Diseases of the EAC

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Disclosures

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Excess cerumen

- Adults 3-10% 5 studies N=5000
- Children 10% 2 studies N=573
- Geriatric 34% 1 study N=104
- Institutionalized 22-36% 4 studies N=575

Cerumen removal

- Cerumenolytics
  - Peroxide based
  - Cerumenex®
  - NaHCO3
  - Other
- Mechanical
- Irrigation
  - Syringe
  - Water pic
Ear candles

Warmth and smoke from the candle helps soothe the ear and soften old impacted earwax. After being candied, the ear can eliminate this material naturally over the next day or two. Any material left in the candle after the procedure is primarily the remains of the candle burning.

Ear candles -- Sealy 1996

- No neg pressure
- Burnt paraffin
- Injuries (n=122):
  - 13 burns
  - 7 paraffin occlusions
  - 2 TM perfs
  - 3 otitis externa
  - 6 CHL
Cerumen management clinical practice guideline

- Why?
- Strong recommendations
  - Rx if 1) symptomatic 2) prevents a needed exam
- Recommendation
  - Assess for modifying factors
  - Assess HA pts regularly

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Cerumen management clinical practice guideline

- Option
  - May observe non-impacted cerumen
  - May use cerumenolytics, irrigation, or manual removal
  - Carefully assess those who may not be able to express symptoms
  - Council pts on prevention
Furunculosis

- Lateral 1/3
- Staph aureus
- Systemic antibiotics with good gram + coverage
  - Cephalosprin, clinda.,
- I&D

External Otitis

- Inflammation of the EAC
  - Allergic
  - Irritative
  - Bacterial
  - Fungal
  - Viral
  - Primary Dermatitis
- Acute or Chronic
Fungal External Otitis

- Uncommon as a primary disease. Fungal organisms may grow on desquamated epithelium or cerumen as simple saprophytes.
- True fungal otitis is almost always either Aspergillus or Candida species.

Treatment of Fungal Otitis

- Mechanical debridement
- Usually responds to re-acidification &/or the use of topical anti-septics (Gentian violet, mercurochrome, )
- Only rarely will antifungal antibiotics be required

Lucente et al: *The External Ear*
Acute Bacterial Otitis Externa

AOE; Pathogenesis

- Temp and humidity
- Seasonal
- pH
- Dermatitis
- Trauma

Diagnosis of Bacterial Acute Otitis Externa

History
- **PAIN**
- Itching
- Hearing loss

Physical examination
- Swollen external auditory canal
- Erythema (variable)
- Watery, scant exudate
- **Tenderness/PAIN**


Photo courtesy of Michael Hawke, MD.

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Microbiology of Acute Otitis Externa

Organisms (%) Recovered During a Series of Clinical Trials

<table>
<thead>
<tr>
<th>Gram-positives</th>
<th>Gram-negatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staphylococcus sp</strong></td>
<td>27.4%</td>
</tr>
<tr>
<td>Coryneforms</td>
<td>12.1%</td>
</tr>
<tr>
<td><em>Streptococcus</em> + <em>Enterococcus</em></td>
<td>3.9%</td>
</tr>
<tr>
<td><em>Bacillus</em> + <em>Pseudomonas</em></td>
<td>1.5%</td>
</tr>
<tr>
<td><em>Micrococcus</em></td>
<td>0.24%</td>
</tr>
</tbody>
</table>

Fungi and Yeast 1.7%

AOE: Treatment

- Removal of debris
- Re-acidification
- Assure delivery (remove debris or an otowick)
- Appropriate topical antimicrobial
- Appropriate pain management
- Systemic antibiotics are rarely required

Advantages

- Delivery of high concentration (0.3%)
  - 3-5 GTTS dose is only 90µg - 150mcg but at a concentration of **3000mcg/ml** which exceeds the MIC of any known relevant pathogen.
- Minimal systemic effect
- Low cost
- Alter local micro-environment
Disadvantages

- Local discomfort
  - pH
  - alcohol
  - temperature
- Require direct contact
- Topical sensitization
- Alter micro-environment
- Minimal systemic effect

Practical irrelevance of “MIC”

therefore,

*clinical sensitivities are meaningless*

&

*changing topical antibiotics is irrational*
Hypersensitivity

- **WARNING**: THE MANIFESTATION OF SENSITIZATION TO NEOMYCIN IS USUALLY A LOW GRADE REDDENING WITH SWELLING, DRY SCALING AND ITCHING; IT MAY SIMPLY MANIFEST AS FAILURE TO HEAL

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**AOE GUIDELINES**

Otolaryngology-Head and Neck Surgery

Clinical Practice Guideline: Acute Otitis Externa

Rosenfeld *et al* OTO-HNS May 2006
**Strong Recommendation**

Management of AOE should include assessment of pain and a recommendation for analgesic treatment based on the severity of pain.

**Recommendations**

1) Distinguish diffuse AOE from other causes
2) Assess the patient for factors that modify treatment
   - Nonintact TM, TT, diabetes,
   - immunocompromised state, prior radiation therapy
3) Use topical therapy for initial management
4) The choice of topical agent should be based on:
   - Efficacy
   - Low incidents of adverse events
   - Likelihood of adherence
   - Cost

5) Clinicians should inform pts how to administer the drops

6) When the TM is nonintact, a non-ototoxic topical preparation should be prescribed

7) If the patient fails to respond within 48 to 72hrs, the clinician should reassess the pt.
Pay for performance

- Assess for pain at every visit
- Prescribe a topical
- Do not prescribe a systemic

Canal Cholesteatoma

- Unilateral
- Not associated with systemic disease
- Older
- Rx: medical or surgical

Multiple etiologies
- congenital
- Post traumatic
- Post obstructive
- Post inflammatory
- Spontaneous
- Iatrogenic
Keratosis Obturans

- Bilateral
- Associated with sinusitis & bronchiectasis
- Rx: regular office debridement
- 1st and 2nd decades

Symptoms
- CHL
- Otorrhea rare
- Pain

Keratosis Cholesteatoma

CHL
Otorrhea rare
Pain

1st and 2nd decades
Exostosis

- Suture lines
- 17.5 C ➞ canal erythema
- 73% surfers
- Lateral to isthmus

Osteoma

- True neoplasm
- Single
- Unilateral
**Exostosis**
- Reactive
- Non occlusive
- Bilateral
- Multiple
- Sessile
- Lamellar bone

**Osteoma**
- Neoplastic
- Occlusive
- Unilateral
- Single
- Pedunculated
- Trabecular bone
Surgical Technique

- Skin flaps
- Chisel
- Drill
- Facial Nerve!
  - 14% Of FN paralysis (Green)
  - Monitor?

Granular Myringitis

- Definition
  - De – epithelialization of the tympanic membrane
  - Granulation tissue
  - Normal middle ear
- Etiology
  - Trauma, Infection
  - Impaired migration provokes infection and induces trauma in the lamina propria
Granular myringitis

- Symptoms
  - Otorrhea (most common), aural fullness, subjective hearing loss, otalgia, tinnitus, aural pruritus.
- Physical exam
  - Focal versus diffuse
  - Ulceration versus polypoid mass
  - Purulent discharge versus crusting
- Perforation
  - May occur as a result of disease
  - Disease may occur in the setting of a prior perforation

Granular myringitis

- Grade I
  - Focal disease of tympanic membrane +/- ear canal skin
  - Shallow ulceration +/- crusting
- Grade II
  - Focal polypoid granulation
  - Purulent possible foul smelling otorrhea
- Grade III
  - Diffuse tympanic membrane involvement
- Grade IV
  - Diffuse involvement with granulation tissue including canal

Blevins: Otol & Neuronal 2001
El-Sheitl: AJO 2000
Granular myringitis

Therapy

- Topical
  - Antibiotic combination steroid drops
  - Powders
  - Caustic solutions (Phenol, Trichloroacetic acid, Chromic acid.

- Tympanoplasty +/- skin graft

- Laser therapy (CO2)
  - 60% total resolution, 32% partial resolution at 3 months


Granular myringitis

Results

- A dilute vinegar solution has been shown to more effective than topical antibiotics

- In refractory cases surgical excision may reduce recurrence.

Malignant otitis externa

- **Presentation**
  - Severe, unremitting otalgia (worse at night), fullness, otorrhea, hearing loss, headache, trismus, TMJ pain

- **Exam**
  - Granulation and exposed bone at BC junction
  - Facial nerve (25%) most commonly affected cranial nerve, followed by jugular foramen.
  - 43% will present with cranial nerve involvement

Moffat Axon Laryngoscope 2007

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Malignant otitis externa

- **Risk factors**
  - Diabetes mellitus 65% or as high as 90 to 100% of patients (Franco-vidal O&N 2007)
  - HIV/AIDS
  - Chemotherapy
  - Leukemia/lymphoma
  - Splenectomy
  - Transplant
Malignant Otitis externa

- HIV
  - Patients are younger
  - Suspect in patients with otitis externa which does not improve
  - May not to have granulation tissue in EAC
  - Fungal infections more common
  - Pseudomonas when CD4 is less than 100
  - Aspergillus when CD4 less than 50

Malignant otitis externa

- Differential diagnosis
  - Carcinoma of EAC
    - Biopsy granulation if persistent
  - Granulomatous diseases
  - Paget’s disease
  - Nasopharynx malignancies
  - Clival lesions
  - Fibrous dysplasia
Malignant otitis externa

- Pathophysiology – elderly more susceptible
  - Endarteritis, microangiopathy, small vessel obliteration
  - Pseudomonas can invade vessel wall cause vasculitis and thrombosis
  - Poor chemotaxis and phagocytosis
  - Higher cerumen pH in diabetes and males
  - Infection spreads through Haversian system not air cells.

MOE staging

- **STAGE I**: infection of canal and contiguous soft tissue w/wo CN VII involvement
- **STAGE II**: Extension to include osteitis of skull base and multiple cranial nerves
- **STAGE III**: Intracranial complications
Malignant otitis externa

- **Diagnosis**
  - CT
    - Sensitive for bone erosion
    - Permanent.
    - No ideal for f/u
  - MRI
    - Shows marrow and dura involvement
    - Enhancement may be prolonged – not ideal for f/u
    - Poor at showing bone erosion
    - Not an ideal initial study.

Malignant Otitis externa

- Diagnosis
  - Technetium Tc 99m methylene diphosphonate (MDP)
    - Positive in nearly 100% of MOE
    - Concentrates in areas of osteoblastic activity
    - Better for initial diagnosis
    - Increase sensitivity by identifying increase uptake 4 to 24 hours after injection.
    - Positive in cancers
    - Remains positive
Malignant Otitis externa

- **Diagnosis**
  - **Gallium Ga 67**
    - Concentrates in areas with active inflammation
    - Attaches to lactoferrin (large quantities in leukocytes)
    - Binds directly to bacteria and transferrin
    - Resolves with resolution of infection
    - Can repeat every 4 weeks
  - **Follow with Gallium 67 and ESR**
    - Stop therapy when these both normalize
  - **Can recur up to year later**

Malignant Otitis Externa

- **Diagnostic work up**
  - Biopsy granulation tissue
  - Culture (aerobe, anaerobe, fungal and sensitivities)
    - Initiate empiric therapy while awaiting cultures
  - Silver stain to ID fungal elements
Malignant Otitis externa

- Bacterial pathogens
  - *Pseudomonas aeruginosa* most common
    - 33% resistance to Cipro in one series (Bernholz & Harell Lscope 2002)
  - Other organisms: *Staphylococcus aureus, Staphylococcus epidermidis, Proteus mirabilis, Klebsiella oxytoca, P cepacia*
  - *Aspergillus fumigatus* is the most common fungal agent
    - Unresponsive to antibiotics
    - Negative cultures

- Oral versus intravenous antibiotics
- Single versus double coverage
- Duration of treatment 6 to 8 weeks
- Oral Cipro 750 mg BID is acceptable
- May add Rifampin
- Can use antipseudomonal PCN with concurrent aminoglycoside in resistant and complicated cases
- Culture negative (Djalilian HR O&N 2006)
  - Ceftazidime IV + Oral Cipro 750mg BID, topical aminoglycoside steroid drops
  - Use aztreonam for PCN allergic patients
Malignant Otitis externa

- Amphotericin B for fungal MOE
  - Liposomal Amphotericin B is less toxic with equal efficacy.
- Oral itraconazole after amphotericin has also been used successfully.

- Is there a role for hyperbaric oxygen?
  - Increases the partial pressure of oxygen improving hypoxia and allowing greater oxidative killing of bacteria
  - One series 7 of 8 patients recovered
  - No evidence to support its use by Cochrane review
- Limited role for surgery
  - Debridement of bone sequestrum and granulation
  - Biopsy
- Duration of treatment is typically 6 weeks
Malignant Otitis externa

- Prognosis
  - Mortality decreased 50% to 0 to 15%.
  - Aspergillus, dural involvement are poor prognostic factors
  - Facial nerve palsy can recover but incomplete
  - Lower cranial nerve palsy can completely recover.

MOE oral quinolones

- Giamarellou
  - 159 patients
    - Ciprofloxacin 88/101
    - Ofloxacin 38/46 (5 resistant)
Chronic External Otitis

- A low grade, diffuse infection of the external canal that persist for months or years
- It is characterized clinically by pruritis, scanty otorrhea and progressive narrowing of the lumen of the EAC.
- Duration exceeds 4 weeks or more than 4 infections in one year.

Pathology

- Mild to moderate edema
- Chronic inflammatory cell infiltrate
  - Often focal
  - Microabscess formation
  - Areas of calcification
Pathology

- Progressive subepithelial fibrosis leading to stenosis
- Post inflammatory medial canal fibrosis
Clinical Presentation

- Hearing loss is a more common presenting symptom than otorrhea
- Females 2:1
- Exacerbated by hearing aids
- Often starts in anterior sulcus
- Bilateral in 50%

Physical examination

- Absent cerumen
- Raw epithelial surface—erythema
- Elephantiasis
- Scant, milky otorrhea
- Shinny
- Narrowing of the lumen
Infectious

- Bacterial
  - Gram negative, especially Pseudomonas
  - Staphylococcus
- Mycotic
  - Not common pathogens in AOE but role in COE unclear—probably greater
  - Aspergillus & Candida
  - Slow growing fungi may be missed
  - “Id” reactions

Dermatological

- Seborrheic dermatitis
  - + fam history, scalp (“dandruff”), flexures (retro-auricular)
- Psoriasis
  - Occasionally is isolated to ears
  - May develop from seborrhea
- Neurodermatitis
Sensitization

- **1st case** of contact allergy to Neomycin was reported in 1952 by Baer and Ludwig in a pt with chronic OE.
- **Cross reactivity** between Neomycin and other Aminoglycosides is common. Cf tobra in the Netherlands.
- The reaction time of the aminoglycosides in patch testing almost always exceeds 3 days and often takes 7 days.
- The routine use of Neomycin is not recommended because of the high risk of sensitization.

Hypersensitivity

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Mixed

- The majority of cases of COE are probably in this category

Treatment

- Medical
  - Early stage of disease. Ideally will prevent stenosis
  - May only serve to slow progression—no long term outcome data

- Surgical
  - Late stage of disease.
Medical Therapy

- Steroids: drops, creams, injections?
  - Single agents. ophthalmic drops or dermatologic creams
  - Combination agents

- Topical Tacrolimus
  - More effective in dry rather than wet cases
  - Complete resolution in 46% patients.


Medical Therapy

- Antibiotics
  - Use sparingly
  - Quinolone drops
  - Powders--last longer & can include multiple agents
  - Culture

- “No Touch” aural toilet
Surgical Therapy

Local flaps

- Pre-conchal, post auricular
  - Tendency to contract may help pull canal open
  - Decreased scarring because ↑ vascularity
  - Hard to get enough length
  - Bulky
FTSG vs. STSG

- Greater resistance to trauma
- Glandular elements provide lubrication
- Less likely to contract
- Most commonly used
- Easiest to obtain
- Less re-stenosis?

Successful operations

- Completely remove cicatrix
- Include a canalplasty
- Resurface the bony canal with skin
Surgical results

- ≈ 80% patent canal but recurrences occur late
  - earliest @ 3yrs in Slattery’s series

- Hearing improvements range from 10dB to 50dB
  - 61% with closure of the air-bone ABG to 20 dB (Beckers -- 53 pts)