

Effect of Enlarged Adenoid on Middle Ear Function

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This prospective study was done in Rangpur Medical College Hospital from October 2009 to September 2011 to find out the effect of enlarged adenoid on middle ear function. Sixty patients of enlarged adenoid were included in this study consisting of males and females of varying age of different socio-economic condition. There were 36(60%) male patients and 24(40%) female patients and commoner age group for enlarged adenoid patients was 6-10 years, most patients were from middle class family (60%). Most of the patients presented with multiple symptoms and commonest presenting symptom was nasal obstruction and mouth breathing which was 70% (42) and next common symptom was hearing impairment (63.33%). Grossly enlarged adenoid was 26 (43.33%) cases, moderate enlarged adenoid was 24(40%) cases and mild enlargement was 10(16.67%) cases. Otitis media with effusion (OME) was found in 35 (58.33%) adenoids patients. Incidence of OME was more in grossly enlarged adenoid patients (73.07%). Majority of adenoid patients showed mild to moderate hearing loss (26-60 dB). In myringotomy fluid was found in 56 ears of 35 OME cases.

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Introduction

Hypertrophy of nasopharyngeal tonsil sufficient to produce symptoms called adenoids which occur most commonly between the ages of 3 to 7 years. Pathological enlargement of nasopharyngeal tonsil was first described by Meyer in 1870 who called the condition 'Adenoid vegetation'.¹ An acute upper respiratory tract infection causes hyperplasia and hypertrophy of the lymphoid follicles which causes enlargement of adenoid. It has been suggested that allergic episodes also causes adenoid enlargement.

By the age of 2 years hypertrophy and hyperplasia of the adenoids occurs. Rapid growth occurs from 3 to 5 years with a consequent decrease in the nasopharyngeal airway. After that the adenoid size remains relatively constant while the nasopharynx increase in size and involution of adenoid

occurs after puberty. Enlarged adenoid causes nasal obstruction, mouth breathing, hearing impairment, snoring, hyponasal speech and sleep disturbance. It is likely that most of the harmful effects caused by adenoids are related to size. Apparent size of the adenoid is less important than its size relative to the width of the nasopharyngeal space that determines airway obstruction. The most reliable way of assessing the size of adenoid is to take a lateral radiograph of the nasopharynx in open mouth. This will give a measure of the absolute size of adenoid and also an assessment of the relation to the size of airway. The classical concept is that, enlarged adenoid or recurrent infection of adenoids causes recurrent acute otitis media and otitis media with effusion (OME). The normal middle ear pressure is -100mm of H₂O to + 50mm of H₂O and the normal middle ear compliance is 0.39ml to 1.30 ml.²

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Enlarged adenoid causes tubal obstruction at its nasopharyngeal opening and causes reduction of middle ear pressure towards negative side due to absorption of gas which leads to otitis media with effusion.³ In OME middle ear pressure usually reduces below – 100 mm of H₂O³. It is associated with reduction of compliance of middle ear below 0.39ml and conductive deafness of variable degree.

Since only limited study have been done in our country regarding effects of enlarged adenoid on middle ear function, this study was done to find out the effects of enlarged adenoid on middle ear function which causes otitis media with effusion, so that early diagnosis and treatment can be given for adenoids patients to prevent middle ear dysfunction and to decrease the incidence and complications of OME. I hope that this present study will help in better management of this disorder. This study was carried out to find out the effect of enlarged adenoid on middle ear function, to find out the relationship between enlarged adenoid and otitis media with effusion, and to determine the amount of hearing loss according to size of adenoids.

Methods

For this prospective study total 60 patients of enlarged adenoid were collected from the department of otolaryngology and Head-Neck Surgery of Rangpur Medical College Hospital during the period of October 2009 to September 2011. Patients were diagnosed as having enlarged adenoid on the basis of history, clinical examination and radiological investigation of nasopharynx. The diagnosis of OME was established by history, clinical examination and various hearing test like pure tone audiometry (PTA), tympanometry, play audiometry, behavioral audiometry. Only one type of hearing test was done for each patient. PTA was done commonly for children aged

above 4 years. Children below the age of 4 years those who were not responsive to PTA were assessed by other hearing test. After collection of data statistical analysis was done according to standard studies.

Results

Sixty patients of enlarged adenoid were included in this study. Table I shows the age and sex distribution of patients. Out of sixty patients 36 (60%) were male & 24 (40%) were female and commoner age group for enlarged adenoid patients was 6-10 years. The study shows male-female ratio 1.5:1. Table-II shows the socio-economic status of study population. Most of the patients (60%) of enlarged adenoid came from middle class family.

Table I: Age and sex distribution of adenoids patients (n-60)

Age in year	Sex		No. of patients	Percentage (%)
	Male	Female		
0-5	13	07	20	33.33
6-10	18	14	32	53.33
11-15	05	03	08	13.33
Total	36	24	60	100

Table II: Socio-economic status of patients (n-60)

Class	Number of patients	Percentage (%)
Poor class	18	30
Middle class	36	60
Affluent class	06	10
Total	60	100

Table III shows the presenting symptoms of adenoids patients. Most of the patients presented with multiple symptoms and commonest symptom was nasal obstruction and mouth breathing (70%) followed by hearing impairment (63.33%).

Table III: Presenting symptoms of adenoids patients (n=60)

Symptoms	No. of patients	Percentage (%)
Nasal obstruction	42	70
Mouth breathing	42	70
Hearing impairment	38	63.33
Snoring	26	43.33
Sleep disturbance	23	38.33
Feeding difficulty	22	36.67
Pain in the throat	18	30
Tinnitus	05	8.33

On ENT examination revealed that 42 patients had nasal obstruction, 35 patients had retracted tympanic membrane and 36 patients had enlarged tonsil, 12 patients had adenoid facies (Table –IV).

Table IV: Presenting signs of adenoids patients (n-60)

Signs	No. of patients	Percentage (%)
Nose-nasal obstruction	42	70
Throat-Enlarged tonsil	36	60
Neck-palpable jugolodigastric lymph node	35	58.33
Ear-retracted tympanic membrane	35	58.33
Adenoid facies	12	20

X-ray nasopharynx, lateral view was done in every cases and shows grossly enlarged

adenoid in 26 (43.33%) cases, moderate enlargement in 24 (40%) cases and mild enlargement in 10 cases (Table V).

Table VI shows hearing status of adenoids patients by audiometry. Out of 60 adenoids patients hearing loss was found in 38 cases and normal hearing was found in 22 cases and majority of patient showed mild to moderate hearing loss.

Tympanometry was done in 120 ears of 60 adenoids patients. Table-VII shows the compliance and pressure in middle ear.

In 22 cases both (44) ears are normal. In 10 cases unilateral OME observed (10 ears). In 25 cases bilateral OME observed (50 ears).

Incidence of OME was more in grossly enlarged adenoid patients (Table VIII). 19 OME patients were found among 26 grossly enlarged adenoid patients.

Myringotomy was done in every OME cases. Fluid was found in 56 ears of 35 OME cases (Table IX).

Table V: Size of adenoids patients (n-60)

Size of adenoids	No. of patients	Percentage (%)
Mild enlargement	10	16.67
Moderate enlargement	24	40
Gross enlargement	26	43.33
Total	60	100

Table VI: Hearing status of patients (n-60)

Status of hearing	No. of patients	Total no. of ear	Distribution of ears	Hearing level	Distribution of % of ear	Percentage (%)
Normal hearing	22	44	44	< 26 dB	36.67	36.67
Hearing loss	38	76	38	26-40 dB	31.67	63.33
			22	41-60dB	18.33	
			16	61-80dB	13.33	

Table VII: Changes in compliance and pressure in middle ear (n=60, ears=120)

Compliance	Pressure					Total (No. of ears)
	+50 to -100mm of water (No. of ears)	-100 to -200mm of H ₂ O (No. of ears)	-200 to -300mm of H ₂ O (No. of ears)	Flat curve without peak (No. of ears)		
Normal (0.39 to 1.30ml)	44	0	0	0	44	
Increase	0	0	0	0	0	
Decrease (<0.39ml)	0	6	10	60	76	
Total (no. of ears)	44	6	10	60	120	

Table VIII: Correlation between sizes of adenoids with incidence of OME

Sizes of adenoids	No. of patients of adenoids (n-60)	Incidence of OME (n=35)	Percentage of incidence of OME in relation to particular sizes of adenoids
Mild	10	3	30
Moderate	24	13	54.17
Gross (Severe)	26	19	73.07
Total	60	35	

Table IX: Operative finding of OME patients (patients-35 Ears-60)

Operative finding	Distribution of Ears	Percentage (%)
Fluid present	56	93.33
Dry tap	4	6.67
Total	60	100

Discussion

Enlarged adenoid is a common childhood disease in Bangladesh which causes obstruction of nasopharyngeal opening of Eustachian tube which leads to otitis media with effusion and hearing impairment. It may also present as speech, language or learning delay and sometimes as behavioral and education problems.

This study was done with an intention to reveal the possible relationship between adenoids with otitis media with effusion and to detect the impairment of hearing in a section of children below the age of 15 years. The prevalence of adenoids are common in age group of 3 to 7 years.⁴ In this study about 54% patients having adenoids are in the age group of 6 to 10 years. In a study, adenoids were found in 76.31% of patients between 5 to 8 years of age which is nearly consistent with my study.⁵ Another report also revealed that size of the adenoids were largest between 6 to 8 years of age.⁶

In this study there were 36 male and 24 female adenoids patients and the male-female ratio was 1.5:1 which is similar with the study of other workers.⁷

Risk factors related to socio-economic status, like poor nutrition, poor personal hygiene, over crowding, lack of health education, lack of breast feeding and reluctance to receive treatment of adenoids may increase the incidence and severity of OME.⁸ In the study of Boston, the incidence of OME is more common in household with many members than children in household with few members.⁹ It is also similar with this study. In this series maximum adenoids patients (70%) presented with multiple symptoms and commonest presenting symptoms was nasal obstruction and mouth breathing and next common symptoms was hearing impairment (63.33%). These findings of the present series are similar with other workers.¹⁰ According to another study 74% of the patients of adenoids presented with nasal obstructions, mouth breathing and 68% of the patients presented with hearing impairment.¹¹ All the patients of present study were examined otoscopically and out of 60 adenoids patients 35 (58.33%) patients showed the features of OME, that is retracted tympanic membrane, change of colour of tympanic membrane and loss of

cone of light and these findings are consistent with other study.¹²

All the patients in this series were investigated by radiography and audiometry. Size of the adenoids was evaluated in relation to nasopharyngeal airway by radiography. Width of the airway was determined by the shortest distance from the posterior nasopharyngeal wall and basiocciput to the posterior wall of maxillary antrum¹³. On the basis of encroachment of adenoids in the nasopharyngeal airway it was categorized mild, moderate and gross (severe). In this series, gross enlargement was found in 26 (43.33%) patients.

According to a reported series, minimal otitis media with effusion had a hearing threshold of 23 dB, moderate otitis media with effusion 29 dB and impacted middle ear 34dB.¹⁴ The hearing loss was found conductive in nature. In this series maximum number of ears (31.67%) had hearing loss between 26-40dB, the mean hearing loss is 33dB which is nearly consistence with the above study. In this series tympanometry were done in both the ears of all patients (120 ears). Out of 120 ears of 60 patients 60 ears showed reduced compliance, with flat curve and 10 ears had reduced compliance and pressure between – 200 to –300 mm of water, 6 ears had reduced compliance and pressure between –100 to – 200 mm of water. These findings are nearly similar with other study.¹⁵

In the present series, out of 60 adenoids patients, 35 (58.33%) patients had OME and out of 35 OME cases unilateral OME was found in 10 cases & bilateral OME was found in 25 cases. So, by this figure it is clear that there is a very important aetiological relationship present between enlarged adenoid and OME. In most of the studies adenoids is thought to be an important aetiological factor for OME^{16,17} but in some study it is

questionable.¹⁸ In this study, myringotomy was done in 60 ears of 35 patients.

Effusion (fluid) was found in 56 (93.33%) ears and fluid was not found in 4(6.67%) ears, which were otoscopically suspected for effusion in the middle ear. This study is consistent with a reported study.¹⁹

In 4 cases, clinically fluid was suspected in the middle ear but after myringotomy fluid could not be detected. The reason may lie behind this, is recent onset of eustachian tube obstruction with enlarged adenoid.

Conclusion

In this study it can be concluded that enlarged adenoid is an important aetiological factor for otitis media with effusion and reduction of middle ear pressure and compliance and causes hearing impairment. Grossly enlarged adenoid causes mild to moderate hearing loss. So early diagnosis and treatment should be given to adenoids patients to prevent middle ear dysfunction and to decrease the incidence and complications of OME.

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