

# Where Is the Axis?

The surgical correction of astigmatism.

BY R. BRUCE WALLACE III, MD, FACS

A growing interest in presbyopia-correcting IOLs has helped to renew ophthalmologists' attention to preoperative biometry in order to maximize the accuracy of their IOL power calculations. Additionally, the surgical correction of astigmatism is becoming more common. For those surgeons who plan to use only monofocal IOLs, toric IOLs such as the ones from STAAR Surgical Company (Monrovia, CA) and Alcon Laboratories, Inc. (Fort Worth, TX) can provide an answer to their cylinder-correction needs. However, toricity is not yet available on a presbyopia-correcting IOL platform. For now, surgeons must couple corneal refractive procedures with presbyopia-correcting IOLs of the appropriate spherical power to achieve the desired result.

## SURGERY TO REDUCE POSTOPERATIVE ASTIGMATISM

Central corneal surgery such as PRK, Epi-LASIK, and LASIK can reduce unwanted postoperative astigmatism, but these procedures are relatively expensive alternatives to incisional, peripheral, corneal surgery such as limbal relaxing incisions (LRIs). Excimer laser ablation also means another surgical event for patients, and some of these patients may have other ocular conditions such as dry eye, which might adversely affect their postoperative outcome. Most surgeons have found that LRIs provide a safe and effective means of correcting unwanted cylinder with remarkable postoperative stability. For these reasons, LRIs have become a popular method to reduce astigmatism.

## FINDING THE AXIS

Astigmatic procedures require the surgeon to select the proper axis of astigmatism. With toric IOLs and LRIs, the plus axis is the reference point. With corneal laser correc-

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tion, the minus axis is the reference point.

What are surgeons' choices to measure and determine where the axis is? Most depend on keratometry because the refractive cylinder may be influenced by lenticular astigmatism, which will be eliminated after the lens is removed. Many cataract surgeons like manual keratometry instead of automated methods because visualizing the regularity and sharpness of the corneal mires can help determine the quality of the manual reading. In addition, more cataract practices have been investing in corneal topography to determine the pattern of the astigmatism as well as its amount and location.

## AXIS LOCATION STUDY

My colleagues and I performed a study to decipher the best way to locate the proper axis for astigmatic correction.<sup>1</sup> We found a surprising variance between refractive, keratometric, and corneal topographic axis locations among patients with 2.00D or less of measurable cylinder. However, for eyes with more than 2.50D, we began to see a stronger correlation of the axis' location with all methods used to measure corneal cylinder.

Most of our patients needing astigmatic correction with lenticular procedures will have less than 2.50D of cylinder. Therefore, the surgeon must “guesstimate” the axis' position using the current methods to measure corneal curva-

ture. Fortunately, astigmatic correction is usually more forgiving than spherical correction, especially for patients with 0.50 to 2.00D of cylinder.

Most of my patients in need of astigmatic correction benefit from LRIs. When planning the incisions, I pay most attention to the axis' location and cylindrical pattern as displayed by the corneal topographic map. If I find a significant disparity between corneal topography and keratometry (ie, more than 30°), I may elect to postpone the LRI until after the lens' replacement and usually will offer any needed astigmatic correction for this eye in tandem with lens surgery on the fellow eye.

### CONCLUSION

All methods to surgically correct astigmatism during (and after) lens replacement depend on choosing the correct axis of the corneal cylindrical power. Because this axis can be difficult to locate, especially with astigmatism of less than 2.00D, the surgeon will need to make a judgment call as to the placement of the astigmatic correction. If unsuccessful, the ophthalmologist can still fine-tune eyes with problematic levels of astigmatism. Fortunately, because

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astigmatic surgery is relatively forgiving, most of these patients will be satisfied with their UCVA after their initial astigmatic procedure. ■

*R. Bruce Wallace III, MD, FACS, is Clinical Professor of Ophthalmology at Louisiana State University Medical School in New Orleans, Assistant Clinical Professor of Ophthalmology at Tulane School of Medicine, and Director of Wallace Eye Surgery in Alexandria, Louisiana. He is a paid consultant for Advanced Medical Optics, Inc., and Allergan, Inc. Dr. Wallace may be reached at (318) 448-4488; rbw123@aol.com.*



1. Wallace RB. On-axis cataract incisions: where is the axis? In: 1995 ASCRS Symposium of Cataract, IOL and Refractive Surgery Best Papers of Sessions. ASCRS: Fairfax, Virginia; 1995; 67-72.