Acute Versus Chronic Middle Ear Disease

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Otolaryngology/Head & Neck Surgery
Facial Plastics and Reconstructive Surgery
• Myringitis

• Acute versus Chronic Granular Myringitis

• Acute Otitis Media

• Suppurative, Mucoid, or Serous

• Chronic Otitis Media

• with effusion (COME)

• without effusion (COM)
Anatomy

Roof of Mouth - Soft Palate
Posterior View

- Levator veli palatini muscle (cut)
- Basilar part of occipital bone
- Cartilaginous auditory (Eustachian) tube
- Pharyngobasilar fascia
- Levator veli palatini muscle
- Choanae
- Pterygoid hamulus
- Superior pharyngeal constrictor muscle
- Palatopharyngeus muscle (cut)
- Uvular muscle
- Pterygoid hamulus
- Levator veli palatini muscle (cut)
- Medial pterygoid muscle (cut)
- Medial pterygoid plate
- Tendon of tensor veli palatini
Eustachian Tube

- 17-18 mm at birth : 35 mm adult
- Horizontal at birth : 45° adult
- Anteromedial cartilage (24 mm)
- Posterolateral bony (11 mm)
- Opens by tensor palati ($V_3$) and levator veli palatini (X)
- Tonsil of Gerlach
Eustachian Tube

• Pressure of -30 mm Hg or lower for 15 minutes can produce transudate

• Pressure differential of 90 mm Hg may “lock” eustachian tube (critical pressure difference)

• Pressure differential exceeds 100 mm Hg the TM may rupture

• Valsalva maneuver generates 20-40 mm Hg
Physical Exam

• Otoscopy: hand-held, microscopic binocular, endoscopic
• DEBRIDEMENT!!! (?biopsy)
• Autoinflation, pneumatic otoscopy, tympanogram, audiogram
• Tuning forks: Weber, Rinne
• Nasopharyngoscopy/nasal endoscopy???
• Imaging: CT or MRI
Acute Myringitis

- 2% of AOM
- Primary-- no middle ear pathology
- Secondary-- associated with AOM
- Severe pain for 3 to 4 days
- Blisters on the lateral surface of the TM
- Hemorrhagic myringitis-- no blisters
Acute Myringitis

- Streptococcus pneumoniae
- Hemophilus influenzae
- Moraxella catarrhalis

 Tx: Topical antibiotics (primary), lance bullae, oral antibiotics (secondary)
Chronic Granular Myringitis

- Loss of epithelium of TM and replacement with granulation tissue
- Painless otorrhea and pruritus
- TM thickening and blunting
- 33% develop TM perforation (frequently heals)
- No middle ear pathology
Chronic Granular Myringitis

• Consider CT to rule out COM

• *Pseudomonas aeruginosa*

• *Staph. aureus*

• *Proteus mirabilis*

• Tx: topical antibiotics, drying agents, cautery, acidification, surgery tympanoplasty
Risk Factors for Middle Ear Disease

- Cleft Palate
- Genetic Predisposition
- Indigenous people (Native American, Inuit, Native Australians)
- Lower socioeconomic status
- Premature birth
- Presence of siblings
- Attendance at day care
- Second hand smoke exposure
- Lack of breastfeeding in first 6 months
- Supine bottle feeding
Etiology of Middle Ear Disease

• Upper Respiratory Infection (URI)
• Adenoid pad with bacterial nidus (biofilm)
• TM retractions with middle ear violation (e.g. cholesteatoma)
• Poor middle ear clearance and refluxed bacteria
Acute Otitis Media

- *Strep. pneumoniae* (most common)
- Vaccine has altered prevalence of serotypes
- Serotype 19A is highly multidrug-resistant
- Penicillin resistance is due to alterations of PCN-binding proteins in cell wall
Acute Otitis Media

- *H. influenzae* and *M. catarrhalis*
- 50% of *H. influenzae* and 100% of *M. catarrhalis* are β-lactamase positive
- Multiple viruses (75% of aspirates)
- RSV, rhinovirus, coronavirus, parainfluenza virus, enterovirus, adenovirus
Acute Otitis Media

• Diagnosis established by physical examination findings and presence of symptoms

• TREAT PAIN!
Children six months or older with otorrhea or severe signs or symptoms (moderate or severe otalgia, otalgia for at least 48 hours, or temperature of 102.2°F [39°C] or higher): antibiotic therapy for 10 days

Children six to 23 months of age with bilateral acute otitis media without severe signs or symptoms: antibiotic therapy for 10 days

Children six to 23 months of age with unilateral acute otitis media without severe signs or symptoms: observation or antibiotic therapy for 10 days
<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Dosage</th>
<th>Route of Administration</th>
<th>Frequency of Administration</th>
<th>Duration of Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>80-90 mg/kg/day (max 3 g daily)</td>
<td>Oral</td>
<td>Twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate&lt;sup&gt;a&lt;/sup&gt;</td>
<td>90 mg/kg/day of amoxicillin (max 3 g daily)</td>
<td>Oral</td>
<td>Twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td><strong>Alternative Agents in Children With Mild Allergy to Penicillins</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cefdinir</td>
<td>14 mg/kg/day (max 600 mg daily)</td>
<td>Oral</td>
<td>Once to twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>50 mg/kg/day (max 1 g daily)</td>
<td>IM or IV</td>
<td>Once daily</td>
<td>1-3 days</td>
</tr>
<tr>
<td>Cefpodoxime</td>
<td>10 mg/kg/day (max 400 mg daily)</td>
<td>Oral</td>
<td>Twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>30 mg/kg/day (max 1 g daily)</td>
<td>Oral</td>
<td>Twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td><strong>Alternative Agents in Children With Severe Allergy to Penicillins and Cephalosporins</strong></td>
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<tr>
<td>Azithromycin</td>
<td>10 mg/kg/day on day 1, then 5 mg/kg/day (max 500 mg on day 1, then 250 mg daily)</td>
<td>Oral</td>
<td>Once daily</td>
<td>5 days</td>
</tr>
<tr>
<td>Clarithromycin&lt;sup&gt;b&lt;/sup&gt;</td>
<td>15 mg/kg/day (max 1 g daily)</td>
<td>Oral</td>
<td>Twice daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td>Clindamycin&lt;sup&gt;b&lt;/sup&gt;</td>
<td>30-40 mg/kg/day (max 1.8 g daily)</td>
<td>Oral</td>
<td>3 times daily</td>
<td>5-10 days</td>
</tr>
<tr>
<td>Erythromycin-sulfisoxazole&lt;sup&gt;c&lt;/sup&gt;</td>
<td>50 mg/kg/day of erythromycin (max 2 g daily)</td>
<td>Oral</td>
<td>3-4 times daily</td>
<td>5-10 days</td>
</tr>
</tbody>
</table>

<sup>a</sup> For children who received amoxicillin in the previous 30 days, who have concurrent conjunctivitis, or for whom coverage of resistant organisms is desired.

<sup>b</sup> May be used in combination with a third-generation cephalosporin.

<sup>c</sup> Avoid in children with allergy to sulfa drugs.

AOM: acute otitis media; max: maximum. Source: References 1, 11.
Chronic Suppurative Otitis Media (COM)

• BIOFILM! bacteria (not colonization): illicits a host inflammatory response
• Unclear what causes the conversion
• Decreased metabolic rate
• Different gene expression
• Matrix of oligopolysaccarides (inhibits immune response)
Chronic Suppurative Otitis Media (COM)

- Biofilms frequently polymicrobial
- Most bacteria can form biofilms
- Biofilm matrix contains bacterial endo- and exotoxins that cause host response
- Frequently CULTURE NEGATIVE
Chronic Suppurative Otitis Media (COM)

- *H. influenzae* is the most common pathogen found in OM biofilms
- Pneumococcus, *M. catarrhalis*, Staph. *aureus*, and *Pseudomonas aeruginosa* also found in biofilms
- Goal is to create a dry, safe ear.
- Tx: tubes, tympanoplasty, tympanomastoidectomy, adenoidectomy
Chronic OM with Effusion (COME)

- Extremely common in children
- 60% of children with have had a middle ear effusion by age 6
- highest incidence in 1- to 2-year-old children
- caused by ET dysfunction and reduced middle ear clearance
Chronic OM with Effusion (COME)

• 1. Transudate forms from ETD
• 2. Glycoproteins from mucosa increases fluid viscosity
• 3. Bacterial infection of ME effusion (likely from adenoid reservoir (biofilm))
Chronic OM with Effusion (COME)

• COME implies a lack of otalgia and systemic symptoms

• Aural fullness, conductive HEARING LOSS, visible ME effusion, intact TM.

• 70% of children will clear ME effusion within 3 months (90% if abx. treated AOM)

• Antibiotics, steroids, antihistamines, and decongestants DO NOT have benefit
Chronic OM with Effusion (COME)

- Tubes offered to COME for 3 months and hearing difficulties, speech delay, developmental delay, and TM complications

- Cochrane review demonstrated: reduction in the rate of COME following adenoidectomy (tonsillectomy not effective)
Table 6. Summary of guideline action statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Action</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. OME of short duration</td>
<td>Clinicians should not perform tympanostomy tube insertion in children with a single episode of OME of less than 3 months’ duration.</td>
<td>Recommendation (against)</td>
</tr>
<tr>
<td>2. Hearing testing</td>
<td>Clinicians should obtain an age-appropriate hearing test if OME persists for 3 months or longer (chronic OME) OR prior to surgery when a child becomes a candidate for tympanostomy tube insertion.</td>
<td>Recommendation</td>
</tr>
<tr>
<td>3. Chronic bilateral OME with hearing difficulty</td>
<td>Clinicians should offer bilateral tympanostomy tube insertion to children with bilateral OME for 3 months or longer (chronic OME) AND documented hearing difficulties.</td>
<td>Recommendation</td>
</tr>
<tr>
<td>4. Chronic OME with symptoms</td>
<td>Clinicians may perform tympanostomy tube insertion in children with unilateral or bilateral OME for 3 months or longer (chronic OME) AND symptoms that are likely attributable to OME that include, but are not limited to, vestibular problems, poor school performance, behavioral problems, ear discomfort, or reduced quality of life.</td>
<td>Option</td>
</tr>
<tr>
<td>5. Surveillance of chronic OME</td>
<td>Clinicians should reevaluate, at 3- to 6-month intervals, children with chronic OME who did not receive tympanostomy tubes, until the effusion is no longer present, significant hearing loss is detected, or structural abnormalities of the tympanic membrane or middle ear are suspected.</td>
<td>Recommendation</td>
</tr>
<tr>
<td>6. Recurrent AOM without MEE</td>
<td>Clinicians should not perform tympanostomy tube insertion in children with recurrent AOM who do not have middle ear effusion in either ear at the time of assessment for tube candidacy.</td>
<td>Recommendation (against)</td>
</tr>
<tr>
<td>7. Recurrent AOM with MEE</td>
<td>Clinicians should offer bilateral tympanostomy tube insertion to children with recurrent AOM who have unilateral or bilateral middle ear effusion at the time of assessment for tube candidacy.</td>
<td>Recommendation</td>
</tr>
<tr>
<td>8. At-risk children</td>
<td>Clinicians should determine if a child with recurrent AOM or with OME of any duration is at increased risk for speech, language, or learning problems from otitis media because of baseline sensory, physical, cognitive, or behavioral factors (see Table 2).</td>
<td>Recommendation</td>
</tr>
<tr>
<td>9. Tympanostomy tubes in at-risk children</td>
<td>Clinicians may perform tympanostomy tube insertion in at-risk children with unilateral or bilateral OME that is unlikely to resolve quickly as reflected by a type B (flat) tympanogram or persistence of effusion for 3 months or longer (chronic OME).</td>
<td>Option</td>
</tr>
<tr>
<td>10. Perioperative education</td>
<td>Clinicians should educate caregivers of children with tympanostomy tubes regarding the expected duration of tube function, recommended follow-up schedule, and detection of complications.</td>
<td>Recommendation</td>
</tr>
<tr>
<td>11. Acute tympanostomy tube otorrhea</td>
<td>Clinicians should prescribe topical antibiotic eardrops only, without oral antibiotics, for children with uncomplicated acute TTO.</td>
<td>Strong recommendation</td>
</tr>
<tr>
<td>12. Water precautions</td>
<td>Clinicians should not encourage routine, prophylactic water precautions (use of earplugs, headbands; avoidance of swimming or water sports) for children with tympanostomy tubes.</td>
<td>Recommendation (against)</td>
</tr>
</tbody>
</table>

Abbreviations: AOM, acute otitis media; MEE, middle ear effusion; OME, otitis media with effusion.
Transnasal Eustachian Tube Insufflation

• For COME only...
• IT WORKS!!!
  Very well!
• CPT 69401
Chronic OM with Effusion (COME)

- Unilateral COME in adult REQUIRES nasopharyngoscopy!
- COME may be the only sign of nasopharyngeal carcinoma or lymphoma
Cholesteatoma/Keratoma

• Congenital
• Acquired
  • Primary
  • Secondary
• Otorrhea and hearing loss
• Slowly erosive/destructive
• Tx: surgical removal (safe dry ear)
Bibliography

• All ear photos www.hawkelibrary.com

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Thank You

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