

Optimizing Outcomes With Toric IOLs

Toric IOLs give many astigmatism patients a new lease on sight, making these lenses an attractive option for some cataract surgery patients. For ophthalmologists, however, toric IOLs may pose challenges. Three cataract surgeons provide insight on achieving optimal results, discussing the importance of patient selection and offering pre-, intra-, and post-op pearls for avoiding potential pitfalls.

Patient Selection

Successful toric IOL outcomes depend in part on both patient education and selection.

Educating patients. Before starting a conversation about the specifics of astigmatism correction, John A. Hovanesian, MD, at Harvard Eye Associates in Laguna Hills, California, first asks his patients, “Have you been told you have astigmatism, and do you know what it is?” Starting with this basic question allows him to assess the patient’s level of knowledge so that he can properly tailor the conversation.

As part of the discussion, it’s important to talk about the type of astigmatism patients have—regular or irregular—and whether or not they are a good candidate for a toric lens, said Sumitra S. Khandelwal, MD, at Baylor College of Medicine–Cullen Eye Institute in Houston.

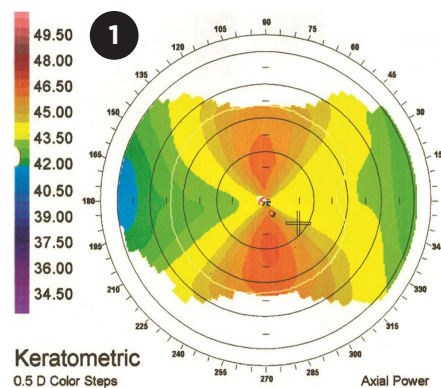
And John Berdahl, MD, at Vance Thompson Vision in Sioux Falls, South

Dakota, eases into discussions about toric IOLs by telling patients this: “We’re going to fix your astigmatism—either with contact lenses, a Light Adjustable Lens, or an intraocular lens that fixes astigmatism during cataract surgery.” If the patient is properly educated and you know you can solve their problem, he added, they’re going to take their cues from you and relax.

Candidates. Good candidates for toric IOLs are patients with regular astigmatism, consistent and repeatable corneal measurements, and a stable ocular surface, said Dr. Khandelwal. In addition, said Dr. Berdahl, ideal candidates have 1 D or more of astigmatism and would like to correct astigmatism during cataract surgery to decrease their dependence on glasses.

Caution. “Be careful with patients who have changing vision or who have low amounts of astigmatism,” noted Dr. Khandelwal. “It may be difficult for you to meet their expectations.” In addition, she said, a toric lens may not be the best option for a patient with irregular astigmatism and may even make vision worse. This includes patients with very irregular keratoconus, corneal scars, or ocular surface disease, she said.

Patients with irregular astigmatism should have a gas permeable contact lens over-refraction prior to cataract surgery, added Dr. Berdahl. “If the gas-permeable over-refraction shows no improvement in their vision, the



TOPOGRAPHY. Corneal astigmatism in a symmetric bow-tie pattern.

corneal irregularity is not contributing to their decreased vision and a toric lens may make sense. Conversely, if the gas-permeable over-refraction does show improvement, the corneal irregularity is a part of their decreased vision and a toric probably should be avoided.”

Refractive surgery. Also, said Dr. Berdahl, patients who’ve had prior refractive surgery present a challenge, in part, because it’s more difficult to get accurate biometric readings. “Plan carefully. Be sure to also account for posterior astigmatism so you don’t induce unnecessary astigmatism. To do so, compare manifest refraction to biometry, measure posterior corneal curvature, or use intraoperative aberrometry.”

Preoperative Procedures

Implant a toric lens only if you’re confident that you’ve obtained measurements that are repeatable and that agree

BY ANNIE STUART, CONTRIBUTING WRITER, INTERVIEWING JOHN BERDAHL, MD, JOHN A. HOVANESIAN, MD, AND SUMITRA S. KHANDELWAL, MD.

with each other, said Dr. Khandelwal. Prior to surgery, Dr. Khandelwal gets measurements on two different days. “I use topography when I see the patient for the first time.” Later, she said, “at the pre-op visit, I do both biometry and topography, which should match the first topography measurement. I then look at the magnitude and axis for all my measurements, as well as the patient’s refraction, to determine the lens.”

Topography. For the initial cataract evaluation, Dr. Khandelwal likes using Placido disc–based topography to photographically map the curvature of the cornea. “Placido imaging gives magnitude and axis but also shows rings that correlate with the cornea,” she said. “I point out any irregular rings or missing data, educating the patient about signs of an irregular cornea.”

If the pattern is a fairly symmetrical bow tie (Fig. 1), a toric lens should work well, said Dr. Hovanesian. “But if it’s off center—a bow tie with skewed radial axes and other evidence of a higher-order aberration—I show this to the patient and note that I likely won’t be able to fully correct their irregular astigmatism.”

Biometry. Optical biometers measure the length of the eye, curve and width of the cornea, and anterior chamber depth. Optical biometers—such as Argos (Alcon), Lenstar (Haag-Streit), and IOLMaster (Zeiss)—usually provide “a fairly accurate read on the magnitude of astigmatism. Although corneal topography tends to be the best measure of the axis of the astigmatism, most cataract specialists use optical biometry and double-check it against corneal topography,” Dr. Hovanesian said.

Digital planning systems. Dr. Hovanesian finds it helpful to use a digital planning system such as SmartCataract (Alcon) or Veracity Surgical (Zeiss). “It interfaces with optical biometry, automating calculations, improving accuracy, saving time, and reducing costs. It automatically applies the most modern formulas, giving the surgeon reliable calculations with no risk of transcription error that occurs with other online calculators.”

Before surgery. To get the best surgical results, Dr. Khandelwal said, patients should stop wearing toric contact lenses for several weeks before cataract surgery.

If you have a patient with a treatable condition that is causing astigmatism or irregularity, such as Salzmann nodular degeneration or a pterygium, treat it and let it heal for a couple of months before cataract surgery, said Dr. Hovanesian. “Then, reassess what type of correction is best for this patient.”

Intraoperative Alignment

During the procedure, the surgeon can choose from an array of tools that may help achieve optimal results.

Aberrometry. An intraoperative aberrometer such as Optiwave Refractive Analysis (ORA; Alcon) takes phakic, aphakic, and pseudophakic refractive measurements in the operating room, which allows the surgeon to determine whether the lens is positioned correctly. This can improve accuracy, especially in patients for whom getting good pre-op measurements are challenging, such as those who’ve had prior refractive surgery, said Dr. Hovanesian.

Marking. Some surgeons use ocular blood vessels as reference points, said Dr. Berdahl. “Called fingerprinting, this allows a proper reference for the IOL, whether the patient is sitting or lying down.” This technique can be supported by image-guided systems, such as Verion (Alcon) and Callisto Eye (Zeiss), which capture a preoperative reference image and intraoperative image registration using limbal landmarks to match the two images, he said.

Marking can also be done manually, which usually produces results consistent with image-guided systems, said Dr. Khandelwal. “The image-guided system avoids problems with the mark washing off or being of poor quality,” she said. “But you never know when a machine will have challenges, so I always manually mark the patients as a backup.” Dr. Berdahl also uses manual marking as a fail-safe. “If I can’t get an accurate intraoperative aberrometry reading, the six o’clock mark is the backup reference point.”

IOL positioning. To ensure good

positioning, Dr. Khandelwal advises putting the hash marks on the toric IOL in the alignment of the axis and then completely removing the viscoelastic, including behind the IOL.

“Make sure the chamber doesn’t completely shallow, and check the lens one more time before you end the surgery,” she said. “Sometimes the lens will rotate a little bit more after the viscoelastic is removed, in which case it’s important to take the time to rotate it all the way around.”

Other steps to take? “Just do a good cataract surgery with a nice, round capsulotomy that overlaps the IOL 360 degrees,” said Dr. Berdahl. “Be sure you don’t induce a lot of astigmatism with your incision or corneal edema with your surgery. Make sure wounds are well sealed with no small leaks. And when you take out the lid speculum, check that the IOL hasn’t shifted.”

Postoperative Problem-Solving

After cataract surgery, patients with astigmatism are often able to go without glasses, said Dr. Berdahl. However, toric lenses can rotate, leaving the patient somewhat astigmatic, he said.

Residual astigmatism. To set expectations, Dr. Khandelwal tells patients that fewer than 5% of patients need further corrections or adjustments after cataract surgery to correct residual astigmatism. Dr. Berdahl quotes a slightly higher percentage, and given a multitude of cases, he said, the total number adds up. “We usually do a LASIK enhancement for residual astigmatism,” said Dr. Berdahl. Dr. Khandelwal agrees that it is wise to err on the side of not going back inside the eye to make adjustments.

Rotation. About rotation, Dr. Khandelwal said that there have been instances in which “we put a hash mark on the cornea that matches the lens implant and it’s been perfectly aligned at the end of surgery, but the lens then rotates after surgery.” Studies have shown that if the lens rotates, it does so within a few hours of surgery, she said. She added that studies have suggested the optimal time to correct the rotated lens is usually one to three weeks after surgery. “If

you do this too early, the lens may just rotate again.”

In cases with residual astigmatism, Dr. Berdahl said, “We have found that about 72% of the time, residual astigmatism is present because the intended axis was not the ideal axis. We also found that the IOL rotated about 75% of the time.”

Outcomes analysis. “I believe the vast majority of surgeons don’t do outcomes analysis because it’s a bit of a heavy lift,” said Dr. Berdahl. His practice uses local premed college students to enter, analyze, and present the data to the surgeons.

Toric results analyzer. Whenever you do a toric IOL surgery, you should have a plan to address remaining astigmatism if the patient is unsatisfied, said Dr. Berdahl. “You may need to do an IOL exchange, an IOL rotation, or laser vision correction afterward. A number of calculators are available to help you with this planning.”

Dr. Berdahl and colleagues created a free online resource called Toric Results Analyzer (astigmatismfix.com). Using the patient’s postoperative manifest refraction, power, and the IOL’s current axis, the calculator helps predict the ideal position of the toric IOL to minimize the patient’s residual astigmatism, said Dr. Berdahl. Dr. Khandelwal added that this calculator helps her decide whether rotation or another approach is the best option for correcting residual astigmatism.

Dr. Berdahl is partner at Vance Thompson Vision in Sioux Falls, S.D. *Relevant financial disclosures:* Alcon: C,L; Bausch + Lomb: C; Johnson and Johnson: C; RxSight: C.

Dr. Hovanesian is principal at Harvard Eye Associates in Laguna Hills, Calif., and clinical assistant professor at the University of California, Los Angeles Jules Stein Eye Institute. *Relevant financial disclosures:* AcuFocus: C; Alcon: C,L,O,S; Bausch + Lomb: C,L,S; Carl Zeiss Meditec: C,L,S; Johnson and Johnson Vision: C,L,O,S; RxSight: C,O.

Dr. Khandelwal is associate professor of ophthalmology at Baylor College of Medicine–Cullen Eye Institute in Houston. *Relevant financial disclosures:* Alcon: C; Bausch + Lomb: C; Carl Zeiss Meditec: C.

See disclosure key, page 8. For full disclosures, view this article at aao.org/eyenet.



AMERICAN ACADEMY
OF OPHTHALMOLOGY®

Ophthalmology Job Center

Save Thousands in Recruiter Fees

Find the right fit fast with
the #1 job site for ophthalmology



Protecting Sight. Empowering Lives.®