Extradural Haematoma

**Synonyms:** epidural haemorrhage and epidural haematoma if the lesion is of the spinal cord

Extradural haemorrhage (EDH) is a collection of blood in the potential space between the dura and the bone. Usually that bone is the skull but extradural haemorrhage can occur in the spinal column.

**Epidemiology**

It occurs in about 2% of all cases of head injury but 5-15% of cases of fatal head injury.\(^1\) Around 60% of cases are acute, 30% subacute and 10% chronic.\(^2\) Males outnumber females by 4:1.\(^3\) It is rare in small children because of the plasticity of the skull and is less common over the age of 60 because the dura is tightly adherent.\(^4, 5\)

One study of paediatric EDH reported a peak incidence between 11-16 years.\(^6\) Spontaneous spinal EDH is most common in the fourth and fifth decades.\(^7\) The prognosis is poorer in the older group.

**Aetiology**

- EDH is most often due to a fractured temporal or parietal bone damaging the middle meningeal artery or vein, with blood collecting between the dura and the skull.
- It is typically caused by trauma to the temple just beside the eye, although it may also follow a tear in dural venous sinuses.
- Children are less likely than adults to have an associated skull fracture.
- EDH in the spinal column may follow the trauma of epidural anaesthesia or lumbar puncture. When it is spontaneous there is usually a coagulation or platelet defect.
- Posterior fossa EDH is rare in adults but may be more common in children.\(^8\)

**Presentation**

- There is usually a history of trauma and head injury that causes loss of consciousness.
- Classically, this is followed by a lucid interval after which the patient deteriorates. However, this 'classical' presentation occurs in less than a third of cases.
- EDH in the posterior fossa can produce a very rapid deterioration to death, measured in minutes.

A haematoma in the skull may produce a number of changes that should be sought in a patient who has suffered a serious head injury, especially if there was loss of consciousness:

- Headache.
- Nausea or vomiting.
- Seizures.
- Bradycardia with or without hypertension, indicates raised intracranial pressure.
- Evidence of skull fractures, haematomas, or lacerations.
- Cerebrospinal fluid (CSF) otorrhoea or rhinorrhea resulting from skull fracture with a tear of the dura.
- Alteration in level of consciousness with deterioration of the Glasgow Coma Scale (GCS) score.
- Unequal pupils.
- Facial nerve injury.
- Weakness of limbs.
- Other focal neurological deficits include aphasia, visual field defects, numbness and ataxia.
- **Always remember patients with EDH seen in casualty may also have a traumatic cervical spine injury.**
A haematoma in the spinal column will produce compression of the cord. There may be radicular symptoms or a complete cord compression. Presentation may include:

- Weakness.
- Numbness.
- Alteration in reflexes.
- Urinary incontinence.
- Possibly both urinary and faecal incontinence.

**Differential diagnosis**

People with a head injury are often intoxicated and it may be difficult to know if any deterioration in level of consciousness is due to a haemorrhage or to the effects of alcohol or drugs.

**Investigations**[9]

Baseline FBC and U&E are advisable. If there is any suspicion of abnormality of coagulation, as with a spontaneous haemorrhage, then platelets and coagulation studies are required.

- Plain X-ray of the skull may show a fracture.
- X-ray of the cervical spine with views of the odontoid peg. Spinal injury must be excluded.
- CT scanning gives much more information. It may show a haematoma or air pockets.
- If there is deterioration, CT must be repeated.
- MRI scanning gives very good images but may not be suitable for a patient in an unstable condition.
- Lumbar puncture should be avoided, especially if raised intracranial pressure has not been excluded.

**Management**[3, 10]

- If the patient is unconscious, the basic 'ABC' (airways, breathing, circulation) of resuscitation must be employed.
- Maintain an airway and treat the neck with great care until injury has been excluded. Oxygen may be given.
- A full trauma assessment must be made. There may be fractured bones or a ruptured liver or spleen.
- Intravenous (IV) fluids may be required to maintain the circulation and preserve cerebral perfusion.

Further management depends upon the condition of the patient:

- An alert patient with a small haematoma may be treated conservatively but must be observed in case of sudden deterioration.
- If intracranial pressure is raised, it may be treated with osmotic diuretics, such as IV mannitol. Hypertonic saline is increasingly considered a safer and more effective alternative.[11] In the trauma situation it has the advantage of repleting/preserving intravascular volume rather than increasing fluid loss by diuresis. If ventilation is required, hyperventilation, with elevation of the head of the bed to 30°, will help further but excessive hypocapnia should be avoided, as it causes cerebral vasoconstriction.
- Burr holes may be required to evacuate a haematoma.
- Intervention is required for a large haematoma and conservative management is in order for a small one. One study found that conservative management could be appropriate for large-volume EDHs, providing the GCS at presentation and follow-up remained the same with symptomatic improvement.[12] However, the Brain Trauma Foundation has published guidance stating that the criteria laid out for conservative management comprises non-comatose patients with EDH less than 30 cm in volume, less than 15 mm thick and causing less than 5 mm midline shift. They recommend that all patients with an EDH volume greater than 30 cm³ should have a surgical evacuation regardless of GCS.[13]
- There may well be other injuries that also need attention and priorities must be set.

There are a number of other issues with the seriously ill patient, such as low-dose heparin to prevent deep vein thrombosis and acid suppression to prevent gastric erosions.

Anticoagulation in the presence of EDH has potential danger and TED® stockings alone may be safer. It is a difficult balance.
Complications

- Neurological deficits can be temporary or permanent. Death may occur.
- Post-traumatic seizures due to cortical damage may develop 1 to 3 months after the injury:
  - The risk diminishes with time.
  - Alcoholism increases the risk of post-traumatic seizures.
  - A Cochrane review found low-quality evidence to support the use of prophylactic phenytoin in the prevention of early post-traumatic seizures. There was, however, no evidence that such treatment prevented late-onset seizures or affected mortality.\[14\]

  - Delayed effects include the post-concussion syndrome, which is characterised by headaches, dizziness, vertigo, restlessness, emotional lability, inability to concentrate and fatigue.
  - Spinal EDH may cause spasticity, neuropathic pain and urinary complications.

Prognosis

Prognosis in children is excellent.\[15\] One study reported that acute EDH in those over the age of 75 had a poor prognosis. The authors concluded that conservative management in this age group was justified.\[16\]

- The overall mortality rate is about 30%. Those who are alert on admission rarely die but a low GCS worsens the prognosis.\[17\]
- The outcome is improved by expeditious treatment but even so less than a third of patients with best initial GCS below 8 will do well.
- Other factors increasing the risk of poor prognosis include:\[18\]
  - Older age
  - Intradural lesions
  - Volume of the haematoma
  - Temporal location
  - Rapid clinical progression
  - Pupillary abnormalities
  - Increased intracranial pressure

Prevention

- Crash helmets for motorcyclists have been compulsory for some years but they are not obligatory off the public highway. Helmets for cyclists should be used more often and also for skateboarding, snowboarding, etc.
- Alcohol is often a contributing factor, whether this be drinking and driving or binge drinking followed by falls or fighting.
- Head guards do not protect the brain in boxing and the British Medical Association (BMA) has advised for many years that amateur and professional boxing should be banned as well as mixed martial arts.\[19\] Boxing is by far the most common cause of head injuries but the second most common cause in sport is equestrian activities. Appropriate immediate management is possible at large events but many injuries occur in unsupervised leisure settings.\[20\]

Further reading & references

2. Chugn D et al; Emergency Cross-sectional Radiology
5. Mark P; Handbook of Evidence-Based Critical Care, 2012.