

Maximizing Outcomes After IOL Surgery

Astigmatic correction using today's technology optimizes refractive outcomes and patients' postoperative satisfaction.

BY ERIC D. DONNENFELD, MD

Residual postoperative astigmatism is the most common reason that patients may feel dissatisfied after refractive cataract surgery. Despite significant improvements in IOLs, biometry, diagnostic technologies, and power calculations, cataract procedures fail to achieve a plano result in a significant number of cases. Successful visual outcomes require the treatment of residual postoperative astigmatism. Numerous options are available for this purpose. Limbal relaxing incisions (LRIs), for example, are a simple, effective method worth learning and implementing. Here are some tips for getting started.

WHO?

In my experience, most patients can tolerate up to 0.50 D of astigmatism postoperatively. If preoperative topography suggests that they will have between 0.50 and 1.50 D of residual cylinder, I plan to perform LRIs. Excimer photoablation is another option for astigmatic correction, but I believe it unnecessarily introduces expense and laser surgery's risk of complications for such a small amount of astigmatism.

Most insurance plans, including Medicare, do not reimburse surgeons for correcting preexisting corneal astigmatism during cataract surgery. I find, however, that patients are generally happy to pay out of pocket for markedly improved UCVA. For that reason, I usually bundle the cost of LRIs with any additional charges for multifocal or accommodating IOLs. It is important to offer astigmatic correction to patients who will receive a monofocal lens implant as well, because these individuals will experience a dramatic improvement in their distance vision. In general, every 0.50 D of cylinder results in a one-line decrease in UCVA.

NOMOGRAMS

Several notable surgeons have created useful nomograms for correcting small amounts of cylinder with LRIs.¹⁻³ When reviewing these formulas' specific adjustments for patients'

TABLE. THE DONNENFELD NOMOGRAM (DONO) FOR LRIs

Preoperative Astigmatism	Number of Incisions ^a	Length of Incisions (Clock Hours) ^b
0.50 D	1	1.5
0.75 D	2	1
1.50 D	2	2
3.00 D ^c	2	3

^aAll incisions are placed 0.5 mm from the limbus in the correct axis.

^bPatients who have against-the-rule astigmatism or who are less than 45 years old may benefit from slightly longer incisions. Shorter incisions may be indicated for patients older than 65 years.

^cI will use LRIs to correct up to 3.00 D of astigmatism if a laser correction is contraindicated for financial or medical reasons.

age and the axis of cylinder, however, many surgeons feel the procedure must be complex and unforgiving. Actually, I think LRIs are as much an art as a science. After practicing the basic techniques for placing these incisions, most surgeons ultimately develop their own nomograms to deliver consistent results, as did I (Table). The nomogram is simple and easy to follow, and I find it yields very good results.

For those new to LRIs, I suggest starting by adding the procedure to routine cataract surgery with peribulbar anesthesia. I place the incisions at the outset of the cataract procedure, because the cornea tends to thin as it becomes dehydrated under the operating microscope.

PLACEMENT

Ophthalmologists should determine the axis of the incision prior to surgery based on the preexisting corneal cylinder and the cylinder introduced by the cataract incision. An excellent Web site that performs vector analysis and prints out the correct length and axis for the LRI is www.lricalculator.com. For

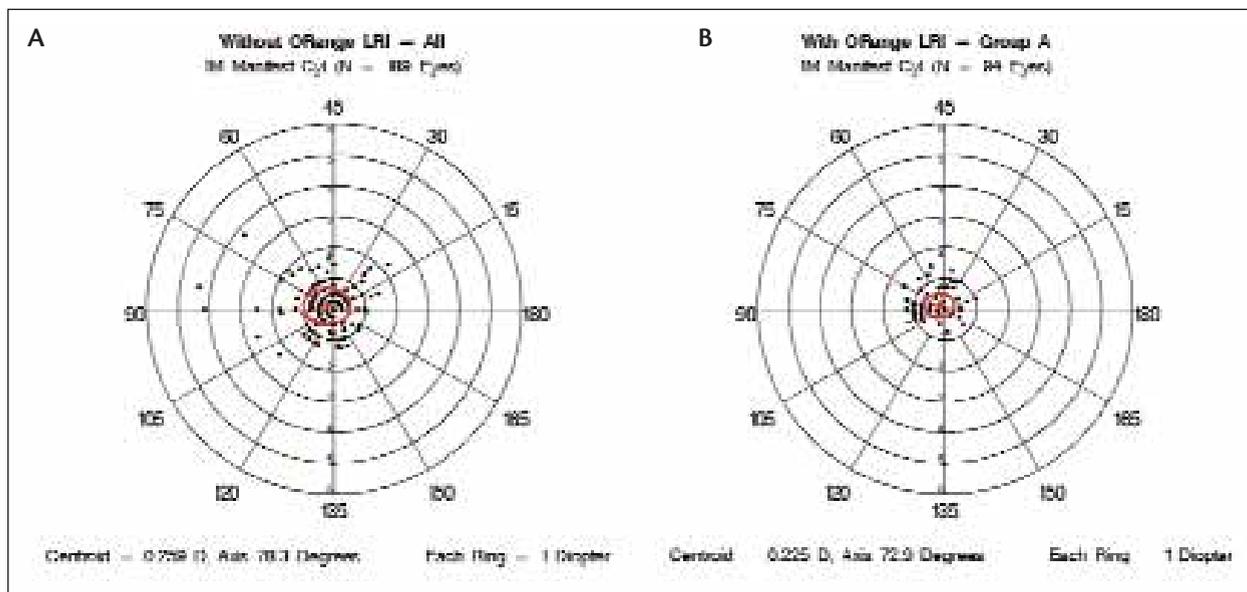


Figure 1. Vector analysis shows the presence of cylindrical outliers after cataract surgery with LRIs performed not using the ORange (A) or using the aberrometer (B).

even more precise results, the ORange intraoperative wave-front aberrometer (WaveTec Vision, Aliso Viejo, CA) provides a real-time evaluation of sphere, cylinder, and axis in a matter of seconds. Its current applications include measuring LRIs and guiding their placement.

Data from a multicenter study showed that intraoperatively using the ORange significantly improved visual outcomes with LRIs.⁴ Participants in the effort included the first 10 ORange users in the United States. The prospective study compared their 1-month results in eyes for which they used the aberrometer during the LRI procedure with those for which they did not. The mean refractive cylinder decreased from 1.45 D preoperatively to 0.47 D postoperatively in the ORange group (n = 94 eyes), and 39% of these eyes underwent an enhancement of the LRIs based on the aberrometer’s measurement. In contrast, the mean refractive cylinder decreased from 1.47 D preoperatively to 0.70 D postoperatively in the control group (n = 189 eyes) (Figure 1).

SURGICAL TECHNIQUE

I place a modified Dell marker (Donnenfeld LRI Marker; Accutome, Inc., Malvern, PA) against the cornea and mark the axis and length of the incision. I then instill a drop of Blink Tears (Abbott Medical Optics Inc., Santa Ana, CA), which

has a viscoelastic effect and significantly reduces the risk of an abrasion. Next, I grasp the episclera at the limbus with a 0.12-caliber forceps approximately 180° away from the intended site of the incision. I apply a diamond blade—usually preset to 0.6 mm—to the cornea and hold it in place for a second to ensure that it has achieved the desired depth. I then extend the incision toward the caliber to the required length in order to correct the targeted amount of cylinder.

The instruments that I use are bundled as the Donnenfeld LRI Kit (Accutome, Inc.). The set comprises



Figure 2. This patient is receiving an LRI to correct with-the-rule astigmatism. A close-up of the Donnenfeld LRI Diamond Knife (inset).

the Donnenfeld LRI Marker, my nomogram, and the Donnenfeld LRI Diamond Knife. The last is preset and configured with a 15° angle to its head that improves access to the cornea in areas that would be hard to reach with a straight knife. Another advantage of the Donnenfeld LRI Diamond Knife is that it facilitates the creation of LRIs at the slit lamp, a boon to surgeons who do not have access to an operating microscope in their office.

For an in-office LRI procedure, I begin by anesthetizing the eye with lidocaine gel. After ensuring that the patient's head is correctly positioned on the chin rest, I place the phoropter next to the patient to confirm the axis and use the diamond blade to create a small LRI (Figure 2), just as I would under the operating microscope. A single small incision will correct between 0.50 and 0.75 D of cylinder, and the entire procedure lasts approximately 30 seconds. Patients' visual acuity improves immediately.

To prevent postoperative inflammation and infection, I prescribe prednisolone acetate 1% and gatifloxacin 0.3% q.i.d. for 5 days.

CONCLUSION

LRIs are a critical tool in the refractive cataract surgeon's armamentarium. Simple to perform, these incisions can greatly improve patients' UCVA after the cataract procedure. ■

Video demonstrations of techniques described herein are available at <http://eyetube.net/v.asp?jihavi>, <http://eyetube.net/v.asp?drodij>, and <http://eyetube.net/v.asp?mahagi>.

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