

## Peripheral sterile corneal infiltrates and melting after collagen crosslinking for keratoconus

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Corneal collagen crosslinking (CCC) with riboflavin/ultraviolet-A (UV-A) is a new therapeutic technique designed to strengthen the cornea and arrest progressive corneal ectasia.<sup>1</sup> Few complications have been reported following this therapy.<sup>2,3</sup> We report the case of a 40-year-old patient who had CCC for progressive keratectasia secondary to keratoconus. The patient had no medical history of systemic illness or ocular inflammatory disorders.

Corneal collagen crosslinking was performed under topical anesthesia (proxymethacaine 0.5% without preservative). The central 8.0 mm of epithelium was mechanically debrided without trephination using a hockey stick blade. Riboflavin 0.1% in 20% dextran drops (Medio-Cross, IROC AG) were applied every 3 minutes for 30-minute exposure to UVA (365 nm, 3 mW/cm<sup>2</sup>) using a dedicated UVA source (UV-X, IROC AG). Riboflavin 0.1% drops were applied every 5 minutes throughout the UV exposure period. A bandage contact lens was placed at the end of surgery. Postoperatively, chloramphenicol 0.3% 4 times daily, dexamethasone 0.1% drops 2 hourly (preservative-free), and cyclopentolate 1% drops twice daily were prescribed.

Five days postoperatively, 3 peripheral areas of marginal infiltration without overlying epithelial ulceration were observed (Figure 1, A). The central epithelial defect had healed. A diagnosis of noninfective keratitis was made, and the patient was started on twice hourly preservative-free levofloxacin and dexamethasone 0.1%. Markers for rheumatoid factor, antineutrophilic cytoplasmic antibodies, immune

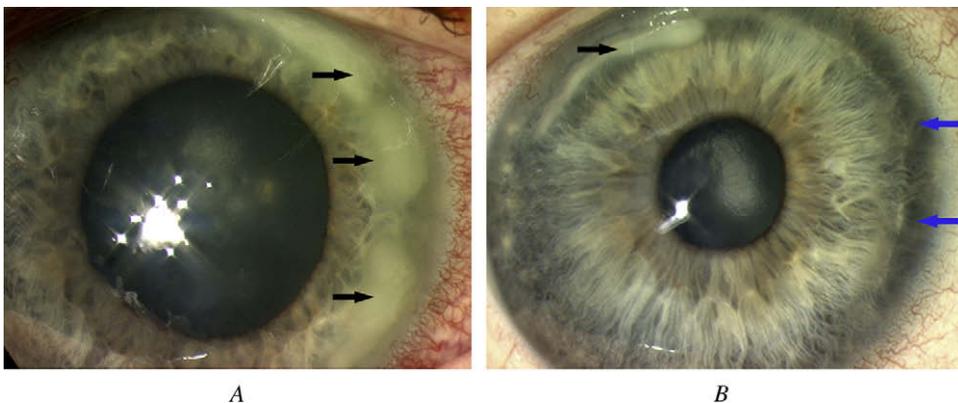
complexes, erythrocyte sedimentation rate, and C-reactive protein were all negative.

One week later, much of the marginal infiltration had disappeared leaving areas of peripheral stromal thinning, estimated at 40% to 50% of the total corneal thickness at the maximal point. A linear superior area of superficial infiltration remained (Figure 1, B). Topical steroids were increased to hourly prednisolone acetate 1%, and topical antibiotic agents were reduced to 4 times daily. In the subsequent weeks, there was complete resolution of infiltrates but with residual marginal thinning (maximum 30%) (Figure 1, B). The best corrected visual acuity had returned to 6/18 at the last examination, 2 months after the crosslinking procedure.

## DISCUSSION

Sterile corneal stromal infiltrates have been described in several clinical settings and probably occur as a result of enhanced cell-mediated immunity to staphylococcal antigens deposited at high concentrations in areas of static tear pooling.<sup>4</sup> The pattern of marginal infiltration in rosacea keratitis reflects tear pooling at the lid margins. After laser in situ keratomileusis, infiltrates are known to be localized to the flap margin, where tear pooling may occur in the gutter formed by the flap edge.<sup>5</sup> Diffuse sterile infiltrates are also associated with poor hygiene in contact lens users, as tear fluid and antigens accumulate under the lens.<sup>6</sup>

This case of sterile infiltration and corneal stromal melting may represent a variant of syndromes related to staphylococcal antigen deposition in areas of static tear pooling beneath the bandage contact lens. The efficacy of crosslinking without debridement remains contentious.<sup>7,8</sup> We now ensure that any area of heaped up epithelium is debrided before a bandage contact lens is applied at the end of the crosslinking procedure.



**Figure 1.** A: Marginal stromal infiltration (dark arrows) without an overlying epithelial defect after CCC for keratoconus. B: Residual superficial infiltration (dark arrow) after initial treatment with antibiotic and corticosteroid agents. Peripheral stromal thinning in areas of previous peripheral infiltration are evident (blue arrows).

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## Cataract surgery in ancient Egypt

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The first documented case of cataract is on a statue from the fifth dynasty (about 2457–2467 BC) contained in the Egyptian Museum in Cairo, Egypt.<sup>1</sup> It confirms that old Egyptians knew this disease. Scientists have often discussed whether cataract was first operated on in ancient Egypt. Although the first known description of the surgical treatment of cataract comes from “Sushruta Samhita-Uttar Tantra,” an Indian medical treatise (800 BC),<sup>2</sup> cataract surgery was mentioned in the Babylonian Code of Hammurabi (1750 BC).<sup>3</sup>

A wall painting in the tomb of the master builder Ipwy at Thebes (about 1200 BC) shows an oculist treating the eye of a craftsman (Figure 1). Because of the length of the instrument, the scene might be interpreted as cataract surgery by couching of the lens into the vitreous cavity. In the temple of Kom Ombo, constructed by Tutmes III (1479–1425 BC), there is a relief on the internal facade of the second wall that depicts a series of surgical instruments carved in stone, including several needles (Figure 2). The National Museums in Liverpool, England, contain a series of ancient copper needles having neither



**Figure 1.** A wall painting in the tomb of the master builder Ipwy at Thebes (about 1200 BC) showing an oculist treating the eye of a workman (modern copy of the painting at the entrance to the Cornea Bank at Ain Sham’s University Hospital, Cairo, Egypt).

hooks nor eyes (Figure 3). They were found in 1900 by Flinders Petrie in the tomb of King Khasekhemwy (c. 2700 BC) in the Royal Necropolis at Abydos, Upper Egypt.<sup>4</sup> In 2001, near the Saqqara pyramid complex (built c. 2630 BC), about 19 miles south of Cairo, archaeologists made a fascinating discovery: the oldest known tomb of a Pharaonic surgeon, dating back more than 4000 years. This was the tomb of Skar,



**Figure 2.** Detail from the relief on the internal facade of the second wall in the temple of Kom Ombo, Egypt, showing a series of surgical instruments carved in stone.