Transepithelial “epi-on” corneal collagen cross-linking-A Healthier Approach?
Matt Kauffman, O.D.

Corneal collagen cross-linking (CXL) was first developed in 1998 to strengthen ectatic corneas. The original procedure, which involves debriding the corneal epithelium prior to the application of riboflavin, is known as “epi-off” CXL.

Epi-off CXL has been successful in reducing the progression of ectatic diseases. However, because a large epithelial defect is created, the patient is at higher risk for developing complications. The most serious complication reported is microbial keratitis. Additional corneal complications include haze, subepithelial nerve plexus damage, reduced sensitivity, melting and edema. This procedure is contraindicated on corneas thinner than 400 µm due to the increased risk of ultraviolet-A (UV-A) exposure to the endothelium and other intraocular structures.

In 2004, the first CXL procedure where the epithelium was not debrided, known as transepithelial or “epi-on,” CXL was performed. The biggest challenge was devising a method that allows riboflavin to penetrate an intact epithelium. Various topical agents, such as benzalkonium chloride and ethylenediaminetetraacetic acid (EDTA), have been successfully utilized to increase riboflavin’s permeability into the stroma.

Transepithelial CXL has been successful at strengthening ectatic corneas with a lower incidence of the complications associated with epi-off CXL. Studies have shown it is as effective as the epi-off procedure for corneal stabilization and visual improvements. Advantages of transepithelial CXL are summarized below.

- Less post-operative pain
- Faster healing
- More rapid improvement in visual acuity (several weeks vs. three to six months with epi-off)
- Earlier resumption of contact lens wear (a few days vs. two to six weeks with epi-off)
- Reduced risk of keratitis, haze or delayed epithelial healing
- Insignificant reduction in corneal sensitivity
- Less risk of UV-A exposure to endothelium and other intraocular structures
- Suitable for corneas thinner than 400 µm

For the reasons listed above, epi-on CXL is a better option for ectatic corneal patients.

References

Matt Kauffman is currently the cornea and contact lens resident at the University of Missouri-St. Louis College of Optometry. Dr. Kauffman is a graduate of the University of Houston College of Optometry. He grew up in Houston, Texas, and received his Bachelor of Science in biology from Southwestern University in Georgetown, Texas.

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