Otitis Media

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Epidemiology

- 80% of children with AOM episode before school age
- 2.2 million episodes annually
- US Cost of 4 billion dollars
  - Medical expenses
  - Missed work
  - Decreased productivity
  - 2.8 billion dollars on antibiotics

Most common causes of AOM
- Haemophilus influenzae
- Streptococcus pneumoniae
- Moraxella catarrhalis

Multi-drug resistant organisms becoming more common

PREVENTION
AOM Risk Factors

- Male gender
- Native American ethnicity
- Having siblings in the home
- Low socioeconomic status
- Former premature infants
- Bottle feeding
- Family history of recurrent AOM

Ways to reduce risk of AOM

- Eliminate exposure to tobacco smoke
- Encourage breast feeding
- Reduce pacifier use during months 7-12 of life

Dietary Supplementation

- Deficiencies linked to AOM
  - Vitamin A
  - Vitamin D
  - Omega 3 fatty acids
  - Zinc
- Mixed evidence at best that supplementation helps prevent AOM

Zinc

- Prevents AOM in malnourished children under age 5
- No real benefit for normal nutritional children
<table>
<thead>
<tr>
<th>Vitamin D</th>
<th>Probiotics</th>
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</table>
| • If serum levels less than 30ng/ml supplementation will reduce incidence of AOM | • Formula supplements  
  - Lactobacillus rhamnosus GG  
  - Bifidobacterium lactis Bb-12  
• Reduces incidence of AOM from 22-50% in first 7 months of life  
• In older kids, may reduce days of day care missed |

<table>
<thead>
<tr>
<th>Xylitol</th>
<th>OMT</th>
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</table>
| • Polyol sugar alcohol  
  - Found in plums, strawberries, raspberries  
• Must be given 5 times per day, every day  
  - Gum (8.4g/day) Syrup (10g/day)  
  - NNT 8 to reduce 1 AOM  
• Side effects: abdominal pain and diarrhea  
• Will not work if tympanostomy tubes in place! | • May reduce symptoms  
• No clear studies showing preventive benefit  
  - Small groups, high drop-out rate  
• Manuevers commonly done  
  - Galbreath maneuver- movement of mandible to generate a pumping action on Eustachian tube and drain middle ear  
  - Muncie technique- opens Eustachian tube |

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Is there a vaccine that can reduce AOM?

Pneumococcal Vaccine
- 34% risk reduction for children developing AOM
- Effect of 13 valent PCV not fully elucidated yet
- Vaccine helps, but does not eliminate risk

PCV-9 Vaccine
- Does vaccinating pregnant women with PCV-9 in last trimester prevent early infant otitis media?
  - Pregnant women vaccinated with PCV-9 and infants given PCV at 2, 4, 6 and 12 months
  - Rates of AoM increased in the infants of vaccinated mothers
    - Passive immunity may have dampened vaccine response in infants

Influenza vaccine
- Reduces AOM
- How to a vaccine that prevents a viral infection reduce incidence of a bacterial disease?
**History and Physical Exam Criteria**

- **AOM Diagnosis**
  - Moderate to severe bulging of TM or
  - New onset of otorrhea not attributable to AOE
- **AOM Likely**
  - Mild bulging of the TM and
    - Recent onset of ear pain or
    - Intense erythema of TM
- **Middle ear effusion alone not sufficient for diagnosis**

**DIAGNOSIS**

- **A= Normal TM**
- **B= Mild bulging**
- **C= Moderate bulging**
- **D- Severe bulging**
A child is crying during the ear exam. You cannot tell if the TM is red because of infection or because of crying so you exclude this from consideration for making the diagnosis.

Question

- A child is crying during the ear exam. You cannot tell if the TM is red because of infection or because of crying so you exclude this from consideration for making the diagnosis.
- True or False?
Answer

• False

• Study evaluated children less than 30 months of age

• Examined TMs before and after vaccines
  – Increases pinkness, but not redness of TM

TREATMENT

Treatment of AOM

• 2004
  – AAP and AAFP release guidelines for watchful waiting
  – Very little uptake of guidelines

• 2013 AAP releases new guidelines
  – AAFP currently reviewing

ANALGESIA
Pain associated with AOM

- Even on antibiotics can continue for up to 7 days

Oral Medications

- Ibuprofen
- Acetaminophen

Oral Medications

- Narcotics
  - Respiratory depression
  - Altered mentation
- Antihistamines/Decongestants
  - No evidence of benefit
  - 5-8 fold increase in risk of side effects

Topical Medications

- Procaine
- Phenazone
- Benzocaine
- What about Auralgan?
**A/B Ear Drops**

- Antipyrine (analgesic) + Benzocaine (anesthetic)
  - Auralgan, Aurodex, Auroto
- Use every 2-3 hours for pain

- In 2008, Auralgan added acetic acid and U-polycosanol 410
  - Couldn’t substitute generic antipyrine/ benzocaine for auralgan
  - Cost went from $2.00 to $150.00

**Auralgan**

- If using this, write the prescription as:
  - Antipyrine (54mg/1ml) and Benzocaine (14mg/1ml) NOT as Auralgan to avoid brand name pricing

**Naturopathic remedies**

- 46% of parents of children with recurrent AOM have used complimentary or alternative analgesics for children
- Naturopathic drops most common and probably OK
  - Variable composition
  - Otikon Otic works

**Natural Remedies that may work**

- Warm compresses or steam to relieve pain
- Acupuncture may help
- Traditional Chinese herbs
  - Skullcap, alisma, plantain, licorice
- Aromatherapy with lavender, chamomile, evening primrose oil
### AOM with otorrhea

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<th>Unilateral</th>
<th>Bilateral</th>
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### AOM with severe symptoms

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Severe Symptoms

- Toxic appearing child
- Persistent otalgia more than 48 hours
- Temperature greater than 39 Celsius in past 48 hours
- Uncertain access to follow up

Which antibiotic to use?

- Amoxicillin 80-90 mg/kg/day, divided BID
  - Should be first line therapy
- If even 14% of children who receive cefdinir (Omnicef) were treated with amoxicillin
  - Savings of 34 million dollars annually

Other antibiotic choices

<table>
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<th>Taken amoxicillin in prior 30 days</th>
<th>Has conjunctivitis</th>
<th>Penicillin allergy</th>
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<td>Amoxicillin/Clavulanate</td>
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<td>Cefdinir</td>
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<td></td>
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<td>Cefuroxime</td>
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<td></td>
<td></td>
<td>Cefpodoxime</td>
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<td></td>
<td></td>
<td>Ceftriaxone</td>
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Dosages

- Amoxicillin/Clavulanate (90mg/kg/day and 6.4 mg/kg/day, divided BID)
- Cefdinir (14mg/kg/day, divided QD or BID)
- Cefuroxime (30mg/kg/day, divided BID)
- Cefpodoxime (10mg/kg/day divided BID)
- Ceftriaxone (50mg IM/IV per day for 1-3 days)
- Clindamycin (30-40mg/kg/day, divided TID)
Question

• A child has tympanostomy tubes in place and has a small amount of otorrhea and moderate bulging of the TM. You have diagnosed AOM. What treatment do you recommend?

Answer

• For any perforation with AOM
  – Oral antibiotics (typically Amoxicillin) AND
  – Topical ciprofloxacin and dexamethasone

Child not improving in 48-72 hours

• If on amoxicillin
  – High dose amoxicillin/ clavulanate
  – Ceftriaxone
  – Clindamycin
  – Tympanocentesis
• Do NOT use
  – Erythromycin
  – Azithromycin
  – Clarithromycin
  – Trimethoprim/ sulfamethoxazole

How long to treat?

• Depends on age

• Less than 2 years = 10 days
• Older than 2 years= 5-7 days
• Cannot tolerate oral antibiotics
  – Could consider single dose of ceftriaxone
Race and Antibiotics

- December 2014 study in Pediatrics
- Antibiotic prescribing compared for OM visits for children (<14 years) from 2008-2010

Diagnosis
- AOM diagnosis 30% lower in black children compared with others (7% vs. 10%, p=0.004)
- OM visits per 1000 population not different

Treatment
- If diagnosis of AOM made, black children less likely to receive broad spectrum antibiotics (42% vs. 52%, p=0.01)

Observation

- For every 100 children
  - 80 improve within 3 days with no antibiotics
  - 92 would improve if treated with amoxicillin
    - 10 would have a rash
    - 10 would have diarrhea

- Child needs to improve in 48-72 hours and cannot worsen
  - Need to be able to be seen or start antibiotic

- Delayed prescriptions work for this
  - Parents will wait to start antibiotic
  - Resistance to observation is
    - More than 1 visit
    - Child in pain
**Question**

- Watchful waiting of AOM will increase rates of meningitis and mastoiditis
  - True or False

**Answer**

- False
- No increase in mastoiditis or meningitis with watchful waiting/observation of AOM
- 4800 children must be treated for AOM to prevent 1 case of mastoiditis

**Complications**

- Review of all complications of AOM 1998-2013 in 15 year period at tertiary care hospital (n=109)
  - 86.1% mastoiditis
  - 38% subperiosteal abscess
  - 16.7% facial nerve palsy
  - 8.3% sigmoid sinus thrombosis
  - 7.4% epidural abscess
- 56% received antibiotics prior to presentation
- Causative agents
  - 33.3% strep pneumoniae
  - 55% multi-drug resistant
  - 27.8% other bacteria
  - 30.5% no growth on culture
  - 8.3% no culture performed
Does AOM cause hearing loss?

- Cohort study of 32,786 participants who had audiometry in elementary school and age 20-56 years
  - 3066 children with hearing loss included in sample
    - 1255 otitis media with effusion
    - 108 chronic suppurative otitis media
    - 613 hearing loss after recurrent AOM
- Chronic suppurative otitis media and recurrent AOM associated with adult hearing loss
- Faster rate of age related hearing loss if childhood hearing loss occurs

Tympanostomy Tubes

- 3 or more episodes of AOM in 6 months
- 4 or more episodes of AOM in 1 year with 1 in last 6 months
- If child’s first episode of AOM is before 6 months, may want to be more aggressive

Adults with AOM

- Should be uncommon
- If recurrent episodes
  - rule out nasopharyngeal carcinoma
**OTITIS MEDIA WITH EFFUSION**

### Epidemiology
- May follow a viral URI
- May follow an episode of AOM
- May precede an episode of AOM

### AOM vs. OME

**AOM**
- Infectious
- Erythematous TM
- Otalgia
- Fluid in middle ear

**OME**
- Not infectious
- No erythematous TM
- No otalgia
- Fluid in middle ear

### Answer
- Pneumatic otoscopy
- Tympanometry
- Acoustic reflectometry
Pneumatic otoscopy

- Can diagnose a middle ear effusion
  - Also tympanometry and acoustic reflectometry
- Squeezing bulb creates positive pressure
- Releasing bulb creates negative pressure
- Airtight seal is key
- Won’t work if perforation or tubes present
- No movement = middle ear effusion

Treatment of OME

- Watchful waiting
  - Spontaneous resolution within 3 months
- If language delay or OME for more than 3 months
  - Refer for tympanostomy and ventilation tubes
- 40% of kids have frequent recurrence
  - May need TM tubes

What doesn’t work

- Antibiotics
- Oral steroids
- Intranasal steroids
- Antihistamines
- Decongestants

References