Ocular trauma. Part 1: penetrating injuries

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Ocular trauma can be an emergency presentation having serious consequences for vision. This month, we begin a three-part article dealing with a spectrum of injuries to the eye.

Ocular trauma is a common presentation in general practice. It is estimated that approximately 10% of workplace injuries involve the eye. Usually, these injuries involve superficial foreign bodies, but on other occasions prompt and appropriate management will be crucial to a good visual outcome.

General practice also has an important role in educating patients about the prevention of eye injury. Most ocular injuries can be prevented by using appropriate eye protection devices (such as safety glasses with polycarbonate lenses or helmets with visors and browguards) or by modifying the handling of materials. Legislation can also alter the pattern of eye injuries. For example, making seatbelt wearing compulsory has dramatically reduced the number of devastating eye injuries suffered by passengers in motor vehicle accidents (see Figure 1).

Part 1 of this article will begin with a general discussion of the presentations of the different types of ocular trauma. Penetrating eye injuries will then be discussed in detail.

Ocular trauma: considerations in assessment

Prior to examination, patients with ocular trauma should generally be questioned carefully about the circumstances of their injury, and their previous ocular and general health. Note should be made of any treatment given for the injury prior to the consultation. The only instance in which treatment takes precedence over careful history taking and examination is when a patient presents with an injury involving chemical exposure – in this case, copious irrigation should be initiated immediately to reduce the potential impact. Except in some specific occupational circumstances, time should not be wasted looking for antidotes to the chemical agent; rather, any clean fluid should be used to commence irrigation of the affected eye (or eyes).

After taking the patient's history, the eyes should be examined. Particular attention should be paid to visual acuity, which should always be recorded in the patient's notes because it may have medicolegal consequences. The presence of foreign bodies or any damage to the adjacent structures should be noted. The pupillary responses should be assessed, with particular reference to the presence of a relative afferent pupillary defect, which would indicate a significant injury to the optic nerve or retina. The pupil shape should be checked – a teardrop-shaped pupil could indicate an iris prolapse through a penetrating corneal wound (Figure 2). A slit lamp or binocular loupe should be used to examine the integrity of the eyeball and the presence of bleeding in the anterior chamber (hyphaema).

A general examination should also be

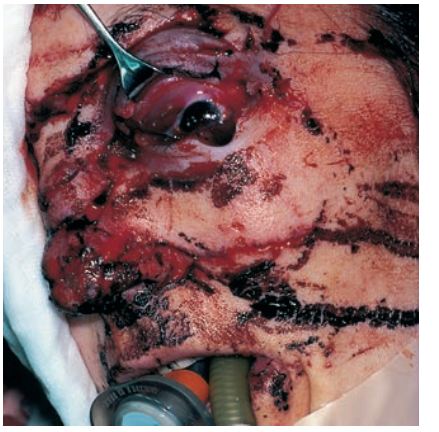

Figure 1. Multiple facial lacerations and a lacerated eyeball after a motor vehicle accident.

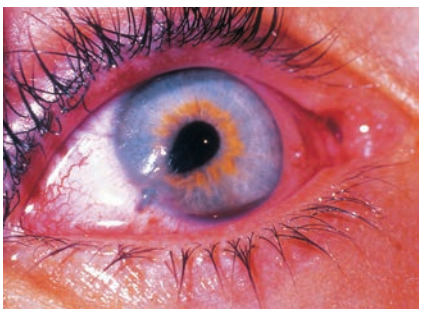

Figure 2. Slit lamp photograph of a penetrating eye injury caused by fencing wire. Note the tear-shaped pupil and hyphaema (blood level in the anterior chamber).

Other tests may be needed if a retained intraocular foreign body is suspected or facial fractures are present. CT scanning is generally the method of choice in these situations.

Penetrating eye injuries

Penetrating ocular injuries occur with a frequency of about 1 in 70,000 people per year. The list of causative agents is long, but common ones include fencing wire, missiles thrown from lawn mowers or edge-trimmers, glass fragments and sticks.

History and examination

The circumstances of the injury should be queried in detail, although it may be difficult to get a clear history of an injury

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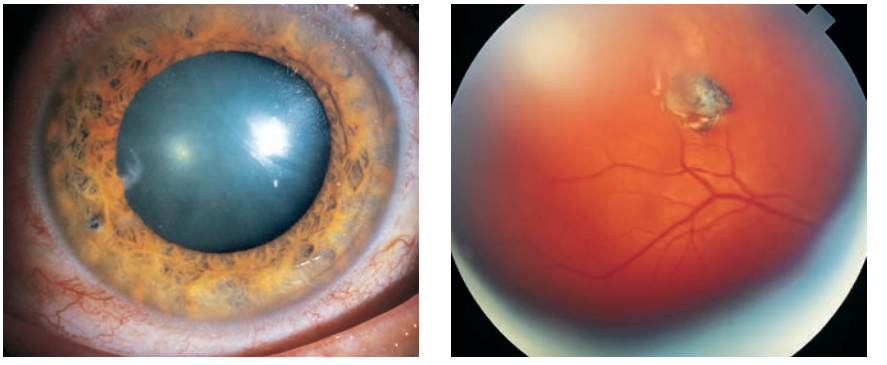
from a child. Children are especially susceptible to penetrating injuries – the possibility of damage to the eyeball should always be considered in a child presenting with a periocular laceration, especially if there is an associated subconjunctival haemorrhage.

Signs of a penetrating ocular injury include:

- a scleral or corneal laceration
- a distorted pupil
- prolapse of iris or uveal tissue
- hyphaema
- extensive subconjunctival haemorrhage
- hypotony
- poor vision.

The possibility of a retained intraocular foreign body should be considered if there is a history of metal-on-metal contact (such as the use of a metal hammer on a cold chisel or after an explosion). The entry wound of a small, metallic foreign body can easily be overlooked, and such injuries can be associated with good vision; however, an unrecognised metallic intraocular foreign body may have long term adverse effects on vision (Figures 3a and b). Iron foreign bodies may produce siderosis, which is manifested by heterochromia of the iris, deposits of iron salts in the lens capsule and retinal degeneration leading to poor vision. Copper foreign bodies usually provoke a more intense inflammatory response but, depending on the composition of the alloy, may produce chalcosis, with copper deposits in the lens and retina leading to poor vision. CT scanning will be most useful in localising the foreign body, and will also provide vital information when planning surgery.



Figures 3a and b. An intraocular metallic foreign body. a (left). Slit lamp examination showing a penetrating wound in the iris at the eight o'clock position from a metallic foreign body. b (right). The intraocular metallic foreign body.

Management and transport

If a penetrating injury is diagnosed or suspected, no further examination is required and the patient should be prepared for evacuation to the nearest specialist or referral centre. The eye should be protected physically during transit by a plastic or metal eye shield taped over the eye; alternatively, a suitable device can be made from a plastic drinking cup. An eye pad should not be used because it could produce excessive pressure on the eye, leading to extrusion of intraocular contents through the wound.

Protruding foreign bodies should not be removed. Appropriate antiemetics and analgesics should be given parenterally. Prophylactic antibiotics are usually given intravenously, and initial treatment would normally consist of an aminoglycoside (gentamicin [Gentamicin Injection], 80 mg eight hourly) combined with a cephalosporin (cephazolin [Cephazolin Sodium for Injection, Kefzol], 1 g eight hourly). In patients with farm injuries, clindamycin ([Delacin C Phosphate Sterile Solution], 500 mg eight hourly) should be added because of the higher risk of infection with *Bacillus cereus*.

Patients with penetrating injuries will usually be dealt with in a secondary or tertiary referral centre so evacuation is often required. Ideally, injuries should be repaired within 24 hours. Patients are best transported in the supine position, with the head of the bed elevated. The injured eye should be protected by an eye shield (but should not be padded), and humidified oxygen should be given (6 to 8 L/min).

If air transport is required, cabin pressure should be maintained at sea level or the aircraft should fly at an altitude below 1300 metres. Air turbulence should be avoided and so a patient may need transfer on a night flight, when turbulence is generally reduced.

Prognosis

The prognosis for recovery of vision will depend greatly on the circumstances of the injury. A large corneoscleral laceration with prolapse of intraocular contents will have a poor prognosis for useful vision and the eye may need to be removed to reduce the risk of sympathetic ophthalmia developing in the fellow eye. On the other hand, a small corneal laceration without loss of intraocular contents may have a good prognosis for vision in the long term.

Key point: prevention

Patient education is very important in the efforts to reduce penetrating ocular trauma. Appropriate eye protection is readily available and not expensive when compared with the cost to the individual and community of a serious injury. MT

Next month, part 2 of this article will discuss blunt eye injuries.