

# The Surgical Correction of Astigmatism

An instructive historical perspective.

BY LEE T. NORDAN, MD



Recently, I opened my mailbox and found a monthly ophthalmic publication. One of the headlines emphasized the importance of correcting astigmatism after penetrating keratoplasty. Because I have been connected with the surgical

correction of astigmatism from the beginning of the modern era of refractive surgery, that headline inspired me to write about the correction of astigmatism.

## THE GOAL OF SURGERY

In the mid-1980s, I had a heated discussion with a famous cataract surgeon that was sparked by my question, "What is the goal of cataract/IOL surgery?" He quickly replied, "To remove the cataract and implant an IOL with the best technique." I countered that the goal of cataract/IOL surgery (as well as refractive surgery) is to provide the patient with the best possible, appropriate UCVA.

"You are focusing on the technical aspect of the surgery, which is a major improvement, but it is not the goal of the surgery," I said. "If you are not correcting astigmatism as well as implanting an IOL, you are not performing excellent surgery, because you are not providing the patient with the best possible outcome."

The surgeon was livid at the thought that he was not performing the best surgery. At 2:00 AM the next day, he knocked on the door of my hotel room and asked to speak with me. His anger having subsided, he realized that he had been focused on the technical aspect of surgery but had missed the forest for the trees. We drank wine together that night and remained fast friends until his recent death.

Approximately 85% of patients undergoing cataract/IOL surgery and refractive surgery present with astigmatism of 1.25 D or less. In the past 25 years, these patients have achieved a reasonable UCVA after cataract surgery, although most ophthalmologists were not correcting

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these individuals' astigmatism. My question was, why?

As the teacher of countless courses on the correction of astigmatism, I always asked attendees to identify the goal of surgery. My observation was that most of them did not correct astigmatism, because (1) a cataract/IOL surgeon would have to learn an RK-based surgery and/or (2) the number of dissatisfied patients was low.

## LESSONS LEARNED

Since the advent of the nylon suture and the operating microscope, most corneal transplant surgeons have tolerated 5.00 D of astigmatism on average without any serious attempt at its correction. A clear corneal transplant was considered a success, even if the patient were anisometropic and not achieving the best functional vision possible.

Many years ago, I examined a patient in Europe who had undergone bilateral, clear penetrating keratoplasties 10 years earlier. She had 20.00 D of astigmatism in each eye postoperatively. After several years, she returned to the surgeon's office and questioned the result. He replied, "I do the surgery, and the result is the result. That's it. Wear glasses!" Subsequently, another ophthalmologist corrected the astigmatism in both of her eyes to under 3.00 D, which gave her a new lease on life.

A brief review of the modern surgical correction of astigmatism is informative. In the 1960s, Professor José Barraquer and others experimented with disparate graft sizes and wedge resections. In 1978, the advent of RK

led to T-cuts for the correction of astigmatism that were combined with the phaco/IOL procedure. In 1981, Luis Ruiz, MD, created the Ruiz incision (trapezoidal astigmatic keratotomy) for the correction of high degrees of astigmatism. Astigmatic PRK was the next advance, followed by LASIK procedures that included astigmatic correction. Limbal relaxing incisions (LRIs) supplanted T-cuts for the correction of astigmatism during small-incision cataract/IOL surgery.

Astigmatic PRK, followed by LASIK, differs from T-cuts and LRIs in the fundamental regard that the incisions function by weakening the inherent structure of the cornea. The instability of the cornea therefore increases. Because surgeons use LRIs to correct astigmatism ranging from 1.00 to 2.50 D, even a correction of 50% results in a significant improvement in visual function. For astigmatism greater than 3.00 D, I would contend that PRK provides a more accurate and stable result.

## CONCLUSION

Current anterior segment surgery that includes refractive surgery, cataract/IOL surgery, and new-technology IOLs requires the correction of significant amounts of preoperative astigmatism. The goal of surgery remains the same: to provide patients with the best possible, appropriate UCVA. Today, most anterior segment surgeons, including those specializing in corneal transplants, accept the responsibility of providing patients with excellent vision, which requires the surgeon's superb technical skills plus astigmatic correction. ■

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