

Incidence of otitis media with effusion in children with adenoid hypertrophy

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Abstract

Background and objectives: Otitis media with effusion is collection of fluid behind intact tympanic membrane. Otitis media with effusion usually coexists with the adenoid hypertrophy. The adenoid is a part of Waldeyer's ring; its basic function is thought to be antibody production. The aim is to identify the incidence of otitis media with effusion in children with adenoid hypertrophy.

Methods: A prospective descriptive cohort study had been employed at Rizgari Teaching Hospital/ Erbil from January 2008 to July 2008. Summation of total 120 Child aged 3-12 years old were being conducted in the survey. All patients subjected for history, local physical examination, Information's recorded on a specially designed Questionnaire and proper investigations were done including lateral X ray of post nasal space, and audiological examination.

Results: : Among 120 patients age (3-12) years old with adenoid hypertrophy, 44 patients (36.7%) had OME, mean age was 6.5 years. Most common age group was (5-6) years (21) (47%).

Conclusion: Adenoid Hypertrophy (AH) can be relevant in the pathogenesis of otitis media with effusion (OME) due to its anatomic position.

Key words: Otitis media with effusion, adenoid hypertrophy, deafness.

Introduction

The adenoid (pharyngeal tonsil) is triangular-shaped mass of lymphoid tissue located on the posterior aspect of the nasopharynx¹. Together with the lingual tonsils anteriorly, the palatine tonsils laterally, all together form a ring of lymphoid tissue known as Waldeyer's tonsillar ring².

The adenoid appears to be at largest in 7 year old age group. However, clinical symptoms are more common in the younger age group, due to the relative small volume of the nasopharynx and the increased frequency of the upper respiratory tract infections³. Nasal obstruction, rhinorrhoea, and hyponasal voice are the usual presenting symptoms of adenoid hypertrophy⁴. The adenoid may be implicated in the upper respiratory disease due to

partial or complete obstruction of the nasal choanae or as a result of sepsis. Pathological manifestations include rhinitis, rhinosinusitis, otitis media and otitis media with effusion. OME is the chronic accumulation of mucus, serous or glue character fluid within the middle ear (ME) and sometimes in the mastoid air cell system. The time that the fluid has to be present for the condition to be chronic is usually taken as 12 weeks. In children, OME usually present because of the associated hearing impairment and sometimes with a preceding history of illness and otalgia consequent on an episode of acute otitis media (AOM)³. In spite that real etiology of OME is unknown but some conditions are generally accepted to play a direct role or as a predisposing factors to OME such as

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eustachian tube (ET) obstruction or previous or ongoing ME inflammation.

Nasal inflammation secondary to upper respiratory tract viral infection or allergic rhinitis, adenoid hypertrophy (AH), or a nasopharyngeal mass can adversely affect the normal ET function and result in OME⁵.

Methods

A prospective defacto study was being conducted at Rizgari Teaching Hospital/ Erbil during the period of January 2008 to July 2008.

Inclusion Criteria: the study embodied 120 Children aged 3-12 years. All the children had symptoms of adenoid hypertrophy.

Exclusion Criteria: Children with cleft palate, Down's syndrome, septal deviation, and previous adenoidectomy.

Verbal Consent was obtained from the Children's parents to whom full explanations about the study were given. The following steps were implemented in reaching the diagnosis:

History was taken from the parents, focusing on different aspects of the condition including nasal obstruction, snoring, hyponasal speech, difficulty in hearing, repeated sore throat, previous ear problems, and previous operation in the field of Ear, Nose, and throat. Complete clinical examination of ear, nose, and throat done. Rinne and Weber test for cooperative children above 6 years of age. Otoscopy to look for the signs of OME.

Investigations: Radiographs of post nasal space to determine the adenoid size. Tympanometry was performed using Grason-Stadler 1772 Middle ear Analyzer and MAICO MI 24 automated devices. Pure Tone Audiometry (PTA) to check the hearing status by using MA53 computerized devices questionnaire was filled out with positive findings.

Results

Among 120 patients with adenoid hypertrophy age (3-12) years old, 44 of them (36.7%) had OME, and 76 (63.3%)

patients has no OME (Figure 1). Among the (44) patients mean age was 6.5 years and most common age group was (5-6) years (21) (47%) as shown in (Table 1).

Gender distribution of OME was 24 (55%) male, and 20 (45%) were female. The symptoms of AH in patients with OME were nasal obstruction 44 (100%), mouth breathing 38 (86%), snoring 37 (84%), and hyponasal speech 6 (13.6%) below. Among the 44 patients with OME and AH, 21 (48%) had features of chronic tonsillitis. In the 44 patients with OME, deafness was detected by statements of parents in 16 (36%) patients, statements of teachers in 6 (14%) patients, and incidentally by tympanometry in 22 (50%) patients as shown in (Table 2). All the patients with OME showed color changes (Table3). Distorted cone of light was found in 58 ears (70%), increased vascularity in 10 ears (12%), no cone of light in 9 ears (11%), retraction in 4 ears (5%), and air bubbles in 2 ears (2%) as shown (Table 4). When the patients were tested by tympanometry, B type was found in 58 ears (70%) patients, C2 type in 21 ears (25%), and C1 type in 4 ears (5) taking in consideration that 5 patients had unilateral OME as shown in (Table 5).

When the patients were tested for PTA, 5 of them did not respond (out of them, one had unilateral findings and the rest with bilateral findings). The hearing loss was slight in 36.8%, mild in 50.5% and moderate in 12.7% as shown in (Table 6).

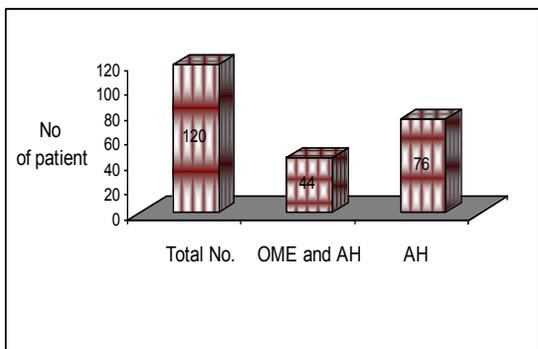


Figure 1: Incidence of Otitis Media with Effusion in Adenoid Hypertrophy

Table 1: Age Distribution

| Age Group/ Years | No. | Percentage % |
|---------------------|-----------|--------------|
| 3-4 | 7 | 16 |
| 5-6 | 21 | 47 |
| 7-8 | 7 | 16 |
| 9-10 | 6 | 14 |
| 11-12 | 3 | 7 |
| Total | 44 | 100 |

Table 2: Detection of Deafness

| Detected by | No. | Percentage % |
|------------------------|-----------|--------------|
| Statements of parents | 16 | 36 |
| Statements of teachers | 6 | 14 |
| Tympanometry | 22 | 50 |
| Total | 44 | 100 |

Table 3: Color Changes

| Color | No. of ears | Percentage % |
|---------------|-------------|--------------|
| Yellow-orange | 53 | 64 |
| Dull grey | 30 | 36 |
| Total | 83 | 100 |

Table 4: Otoscopic Findings

| Findings | No. of ears | Percentage % |
|-------------------------|-------------|--------------|
| Distorted cone of light | 58 | 70 |
| Increased vascularity | 10 | 12 |
| No cone of light | 9 | 11 |
| Retraction | 4 | 5 |
| Air bubble | 2 | 2 |
| Total | 83 | 100 |

Table 5: Tympanometric finding

| Type of tympanogram | No. of Ears | Percentage (%) |
|---------------------|-------------|----------------|
| B | 58 | 70 |
| C2 | 21 | 25 |
| C1 | 4 | 5 |
| Total | 83 | 100 |

Table 6: Pure Tone Audiometry Findings

| Degree of hearing loss | Hearing loss range (dB HL) | % |
|------------------------|----------------------------|------------|
| Slight | 27 | 36.8 |
| Mild | 37 | 50.5 |
| Moderate | 9 | 12.7 |
| Total | 73 | 100 |

Discussion

Among 120 patients aged (3-12) years with AH, 44 (36.7%) had OME. Out of the 44 patients with OME 23 (52%) had only AH and 21 (48%) in addition to AH, they had symptoms of chronic tonsillitis. This result is similar to the results found by Wright *et al*,⁶ that among 273 children aged (10 months-14) years with AH, 116 (42.5%) had OME.

A study done by Yasan *et al*,⁷ mentioned that among 126 children aged (3-13) years with AH without chronic tonsillitis 42 (33.3%) had OME. Keles *et al*⁸ stated that among 72 children in the 1st and 2nd grade primary school students, with OME, 27 (37.5%) had AH. Vikas *et al*⁹ found that among 100 children aged (2-12) years with AH and chronic tonsillitis 33% had OME, and Khan *et al*,¹⁰ concluded that among 87 patients aged (5-8) years with OME, 30 (34.5%) had AH. A recent research by Yildirim *et al*,¹¹ resulted that among 23 children aged (4-11) years with adenoid hypertrophy 9 of them (39.1%) had OME.

Cengel & Akyol¹² found that among 67 children aged (3-15) years with AH, 34 (50.7%) had OME while Tanpowpong *et al*,¹³ concluded that among 23 children aged (4-11) years with OME, 21.7% had obstructive sleep apnea from chronic hypertrophic tonsillitis and AH. A research by Di Francesco *et al*,¹⁴ concluded that among

67 children aged (5-10) years with adenoid hypertrophy and tonsil enlargement, 33 (49.2%) had OME. These results are far from our results, which may be due to the higher incidence of upper respiratory tract infections and/or different craniofacial morphology of the children participated in their studies.

Regarding the role of adenoid in the pathogenesis of OME, it may be due to mechanical obstruction and/or repeated infection of adenoid. Some authors supported the obstruction theory like Wright *et al*,⁶ who supported the hypothesis stated that adenoid may compress or obstruct the ET lumen thereby causing middle ear under pressures and subsequent OME also Abdul-Baqi *et al*,¹⁵ mentioned that the removal of adenoid is presumed to eliminate the mechanical obstruction effect of this tissue and/or the source of nasopharyngeal infection.

Abdul Latif *et al*,¹⁶ mentioned that the role of adenoid in ME disease is complex. The removal of large adenoid results in better effusion resolution compared with removing small adenoid, suggesting that mechanical obstruction of the ET may be an important factor. However, recurrent or chronic infection in adenoid without obstructive hypertrophy might also have been manifested as recurrent AOM, persistent OME, or chronic rhinosinusitis, supporting the widely held theory of adenoid being a reservoir of pathogenic organisms leading to tubal oedema and malfunction. Di Francesco *et al*,¹⁴ mentioned that enlarged adenoid is an associated factor in OME, once it obstructs the pharyngeal ostia of the auditory tube.

Kindermann *et al*,¹⁷ mentioned that obstruction of the ET orifice by adenoid tissue was associated with tympanograms suggestive of abnormal pressure in the ME, in children with occlusion of the ET orifice by adenoid tissue, 87% had abnormal pressure in the ME according to tympanograms. When orifices were not occluded, 86% of the tympanograms were normal.

Other researches supported the theory of infection, Stewart, 1999¹⁸ mentioned in discussing surgery for OME, it is likely that the beneficial affects of adenoidectomy relate to removal of a focus of infected tissue from the nasopharynx and it is recognized that a similar bacterial population is found in the nasopharynx to the ME in cases of OME.

Balram *et al*,¹⁹ concluded that adenoid acts as a focus of infection, the adenoid positioned in the posterior nasopharynx serves as an area of contact between inhaled bacterial and lymphoid cells. Its proximity to the orifice of the ET, when combined with a mechanism for the transport of mucus into the ME, provides a logical link between bacterial or viral colonization of the adenoid and OME. Takahashi *et al*,²⁰ mentioned that adenoidectomy improves ET function by diminishing inflammatory conditions in the nasopharynx rather than mechanical obstruction, also Ru & Grote²¹ mentioned that several studies suggest that OME in young children is more likely to be as a result of an infectious focus rather than of mechanical obstruction.

In Our study, the age of patients with OME ranged between 3-12 years, the mean age was 6.5 years. Most common age group was (5-6) (47%). The mean age in our study is near to that obtained by (Abdul-Baqi *et al*,¹⁵; Yasan *et al*,¹¹; Agidir *et al*,²², Cengel & Akyol,¹²; and Tanpowpong *et al*,¹³). Their results were 5.8, 7, 6.9, 6, and 6.8 respectively. These results are probably due to the fact that adenoid reaches its maximum size at the age of 7, and then gradually regress in size. Di Francesco¹⁴ mentioned that OME mainly affects pre-school children due to ET dysfunction, which may be due to adenoid enlargement. Regarding gender distribution, in our study it was found to be slightly more in male 24 (55%) rather than female 20 (45%) which is similar to the result obtained by Yasan *et al*,¹¹ who found that that (62%) were male, and (38%) female also Agidir *et al*,²² found that (60%) were male, and (40%) were female, this is may be due to the overall male

predominance for childhood infection.

Tong *et al*,²³ did not found any significant difference between male and females in the prevalence of OME. Some studies report the risk of OME to be no different in boys and girls, some report a higher risk in boys and others a higher risk in girls. It must be concluded that there is likely to be a little difference, if any, in the risk of boys compared with girls.³

Our results regarding the symptoms of AH in children with OME, were nasal obstruction 44 (100%), mouth breathing 38 (86%), snoring 37 (84%), and hyponasal speech 6 (13.6%), which is similar to the symptoms in a study done by Yildirim *et al*,¹¹ who found among 23 children with AH and OME symptoms of nasal obstruction in 23 (100%), snoring in 12 (52.2%), rhinolalia in 2 (8.7%) and obstructive sleep apnoea in 1 (4.3%) also Egeli *et al*, studied 64 children and the symptoms of AH were nasal obstruction, mouth breathing, and hyponasal speech²⁴.

Regarding associated chronic tonsillitis, out of 44 patients with OME 23 (52%) of them had only AH and 21 (48%) had AH and chronic tonsillitis. This result is in agreement with a study done by Abdul-Baqi *et al*,¹⁵ on 48 children aged 2-14 years with AH and OME, half of them had symptoms of chronic tonsillitis.

In our study, deafness was noticed by Parents in 16 patients (36%), by teachers in 6 patients (14%), and incidentally by tympanometry in 22 patients (50%). In a study done by Keles *et al*,⁸ families were asked about their children's complaints, 14 (19.4%) families indicated that their children had no complaints, 32 (43.2%) families stated that their children definitely had prominent hearing loss, and 26 (35.4%) families thought that their children might have hearing loss. Lo *et al*²⁵ mentioned in his study, if we relied on parental suspicion as the 1st screening, at least 80% of the OME cases would have been missed. The otoscopic findings in our study showed color changes of the tympanic membrane, which was dull grey in 36%, and

yellow-orange in 64% of the cases. Distorted cone of light was found in 70%, no cone of light in 11%, increased vascularity in 12%, retraction in 5%, air bubbles in 2%, similar results were found by Vikas *et al*,⁹ who found retracted drums in 45%, dull appearance in 13%, opaque appearance in 4%, oil drop appearance in 1%, air bubbles behind the tympanic membrane in 6%.

Regarding the tympanometric types, it was B type in 70%, C2 in 25%, and C1 in 5%. Guragain & Sinha²⁶ concluded that tympanometry is the most sensitive tool for the diagnosis of OME. When otoscopy suggests OME and is associated with a type B tympanogram, the combined sensitivity is 98%³.

Regarding the severity of hearing loss in our study, it was slight in 36.8%, mild in 50.5% and moderate in 12.7%. Routine audiometric testing of the hearing of every child with OME is recommended, as the associated hearing impairment can vary enormously from negligible to moderately severe hearing loss³.

Conclusion

Adenoid Hypertrophy (AH) might be implicated in the pathogenesis of otitis media with effusion (OME) due to its close anatomical vicinity. Half of the cases of otitis media with effusion were diagnosed incidentally by clinical and audiological findings; the parents were unaware of the hearing impairment.

It is important to educate the parents and school teaching staff about the problem of otitis media with effusion. Otitis media with effusion is often asymptomatic therefore screening is of value for detection of otitis media with effusion in pre- school and school aged children. Also it's essential to raise the awareness regarding otitis media with effusion by setting out posters and brochures concerning otitis media with effusion in hospitals and health.

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