

Medical and surgical treatment of recurrent corneal erosions

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Topical lubrication is the mainstay of medical treatment for recurrent corneal erosion, with surgery being reserved for those patients in whom medications fail to control symptoms or are not tolerated.

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Recurrent corneal erosion (RCE) syndrome is a relatively common and painful eye condition characterised by recurrent sloughing off of the corneal epithelium.¹ It is episodic in nature and typically occurs after corneal injury, generally in patients with an underlying corneal dystrophy. The first symptom of an episode is usually pain upon awakening or that causes the patient to wake up.

RCE syndrome is a not uncommon presentation in primary care medicine. Although the condition is not immediately sight-threatening, patients are often quite distressed and bewildered on presentation because of the combination of severe pain and the unexpected nature of the problem. A history of eye pain upon awakening and opening the eyes or that awakens the patient is highly suggestive of RCE syndrome.¹

Fortunately, the condition can often be controlled with the long-term use of topical lubrication or other medication. In some cases, however, surgical intervention may be required.² Review by an ophthalmologist is important to establish the diagnosis of the condition and exclude any other sight-threatening pathology.

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PATHOPHYSIOLOGY

The cornea is composed of five layers. These are, from anterior to posterior, the corneal epithelium, Bowman's membrane, corneal stroma, Descemet's membrane and corneal endothelium (Figure 1).

The basal cells of the corneal epithelium are anchored to the underlying Bowman's membrane and stroma through an adhesion complex formed by attachment structures (hemidesmosomes) on these cells and the secretion by these cells of the basement membrane. Recurrent corneal erosions are thought to be caused by a disruption to this adhesion complex. This results in loose adhesion between the epithelium and underlying corneal layers, leaving the epithelium prone to erosion and potential exposure of the densely populated sensory nerve endings of the corneal subepithelial nerve plexus.

The most common causes of disruption to the adhesion complex are previous corneal abrasions and corneal dystrophies. Patients with corneal erosion caused by injury often also have an underlying corneal dystrophy (Figure 2). By far the

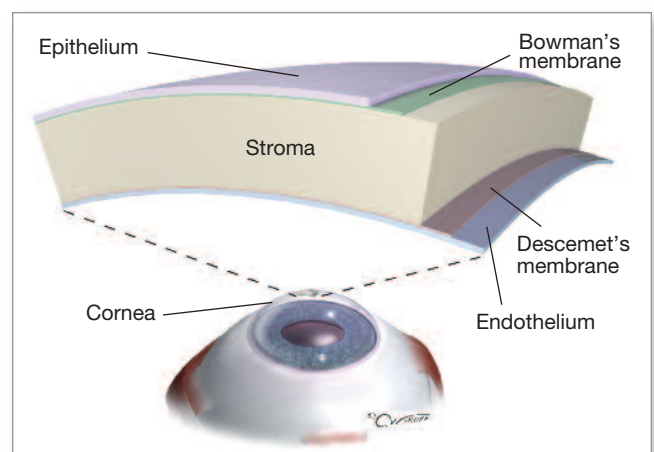


Figure 1. The five layers of the cornea. Disrupted attachment of the epithelium to the underlying corneal layers accounts for the recurrent epithelial erosion seen in RCE syndrome.

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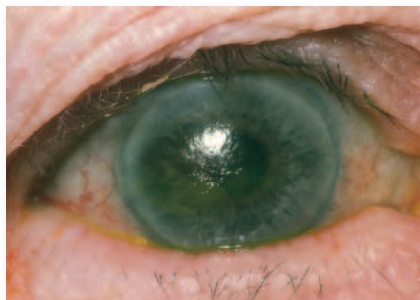
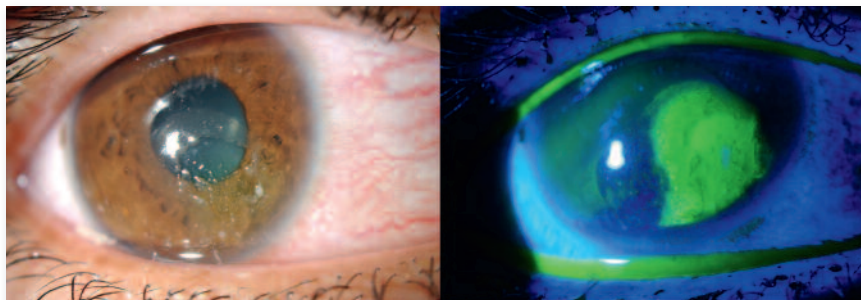


Figure 2. Patient with anterior basement membrane dystrophy.



Figures 3a and b. a (left). Inferior corneal epithelial erosion. b (right). Fluorescein staining and cobalt blue light highlighting the corneal erosion.

most common abrasive injuries are those from human fingernails and vegetable material such as tree leaves and branches. The most common corneal dystrophy is anterior basement membrane dystrophy. RCE syndrome is usually unilateral but corneal dystrophies are usually bilateral.

The sudden pain often felt in an episode of RCE syndrome on awakening or during sleep occurs because the lid and cornea may have adhered overnight and movement of the lid on waking or of the eye during rapid eye movement sleep causes tearing of the loosened corneal epithelium.²

CLINICAL FEATURES

During an acute attack of RCE syndrome, the corneal epithelium is eroded and the underlying sensory nerves are exposed. Symptomatically, there is variable discomfort, ranging from foreign body sensation to extreme pain, in association with lacrimation and photophobia. The symptoms can last from minutes to hours.

The debilitating aspect of this disease is its recurrent nature, with the threat and fear of a painful attack being anxiety provoking for patients.

Patients will often describe techniques to avoid the erosion, such as learning to keep their eyes closed when they wake up and gently rubbing the eyelids to prevent a rapid corneal epithelial tear before opening the eyes.

DIAGNOSIS

The diagnosis of RCE syndrome is made on clinical history and physical examination. Episodes of eye pain or grittiness upon awakening or that wake the patient during the early morning hours are highly suspicious for the condition. A concomitant history of ipsilateral traumatic corneal abrasion, even months earlier, is highly suggestive of recurrent corneal erosion.

Examination of the eye using fluorescein staining at the time of the attack may reveal signs of a corneal erosion (Figures 3a and b). Milder attacks may not be obvious without a careful slit lamp examination. The corneal epithelium has a rapid and extensive replicative capacity and, especially in milder cases of the disease, the signs may have completely resolved by the time of examination. In patients with an underlying corneal dystrophy, slit lamp examination may show signs of this in both the eye with corneal erosion and the fellow eye.

MANAGEMENT

Managing RCE syndrome involves initially facilitating corneal healing (acute management) followed by preventing further attacks.

Acute management

The acute management of corneal erosions comprises controlling pain, encouraging corneal re-epithelialisation and minimising the risks of infection. The initial management depends on

the severity of the symptoms.

Any loose epithelium should be debrided as this generally impedes healing (see below under 'Surgical treatment'). Severe pain may be alleviated with the use of a bandage soft contact lens, which protects the ulcerated corneal surface from friction during blinking and also from external sources of injury. Oral analgesia is often required, especially if a bandage contact lens is not used.

A topical antibiotic such as chloramphenicol eye ointment should be prescribed to protect against infection, and this will also act as a lubricant. A medium duration-acting cycloplegic such as homatropine may be required to relieve ciliary muscle spasm.

Prevention of attacks

Medical treatment

The vast majority of recurrences of corneal erosions can be prevented with medications. A detailed Cochrane review is available on the medical treatment of recurrent erosions of the cornea.²

Topical lubrication, especially with paraffin-based ointment at night before sleeping, is the mainstay of medical treatment for preventing recurrent erosions.¹⁻⁷ This creates a barrier between the eyelid and cornea and is generally effective in preventing further attacks of corneal erosions in most patients. It does, however, need to be continued for six to 12 months to allow adequate re-adhesion of the corneal epithelium to the underlying

layers. Any signs of underlying dry eye or uncontrolled blepharitis should be treated with topical lubrication and lid hygiene measures (hot compresses and eyelid scrubbing), with additional oral doxycycline in more severe cases.

If topical lubrication does not prevent further attacks of RCE syndrome, medical treatment with a topical corticosteroid (such as fluometholone 0.1%) and oral doxycycline (100 mg daily) may be needed. This therapy has been reported to be beneficial for treating recurrent attacks and preventing further attacks.^{2,3} The treatment period is usually for at least one month. This treatment has the advantage of being noninvasive and effective (83% of patients were free of symptoms at six months and 73% at 12 months).³ It can also benefit patients who have recurrences despite surgical intervention. Its disadvantage is the potential for side effects.

Surgical treatment for recurrences despite medical treatment

In some patients, medical treatment fails to control the symptoms of RCE syndrome or is not tolerated. This often leads to significant worry and anxiety for patients because they become fearful of the pain that may awake them or occur upon awaking. Surgical therapies can be used with a high degree of success in such cases. There is no one treatment that is beneficial for all patients so the choice will depend on factors such as availability of treatment and the severity and site of the corneal erosion. Although effective, the surgical treatments may require repeating for further recurrences.

The following surgical treatments are available.

- **Epithelial debridement.** Debridement of the epithelium with a cotton tip can be an effective and readily available treatment. The treatment effect can be optimised by using a solution of 20% alcohol to loosen the epithelium from the underlying cornea.⁴ The result is a very clean dissection plane between the corneal epithelium and

underlying Bowman's membrane that allows new epithelium to regenerate and anchor more securely to the underlying layers. There is a small risk of corneal haze with this treatment.

- **Anterior stromal puncture.** Micro-puncture of the anterior part of the stroma at the site of recurrent erosion using a 23 gauge needle or Nd:YAG laser can also be effective in creating an adhesion complex stimulated by scar formation.^{1,7} This procedure is best used for erosions off the visual axis to avoid visually symptomatic scars.
- **Diamond burr polishing.** Diamond burr polishing of the bed of the erosion after epithelial debridement is also effective at inducing epithelial adhesion and has the advantages of being inexpensive and available in the offices of most ophthalmologists. However, it can rarely cause corneal haze.⁵
- **Phototherapeutic keratectomy (PTK).** In PTK, the excimer laser, the laser commonly used for laser surgery of the cornea (laser-assisted in-situ keratomileusis [LASIK]), is used to debride the corneal Bowman's membrane after the epithelium has been removed. The ablated Bowman's membrane facilitates more secure attachment of the corneal epithelium to the underlying corneal layers as the corneal epithelium grows back onto the cornea. This treatment, available in almost every major city, is effective (74 to 100%) in preventing recurrence of symptoms, although there may be recurrences in a minority of patients and complications such as corneal haze and infection are possible.⁶ There is the potential, however, for PTK to induce a hyperopic shift in the patient's refraction, which may necessitate a change of glasses or contact lenses or further laser surgery in some instances to correct the hyperopia.

CONCLUSION

RCE syndrome is a painful eye condition that is usually related to trauma. Its typical presentation is ocular pain and foreign body sensation experienced on opening the eye upon normal awakening or occurring during sleep and awakening the patient. The history will usually be enough to make the diagnosis, although a slit lamp examination is mandatory. Patients who experience corneal erosions are initially anxious and bewildered by their onset and when they recur become distressed at the thought of continuing attacks causing pain and interrupting normal sleep patterns. The symptoms can often be controlled with ocular lubricants or other medication, and surgery if these fail.

RCE syndrome may remain a lifelong problem for patients due to its recurrent nature. This may be especially so in patients with corneal dystrophies, who have an underlying genetic abnormality predisposing them to corneal erosion. **MT**

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