic achievement	21(70.0)	13(43.3)	0.037
Behavioural problem	16(53.3)	3(10.0)	0.013

Data were analysed using McNemar Chi-square Test.
Figures in the parentheses denote corresponding percentage

DISCUSSION

Otitis media with effusion (OME) is the most common cause of acquired hearing loss in childhood and has been associated with delayed language development and behavioural problems.

In the present study more than 50% of the children were > 5 years old. Consistent with this finding, several other studies also reported OME in young children ranging from infancy to 5 years of age.[2-4] OME has a prevalence of about 20% at around two years.18 It remains common up to the age of seven years when the prevalence is between 3 to 8%.[19-21]

Persistent OME may be associated with physical or behavioral symptoms including hyperactivity, poor attention, and behavioral problems in some studies[22-24] and reduced child quality of life.9In the present study poor attention, unexplained sleep disturbance and co-existent recurrent acute otitis media were frequently reported by the parents. Impaired speech performance in noise, poor academic performance, delayed language development and behavioural problem were next predominant complaints. All these signs and symptoms responded well six months after adenoidectomy with myringotomy indicating that the operative procedure performed is a good option for the treatment of OME. Tympanostomy tube insertion was not needed as none of the patients presented with glue ear. No postoperative complications like focal atrophy and haemorrhage were encountered by the patients.

If OME is asymptomatic and is likely to resolve spontaneously, intervention is unnecessary even if it persists for more than three months. The clinician should determine whether risk factors exist that would predispose the child to undesirable sequelae or predict nonresolution of the effusion. As long as OME persists, the child is at risk for sequelae and must be reevaluated periodically for factors that would prompt intervention. Children with chronic OME are at risk for structural damage of the tympanic membrane[14] because the effusion contains leukotrienes, prostaglandins, and arachidonic acid metabolites that invoke a local inflammatory response.[25] Reactive changes may occur in the adjacent tympanic membrane and mucosal linings. A relative underventilation of the middle ear produces a negative pressure that predisposes to focal retraction pockets, generalized atelectasis of the tympanic membrane and cholesteatoma.

The benefit of adenoidectomy is apparent at 2 years old,[15] greatest for children 3 years old or older, and is independent of adenoid size.[16,17] Myringotomy is performed along with adenoidectomy. Myringotomy plus adenoidectomy is effective for children 4 years old or older,16 but tube insertion is advised for younger children, when potential relapse of effusion must be minimized (eg, children at risk) or pronounced inflammation of the tympanic membrane and middle-ear mucosa is present.

Adenoidectomy plus myringotomy (without tube insertion) has comparable efficacy in children 4 years old or older[16] but is more invasive, with additional surgical and anesthetic risks. Similarly, the added risk of adenoidectomy outweighs the limited, short-term benefit for children 3 years old or older without prior tubes.[26] Consequently, adenoidectomy is not recommended for initial OME surgery unless a distinct indication exists, such as adenoiditis, postnasal obstruction, or chronic sinusitis.

Anesthesia mortality has been reported to be 1:50 000 for ambulatory surgery,[28] but the current fatality rate may be lower.[29] Laryngospasm and bronchospasm occur more often in children receiving anesthesia than adults. But no such complications were encountered in the present study. Tympanostomy tube sequelae are common[30] but are generally transient (otorrhea) or do not affect function (tympanosclerosis, focal atrophy, or shallow retraction pocket). Adenoidectomy has a 0.2 to 0.5% incidence of hemorrhage[15,31] and 2% incidence of transient velopharyngeal insufficiency.[26] No such complications were evident in the present study.

The present study suggests that the impact of adenoidectomy along with myringotomy in children with OME is appreciable without any major complications. Selection of right candidate for surgery is one of the prerequisite for better outcome after adenoidectomy along with myringotomy.

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