

# Swimmer's ear

## what the GP needs to know

**Swimmer's ear (acute diffuse otitis externa) is usually easy to diagnose. Treatment is initiated with cleaning of the ear canal and commencement of topical antibiotic therapy. Referral is required when the condition worsens or persists despite appropriate management.**

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Otitis externa refers to any infectious or inflammatory disorder affecting the skin of the external auditory canal (Table 1). Acute diffuse bacterial infection is the commonest cause of otitis externa and is known as swimmer's ear. In the USA, it affects 4 per 1000 population each year. As high humidity and contact with water predispose an individual to this condition, it would be expected that the incidence would be higher in Australia and occur more frequently over the summer months.

It is important for the general practitioner to be able to distinguish this condition from otitis media because swimmer's ear has a different bacterial profile and usually requires topical rather than systemic antibiotic therapy.

Swimmer's ear should respond rapidly to local therapy. If it persists, especially in immunocompromised or elderly diabetic patients, then the infection can extend to invade deeper tissues, leading to malignant (necrotising) otitis externa, which is an osteomyelitis of the skull base and is life threatening.

### **Pathophysiology**

An understanding of the normal physiology of the ear canal is necessary to advise patients, particularly those with recurrent problems.

The external auditory canal is cartilaginous in its outer portion, with a bony inner part leading to the ear drum. The skin over the cartilage is thicker and contains hair, sebaceous glands and ceruminous glands. The skin of the canal is unique in that it migrates radially off the ear drum and then along the length of the canal. Desquamated skin mixes with the secretions from the glands to produce cerumen (ear wax), which protects the canal from infection because it forms an acidic environment and contains immunoglobulin and lysozymes.

Any factors upsetting this environment will therefore predispose the individual to swimmer's ear. Contact with water or a high humidity climate will firstly decrease the acidity of the canal. Prolonged contact leads to maceration of the canal lining, creating microfissures for organisms to

### **IN SUMMARY**

- **Contact with water or high humidity decreases the acidity of the ear canal, and can lead to maceration of the canal lining, predisposing an individual to swimmer's ear.**
- **The mainstay of eradicating swimmer's ear is adequate cleaning of the ear canal and topical antibiotic–corticosteroid therapy.**
- **Suction cleaning is preferable, but dry swabbing of the canal with a probe and cotton wool will suffice.**
- **Caution should be used with antibiotic–corticosteroid preparations when the tympanic membrane is perforated.**
- **Referral to an ENT specialist is required when the condition worsens or persists despite appropriate management.**

**Table 1. Forms of otitis externa**

- Acute diffuse bacterial (swimmer's ear)
- Acute localised bacterial (furunculosis)
- Chronic
- Eczematous
- Fungal (otomycosis)
- Malignant (invasive)

enter. Some studies have shown high bacterial counts in swimming pools and freshwater lakes, but it is not certain if these are the source of infection.

Excessive cleaning of the ear canal will remove the protective wax and lead to trauma of the canal lining. The use of cotton buds in the ear canal should be discouraged.

Whereas the healthy ear canal is host to a variety of bacteria and some fungi, the organisms that cause swimmer's ear are mostly Gram-negative bacteria (Table 2). *Pseudomonas* species account for over half the cases, followed by *Proteus* species, *Staphylococcus aureus* and, to a lesser extent, streptococci.

### Clinical presentation

Swimmer's ear (Figure 1) presents with pain in the ear and a slight watery or purulent discharge of recent onset.



Figure 1. Swimmer's ear. The debris needs to be thoroughly cleaned out to allow the topical medication to contact the inflamed canal lining.

**Table 2. Common pathogens in swimmer's ear**

- *Pseudomonas aeruginosa*
- *Proteus mirabilis*
- *Staphylococcus aureus*
- Other Gram-negative bacteria
- Fungi (*Aspergillus*, *Candida* species)

In the early stages, the pain is mild to moderate and the canal slightly inflamed but still patent. The patient may give a history of pruritus or recent prolonged exposure to water.

As the condition worsens, the pain may become severe and the canal may become completely occluded because of swelling and debris, causing deafness. At this stage, the periauricular nodes become palpable and the infection can progress to a cellulitis of the pinna and surrounding areas. In a patient with a history of prolonged, painless, purulent otorrhoea who then develops these symptoms, a chronic suppurative otitis media (middle ear infection with a tympanic membrane perforation) with secondary otitis externa needs to be considered.

When examining the ear, pull the auricle back and up to straighten the ear canal. This will elicit tenderness, which can be marked in otitis externa but cause little problem with otitis media. The degree of canal occlusion can then be assessed, and the ear drum may or may not be visible.

### Management

The mainstay of eradicating swimmer's ear is adequate cleaning of the ear canal and topical antibiotic therapy. A management plan is summarised in the box on page 29.

#### Cleaning the ear canal

A good light source is mandatory. Suction cleaning is preferable. If suction is not available, dry swabbing of the canal

with a probe and cotton wool will suffice (Figures 2 and 3).

### Antibiotic therapy

In early otitis externa with an open ear canal, antibiotic–corticosteroid drops (such as Ciproxin HC, Kenacomb Otic, Locacorten-Vioform, Otocomb Otic, Otodex, Sofradex) will suffice.

As the canal becomes more occluded, debris needs to be cleared so that the drops will be effective. A wick of ribbon gauze or foam, such as a Pope wick, may need to be inserted to ensure that the drops make good contact with the canal lining. On occasions, the canal is so swollen that this cannot be achieved. A 10 mL syringe with a luer lock and a 16G jelco will allow the injection of an antibiotic–corticosteroid ointment down the canal (Figure 4). Once the swelling has settled over 24 to 48 hours, the canal can be cleaned and a wick inserted. Analgesia is prescribed as required.

Routine swabs for culture are of little benefit in the initial stages. The organisms and sensitivities have little relevance because the concentrations achieved by topical antibiotics are many thousands of times higher than those used to determine susceptibility. The causative bacteria have not changed over the last 50 years and no reports have been published of resistant organisms from the use of topical antibiotics in the ear canal. This contrasts markedly with our experience of systemic antibiotics in the treatment of otitis media and sinusitis. Taking a swab becomes useful in cases not responding to antibiotic treatment and will usually demonstrate a fungal cause.

If the infection extends to the pinna or to the face, systemic antibiotics are required. Usually at this stage it is necessary to hospitalise the patient for intravenous antibiotics and adequate analgesia.

Much has been made of identifying a tympanic membrane perforation before commencing therapy, but this can be difficult to establish with a swollen canal.

As discussed earlier, the history may give a clue to this. I do not favour irrigation to clear debris in this situation, preferring to use suction or dry swabbing. Although ear drops are contraindicated when there is a known or suspected perforation, I find that they rarely cause problems if used for short periods (three to four days) in an inflamed ear. Should this be a concern, ciprofloxacin–hydrocortisone (Ciproxin HC) drops may be used, but only for a short time – with follow up after three to four days of use.

### Adding an antifungal

Some ear drops contain not only an antibiotic plus corticosteroid but also an antifungal agent. It is common to see an otitis externa that improves and then deteriorates with prolonged use of an antibiotic–corticosteroid agent. The antibiotic changes the balance between the bacteria and fungi, leading to an overgrowth of fungi and a fungal otitis externa. This is usually (but not always) apparent, with white, brown or black hyphae and spores evident. In these cases, an antifungal agent needs to be added.

### Neomycin hypersensitivity

Neomycin is included in some ear drop preparations and may cause an allergic reaction in 5 to 15% of people. With prolonged use of these drops, the problem may become a low-grade hypersensitivity to neomycin – and not a resistant otitis externa.

### Prevention of otitis externa

The patient (or parent, in the case of a child) should be advised about measures to prevent otitis externa, such as:

- decreasing moisture exposure by shortening swimming and bathing times and using ear plugs
- drying ears after water exposure by using acetic acid–isopropyl alcohol drops (Aquaear, Ear Clear For Swimmer's Ear) or a blow dryer on a low setting



Figure 2 (left). The ear canal is best cleaned by dry swabbing with a probe tipped with cotton wool.



Figure 3 (right). When cleaning the canal, grasp the auricle, elevating it up and back. Note that the fingers of the hand holding the probe rest against the patient's face to prevent damage to the ear drum should the patient move.

## Swimmer's ear management plan

### If the ear canal is open

- Instil ear drops and follow up as required.

### If the ear canal is swollen or has debris

- Clean the canal and apply ear drops through a wick.

### If the ear canal is closed

- Apply drops through a trimmed Pope wick or inject antibiotic–corticosteroid ointment into the canal.
- Review in 24 to 48 hours, then clean the canal and apply drops through a wick.

### If there is severe pain, a prolonged course, or diabetes

- Refer to an ENT specialist.

### Notes

- Common ear drops include Ciproxin HC, Kenacomb Otic, Locacorten-Vioform, Otocomb Otic, Otodex, Sofradex.
- Eye drops are also commonly used and have a more neutral pH, which is less irritating to patients.
- It should be noted that not all drops are approved for otological use and should therefore not be prescribed on the PBS.
- Caution should be used with antibiotic–corticosteroid preparations in the presence of a tympanic membrane perforation.

continued



Figure 4. A 10 mL syringe with a luer lock and a 16G jelco can be used to inject antibiotic-corticosteroid cream down a swollen ear canal.

- avoiding cleaning and dewaxing of the ear canal.

### Differential diagnosis

Swimmer's ear is an acute, diffuse, bacterial otitis externa. It needs to be differentiated from other forms of otitis externa and conditions affecting the external and middle ear.

### Acute localised otitis externa (furunculosis)

Acute localised otitis externa is caused by abscess formation in the hair follicles or glands of the cartilaginous part of the ear canal, usually due to *Staphylococcus aureus*. It presents as a localised area of pain and swelling in the outer part of the canal. Treatment depends on the stage of abscess development. In the early stage of inflammation, local and/or systemic antibiotics and analgesia are appropriate.



Figure 5. Fungal otitis externa. Yellow fungal growth is visible in the ear canal.

When the abscess has formed, it should be lanced and drained. The use of antibiotics is dependent on the degree of surrounding inflammation.

### Chronic otitis externa

Chronic otitis externa is caused by a persistent, diffuse, low-grade infection and inflammation of the ear canal. It can be reactive or infective in origin.

The reactive forms, also known as eczematous otitis externa, are due to various dermatological conditions. Atopic dermatitis, seborrhoeic dermatitis, contact dermatitis, psoriasis and neurodermatitis may all affect the ear canal. The main complaint is usually pruritus, and examination reveals erythema, oedema, scaling, crusting, oozing and fissuring of the canal and conchal bowl. Management is based on the underlying dermatological condition, but most respond quickly to cleaning and topical corticosteroid therapy.

The low-grade infective forms of chronic otitis externa have little in the way of pain. They generally present with pruritus and mild discomfort. The canal is usually deficient of wax (asteatosis), and the lining skin is dry and hypertrophic. Frequent, thorough cleaning of the ear canal is necessary, along with topical antibiotic and corticosteroid therapy.

### Fungal otitis externa

Fungal infection accounts for approximately 10% of cases of otitis externa. This usually occurs in more humid environments and can be associated with prolonged use of antibiotic ear drops. The usual organisms are *Aspergillus niger* and, less so, *Candida* species, and they may occur with a bacterial infection.

The presentation is similar to that of diffuse bacterial otitis externa, but a black-grey, yellow or white fungal growth is usually readily identifiable along with the canal debris (Figure 5). These infections are more resistant to treatment and necessitate meticulous cleaning of the canal along with antifungal agents. They

may lead to tympanic membrane perforations, which often do not heal. Early and thorough management may prevent this complication.

### Necrotising (malignant) otitis externa

When an otitis externa infection extends to involve the deeper tissues and bone of the skull base, necrotising otitis externa may arise. It usually occurs in immunocompromised or elderly diabetic patients, by extending through fissures in the canal. It manifests as a prolonged otitis externa not responding to treatment, with severe pain and granulation tissue in the canal. The causative organisms are almost always *Pseudomonas* species and necessitate urgent specialist referral.

Treatment is by debridement and topical antipseudomonals, stabilisation of the diabetes and appropriate systemic antibiotics. The antibiotics are usually given intravenously, but in the early stages of the condition some success has occurred with prolonged oral ciprofloxacin treatment.

### Granular myringitis

Granular myringitis is a localised form of otitis externa characterised by chronic inflammation on the lateral surface of the ear drum. The ear canal is normal. Areas of granulation tissue on the ear drum may be localised or may cover most of the drum. Granular myringitis may be difficult to cure; however, I have found good success with cleaning and the topical application of ciprofloxacin with hydrocortisone.

### Bullous myringitis

Bullous myringitis is an extremely painful condition of acute onset, thought to be due to *Mycoplasma pneumoniae*. The canal is normal, but the ear drum and possibly the deep canal show haemorrhagic bullae. The pain usually subsides with the spontaneous rupture of the bullae and the appearance of a slight bloody

discharge. Treatment is to give adequate analgesia. It is not certain whether erythromycin changes the course of the disease.

### Otitis media

If the ear drum is intact, otitis media will present as pain. On examination of the ear, no additional pain should be experienced, the canal should appear normal, and the drum will be inflamed and bulging. Oral antibiotics, e.g. amoxicillin or trimethoprim-sulfamethoxazole, are appropriate.

Tympanic membrane perforation with chronic or intermittent discharge constitutes chronic suppurative otitis media. In this situation, there will be frank pus within the canal, which exudes freely from the ear. This contrasts with the small amount of pus and gross canal swelling that exists with otitis externa. Confusion may arise as the draining

pus may cause a degree of inflammation and infection of the ear canal. It is important to always examine an ear drum thoroughly once an otitis externa has settled to ensure that a perforation does not exist.

### Neoplastic lesions

Various tumours can exist in the ear canal. Their mass effect may predispose to an infective otitis externa. It is therefore important to examine the ear canal for any suspicious lesions once the infective component has been eliminated, and refer if needed.

### Conclusion

Swimmer's ear is acute diffuse otitis externa. It is a common problem usually managed by the general practitioner. Its diagnosis is usually straightforward, and treatment is initiated with cleaning of the ear canal and commencement of

topical antibiotic therapy with or without a corticosteroid. Referral to an ENT specialist is required when the condition worsens or persists despite appropriate management. An understanding of the normal physiology of the ear canal is necessary to advise patients with recurrent problems. **MT**

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