

(RESEARCH ARTICLE)



The frequency of otitis media with effusion in patients undergoing adenotonsillectomy

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Abstract

Background: Otitis media with effusion (OME) is one of the most common pediatric health problems especially among young children. It is a condition characterized by accumulation of non-purulent fluid in the middle ear cleft. It may cause serious morbidity to the patient as hearing loss and delayed speech and language development.

Objectives: To study the frequency of OME in patients undergoing adenotonsillectomy and to assess the effect of adenotonsillar hypertrophy as an etiological factor.

Patients and Methods: This is a clinical observational case-based study was done during the period from June 2012 to January 2013 in the Department of Otolaryngology of Al-Yarmouk Teaching Hospital including 150 patients (aged 4 to 15 years) who visit the outpatient department for various indications for tonsillectomy with or without adenoidectomy). Ear examination was done to all patients and tympanic membrane (TM) features (color, position, air-fluid level, air bubbles and mobility) were recorded. The size of palatine tonsils was evaluated by clinical examination and classified into five grades (0, +1, +2, +3, +4) while adenoid was assessed by flexible nasendoscope and classified into 4 grades (grade 1, 2, 3, 4). Hearing assessment was done using either pure tone audiometry (P.T.A) or free field test in the uncooperative patients. Impedance audiometry was done to assess middle ear pressure.

Results: A total of 27 of 150 patients (18 %) were diagnosed to have OME and the majority aged 6-7 years old (12 patients, 44.5%). Seventeen patients (62.9%) were males and 10 patients (37.1%) were females. Nineteen patients (70.4%) had bilateral involvement and 8 patients (29.6%) were unilaterally involved. The TM features were dull color in 28 ears (60.8%), retracted TM in 35 ears (76.1%), impaired mobility in 24 ears (66.7%), air-fluid level in 5 ears (10.9%) and air bubbles in 4 ears (8.7%). Regarding adenotonsillar grading, the common tonsillar grade was +2 (16 patients, 33.3%) while the common adenoid grading was grade 4 (11 patients, 40.8%). Hearing loss was identified in the majority of cases (23 patients, 85.2%) to be in the range of 20-40 dB HL. Impedance audiometry showed that 41 ears (89.1%) had type B tympanogram and 40 ears (86.9%) had negative stapedial reflex. Myringotomy was done in 46 ears. Positive tap was obtained in 43 ears (93.5%). Serous fluid discovered in 26 ears (56.6%) while glue was discovered in 17 ears (36.9%).

Conclusion: The frequency of OME is directly related to adenoid hypertrophy regardless the degree of palatine tonsils grading.

Keywords: OME; Tonsillar grading; Adenoid hypertrophy; Pure tone audiometry; Free field test

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1. Introduction

OME is the chronic accumulation of mucus within the middle ear and sometimes 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 [1]. In children, OME usually presents because of the associated hearing impairment and sometimes with a preceding history of illness and otalgia consequent on an episode of acute otitis media. In many children, OME is preceded by an episode of acute otitis media with otalgia and fever. In the majority of children, acute otitis media is considered to have been triggered by a viral upper respiratory tract infection that damages the epithelium of the Eustachian tube, resulting in retention of middle ear fluid. These secretions then become secondarily infected with bacteria- acute otitis media. Once the infection has resolved, it can take time for the epithelium to recover [2]. Goblet cells are frequently present and sometimes mucus-secreting glands are formed. The ciliary lining would appear to be less efficient at moving the secretions in to nasopharynx [3].

In surgical practice, the fluid is usually characterized by its consistency as being either serous or mucoid. There will be a full spectrum of fluid type made up of a mixture of the secretions of the epithelial cells, the goblet cells and the mucus glands along with the inflammatory transudate/exudates. The main finding is that it is the mucins that come from the secretions that are responsible for the variable viscosity of the middle ear fluids [4]. The incidence of pathogens was higher in younger children (less than two years) and in those with recurrent upper respiratory infections and recurrent attacks of acute otitis media. About 66% of cultures were negative [2]. Children with a cleft palate, even if repaired, have deficient palatine muscles and resultant poor Eustachian tube function [2].

Initial reports on the biochemical analysis of middle ear fluid in OME suggest that pepsin is present in a high proportion of effusions (approximately 80 percent)[5]. The present study aimed to estimate the frequency of OME in patients undergoing adenotonsillectomy and to assess the effect of adenotonsillar hypertrophy as an etiological factor.

2. Material and methods

This is a clinical observational case-based study that was done during the period from June 2012 to January 2013 in the Department of Otolaryngology of Al-Yarmouk Teaching Hospital. A total of 150 patients who visit the outpatient department for various indications for tonsillectomy (with or without adenoidectomy) were included.

The age of children ranged from 4 to 15 years (both sexes). Inclusion criteria were chronic cases of OME (i.e. more than 3 months duration) and any patient referred for tonsillectomy with or without adenoidectomy. Whereas exclusion criteria were Patients with cleft lip & \ or cleft palate, Patients with mixed & \ or sensorineural hearing loss patients, with postnasal mass (apart from adenoids), with skull deformity, with allergic rhinitis, and acute OME.

All patients underwent clinical assessment via history & physical examination supported by audiological assessment.

3. Results

Table 1 Patients Distribution According To Age

Age (years)	Number of patients	Percentage %	Number of patients with OME	Percentage of patients with OME(%)
4-5	37	24.6	9	33.3
6-7	46	30.7	12	44.5
8-9	31	20.7	4	14.8
10-11	12	8	1	3.7
12-13	20	13.4	1	3.7
14-15	4	2.6	0	0
Total	150	100	27	100

Mean age & std. deviation = 7.75± 2.84

The age distribution of our patients revealed that the commonest age of presentation was 6-7 years (46 patients, 30.7%). Of them, 12 patients (44.5%) had OME and the least common age of presentation was 14-15 years (4 patients, 2.6%) and none of them had OME (Table 1).

Sex distribution among our patient revealed that 17 patients (62.9%) with OME were males and 10 patients (37.1%) were females(Fig. 1).

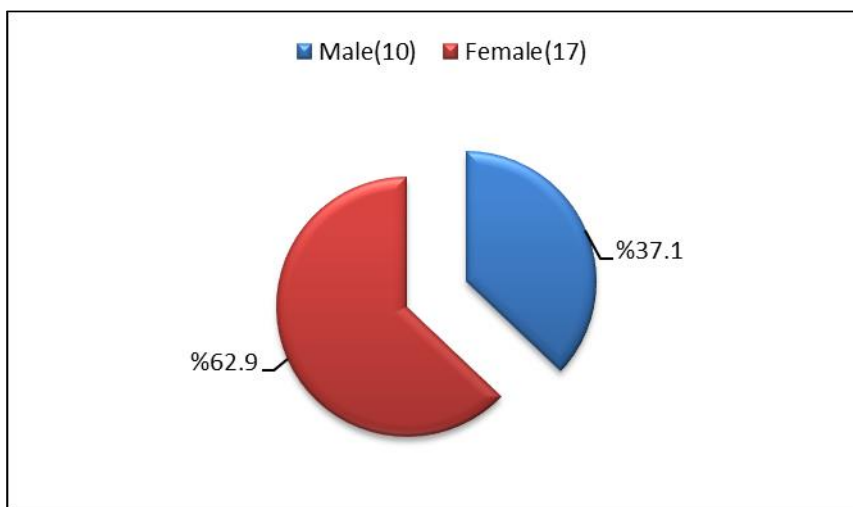


Figure 1 Patients Distribution According to Gender

From the total number of studied patients (i.e.150), twenty seven patients (18%) had OME. Of those, 19 patients (70.4%) had bilateral OME and 8 patients (29.6%) had unilateral OME (table 2).

Table 2 Laterality of OME

Laterality	No. of patients	Percentage %
Unilateral	8	29.6
bilateral	19	70.4
Total	27	100

Seventy six patients of the total number (50.7%) had no ear symptoms. However, the commonest ear symptom among the 74 patients (49.3%) with symptoms was hearing loss (26%) followed by otalgia (18%) (table 3).

Table 3 Patients Distribution According To Ear Symptoms

Symptom	No. of patients	%	No. of patients with OME	%
Hearing loss	39	26	21	77.8
Otalgia	27	18	3	11.1
Speech impairment	7	4.6	7	25.9
Tinnitus	8	5.3	5	18.5
No ear symptoms	76	50.7	1	3.7

This table 4 reveals the characteristics of the T.M. according to different variables (color, position, mobility, air-fluid level and air bubbles).

Table 4 Tympanic Membrane Features in Patients with OME

Feature	Type	No. of ears	Percentage %
Color	Pearly – grey	6	13.1
	Dull	28	60.8
	Yellow	12	26.1
	Total	46	100
Position	Retracted	35	76.1
	Bulging	9	19.5
	Normal	2	4.4
	Total	46	100
Mobility	Impaired	24	66.7
	Immobile	12	33.3
	Total	36	100
Air-fluid level	Present	5	10.9
	Absent	41	89.1
	Total	46	100
Air bubbles	Present	4	8.7
	Absent	42	91.3
	Total	46	100

P value of all features < 0.001 (significant) ; P value of mobility = 0.046 (significant)

Various grades of tonsillar hypertrophy (apart from 3 patients who were previously underwent tonsillectomy) were identified and the commonest grade was grade +2 in patients with OME as shown in (table 5).

Among the studied patients, 149 patients show various grades of adenoid hypertrophy (as shown in table 6) while one patient was previously underwent adenoidectomy. The commonest grade was grade 4.

Table 5 Results of Tonsillar Grading

Grade	No. of tonsils in overall patients	%	No. of tonsils in patients with OME	%
Grade 0	38	12.9	6	12.5
Grade +1	34	11.5	8	16.7
Grade +2	75	25.5	16	33.3
Grade +3	102	34.7	10	20.8
Grade +4	45	15.4	8	16.7
Total	294	100	48	100

P value (for OME patients) = 0.187 (not significant)

Table 6 Results of Adenoid Grading

Grade	No. of patients	%	No. of patients with OME	%
Grade 1	39	26	1	3.7
Grade 2	75	50	5	18.5
Grade 3	27	18	9	33.3
Grade 4	8	5.3	11	40.8
No adenoid tissue	1	0.7	1	3.7
Total	150	100	27	100

P value (for OME patients) = 0.004 (significant)

Pure tone audiometry (PTA) was performed in 97 patients (64.7%) while in 53 patients (35.3%) hearing was assessed with free field test. The commonest degree of hearing loss (taken at the speech frequencies) was found in the range between 20-40 dB hearing loss (table 7).

Table 7 Results of Hearing Loss

Hearing loss (dB)	No. of patients	%	No. of patients with OME	%
0-20	125	83.4	3	11.1
20-40	23	15.3	23	85.2
40-55	2	1.3	1	3.7
55-70	0	0	0	0
70-90	0	0	0	0
> 90	0	0	0	0
Total	150	100	27	100

Table 8 shows the results of impedance audiometry in the studied patients.

Table 8 Results of Impedance Audiometry

Type of tympanogram	No. of ears	%	No. of ears in patients with OME	%	Stapedial reflex	
					Positive	Negative
A	193	64.4	1	2.2	1	0
C1	49	16.3	1	2.2	0	1
C2	15	5	3	6.5	0	3
B	43	14.3	41	89.1	1	40
Total	300	100	46	100	2	44

Myringotomy was done in 46 ears. Positive tap was obtained in 43 patients (93.5%). Serous fluid discovered in 26 patients (56.6%) while glue was discovered in 17 patients (36.9%) (Table 9).

Table 9 Results of Middle Ear Fluid Aspirated

Type of fluid	No. of ears in patients with OME	%
Serous	26	56.6
Glue	17	36.9
Negative	3	6.5
Total	46	100

The results of tympanometry were compared with the results of intraoperative findings regarding the presence and the type of middle ear fluid (table 10).

Table 10 Correlation between the type of Tympanogram & the type of middle ear fluid aspirated

Type of tympanogram	Type of fluid			Total
	Serous	Glue	Negative	
A	1	0	0	1
C1	1	0	0	1
C2	1	1	1	3
B	23	16	2	41
Total	26	17	3	46
	46			

P value (for type B tympanogram) < 0.001(significant); Sensitivity of type B tympanogram = 90.69%; Specificity of type B tympanogram = 33.3%

4. Discussion

In the current study, results showed that patients at the age of 6-7 years old had have highest OME. Similar results obtained by Brooks [6] who found that 50% of the patients were in the age group of 5-7 years. Matloob [7] found a mean age of 6.5 years in the first decade of life. However, the results disagreed with Apostolopoulos et al. [8] who found that 93.7% of patients with OME were 11 years old or younger.

The study revealed an increase in the incidence of OME in males (63.9%) in comparison to females (37.1%) with male to female ratio 1.7:1. This was nearly the same ratio found by Black et al. [9] which was 1.9:1. Tos and Stangerup[10] have shown that male children have more incidences of secretory otitis media than females due to male preponderance of childhood infection. Al-Badri and Al-Mukhtar[11] showed in their studies that there was a male predominance with male to female ratio of 2.3:1 while Paradise et al.[12] reported no sex difference in the incidence of secretory otitis media.

Hearing loss was the most common ear-related symptom and found in 21 patients (77.8%). The results agreed with Reddy[13] (74%) of patients with OME had hearing loss. However the percentage was lower than Al-Bayati[14] (91%).

Regarding to T.M. color, the current study revealed that 28 ears (60.8%) showed dull colored membrane. These results were nearly similar to that of Krishna [15] (56%) and Patil [16](66.6%).

Concerning to T.M. position, 35 ears (76.1%) showed retracted ear drum, 9 ears (19.5%) showed bulging ear drum while only two ears (4.4%) showed normal membrane. Schilder et al.[17] and Maw[18] found that retracted TM in 81% and 76% of these cases respectively.

Regarding T.M mobility, 24 ears (66.7%) showed impaired mobility of T.M. and 12 ears (33.3%) showed immobile T.M. These results confirmed other results obtained by some researchers[19, 20].

Regarding air-fluid level and air bubbles, the current study showed that fluid level was present in 5 ears (10.9%) with OME while 41 ears (89.1%) did not reveal air-fluid level and air bubbles were present in 4 ears (8.7%) and absent in 42 ears (91.3%). These results are lowered than that reported by Baharudin et al.[21] (40%) and by Maqbool et al.[22] (26.7%) and close to Krishna [15] (12%).

Various adenotonsillar grading was detected during the current study. Collins et al.[23] showed that the total amount of Histamine in patients with bilateral otitis media with effusion was significantly higher than in patients without the condition. They suggested that adenoidectomy may reduce a potential source of inflammatory mediator from the vicinity of the Eustachian tube.

The type of fluid obtained by myringotomy and aspiration did not show a correlation with the type of tympanogram as both types of fluid (serous or mucous) can occur in any type of curve. This was consistent with the findings of Ovesen et al.[24] who showed that there was no statistical correlation between the tympanometrical findings and the viscosity of fluid.

5. Conclusion

OME has higher incidence in children aged 6-7 years old. The incidence in male patients was higher than female: sex ratio of 1.7: 1. **The** OME is not related to tonsillar hypertrophy without adenoid enlargement. The incidence of OME in children is directly related to adenoid size. The hearing loss in OME is most commonly of mild type. Type B tympanogram is highly correlated with OME but is not diagnostic to the type of middle ear fluid.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of ethical approval

Ethical approval for this study was done.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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