

## Ear Trauma

Head trauma is a very common presentation to any emergency department and this often includes direct or indirect trauma to the ear.

For all trauma patients, a good primary and secondary survey is paramount and ruling out a serious head injury is a priority.

The most common traumatic otological injuries and their management will be discussed in this tutorial. These consist of;

- Pinna lacerations
- Pinna haematoma
- Traumatic tympanic perforations
- Temporal bone fractures
- Acoustic trauma

### Pinna lacerations

Closure of all facial lacerations is a matter of damage limitation aiming to restore and maximise both function and cosmetic appearance.

There are a few aspects to consider specially for pinna lacerations.

1. Has the pinna cartilage been exposed?
2. Has the wound been contaminated or is it a dirty wound?

If either of the above factors are seen then prophylactic antibiotics should be considered. All lacerations should be thoroughly explored, cleaned and dead / compromised tissue or foreign bodies removed. The tissues can be closed with either dissolvable or non-dissolvable sutures. Attempt to approximate skin edges without putting the tissues under tension, whilst taking care to cover all exposed cartilage.

Lacerations to the external auditory canal rarely need closure however it may be a good idea to cover with topical antibiotic drops giving advice to the patient to avoid water entering the ear for a few weeks.

Lacerations in the ear canal itself should not be treated but the patient should keep the ear dry until they are healed.

Please note: Animal or human bites must be thoroughly washed out, receive prophylactic antibiotics (Amoxicillin) and be closed with non-dissolvable suture material to reduce the risk of wound infection. Also consider the need for tetanus or rabies vaccination.

## **Pinna / auricular haematoma**

These usually occur secondary to blunt or shearing trauma to the pinna. This causes separation of the anterior auricular perichondrium from the underlying cartilage and subsequent haematoma formation between these two layers. Early drainage of this blood helps prevent infection and subsequent cartilage necrosis or deformity.

### **Symptoms / Clinical Findings**

- Painful swelling of the pinna
- Swelling, this may be fluctuant or tense

The image to the right shows a large swollen pinna post trauma



### **Treatment**

#### **1. Needle aspiration**

- If relatively small, attempt aspiration with a large bore needle and syringe.
- A pressure head bandage should then be applied
- <https://www.youtube.com/watch?v=vGWfHNYk14g> - shows an example of an aspiration

#### **2. Incision and drainage**

- If there is a large collection of blood, then formal incision and drainage may be required
- The site should be prepared/cleaned with betadine or chlorhexidine
- Infiltrate the area with 5 – 10ml of local anaesthetic
- Incision and drainage should then be conducted around the helical rim and all blood squeezed out of the incision site
- Thorough washout with sterile saline should be performed
- Dental rolls are then sutured either side of the pinna using a non-dissolvable suture to provide pressure to the pinna and help prevent recollection
- A pressure head bandage should then be applied with gauze either side of the ear

- Care must be taken to ensure the pinna is not bent and the bandage is not too tight
- Antibiotics are usually prescribed prophylactically for 7 days to prevent infection
- The patient should be reviewed in 2 - 3 days and the bandage and sutured pressure dressing removed
- If recollection occurs a formal incision and drainage and washout under a general anaesthetic may be required

The patient should be warned of the high risk of cauliflower ear, despite treatment!

### Traumatic perforation of tympanic membrane

The tympanic membrane is often subject to trauma, either the result of a blunt trauma, barotrauma (explosions) or more rarely the result of direct penetrating trauma from a foreign body passing into the external auditory canal.

Presenting symptoms include; otalgia, hearing loss, aural fullness or tinnitus and blood stained discharge. These symptoms are usually self-limiting.

Patients with isolated, uncomplicated, dry perforations normally recover spontaneously without any intervention. Most of these heal within 8 weeks.



### Management

Remove any foreign bodies from the canal and consider topical antibiotics if contaminants (e.g. soil). Advise the patient to keep the ear dry to help prevent secondary infection. A good method whilst showering or bathing is to superficially place a cotton wool ball covered in petroleum jelly into the canal.

Safety net the patient regarding signs of infection; increasing pain, discharge! If these symptoms occur the patient should seek medical advice and antibiotic treatment should be commenced.

### Temporal bone fractures

Occur secondary to high impact trauma, with likely significant intracranial head injury/pathology.

### Signs

- Battle's sign (bruising over the mastoid process),
- Lower motor neurone facial nerve palsy,
- CSF otorrhoea or rhinorrhoea

- Haemotympanum (bluish colour) on otoscopy. This is accompanied by a conductive hearing loss that resolves when the blood reabsorbs.

## Management

Intracranial pathology and management of other injuries should take precedence. Management of the complications of a temporal bone fracture is the main approach

- CSF leak – usually resolves with conservative management. A leak can be confirmed by testing the fluid for beta-2-transferrin. Leaks persistent greater than 7 days may require further intervention. There is no evidence for the use of prophylactic antibiotics.
- Lower motor neuron facial nerve palsy – an immediate facial palsy could represent direct nerve injury and may warrant surgical exploration. A delayed palsy suggests neurapraxia. Both presentations benefit from the use of oral steroids to reduce oedema. Eye care is paramount.
- Hearing loss – conductive hearing loss often resolves spontaneously. Persistent conductive loss suggests possible damage to the ossicles or a tympanic perforation. Sensorineural hearing loss and vertigo in significant head injury could indicate possible vestibular failure. The dizziness will resolve but the hearing loss is likely permanent.

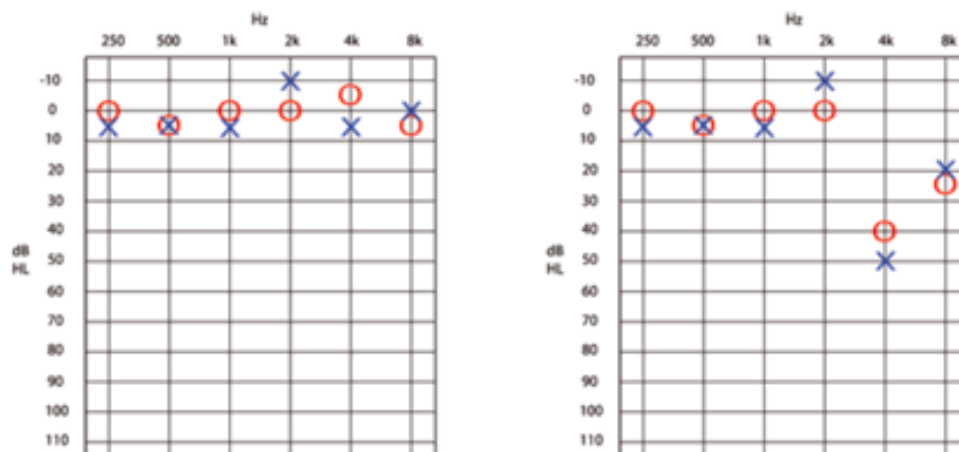
## Acoustic trauma

Can be defined as an injury to the inner ear caused by exposure to a high-decibel noise.

This can be of two types;

1. Exposure to a single very loud noise (e.g. explosion)
2. Exposure to loud noises over a prolonged period e.g. mining industry, steel works

The hearing loss is characteristically sensorineural and at its maximum at 4kHz. It is almost always present in both ears. Since the damage is irreversible only hearing aids offer any help to the severely affected.



The audiogram on the left shows normal hearing thresholds on the right (red circles) and on the left (blue crosses). The one on the right is typical of a patient with noise induced hearing loss. Note that at 4kHz there is a marked increase in the threshold of hearing on both sides. The 8kHz threshold has suffered a little as well.

## Symptoms

- Hearing loss – high frequency sounds, low frequency occurs with prolonged exposure
- Tinnitus or ringing in the ear
- Acute vertigo (usually in single very loud noise) – usually resolves

## Management

The key here is prevention. Wearing ear protection is paramount if chronically exposed to loud noises, to prevent further deterioration in hearing. If exposed to the loud noise for a short period of time then the hearing loss may improve after a few days. However, if exposure to the loud noise persists then damage to hearing sustained in acoustic trauma is irreversible. In these cases a hearing aid will be helpful.

In cases where the noise perforates the tympanic membrane, the perforation should be managed as any other traumatic perforation.