The dilemmas of otitis externa

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Introduction

Otitis externa is one of the most common conditions seen in otorhinolaryngologic practice, affecting 3%-10% of the patient population. The most common types, in both general and hospital practice, are diffuse otitis externa and furunculosis, whereas invasive otitis externa and keratosis obturans are both rare. Otitis externa is a complex topic, with dilemmas in the causes, pathogenesis, diagnosis and management of the condition.

Definition

Otitis externa is a broad generic term for an acute or chronic disease that includes inflammation or infection of the external ear arising from local or general causes, or both. It can range from mild inflammation and discomfort to a life-threatening disease.

A dilemma is a situation where choices have to be made between various alternatives which are equally unfavourable.

Review of otitis externa

Classification of otitis externa

Infections of the external ear may be classified by aetiology, extent of the lesion and the duration of the illness. The classification is outlined in Table I.

Anatomy and physiology

The external ear consists of the auricle (pinna), the external auditory canal and the outer layer of the tympanic membrane. The external auditory canal contains skin and adnexal structures (the latter only in the lateral cartilaginous portion), elastic cartilage, bone (medial osseous portion) and subcutaneous tissue.

The three adnexal structures, termed the apopilosebaceous unit (sweat glands, hair, sebaceous glands), provide a protective function and a self-cleansing function to the external ear. The anterior aspect of the cartilaginous portion is divided by two or three variably present vertical fissures known as the fissures of Santorini. These fissures can predispose to the spread of an infective process or neoplasm between the external auditory canal and the parotid gland.

Cerumen (earwax) is a combination of the secretions produced by sebaceous and ceruminous glands mixed with desquamated epithelial cells. The function of earwax is to protect the external ear from infection by lowering the pH in the ear canal. The normal pH of the ear canal is about 5.5 (mildly acidic) which inhibits bacterial growth. The inferior tympanic recess (immediately lateral to the tympanic membrane) is important in the pathogenesis of otomycosis, because it tends to be a region of accumulation of cerumen and debris and is often difficult to clean thoroughly and comfortably.

Table I: classification of otitis externa

<table>
<thead>
<tr>
<th>Classification</th>
<th>Subclassification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>1) Localized</td>
</tr>
<tr>
<td></td>
<td>2) Diffuse</td>
</tr>
<tr>
<td></td>
<td>Traumatic</td>
</tr>
<tr>
<td></td>
<td>Infective</td>
</tr>
<tr>
<td></td>
<td>Allergic</td>
</tr>
<tr>
<td></td>
<td>Bacterial/Viral</td>
</tr>
<tr>
<td></td>
<td>Clinico/environmental</td>
</tr>
<tr>
<td>Chronic</td>
<td>1) Specific</td>
</tr>
<tr>
<td></td>
<td>Tuberculosis</td>
</tr>
<tr>
<td></td>
<td>Syphilis</td>
</tr>
<tr>
<td></td>
<td>Leprosy</td>
</tr>
<tr>
<td></td>
<td>2) Non-specific</td>
</tr>
<tr>
<td></td>
<td>Seborrhoeic</td>
</tr>
<tr>
<td></td>
<td>Allergic</td>
</tr>
<tr>
<td></td>
<td>Atopic</td>
</tr>
<tr>
<td></td>
<td>Porotic</td>
</tr>
<tr>
<td>Part of generalised skin conditions</td>
<td>Dermatitis</td>
</tr>
<tr>
<td>Invasive (malignant otitis externa)</td>
<td></td>
</tr>
<tr>
<td>Other (keratosis obturans)</td>
<td></td>
</tr>
</tbody>
</table>

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Bacteriology

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The external ear canal is sterile in approximately 30% of patients. *Staphylococcus epidermidis* and *Corynebacterium spp.* (diptheroids) are the commensal organisms most commonly isolated from the ear canal. *Staphylococcus aureus* and *Streptococcus viridans* can frequently be present without causing any ill effects. *Proteus* and *Pseudomonas spp.*, which are normal commensals of the other parts of the body, may multiply and cause infection when the natural defence mechanism in the external ear canal breaks down.

**Aetiology**

The aetiology of otitis externa is described in Table II.

**Clinical features**

*Acute localized otitis* (furunculosis) of the external ear canal is a folliculitis usually due to *Staphylococcus aureus*. Symptoms of a furuncle are localized pain and itching. Signs include oedema, erythema and, possibly, abscess formation. Occlusion of the ear canal may lead to conductive hearing loss. Trismus may occur when the boil is anterior. Spread beyond the confines of the external ear may lead to periauricular cellulitis.

*Diffuse otitis externa* is an inflammatory or infectious process of the external auditory ear canal. Cardinal symptoms are itching, irritation and pain. Redness, swelling, serous oozing in the lining of the canal and tenderness to palpation are symptoms most commonly found. Crusting, desquamation and purulent otorrhea may be present in varying degrees. With advanced disease, fever and lymphadenopathy of the preauricular, postauricular, and cervical regions can be present.

*Chronic otitis externa* results in thickening of the canal skin caused by a persistent low-grade infection or inflammation. Pruritus, mild discomfort, purulent discharge and dry flaky canal skin are common findings which may result in stenosis of the canal. Fungal otitis externa is usually caused by *Aspergillus* (80% to 90% of otomycosis), which accounts for the grey to black specks within the secretions, i.e. "wet-newspaper appearance". Bluish-green, yellow or white fungal growths and debris may also be seen. Pruritus and thick otorrhea are early symptoms.

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**TARGETS**

High Rulide levels where the majority of bacteria responsible for RTI multiply

**Rulide**

Leaves bacteria no place to hide.

**Roxythromycin**

150 mg V/20.1/12/05

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J. Fisb A. Roxithromycin (Rulide) in Respiratory Infections: Pharmacokinetics and Clinical Data. Eutra on file - HMR
**Table II: Predisposing and precipitating factors for otitis externa**

<table>
<thead>
<tr>
<th>Predisposing Causes</th>
<th>Local predisposing causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant otitis externa</td>
<td>Accumulation of moisture in ear canal caused by the following:</td>
</tr>
<tr>
<td>Infection (20% of cases)</td>
<td>1. Swimming</td>
</tr>
<tr>
<td>Bacterial infection</td>
<td>2. Drowning</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>3. Snorkeling</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>4. Swimming</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>5. Scuba diving</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>6. Genetically narrow ear canal</td>
</tr>
<tr>
<td>S. aureus</td>
<td>7. Long-term ototopical antibiotics - predispose to fungal infections</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Precipitating Causes</th>
<th>Non-infective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predisposing factors</td>
<td>1. Trauma - self-induced from scratching:</td>
</tr>
<tr>
<td>Malignant otitis externa</td>
<td>can abrade and bore canal</td>
</tr>
<tr>
<td>Pseudomonas</td>
<td>2. Allergic reactions to the following:</td>
</tr>
<tr>
<td>Eczema</td>
<td>Antibiotics:</td>
</tr>
<tr>
<td>...</td>
<td>1. Polymyxin</td>
</tr>
<tr>
<td>...</td>
<td>2. Gentamicin</td>
</tr>
<tr>
<td>...</td>
<td>3. Neomycin</td>
</tr>
<tr>
<td>Irritants</td>
<td>4. Freon</td>
</tr>
<tr>
<td>...</td>
<td>5. Hair preparations</td>
</tr>
<tr>
<td>...</td>
<td>6. Soap and shampoo</td>
</tr>
</tbody>
</table>

**Eczematous otitis externa** is a broad term that describes various dermatological conditions such as atopic, seborrheic, contact, infantile dermatitis and psoriasis that may affect the external ear, resulting in otitis externa. The most prominent symptom is continual itching of the ears. On clinical examination, the skin of the canal may be lacking wax and is shiny, scaling, crusty or erythematous. Vesicles may also be present. Usually there is evidence of skin involvement elsewhere in the body.

**Malignant external otitis** refers to a progressive and necrotizing *Pseudomonas* infection of the external ear and adjacent structures. The typical patient with malignant otitis externa is often an elderly diabetic suffering from otalgia and a seropurulent discharge. Classically there are signs of external ear inflammation with granulation tissue on the floor of the canal, usually at the junction of the bony and cartilaginous canal.

**Diagnosis**

Important parts in the diagnosis of the different forms of otitis externa are summarised in Table III.

**Differential diagnosis**

Furunculosis of the external ear must be distinguished from acute mastoiditis, as swelling and tenderness can spread to the postauricular region. The differential diagnosis is summarised in Table IV.
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times herpetic lesions may cause difficulty, especially after rupture of the vesicles. Granulation tissue in the external auditory canal as a manifestation of malignant otitis externa needs to be differentiated from neoplasms.

Table III: Diagnosis of otitis externa

- History
  1) Water contamination of ears due to washing and showering.
  2) Cleaning of ears with ear buds, keys, hairclips, matches, etc.
  3) Occupational - ear protectors, exposure to chemicals or irritants, professional divers.
  4) Previous ototopical ear drops may cause allergy or irritation in the ear canal.
  5) Medical history of diabetes, immunosuppression due to HIV and steroids, otitis media.
  6) Dermatologic history of generalised skin conditions and dermatological disease behind the ear on the face and scalp.
  7) Allergens such as inhalants and ingestants (food, colorants, preservatives).
  8) Irritants such as soap, nail varnish, shampoo.
  9) Hobbies such as scuba diving and swimming.

- Examination
  1) General - concomitant dermatological disease, especially behind the ear on the scalp, face and neck.
  2) Local - a complete and thorough cleaning of the external ear canal is essential to make a diagnosis.

- Special investigations
  1) Pus swab for culture, sensitivity and microscopy.
  2) Temporal bone ct and MRI scans may show bone and soft tissue changes.
  3) Technetium scans permit the early detection of osteomyelitis of the temporal bone and skull base before radiological evidence of demineralisation has appeared.
  4) Blood tests: Allergy tests and HIV

Treatment of otitis externa

Treatment of acute otitis externa is based on the following:
- A thorough understanding of the anatomy and physiology of the ear canal.
- A knowledge of the predisposing and precipitating causes and microbiology of potential pathogens.
- The familiarity with the clinical presentation, so that an accurate and timely diagnosis can be reached.
- Prevention of future episodes is truly the best treatment and is based on patient education about the risk factors that promote otitis externa.

The treatment of otitis externa is summarised in Table V.
In addition, poking instruments into the ear may cause an irritant or allergic reaction. Ototopical medication causing an allergic, chemical reaction or secondary fungal infection may further aggravate the condition.

The role of bacteria in otitis externa is also controversial. The role of commensal flora such as Staphylococcus epidermidis (Albus) and Corynebacterium spp. (diphtheroids) in the pathogenesis of otitis externa is also unknown. Bowel-type bacteria frequently colonize inflamed areas such as in the external ear. It is unknown whether they can cause a primary infection or whether they are only secondary colonizers.

The significance and causation of otomycosis have long been controversial. There are long-lasting debates about whether fungi are the primary infectious agents or are secondary pathogens which affect the skin of the external canal only in the presence of bacterial infection. Overwhelming evidence today shows that fungi can be primary pathogens.

### The dilemmas of otitis externa

A few of the most prevalent dilemmas in the clinical situation are as follows:

**The aetiology and pathogenesis of diffuse otitis externa**

What is the role played by mechanical, infective, allergic and chemical factors in diffuse otitis externa?

Most of the cases of diffuse otitis externa are idiopathic and are likely to be due to a combination of factors superimposed upon a breakdown in the skin's natural defence mechanism; in particular of the sebaceous and ceruminous glands whose lipid secretions coat the squamous epithelium of the meatus. It then requires only the addition of another minor factor, such as trauma, for the condition to commence. Mechanical factors, such as scratching the ear, may break the skin and allow secondary infection to occur.
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Table V: continued

| Management of any underlying dermatological disorder. |
| **Topical antibiotics** | Careful cleaning of ear canal with use of the otoscope. |
| A 1% povidone-iodine or propionic acid (2% in 95% alcohol) or amikacin (0.125% in 95% alcohol) is useful in stubborn cases. |

**Systemic antibiotics**

- **Antiviral agents**
  - Ophthalmic antiviral drops may be effective against Herpes simplex.
  - Acyclovir (100 mg) or foscarnet (40 mg) may be effective.

**Antifungal agents**

- **Systemic antifungal agents**
  - Amphotericin B, 1% clotrimazole, or miconazole are useful in stubborn cases.

**Systemic antifungal agents**

- Patients with these conditions are susceptible to fungal and fungal ear infections and may have to wait for the development of antifungal activity.

**Surgical measures**

- A superficial, point-ceptor is treated by incision and drainage, topical and oral antibiotics, and local heat and oral analgesics.

**Management of malignant otitis externa (MEO)**

- **In the literature there is no single policy for the management of malignant external otitis.**

  - **Three aspects to the treatment of MEO:**
    - Gaining control of the patient’s diabetes.
    - Debridement of the infection. In early MEO, curative treatment of the external auditory canal may be adequate. Methylene blue or an extended resection of the skull base may be required, if the facial or lower cranial nerves are involved. Adequate surgical debridement removes infection and improves control of diabetes. Hyperbaric oxygen is a useful adjunct.
    - Antibiotics, orally and systemic agents for a long time. Early stages of MEO respond well to oral ciprofloxacin. The mainstay remains a combination of IV semi-synthetic penicillin and oral ciprofloxacin. Therapy should be maintained until the glistening skin returns to normal (red). Decrease in pain and improved control of diabetes are early signs of recovery.

The diagnosis of different types of otitis externa

Fungal infections of the external ear are often misdiagnosed, unless manifesting in the classical way and are frequently refractory to the treatment prescribed for most external ear infections. They also challenge the clinician to determine whether the external ear disease is an isolated entity, is related to another systemic disorder or possibly to an underlying immunodeficiency disorder. The differentiation between infective otitis externa and eczematous otitis externa is sometimes problematic. To overcome the problem, it is important to follow the steps as described in Table III.

The management of otitis externa

The management of most medical conditions is based on the treatment of the underlying predisposing and precipitating causes. Most of the cases of otitis externa are multifactorial and idiopathic, causing difficulty in the management of otitis externa.
The treatment of infective otitis externa with ototopical antibiotics may also cause otitis externa. Neomycin causes contact dermatitis; this happens in less than 0.1% of the general population. Cerumenex (triethanolamine polypropylene olate condensate) is an agent for softening hard ear wax, but severe eczematoid allergic reactions occasionally occur. It can, therefore, be used to soften wax in the physician's office before syringing of the ears but should not be prescribed for use at home.

The role of systemic antibiotic therapy in inflammatory conditions of the external auditory meatus is controversial due to likelihood of development of resistant organisms (β-lactam-producing) in the population. The indiscriminate prescription of the penicillins and cephalosporins will increase the number of resistant strains within the population.

Cleaning the ear canal using the microscope, and the installation of ototopical antiseptics and antibiotics are the mainstay of treatment. Systemic antibiotics can be used when there is spreading of the infection beyond the confines of the external ear and in malignant otitis externa.

References

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