

Chapter 20

Acute Ear Emergencies

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Introduction

The emergency department is often the first port of call for a variety of ear, nose and throat (ENT) disorders. Although most of these conditions are benign, there are important critical ENT disorders that must be immediately recognised and managed. This chapter, divided as three subsections, attempts to discuss salient disorders from the perspective of the emergency physician.

Applied Anatomy

- The ear canal is a tortuous tube, directed upwards and backwards in the outer half and downwards and forwards in the medial half. In children, it is almost straight. Hence, while examining the ear, the pinna should be pulled upwards and backwards in adults and downwards in children.
- There is a narrow part of external canal, the isthmus, at the junction of the outer two-third and inner one-third, which should be kept in mind, while removing foreign bodies (FB).

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Fig. 20.1 Normal tympanic membrane

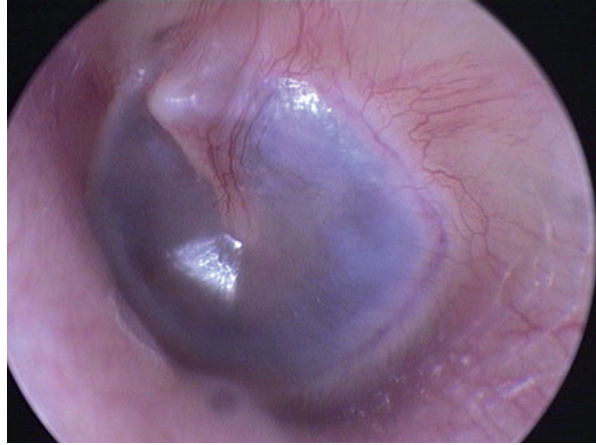


Table 20.1 Aetiology of otalgia

Trauma to the ear
Keratitis obturans
Herpes zoster oticus
External otitis
Necrotising otitis
Otalgia of children
Otalgia of air travel

- The skin is tightly draped over the canal wall which makes the furuncle very painful, and any careless handling can be very painful.
- The normal tympanic membrane is a shiny white surface with a cone of light antero-inferiorly (Fig. 20.1).
- A branch of the vagus nerve (Arnold's nerve) can get stimulated, which can result in syncope [1]. Due to the same reason, some patients develop cough on stimulating the external canal.
- The auriculo-temporal branch of the trigeminal nerve is the cause of referred otalgia of dental origin [2].
- Glossopharyngeal nerve, which presents itself as a plexus in the middle ear, is the cause of pain of the posterior one-third of the tongue and is due to tonsillar lesions [3].

Acute Ear Pain

Pain in the ear is one of the common emergencies which require urgent doctor's help in odd hours especially in children. Although there are many causes, the salient ones are enumerated in Table 20.1.

Fig. 20.2 Traumatic perforation – TM

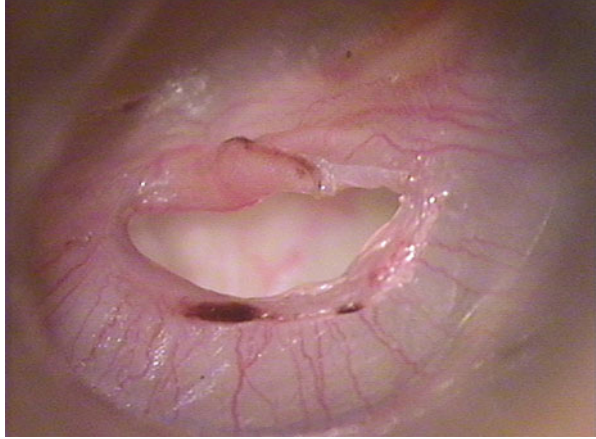


Fig. 20.3 Perforation of chronic suppurative otitis media



Trauma to the Ear

- Trauma to the ear can be trivial – nail scratch causing abrasion or haematoma of the pinna or lacerated injury. An example of occult trauma is perforation of the eardrum.
- A slap on the face/ear can result in traumatic perforation of the tympanic membrane (TM), which has a classical appearance of irregular margins (Fig. 20.2). This needs to be differentiated from the circular perforation due to suppurative otitis media (Fig. 20.3). *However, post-traumatic perforation will assume a circular shape, after a few days due to the ongoing healing process.*

- Traumatic perforation of TM has a significant chance of spontaneous healing unless impeded by application of ear drops (a common iatrogenic blunder), or use of earbuds, which have the potential to contaminate the ear canal.

Haematoma Auris

- Collection of serous fluid in the subperichondrial space in the pinna is known as pseudocyst. When it turns bloody, it is haematoma auris, and when there is infection, it is known as perichondritis or perichondral abscess.
- Haematoma auris and perichondral abscess require incision and drainage under antibiotic cover.
- The deformity which results in the healing phase of perichondritis is known as 'cauliflower ear'.

Keratosi Obturans

- This is a condition of the external ear, in which accumulation of keratotic, desquamated material presents as a sac of external canal skin. It can expand and erode the bone and can cause facial palsy [4].
- Patients present with history of pain and fullness of the ear. On examination, there is earwax of varied colour, consistency and tenderness on touching the pinna.
- Usually there will be no history of ear discharge, which is indicative of CSOM (chronic suppurative otitis media).
- There may be history of similar episode in the same ear indicating a tendency as a result of defect in epithelial migration of the ear canal skin.
- Pain relief is achieved by excision of the sac either under local anaesthesia or general anaesthesia. Use of microscope is recommended.

Necrotising Otitis Externa

- Also referred to as malignant otitis externa. However, this is not a malignant condition but can be as devastating and fatal [5].
- Progressive pseudomonas infection of the external canal and mastoid bones occurs in immune compromised, commonly in diabetics.
- Patient presents with very painful external otitis with tenderness, aural fullness and otorrhoea. The ear canal may have granulations and oedema and occasionally with lower motor neuron facial palsy.
- Pain is disproportionate to the findings inside and unrelenting, in spite of antibiotics and painkillers.

- Knowledge of this condition is necessary for early and aggressive therapy. Early ENT consultation needs to be sought.
- *Management includes* surgical debridement, control of diabetes, opioids for pain relief and appropriate parenteral antibiotics.
- Patients with associated co-morbidities such as uncontrolled diabetes, renal impairment or peripheral vasculopathy have poor prognosis.

Herpes Zoster

- This is a painful condition of the ear, presenting with vesicular rashes on one half of face and pinna.
- Described first by Ramsay Hunt in 1907, the reactivated varicella zoster infection from dormant viral particles resident in the geniculate ganglion of the facial nerve is the cause.
- Herpes zoster oticus is the second major cause of facial palsy after Bell's palsy.
- The sequel of concern in herpes zoster oticus is the development of lower motor neuron facial palsy which is often not reversible and facial neuralgia which persists after the vesicles resolve.
- Management includes early administration of oral steroids and antiviral drugs (acyclovir) to achieve best facial nerve outcome.
- For neuralgia, carbamazepine may be necessary.

Acute Pain of Air Travel

- Acute otalgia during air travel is due to the pressure gradient between the ground level and the higher altitude, especially when there is eustachian catarrh.
- It presents as progressive increase in aural fullness and pain.
- During travel, by a manoeuvre of pinching the nose and trying to swallow the saliva, this would pop the ears open. Anti-inflammatory and decongestant antihistamine tablets can be taken. Application of nasal decongestant drops (oxymetazoline) will help immediately.
- Prevention: Treatment of upper respiratory infection prior to air travel and use of chewing gum for a few days prior to travel for anyone who has the tendency to develop ear pain during air travel.

Acute Ootalgia of Infants

Incessant cry of an infant or child is often due to ear pain. Most of the ear pain is due to the middle ear effusion caused by:

1. Untreated upper respiratory infection and nasal block.
2. Improper feeding positioning of breast-feeding, for example, mother lying down on side and feeding the baby.

Table 20.2 Referred otalgia

Source of pain	Cranial nerves involved
Dental caries, temporomandibular joint pathology	Facial nerve
Tonsillitis, oropharyngitis and carcinoma of oral cavity	Glossopharyngeal nerve
Pharyngolaryngeal area (infections, Ca larynx) and reflex oesophagitis	Vagus nerve (Arnold's nerve)

3. Use of feeding bottles with child lying flat on the lap of the mother. This may result in milk regurgitating into the patulous and short eustachian tube of the infant.
4. Laying down the child flat after a full feeding without burping.

Management

1. Instillation of saline nasal drops and administering decongestant antihistaminic syrup, pain-relieving syrup and antibiotic as per the associated symptoms.
2. *Do not instil ear drops*; do not try to clean the ear even if there is a discharge. Do not use cotton ear tips.

Referred Otolgia

The pain felt in the ear for the pathologies in the adjoining regions is known as referred otalgia (Table 20.2). This is due to the shared innervations of the inner ear with these regions. The following table shows the pathology and the respective nerves involved. On examination the ear appears normal. Trigeminal nerve can be a rare cause for referred otalgia.

Bleeding from the Ear

History

- Trauma
- Use of cotton ear tip
- Nasal block with pain in the ear
- Frank blood (trauma) or associated watery/purulent discharge (otitis media)
- Injury to head (watch for other signs of head injury)

- Injury to chin often causing bilateral ear bleeding due to impaction of external ear canal often misunderstood as head injury

Examination

- Pinna should be gently pulled backwards to examine the canal for laceration.
- There can be oedema of the external canal or perforation of tympanic membrane.
- If the canal is filled with wax, it should be cleaned only if soft and easy to clean by suction.
- Cleaning can be done after initial bleeding has settled.
- In children and infants, no attempt to clean should be made, since it may cause more pain and trauma.
- Do not plug the ear in suspected head injury which can cause increased pressure in the canal and can get conducted intracranially, and plugging can also promote infection.
- Examination of nasal cavity may show nasal block, which could be the cause of acute otitis media resulting in bleeding from the ear.
- Laboratory investigation for clotting profile is necessary only if there is history of bleeding diathesis or if the bleeding doesn't stop within the time of average clotting.
- Never apply ear drops.

Ear drops and ear tips: There is a tendency to use or prescribe ear drops in every ear symptom – be it pain, blocked sensation, itching and finally trauma to ear. The fact is that majority of ear problems do not require any ear drops. Ear drops applied unnecessarily wets the ear, and in traumatic perforation, the medication is potentially more harmful than the pathology. The next danger posed to the ear is the use of ear tips. This can potentially damage the eardrum, destroy the epithelial lining of external canal and also can introduce infection.

A useful algorithm which could be utilised in the evaluation of painful ear is depicted in Fig. 20.4.

Foreign Bodies in the Ear (FB) (Table 20.3)

- Syringing with warm water is the best method to remove any foreign body of the ear.
- Syringing should be done without touching the external canal skin, since it is very sensitive.
- Glycerine syringe is the ideal equipment along with suction apparatus and appropriate suction tip.

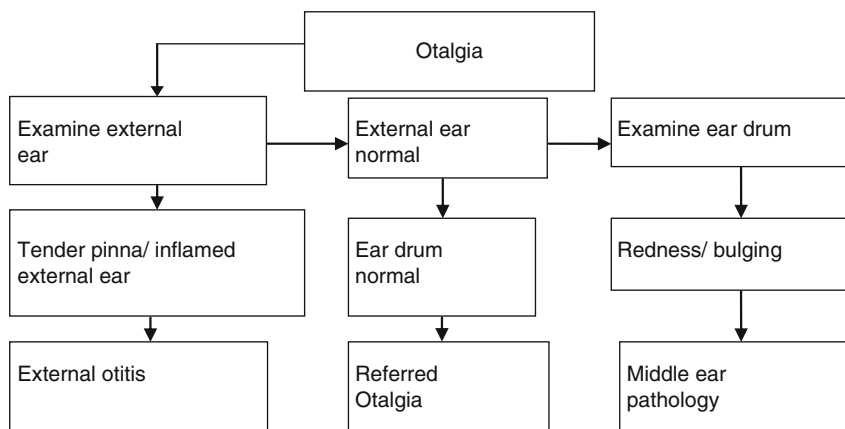


Fig. 20.4 Algorithm for otalgia

Table 20.3 Foreign bodies in the ear

Rubber pieces
Vegetable seeds
Plastic beads
Insects
Cotton tips
Metallic objects

- In case of a live insect, lignocaine is an effective agent to kill the creature quickly, which can be subsequently removed by syringing.
- Syringing is the ideal method in vegetable seeds also, with deference to the concept that vegetable may swell up with water, since the FB is going to be removed as soon as possible.
- As far as possible, the use of metallic sharp instruments should be avoided.

In case of a child, proper immobilisation of the child is essential. The classical child-holding position should be practiced. The child should be made to sit on the lap of the parent or assistant in straight posture with both the legs of the child crutched between the thighs and the left hand holding the wrist (narrowest part) of both the hands of the child together and the right palm of the examiner holding the forehead (not the chin to avoid choking) of the child firmly against chest of the assistant (Fig. 20.5).

- Occasionally when the foreign body is impacted at the isthmus or if there is an inflammation and oedema of external canal and in children, general anaesthesia may be needed for removal.
- In case of the presence of wax (cerumen), it is prudent to apply wax solvent ear drops and remove by syringing, the following day.
- Live insect FB is a true emergency.

Fig. 20.5 Positioning a child for clinical examination



Vertigo

- Vertigo, also known as dizziness and giddiness, is defined as abnormal sense of movement either rotatory or linear, if linear, back and forth or sideways.
- Vertigo, though it is basically a symptom, can represent a large group of diseases.
- The lifetime incidence of vertigo is about 30 % for any individual, and in most occasions, the cause for vertigo is indeterminate since it is often idiopathic.

Vertigo is discussed in detail under the chapter Dizziness and Syncope, elsewhere in the book.

Facial Palsy

- Facial palsy causes cosmetic disfigurement, functional disability and anxiety due to uncertainty of the cause and prognosis. The commonest form of facial palsy is the Bell's palsy [6].
- Facial palsy associated with co-morbidities such as middle ear disease, trauma or vascular episodes is understood and managed with the primary disease.
- Facial palsy could be of either upper motor neuron (UMN) or lower motor neuron (LMN) origin.
- Bell's palsy is a LMN facial palsy, sudden in onset with or without pain.
- Symptoms include facial asymmetry, inability to close the eyes, inability to chew and swallow food as well as decrease in ability to taste.
- There is decrease in the amount of tears and saliva produced.
- On examination the ear canal and tympanic membrane appear healthy, unless the condition was preceded by an episode of common cold, due to which there could be signs of eustachian catarrh.
- Steroids, vasodilators and antiviral drugs are the main stay of therapy.
- Tablet prednisone for 1 mg/kg or 60 mg/day for 6 days is to be administered, which is tapered off in 10 days.
- Tablet acyclovir is given at a dosage of 400 mg orally five times daily for 10 days.
- Physiotherapy is to be commenced early, to maintain the muscles of the face active and well exercised.
- Majority of cases recover fully. However, few cases remain with residual palsy.
- In case of signs of exposure keratitis, blepharoplasty may be required.

Sudden Hearing Loss (Idiopathic)

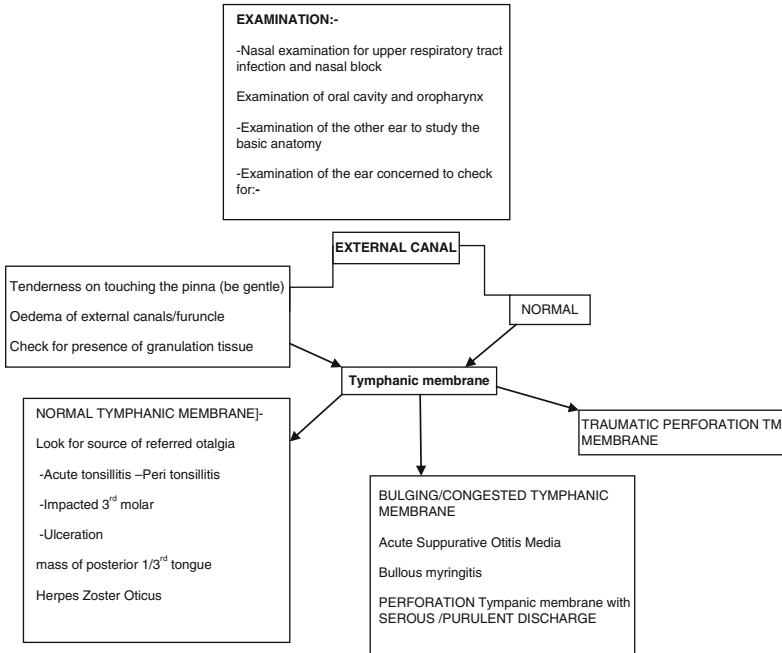
- Defined as a minimum of 30 dB hearing loss in three consecutive frequencies occurring within 3 days.
- Symptoms are associated with ear infections, trauma and neuro-otological conditions such as Meniere's syndrome. However, in most patients, the cause cannot be identified [7]
- Viral, vascular and autoimmune theories are postulated.
- Patient presents with sudden profound hearing loss with or without tinnitus and vertigo, more commonly unilateral. Nine out of ten people with SSSL lose hearing in only one ear.
- Obtain history of pre-existing hearing loss which the patient is ignorant of; the close relative of the patient has to be questioned. Also enquire about intake of ototoxic drugs; fever of high degree could have caused toxicity due to viral/bacterial infection.
- Requires early specialist referral.
- The prognosis is unpredictable.

Tips to Prevent Otolgia

- In a case of an infant, advise the mother not to feed the infant in a supine position, since regurgitation of milk into the short and patulous eustachian tube tends to occur.
- Both in child and in the adult, usage of nasal drops will relieve symptoms.
- Steam inhalation helps to open the eustachian tube and moisturises the respiratory mucosa.

OTOLGIA (HISTORY)

CHILD		ADULT
INFANT FEEDING BOTTLE UPPER RESPIRATORY CATARRH		DIABETES MELLITUS, NEURALGIAS -FACIAL/TRIGEMINAL
History of Trauma History of barotrauma Slap on the ear Blast –cracker History of travel to high altitude History of foreign body Insect, Inert object, Vegetable matter Attempted removal	History of Head Injury History of chin injury History of air travel History of Upper respiratory infections (Eustachian Catarrh)	History of wax in the ear History of painful wax removal in the past [keratosis obturans] Use of ear tips Bleeding from the ear History of use of ear drops



References

1. Canning BJ. Anatomy and neurophysiology of the cough reflex: ACCP evidence-based clinical practice guidelines. *Chest*. 2006;129(1_suppl):33S–47S.
2. Malik MK, Sharma JK. Referred otalgia of dental origin. *J Indian Dent Assoc*. 1975;47(10):413–6.
3. Lam L, Logan RM, Luke C. Epidemiological analysis of tongue cancer in South Australia for the 24-year period, 1977–2001. *Aust Dent J*. 2006;51(1):16–22.
4. Piepergerdes MC, Kramer BM, Behnke EE. Keratosis obturans and external auditory canal cholesteatoma. *Laryngoscope*. 1980;90(3):383–91.
5. Nawas MT, Daruwalla VJ, Spierer D, Micco AG, Nemeth AJ. Complicated necrotizing otitis externa. *Am J Otolaryngol*. 2013;34(6):706–9.
6. Baugh RF, Basura GJ, Ishii LE, Schwartz SR, Drumheller CM, Burkholder R, et al. Clinical practice guideline: Bell's palsy executive summary. *Otolaryngol Head Neck Surg*. 2013;149(5):656–63.
7. Chung SD, Chen PY, Lin HC, et al. Sudden sensorineural hearing loss associated with iron-deficiency anemia: a population-based study. *JAMA Otolaryngol Head Neck Surg*. 2014;140(5):417–22.