

# Painful red eye associated with contact lens wear

**NATHAN WALKER**

BAppSc(Optom)(Hons), MB BS(Hons)

**ANDREW APEL** MB BS, FRANZCO

Contact lenses are popular in Australia, but problems can arise quickly. GPs need to be familiar with the common complications.

## Case presentation

A 26-year-old woman, Samantha, presented with a painful, red right eye that she had first noticed on waking that morning. She was photophobic and complained of blurred vision in the eye. Reluctantly, she reported having stayed at a friend's house the previous night and of forgetting to take her contact lens case and cleaning solution; consequently, she had slept wearing her contact lenses. She said that, although this was not the first

time she had worn the lenses during sleep, it was the first time she had woken with such distressing symptoms. The pain had been moderate on waking, but had worsened considerably when the lenses were removed.

Samantha had been wearing disposable soft contact lenses for about 12 hours/day, every day, for myopia. Apart from an episode of giant papillary conjunctivitis three years previously that had caused her to switch from conventional soft contact lenses to the disposable type, her ocular history was unremarkable.

## Examination

Examination of the patient's right eye was difficult because of the associated photophobia and excessive tearing, but her visual acuity was found to be roughly 6/60 wearing a recent pair of spectacles. Closer examination with a slit lamp revealed conjunctival injection, especially around the margin of the cornea. A 5 mm central corneal ulcer with adherent mucus was seen overlying a white stromal infiltrate – that is, a focal collection of white blood cells in the stroma of the cornea (Figure 1). Fluorescein staining accentuated the ulcer and was seen to diffuse slowly into the corneal stroma around the lesion (Figure 2).

The left eye was normal, apart from some sympathetic excessive tearing, and visual acuity with glasses was found to be 6/5.

## Diagnosis

Samantha was diagnosed with a bacterial corneal ulcer secondary to overwear of a contact lens. Given the history of sleeping in the lenses and the appearance of a central corneal epithelial defect, a corneal abrasion is actually a more likely diagnosis. However, the appearance of an opaque infiltrate underlying the lesion and the fact that fluorescein was able to diffuse into the stroma suggested that this was deeper and more sinister than a simple abrasion. Abrasions do not

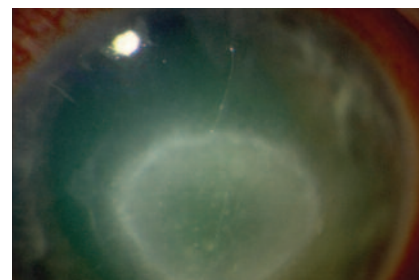


Figure 1. Central corneal ulcer with adherent mucus and underlying stromal infiltrate.

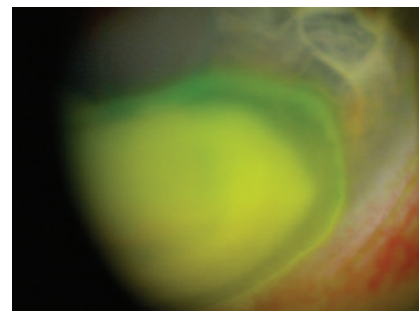


Figure 2. Diffusion of fluorescein into the stroma around the ulcer.



Figure 3. *Pseudomonas* keratitis can rapidly destroy the eye.

breach Bowman's membrane (i.e. the basement membrane that lies directly under the corneal epithelium) so fluorescein cannot diffuse into the underlying corneal stroma.

## Treatment

Samantha was prescribed a topical antibiotic. The predominant causes of bacterial corneal ulcers are *Staphylococcus aureus*, *Streptococcus* species, and Gram-negative organisms. *Pseudomonas* can cause catastrophic damage to the eye



Dr Walker is a Resident Medical Officer at The Townsville Hospital, Townsville. He is also a qualified Optometrist.

Dr Apel is an Ophthalmologist with fellowship training in corneal surgery and external eye disease from the University of Toronto, Canada. He now works in private practice in Brisbane and Bundaberg, Qld.

within hours and must be suspected until proven otherwise (Figure 3). The lesion should be cultured and treated with 0.3% ciprofloxacin (CiloQuin, Ciloxan) or 0.3% ofloxacin (Ocuflax) drops, every 15 minutes for six hours and then every hour while awake, until review by an ophthalmologist within 24 hours. The sample for culture can be obtained by rolling a sterile swab over the area after instillation of local anaesthetic; alternatively, a formal scraping can be taken by an ophthalmologist.

### Follow up

Six weeks later, Samantha presented again. She complained that her vision had not improved despite the rapid resolution of her other symptoms with treatment. Her visual acuity with glasses was found to be 6/36 (right eye) and 6/5 (left eye), with no improvement using a pin-hole test. Slit lamp examination revealed a central corneal scar in the right eye, and she was referred to a corneal surgeon for consideration of corneal transplantation to improve her vision.

Twelve months after the corneal graft, Samantha underwent laser refractive surgery to both her grafted right eye and myopic left eye to reduce her dependency on glasses and contact lenses.

### Discussion

Optometrists and ophthalmologists are responsible for fitting contact lenses, but the complications of their use frequently occur after hours when the GP is the first port of call. Therefore, it is important that GPs be familiar with the different types of contact lenses, basic contact lens hygiene, and initial management of common complications.

Although Samantha's case illustrates a contact lens-related corneal ulcer, this is by no means the only cause of a painful, red and photophobic eye with reduced vision in a contact lens wearer. The Table lists the main disorders that should be considered in this scenario.

### Corneal ulcers v. abrasions

Distinguishing between ulcers and abrasions is important because abrasions usually heal spontaneously within about 24 hours without scarring, whereas ulcers do cause scarring and can thus permanently affect vision if they occur in the visual axis. Furthermore, the penetration of Bowman's membrane indicates a breach in a significant barrier to the spread of infection within the eye and therefore predisposes the eye to more extensive infections, such as endophthalmitis. Infection of the cornea usually occurs after injury to the epithelium or in immunocompromised hosts, so contact lens wear (particularly overwear, such as sleeping while wearing the lenses) is a common predisposing factor.

### Types of contact lenses

There are basically two types of contact lenses: soft and hard.

Soft contact lenses, which are physically soft and floppy, are available in 'disposable' and 'conventional' types. Disposables

**Table. Clinical signs of contact lens-induced disorders\***

<b>Metabolic disorders</b>	
Overwear syndrome	Small central corneal epithelial erosions or an ulcer with conjunctival injection
Neovascularisation	New blood vessels growing onto the cornea secondary to hypoxia
<b>Traumatic disorder</b>	
Corneal abrasion	Linear or sharp-edged corneal epithelial defect with conjunctival injection due to a foreign body under the lens or trauma from insertion or removal of the lens
<b>Toxic and allergic disorders</b>	
Toxic keratopathy	Painful and widespread corneal epithelial punctate staining and engorged blood vessels all around the edge of the cornea ('ciliary injection') after inserting a lens soaked in a cleaning agent such as hydrogen peroxide without appropriate neutralisation (see Figure 4)
Giant papillary conjunctivitis	Mucous discharge, redness, punctate staining at the upper limbus, and giant papillae (>0.3 mm in diameter) on the conjunctiva under the upper eyelids
Microbial keratitis	Epithelial ulcer overlying a white stromal infiltrate, with oedema and adherent mucus ( <i>Pseudomonas</i> should be suspected in contact lens wearers; <i>Acanthamoeba</i> should be suspected if there is a herpes simplex-like lesion)
<b>Tear resurfacing disorders</b>	
3 and 9 o'clock staining	Punctate fluorescein staining of conjunctiva at the 3 and 9 o'clock positions, adjacent to the cornea, caused by drying adjacent to the lens
Incomplete blink stain	Fluorescein staining of the inferior third of the cornea caused by drying resulting from incomplete blinking

\* Adapted from: Pavan-Langston D. Manual of ocular diagnosis and therapy. 4th ed. New York: Little, Brown & Co., 1996.

are by far the most popular – users can throw these away after the recommended lifespan, which ranges from one day to one month. Conventional soft lenses are worn for up to two years before replacement, and are custom-made for patients whose refractive error or eye shape is not suitable for disposable lenses.

Hard contact lenses are smaller than soft lenses and are made from rigid plastic. They are the least popular type because they can be quite uncomfortable initially. Hard contact lenses are largely limited to patients with misshapen corneas (e.g. astigmatism and keratoconus) or high refractive errors because they hold their shape even on eyes with distorted corneas.

Removal of both hard and soft contact lens types before sleep is generally recommended because the risk of developing an infection such as a corneal ulcer increases substantially if they are worn during sleep. However, a new type of disposable soft lens called an ‘extended wear’ lens is

approved for wear during sleep because it is made of new materials that allow more oxygen to reach the cornea. Extended wear lenses are potentially of use to patients who are not sufficiently dexterous to insert and remove their lenses daily or cannot be relied on to remove them before sleep, but wearing these lenses overnight should be considered a last resort.

### Contact lens cleaning regimens

The vast majority of patients use an ‘all-in-one’ solution to clean and store their lenses. These are usually weak antiseptic solutions that do not irritate the eye. Other cleaning systems use harsher chemicals, such as hydrogen peroxide, so failure to neutralise the solution can burn the eye when the lens is inserted (Figure 4). Lastly, some patients still use the older, more labour-intensive heating systems that clean the lenses without the need for chemicals. Heating is probably the safest and most effective cleaning method, but it can damage some lenses.

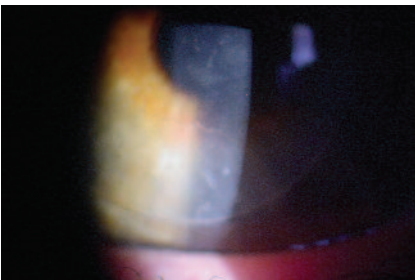


Figure 4. Punctate lesions in toxic keratopathy.

### Management

If a contact lens wearer presents with a painful red eye, the lens must be removed (if the patient has not already done so), but be aware that removal may actually increase the pain because the eyelids will then rub the corneal lesion with each blink. For abrasions and other simple problems, contact lens wear can be resumed one week after the symptoms and signs have resolved. However, the diagnosis of a corneal ulcer requires urgent referral to an ophthalmologist, a rethink of the patient’s need for contact lenses, and a revision of correct lens hygiene practices (some handy hints are given in the box on this page). Options include reverting to spectacle wear or undergoing refractive eye surgery.

Wearing of contact lenses after a bacterial corneal ulcer, if desired, should not be resumed for at least two weeks after the ulcer has fully healed (actual duration will depend on severity of the lesion). **MT**

### Hygiene hints for contact lens wearers

- Always wash your hands before touching the lenses
- When the lens case is not in use, dry the case, leave it open, and expose it to direct sunlight because UV light has a sterilising effect
- Clean lenses regularly, even if they are not being worn for extended periods