Jules Stein Eye Institute
U C L A

Clinical Update

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Rethinking Management of Recurrent Corneal Erosions

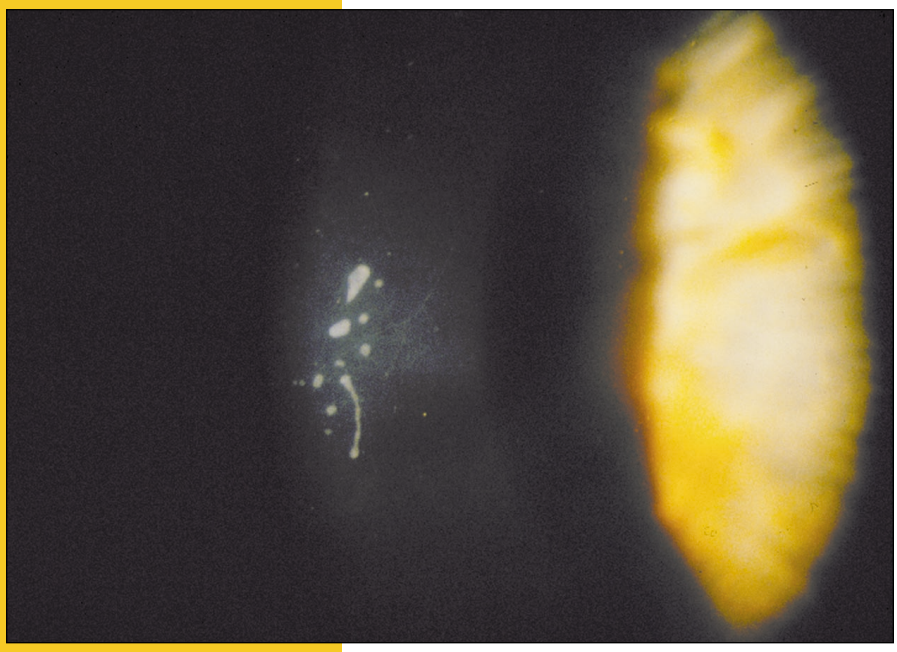

Figure 1: Slit lamp photograph of Cogan's microcysts, representing foci of aggregated, degenerated epithelial cells. These epithelial microcysts, in junction with intraepithelial map and fingerprint lines, are characteristic features of anterior basement membrane dystrophy.

Notwithstanding lasers and other major advances, low-tech solutions are still worthwhile for recurrent corneal erosions, says Anthony J. Aldave, MD, Assistant Professor of Ophthalmology and Director of the Cornea and External Disease Fellowship Program at Jules Stein Eye Institute. "Although excimer laser phototherapeutic keratectomy (PTK) has enamored clinicians, and I use PTK for selected patients with recurrent erosions, simpler and less expensive modalities can be comparably effective," he says.

Basic Care

Factors predisposing a patient to recurrent corneal erosions typically dictate the most appropriate management. Many patients with corneal dystrophies — anterior basement membrane dystrophy, dystrophies of Bowman's layer, or lattice or granular dystrophies — will experience recurrent erosions (Figure 1). Other predisposing factors include ocular rosacea and diabetes mellitus. "Any minor trauma may launch a cycle of recurrent erosions in such patients," notes Dr. Aldave.

Acute management aims to speed healing and limit patient discomfort by patching the eye with a bandage soft contact lens and/or by instilling hypertonic, antibiotic, or artificial tear drops or ointments. Cycloplegia can decrease light sensitivity. For subsequent prophylaxis, says Dr. Aldave, instilling a hypertonic solution or a lubricating ointment in the eyes at bedtime can minimize any shearing force exerted by the upper lid on the corneal epithelium upon awakening. "However, effective as nightly ointment may be, many patients find this regimen burdensome long term, and the secondary blurred vision may increase the risk of falls when the patient gets out of bed during the night," he observes.

Next Phase

Medical therapy for refractory cases includes corticosteroid eye drops or oral tetracycline. Both have activity against matrix-metaloproteinases (collagenases, elastases) — enzymes that may weaken attachment of the epithelial cells to the underlying basement membrane. Explains Dr. Aldave, "In one very small but placebo-controlled trial, two months of oral doxycycline was given followed by three weeks of topical steroids to patients with intractable corneal erosions; no patient experienced a recurrence

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RECURRENT CORNEAL EROSIONS

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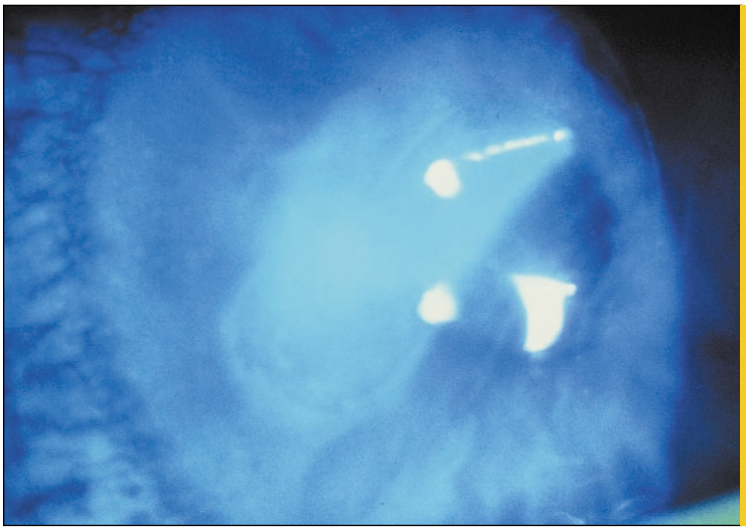

Figure 2: Slit lamp photograph with cobalt blue illumination demonstrating flourescein-stained, large, recurrent corneal erosion in a patient with global epithelial dysadherence secondary to anterior basement membrane dystrophy.

throughout follow-up of over one year. Despite questioning why benefits lasted so long after therapy ceased, I'll consider oral tetracycline/doxycycline or steroids prior to or in conjunction with surgical intervention."

Surgical treatment may be needed if the patient fails to respond to medical therapy, has a corneal dystrophy, or has global epithelial dysadherence. "These patients are far more likely to have chronic, multifocal erosions and a more difficult-to-manage course," says Dr. Aldave. He leaves the timing of intervention to the patient: "If the patient lives in fear of erosion recurrence and has disabling pain, surgery makes sense. To be free from erosions, these patients will accept the slight risk of haze with diminished visual acuity or mild night-vision disturbance associated with some procedures."

Surgical Approaches

The least invasive modality — bandage soft contact lens — may be used for symptomatic relief of discomfort associated with a recurrent erosion. Longer use (three months or more) may help promote stronger adherence of epithelial cells to the underlying basement membrane, Dr. Aldave notes.

Another low-tech procedure easily performed in the office, anterior stromal micropuncture with 25-gauge needle to a depth of .1mm, causes just enough scarring to effectively improve adherence of the epithelial basement membrane to Bowman's layer. A variation using neodymium YAG laser to scar the cornea, Dr. Aldave considers "somewhat overkill; the needle works just as well. The problem with micropuncture, however, is scarring, which can be significant. This procedure is best reserved for the patient with localized, usually posttraumatic, erosions in the periphery of the cornea, with no underlying dystrophy predisposing to chronic multifocal erosions."

For patients whose recurrent erosions are related to an epithelial, Bowman's layer or stromal dystrophy, excimer laser PTK is about 75 to 90 percent successful in preventing recurrences. Explains Dr. Aldave, "Theoretically, removing about 5 microns of Bowman's layer creates a smooth surface for formation of a new basement membrane and migration of epithelial cells." The very low incidence of haze after PTK is seldom visually significant. What concerns Dr. Aldave is that removing even a little tissue in the central cornea may produce a hyperopic shift — usually negligible after a single treatment but measurable after repeated treatment. "PTK can be repeated if necessary, but a shift to farsightedness, albeit slight, is a consideration," he notes.

Dr. Aldave describes another procedure, combination epithelial debridement with polishing of Bowman's layer, as "fairly crude." This procedure uses a Weck cell sponge to remove non-adherent epithelium and a 2.5 to 5 mm diamond-dusted spherical burr to roughen Bowman's layer. "About 90 percent successful after one treatment, this procedure is easy to perform at the slit lamp, has a low incidence of haze formation, and rarely reduces best corrected visual acuity. Best of all, it can be repeated without changing the patient's refractive status," he says.

Suspects and Solutions

Resolving recurrent corneal erosions demands meticulous care. "Findings of anterior basement membrane dystrophy," says Dr. Aldave, "are often subtle and evanescent. I take a full history and closely examine both the involved and unaffected corneas. Erosion recurrence raises suspicion of global epithelial dysadherence." (Figure 2)

Dr. Aldave believes that although the mechanisms of some treatments for recurrent corneal erosions remain hypothetical and lack scientific explanation, "any modality that is clinically effective, with negligible side effects, is worth trying."

RECENT PUBLICATIONS:

Sridhar MS, Rapuano CJ, Cosar CB, Cohen EJ, Laibson PR. ***Phototherapeutic keratectomy versus diamond burr polishing of Bowman's membrane in the treatment of recurrent corneal erosions associated with anterior basement membrane dystrophy.*** Ophthalmology. 2002 Apr;109(4):674-9.

Soong HK, Farjo Q, Meyer RF, Sugar A. ***Diamond burr superficial keratectomy for recurrent corneal erosions.*** Br J Ophthalmol. 2002 Mar;86(3):296-8.

Case Report: Glaucoma Care in a Patient Who Underwent a Refractive Procedure for Presbyopia

The following report was submitted by Simon K. Law, MD, PharmD, Assistant Professor of Ophthalmology, in the Glaucoma Division of the Jules Stein Eye Institute at UCLA.

A 59-year-old Caucasian male presented with complaints of ocular discomfort and evidence of a bleb leak in the left eye. About two years prior to consultation, he underwent an anterior ciliary sclerotomy procedure (ACS) for presbyopia of his left eye. Six months after the procedure, he was noted to have increased intraocular pressure (IOP) requiring glaucoma eye drops. As a result of regression from the initial corrective effect with ACS, and the added possibility of a pressure reduction effect, he subsequently underwent implantation of four silicone scleral expansion bands in the perilimbal quadrants. The patient's IOP remained uncontrolled, however, and he later required trabeculectomy.

Initial examination of his left eye revealed visual acuity of 20/100 and IOP of 10 mm Hg. A small, superior conjunctival bleb was present and noted to be cystic, thin and leaking. The surrounding conjunctiva was injected and scarred. The bleb extended 3 mm anteriorly onto the superior cornea. The remainder of the limbal conjunctiva was retracted. There were four deep conjunctival scars corresponding to the insertion sites of the scleral expansion bands. The superior-nasal and inferior-temporal bands were exposed. The conjunctiva near the inferior-nasal band was hyperemic with granulation tissue. The superior-temporal conjunctiva area had a depressed scar of 1.5 x 3 mm and the expansion band at that location appeared to have extruded.

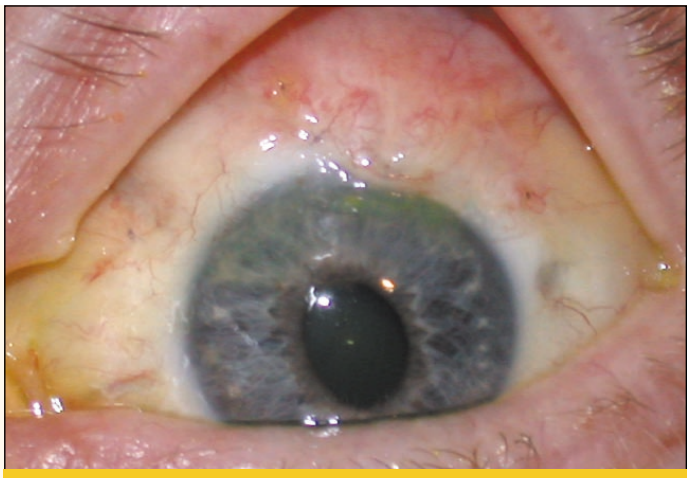

Figure 1: Left eye one month after operation.

Treatment

Surgical revision was performed to repair the bleb leak. The anterior extension and the leaky avascular portion of the bleb were excised. The surrounding conjunctiva was undermined and mobilized to the limbus to cover the trabeculectomy site. The conjunctiva overlying the expansion bands was dissected and the bands were removed.

Four weeks post-operatively, best-corrected visual acuity improved to 20/30 with resolution of the patient's ocular discomfort. Intraocular pressure was controlled at low to mid teens (Figure 1).

Discussion

ACS is a relatively new surgical technique based on the Schachar model of accommodation and presbyopia. ACS involves radial scleral incisions overlying the ciliary body in the four oblique quadrants. Limbal peritomies are usually required. According to the Schachar theory, ACS may restore the zonular tension lost to normal lens growth, thereby allowing accommodation to function again. Because of rapid regression of the surgical effect in general, silicone scleral expansion bands can be inserted at the depth of the sclerotomy to keep the incision open or even tunneled into the sclera to achieve the theoretical effect. The true mechanism of accommodation and the effectiveness of restoring accommodation with the scleral expansion procedure (SEP) have been the topics of heated debate in the ophthalmology community for the last five years.

There are conflicting reports that SEP may have an IOP reduction effect. Fukasaku et al. and Marmer have reported, separately, a dramatic IOP reduction of almost 10 mm Hg postoperatively. The method of the study, results and analysis were not reported in detail. On the contrary, a peer reviewed, prospective small case series by Malecaze et al. reported that IOP was not modified after SEP. The speculated mechanisms of IOP reduction range from creation of a localized ciliochoroidal detachment to expansion of the anterior chamber angle with facilitation of aqueous outflow. It is uncertain whether reported IOP reduction is only an artificial effect; decreased sclera rigidity as a result of the incisions may result in an artificially lowered IOP by applanation. However scarring and hardening of sclera, or closure of the proposed ciliochoroidal space, may ultimately reverse the initial effect.

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GLAUCOMA CARE

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Figure 2: Left eye with conjunctiva hyperemia and scarring, exposed superior-nasal scleral expansion band, and anteriorly migrated bleb onto the cornea.

Implantation of any foreign body close to the limbus is known to cause ocular irritation. The implantation of tube shunt devices and scleral buckles has shown that foreign body reaction to the implanted materials is virtually inevitable regardless of their inert properties. While encapsulation of a foreign body occurs when the implant is placed posterior to the equator, erosion through the conjunctiva is common when the implant is near the limbus. Scleral or pericardial grafts are frequently used to cover the extraocular portion of glaucoma drainage devices anterior to the equator before closure of the conjunctiva. Even with this additional protection, glaucoma specialists frequently observe thinning of the overlying graft and conjunctiva over time. In our patient, three implanted bands were exposed or extruded.

Extensive conjunctiva scarring is a common risk factor for failure of glaucoma surgery. In this patient the previous peritomies, with their resultant conjunctival retraction, and the implanted bands, with their associated foreign body reaction, led to aggressive scarring of tissue surrounding the bleb (Figure 2). Tight scarring of the surrounding conjunctiva limits filtration of the trabeculectomy and is frequently associated with progressive thinning and bleb leakage. Multiple episodes of leakage and healing may lead to migration of the bleb or conjunctiva onto the cornea.

One could argue that a tube shunt procedure should be the glaucoma procedure of choice in eyes with previous SEP. However, with continuous foreign body reaction in all limbal quadrants, the success of a tube shunt procedure may be limited. The expansion bands should be removed to improve the chance of success with glaucoma surgery. The need for glaucoma surgery in patients with previous SEP will be a new challenge in the refractive era.

RECENT PUBLICATIONS:

Marmer R. ***The surgical reversal of presbyopia: a new procedure to restore accommodation.*** Int Ophthalmol Clin. 2001;41:123-32.

Fukasaku H, Marron J. ***Anterior ciliary sclerotomy with silicone expansion plug implantation: effect on presbyopia and intraocular pressure.*** Int Ophthalmol Clin. 2001;41:133-41.

Malecaze FJ, Gazagne CS, Tarroux MC, Gorrand JM. ***Scleral expansion bands for presbyopia.*** Ophthalmology. 2001;108(12):2165-71.

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