Pharmacologic Management of Otitis Externa and the Draining Tympanostomy Tube
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Objectives
- Distinguish proper pharmacologic management of acute and chronic otitis externa
- Analyze when pain medication for otitis externa is appropriate
- Develop a treatment plan for the draining tympanostomy tube
- Participate in an interactive discussion on pharmacologic management of otitis externa and the tympanostomy tube otorrhea

Definition of acute otitis externa - Diffuse inflammation of the external auditory canal which may also involve the auricle or tympanic membrane.

Definition of chronic otitis externa - Incomplete resolution or inflammation lasting > 3 months

Pathogenesis of otitis externa
- Exposure of ear to heat, humidity, maceration, absence of cerumen (a natural barrier against moisture and bacteria), loss of acidity (Cerumen creates a slightly acidic pH)
- Decreased acidity shown to be proportionate to the degree of infection
- Edema of stratum corneum resulting in blockage of apopilosebaceous units.
- Bacterial overgrowth leads to progressive edema and increased pain

Pathogenesis of Otitis Externa
- 98% of OE in North America is bacterial
- Most common pathogen
  - Pseudomonas aeruginosa
  - Staphylococcus Aureus
  - Rarely gram negative organisms other than P Aeruginosa
- Fungal involvement is uncommon in primary acute OE

Nonpharmacologic Treatment
- Debridement of the canal avoiding trauma
- Ear wick for severe stenosis of canal
Pharmacologic management

- Antiseptic preparations
  - Acetic and boric acids
  - Ichthammol
  - Phenol
  - Aluminum acetate
  - Gentian violet
  - Thymol
  - Thimerosal
  - Cresylate
  - Alcohol

Pharmacologic management

- Antibiotic preparations
  - Ofloxacin
  - Ciprofloxacin
  - Colistin
  - Polymyxin B
  - Neomycin
  - Chloramphenicol
  - Gentamicin
  - Tobramycin

Pharmacologic management with topical antibiotics

- Bacterial resistance less of a concern with topical antibiotics. High local concentrations of antibiotic in the canal will usually eradicate both susceptible bacteria and those with marginal resistance.

Pharmacologic Management with Topical Steroids

- Corticosteroids
  - Fluocinolone otic
  - Found in combination products
- Ciprodex otic-ciprofloxacin/dexamethasone otic
- Cipro HC otic-ciprofloxacin/hydrocortisone
- Cortisporin neomycin/polymyxin B/hydrocortisone
- Hydrocortisone/acetic acid otic

Pharmacologic Management with Systemic Antibiotics

- Systemic Antimicrobial Therapy
  - Should be used only for infection extending beyond ear canal or presence of specific host factors that would indicate need for systemic treatment
  - Oral antibiotics are overused for acute OE (20-40% of patients receive oral antibiotics often in addition to topical antibiotics)
  - Oral antibiotics selected are usually inactive against P aeruginosa and S aureus

Medical History that May Warrant use of Systemic Antibiotics

- Diabetics
- HIV infection
- Other immunocompromised state
- History of radiation therapy
- TM perforation
- Tympanostomy tube
**Systemic Antibiotics**

- Most people with OE do not need oral antibiotics!!!
- Cipro 250 to 750 mg PO BID for 10 days (dose, duration vary with severity). Not FDA approved for use in children.
- Culture directed antibiotic therapy recommended for children

**Risks of Topical Antibiotic use**

- Sensitization/secondary contact otitis can occur from prolonged or recurrent use of topical antibiotics (Most common with neomycin)
- Otoxicity with neomycin if tympanic membrane perforation or tympanostomy tube present
- Otomycosis can result from prolonged use of topical antibiotics

**Risk of Oral Antibiotics in Otitis Externa**

- Significant adverse events that can include diarrhea, vomiting, allergic reactions, development of bacterial resistance
- Societal consequence of spreading resistant pathogens
- Many of antibiotics chosen ineffective against usual pathogens in otitis externa

**Otomyosis**

- Inflammatory process of the external ear caused by fungi
- Responsible for 9% of otitis externa
- Most common pathogens include Aspergillus and Candida
- Usually presents with pruritus

**Pharmacologic Management of Otomycosis**

- Nonspecific antifungal agents- thimerosal and gentian violet
- Specific antifungals- clotrimazole, Nystatin, ketoconazole.
- CSF powder (cholamphenicol, sulfamethoximazole, and fungizone)

- No FDA approved antifungal otic preparation

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**INSERT TABLE 1 FROM ABOVE ARTICLE**
Pain assessment should be included in OE management

Mild to Moderate pain—acetaminophen or NSAIDS given alone or in combination with an opioid (acetaminophen with codeine, oxycodone, or hydrocodone; ibuprofen with oxycodone)

Rarely, parental analgesia may be necessary to control pain

Rosenfeld et al., Clinical Practice Guideline: acute otitis externa. 2006

Topical preparations

- Benzocaine otic solution with or without pyrine
- No clinical trials show efficacy in AOE
- May mask progression of underlying disease due to suppression of pain
- Benzocaine may cause contact dermatitis
- If prescribed reexamine in 48 hours

Rosenfeld et al., Clinical Practice Guideline: acute otitis externa. 2006

Nonpharmacologic therapies—heat, cold, relaxation, and distraction have unproven value

Rosenfeld et al., Clinical Practice Guideline: acute otitis externa. 2006

Tympanostomy tube placement is the most common surgical procedure performed in children

Most studies show posttympanometry (PTTO) at a rate of 16% although it can range from 17 to 74%.

Rosenfeld et al., Clinical Practice Guideline: acute otitis externa. 2006

Microbiology of PTTO

- Streptococcus pneumoniae
- Hemophilus influenzae
- Moraxella catarrhalis
- Staphylococcus aureus
- Pseudomonas aeruginosa
- Concomitant viral infection found in as many as 70%

Rosenfeld et al., Clinical Practice Guideline: acute otitis externa. 2006
Topical Fluoroquinolones with or without corticosteroids preferred to systemic antibiotics

**Advantages**
- Can be applied directly to middle ear through patent tube
- Higher concentration of medication which can overcome antibiotic resistance
- Do not carry the risk of ototoxicity associated with aminoglycosides
- Decreased systemic adverse reactions

Pharmacologic Management of PTTO
- Ciprofloxacin Otic 4 gtt's in draining ear BID for 7 days
- Bactericidal and anti-inflammatory action
- Minimal/no systemic absorption

- Ofloxacin Otic 5-10 gtt's in draining ear BID for 10-14 days
- Bactericidal
- Minimal systemic absorption
- Minimal metabolism in the liver

**Expense of Topical Antibiotics**
- Ciprofloxacin Otic
  - $184.40 (7.5ml bottle)
  - Not covered by Medicaid and certain HMOs
  - Higher out of pocket expense compared to Ofloxacin

- Ofloxacin Otic
  - $148.99 (10ml bottle)
  - Preferred by Medicaid
  - Lower out of pocket cost/lower tiered copay

**Failure of Oto-topical Antibiotic Therapy**
- 4.83% of children with PTTO treated with quinolones require treatment with oral antibiotics for persistent symptoms
- Occur when topical antibiotics cannot reach middle ear space
- Clean ear before administering drops by blotting the canal openings, using infant nasal aspirator, q-tip soaked in hydrogen peroxide (for use around EAC opening), or suction using open head otoscope or binaural microscope
- “Pump” tragus several times after drop has been instilled
- Avoid water in ears during period of otorrhea

**Case Study #1**
- 70 yo male c/o left ear itching and pain for 5 days which is getting progressively worse
- History of SNHL and has been wearing hearing aids for 3 years

Clinical Practice Guideline: Tympanostomy Tubes in Children, Otolaryngology-head and Neck Surgery July 2013

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Case Study #1 exam

HEENT – Patient wearing bilateral hearing aids. Small amount of cerumen in right EAC with TM clear and mobile. Left EAC obstructed by white debris and fungal hyphae. Canal inflamed. TM not visible. After cleaning with suction the left TM is clear and mobile.

Case Study #1 physical exam

- Debridement of canal
- Consider ear wick
- Antimycotic solution (Gentian Violet, Acetic Acid, CSF powder, etc.)
- Keep hearing aid out of affected ear until resolved

Case Study #1 Treatment plan

- 2 yo female with history of recurrent AOM
- 2 weeks s/p insertion of tympanostomy tubes.
- Mother reports child has had yellow drainage from both ears for 3 days
- Medication-None
- NKDA

Case Study #2

- Afebrile
- HEENT- Bilateral EAC- purulent drainage, Tubes in place and draining. Nose patent without drainage. Tonsil 3+ without erythema.
- Neck- No LAD
- Lungs- CTAB A & P

Case Study- Physical Exam

Case Study- Physical Examination
Case Study- Treatment

- Suction ears as tolerated
- Ciprodex Otic 4 gtts AU BID for 7 days or
- Floxin Otic 5 gtts in AU BID for 10 days
- Follow-up in a week if not improving for culture and suctioning if necessary