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Clinical profile and treatment modalities of otitis media with effusion: A prospective study

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Abstract
The present prospective study was carried out in the Department of Otolaryngology and Head Neck Surgery, BSMMU, Dhaka, Bangladesh from January to June 2022. Sixty (60) consecutive patients diagnosed as cases of OME, who attended the Outpatient Department and/or were admitted in the ward irrespective of age, sex and socioeconomic status formed the study group. They were evaluated for the clinical profile, laboratory findings and results of medical and surgical managements. Total 60 patients of OME were included in the present study. The age of the patients ranged from 4 years to 50 years. Majority of the patients (53.3% of the cases) were between 5 and 8 years of age. The youngest age was 4 years and the oldest 50 years of age. Males outnumbered females at a ratio of 3:2 (males=36, females=24). Out of the 60 cases, 27 cases (45%) were treated medically and 33 (55%) were treated surgically. Grommet insertion was done in 22 cases (36.6%), myringotomy only in 8 patients (13.5%) and adenotonsillectomy in 3 young patients (5%). Hearing loss was the main complaint in all the cases; 25 cases (41.6%) complained of hearing loss alone, 22 (36.6%) complained of hearing loss with tinnitus, 11 cases (18.3%) with hearing loss and otalgia and 2 patients (3.3%) complained of all the above three symptoms. Minimal hearing loss (16-25 dB) was present in 10 patients (16.6%), mild hearing loss (26-40 dB) in 29 cases (48.3%) and moderate hearing loss (41 to 55 dB) in 21 patients (35.1%). Out of the 27 patients treated medically, 17 patients (62.9%) showed clinical improvement and 10 patients (37.1%) showed no change. In the surgically treated group (33 patients), 29 patients (87.8%) showed good response and 4 cases did not have any improvement. Therefore, surgical treatment is preferred in those cases refractory to medical therapy. Medical and surgical treatments are employed in the management of OME. Surgical treatment is preferred in those cases refractory to medical therapy. Early diagnosis and timely intervention are important as the disease tends to persist from months to years leading to multiple hospital visits, which in turn leads to loss of school days for the children and undue apprehension of the parents.

Keywords: Otitis media with effusion, grommet, myringotomy

Introduction
Otitis media (OM) or middle ear infection is a group of diseases that includes acute otitis media (AOM), otitis media with effusion (OME; "glue ear") and chronic suppurative otitis media (CSOM). OM is one of the most common diseases in young children worldwide. Otitis media with effusion is one of the most common diseases of the middle ear in which the tympanic membrane is intact. The presence of fluid in the middle ear, a key feature of OME, is associated with a conductive hearing loss of up to 30-35 dB, primarily due to the mass effect of the fluid on the tympanic membrane, secondarily due to an increase in middle ear impedance, a decrease in air volume in the middle ear, and possibly static negative middle ear pressure. OME is one of the most common causes of hearing loss in children [1]. OM may resolve spontaneously without complications, but may be accompanied by hearing loss and lifelong sequelae. In developing countries, CSOM is the most common cause of hearing loss. OM may be of bacterial or viral origin. During a "cold," a virus may rise up the Eustachian tube to the middle ear, paving the way for bacterial otopathogens living in the nasopharynx. It is an inflammatory disease of the middle ear in which fluid accumulates in the middle ear cleft, without the signs and symptoms of acute infection such as ear pain, fever, or red or white swollen and bulging eardrum. The tympanic membrane may be slightly or moderately retracted, have limited mobility, and may have a cloudy or abnormal color in appearance.

In some cases, an air-fluid level or air bubbles may be visible behind an intact tympanic membrane. The etiology of OME is unknown, but it is generally believed to be either persistent effusion secondary to acute otitis media or Eustachian tube dysfunction with or without upper respiratory tract infection [2]. CSOM is defined as a chronic inflammation of the middle ear and mastoid cavity. Persistent or recurrent otorrhea due to perforation of the tympanic membrane or ventilator tube is the most prominent symptom [3]. CSOM can cause conductive hearing loss and damage the ossicles of the middle ear. It also increases the risk of permanent sensorineural hearing loss (hearing loss due to damage to the inner ear) and intracranial complications [4]. The prevalence of this condition varies widely between countries, but it is most common in low- and middle-income countries [5]. The diagnosis of OME is based on medical history, clinical tests such as pneumatic otoscopy and tuning fork testing, laboratory tests such as pure tone audiometry (PTA) and impedance audiometry, and surgical procedures such as tympanotomy [4]. Treatment of OME is a controversial topic in otology. Medical treatment aims to control infections and allergies, reduce edema and inflammation in the Eustachian tube, nasopharynx, and nose, and improve middle ear ventilation. Surgical treatment is usually performed only when medical treatment is ineffective. Tympanotomy and tympanostomy tube insertion are currently the standard of care. Adenotonsillectomy is performed in selected cases when these normal anatomical structures are abnormally enlarged. Currently, adenoidectomy is performed in younger children in conjunction with the use of tympanostomy tubes to obtain a permanent outcome [5,6]. The aim of this study was to investigate the clinical profile of OME in an institutional setting, make an accurate diagnosis, and investigate the efficacy of different treatment modalities in order to detect early and effectively treat such a common and intractable disease process.

Materials and Methods

The present prospective study was carried out in the Department of Otolaryngology and Head Neck Surgery, BSMMU, Dhaka, Bangladesh from January to June 2022. Sixty (60) consecutive patients diagnosed as cases of OME, who attended the Outpatient Department and/or were admitted in the ward irrespective of age, sex and socioeconomic status formed the study group. An obtained of detailed history was each case followed by a complete physical examination of the ear, nose and throat. Apart from the routine investigations, special investigations including PTA, impedance audiometry, X-ray PNS and mastoids were done for each and every case. The clinical findings and the results of PTA and impedance audiometry were recorded. Medical therapy was used in mild cases and for patients who refused surgical intervention. Treatment included systemic antibiotics, decongestants, antihistamines, and mucolytics (acetylcysteine) for 2 weeks. Surgical treatment was used in cases with severe signs and symptoms or in patients where previous treatment had failed. Surgical procedures included tympanotomy, tympanostomy tube insertion, and adenotonsillectomy. Tympanotomy and tympanostomy tube insertion were performed under endoscopic control using a rigid endoscope under local or general anesthesia, whereas adenotonsillectomy was traditionally performed under general anesthesia only. A minimum of 1-year follow-up was performed in all cases at 3, 6, 9 months and 1 year. Criteria for improvement were hearing loss less than 20 dB, intact tympanic membrane, and relief of symptoms.

Results

Total 60 patients of OME were included in the present study. The characteristics of this group of patients are indicated in Tables 1 and 2.

Table 1: Age distribution (n=60)

Age (Years)	Number of patients	Percentage
2-4	5	8.3%
5-8	32	53.3%
9-16	7	11.6%
17-30	5	8.3%
>30	11	18.3%
Total	60	100%

The age of the patients ranged from 4 years to 50 years. Majority of the patients (53.3% of the cases) were between 5 and 8 years of age. The youngest age was 4 years and the oldest 50 years of age.

Table 2: Sex distribution (N=60)

Sex	Number of cases	Percentage
Male	36	60%
Female	24	40%
Total	60	100%

Males outnumbered females at a ratio of 3:2 (males=36, females=24).

Hearing loss was the main complaint in all the cases; 25 cases (41.6%) complained of hearing loss alone, 22 (36.6%) complained of hearing loss with tinnitus, 11 cases (18.3%) with hearing loss and otalgia and 2 patients (3.3%) complained of all the above three symptoms (Fig 1).

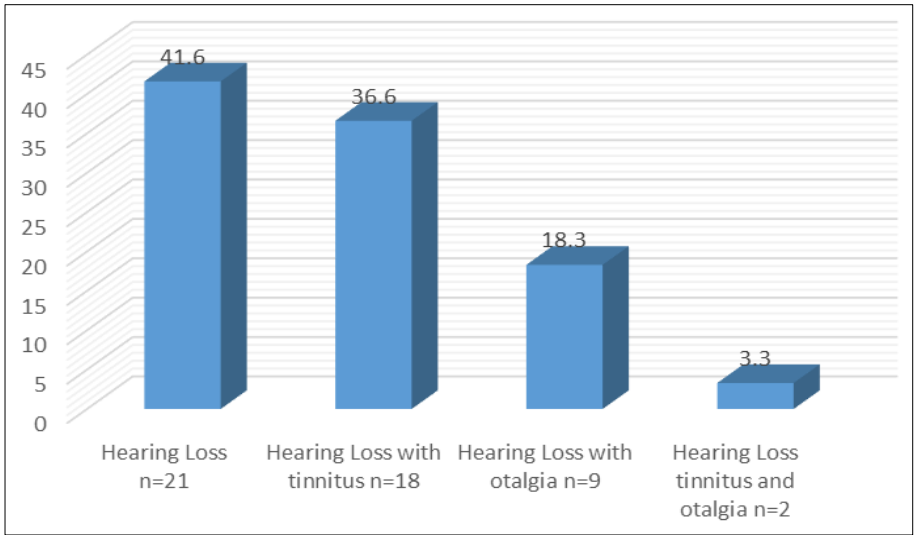

Fig 1: Showing presenting complaints of OME pertaining to ear symptoms.

Tympanic membrane (TM) was dull opaque in 32 cases (53.3%) and retracted in 18 cases (30%). 10 cases (16.7%) had fluid in the middle ear. Out of 60 pairs of ears examined, 43 ears had bilateral involvement and 17 ears had unilateral involvement (10 in the right ear and 7 in the left ear). 24 patients (40%) had dull opaque TM bilaterally, 4 patients (6.7%) had dull opaque TM in right ear and 4 patients (6.7%) had dull opaque TM on left ear. Retracted TM was seen bilaterally in 11 patients (18.3%), in the right in 5 patients (8.3%) and in the left ear in 2 patients (3.3%). Middle ear fluid was seen bilaterally in 8 patients (13.3%) and in the right ear in 2 patient (3.3%) (Fig-2).

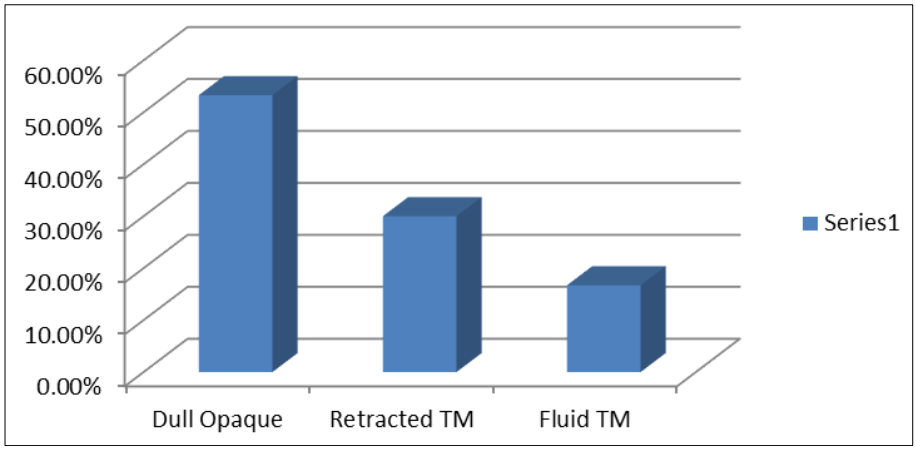

Fig 2: Showing otoscopic findings with the side involved.

Minimal hearing loss (16-25 dB) was present in 10 patients (16.6%), mild hearing loss (26-40 dB) in 29 cases (48.3%) and moderate hearing loss (41 to 55 dB) in 21 patients (35.1%) (Fig 3).

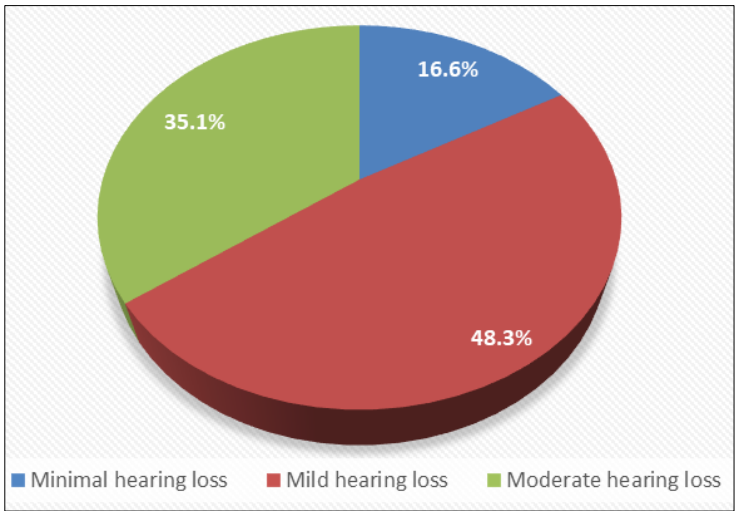

Fig 3: Showing degree of hearing loss.

Table 3: Types of Tympanogram Curve (N=60)

Type of Tympanogram curve	Number of patients	Percentage
_B' type - Bilateral	43	71.6%
_B' type – Right side	10	16.6%
_B' type – Left	7	11.8%
Total	60	100%

Tympanogram revealed B type curve in all the cases; bilateral in 43 cases (71.6%), unilateral in 17 patients (28.4%) (Table 3).

Fig 4: Showing endoscopic view of OME noted by presence of bubbles.

Out of the 60 cases, 27 cases (45%) were treated medically and 33 (55%) were treated surgically. Grommet insertion was done in 22 cases (36.6%), myringotomy only in 8 patients (13.5%) and adenotonsillectomy in 3 young patients (5%) (Table 4).

Table 4: Treatment methods (N-60)

Treatment	No. of Patients	Percentage
Surgical	**33**	**55%**
• Grommet insertion	22	36.6%
• Myringotomy	8	13.5%
• Tonsillectomy	3	5%
Medical	27	45%
Total	60	100%

Follow up was done for all the patients for a minimum period of one year at 3 months, 6 months, 9 months, and 1 year. During the follow up, PTA, otoscopic and endoscopic examination was done in all the patients. PTA results indicated that 42 patients (70%) had improved hearing (<20 dB) and 18 patients (30%) still had residual mild hearing loss. The TM was normal in 42 cases (70%), dull and opaque in 11 cases (18.3%) and slightly retracted (1st degree) in 7 cases (11.7%). There was not a single case of fluid in the middle ear on follow up (Table 5).

Table 5. Follow up otoscopic appearance of TM and PTA Results.

Follow up findings	No. of cases	Percentage	Total
Otoscopic findings of TM	42	70%	60 (100%)
Normal Dull grey	11	18.3%	
Retracted	7	11.7%	
PTA results			
Normal hearing	42	70%	60 (100%)
Mild hearing loss	18	30%	

Out of the 27 patients treated medically, 17 patients (62.9%) showed clinical improvement and 10 patients (37.1%) showed no change. In the surgically treated group (33 patients), 29 patients (87.8%) showed good response and 4 cases did not have any improvement. Out of these 4 patients, 2 were from the group of grommet insertion; in the first case, grommet had to be removed due to medialisation of the tube, and the second case, the grommet was removed due to persistent otorrhoea. Three patients were from the myringotomy group (Fig 5).

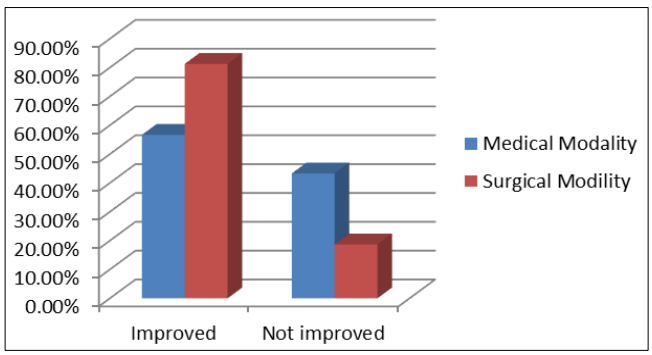

Fig 5: Showing the treatment response

Discussion

Despite the high disease burden, OM in developed countries is usually uncomplicated and self-limiting, and rarely result in ongoing hearing problems or developmental delay [7]. However, in high-risk populations in both developing and developed countries, considerable hearing loss with life-long sequelae does occur more frequently. In these populations, the progression of disease is a complex aggregate continuum of exposures to numerous social, environmental and genetic risk factors. Otitis media with effusion is mainly a disease of childhood. Total 60 patients of OME were included in the present study. The age of the patients ranged from 4 years to 50 years. Majority of the patients (53.3% of the cases) were between 5 and 8 years of age. The youngest age was 4 years and the oldest 50 years of age. In the UK 50% incidence of OME is seen in children aged 5-7 years, while in USA, a higher incidence in the range of 53%-61% in children between 2 and 6 years of age have been reported [6]. Male preponderance is noted in OME. In the present study, males outnumbered females at a ratio of 3:2 (males=36, females=24). Lee *et al* in the study of 51 patients reported that 33 patients were males and 18 patients were females [4]. In a study by Khan *et al*., out of 87 patients suffering from OME, 58 (66.6%) were males and 29 (3.3.3%) were females and majority of the patients, 54 (62%) cases were between 5-8 years of age [7]. Hearing loss of conductive type is the dominant symptom in the present study. Minimal hearing loss (16-25 dB) was present in 10 patients (16.6%), mild hearing loss (26-40 dB) in 29 cases (48.3%) and moderate hearing loss (41 to 55 dB) in 21 patients (35.1%).

A study by Reddy V showed that hearing loss was the presenting symptom in 74% of the cases, nasal obstruction in 38% and neck swelling in 8% of the cases [8]. Out of 60 pairs of ears examined, 43 ears had bilateral involvement and 17 ears had unilateral involvement (10 in the right ear and 7 in the left ear). A similar finding was also reported by Khan *et al*. with 65.5% of the cases affecting both ears [7]. Retracted TM was seen bilaterally in 11 patients (18.3%), in the right in 5 patients (8.3%) and in the left ear in 2 patients (3.3%). Middle ear fluid was seen bilaterally in 8 patients (13.3%) and in the right ear in 2 patient (3.3%). The present study is also similar to a study by Reddy V where he found dull grey and retracted TM to be the most common otoscopic finding [8]. In OME, deafness is of conductive type and the degree of hearing loss ranges from mild to moderate. A study by Raza *ssss*. showed that hearing loss ranged from mild to moderate (25-55 dB) where 50% of cases had 35 dB hearing loss and 10% of the cases having hearing loss exceeding 45 dB [9]. In the present study, Tympanogram of all the patients showed B type curve; bilateral in 72% and unilateral in 28% of the cases. Raza *et al*. showed that tympanornetry in 98.6% of the cases showed flat B type of curve [9]. Thus, the flat B type curve in Tympanogram is a consistent finding in OME and is diagnostic of the disease. Out of the 27 patients treated medically, 17 patients (62.9%) showed clinical improvement and 10 patients (37.1%) showed no change. In the surgically treated group (33 patients), 29 patients (87.8%) showed good response and 4 cases did not have any improvement. Khan *et al*. also reported thick and viscid fluid in 86% of the cases and serous fluid in 13% of the cases [7]. Thus, in OME the fluid present in the middle ear is mainly of glue type. In our present study, 27 cases underwent surgical treatment. Surgical treatment was given to those patients with more severe symptoms and those who are refractory to previous medical treatment. In a study conducted by Khan *et al* out of 87 patients, 57 patients underwent surgical procedures of which myringotomy alone was done in 12.3% of the patients, tympanostomy tube insertion in 29.8%, adenoidectomy in 17.5%, adenotonsillectomy in 21% and antral lavage in 5.3% [7]. In the present study, patients were followed for a minimum period of 1 year at 3, 6, 9 and 12 months. On otoscopy, TM was normal in 70% of the cases, dull and opaque in 18% and retracted in 12% of the cases. No fluid was present in the middle ear. The rationale for antimicrobial therapy of OME is based on a 30% prevalence of viable bacteria in aspirated effusions and an 80% prevalence of bacterial genomic material [10-12]. Because of the difficulty in obtaining viral cultures, fewer specific data are available regarding their occurrence in patients with OME. However, respiratory syncytial virus accounts for a majority of the viral infections of the middle ear space [13]. In the surgically treated group (33 patients), 29 patients (87.8%) showed good response and 4 cases did not have any improvement. Out of these 4 patients, 2 were from the group of grommet insertion; in the first case, grommet had to be removed due to medialisation of the tube, and the second case, the grommet was removed due to persistent otorrhoea. Three patients were from the myringotomy group.Grommet insertion was done in 22 cases (36.6%), myringotomy only in 8 patients (13.5%) and adenotonsillectomy in 3 young patients (5%). Grommet insertion; in one case repeat myringotomy had to be done as the Grommet was displaced medially into the middle ear cavity and in the other case the tube had to be removed due to infection and persistent otorrhoea. Kumar *et al*. in a study reported medial displacement of tube in 3 cases [14]. In our study, there was no recurrence of effusion in the two patients who underwent adenotonsillectomy. Khan *et al*. also showed that there was no recurrence in their group where tonsillectomy was done [15]. Gates demonstrated greater long-term efficacy in the treatment of OME in children 4 to 6 years of age when adenoidectomy was added to tympanostomy tube placement or myringotomies even if this was the first surgical intervention in a child [16]. Paradise *et al*.on the other hand, recommend adenoidectomy only if a child fails initial tympanostomy tube placement [17]. From these findings, it is clear that surgical treatment is more effective than the medical treatment for OME.

Conclusion

Medical and surgical treatments are used to treat OME. Surgical treatment is preferred when medical therapy is ineffective. Insertion of tympanostomy tubes is the most reliable method with the least recurrence. However, a common complication of tympanostomy tube insertion is persistent otorrhea. Early diagnosis and timely intervention are important, as the disease often lasts for months or years and is often accompanied by numerous hospitalizations, resulting in children missing many days of school and unnecessary anxiety for parents.

Author's Contribution

Not available

Conflict of Interest

Not available

Financial Support

Not available

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