Astigmatism management for today’s patient:
Technologies and techniques that take your practice to the next level

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Astigmatism management for today’s patient:
Technologies and techniques that take your practice to the next level

By Elizabeth Yeu, MD

To ensure that patients achieve their best possible visual outcome, astigmatism should be addressed at the time of cataract surgery. This includes low cylinder, which is anything less than 1.25 D to 1.50 D. Low cylinder definitely needs to be treated, because patients can experience a decrease in the quality of their uncorrected vision within the low cylinder realm of anything above 0.5 D.

Previously, we were only able to treat these patients using corneal relaxing incisions, which were not ideal. As we know, the more peripheral the incision, the weaker the effect.

Toric IOLs are a better choice for addressing astigmatism at the time of cataract surgery because they can provide a greater level of accuracy. Having had 8 years of experience with them, I can say with certainty that some of my happiest patients are the ones who have had their higher levels of astigmatism corrected. Conversely, some of the unhappiest patients that I’ve counseled have been those with lower levels of astigmatism that was not corrected at the time of surgery. Not correcting these low levels of astigmatism can lead to a compromise in quality of vision and a dissatisfied postoperative patient. Also, the more advanced toric online calculators and diagnostic tools are providing better insight into the total corneal power. This further increases our accuracy with utilizing the toric technology, which then leads to better outcomes. In my hands, 94% of my patients have less than 0.5 D of residual refractive astigmatism after toric IOL implantation. These are my happiest post-cataract surgery patients.

Toric IOLs are my preferred method for treating astigmatism, even low cylinder. For anyone who has total corneal astigmatism of 0.75 D against the rule or 1.0 D with the rule, my go-to is a toric lens implant because it provides a consistent, accurate outcome that has a longevity in effect. Relaxing incisions can reduce upwards of 1.0 D of astigmatism and can result in less than 0.5 D of residual refractive astigmatism, but regression is common. The outcome with toric lens implants is much longer lasting.

I have used all of the different toric lens technologies, but I achieve the most predictable outcomes with the Alcon toric lens. I believe that the lens material provides greater stability and less rotation, and I also think that the quality of the actual lens provides a predictable outcome. For these reasons, it is my go-to toric lens.

Successful toric IOL surgery comes down to three steps: accuracy of preoperative measurements of the corneal astigmatism, proper steep meridian identification during
cataract surgery, and technique to ensure stability of the IOL's position. It is important to be as accurate as possible because, for every degree that the lens is off, the patient loses 3.3% of astigmatism correction. As an example, if the toric IOL is off by just 10°, it causes a 33% loss in desired astigmatic correction and, potentially, an unhappy postoperative patient.

There are several ways to measure the axis of astigmatism. I identify the total corneal astigmatism with the Cassini, which accurately determines the astigmatic contribution of the posterior cornea. Then, the LenStar biometry provides extremely accurate anterior K values as it measures the corneal curvature at the 1.8 and 2.3 mm zones, and I verify these values with a placido-disk topography device. We have the Atlas and the Nidek OD, but I commonly will use the OPD because it also offers angle kappa information.

Additionally, there are several methods for marking the axis of astigmatism, and they vary in accuracy. The standard of care for marking the axis has been ink, but ink pens are not ideal because of the precision required for both measuring and marking the target axis. Marking at the slit lamp as well as incorporating various astigmatic gauges and markers to identify the reference axes and the steep meridian can increase accuracy.

Other methods include imaging or fingerprinting, limbal registration, and wavefront intraoperative aberrometry.

I have had experience with the VERION system. While it takes time to initially get comfortable incorporating the VERION into the practice, once it is incorporated, I do believe this technology will continue to improve and make my toric surgery efficient, because the reference landmarks have already been identified. Intraoperatively, you no longer have to ink mark the steep meridian on the cornea beyond image registration of the eye, as the VERION projectects this into the cornea. Preoperatively, the VERION requires an extra image capture for the surgical planning. Intraoperatively, this does help to increase efficiency and accuracy with toric IOL surgery.

Some surgeons believe that low levels of astigmatism do not need to be treated during cataract surgery. However, if we are of a refractive mindset, and we are setting expectations, we must be mindful of the effects of residual astigmatism on final outcomes. Interestingly, patients who have some with-the-rule residual astigmatism, even upwards of 0.5 D, can still achieve acceptable quality of vision. Unfortunately, against-the-rule astigmatism is not nearly as forgiving. If we are not planning to correct astigmatism within the appropriate ranges (0.5 D or more against the rule or 1.0 D or more with the rule), we are setting ourselves (and our patients) up for likely disappointment if we are trying to provide patients with the highest quality of vision, particularly without spectacle correction. I recommend that we spend extra chair time explaining to our patients that they will most likely require glasses if their cylinder is not addressed during surgery.

"Some of my happiest patients are the ones who have had their higher levels of astigmatism corrected."

—Elizabeth Yeu
Astigmatism management for today’s patient: Technologies and techniques that take your practice to the next level

Excellent outcomes are only as stable as the toric IOL you choose

By John Berdahl, MD

Even low levels of astigmatism need to be addressed during cataract surgery to get an optimal postoperative result. I typically evaluate whether to correct astigmatism starting at 0.5 D. At lower levels of cylinder, people can still see well, but at about 0.5 D, it becomes visually significant, especially in combination with multifocality.

Toric IOLs are a good choice for managing astigmatism, and there have been huge improvements in these lenses in recent years. However, for a lens to successfully correct astigmatism, it must be stable inside the eye. The AcrySof IQ Toric platform is a great option for astigmatism correction, particularly because of its rotational stability.

To examine rotational stability, my colleagues and I recently analyzed IOL orientation data from an online toric back-calculator (astigmatismfix.com) to see if differences were apparent by lens type. In this retrospective review, we looked at astigmatismfix.com toric back-calculations that included IOL identification and intended orientation axis.

Of the 12,812 total validated calculation records, 8,229 included the intended orientation and lens identification data. Of the 8,229, 5,674 calculations (69%) involved lenses that were oriented 5° or more from their intended position. Using estimated toric lens usage data, we found that the percentage of lenses with orientation 5° or more from intended was 0.89% overall. However, the percentage varied significantly between specific toric IOL brands.

Specifically, the relative percentage of Tecnis Toric IOLs that were 5° or more from their intended rotation (1.86% by estimated market usage, n = 1,953) was significantly higher than the percentage of AcrySof IQ Toric IOLs (0.75% by estimated market usage, n = 3,556; p<0.01 for the comparison).

Our study also found that the Tecnis Toric IOL appears more likely to be misoriented in a counterclockwise direction than in a clockwise direction (65% counterclockwise vs. 35% clockwise, n = 1,953, p<0.01). In contrast, the other lenses tested — including the AcrySof IQ Toric IOLs — showed no rotational bias.

There are two important features to consider when choosing a toric IOL: rotational stability and good optics. We have learned that lenses do rotate sometimes and that our preoperative measurements aren’t always a great representation of how much astigmatism the eye truly has.

Toric lenses do a great job of treating the astigmatism, but having a consistent and reliable process for measuring preoperatively, potentially measuring intraoperatively with aberrometry to confirm those measurements, and then placing a good rotationally stable lens is going to give us the highest likelihood of neutralizing the astigmatism.

It may be a little bit of overkill, but I get three sources of Ks prior to cataract surgery on every patient: topography, autorefractor, and optical biometry. Intraoperatively, I use aberrometry, and this often changes my IOL power because it’s taking a measurement after an incision has been created and taking into account posterior corneal curvature.

Using this preoperative and intraoperative approach, we are achieving very good results, approaching 85% to 90% of patients within 0.5 D of residual astigmatism, but that means there are still patients who have residual astigmatism, and we need to have a plan to correct that. That plan could include an excimer laser enhancement, an IOL rotation using something like astigmatismfix.com to calculate the new axis, or an IOL exchange.

As toric multifocals become available, correcting toricity is going to be even more important and less forgiving, and we need to do a really good job correcting astigmatism for our patients to achieve their best outcomes.

Reference
Precision and stability: How I achieve the best results for my patients

By Johnny Gayton, MD

I’m a big proponent of the femtosecond laser, but the ORA SYSTEM has improved our accuracy and our outcomes even more than the femto has. By marrying the two, we have more accurate refractive outcomes, and that improved accuracy has decreased our enhancement rate.

Cost benefit

Some surgeons have been reluctant to incorporate the ORA SYSTEM into their practices for several reasons. One concern for some surgeons is the cost of incorporating the system into their practice. However, we have found that our patients are very interested in the technology being a part of their procedure, so it has significantly increased our revenue, thus taking care of the cost issue for us. Another concern is the increased time needed for the procedure. There is no question that there is some increase in time when adding the ORA SYSTEM to your practice, but the profit margin is generally greater for a cataract procedure with special testing than it is for a more routine cataract surgery. This means that we are compensated for the extra time. Additionally, having a less-than-satisfactory refractive result takes up a lot of time in the office and because I get more accurate results in cataract procedures with the ORA SYSTEM, I have fewer enhancements later on that cost us both time and money. Some surgeons may also remember a time when previous versions of the ORA SYSTEM were not as accurate as it is now. Over the years, this technology has had several upgrades, and to date has over 700,000 cases in the AnalyzOR database, so its accuracy has improved greatly from earlier versions. Because I was so convinced of the value of this technology, I decided to jump in with both feet and had a system placed in both operating rooms.

Driven by outcomes

To achieve the best possible outcomes, I believe the first step is to set realistic expectations with my patients regarding their treatment options and anticipated outcomes. Additionally, I think it’s important to get as much information as possible in the pre-op planning stage. We use several different topographies, Ks, a refraction with our automated system, sometimes even a manual refraction might be used. I also think it’s very important to look at patients’ glasses, and of course we use the ORA SYSTEM.

Unrivaled stability

Another factor that has an impact on outcomes is the IOL orientation that is chosen. Alcon has long been known for the rotational stability of its AcrySof toric IOLs. Between the design of the AcrySof IQ Toric Stableforce haptics, which hold the lens in place, and the AcrySof IQ material which promotes adhesion through fibronectin binding, the lens is not likely to rotate. This stability certainly results in consistent outcomes.

I have long been a proponent of using a toric IOL in people who have irregular astigmatism, if we could refract their astigmatism and they were not contact lens dependent. In these patients, we have had great results with the ORA SYSTEM. We always have to use caution in implanting toric IOLs in patients who have had corneal transplants, previous RK, and various eye injuries. With the ORA SYSTEM, I have successfully implanted toric IOLs in these more challenging patient types. I believe that I would have missed the refractive target in some of these patients, if I had not had the ORA SYSTEM.

Recently, I used the ORA SYSTEM to reposition a lens for a patient that I previously missed her refractive target prior to acquiring the ORA SYSTEM. Her best-corrected vision improved two lines. But more importantly, her uncorrected vision improved from 20/200 to 20/50. It was a huge improvement. As it turns out we were originally 20° off target, the ORA SYSTEM definitely helped us with that case.

A few years ago, Dr. Warren Hill said that there is a huge tsunami of people who have had refractive surgery headed toward cataract surgeons. That tsunami is here.

Every surgery day, I see RK patients who have been evaluated, and we have pulled a lens based on their pre-op surgical plan. Then, in the OR the ORA SYSTEM recommends a different lens power. In every case, we have gone with the ORA SYSTEM recommendation, and we have not been disappointed. In a case that my associate recently performed, the ORA SYSTEM recommended 2.5 diopters more lens power than predicted, they followed the recommendation, prevented a refractive surprise and the patient ended up with the intended result.

While I don’t think the ORA SYSTEM has improved my confidence utilizing a toric IOL, it has improved my confidence in being more accurate with them. For example, I recently implanted some T9s and being off axis even a little bit with these high-powered toric IOLs has a significant impact on outcomes. When using the ORA SYSTEM, we have been right on target with these lenses.

References

Spotlight on the LenSx Laser

Are you ready for femto? Practice considerations for the LenSx Laser

By Scott LaBorwit, MD

I f you are considering adding laser cataract surgery to your practice, it is important to do your homework. Surgeons have an obligation to their patients to really assess the technology before deciding. This requires visiting an OR to actually see the laser being used and to understand the impact in the operating room. Additionally, discussing cases and outcomes can elucidate the impact it can have on astigmatism management and the patient experience.

Five years ago, I flew from Maryland to California to assess the technology. My plan was to understand it well enough to be able to tell my patients why I didn’t need a laser to do parts of cataract surgery. Cataract technology had come so far in the past 10 years that I didn’t feel like we needed more. After I saw the technology, it was a long flight home. I realized that there were advantages to using the imaging and the technology to benefit my patients. So, it started with me believing in the technology and wanting my patients to have the opportunity to have this technology as a part of their surgery. Then, I had to figure out how to afford it and how to incorporate it into my practice.

Overcoming obstacles

The first obstacle was the cost. It was an expensive purchase, so looking at it over time and creating a business plan made it much easier for me to incorporate financially. Since this technology was very new at the time and I was buying a laser alone, I knew it was a possibility to lose money for the first few years. It also required more time and space. I had to go to a second room and do a procedure before my cataract surgery. My answer to other ophthalmologists’ questions about my purchase was simply that I believe it’s better and worth it for my patients.

In the 4.5 years that I have had the laser, 68% of my cataract patients have chosen the laser technology. In a one-room OR, I can do 25 cases in a day, and 18 of them are typically laser cataract patients. I have been able to create efficiency in the OR to not significantly compromise my volume while still delivering what I believe to be better technology and surgery.

It was also important to bring this into the office and make sure my staff didn’t feel burdened with another layer of discussion and more testing. The initial step was to bring them into the surgical center and have them observe the technology first-hand. We included our front desk people, our billing people, and our referring doctors. It had a tremendous impact. Everyone was excited, and we wondered why we didn’t do that even sooner.

I was concerned about how to speak to my patients about the technology, especially since it was an out-of-pocket expense. I really put a lot of thought into it. I explain the technology and how it may help manage some levels of astigmatism, and I make a personal recommendation for it because I do believe in it. I explain that I can do traditional surgery or I can use the laser before going into the operating room to do key steps of the operation. Along with making a personal recommendation, I also decided that I wanted to discuss risks and benefits of cataract surgery. I did not want to discuss price or ask patients if they wanted to do it or not. I wanted to preserve my relationship with them while offering this technology. My surgical scheduler reviews the price and then asks them if they want to use this technology when they are having surgery. In the end, I am giving patients an opinion regarding the technology, but I’m empowering them to have the information and make the decision on their own without any pressure from me.

Learning curve

There is a learning curve when incorporating this technology into your practice, but it’s more about how to talk to patients, getting your staff on board, and making sure patients understand the technology. I found there is a minimal learning curve in the operating room, because it just enhances your ability to do surgery. It doesn’t change any of the steps of the procedure. If the capsule is not completely cut, you can still use the Utrata and finish it. If the cataract is not completely cut, you simply use more ultrasound. This gives you confidence that you can still have a successful surgery while you are using the technology.

In our practice, due to its precision, laser cataract surgery contributes to 94% of our patients being spectacle free for distance activities such as driving. We share these statistics with them preoperatively. There are many cases in which I am glad that the capsule was treated by the laser, because I believe there is improved safety with this technology. These include difficult cases, such as trauma or pseudoeooxification, and patients with very dense lenses or small pupils.

Since I started using the LenSx Laser 4.5 years ago, I have not had to use iris hooks or rings in any cases. It has helped to enhance my outcomes, certainly in managing astigmatism.

Choosing a laser

There are many choices of femtosecond lasers. When I chose the LenSx Laser initially, my decision was based mostly on what the laser could do and FDA clearance. The second time I purchased a laser, there was more competition, and it was important to look at not just the laser’s delivery, but also at important other factors, such as the health
of the company, the innovation over the years to keep the laser current, and the service. I approached it as if I was considering a stock to purchase. This is a tremendous consideration when choosing where to make a significant investment. Buying a femtosecond laser may not be for everyone and this may become evident as you build your business plan. However, the LenSx Laser is mobilized through Sightpath Medical. Some of my peers who believe in this technology, but don’t have the volume to support a purchase, have used Sightpath Medical with great success. They believe Sightpath Medical is reliable and consistent, allowing them to operate while feeling quite comfortable and confident. This company has a dedicated engineer who stays with you the whole day and simply rolls it back out upon completion until your next scheduled contract date.

Furthermore, I was impressed that the LenSx Laser had five upgrades in my first 2 years of owning it. The technology was continuing to evolve, and the company was not charging me more as the enhancements were being applied. There have been two more recent revisions and more are on the way this year and next. Alcon has listened to their customers by incorporating many of their suggestions on how to improve efficacy, predictability, and procedural flow. When the laser in my office went down, a technician came within an hour, and the part was flown from California. The technician stayed in the hotel and was there at 6 in the morning to fix it so I could finish my cases the next morning. That kind of service and the commitment to technology from the company solidified my choice. It’s important to make sure, in this fast-paced environment, that the technology doesn’t become obsolete or frustrating.

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### LenSx Laser Important Product Information for Cataract Treatment

**Caution**

Federal Law restricts this device to sale and use by or on the order of a physician or licensed eye care practitioner.

**Indications:**

The LenSx Laser is indicated for use in patients undergoing cataract surgery for removal of the crystalline lens. Intended uses in cataract surgery include anterior capsulotomy, phacoemulsification, and the creation of single plane and multi-plane arc cuts/incisions in the cornea, each of which may be performed either individually or consecutively during the same procedure.

**Restrictions**

- Patients must be able to lie flat and motionless in a supine position.
- Patient must be able to understand and give an informed consent.
- Patients must be able to tolerate local or general anesthesia.
- Patients with elevated IOP should use topical steroids only under close medical supervision.

**Contraindications**

- Corneal disease that precludes applanation of the cornea or transmission of laser light at 1,030 nm wavelength
- Descemetocle or impending corneal rupture
- Presence of blood or other material in the anterior chamber
- Poorly dilating pupil, such that the iris is not peripheral to the intended diameter for the capsulotomy
- Conditions which would cause inadequate clearance between the intended capsulotomy depth and the endothelium (applicable to capsulotomy only)
- Previous corneal incisions that might provide a potential space into which the gas produced by the procedure can escape

**Important Product Information**

**Contraindications:**

- Complete or interrupted capsulotomy, fragmentation, or corneal incision procedure
- Capsular tear
- Corneal abrasion or defect
- Infection
- Bleeding
- Damage to intraocular structures
- Anterior chamber fluid leakage, anterior chamber collapse
- Elevated pressure to the eye

**Warnings**

The LenSx Laser System should only be operated by a physician trained in its use.

The LenSx Laser delivery system employs one sterile disposable Patient Interface consisting of an application lens and suction ring. The Patient Interface is intended for single use only. The disposables used in conjunction with ALCON instrument products constitute a complete surgical system. Use of disposables other than those manufactured by Alcon may affect system performance and create potential hazards.

The physician should base patient selection criteria on professional experience, published literature, and educational courses. Adult patients would be scheduled to undergo cataract extraction.

**Precautions**

- Do not use cell phones or pagers of any kind in the same room as the LenSx Laser.
- Discard used Patient Interfaces as medical waste.

**Complications**

- Capsulotomy, phacofragmentation, or cut incision decentration
- Incomplete or interrupted capsulotomy, fragmentation, or corneal incision procedure
- Capsular tear
- Corneal abrasion or defect
- Infection
- Bleeding
- Damage to intraocular structures
- Anterior chamber fluid leakage, anterior chamber collapse
- Elevated pressure to the eye

**ORA SYSTEM Important Product Information**

**Caution:**

Federal (USA) law restricts this device to sale by or on the order of a physician.

**Indications:**

Federal (USA) law restricts this device to sale by, or on the order of, a physician.

**Intended use:**

The ORA SYSTEM uses wavefront aberrometry data in the measurement and analysis of the refractive power of the eye (i.e., sphere, cylinder, and axis measurements) to support cataract surgical procedures.

**Contraindications:**

There are no known contraindications for this device.

**Warnings and precautions:**

The following conditions may make it difficult to obtain accurate readings using the ORA SYSTEM:

- Patients having received retro or peribulbar block or any other treatment that impairs their ability to visualize the fixation light.
- Use of iris hooks during an ORA SYSTEM image capture will yield inaccurate measurements.

**In addition:**

- Significant central corneal irregularities resulting in higher order aberrations might yield inaccurate refractive measurements.
- Post refractive keratotomy eyes might yield inaccurate refractive measurement.
- The safety and effectiveness of using the data from the ORA SYSTEM have not been established for determining treatments involving higher order aberrations of the eye such as coma and spherical aberrations.
- The ORA SYSTEM is intended for use by qualified health personnel only.
- Improper use of this device may result in exposure to dangerous voltage or hazardous laser-like radiation exposure. Do not operate the ORA SYSTEM in the presence of flammable anesthetics or volatile solvents such as alcohol or benzene, or in locations that present an explosion hazard.

**Attention:**

Refer to the ORA SYSTEM Operator’s Manual for a complete description of proper use and maintenance, as well as a complete list of contraindications, warnings and precautions.
Talk to your astigmatic patients about toric IOL options earlier, and help them see cataract surgery as an opportunity to correct two eye conditions at once.

mycataracts.com: online patient resources
1-844-MYCATARACT (1-844-692-2827): cataract counselors