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*Original Article***The effect of adenoid hypertrophy on development of Otitis Media with Effusion (OME)**Ahsan MZ¹, Saiduzzaman M², Sultan SMT³, Sarkar DK⁴

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Abstract

Background: Adenoid hypertrophy a major problem in paediatric age group despite the advances in medicine. Otitis media with effusion is a treatable cause of deafness which may hamper the learning ability of a child. This study was undertaken to study the effect of adenoidectomy on established otitis media with effusion in children. **Objective:** To find out the effect of adenoid hypertrophy on develop of OME. **Materials and Methods:** This was a prospective observational study was conducted on 100 children between the age group 4-12 years, in Department of ENT, Shaheed Ziaur Rahman Medical College Hospital, Bogura for a period of March' 2018 to February' 2019. These children presented in with features suggestive of OME and adenoid hypertrophy such as difficulty in hearing, snoring, mouth breathing. **Results:** Forty cases were moderate adenoid among them 33(82.5%) cases had normal tympanometry and 7(17.5%) had abnormal tympanometry. The difference was not statistically significant ($p>0.05$) between two groups. Of 138 ears had type A tympanometry among them 83(60.1%) ears in age ≤ 6 years and 55(39.9%) in age 7-12 years. The difference was not statistically significant ($p>0.05$) between two groups. **Conclusion:** Adenoidectomy improves the outcome of OME by improving Eustachian tube function and by removing the focus of infection. It can be regarded as a useful management option in children with adenotonsillar hypertrophy and established otitis media with effusion. The disease process can be identified in its early stages by simple investigations like tympanometry at the earliest. Early diagnosis will help minimize the sequelae of OME.

Key words: Otitis media, adenoid hypertrophy, Adenoiditis, Tympanometry

Introduction

Otitis media with effusion (OME) refers to the accumulation of mucoid or serous fluid, within the middle ear cleft, without features of acute infection.¹ Adenoid is composed of lymph epithelial tissue and it is part of Waldyer's ring. The adenoids produce immunoglobulins through their B-cells which can be induced through antigen which leads to development of immunity during childhood.²⁻⁵ Adenoid tissue is not radiographically visible until the age of one year. Adenoid enlargement can directly obstruct the pharyngeal orifice of Eustachian tube which can lead to otitis media with effusion (OME)^{6,7}. The effect of both obstruction and infection from tonsil and adenoid are seen to cause major ill effect nose and paranasal sinus, eustachian tube and middle ear cleft⁸. It has been postulated that the enlargement of adenoids or

repeated infections of adenoids result in Otitis media with effusion (OME)⁸. Synonyms of OME include glue ear, serous otitis media, secretory otitis media and chronic nonpurulent otitis media.⁹ This study is a prospective study with the specific objective to evaluate the effect of adenoidectomy with tonsillectomy in treatment of established bilateral secretory otitis media in children.

Materials and Methods

This was a prospective observational study was conducted on 100 children between the age group^{4,12} years, in Department of ENT, Shaheed Ziaur Rahman Medical College Hospital, Bogra for a period of March 2018 to February 2019. These children presented in with features suggestive of OME and adenoid

hypertrophy such as difficulty in hearing, snoring, mouth breathing. Clinical examination was done. Otoscopy was done to view the condition of the tympanic membrane digital X-ray nasopharynx lateral view in erect position was done to confirm adenoid hypertrophy. Tympanometry were done to establish OME. All the patients underwent adenotonsillectomy under general anaesthesia. After surgery the patients were followed up at 6 weeks and 3 months and tympanometry to assess the improvement in hearing and the data thus collected were analyzed. Patients with discharging ear or perforation in tympanic membrane, patients with congenital deformities like cleft palate or other craniofacial anomalies, patient with previous ear or palatal surgery were excluded from the study.

Results

Almost two third (62.0%) cases were male and 38(38.0%) were female. Almost two third (62.0%) of cases belonged to age ≤ 6 years (Table-I). Fifteen cases were found abnormal tympanometry findings among them (66.7%) cases were male and 5 (33.3%) were female (Table-II). Forty cases were moderate adenoid among them 33 (82.5%) cases had normal tympanometry and 7(17.5%) had abnormal tympanometry. The difference was not statistically significant ($p>0.05$) between two groups (Table-III). Of the 100 patients, 61(61.0%) patients had eustachian tube obstruction and 39 (39.0%) had without eustachian tube blockade. Of 138 ears had type A tympanometry among them 83 (60.1%) ears in age ≤ 6 years and 55 (39.9%) in age 7-12 years. The difference was not statistically significant ($p>0.05$) between two groups (Table-V).

Table-I: Distribution of sample by gender according to age groups (n=100)

Age (years)	Male (n=62)		Female (n=38)		Total (n=100)	
	n	%	n	%	n	%
≤ 6	40	65.6	22	56.4	62	62.0
7-12	21	34.4	17	43.6	38	38.0

Table II: Abnormal tympanometric type by gender (n=15)

Abnormal tympanometric type	Male (n=10)		Female (n=5)		Total (n=15)	
	n	%	n	%	n	%
C2	4	40.0	1	20.0	5	33.3
B	6	60.0	4	80.0	10	66.7
Total	10	66.7	5	33.3	15	100.0

Table-III: Tympanometric finding according to adenoid size (n=100)

Adenoid size	Total (n=100)	Normal (Type A and C1) (n=85)		Abnormal (Type B and C2) (n=15)		p value
		n	%	n	%	
Gross	28	2	78.	6	21.4	0.220 ns
		2	6			
Moderate	40	3	82.	7	17.5	
		3	5			
Minimal	32	3	93.	2	6.3	
		0	8			

ns= not significant, p value reached from chi square test

Table-IV: ET obstruction of the study patients (n=100)

ET obstruction	n	%
Present	61	61.0
Absent	39	39.0

Table-V: Association between tympanogram findings and age

Tympanometric type	Total (n=200)	Age ≤ 6 years (n=124)		Age 7-12 years (n=76)		P value
		n	%	n	%	
A	138	83	60.1	55	39.9	0.113 ^{ns}
CI	24	14	58.3	10	41.7	
C2	11	5	45.5	6	54.5	
B	27	22	81.5	5	18.5	

ns= not significant, p value reached from chi square test

Discussion

In this study observed almost two third (62.0%) cases were male and 38(38.0%) were female. Almost two third (62.0%) of cases belonged to age ≤ 6 years. Timna and Chandrika reported 59.5% of patients were in age group of 5-7 years. Eighteen (60%) were male children and 40% patients were female children. Incidence of abnormal tympanometry and otitis media with effusion fall between 1.3% -20%.^{11,12} Among 71 children (41 boys and 30 girls) (142 ears), 63% of cases with upper airway obstruction symptoms were between 3-6 years old. The mean age obtained in our study was close to findings in studies like Abdul Baqi 2001 was 5.8 and Cengel and Akyol 2006 was 6.9,¹³ Durgut and Dikici reported the mean age of the patients aged 5 to 14 was $8.32 \pm 2.66.1$ The gender distribution was equal (25 males and 25 females). Els and Olwoch observed prevalence was found to be highest in the 6–9 year group (16.3%) and in males (14.0%) with a male to female ratio of 1.6:1.14 However, there was no statistically significant ($p > 0.05$) relationship between OME and either age or gender. Vijayan et al. reported age ranged from 4 – 15 with a mean age of 8.45 of this 81% are males and 79% are females.¹⁵

In this study observed fifteen cases were found abnormal tympanometry findings among them (66.7%) cases were male and 5(33.3%) were female. Khayat et al. reported among the study cases with abnormal tympanometry findings, 61.5% (8/13) were male and 38.5% (5/13) females cases.¹⁶ Both Yassan 2003 and Agidir 2006 showed that 60% of cases with abnormal tympanometry were males and the rest were females.¹⁷⁻¹⁸ Khayat 2008 also found that 55% male patients had abnormal tympanometry and OME and 45% of females had OME.¹⁹ While in other studies like Tong 2005 did not find any significant difference between both genders in the prevalence of OME.²⁰ Durgut and Dikici also observed that the tympanogram was type B in 46 ears, type C2 in 42 ears, and type A in 12 ears.¹

In this study showed 40 cases were moderate adenoid among them 33 (82.5%) cases had normal tympanometry and 7(17.5%) had abnormal

tympanometry. The difference was not statistically significant ($p > 0.05$) between two groups, Similar observation was found Khayat et al.¹⁶ reported 25% showed to have abnormal tympanometry (C2 and B) while 75% had normal tympanometry. Durgut and Dikici reported no significant correlation was found between adenoid size groups and mean air conduction thresholds ($p:0.213$).¹ Wang et al.²¹ found no significant association between adenoid size and tympanogram results. Large adenoid tissue partially or completely blocks the entry to the Eustachian tube, thus interfering with the ventilation function. Type C2 and type B tympanograms were found in 74% of the patients where the Eustachian tube ostium was completely closed with adenoid tissue.²² Vijayan et al.¹⁵ also reported 71(44.375%) patients had type B tympanogram which is suggestive of fluid in the middle ear. Pure tone audiogram revealed conductive hearing loss in 50% patients.

In this study showed out of the 100 patients, 61(61.0%) patients had eustachian tube obstruction and 39(39.0%) had without eustachian tube blockade. Wright et al. 1998 who stated that adenoid might compress the lumen of Eustachian tube thereby causing middle ear negative pressure and subsequently OME.²³ Di Francesco et al. 2008 mentioned that enlarged adenoid is an important factor for OME once it obstructs the pharyngeal ostia of the auditory tube.²⁴ Abdul Baqi et al. 2001 also mentioned that removal of adenoid could eliminate the obstructive effect of adenoid and/or the source of nasopharyngeal infection.¹³ Kindermann et al. 2008 revealed that Eustachian tube orifice compression by adenoid enlargement is associated with middle ear pressure changes and OME. They showed that children with Eustachian tube obstruction by adenoid tissue, 87% of cases had tympanogram changes while when the Eustachian tube orifice was not obstructed, in 86% of cases, tympanogram was normal.³

In current study showed of 138 ears had type A tympanometry among them 83(60.1%) ears in age ≤ 6 years and 55(39.9%) in age 7-12 years. The difference was not statistically significant ($p > 0.05$) between two groups. Khayat et al. reported of 142 ears who had

tympanometry, 72% were type A, 11.2% type C1, 7.7% type C2 and 9.1% were type B.¹⁶ Tanpowpong 2007 also showed that among the 23 children with adenoid enlargement between ages 4-11 years old, 21.7% had OME.²⁵ While Yssan 2003 and Khayat 2008 both demonstrated that OME incidence among children (3-13 years old) with adenoid enlargement was near 35%.^{19,26} Alhady et al.²⁷ study, among 40 cases (2-6 years old) with adenoid enlargement, 23 cases showed abnormal tympanometry including five ears with type B and 27 ears type C2. Similarly, in Khayat 2011 study, among 120 children with adenoid size enlargement, 44 (36.7%) had abnormal tympanometry. They found that the changes in middle ear pressure due to adenoid enlargement were significant.¹⁹ While in Toros et al. 2010 study, among 95 patients aged 2-12 years old with adenoid enlargement, the tympanometry types were (21.4% A, 20.4% B and 33.9% C) in patients with severe enlargement (63.3% A, 59.2% B and 53.2% C) in cases with moderate enlargement and in mild enlargement, tympanometry types were (12.7% A, 20.4% B and 12.9% C). They found this correlation was not significant because they supposed that the role of adenoid infection rather than obstruction.²⁸

Conclusion

Adenoidectomy improves the outcome of OME by improving Eustachian tube function and by removing the focus of infection. It can be regarded as a useful management option in children with adenotonsillar hypertrophy and established otitis media with effusion. The disease process can be identified in its early stages by simple investigations like tympanometry at the earliest. Early diagnosis will help minimize the sequelae of OME.

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