COMMON EAR PROBLEMS

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Disclosures

- This speaker has no commercial relationships to disclose.

Common Ear Problems

- Otitis Externa
- Otitis Media with Effusion
- Acute Otitis Media
- Mastoiditis
Objectives

- Review criteria for the diagnosis of OE, OME, AOM and Mastoiditis
- Discuss evidence-based treatment options
- Review when observation is the best treatment
- Review available guidelines

Otitis Externa

- Defined as: diffuse inflammation of the external ear canal, which may also involve the pinna or tympanic membrane.
- DX requires: rapid onset (generally within 48hrs) of symptoms and signs of ear canal inflammation.

Otitis Externa

- Hallmark Sign: Tenderness of the pinna, tragus or both that is disproportionate to what might be expected based on visual inspection
Annual Incidence

- One of the most common infections encountered by clinicians.
- Annual incidence 2.4 million, 1:100 in the general population.
- With a lifetime incidence up to 10%

Direct Cost Unknown

- However, Ototopical market in U.S. is approximately 7.5 million annual prescriptions with total sales of $310 million.
- Additional cost: Provider visits as well as analgesic and systemic medications.

Acute OE is a cellulitis of the ear canal skin and subdermis with acute inflammation and variable edema

- 98% of OE in North America is bacterial
- Pseudomonas Aeruginosa (20 - 60% prevalence)
- Staphylococcus Aureus (10 - 70% Prev.) Often occurring as polymicrobial infection.
- Fungal involvement uncommon in primary AOE.
Cause of AOE is multifactoral

- Regular ear cleaning
- Water exposure
- Debris from dermatologic conditions
- Local trauma (Q-tip use)
- Use of hearing aids
- Sweating, allergy and stress have been implicated in the pathogenesis of AOE.

Otitis Externa

Otomycosis
Treatment Considerations

- Risk Factors:
  - Excess moisture (swimming, bathing, or increased environmental humidity)
  - Trauma (scratching or foreign body)
  - Irritants in the ear (hair spray, hair dye)
  - Self cleaning
  - Primary skin conditions
  - Coexisting diseases (e.g., DM type 1 or 2, leukopenia, malnutrition, HIV/AIDS with immune deficiency)

Treatment Considerations

- What does the history tell you?
- Has the Pt used alternative therapy?
- What does the PE tell you?
- Is there extension outside the canal?
- Is the TM intact?
- Aural toilet, debridement?
- Is a wick required?
- What is your initial therapy?

Initial Therapy

As with acute otitis externa, cleaning the ear is important. Often, in chronic otitis, sedation is necessary to clean the ear effectively due to stenosis of the ear canals and excessive inflammation and pain.
Wick or no Wick

Initial Therapy

- Topical Preparations
  - If OE not complicated by osteitis, abscess formation, middle ear disease, or recurrent infections.
    - Otic Domeboro (Acetic acid, aluminum acetate)
    - VoSol HC (Acetic acid, hydrocortisone)
    - Cipro HC (Ciprofloxacin, hydrocortisone)
    - Ciprodex (Ciprofloxacin, dexamethasone)
    - Cortisporin Otic (Neomycin, polymyxin B, hydrocortisone)
    - Floxin Otic (Ofloxacin)

Adverse Events to Therapy

- Pruritus (7%)
- Site reaction (5%), Neomycin (5 to 15%)
- Other events (<2%)
  - Rash
  - Otalgia
  - Dizziness
  - Otomycosis
  - Superinfection
  - Reduced hearing
### Recommended Review

Clinical Practice Guideline: Acute Otitis Externa  
Online Version  
[http://oto.sagepub.com/content/134/4_suppl/S4](http://oto.sagepub.com/content/134/4_suppl/S4)  
OR  
Otolaryngology—Head and Neck Surgery 2006  
134:S4  
Updated Feb - 2014

### Guideline Update

- Distinguish diffuse AOE from other causes of otalgia, otorrhea, and inflammation of canal  
- Assess the pt for factors that modify management (perf, tubes DM, immunocompromised, prior radiation).  
- Assess for pain and recommend analgesic based on severity  
- Topical therapy for initial tx of uncomplicated AOE

### Guideline Update

- Clinicians should not prescribe oral antimicrobials unless factors indicate a need for systemic therapy  
- Educate pt on how to administer topical drops and should enhance delivery of drops when the canal is obstructed by performing aural toilet, placing a wick, or both.  
- Known or suspected TM perforation including tube, prescribe non-ototoxic topical preparation
Guideline Update

• If the patient fails to respond to the initial therapeutic option within 48 – 72 hours, the clinician should reassess the patient to confirm the dx of AOE and to exclude other causes of illness

Case # 1

• 24 y/o male with h/o DM has c/o ear pain, decreased hearing and aural fullness despite two courses of oral antibiotics and otic drops.
• PE: the patient is alert and appears to be uncomfortable but in no acute distress
• Hemoglobin A1c = 6.0 %

Otoscopic Evaluation
Otitis Media with Effusion (OME)

OME Defined
• The presence of fluid in the middle without signs or symptoms of acute ear infection.
Etiology and Epidemiology

- Epidemiology
  - 90% of children suffer from OME before school age (usually 6 months to 4 years)
  - 30-40% of children with recurrent OME
  - 5-10% last greater than 1 year

Etiology
- Poor Eustachian Tube Function
- Inflammatory response following AOM

Clinical Practice Guidelines

- Applicable to all children ages 2 months to 12 years with or without disability
- Expert panel (AAO-HNS, AAP, AAFP)
- Primary outcomes:
  - Speech, language, learning
  - Physiologic sequelae
  - Health care utilization
  - Quality of life

Recommendation Levels

- Strong Recommendation – clinicians should follow unless clear rational
- Recommendation – clinicians should follow, but remain alert to new information
- Option – flexible, clinicians may set bounds on alternatives
- No Recommendation – little constraint in decision, be aware of new data
Diagnosis of OME

- Strong Recommendation – Pneumatic otoscopy should be used as the Primary diagnostic method for OME
- Option – tympanometry should to confirm diagnosis
- Important to distinguish from AOM – redness of TM not an indication for antibiotics.

Screening

- Recommendation – population based screening programs are not recommended in healthy, asymptomatic children
  - Has not been found to influence short-term language outcomes
  - Long-term effects have not been evaluated in randomized controlled trial

Documentation

- Recommendation – clinicians should document laterality, duration, presence and severity of associated symptoms at each assessment
- Difficulty – 40-50% of children have no complaints referable to MEE
Documentation

• Associated signs and symptoms
  – Ear pain, popping, fullness
  – Ear rubbing, irritability, sleep disturbance
  – Failure to respond appropriately to voices or sound
  – Hearing loss
  – Recurrent AOM
  – Problems with school performance
  – Balance problems, motor delay
  – Delayed speech, language

Child at Risk

• Recommendation - Clinicians should distinguish the child with OME who is at risk for speech and language delay and promptly evaluate hearing, speech and language

Watchful Waiting

• Recommendation – Clinicians should manage not at risk children with OME by watchful waiting for 3 months from the date effusion onset (if known) or from the date of diagnosis (if onset is unknown)
• Self limited nature – well documented in cohort and randomized trials
Watchful Waiting

• Likelihood of resolution determined by cause and duration of effusion
  – 75-90% of episodes following AOM resolve by 3 months
  – 55% of children newly diagnosed with OME with a flat tympanogram will change to a non-type B tympanogram within 3 months of onset. One third relapse in next 3 months.

Watchful waiting

• 25% of newly detected OME of unknown duration in children age 2-4 years resolves by 3 months based on tympanogram
  – Resolution rates may be higher for infant and young children in whom the preexisting duration of effusion is shorter
  – Documented bilateral OME of 3 months duration of longer resolves in 30% of children 2 or older after 6-12 months observation

Medication

• Recommendation: Antihistamines and decongestants are ineffective for OME and are not recommended for treatment. Antimicrobials and corticosteroids do not have long term efficacy and are not recommended for routine management
Medication

- No benefit for antihistamines and decongestants vs. placebo
- Long-term benefits of antimicrobials unproven despite modest short-term benefit for 2-8 weeks in randomized trials.
- Oral steroids and antimicrobial combination:
  - Short term benefit compared to antibiotics alone in 1/3 children treated
  - Not sustained after several weeks
  - Intranasal steroids – no benefit over antimicrobials alone.

Medication

- Antimicrobials with or without steroids may be considered in some cases of parental aversion to surgery
  - 10-14 day course
  - Unlikely to provide long term benefit
  - Multiple courses not recommended

Medication

- Insufficient data regarding:
  - Mucolytics
  - Auto-inflation
  - Systemic use of other medications other than antimicrobials, antihistamine-decongestants, or steroids
Hearing and Language

• **Recommendation:** hearing testing is recommended when OME is present for 3 months or longer, or at any time that language delay, learning problems, or a significant hearing loss is suspected in a child with OME. Language testing should be conducted for children with hearing loss.

Hearing and Language

• OME may impair binaural processing, sound localization, speech perception in noise
• Home environment critical
• Studies suggest no impact on children with OME who are not at risk by screening or surveillance

Hearing and Language

• Average pure tone hearing loss at 4 frequencies ranges from normal to moderate hearing loss with OME (0-55dB)
• 25dB is 50th percentile
• Evidence that children with greatest hearing loss for longest period of time more likely to develop sequelae
Hearing and Language

- Initial testing for children older than 4 can be done in the primary care setting
- Fail criteria >20dB loss at 1 or more frequency
- Formal audio recommended for children that:
  - Fail primary care testing
  - Younger than age 4
  - Primary care testing cannot be performed

Hearing and Language

- Language testing – indicated if hearing loss present
- Children with repeated and persistent OME and hearing loss may be at disadvantage for learning speech and language
- Conflicting data

Surveillance

- Recommendation: children with persistent OME who are not at risk should be reexamined at 3 to 6 month intervals until the effusion is no longer present, significant hearing loss is identified, or structural abnormalities of the eardrum or middle ear are suspected.
Surveillance

• Significant change in recommendation from 1994 guidelines
• Previous recommendations included surgery if effusion persisted 4-6 months with hearing loss.
• New data indicates developmental outcomes are not improved for children not at risk with early tube placement

Surveillance

• Likelihood of effusion resolution
  – Decreases with time for asymptomatic effusions
  – Risk factors making spontaneous resolution less likely
    • Onset of OME in summer or fall
    • Hearing loss greater than 30dB in the better-hearing ear
    • History of prior tympanostomy tubes
    • Not having had an adenoidectomy
• Sequelae of chronic OME – Tympanic membrane damage and inflammation, retraction pockets, atelectasis, and cholesteatoma. Comprehensive audiologic evaluation indicated.

Surveillance

• Conditions mandating tube insertion:
  – Posterior-superior retraction pockets, ossicular erosion, adhesive atelectasis, retraction pockets that accumulate debris
  – Increased incidence with prolonged effusion
Surveillance

• Treatment algorithm for children with persistent OME greater than 3 months
  – Hearing loss >40dB for better hearing ear – surgery recommended
  – Hearing loss 21-39dB – individualized management. Repeat audio in 3-6 months if tubes not placed and effusion persists at follow-up
  – Normal hearing – repeat audio in 3-6 months if OME persists at follow-up

Surveillance

• Other factors influencing decision to intervene:
  – Poor caregiving environment
  – Low socioeconomic status
  – Poor maternal education level
  – Physical and behavioral symptoms associated with OME
    • ADHD
    • Behavioral problems
    • Poor vestibular function and motor proficiency
    • Otitis
    • Sleep disturbance
    • Recurrent AOM

Referral

• Option: When children with OME are referred by the primary care physician for evaluation by an otolaryngologist, audiologist, or speech-language pathologist, the referring clinician should document the effusion duration and specific reason for referral (evaluation, surgery), and provide additional relevant information such as history of AOM and developmental status of the child.
Surgery

• **Recommendation:** *when a child becomes a surgical candidate, tympanostomy tube insertion is the preferred initial procedure; adenoidectomy should not be performed unless a distinct indication exists (nasal obstruction chronic adenoiditis). Repeat surgery consists of adenoidectomy plus myringotomy, with or with or without tube insertion. Tonsillectomy alone or myringotomy alone should not be used to treat OME.*

Surgery

• Tubes recommended as initial surgery because:
  – 62% decrease in effusion prevalence
  – Absolute decrease of 128 effusion days per child during the next year
  – Hearing levels improve by mean 6-12dB while tubes patent
  – Adenoidectomy confers 50% reduction in need for future operations
  – Benefit of adenoidectomy apparent at age 2 years, greatest for children >3years, independent of adenoid size

Surgical Complications

• Anesthesia – mortality reported as 1:50,000 for ambulatory surgery
• Tympanostomy tube sequelae
  – Perforations in 2% after short-term tubes, 17% after long-term tubes
  – Usually transient (otorrhea) or do not affect function (tympanosclerosis, atrophy, shallow retraction)
• Adenoidectomy
  – 0.2-0.5% incidence hemorrhage
  – 2% incidence of transient Velopharyngeal Incompetence (VPI)
Complementary and Alternative Medicine

- *No recommendation regarding CAM as a treatment for OME*
- No randomized trials demonstrating efficacy
- Proposed interventions include:
  - Chiropractic manipulation
  - Dietary exclusion
  - Acupuncture
  - Traditional Chinese medicine
  - Homeopathy

Allergy Management

- *No recommendation is made regarding allergy management as a treatment for OME*
- No controlled studies
- Prevalence of allergy in children with OME ranges from 10-80%
- Postulated to contribute to OME through eustachian tube dysfunction

Overview of AOM

- AOM accounts for 25 million office visits – of which 804 out of 1000 result in an antibiotic being prescribed
- Guidelines created by AAP and AAFP in conjunction with AAO-HNS
- Guidelines apply only to healthy kids
- Based on evidence reviewed through September 2003
Case One

• A 3 year old male presents with fever to 101F since yesterday. His mother thinks he has an ear infection because he keeps pulling on his ears. What are the criteria needed to make the diagnosis of AOM?
  - Three main criteria:
    • Acute onset
    • Middle ear effusion
    • Middle ear inflammation

Diagnosis of AOM

• Otitis media with effusion (OME) vs. AOM: which condition is more common?
  - OME is far more common
• MEE accompanied by constitutional signs of illness (fever, irritability, vomiting) is NOT sufficient for diagnosis of AOM
• By adhering to strict criteria of AOM and improving otoscopic exam skills, overuse of antibiotics can be avoided

Middle Ear Effusion

• Defined as:
  - Bubbles or an air fluid level
  OR
  - At least TWO of the following:
    • Abnormal color (white, yellow, amber, blue)
    • Opacification of part or all of TM
    • Decreased or absent mobility of TM
Middle Ear Inflammation

- Requires at least one of the following:
  - Bulging TM or distinct fullness of TM (i.e. without bulging) – this alone is the best positive predictor of AOM
  - Otalgia (a non-otoscopic finding)
  - Erythema/hyperemia of TM – however, if no bulging or TM immobility associated, then PPV of only 15%

What is not considered AOM

- Middle ear effusion alone
- The best negative predictor of AOM is a retracted TM – even if concurrent opacity, erythema or reduced mobility is present
- The least predictive factor of AOM is TM erythema alone. To be of significance it must be differentiated from hypervascularity seen on the rim of the TM annulus

Case #1

- On your exam, the patient appears uncomfortable and pulling at his ear. You visualize the TM as seen on the right.
- What is your diagnosis?
Case #1 Continued

- Diagnosis: Acute Otitis Media
- What pathogens can cause this condition?
  1. Strep pneumoniae
  2. H. influenzae
  3. Moraxella catarrhalis

Case #1 Continued

- Pt's mom says he had a throat infection 3 months ago and received amoxicillin.
- She wants to know if he needs antibiotics again.
  What treatment will you prescribe?
- Two options:
  - Antibiotics (first line – amoxicillin)
  - Observation therapy

The Observation Option

- Limited to healthy kids over the age of 6 months
- May observe age group 6 months to 2 years if AOM is uncertain and pt has non-severe illness.
  - What defines a severe illness?
    - Fever ≥ 39°C or 102.2°F, severe otalgia
  - Older than 2 years if non-severe illness
  - Family has access to doctor, and family member to close eye on patient
Why Observation?

• The European Experience
  – Dutch study: 2.7% of 4860 patients older than 2 years had persistent symptoms (fever, pain, discharge after 3-4 days). Only 2 developed mastoiditis.
  – UK – in randomized trial: 76% of kids in delayed group never required antibiotics.
  – Study limited by imprecise criteria of AOM, and a set dosing of Amox (125mg tid x7 days for all ages)

Recent Data

• 2006 study conducted in the ER setting evaluated a ‘wait-and-see prescription’ for antibiotics in AOM.
• Parents asked to not fill prescription unless child either did not improve or worsened in 48 hours.
• Results showed substantial reduction in use of antibiotics in the ‘wait-and-see’ group (62% vs. 13%; P < .001)

Observation

• Incidence of mastoiditis – no clear data
  – Incidence does not increase if patient is observed for initial 48 to 72 hours
  – Most cases of mastoiditis develop despite therapy with antibiotics
  – Observation has greater failure rate in younger patients
When to give antibiotics

- All kids under 2 years of age with certain diagnosis of AOM
- Kids over 2 years of age if illness is severe
- Social or clinical barriers to accessing medical care and follow up
- Any child with genetic/immune/anatomic condition should be treated with antibiotics

Case #2

- A 15 month old girl presents with fever to 101.5F. Your otoscopic exam is seen below. What is your diagnosis and treatment?
  - Bullous Myringitis
  - Treatment: amoxicillin given patient’s age

Case 2 Continued

- Your prescribed high dose Amox. Her mother calls after 2 days and states the fever has not resolved and child is still having decreased oral intake and is fussy. What is your recommendation?
  - Change to augmentin or 2nd generation cephalosporin; other option:
    - Tympanocentesis
  - Mom calls again after another 2 days and states there is still no improvement... what next?
    - Ceftriaxone 50mg/kg/d IM x 3 days
Case #3

- A 4 year old girl presents with fever of 102F, severe left ear pain and discharge since yesterday. She denies pain with tugging of ear auricle. View of TM is obstructed by purulent discharge. What is the diagnosis?
  - If OE ruled out and acute purulent otorrhea is present due to TM perforation, then diagnosis of AOM may be made.

Case #4

- 12 month old male presents for routine well child exam. He is afebrile and doing well. Physical exam reveals accompanying TM. The TM is immobile with insufflation.
  - How do you approach treatment for this child?

Case 4 Continued

- Diagnosis: Otitis media with effusion
- Treatment:
  - Assess for any signs/symptoms of hearing deficits
  - Watchful waiting, re-evaluate in 3 months
Assessment of Pain

- Management of pain is a cornerstone of AOM therapy
- Acetaminophen and ibuprofen strongly recommended
- Topical anesthetic (i.e., Auralgan) and oral narcotics are other options in older children

Mastoiditis

- As the mastoid is contiguous with the middle ear cleft. Virtually every child or adult with AOM or chronic middle inflammatory disease has mastoiditis.
- In most cases, the symptomatology of the middle ear cleft predominates (eg, fever, pain, CHL), and the disease within the mastoid is not considered a separate entity.

Acute Mastoiditis

- Associated with AOM
- Infection spreads beyond the mucosa of the middle ear cleft
- Osteitis develops within the mastoid air-cells or,
- Periostitis of the mastoid process develops
- Either by bone erosion through the cortex or indirectly via the emissary vein of the mastoid
- RESULT – Acute Surgical Mastoiditis (ASM)
Chronic Mastoiditis

• Commonly associated with chronic suppurative otitis media and cholesteatoma.
• Destructive process is accelerated in the presence of active infection by the secretion of osteolytic enzymes by the epithelial tissue.

History

• >80% have no history of recurrent OM
• Persistent otorrhea >3wks is the most consistent sign of mastoid involvement.
• Persistent fever despite appropriate ATB is common in ASM.
• Pain deep in or behind the ear and worse at night
• Hearing loss is common
• Elevated WBC

Indications for Mastoidectomy

• Acute suppurative otitis media that fails ATB therapy and progresses to coalescent mastoiditis
Questions?