

OTITIS EXTERNA

Alternative names: *Swimmer's ear*

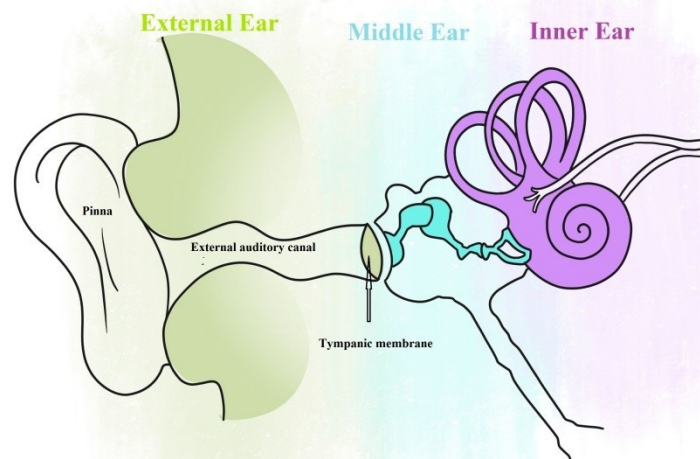
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Background Information

Definitions of levels of care (in this guideline)

- Level 1: Community healthcare worker/non-doctor
- Level 2: Medical doctor
- Level 3: ENT Surgeon

Otitis externa (OE) is an infection of the skin of the external auditory canal (EAC), which can extend to the pinna, tragus, tympanic membrane, and regional lymph nodes. OE is referred to as *swimmer's ear* because of the predisposition of a wet ear canal to infections.



Anatomy of ear (May et al, 2022)

Types of otitis externa

- A. Acute otitis externa
- B. Chronic otitis externa
- C. Necrotising otitis externa

ACUTE OTITIS EXTERNA (AOE)

Background Information

Acute otitis externa (AOE) is a cellulitis of the skin of the ear canal and subdermis, with acute inflammation and a variable degree of oedema. Most AOE cases are bacterial with the most common pathogens being *Pseudomonas aeruginosa* and *Staphylococcus aureus*, and polymicrobial infections^{1,2}. Fungal pathogens, primarily *Aspergillus* and *Candida species*, occur more often in tropical or subtropical environments and in immunocompromised patients or those patients previously treated with local antibiotic drops³⁻⁵.

Diagnosis

History/Predisposing factors:

- Water exposure
- Ear cleaning or local trauma
- Inflammatory skin disorders (eczema, psoriasis, seborrhoea, dermoid cyst, sebaceous cyst, or a furuncle)
- Ear surgery
- Anatomical ear canal abnormalities (narrow canal, exostoses, osteoma)
- Local radiation therapy (osteoradionecrosis)
- Diabetes mellitus
- Foreign body (hearing aid, cerumen)

Symptoms:

- Otagia
- Pruritus
- Aural fullness with or without hearing loss
- Tragal pain upon touch or with chewing

Examination and Investigations

General:

- Look for otorrhoea or erythema of the auricle or skin
- Oedema of external auditory canal
- Erythema of external auditory canal
- Otorrhea (white, black, yellow, or clear)
- Tenderness of the tragus, pinna, or both (a hallmark sign that is often intense and disproportionate to what might be expected based on visual inspection).
- Regional lymphadenitis
- Cellulitis of pinna and skin (possible)

Level 1:

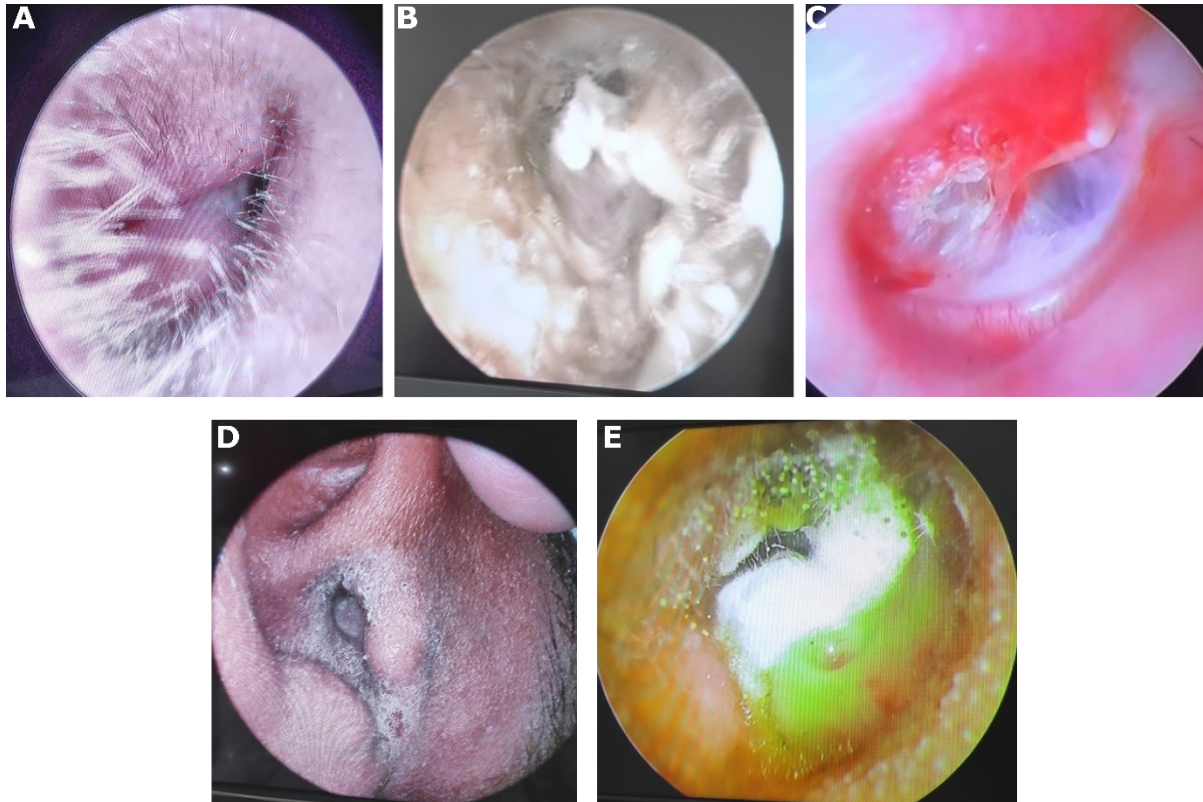
- Gently pull the pinna backwards and upwards (may cause otalgia) to inspect the ear canal with a light source. Tenderness is usually elicited which distinguishes AOE from otitis media.

Level 2:

- Otoscopy should be performed with an otoscope.

Level 3:

- Oto-microscopy or oto-endoscopy should be performed as well as cleaning of the external auditory canal with a suction apparatus. A swab for culture should be obtained.
- Pneumatic otoscopy may be performed to rule out otitis media with effusion.



Management

General:

- Otolgia is a common symptom of AOE⁶. Oral analgesics are the preferred treatment with 1st line treatment which should consist of non-steroidal anti-inflammatory drugs (NSAIDS) and acetaminophen. When ongoing frequent dosing is required for pain control, NSAIDS should be administered on a scheduled basis.
- Benzocaine (topical) otic drops are not recommended as they may compromise the effectiveness of otic antibiotic drops by limiting contact between the drop and the ear canal⁷.
- Patients should be instructed to minimise trauma to (and manipulation of) the ear (avoidance of self-cleaning or scratching the ear canal) and avoiding water exposure for a week.
- Patients with hearing aids or those inserting earphones should limit insertion until pain and discharge (if present), have subsided.
- In all cases, patients should be taught to properly administer otic (topical) medications which are the treatment of choice in AOE.

- Following aural toilet, otic drops should be used. The patient should lie down with his or her affected side facing upward, running the preparation along the side of the ear canal until it is full and gently moving the pinna to relieve air pockets².
- The patient should remain in this position for 3-5 minutes, after which the canal should not be occluded, but rather left open to dry². It may benefit the patient to have another person administer the ear drops, because only about 40% of patients self-medicate appropriately⁸.
- Systemic antibiotics should be used only when the infection has spread beyond the ear canal, or when there is uncontrolled diabetes, immunocompromise, a history of local radiotherapy, or an inability to deliver topical antibiotics^{2,9-11}.

Level 1:

- Acidification of the ear canal is toxic to many bacteria (including *Pseudomonas*) and fungi, and effectively treats many early infections.
- A homemade mixture of equal amounts of white vinegar and rubbing alcohol acidifies and dries the ear canal but this can be used only after verification of an intact tympanic membrane (by otoscopy).
- Acidifying solutions may also be used prophylactically by at-risk patients, such as after swimming.
- A hair dryer on a low heat setting may be used to dry the ear canal gently since keeping the ear dry is a good prophylactic measure¹².

Level 2:

- Use of a topical preparation without culture is a reasonable treatment approach for patients who have mild symptoms of AOE.
- If the tympanic membrane is intact and there is no concern of hypersensitivity to aminoglycosides, an antibiotic and steroid otic preparation (such as neomycin/polymyxin B/hydrocortisone otic preparation) should be used⁷.
- Patients with tympanic membrane perforation or a history of ventilation tube insertion should use ofloxacin or ciprofloxacin/ dexamethasone drops which are not ototoxic⁷; these also may be useful if patients are hypersensitive to neomycin or has problem with adherence dosing frequency of the medication.
- The use of a corticosteroid-containing preparation is recommended to provide more rapid relief in recalcitrant cases, to potentiate anti-inflammatory response⁷.

Level 3:

- When there is marked ear canal oedema, a wick of compressed cellulose or ribbon gauze may be placed in the canal to facilitate antimicrobial or antibiotic administration¹³⁻¹⁵.
- Wick placement permits antibiotic drops to reach portions of the external auditory canal that are inaccessible because of canal swelling. This should be removed after 48 to 72 hours.
- Appropriate treatment of uncomplicated AOE should be followed by symptom improvement (otalgia, itching, fullness) within 48 to 72 hours, although symptom resolution may take up to 2 weeks¹³.
- Initial treatment failures that are not related to drug delivery or microbiologic factors may reflect comorbidity or misdiagnosis^{16,17}. Persistent symptoms can be caused by dermatologic disorders that include dermatitis (atopic, seborrheic, or contact), psoriasis, dermatomycosis, or acne that involves the external auditory canal. This category of patients should be examined by a trained otolaryngologist.

- Failure to improve with use of topical antibacterials may be due to otomycosis, or fungal infection of the external ear canal, that occur more often in tropical or subtropical environments, humid locations, after long-term topical antibiotic therapy, and in patients with diabetes, HIV infection, or an immunocompromised state.
- Patients with severe refractory symptoms should be reassessed for necrotising otitis externa or carcinoma of the external auditory canal, especially if granulation tissue is present^{18,19}.

CHRONIC OTITIS EXTERNA (COE)

Background Information

Chronic otitis externa (COE) is otitis externa persisting for 3 months or more as a result of poorly treated AOE, allergies or chronic skin conditions⁷. COE represents different forms with distinct etiologies¹²:

- **Allergic otitis externa** may result from an allergic reaction to topical agents, most commonly neomycin.
- **Contact dermatitis** can result from contact with various agents, including hairsprays, shampoos and hearing aid molds.
- **Psoriasis or systemic dermatitis** such as seborrhoea can involve the ear canal.
- **Granular otitis externa** is thought to result from chronic infection of the ear canal by bacteria or fungi or both.

Diagnosis

History/Predisposing factors:

- As described in 1.4A Acute otitis externa (AOE)
- Allergy

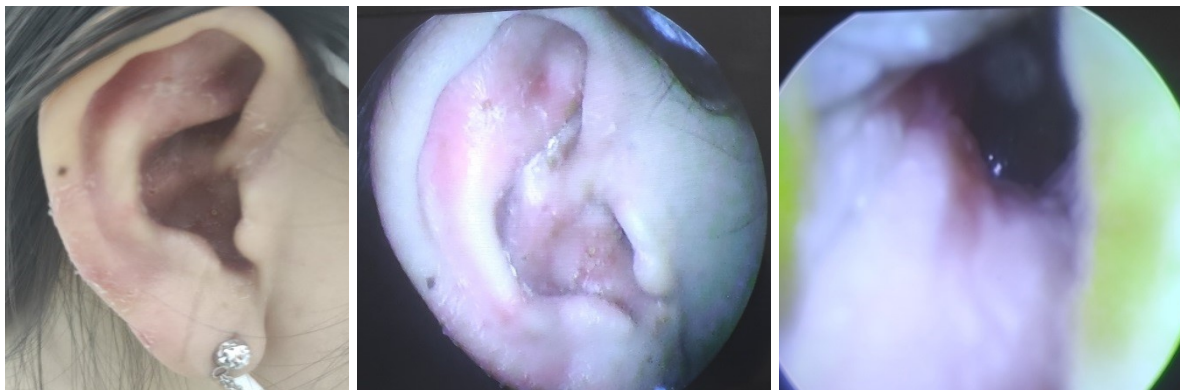
Symptoms:

- Persistent symptoms for 3 months and more
- Otalgia
- Pruritus
- Aural fullness with or without hearing loss
- Tragal pain upon touch or with chewing

Examination and Investigations

General:

- History, predisposing factors and symptoms as indicated.
- A thickened, erythematous canal associated with an allergic or contact dermatitis.
- Maculopapular eruption on the skin of the conchal bowl and ear canal consistent with an allergic reaction to a topical agent (e.g., neomycin).
- Hyperkeratosis and lichenification of the ear canal skin.
- Granulation tissue and excoriation in the canal and on the tympanic membrane caused by chronic infection.



Level 1:

- Gently pull the pinna backwards and upwards (may cause otalgia) to inspect the ear canal with a light source. If COE is suspected, transfer to a 3rd level treatment centre should be performed.

Level 2:

- Otoscopy should be performed with an otoscope.

Level 3:

- Microscopy or oto-endoscopy
- Consider patch skin testing to identify an agent causing allergic contact dermatitis if suspected.

Management

General:

- The treatment of COE depends on the underlying causes. Because many cases are caused by allergies or inflammatory dermatologic conditions, the most important aspect of treatment is to identify the cause and avoid further contact^{17,20,21}.
- Treatment of allergic OE due to sensitization of topical preparations is by stopping use of the otic drops and possible use of topical steroids for a short period⁷.
- Management of COE caused by dermatologic conditions includes gentle skin care, application of emollients, prevention of secondary skin infection, and the use of topical corticosteroids and other antipruritics².

- COE caused by seborrheic dermatitis can be treated with the use of topical antifungal medications to reduce the amount of yeast present and topical anti-inflammatory medications to reduce inflammation².

NECROTISING OTITIS EXTERNA (NOE)

Alternative names: Malignant otitis externa

Background Information

Necrotising (previously known as malignant) otitis externa (NOE) is an aggressive infection that predominantly affects elderly, diabetic, or immunocompromised patients²². The most common causative agent of NOE is *Pseudomonas aeruginosa*, but others include Methicillin-resistant *Staphylococcus aureus* (MRSA) as well as various fungi. The term “malignant” is an anomaly used in describing the aggressive nature of the disease rather than depicting malignancy.

NOE typically starts in the external auditory canal (EAC) and spreads to the stylomastoid foramen and then to the mastoid tip and the jugular foramen. Finally, the septic process extends to the petrous apex and the middle cranial fossa²³. Therefore, initial signs and symptoms are those of the initiating AOE, but untreated disease develops into a skull base osteomyelitis with/without cranial nerve involvement.

Diagnosis

History/Predisposing factors:

- Diabetes
- Immunosuppression (including transplanted patient and patients on long term corticosteroid treatment)
- Elderly
- Local trauma

Symptoms:

- Non-resolving severe nightly otalgia, which usually has persisted for longer than a month
- Chronic otorrhoea
- Headache and secondary cranial nerve involvement²⁴
- Facial nerve paralysis may be an early sign, with the glossopharyngeal and spinal accessory nerves less frequently involved.
- Pruritus

Examination and Investigations

General:

- History and predisposing factors as indicated with symptoms as stated.
- Oedema of external auditory canal.
- Granulation tissue is classically seen on the floor of the canal and at the bony-cartilaginous junction.

Level 1:

- Gently pull the pinna backwards and upwards (may cause otalgia) to inspect the ear canal with a light source. If NOE is suspected, transfer to a 3^d level treatment centre should be arranged.

Level 2:

- Similar to level 1

Level 3:

- Oto-microscopy or oto-endoscopy should be performed as well as cleaning of the external auditory canal with a suction apparatus. A swab for culture should be obtained.
- Blood test for raised erythrocyte sedimentation rate and C-reactive protein.
- Several imaging modalities are possible:
 - computed tomography or magnetic resonance imaging scan^{22,25}
 - gallium scan
 - indium-labelled leukocyte scan
 - technetium-99 bone scan
 - single-photon emission tomography
 - positron emission tomography.
- Following imaging and prior to initiation of antimicrobial therapy, cultures of any drainage and tissue specimens of granulation tissue should be obtained because of the risk of fluoroquinolone-resistant *Pseudomonas*.
- Biopsy may be necessary to rule out neoplasia if the diagnosis of NOE is uncertain or response to therapy is incomplete².

Management

Management of patients with NOE should be individualised, with a multidisciplinary cooperation among specialties, including otolaryngology, infectious medicine, endocrinology, and internal medicine²⁶.

General:

- Systemic antibiotics, adequate to cover for the spectrum of causative organisms especially pseudomonal and staphylococcal infection, including methicillin-resistant *S aureus* for at least 6 weeks and in advanced cases, several months²⁷. The most commonly used antibiotic for NOE is ciprofloxacin.
- Surgery may be considered in cases of aggressive or advanced disease, facial nerve paralysis, deep tissue sterile culture and refractory NOE, which means no clinical improvement after 6 weeks of conventional treatment²⁸. Surgery reduces local infective load, removes necrotic tissue, and allows formation of new tissue growth, which increases local vascularity allowing systemic antibiotics to reach the required area^{29,30}.
- Hyperbaric oxygen (HBO) treatment is often used in centres with easy access to hyperbaric chambers. HBO is used in order to increase the partial pressure of oxygen and may lead to increased oxidative killing of bacterial pathogens³¹.
- Follow-up imaging after long term antimicrobial treatment should be obtained in order to verify the patient's full recovery.

Further reading

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