The discharging ear: an approach to assessment

Taking a history is an essential part of the assessment of patients with ear pathology. A significant number of conditions can be diagnosed based simply on this. It is especially important to find out the type of discharge present: purulent or mucoid, clear or blood stained.

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The discharging ear is a commonly encountered presentation in general practice. It can represent a large variety of conditions that can occur in patients of any age. A logical approach can be taken to the assessment of the patient with a discharging ear and in approaching a diagnosis. This enables accurate treatment and/or referral of the patient.

Assessment

Taking a history is an essential part of the assessment of patients with ear pathology. A significant

IN SUMMARY

- **The discharging ear can represent a large variety of conditions that can occur in patients of any age.**
- **Taking a history is an essential part of the assessment of patients with ear pathology.**
- **Common causes of purulent or mucoid discharge include otitis externa, infected perforation, foreign body or infected cholesteatoma.**
- **Clear discharge is an uncommon form of otorrhoea in general practice. Usually the history is indicative of the underlying aetiology.**
- **Blood-stained discharge usually causes significant concern to the patient. It has a range of possible causes from more benign pathology such as acute otitis media to more serious concerns such as middle ear or ear canal tumours.**
- **Classifying the type of discharge present allows the various common aetiologies to be considered, enabling accurate treatment and/or referral of the patient.**

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Table 1. Causes of the discharging ear according to the type of discharge present

Purulent or mucoid discharge

- Otitis externa
- Infected perforation/grommet
- Chronic suppurative otitis media
- Infected cholesteatoma
- Foreign body

Clear discharge

- Trauma or cerebrospinal fluid leak
- Iatrogenic cause/surgery

Blood-stained discharge

- Acute otitis media/chronic suppurative otitis media
- Cholesteatoma
- Trauma
- Tumour
  - external auditory canal tumour
  - glomus tumour
  - middle ear tumour

number of conditions can be diagnosed based simply on this. It is particularly important to find out the type of discharge present, the three main types being purulent or mucoid, clear and blood stained. Other essential historical features include the presence or absence of otalgia, tenderness (particularly in the region of the tragus or mastoid), hearing loss, tinnitus (either pulsatile or constant in nature) and vestibular disturbance. Other relevant facts to include in the assessment are rapidity of onset and time frame of discharge, history of previous episodes, previous surgery or trauma (use of cotton buds or earplugs), involvement of any activities that involve flying or diving and the presence of any dermatological conditions.

When examining a patient it is important to have a good understanding of the anatomy of the ear and to consider the condition in respect to anatomical divisions (Figure 1). The first consideration is the state of the pinna and ear canal. Good visualisation is best achieved with the largest speculum that can be comfortably used in the patient. The state of the tympanic membrane then needs to be considered, followed by the state of the middle ear and finally the state of the hearing and vestibular function.

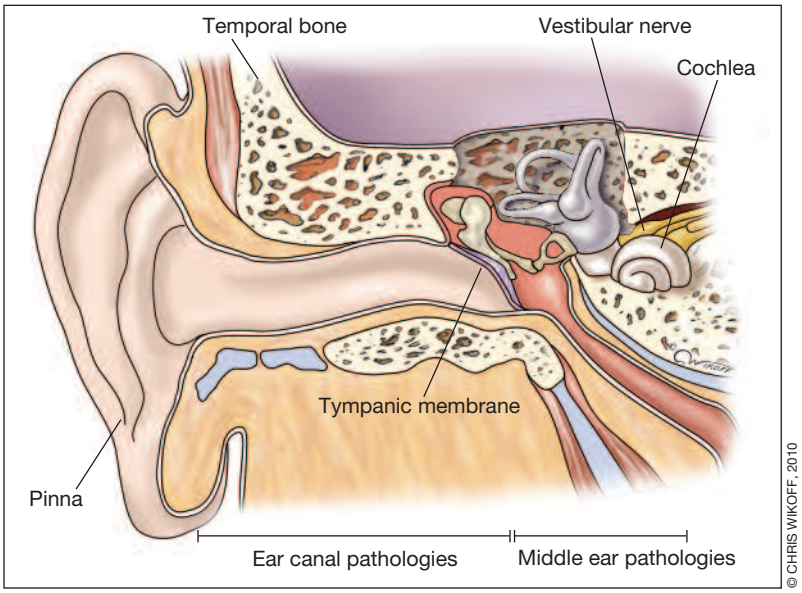

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Figure 1. The anatomy of the ear.

Type of discharge present

Classifying the type of discharge into purulent or mucoid, clear or blood stained allows the various common aetiologies to be considered, as described below (also see Table 1). In broad terms, purulent or mucoid discharge represents the most common type of discharge encountered. Clear discharge is relatively uncommon, although can have significant implications. Blood-stained discharge can represent a wide range of conditions, from benign pathology to malignancy.

It is also possible to classify the discharge according to its site or origin and then to break this down into common diagnoses (Table 2). Generally, discharge arises from either the external auditory canal or the middle ear. The inner ear is not considered because perilymph leaks from the cochlea are not usually of a sufficient volume to present as a discharging ear.

Purulent or mucoid discharge

Purulent or mucoid discharge can occur in any age group and can represent a variety of conditions. The most common cause of purulent or mucoid discharge relating to the ear canal is otitis externa.

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Table 2. Causes of the discharging ear according to the site or origin of discharge

External auditory canal

- Otitis externa
- Trauma
- Dermatological condition
- Tumour

Middle ear

- Acute otitis media/ chronic suppurative otitis media
- Cholesteatoma
- Iatrogenic cause
- Trauma
- Tumour

Figure 2. Fungal otitis externa in the right ear canal.

Table 3. Guidelines to aural toilet

- Maximise visualisation, by using a bright light, magnification and binocular vision
- Use the two-handed technique – one hand to retract the pinna and hold the speculum and the other to toilet the ear
- Perform with a cotton wool carrier or microsuction, as these are preferred methods
- Never place an instrument where the tip of it cannot be seen
- Avoid syringing if a tympanic membrane perforation is suspected

Otitis externa

Acute otitis externa is often related to either trauma to the ear canal or trapping of water within the ear canal. There are two forms of acute otitis externa: bacterial and fungal. The most common form is bacterial with *Staphylococcus* or *Pseudomonas* species.

Bacterial otitis externa classically presents with a rapidly evolving severe otalgia with extreme tenderness, particularly over the tragus, and swelling over the ear canal that may extend into the pre- and post-auricular regions. Severe tenderness on palpating the tragus or on pinna traction is a pathognomonic sign of bacterial otitis externa. Otoscopy often reveals severe oedema with a mucopurulent exudate, and patients often find such an examination extremely painful.

Fungal otitis externa is less commonly encountered and is often seen within the ear canal following use of antibiotic medications (Figure 2). Antibiotics eliminate the normal bacterial flora within the ear canal to allow a secondary fungal overgrowth. *Aspergillus niger* and *Candida albicans* are the two most commonly encountered fungi. Fungal otitis externa is often characterised by a more chronic indolent course with significant itch and less pain.

Both bacterial and fungal otitits externa result in a temporary conductive hearing loss. Fungal otitis externa is further characterised by the possibility of fungal erosion of the tympanic membrane, resulting in a perforation. This is extremely rare in patients with bacterial otitis externa.

The key to treatment of otitis externa is the removal of underlying debris in the ear canal with aural toilet (Table 3), topical antibiotics (Table 4) or antifungal agents, as appropriate, and the use of an ointment-coated ear wick if significant swelling is present. Taking a swab of the ear canal is useful in patients with persistent or recurrent infection to better direct therapy. Topical corticosteroids incorporated into the antibiotic agent rapidly reduce pain and swelling in the acute setting. It is recommended that patients keep the ear dry until the condition has completely resolved and, in cases of recurrent otitis externa, preventative techniques, such as use of ear plugs and alcohol-based drops (not to be used if a perforation is present), are recommended. Predisposing factors, such as severe exostoses, can be addressed surgically to help combat recurrent episodes.

Otitis externa is a much more serious condition in patients who are immunocompromised or have diabetes. These patients have an increased risk of developing a malignant otitis externa (also called skull base osteomyelitis). This condition is characterised by ongoing pain and discharge that fails to respond to standard treatments. A high index of suspicion is also required. *Pseudomonas* species are a common aetiological agent, although fungal infections are also recognised in these patients. Referral of patients with skull base osteomyelitis is mandated because intensive antibiotic or antifungal therapy is required, usually for a minimum of six weeks and often for up to three months. This condition can progress to cause multiple cranial nerve palsies, and there is a significant incidence of associated mortality. Similarly, patients who have had radiotherapy to the ear canal may develop chronic osteoradio - necrosis, resulting in recurrent or persistent epithelial breakdown and infection.

Foreign body

Patients who have foreign bodies in the ear canal – often young children – may present with a purulent or mucoid discharge. The foreign body may be organic or inorganic material. Inorganic materials, such as beads, generally do not produce a significant inflammatory response unless there has been some trauma to the skin of the ear canal in the

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Table 4. Commonly used topical otic antibiotics

- Chloramphenicol
- Ciprofloxacin hydrochloride
- Ciprofloxacin hydrochloride and hydrocortisone
- Gramicidin, neomycin sulfate, nystatin and triamcinolone acetonide*
- Clioquinol and flumethasone pivalate
- Dexamethasone, framycetin sulfate and gramicidin*

* Framycetin and neomycin are aminoglycoside antibiotics.

process of placing the foreign body.

Foreign bodies need to be carefully removed, particularly in small children. This requires a two-handed technique so that the ear canal is not traumatised if the patient's head moves during the procedure. It is essential when removing a foreign body that one can completely visualise the foreign body under binocular magnification so that any instrument used does not traumatise the underlying tympanic membrane. Often small children will require an anaesthetic in the operating theatre or a degree of sedation to enable removal of foreign bodies that are deep in the ear canal. Use of glues on a ridged object is not generally recommended unless circumstances are such that no alternative means of removal is possible.

Acute otitis media

Middle ear pathologies such as acute otitis media commonly present with purulent or mucoid discharge. This common condition is usually bacterial in nature and often presents with typical features of otalgia, fever and malaise, and then a secondary blood-stained purulent discharge that equates to a spontaneous perforation of the tympanic membrane. The perforation is minute in nature and normally resolves within 24 to 48 hours. Uncommonly, it may persist and a more permanent perforation may evolve. Treatment of a spontaneously discharging acute otitis media is with oral antibiotics.

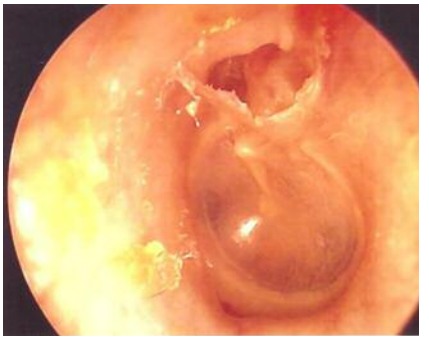

Figure 3. An attic cholesteatoma with erosion of the bone of the superior portion of the left ear canal.

Figure 4. A posterosuperior mesotympanic cholesteatoma (marginal perforation) in the right ear canal.

Infected grommets

Infected grommets (ventilating tubes) are also a common presentation of a purulent discharge. Pain is not a common feature of this condition and the bacterial agents involved vary, including *Staphylococcus* species and gram-negative bacteria such as *Pseudomonas* species. Treatment is best undertaken with aural toilet, a swab for microbiological investigation and topical antibiotics. With recent increasing concern over aminoglycoside ototoxicity, topical antibiotics can be limited to the quinolone class to avoid this risk.[1] Oral antibiotics are occasionally used in severe cases or when there is a lack of initial response to topical drops.

Chronic suppurative otitis media

Chronic suppurative otitis media needs to be considered when a purulent, mucoid or blood-stained discharge persists for a few months. This condition can occur in any age group. A common predisposing feature is eustachian tube dysfunction. The presentation usually consists of recurrent or constant otorrhoea with minimal otalgia.

Pathogens of this condition are quite variable and gram-negative agents, such as *Pseudomonas* species and *Escherichia coli*, are common. Culturing the discharge is particularly important. Otoscopic findings include a tympanic membrane perforation, myringitis, granulation tissue or infection. Discharge may be purulent or blood stained in nature.

Patients with chronic suppurative otitis media require referral and significant intervention with both antibiotics and surgery. The complications are quite serious, including permanent hearing loss of a conductive and sensorineural nature, mastoiditis, facial nerve injury and even meningitis.[2]

Cholesteatoma

Patients with cholesteatoma often present with a continually discharging ear and commonly odour. This locally destructive condition is an abnormal ingrowth of squamous epithelium from the tympanic membrane.

Cholesteatoma may arise from the pars flaccida or pars tensa. With pars flaccida cholesteatoma there is usually erosion superiorly over the head of the malleus into the epitympanum and through into the mastoid air cell system (Figure 3). Pars tensa cholesteatoma often arises from a perforation on the margin of the tympanic membrane (Figure 4). Squamous epithelium may migrate down from here into the middle ear over the ossicular chain and again into the mastoid air cell system.

This condition often presents with intermittent or continued purulent, mucoid or

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blood-stained discharge despite treatment. A high index of suspicion is required for any situation such as this. Patients with a long history of chronic ear problems may develop this condition. Treatment is surgical; the extent of the mastoidectomy is determined by the degree of cholesteatoma. Complications of cholesteatoma are serious and include conductive and sensorineural hearing loss, mastoiditis, labyrinthitis, facial nerve injury, meningitis and cerebrospinal fluid (CSF) leak.

Clear discharge

Clear discharge is an uncommon form of otorrhoea in general practice. Usually the history is indicative of the underlying aetiology. Trauma to the ear canal or tympanic membrane may present with a haemoserous or clear discharge. Items such as cotton buds inserted into the ear or a direct blow to the ear are common causative agents. A clear discharge is also sometimes encountered after surgical intervention. Usually, such intervention is evident on history and examination.

Head injury

Of more serious concern is when there is a history of significant head injury. Clear otorrhoea following such an event should always raise the suspicion of a CSF leak. Temporal bone fractures are often missed on routine radiology. They are classified into horizontal or vertical depending on their axis to the temporal bone. The fractures may run through the roof of the middle ear or bony ear canal, resulting in a direct leak of CSF through the ear canal. Such a presentation requires immediate referral of patients for management and possible surgical repair of the leak.

Blood-stained discharge

Blood-stained discharge usually causes significant concern to the patient. It has a range of possible causes from more benign pathology, such as acute otitis media, to more serious concerns, such as middle ear or ear canal tumours. Of the potential aetiologies, otitis media, either acute or chronic, and cholesteatoma are the most commonly encountered.

Barotrauma

Barotrauma is also a potential cause of blood-stained discharge and is commonly encountered in general practice. It is caused by pressure changes, usually associated with flying or scuba diving. Water skiing and surfing are also recognised causes. Barotrauma can cause damage to the tympanic membrane or middle ear and, in rare situations, the cochlea.

Tympanic membrane injury is usually characterised by initial pain, typically on descent. This may result in a mild hearing loss, but no ongoing vestibular symptoms. Severity can range from simple haemorrhaging to the layers of the tympanic membrane to middle ear effusion or, rarely, tympanic membrane perforation. Barotrauma usually resolves spontaneously, although if an effusion is present a course of antibiotics is often given to the patient. Placement of ventilating tubes can be useful in the prevention of repeated barotrauma.

Perilymphatic fistula is a rare form of barotrauma that involves rupture of the round or oval window membrane, allowing perilymph fluid to escape from the cochlea and vestibular system, and air to ingress. This results in acute onset of sensorineural hearing loss, tinnitus and vertigo. It requires immediate treatment with corticosteroids and surgical repair, and is considered a surgical emergency.

Direct trauma

Direct trauma can occur to the tympanic membrane, usually relating to a foreign body such as a cotton bud (Figure 5). Initial pain usually occurs with the perforation; there is hearing loss but vestibular dysfunction is uncommon. About 80 to 90% of traumatic perforations heal, unless secondary infection becomes established. Ongoing vestibular symptoms should raise a suspicion of perilymphatic fistula.

Figure 5. A posterosuperior traumatic perforation of the tympanic membrane (right ear).

Figure 6. A red mass behind the tympanic membrane indicative of a glomus tympanicum tumour (left ear).

Direct trauma such as head injury may also result in a fractured temporal bone. Fractures of the temporal bone and skull base often present with blood-stained otorrhoea or haemotympanum. The sequelae of this can be quite severe, particularly if the fracture line crosses the cochlea and the vestibular system, resulting in a 'dead ear' as well as severe vertigo. Other associated features, such as facial nerve palsy, CSF leak or meningitis, may occur. Haemotympanum is normally managed conservatively (unless an active CSF leak is present) because there are many fractures of the temporal bone.[3]

Tumours

Purely blood-stained discharge of the ear can, in rare instances, represent a benign

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or malignant tumour. The most common malignancy in the ear is a squamous cell carcinoma. Basal cell carcinomas are also recognised and, in rare instances, minor salivary gland tumours may arise in the cartilaginous canal.

Glomus tumours, also known as paragangliomas and which are related to carotid body tumours, can also arise in the middle ear (Figure 6). These very rare tumours are highly vascular and, if large, may penetrate the tympanic membrane and lead to a blood-stained discharge. Treatment of these complex conditions is difficult and patients are usually managed in a tertiary referral skull base unit.

Conclusion

The discharging ear is a commonly encountered condition and can represent a large variety of conditions. Classifying the type of discharge present enables a better evaluation of the potential aetiologies for this presentation and also accurate treatment and/or referral of patients. MT

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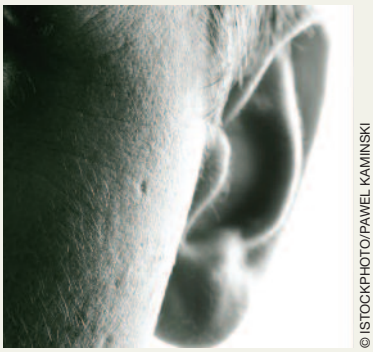

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