

## More about ... Ophthalmology

### Management of chemical ocular injuries – what every GP should know

J Jansen van Rensburg,<sup>1</sup> MB ChB, DipOphth (SA); D Meyer,<sup>2</sup> MB ChB, FCFP (SA), BScHons Pharm, MMed (Ophth), FCOphth (SA), PhD

<sup>1</sup>Registrar, Division of Ophthalmology, Faculty of Medicine and Health Sciences, University of Stellenbosch, South Africa

<sup>2</sup>Professor and Head, Division of Ophthalmology, Faculty of Medicine and Health Sciences, University of Stellenbosch, South Africa

Correspondence to: J Jansen van Rensburg (julijavr@gmail.com)

The general practitioner (GP) is often the first medical professional that a patient with an ocular chemical burn seeks. These injuries are always emergencies. Timely diagnosis and treatment may preserve sight.

Alkaline burns are not uncommon and are often work-related injuries. Cleaning agents, lime and cement are frequently involved. Alkaline agents are more destructive than acids, as they possess both hydrophilic and lipophilic properties. This results in rapid deep corneal as well as anterior chamber penetration of the alkali with caustic effects.

Acidic burns often involve bleaches, swimming pool chemicals and car batteries. These are usually less damaging to the eye as coagulation of the corneal proteins by the acid results in the formation of a tissue barrier, preventing deeper intraocular penetration of the chemical.

#### Management

If a patient phones to seek advice after an ocular chemical burn, the most important immediate on-site action is to rinse the eye with copious amounts of water. If possible the patient should rinse the eye directly under a tap of running water, or a bystander should pour tap water into the affected eye while the patient keeps his/her head tilted with the affected eye closest to the ground to prevent water and chemicals inadvertently spilling into the unaffected eye. Advise the

patient to use at least 1 - 2 litres of water for this purpose.

Once in your consulting room, test the pH of the inferior fornix with litmus paper or the pH indicator on a urine dipstick. If above or below 7, repeat the rinsing process until the pH is neutral. A very effective way of rinsing the cornea as well as the fornices, is to assemble your own 'eye-irrigator'. This can easily be done as follows:

- Cut the needle off a 'butterfly-needle', and tie a knot at the end of the tubing where the needle was detached.
- Use the needle to puncture numerous holes in the tubing, about 0.5 cm apart.
- Connect a vaculiter of saline or water to a drip-set and connect this to the 'eye-irrigator'.
- Instill a few drops of a topical anaesthetic such as Benoxinate® onto the globe.
- Insert the butterfly device into the patient's eye and take care to position it well into the upper and lower fornices (Figs 1 and 2).
- Use a drip stand and allow a litre of fluid to irrigate the eye and fornices.

Carefully evert the upper lid with a cotton bud to ensure that no particles are adherent to the tarsal conjunctivae or fornices – especially the superior fornix. Pull the lower lid down to inspect the inferior fornix for foreign material. Remove with cotton tip applicator if present.

Check the pH again and continue irrigation until neutral.

Stain the eye with fluorescein and document the number of clock hours of limbal staining as observed with a cobalt blue light (all modern direct ophthalmoscopes have one).



Fig. 1. 'Butterfly device' ready for insertion into the fornices. Note fluid droplets emerging from the puncture sites made in the tubing.



Fig 2. Irrigating device carefully placed into the lower fornix, whilst the upper lid is retracted to secure the device in the superior fornix as well. Note how the device is taped to the side of the patient's face to allow easy irrigation.

Estimate the percentage of conjunctival staining. Document your findings as follows, e.g. 6 clock hours of limbal staining and 30% conjunctival staining will be 6/30%. This will be of great help to the ophthalmologist you refer to, or to yourself when monitoring minor burns. The same should be done for thermal burns such as hot water or oil spill injuries.

Discuss with your referring ophthalmologist if in any doubt. If close follow-up is possible, the GP can decide to treat grade I - II injuries (Table 1). The treatment will include broad-

Table 1. New classification of ocular surface burns<sup>(1)</sup>

Grade	Prognosis	Limbal involvement (clock hours)	Conjunctival involvement (%)
I	Very good	0	0
II	Good	≤ 3	≤ 30
III	Good	>3 - 6	>30 - 50
IV	Good/guarded	>6 - 9	>50 - 75
V	Guarded/poor	>9 - <12	>75 - <100
VI	Very poor	12	100

spectrum topical antibiotic cover, oral vitamin C at 1 - 2 g/day, topical cycloplegia and topical steroids.

### Further reading

Webb LA. Manual of Eye Emergencies, Diagnosis and Management, 2nd ed. Oxford: Butterworth Heinemann, 2004.

### Reference

1. Dua HS, King A, Joseph A. A new classification of ocular surface burns. Br J Ophthalmol 2001;85:1379-1383. [<http://dx.doi.org/10.1136/bjo.85.11.1379>]