

Preoperative Planning for Toric IOLs and Limbal Relaxing Incisions

BY PIT GILLS, MD; LOUIS D. "SKIP" NICHAMIN, MD; AND R. BRUCE WALLACE III, MD

How do you determine the alignment and power of toric IOLs and the placement and length of limbal relaxing incisions (LRIs)? When do you choose toric IOLs over LRIs?

—Topic prepared by R. Bruce Wallace III, MD.

PIT GILLS, MD

There are no absolutes in my pattern for correcting astigmatism. My surgical plans are based on a variety of factors. I generally start considering toric lenses, however, when there is more than 1.00 D of with-the-rule astigmatism or more than 1.25 D of against-the-rule astigmatism. I prefer the AcrySof Toric IOL (Alcon Laboratories, Inc.) because it rotates less and has better optical quality compared with other toric models. For patients with borderline astigmatism who also have corneal issues such as Fuchs corneal dystrophy or Cogan syndrome, I implant a toric IOL rather than disrupt the corneal surface with an incision. Toric lenses have a distinct advantage over LRIs in that there is no regression in the corrected power over time. When patients have irregular astigmatism, I explain that a toric IOL will only correct the regular portion of the cylinder. I may combine a toric IOL with LRIs if the patient has a high amount of astigmatism.

There is no perfect marking system for aligning a toric IOL or placing an LRI. When I am not using a femtosecond laser, I prefer the Cionni Toric Reference Marker (Duckworth & Kent USA Ltd.). It is easy to use and makes a mark without smearing.

The addition of the LenSx Laser (Alcon Laboratories, Inc.) to my practice has added a new level of accuracy and precision to correcting astigmatism. Intrastromal keratotomy with the femtosecond laser is my first choice for astigmatic

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—Pit Gills, MD

keratotomy. The incisions made with the femtosecond laser are more corneal and are therefore shorter than manual LRIs. The depth and placement are also more precise, and there is less chance of an epithelial defect.

For patients receiving a toric lens, I use the femtosecond laser to create a pair of 15° intrastromal arcuate incisions at the steep axis. I use these intrastromal incisions as marks for precise alignment of the toric IOL. If the target for the toric IOL falls between two powers, I choose the lower power, because I have the option of breaking the epithelium postoperatively to fine-tune the correction. I believe intrastromal keratotomy with the femtosecond laser holds great promise for the future of astigmatic correction.

LOUIS D. "SKIP" NICHAMIN, MD

Although toric implants continue to receive deserved interest for the correction of preexisting astigmatism, LRIs remain a valuable and (still) underutilized aid to the mod-

ern refractive cataract surgeon. In the United States, LRIs are frequently used in conjunction with presbyopia-correcting IOLs, because toric versions of these premium implants are not yet approved. Relaxing incisions may supplement the cylindrical correction achieved with toric IOLs. Similarly, LRIs may be used with phakic IOLs, and I personally use LRIs in cases of high cylinder before an excimer laser ablation.

Unfortunately, LRIs undeservedly have a mediocre reputation for accuracy and stability. When performed with care and precision, however, their results can rival those of toric lenses. Specifically, proper centration (as with any astigmatic treatment) over the steep meridian is imperative. In addition, the placement of the incision should actually be inside the true surgical limbus, thus making them peripheral intralimbal corneal incisions. Lastly, the cut should be perpendicular to the corneal surface and of consistent and adequate depth to achieve the full effect without regression.

The real art of astigmatic correction with either LRIs or toric IOLs revolves around the measurement of the patient's cylinder and the subsequent plan for its correction. Unfortunately, no hard and fast rules exist. Most surgeons base their correction only on corneal measurements, but I prefer to also factor in the patient's habitual refraction. Corneal topography increasingly provides the greatest amount of information on the extent and location of the correction, even though I consider as many measurements using as many modalities as possible, particularly when disparate readings are obtained. Nomograms for both LRIs and toric IOLs should distinguish between with-the-rule and against-the-rule astigmatism. Moreover, Douglas Koch, MD,¹ has demonstrated the modest but definite role that posterior corneal curvature plays. Dr. Koch's work shows that, for most patients, posterior corneal curvature tends to add against-the-rule astigmatism. Therefore, ophthalmologists need to generally be more aggressive when addressing this form of astigmatism as opposed to with-the-rule astigmatism.

R. BRUCE WALLACE III, MD

When I schedule cataract surgery for patients with significant preoperative corneal astigmatism, I discuss the option of surgical correction. I look for a strong correlation between the degree and location of the cylinder based on preoperative keratometry and corneal topography. Since learning about posterior corneal against-the-rule cylinder from Dr. Koch,¹ I target an outcome of 0.25 to 0.50 D of with-the-rule cylinder. Patients who have more than 2.25 D of preoperative cylinder are generally good candidates for a toric IOL. I offer LRIs to those with less than 2.25 D of preoperative cylinder. Sometimes, preoperative astigmatic measurements do not correlate well to the degree and location of the astigmatism; this is most often the case in eyes with

less than 2.25 D of preoperative cylinder (ie, the majority of astigmats). For these patients, I usually defer astigmatic correction for the first cataract surgery and determine if astigmatism is present postoperatively. I measure the residual astigmatism in the first eye, which helps me determine the placement of the LRI for the second eye, and on the same day, I create an LRI in the first eye if the patient desires to be less dependent on spectacles.

My LRI technique using a circular axis ring and the Wallace LRI diamond blade and forceps (Bausch + Lomb, Duckworth & Kent USA Ltd., and Storz Ophthalmic Instruments) for globe fixation can be viewed on Eyetube.net. ■



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1. Koch DD, Ali SF, Weikert MP, et al. Contribution of posterior corneal astigmatism to total corneal astigmatism. *J Cataract Refract Surg.* 2012;38(12):2080-2087.

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