

How and Why to Implant Toric IOLs

BY PRISCILLA P. ARNOLD, MD; STEPHEN S. LANE, MD; SAMUEL MASKET, MD;
AND R. BRUCE WALLACE III, MD

PRISCILLA P. ARNOLD, MD

Correcting astigmatism with a toric IOL is more predictable and stable than with limbal astigmatic incisions, and the former is my preference for appropriate patients. I offer the following advice to beginning surgeons implanting toric IOLs.

The cylinder of concern is the corneal astigmatism. Do not refer to the refractive astigmatic error, only to the corneal astigmatism. (I use a careful comparison of computerized topography, IOLMaster [Carl Zeiss Meditec, Inc., Dublin, CA] keratometry readings, and manual keratometry readings). The topography readings should be done on a pristine cornea, but it is not the cylindrical power alone that determines an appropriate candidate. The toric IOL is designed to correct regular astigmatism. Use of this IOL for irregular corneal patterns (Figure 1A and B) may result in failure to correct the cylinder, and it may induce unpredictable optical aberrations with poor visual outcomes. In particular, for accurate surgical planning, the topography of contact lens wearers should be followed sequentially until it becomes stable.

The topography and the toric IOL calculation sheet, including axial location, should be clearly visible to you at the time of surgery. Mark the cornea at the 3-, 6-, and 9-o'clock positions preoperatively, while the patient is seated prior to any sedation. From this orientation, mark the axis of desired placement under the operating microscope before proceeding with your usual phaco technique. After inserting the IOL, remove the viscoelastic behind the lens before performing the last, small, clockwise rotation to the axis of final placement.

Attention to these details makes the toric IOL a very positive surgical addition.

STEPHEN S. LANE, MD

There are two preoperative criteria that are critical in determining if a patient is a good candidate for a toric IOL.

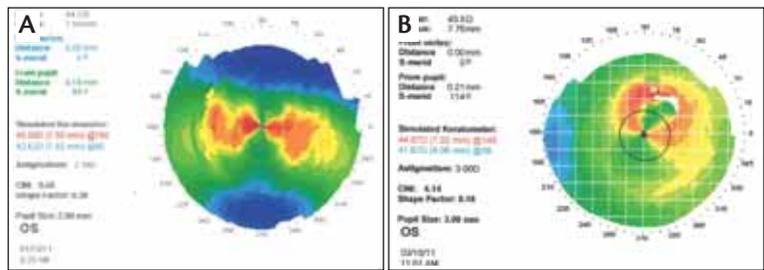


Figure 1. Regular astigmatism demonstrates candidacy for a toric IOL's implantation (A). These IOLs should be avoided in patients with irregular astigmatism (B).

First, the patient must have the stated desire to see well at distance without spectacles and understand that he or she will still need spectacles for near vision. The desire to be spectacle free puts cataract surgery with toric IOLs into a refractive framework where patients not only want to see better than when they had their cataracts but also want to see better than before they developed a cataract. Second, the patient must have keratometric cylinder (not refractive cylinder alone or in part) in the range that can be corrected with the toric IOL alone or in combination with peripheral corneal relaxing incisions or excimer laser ablation.

Implanting a toric IOL requires only minor variation from a standard cataract extraction and IOL implantation procedure. After surgeons perform a standard phaco procedure through the clear corneal incision, they should complete two important surgical steps—marking the eye and aligning the IOL on the axis.

Because the eyes of patients who are placed in a supine position often cyclorotate, surgeons need to make reference marks on the cornea preoperatively. With the patient sitting upright in the preoperative area, the surgeon should place ink marks in at least two locations at the limbus (usually the 3- and 9-o'clock positions). They demarcate the 180° meridian and will serve as the reference points for the placement of the intraoperative axial marks. Surgeons should place the axial marks intraoperatively following the removal of the

(Courtesy of Priscilla P. Arnold, MD)

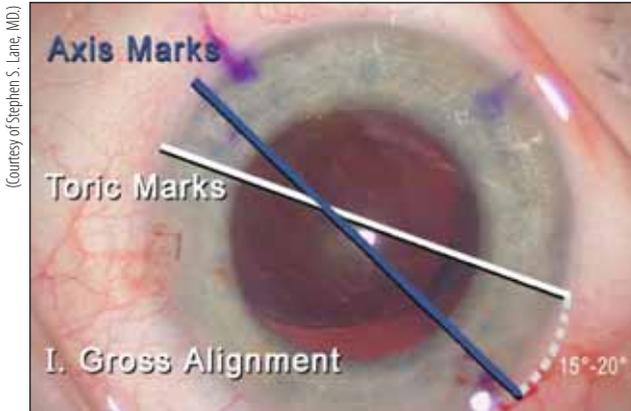


Figure 2. Gross alignment of the IOL is performed.



Figure 3. The surgeon stabilizes the IOL during the OVD removal.

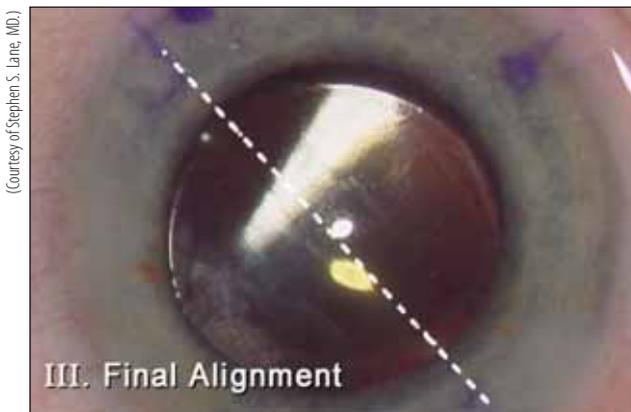


Figure 4. Final alignment of a toric IOL.

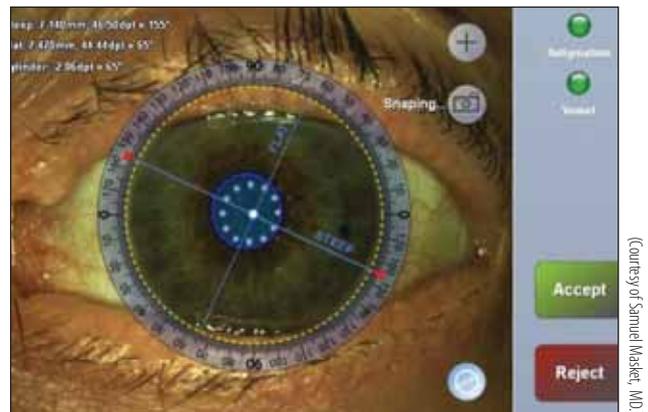


Figure 5. A preoperative image of axial determination.

cataract, which identifies the optimal axis of the toric IOL's placement, as determined by the toric calculator. These axial marks are placed at the limbus using the preoperative reference marks to ensure accurate alignment. Various markers and instruments are available to perform these steps, each usually possessing some type of circular compass degree markings.

Aligning the IOL involves three steps. After the surgeon places the toric IOL in the capsular bag with an ophthalmic viscosurgical device (OVD) still in the eye, gross alignment of the lens is performed by rotating the lens clockwise to approximately 20° to 30° short of the desired position (Figure 2). Next, the surgeon stabilizes the toric IOL, as he or she removes the OVD with I/A while taking care to prevent the IOL from rotating past the intended final desired axis. This can be accomplished in a number of ways, such as using bimanual or coaxial I/A with a silicone, polymer, or metal tip (Figure 3). The surgeon then finalizes the IOL's alignment by carefully rotating it clockwise and aligning the marks on the IOL precisely onto the intended axis of alignment denoted by the intraoperative axial marks. This is most easily achieved by using continuous irrigation to maintain the depth of the anterior chamber while rotating the lens with a second instrument such as a Sinsky hook

through a separate incision (either a paracentesis or the surgical incision) (Figure 4). Alternatively, some surgeons rotate the IOL with their I/A tip.

Toric IOLs enable surgeons to offer a great service to their patients and provide an easy segue into the refractive cataract marketplace. Compared with presbyopia-correcting IOLs, toric IOLs are easier to incorporate into a practice; they require much less chair time, commitment to staffing, educational development, and practice-process retooling. Following these pearls will streamline the transition to using toric IOLs.

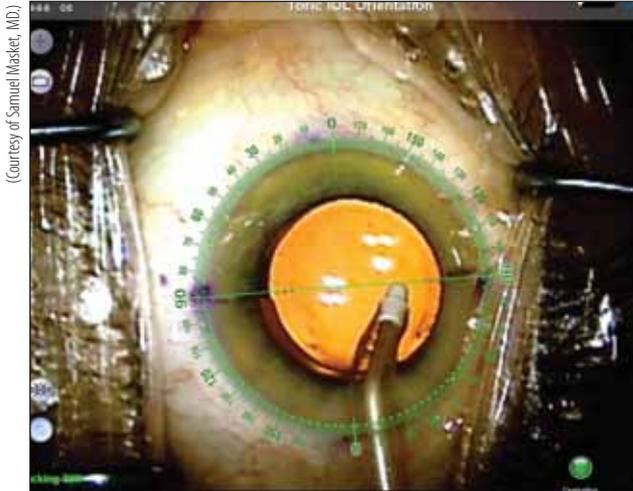
SAMUEL MASKET, MD

Patients qualifying for toric IOLs should have

- regular corneal astigmatism greater than 0.62 D with the rule or 1.00 D against the rule, assuming a temporal 2.2-mm clear corneal incision. We are now able to correct up to 4.00 D of corneal astigmatism with the expanded range of cylindrical IOL powers.

- concordant cylindrical axis and magnitude by keratometry, topography, and Lenstar LS 900 (Haag-Streit USA Inc., Mason, OH) or IOLMaster

- an absence of significant or unstable corneal disease affecting the ocular surface or shape



(Courtesy of Samuel Masket, MD.)

Figure 6. An intraoperative image of an eye-tracking device as it aligns the toric IOL intraoperatively.

I consider toric IOLs for eyes with stable keratoconus and after penetrating keratoplasty if a regrant will not be needed.

To establish the 180° meridian, I mark the nasal and temporal limbus with the patient seated upright, although I recognize the imperfection of this method. I recently evaluated an eye-tracking device from Sensomotoric Instruments GmbH (Berlin, Germany). It is very promising and will, I hope, be available in the near term. With the tracker, preoperative images are transferred to the operating microscope (Figure 5). On demand, the axes are projected to the surgeon’s ocular, allowing the toric IOL to be perfectly aligned (Figure 6).

Routinely, at surgery, however, I mark the steep axis at the limbus with the Koch-Mendez device from Mastel Precision, Inc. (Rapid City, SD). I distend the capsular bag with an OVD, and I inject the toric IOL using the Epsilon Insertor (Epsilon, Ontario, Canada) with the steep axis 10° to 20° counterclockwise to its final position. I hydrate the incision and fully remove the OVD from underneath the optic. I remove the remainder of the OVD and use the disposable polymer I/A tip from Alcon Laboratories, Inc., to rotate the optic into the appropriate position. I then place modest pressure on the optic so that it “sticks” to the posterior capsule. Finally, I carefully ensure that the wound has sealed.

R. BRUCE WALLACE III, MD

Generally, my surgical team recommends toric IOLs for cataract patients who have more than 1.50 D of regular astigmatism by corneal topography and a strong desire to reduce their dependence on spectacles, who know that they need glasses or contact lenses to correct their astigmatism, and who agree to the out-of-pocket expense.

I rely on the AcrySof Toric IOL Web Based Calculators (Alcon Laboratories, Inc.) and refer to the user-friendly computer display of the recommended toric power and axial placement in the preoperative area. I use the Bakewell Marker (Mastel Precision, Inc.) to mark the 180° axis while the patient is in the supine position.

After phacoemulsification, I inject a cohesive viscoelastic and place a Mendez Axis Marker (Mastel Precision, Inc.) at the limbus, with the 180° mark placed on the limbal reference marks. I use a 0.12-mm forceps to mark the intended axis on the cornea inside the ring. I insert the AcrySof Toric IOL in the capsular bag and remove the viscoelastic from underneath and above the IOL. I then reinject the cohesive viscoelastic above the IOL and use a Lester Hook (Bausch + Lomb Storz Ophthalmic Instruments, Aliso Viejo, CA) to rotate the IOL for axial alignment with the corneal marks. Finally, I remove the viscoelastic while exerting slight pressure with the I/A tip on the IOL to prevent its rotation. ■

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