

Otitis Media with Effusion Balasubramanian Thiagarajan

Introduction

Upregulation of mucin genes

Glue Ear



OME is accumulation of mucous within the middle ear cavity / mastoid air system without signs and symptoms of acute ear infection

Adenoiditis

Viral URI

80% of children will have at least one episode of Glue ear before the age of 3. 40% will have more than one episode

More than 3 months (Chronic)

Etiopathogenesis

Inflammation of middle ear epithelium with production of serous / mucous secretions



Flat cuboidal epithelium of middle ear replaced with mucous secreting pseudostratified columnar cells. Goblet cells are also increased

Submucosa oedematous inflamed. Increased number of blood vessels. Increased macrophages, plasma cells and lymphocytes

Cilia less efficient in moving secretions to nasopharynx

Effusion composed of Mucin, IgA, lysozyme, interleukins, inflammatory cytokines

Microbiology

Respiratory Bacteria

Middle ear Positive bacterial culture OME more than 2 months

Pathogens cultured

1. Streptococcus Pneumoniae
2. H. Influenza
3. Moraxella catarrhalis

60% culture negative in traditional culture methods



Biofilms implicated

Biofilms are communities of sessile bacteria, resistant to disruption and with a very low metabolic rate. They are embedded in polymeric substances which are produced by them. Bacteria within biofilms are resistant to antibiotics.

Biofilms identified in 90% of adenoid specimen removed during surgery



PCR demonstrates intracellular streptococcus pneumonia in 30% specimen

Craniofacial Malformations

Palatine muscles controlling ET opening is deficient in patients with cleft palate

Otitis media with effusion occurs in all infants with cleft palate. Cleft palate repair does not help in reducing the incidence

If adenoidectomy needs to be done then subtotal adenoidectomy is preferred. Lower portion of adenoid is retained to facilitate velopharyngeal competence

Children with bifid uvula does not show higher incidence of Otitis media

No correlation between dental malocclusion and OME



Allergy

Children with family H/O allergy have positive rhinovirus in middle ear mucosa



Association with OME conflicting

90% of patients with OME have H/O allergy

IgE not elevated abnormally in patients with OME

GERD and OME

During swallowing fluids can traverse via nasopharynx and ET into the middle ear cavity

2/3 of infants under 4 months of age have GERD

H pylori organism found commonly in stomach identified in middle ear effusion by PCR studies

Middle ear mucosal damage could be mediated by proteolytic effects of Pepsin

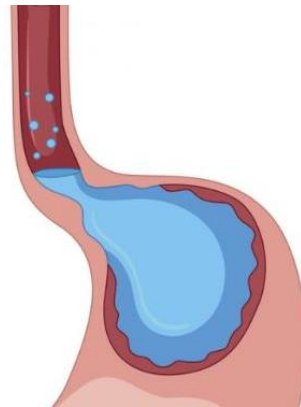
Pepsin secretion of stomach have been isolated from middle ear effusion fluid

Level of pepsin in middle ear effusion fluid is 1000 times more than that of serum levels

Pepsinogen immunoreactivity was found to be higher in adenoid tissue of patients with OME when compared to normals

Animal experiments with H pylori does not indicate them to be direct cause for middle ear effusion. It can accentuate inflammatory reaction in the middle ear cavity

Not enough evidence to recommend anti reflux treatment for patients with OME



Epidemiology

Common during winter months because of increased incidence of viral infections and tendency of children to stay indoors and close together

Prevalance of OME very high

Bimodal distribution. First peak seen in children of 2 years and below – 20%.

Second peak 18% occurs in 5 year olds i.e school going children. Incidence decreases as the child becomes 8 years old



SOM is seen equally in both males and females

Risk factors:

1. Episodes of Acute otitis media. Each episode increases the odd of developing SOM by 90%
2. Middle ear hypoxia. This is caused by genetically inherited inability to optimally utilize oxygen by middle ear mucosa
3. There is upregulation of Hypoxia inducible factor and vascular endothelial growth factor A in these patients

Children exposed to parents smoking are more prone

SOM lasts anywhere between 3-6 months. If it occurs during winter months it takes longer time to resolve. Bilateral lesions takes longer time to resolve

Diagnosis

History:

Deafness. Parent's awareness of this symptom is rather poor and unreliable. Parents tend to under estimate the quantum of deafness in children with SOM.

Poor speech and language development.

Balance disorders. Important to confirm normal pregnancy, delivery and neonatal period. Neonatal hearing screening results. A small number of children could pass neonatal hearing screening and still go on to develop S/N hearing loss. SOM can coexist with S/N loss

Children attending day care centres cause anxiety to their care givers due to inattention and other behavioral problems. In many instances the care givers draw attention to the problem more than the parents.

Every child with URI should undergo otoscopy



High index of suspicion

DIAGNOSIS

After successful surgical treatment of OME parents start believing the improvement the treatment has created.

Children with comorbid conditions like:
1. Down's syndrome
2. Cleft palate
Are more commonly affected and the disease could be more persistent

Children with SOM have inability to take part in group activities in play school is due to hearing loss associated with SOM. Child has impairment in speech processing in noisy environment. It is obvious in one to one situations with primary care givers

Examination

Wax should be removed prior to otoscopy

Pneumatic otoscopy
Highly sensitive if
performed by trained
personal

Free Field voice
testing is also
sensitive if
performed by
trained personal



Tuning fork tests not
reliable

Otoscopy findings

1. Opacification of ear drum
2. Loss / distortion of light reflex
3. Indrawn / retracted / concave ear drum
4. Presence of bubbles / fluid level
5. Decreased / absent mobility of ear drum during pneumatic otoscopy
6. Yellow / amber colored drum
7. Sometimes drum could be bulging

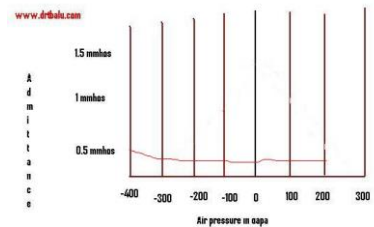


Otomicroscopy highly
sensitive

Investigations

Tympanometry

Hand held automated tympanoscopes are available



Type B curve is frequently associated with SOM



Even though it could be difficult to obtain acoustic seal in all children to perform tympanometry, still it is possible in majority of children to obtain bilateral recording

Type A curve is infrequently associated with SOM, while Type C comes in-between

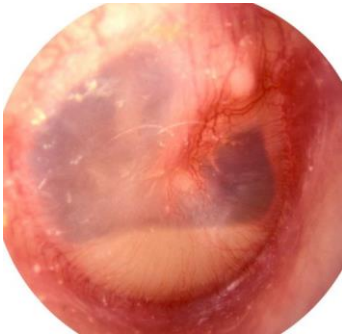
Acoustic reflex studies does not add to the accuracy and hence of no use

Combined analysis of otoscopy and tympanometry improves the accuracy of diagnosis

PTA is mandatory for all children referred to secondary care with hearing impairment. Air bone conduction thresholds are a must. Air bone gap should be at least 30 dB for diagnosis

Carharts notch in bone conduction audiogram is a dip at 2kHz. This is a feature of otosclerosis. In OME also it is seen commonly

Ear drum findings



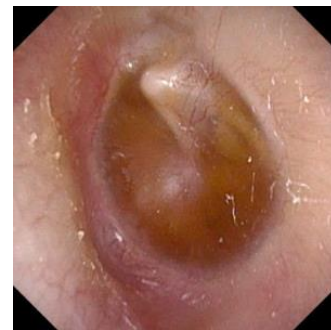
Fluid level



Air bubbles in middle ear cavity



Distorted cone of light



Amber drum



Retracted drum

Complications

Children with OME have poor behavior scores. Their Rutter scores are pretty abnormal



Attic retraction & cholesteatoma

Affects balance. 60% of children with OME had defective motor proficiency

Attic retraction is one of the complications of SOM. Prolonged attic retraction would lead to cholesteatoma formation. There is no evidence that insertion of grommet alters the incidence of attic retraction

Tympanosclerosis



Poor academic performance due to cognition disability. Children with OEM have poor reading ability and low IQ scores in comparison with their non OEM peers

Hearing impairment is a common complication of SOM. Conductive hearing loss is common. Sensory hearing loss above 8 KHz range in children could be due to SOM. Speech and language impairment.

Tympanosclerosis and atrophy of pars tensa. The risk of tympanosclerosis increases on insertion grommet

Management

Reassurance

Major anxiety of parents is about hearing. They should be informed at the most the hearing loss would be between mild to moderate degree

Counselling

Counselling should focus on primary care giver / parents of the child

1. The child's attention should be sought before attempting to speak to it
2. Back ground noise should be reduced as much as possible before attempting to speak to the child
3. The child should be faced while attempt is made to speak to it to encourage it to lip read
4. The child should be spoken in normal volume and accent

Medical Management



Nasal topical steroids
Studies show no benefit in using topical nasal steroids in patients with OME



Short term use of systemic steroids in combination with antibiotics have been proven useful

Nasal decongestants:

Studies have not found it useful in patients with OME. It is not advocated as a treatment modality for OME

Use of Mucolytics S-carboxymethylcysteine.

Studies have not shown conclusive evidence. Currently awaits further investigations. Physicians still prefer to use mucolytics in patients with OEM

Antibiotics

Trials have not proved the use of antibiotics to be beneficial hence it should be withheld during early stages / mild OME. When systemic steroids need to be used then it should be combined with antibiotics

High dose amoxycillin is used during initial stages if OME is severe and when associated with aural pain and fullness. Dosage ranges from 150 – 200 mg in three divided doses.

<i>Initial immediate or delayed antibiotic treatment</i>		<i>Antibiotic treatment after 48-72 h of failure of initial antibiotic treatment</i>	
<i>Recommended first-line treatment</i>	<i>Alternative treatment (if penicillin allergy)</i>	<i>Recommended first-line treatment</i>	<i>Alternative treatment</i>
Amoxicillin (80 to 90 mg/kg per day in 2 divided doses) <i>or</i> Amoxicillin-clavulanate* (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate [amoxicillin to clavulanate ratio, 14:1] in 2 divided doses)	Cefdinir (14 mg/kg per day in 1 or 2 doses) Cefuroxime (30 mg/kg per day in 2 divided doses) Cefpodoxime (10 mg/kg per day in 2 divided doses) Ceftriaxone (50 mg/kg IM or IV per day for 1 or 3 days, not to exceed 1 g per day)	Amoxicillin-clavulanate* (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate in 2 divided doses) <i>or</i> Ceftriaxone (50 mg/kg IM or IV per day for 1 or 3 days, not to exceed 1 g per day)	Ceftriaxone, 3 d clindamycin (30-40 mg/kg per day in 3 divided doses), with or without third-generation cephalosporin Failure of second antibiotic Clindamycin (30-40 mg/kg per day in 3 divided doses) plus third-generation cephalosporin Tympanocentesis† Consult specialist†

Auto inflation of middle ear cavity



Otovent is a balloon that can be inflated via the nasal cavity. The child should attempt to inflate the balloon by blowing it through one nose while the other one is occluded. The same procedure is repeated on the other nose also.

The aim is to introduce air into the middle ear cavity via the ET equalizing the pressure and allowing fluid to drain

In this technique the Eustachian tube is reopened by raising pressure in the nose. This can be achieved by forced exhalation with closed mouth and nose like blowing up a balloon.



This low cost technique can be tried in children of all age groups.

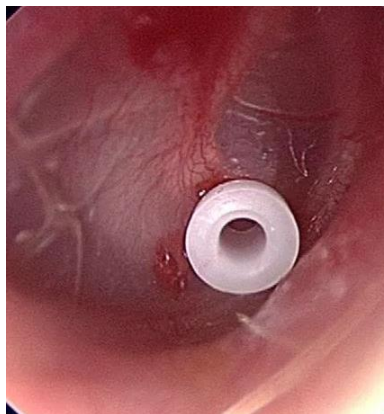
Myringotomy with insertion of ventilation tubes

Myringotomy with aspiration alone is ineffective as the opening closes soon

Insertion of ventilation tubes helps to ventilate middle ear cavity for longer duration facilitating healing process



T Tube grommet



Shepard grommet

Materials used in manufacturing ventilation tubes:

1. Teflon
2. Titanium
3. Gold / Silver oxide coated tubes (inhibits biofilm formation)

Ventilation tubes are inserted into the antero inferior quadrant of the ear drum. T tubes stay for longer duration than Shepard /Shaw tubes.

Complications of Grommet insertion



Persistent perforation



Tympanosclerosis

Persistent / Increasing deafness

Premature extrusion of Grommet
Migration of Grommet into middle ear cavity
Persistent middle ear infections

Adenoidectomy

Biofilms have been demonstrated in adenoid tissue. It could be the focus of infection affecting the middle ear cavity. Adenoidectomy reduces the need for reinsertion of grommet and prevents recurrence of OME. It is performed along with grommet insertion. In fact adenoidectomy with grommet insertion is the commonly performed surgery in children.



Facilitates early resolution of OEM with improved hearing

Provides improved respiratory health

Lower pad of adenoid tissue is conserved in order to prevent velopharyngeal incompetence