Detection of intraocular foreign bodies

In order to prevent irreversible eye damage it is vital that acute ocular trauma is diagnosed and treated rapidly write
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IT IS ESTIMATED that between 1% and 2% of patients attending GP surgeries do so on account of symptoms related to their eye. In those practices aligned with occupational health service this percentage may be significantly higher due to trauma.

As result a condition for rapid diagnosis and treatment in practice is vital, is acute ocular trauma.

Ocular trauma is a major cause of blindness in young adult males and can be either blunt or penetrating. In most cases intraocular foreign bodies (IOFBs) create a visible entry wound or the IOFB can be seen. However foreign bodies can cause minimal and/or no signs and be suspected only on detailed history.

Small to high velocity pieces of steel are easily overlooked, but can lead to severe visual impairment.

In one study, hammering steel on steel accounted for 59% of IOFB. The remainder consisted of 14% as a result of gunshots, 5% were explosions, string trimmers resulted in 5%, and other eye injuries made up the remaining 17%.

We present two case studies where patients who were looked over initially after hammering steel presented with symptoms several weeks later.

Case study 1

A 27 year old man presented to A&E complaining of gradual deterioration of vision in the right eye for four days. A history of hammering steel was elicited. Examination revealed visual acuity of 6/36 in the right eye and 6/6 in the left eye. A small self-sealing 3mm corneal perforation in the right cornea was noted with posterior subcapsular cataract and metal foreign body in his vitreous cavity (see Figure 1 and 2).

Plain orbital x-ray showed retained IOFB posterior to the equator. Surgical management consisted of magnetic removal of the IOFB, lens aspiration and insertion of foldable implant: visual acuity was 6/5 on the last visit with no operative complications.

Case study 2

The second case involved a 50-year-old man, who presented to A&E complaining of foreign body sensation in his left eye. He also had a history of hammering on the day before presentation.

On examination his visual acuity was 6/6 in both eyes. The anterior segment examination revealed a 4mm self sealed corneal wound with iris tissue transillumination at 3.00pm and 5.00pm, small posterior subcapsular lens opacity, and a foreign body in the vitreous gel. The x-ray revealed retained IOFB (see Figure 3 and 4). Management consisted of magnetic removal of the IOFB. Visual acuity was 6/5 on the last clinical visit with no operative complications.

Discussion

The reaction of the eye to a retained IOFB varies greatly depending on its chemical composition, sterility and location. Inert, sterile foreign bodies such as stone, glass, sand, porcelain and plastic are generally well tolerated.

Common reactive foreign bodies are zinc, aluminum, copper and iron. Zinc and aluminum tend to cause minimal inflammation and may become encapsulated. If large enough, glial and fibrovascular proliferation, tractional retinal detachment can occur.

Pure copper is particularly toxic causing acute chalcosis with severe inflammation, which can lead to the loss of the eye.

Signs and symptoms of IOFB

Clinical features of IOFBs range from being asymptomatic to a sudden loss of vision, penetrating eye injury, full thickness laceration and other features like hyphema (blood in the anterior chamber), vitreous haemorrhage or retinal...
detachment and gradual visual loss due to cataract or ocular siderosis. The corneal signs which suggest penetrating eye injury include a full thickness laceration of the cornea, sclera or both. Sometimes, it can be so small it can be overlooked without the use of the slit lamp. Other features include an epithelial defect which stains by fluorescence or a self sealed wound which could appear as small scar. A history of hammering is important in these cases.

**Management**

Intraocular foreign body should be suspected in any penetrating ocular injury or cases with a history of high velocity typically hammering.

Orbital x-ray, anterior, posterior and lateral orbital (in up and down gaze) may be helpful in identifying an IOFB although CAT SCAN is superior. CT is better than plain orbital x-ray at pinpointing the location of a radio-opaque foreign body and detecting and locating less radio-opaque foreign bodies. The presence of non-radio-opaque foreign bodies and their relationship to intraocular structure may be determined by ultrasonography. The possibility of multiple foreign bodies should not be overlooked.

Magnetic resonance imaging (MRI) is contraindicated if the foreign body is metallic because the magnetic force can shift the FB causing ocular damage.

In the management of a retained IOFB, the primary goals of the patients and physician are to restore ocular integrity and obtain good visual acuity results.

The surgical techniques available to remove retained IOFB are:

- **Pars plana vitrectomy** which allows a controlled extraction of the IOFB
- **Pars plana magnetic extraction** can be considered for nonencapsulated foreign bodies that can be easily seen in the vitreous cavity, are not embedded in or adherent to the retina or other structure and have no associated significant retinal pathology such as retinal tear.

**Complications**

Endophthalmitis occurs following 8% of penetrating injuries, the incidence is higher in cases associated with IOFB. Post traumatic endophthalmitis can progress rapidly and its clinical signs include marked inflammation with fibrin, hypopyon (pus in the anterior chamber), vitreous infiltration, and corneal opacification.

The risk of endophthalmitis after penetrating ocular injuries may be reduced by prompt wound closure and early removal of the IOFB. Bacillus cereus, which rarely causes endophthalmitis in other settings accounts for almost 25% of cases of traumatic endophthalmitis. Bacillus cereus endophthalmitis has a rapid and severe course. Once established, it leads to severe visual loss and often the loss of an eye. Bacillus cereus is sensitive to vancomycin and clindamycin. Other organisms, which could occur after trauma, are gram-negative micro-organisms.

In conclusion, a detailed history should be obtained in any case presenting with eye complaints after hammering to exclude any IOFBs.

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**References**