

# Acute red eye in a diesel fitter

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This article outlines a systematic approach to ocular trauma in the primary care setting.

## Case presentation

Jeff, a 19-year-old apprentice diesel fitter, presented with a red left eye and associated foreign body sensation that had begun suddenly when he was grinding metal two days previously. Despite workplace policy, he had not been wearing eye protection. The eye was mildly photophobic and quite uncomfortable, particularly on blinking. He denied any reduction in vision but conceded that he had been experiencing haloes around lights at night. He had no general medical conditions or past ocular history of note, and he did not wear spectacles or contact lenses.

Jeff's unaided vision was 6/6 (right) and 6/7.5 (left), with no improvement using a pinhole. Examination revealed a small ring slightly lateral to the temporal edge of the pupil margin and a diffusely hyperaemic conjunctiva (Figure 1). One

drop of oxybuprocaine was instilled in the eye, easing his discomfort within seconds, and each eye was examined in detail for other evidence of injury using fluorescein and a slit lamp. No further abnormalities were found.

Jeff was diagnosed with an injury caused by a metallic foreign body that had already dislodged but had left a small corneal rust ring. Its position just off the visual axis meant that the patient's vision during daylight was not significantly affected, but the larger pupil size at night caused optical aberrations resulting in haloes around lights.

Using magnification provided by a slit lamp, the bevel of a 23-gauge needle was used to gently debride the epithelium containing the rust. Chloramphenicol ointment was applied and the eye was patched. Jeff was instructed to return the following day for patch removal and assessment of healing.

## Discussion

### Diagnosis

The evaluation of ocular trauma cases begins with a careful history and examination as well as knowledge about the relevant diagnostic eyedrops (Table). It is important to enquire about the nature of the injury and whether vision has been affected. Knowledge of the offending object (e.g. its sharpness and impact velocity) helps in determining the risk of a penetrating injury. Coexistent injuries that can be seen in cases of trauma include cataract (which can sometimes take many years to develop), retinal

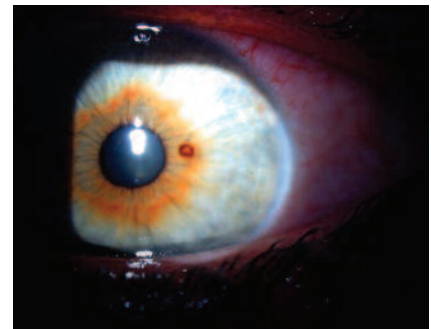


Figure 1. A small corneal rust ring.

damage and vitreous haemorrhage. Other causes of irritation on blinking include misdirected eyelashes (trichiasis) and diseases that cause erosion or desiccation of the corneal epithelium.

Often patients are quite distressed, and use of a topical anaesthetic can make the examination easier. Proxymetacaine (Alcaine, Ophthetic), oxybuprocaine (Minims [Oxybuprocaine]) and amethocaine (Minims [Amethocaine]) are commonly used – each of these have an onset of action of about 10 seconds and last about 20 minutes. However, any local anaesthetic agent (such as 2% xylocaine, with or without adrenaline) can be used. Examining children is often easier with the help of a supportive parent, but local anaesthetic drops may also be useful – these are often best administered by a nurse (rather than the doctor) because they may sting on application and result in loss of the child's trust. However, local anaesthetics delay corneal wound healing and may mask painful conditions so they must not be given to patients to take home.

It is important to test acuity accurately – standard charts are designed to be used at a distance of six metres. The pinhole measurement gives an idea of a patient's vision while wearing his or her best glasses, so anything less than perfect vision is suspicious of an ocular media opacity or sensory problem. Each eye must be tested separately, and the best way to occlude the other eye is with the



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palm of the hand – this prevents the opportunity to peek through the fingers and avoids the temporary reduction in vision that results from pressing too firmly on the eye with the fingers or heel of the hand.

External ocular examination requires appropriate magnification and illumination. A slit lamp is ideal but not always necessary – a torch and magnifying loupe will usually suffice. The upper eyelid should be everted if there is no suspicion of a perforated globe – often a foreign body can be found on the conjunctival surface of the tarsal plate by seeing inflamed blood vessels that lead towards it. Fluorescein should be used to highlight epithelial defects; it diffuses freely into the corneal stroma if Bowman’s membrane is damaged, which helps to differentiate ulcers from simple abrasions (Figure 2). Displacement of fluorescein by aqueous humour flowing from the eye (Seidel sign) is indicative of a perforating injury (Figure 3).

Internal ocular examination involves checking the fundus with an ophthalmoscope, assessing the pupil reactions, and then dilating the pupil with a mydriatic drug such as tropicamide (Minims [Tropicamide], Mydriacyl); supplementary phenylephrine (Minims

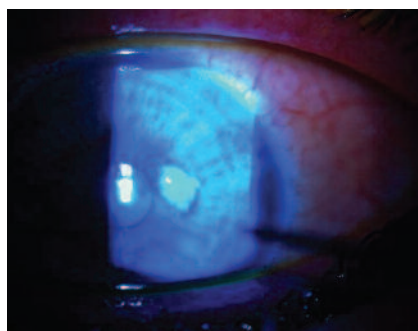


Figure 2. Iatrogenic corneal abrasion following rust ring removal seen with fluorescein under a cobalt blue light.

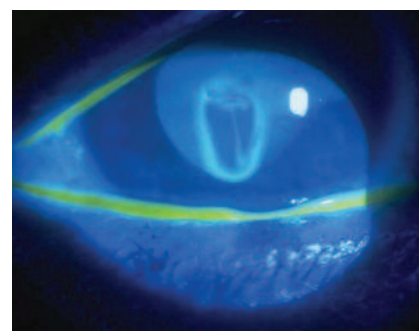


Figure 3. Seidel’s sign indicates a perforated eye with aqueous leaking from the wound.

[Phenylephrine]) can be used in elderly patients if inadequate dilatation is achieved with tropicamide alone. (Note that the standard 10% solution of phenylephrine should never be used on infants because of the risk of severe hypertension from systemic absorption given their tiny volume of distribution; the 2.5% strength is safer.) Cyclopentolate (Cyclogyl, Minims [Cyclopentolate]) can be used as an alternative to tropicamide and provides greater mydriasis in children, but it takes considerably longer to wear off – also, care must be taken because it can rarely induce hyperthermia and seizures in susceptible people.

When any mydriatic is used, the

patient must be warned that the eye will be very sensitive to glare until the effect wears off so he or she will feel more comfortable wearing sunglasses and should not drive until the pupil returns to its normal size. Do not be afraid of inducing angle closure glaucoma. This is rare (the risk is about 3 in 10,000) and the potential benefits far outweigh the risks, but patients should be warned to return as soon as possible if the eye becomes red and painful or if vision decreases.

Investigations are usually not required. However, if there is any suspicion of an intraocular foreign body, plain films or CT scanning of the orbits can be helpful in localising radio-opaque objects.

**Table. Eyedrops used in the diagnosis of ocular injury**

	Onset of action	Duration of action	Possible adverse effects
<b>Anaesthetics</b>			
Oxybuprocaine (Minims [Oxybuprocaine])	10 seconds	20 minutes	Inadvertent corneal injury, delayed healing
Amethocaine (Minims [Amethocaine])			
Proxymetacaine (Alcaine, Ophthetic)			
<b>Mydriatics</b>			
Tropicamide (Minims [Tropicamide], Mydriacyl)	20 to 30 minutes	4 to 6 hours	Acute angle closure glaucoma
Cyclopentolate (Cyclogyl, Minims [Cyclopentolate])	30 to 60 minutes	Up to 24 hours	Acute angle closure glaucoma, hyperthermia, seizures
Phenylephrine* (Minims [Phenylephrine])	30 to 60 minutes	4 hours	Acute angle closure glaucoma, hypertension (in infants)

\* Note that the standard 10% strength must not be used on infants – 2.5% is safer.

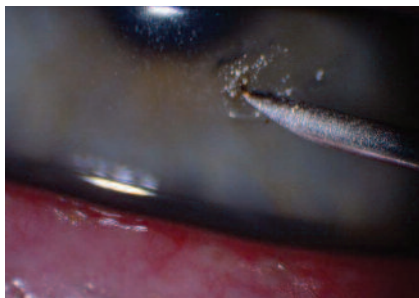


Figure 4. Using the bevel of a 23-gauge needle to scrape away rust. This procedure was used in Jeff's case.

Ultrasonography can be helpful if haemorrhage prevents direct visualisation of internal structures, but MRI must be avoided because metal foreign bodies may move and cause further damage.

### Management

Superficial foreign bodies require simple removal using a standard 23-gauge needle (Figure 4) and/or dental burr. The more centrally a foreign body is located in the cornea, the more meticulous this needs to be because any residue or scarring can cause reduced vision and problems with glare. Antibiotic ointment must be instilled, and a patch may be applied if there is a large epithelial abrasion (traumatic or iatrogenic) but is often not necessary.

Penetrating injuries are much more serious. If suspected, no further examination should take place as any pressure on the eye may result in expulsion of ocular contents from the wound. The eye should be protected by a plastic cup (or other makeshift device) taped so that its mouth surrounds the orbital rim but exerts no pressure on the globe. The patient should then be transferred urgently to a tertiary referral centre. In some penetrating injuries in which the foreign body remains protruding from the eye (e.g. a fish hook), both eyes can be covered to limit eye movement.

Eye infection following acute injury from metallic foreign bodies is uncommon because these objects are often very hot and sterile. Secondary infection can occur, however, so topical antibiotics such as chloramphenicol ointment (Chlorsig, Chloromycetin) are routinely given. Follow up is necessary to ensure that the epithelium is healing. Most surface injuries heal quickly but, generally speaking, the longer a foreign body has been on the eye, the more inflammation will be present and the longer the period required for healing.

### Prevention

Occupational health and safety advice must be considered. Protective eyewear that conforms to Australian Standard

1337–1992 will help to avoid such injuries. It is prudent to suggest that in future cases of injury prompt medical review may help to avoid delays in diagnosis and complications such as rust ring formation. MT

### Further reading

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DECLARATION OF INTEREST: None.