Recurrent Corneal Erosion Syndrome

Recurrent Corneal Erosion Syndrome of RCES for short, is a condition where the transparent skin (epithelium) of the window of the eye (cornea) becomes unstable and breaks down. The breakdown of the surface of the cornea results in an erosion, similar to an abrasion, although the latter technically is caused by eye trauma. RCES often occurs some weeks after a corneal injury and often spontaneously. As the erosion occurs, the nerves that lie just beneath the surface of the corneal epithelium become exposed causing significant pain.

There are no accurate statistics on how common RCES is, but a rate of 1 in 150 people may suffer RCES after eye trauma. It does however affect females slightly more than males.

What are the symptoms of RCES?

A typical history for people suffering from RCES follows a corneal injury some weeks or months previously. A corneal abrasion at the time heals but is not firmly attached down to the surface of the eye. Typically, patients are woken in the early hours of the morning with pain, watering and foreign body sensation. This happens partly due to the loose unattached epithelium 'sticking' to the inner side of the eyelid. During Rapid Eye Movement (REM) sleep, the epithelium is pulled away from the cornea exposing the nerves and causing pain. This often settles over 15 to 30 minutes. If a large erosion occurs the pain is worse, and may take several hours or days to resolve, and vision may be affected. As the name implies, RCES is recurrent, so can occur multiple times and may take months to years to resolve.

Why does it happen?

RCES happens when the epithelium is not strongly enough attached to the underlying tissues. Normally, strong tissue strands anchor the epithelium through Bowman's layer into the stroma. These act like screws in a piece of wood, to hold the epithelium firmly onto the corneal surface. Following an initial injury (amongst other causes) these links are broken and sometimes do not recover and easily then fall off. The epithelium becomes unstable, and RCES results.

Causes of RCES include

- A previously normal cornea that is injured, e.g. scratched by a fingernail. Usually the new surface rapidly grows new links and no further problems occur. The problem happens when the links do not adequately form.

- Previously abnormal cornea**.** In some genetic conditions affecting the cornea, the links and anchors that hold the epithelium down are weak or missing, resulting in RCES without previously injury. Common causes include:
    - Map-Dot-Fingerprint Dystrophy
    - Dry eyes
    - Chemical injuries
    - Diabetes
    - Ocular rosacea and many more

Some drugs are known to be associated with RCES. These include:

- Thiomersal (found in contact lens solution)
- High Dose Neomycin

- All topical anaesthetic drops

What are the treatment options?

Because RCES is a recurring condition, it can be a frustrating condition to manage and difficult to treat. Initially the treatment is to manage the underlying causative condition. Regular lubrication after traumatic eye injury may prevent the formation of RCES before symptoms begin.
If RES does occur. In the acute immediate phase, treatment is managing symptoms, so intense lubrication, patching the eye, dilating the pupil to limit pain are the mainstay. A minority of cases will not respond to these measures and require alternative treatments longer term.

Lubricants

The main treatment for RCES is ocular lubrication. The idea of using regular lubrication is to reduce friction and adherence between the eyelid and the poorly attached corneal epithelium. The use of lubrication during the day, relieves dryness of the eye which may cause issues later in the day or at night. Night time ointment is necessary before going to bed to form a barrier between the eyelid and corneal epithelium. It is usually recommended to use this every night for 6 months after RCES starts.

Medication

Treatment of RCES with the combination of oral doxycycline and topical corticosteroid has been found to be effective in one study - 71% had no recurrence by 12 months. Both have been shown to inhibit key

metalloproteinases important to disease pathogenesis. This treatment may help patients with RCES for whom other forms of treatment have failed

Bandage contact lens

In cases that RCES occurs regularly, say for example 3-4 times per week affecting your daily life, a bandage contact lens can be used to allow the links between the epithelium to form, limiting the risks of RCES. These are soft contact lenses inserted to protect the corneal surface from the mechanical trauma of eyelid movement. They are not designed to improve vision like refractive contact lenses. These bandage contact lenses are worn continuously for as long as six months, but replaced monthly. They are very effective at reducing symptoms, and may improve healing rates.

Surgical options

Anterior Stromal Micropuncture (ASP)

Stromal micropuncture may be recommended if the symptoms are persistent and not responding to conservative measures. This treatment is usually recommended if the defective area of the cornea is outside the zone that is responsible for clear vision on the cornea. ASP is often performed under topical anaesthetic eye drops in a consulting room. Small multiple punctures are made in the outer third to two thirds of the cornea. The intention is to create small scars that help replace the missing normal epithelial links that hold the corneal epithelium down.

Alcohol Delamination of the cornea

This technique has been adapted from laser vision correction, LASEK and may be used in localised or diffuse disease. An alcohol solution is applied to the cornea and the defective epithelium removed. This allows new corneal epithelium to be formed over a bed of clean cornea. The cornea is usually more stable once it has healed over the clean corneal surface. The symptoms you may experience after Alcohol Delamination is similar to experiencing RCES and usually lasts a few days.

Phototherapeutic keratectomy/PTK

PTK is reserved for severe and difficult cases (usually in patients with associated corneal dystrophies). The entire epithelium is removed and allowed to regrow from new over the following 5-7 days. Excimer laser photo-therapeutic keratectomy (PTK) is now a well-established treatment modality for RCES. Partial ablation of Bowman's layer with PTK gives a smooth surface for the newly generating epithelium to form adhesion complexes. It can be carried out more than once if the problem recurs.

What is the long-term outcome of RCES?

Over 90% of cases resolve eventually with various forms of treatment, although it may take several months. Most patients respond well to topical treatment; few patients will have their vision permanently affected.

Where there is a pre-existing corneal abnormality, such as map-dot-fingerprint dystrophy, or the patient has a condition such as diabetes that may impair healing, the chances or resolution maybe lower and take longer to achieve.

Prevention

- Prophylaxis with long-term lubrication (e.g. night-time lubricating ointment for three months) may help prevent recurrence. The success of this approach depends on the patient understanding the importance of continuing the treatment in the absence of symptoms.

- More severe cases may require a protective bandage contact lens.
- Some evidence suggests that a 12-week course of systemic tetracyclines (e.g. oxytetracycline 250 mg bd) may be beneficial (these promote epithelial stability).

Other general preventative measures include:

- Avoiding dry/irritating environments (e.g. cigarette smoke).
- Wearing protective glasses, especially where exposure might risk abrasion (e.g. gardening, painting).
- Keeping well hydrated.
- Avoid rubbing the eyes
- Applying long-lasting lubricating ointments last thing at night.
- Avoiding sleeping in late.
- Learning to wake with eyes closed and still (and having lubricant within reach by the bedside).