OTITIS EXTERNA (OE)

Background

1. Definition: inflammation and/or infection of external auditory canal, which may be:
    - Acute: symptoms <6 weeks, but may be recurrent[1]
    - Chronic: symptoms >3 months[1]
    - Necrotizing (malignant): invasive, with osteomyelitis of temporal bone[2] (See malignant OE)
2. General Information:
    - Associated with exposure to moisture or moist environment, ear canal trauma or aberrant ear wax[1]
    - Bacterial infection far more common than fungal (10%); less than 5% of cases due to other causes[3]
    - Peak age: 7-12; tapers down after age 50[3]
    - Peak Season: end of summer[2]

Pathophysiology

1. Pathology of Disease:
    - Disruption of normal pH and protective factors within auditory canal sets stage for infection[2,3]
    - Process: damage to epithelium + loss of protective wax + accumulation of moisture → higher pH and bacterial growth.[2]
    - Bacterial: Approx 50 % *Pseudomonas aeruginosa*, with *Staphylococcus aureus* second[3]
    - Non-bacterial:
        - Fungal (10%)[3]
            - Aspergillus, post-antibiotic[3]
            - Dermatophytid, hematogenous or contact dissemination.[3]
        - Herpes zoster oticus[3]
2. Incidence, annually in United States: common
    - Acute - four in 1,000 persons, 90% unilateral[3]
    - Chronic – 3-5% of population[3]
    - Disease Severity - 50% mild, local; malignant < 0.5%.[3]
3. Risk Factors:
    - Water immersion, humid climates, mechanical trauma to canal, dysfunctional ear wax (too little or too much)[1]
    - Severe/rapid progression: Diabetes, immunosuppression, radiation therapy[2]
4. Morbidity / Mortality
    - Acute OE - approx ¼ patients disrupted ADL's or bed-ridden for 3-4 days[2]
    - Chronic OE - canal stenosis, hearing loss[1]
    - Severe infection - myringitis, auricular cellulitis, perichondritis, facial cellulitis, osteomyelitis of the temporal bone [2]
    - Necrotizing/Malignant OE - life threatening.[1] (See Malignant OE)

Diagnostics

1. History

- Acute:
  - Onset = 2-7 days[3]
  - Progressive symptoms = pruritus → pain → swelling → otorrhea → severe pain→ hearing loss[3]
  - Inquire about risk factors and dermatologic conditions[3]
- Chronic = pruritis + discomfort, greater than 3 months, may have been preceded by acute OE, but not necessary for diagnosis[3]

2. Physical Examination: ear, external auditory canal, tympanic membrane and regional lymph nodes[3]
   - Early - may have slight discharge, erythema[3]
   - Moderate - more purulent discharge, more erythema/edema, pain with movement of tragus/pinna[3]
   - Severe - canal occlusion, cellulitis of ear, furunculosis (Staph), lymphadenopathy[3]
   - Tympanic membrane (TM) may be erythematous, but still mobile; allows differentiation from acute otitis media (AOM)[3]
   - Chronic - erythema +/- lichenification.[3]
   - Fungal - usually same as bacterial, may have "fluffy white exudate"[4]
3. Diagnostic/Laboratory evaluation: unnecessary except for recurrent/refractory cases, then consider culture (SOR:C)[2]
4. Diagnostic imaging: unnecessary unless malignant OE or mastoiditis suspected (See malignant OE)

Differential Diagnosis

1. Key Differential Diagnoses:
   - AOM with otorrhea due to TM perforation
   - Malignant OE
   - Secondary cellulitis of auricle and surrounding structures; may involve mastoid air cells - more common in children, requires systemic antibiotics[4]
2. Extensive Differential Diagnoses
   - Non-infectious causes of inflammation
     - Acute
       - Trauma due to instrumentation or foreign body[3]
       - Allergic contact dermatitis[3]
     - Chronic
       - Atopic dermatitis[3]
       - Seborrheic dermatitis[3]
       - Psoriasis[3]
       - Food sensitivity/allergy (potentially half of eczematous chronic OE)[3]
       - Type IV cell mediated hypersensitivity reaction to topical treatments[3]
       - Epithelial damage due to drainage from PE tubes or TM perforation[3]

Therapeutics

1. Acute Treatment

- Pain Management: recommend analgesics based on severity. (SOR :B)[5]
- Uncomplicated AOE (mild – mod): Topical treatment.[5] Choose based upon:
  - efficacy of drug:
    - most topical treatments equally effective; acetic acid alone less effective for treatments > 1 week (SOR:B)[2]
    - topical antimicrobials with steroids significantly more effective than placebo drops: OR 11 (SOR:B)[2]
  - efficacy of drug delivery: if obstructed canal, delivery enhanced by aural toilet, use of ear curette, placement of a wick, or combination (SOR:C)[5]
    - How to use cotton wick or commercial product: insert "into the external auditory canal until the remaining edge is flush with the external ear. In smaller children, one fourth to one third of the wick may be cut to prevent it from falling out prematurely. Several drops of topical antibiotics are instilled onto the wick until it has fully expanded. At home, a few drops of topical antibiotic should be applied to the wick every few hours for the first 24 hours to keep the wick moist. The wick should be removed with tweezers within 24 to 48 hours if it has not already fallen out." [4]
  - Risk of adverse events:
    - ototoxicity risk higher with tympanostomy tube or known perforation
      - avoid neomycin, gentamycin, tobramycin, other aminoglycosides.
    - contact sensitivity: up to 15% for neomycin.
    - (SOR:B)[5]
  - Ease of regimen: bid vs. qid therapy, and cost should be considered (SOR:B)[5] See Table.
- Complicated OE (severe): systemic antimicrobial therapy
  - extension outside the ear canal
  - high risk patients (see Risk Factors)
  - (SOR:B)[5]
  - Consider parenteral antibiotics

Topical product	Cost	Dose
acetic acid 2% sol'n (generic Vosol Otic),	<$25	Insert saturated wick; keep moist with 5 drops q 4 h for 24-48 hours prn then remove wick and/or instill 5 drops 3-4 times/day for > = 7d.
Acetic acid/aluminum acetate otic (generic Domeboro) 60 mL	<$25	4-6 gtts q 2-3 h adults 2-3 gtts q 3-4 h peds
Acetic acid/propylene glycol/hydrocortisone otic (generic Vosol HC) 10 mL	<$25	5 gtts TID-QID adult 3-4 gtts TID-QID peds > 3 y
Ciprofloxacin (Cetraxal)	$100-199	1 single use container BID x 1 wk > = 1 y old
Ciprofloxacin/dexamethasone otic	$100-	4 gtts BID x 1 week

(Ciprodex®) 7.5 mL	199	> = 6 mos old
Ciprofloxacin/hydrocortisone otic (Cipro HC Otic®) 10 mL	$100-199	3 gtts BID x 1 wk > = 1 y old
Hydrocortisone/neomycin/thonzonium/colistin otic (Cortisporin TC Otic®) 10 mL	$50-99	4-5 gtts TID-QID for up to 10 d.
Hydrocortisone/neomycin/ polymyxin otic solution or suspension (generic) 10 mL	<$25	4 (adults) or 3 (peds) gtts TID-QID for up to 10 d
Ofloxacin otic (generic) 10 mL	$50-99	5 gtts daily for 1-12 y old. 10 gtts daily for > 12 y old.

(Tarascon Pocket Pharmacopoeia 2012)[6]

2. Further Management (>24 hrs)
    - No response in 48 to 72 hours: reassess patient to confirm dx; consider alternative etiologies (SOR:C)[5], and rule out complications
        - Necrotizing/Malignant OE
        - Cellulitis
        - Mastoiditis
    - If partial response without complete resolution in first 7 days, extend treatment additional 7 days (SOR:C)[2]
3. Long-Term Care
    - Treatment Failure: symptoms persisting beyond 2 weeks of treatment; should prompt change in treatment[2]
    - Watch for hearing loss and canal stenosis from chronic OE[1]

Follow-Up

1. Return to Office
    - Time frame for return visit: if no better in 3 d, or if any worse[5]
    - Recommendations for earlier follow-up: allergic reaction, itchy rash, loss of hearing, secondary cellulitis or bony involvement as above.
    - If partial response without complete resolution in first 7 days, extend treatment additional 7 days (SOR:C)[2]
2. Refer to Specialist: ENT
    - Canal occlusion with unsuccessful wick placement[2]
    - Excessive debris and discharge with unsuccessful aural toilet in PCP office[2]
        - responds well to dry-mopping or suction and further course of topical therapy
    - Severe/Malignant OE
3. Admit to Hospital
    - Malignant otitis externa for parenteral antibiotic therapy[4]
    - Secondary cellulitis or mastoiditis which fails to respond to aggressive outpatient broad-spectrum oral or parenteral therapy

Prognosis

1. Patients treated with antibiotic/steroid drops can expect symptoms to last for approximately 6 days after treatment begun[2]
2. Many cases resolve spontaneously in acute period [1]

3. Acute episodes may recur; risk of recurrence unknown[1]
4. Potential for hearing loss and canal stenosis from chronic inflammation
    - May occur with single acute OE episode[1]

Prevention

1. No direct information from RCTs to support:[1]
    - Topical acetic acid (with or without hydrocortisone)
    - Topical corticosteroids
    - Water exclusion
2. Common Recommendations:
    - Avoidance of predisposing factors
        - eliminate trauma to ear canal
        - avoid frequent washing of the ears with soap
        - regarding water (bathing and swimming): 2 methods
            - strict water avoidance precautions:
                - ear plugs (kept clean to prevent re-infection)
                - bathing cap
                - cotton-balls with petroleum jelly
            - emptying water from canals after bathing or swimming:
                - head tilt and pull on ear
                - hair dryer on the lowest heat
            - acidifying drops after water exposure may benefit
        - (SOR:C)[2]
    - Treat any underlying dermatologic condition: psoriasis, eczema, etc. (SOR:C)[2]

Patient Education

1. http://familydoctor.org/familydoctor/en/diseases-conditions/ear-infections.html

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