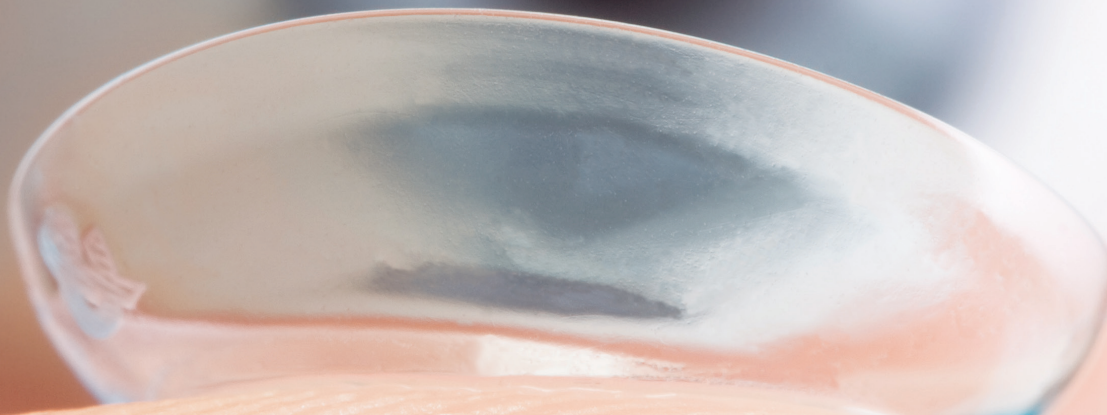




FITTING CONTACT LENSES AFTER CORNEAL CROSSLINKING



Changes brought about by CXL may require adjustments to the patient's existing lenses.

BY GLORIA B. CHIU, OD, FFAO, FSLs

Corneal collagen crosslinking (CXL) is a procedure that aims to stiffen corneal tissue at risk for ectasia and thinning.¹ Several protocols for CXL have been performed worldwide over the past 2 decades, and an FDA-approved version became available in the United States in 2016.² Since then, more US ophthalmologists have been able to offer this procedure (Figure 1), predominately for individuals with progressive keratoconus or corneal ectasia after refractive surgery.

Because this procedure aims to strengthen the corneal tissue and slow ectasia, it is reasonable to expect that

it produces anatomic changes in the cornea. Typically, there are increased bonding connections within the corneal stroma and a flattening effect on the cornea as keratometry values decrease.³ In addition to these beneficial outcomes, there are also potential adverse side effects, including corneal haze and scarring. Corneal haze typically fades over time, sometimes still changing through 1 year after CXL, but there are rare instances in which the haze may persist and lead to compromised vision,⁴ which may not be correctable even with specialty contact lenses.

Optometrists play an important role in providing optimized vision to

individuals with keratoconus or with corneal ectasia after refractive surgery. As these patients are often good candidates for CXL, we must anticipate how the procedure affects the cornea.

Because optometrists often refer patients to ophthalmology for CXL, we must also be prepared for how to manage these patients when they return. Due to the structural changes caused by CXL, contact lens fittings and prescriptions frequently must be updated postoperatively. In this article, I answer some frequently asked questions about contact lens fitting after CXL.

WHEN CAN I INTRODUCE OR REINTRODUCE CONTACT LENSES?

Immediately after CXL, a soft bandage contact lens is placed on the cornea, and the patient is instructed to use topical medications to expedite healing of the eye and prevent infection. The bandage lens is typically removed after 1 week, when the epithelium has regenerated and healed. Studies show that corneal remodeling occurs during the first few months (Figure 2).² During this time of remodeling, it is most practical to have patients wear the glasses prescribed to them before CXL.

After 1 to 2 months, the cornea has generally stabilized enough to reassess the patient's vision with glasses and contact lenses. One may consider refracting at 1 and 2 months after CXL to check



Figure 1. A CXL procedure being performed.

for stability before having the patient fill a spectacle prescription. If vision is still changing, it is reasonable to repeat refraction until results are consistent.

Corneal topography or tomography images should also be captured regularly after CXL to monitor corneal shape. As corneal shape and keratometry values stabilize, refraction should also become more consistent.

The FDA-approved version of CXL requires epithelial removal (epi-off CXL). Some practitioners, however, are performing off-label transepithelial (epi-on) procedures. The epi-off protocol has been shown to be more effective in stabilizing progressive ectasia,⁵ but the epi-on procedure typically has a faster healing time.⁶ Therefore, individuals undergoing epi-on CXL may be able to resume contact lens wear

sooner than those undergoing the epi-off procedure.

Individuals who wore glasses as their predominant mode of vision correction before CXL should still be able to wear glasses afterward. Due to the corneal flattening effect, it is possible that their overall refractive error may decrease, along with the amount of cylinder. It is also possible for some patients to achieve better BCVA with glasses after CXL,⁷ although this should never be expected.

WHAT CONTACT LENS MODALITY SHOULD I CHOOSE?

When the patient's manifest refraction through glasses is stable, it is likely that the corneal shape has also stabilized enough for a contact lens fitting. Because CXL has now structurally

changed the cornea, it is imperative to reevaluate for the best contact lens modality for your patient. If patients previously wore specialty contact lenses, it is possible that, with their refractive error changed or astigmatism reduced, they may be able to switch to another lens modality.

For patients who achieve good vision through glasses, soft contact lenses are an excellent option. Soft lenses are typically the most comfortable and easiest to fit. However, if irregular astigmatism is still present after CXL, specialty contact lenses will provide better vision. Specialty modalities include rigid gas permeable (RGP), hybrid, and scleral contact lenses.

RGP Lenses

If patients wore RGP lenses before their CXL procedure, and if they still have enough irregular astigmatism after CXL that glasses or soft lenses do not provide optimal vision, they may still need RGPs.

Due to the flattening effect that frequently results after CXL, it is possible that the lens design may have to be changed.⁸ An entirely new fit could be started from a trial lens based on topography images, but it would also be practical to use the pre-CXL RGP lens as a starting point. Additionally, an over-refraction should be conducted, either with a new trial lens or the patient's existing lens.

It is important to ensure that the corneal epithelium has healed fully before initiating RGP lens wear because the lens rests on the corneal surface and moves with each blink. Premature RGP lens wear could interfere with epithelial healing. Typically, 1 to 2 months' wait should be sufficient to resume RGP lens wear. It has even been reported that some individuals develop better RGP tolerance after CXL due to corneal flattening and potentially decreased corneal sensitivity.⁹

Hybrid Contact Lenses

As with RGP lenses, it is likely that patients wearing hybrid lenses before CXL will also require adjustments in

AT A GLANCE

- ▶ Corneal collagen crosslinking (CXL) strengthens corneal biomechanics in eyes at risk for ectasia and thinning.
- ▶ Optometrists play an important role in optimizing vision after CXL for individuals with keratoconus or corneal ectasia after refractive surgery.
- ▶ If irregular astigmatism decreases after CXL, individuals previously wearing specialty contact lenses may be able to convert to traditional soft lenses for vision correction.

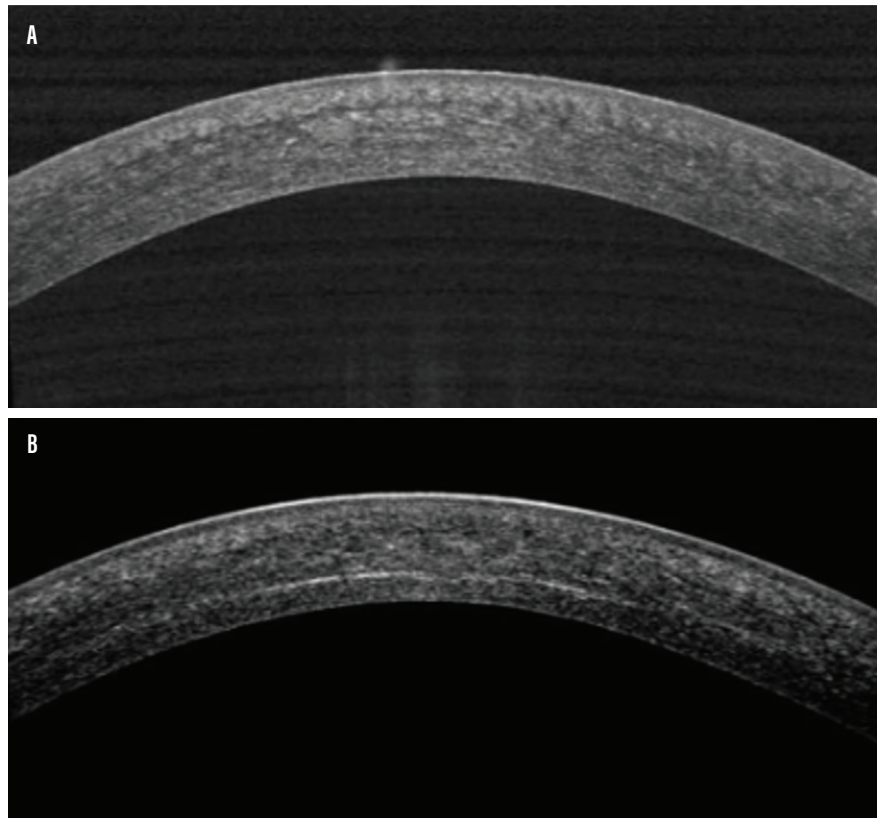


Figure 2. Images of a cornea before (A) and 7 weeks after (B) CXL, demonstrating transient changes and demarcation line in corneal tissue during remodeling stages.

their hybrid lens designs after CXL. Depending on the flattening effect of CXL, the base curve of the gas permeable (GP) central portion of the hybrid design may have to be adjusted, along with the power.

It is unlikely that the skirt would have to be changed because scleral shape is not typically affected by CXL. However, hybrid silicone hydrogel skirts are softer than the stiffer hydroxyethyl methacrylate skirts of older designs, so evaluation of the skirt after adjustment of the GP center is still important.

Because hybrid lenses rest directly on the cornea and tend to settle into the cornea and conjunctival tissue, it is important to observe complete healing of the corneal epithelium before the patient resumes hybrid lens wear.

Scleral Lenses

Unlike soft, RGP, and hybrid lenses, scleral lenses do not (or should not)

touch the corneal surface. These large-diameter lenses are designed to rest entirely on the conjunctival tissue, vaulting over the cornea and limbus (Figure 3).

A study that evaluated scleral lens wear before and after CXL for keratoconus found that lens tolerance appeared to be stable after the procedure.⁷ In a cohort of 18 eyes of 18 patients, there was no significant change in scleral lens–corrected vision after CXL at 1-year follow-up, although spherical power changed in 61% of eyes and cylindrical power changed in 50%. Individual scleral fitting parameters (radius, toricity, sagittal depth, base curve, and total diameter) changed in 17% to 50% of eyes at 1-year follow-up, but the authors noted that variations in scleral lens parameters over time are typically expected. The study authors advised that patients should discontinue scleral lens wear for 1 month after CXL, but they noted that there was no

consensus regarding the temporary discontinuation of contact lens wear after CXL.⁷

Theoretically, because a scleral lens does not rub on the cornea, this modality of lens wear could be initiated earlier than other modalities. Scleral lens wear has been shown to be an effective treatment for persistent corneal epithelial defects,¹⁰ so these lenses could potentially create an environment to support healing of the epithelium after epi-off CXL.

Patients who wore scleral lenses before CXL can probably resume wear after 1 month, or even after 2 to 3 weeks, if necessary, for optimal vision correction. For individuals with keratoconus considering scleral lens wear for the first time after CXL, it would be prudent to wait 1 to 2 months due to the training process required for a successful fitting. Rough insertion, potentially scratching the corneal epithelium, could interfere with healing within the first month after CXL.

CONTACT LENS FITTING AFTER CXL DEPENDS ON TYPE

CXL has been demonstrated to change corneal biomechanics and morphology.¹¹ Expected changes include increased bonding of collagen fibers and flattening of the cornea. These changes may more often affect the fitting of contact lenses that rest directly on the cornea, including soft, RGP, and hybrid lenses. For these types of lenses, it is prudent to wait at least 1 to 2 months for the corneal epithelium to fully heal and for the stromal tissue to complete its remodeling before reevaluation for contact lenses.

For scleral lenses, which do not rest on the cornea, lens wear can often resume within 1 month; new fits can be initiated after 1 to 2 months because lens application training for a novice could cause minor trauma to the ocular surface.

The global period for most specialty lens fittings usually provides a sufficient buffer for minor changes that

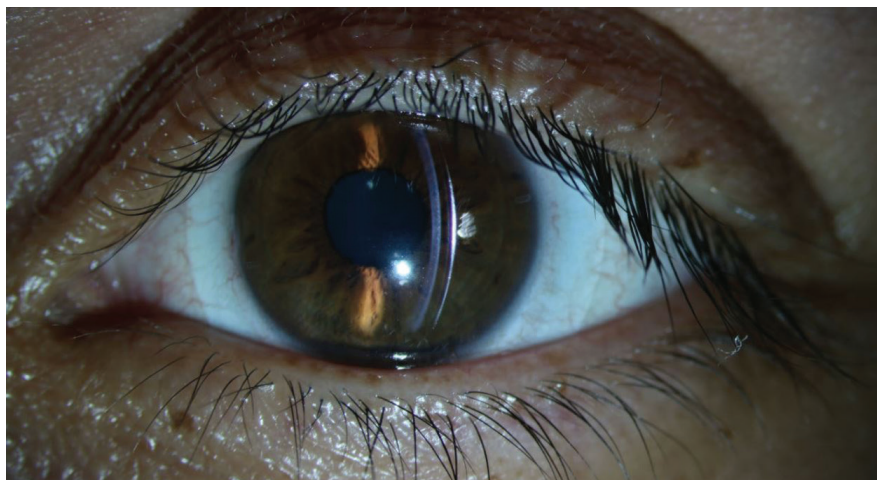


Figure 3. A scleral lens was fit for this keratoconic eye after CXL.

may be required. It is also important to note that if the amount of irregular astigmatism in the eye decreases after CXL, individuals previously wearing specialty contact lenses may be able to convert to traditional soft lenses or even glasses for vision correction.

Teamwork between ophthalmologists and optometrists is critical to

ensure optimal corneal health and vision in patients who have had CXL. Although the MD is responsible for structurally strengthening the cornea through CXL, the OD completes the process by prescribing vision correction to optimize visual acuity. ■

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