Advanced biometry for advanced lenses

by Warren E. Hill, MD

The Lenstar helps increase refractive accuracy for patients, especially those with advanced IOL options

Today's cataract patients, and especially those with premium lenses, have learned to anticipate nothing short of excellent postoperative vision, and using the most advanced biometry preoperatively helps us achieve that goal for our patients. Accuracy in IOL power calculations requires precise measurements, including axial length, lens thickness and keratometry, to provide the best estimate of the effective lens position by advanced formulas.

In my opinion, the Lenstar LS900 (Haag-Streit AG, Koeniz, Switzerland) goes beyond what we generally expect from a biometer. The autokeratometry feature is both precise and uniquely suited to the toric IOL; a total of five axial measurements (central corneal thickness, aqueous depth, anterior chamber depth, lens thickness, and axial length) are by optical biometry. Every aspect of every measurement process is open to physician inspection, validation, and correction.

K readings

The Lenstar LS900 uses dual-zone keratometry, with two concentric rings of 1.65 and 2.30 mm. The 16 measurement points in each ring comprise a total of 32 measurement points. Each displayed K reading is a composite of four measurements, representing 128 measurement points. Performing five scans is recommended, which generates a total of 640 individual measurements per eye. Because the greatest distance that any measurement can be from a principal meridian is only 11 degrees, the K readings are uniquely suited for identifying the steep and flat meridians and the power difference between them, a requirement of the AcrySof toric IOL calculator (Alcon, Fort Worth, Texas). The K measurements can also be used with the ASCRS online post-keratorefractive surgery IOL power calculator. Comparatively, the IOLMaster (Carl Zeiss Meditec, Dublin, Calif.) measures only three points above and below the horizontal at 60 degrees, 120 degrees, and 180 degrees.

With the Lenstar, each button push generates four displayed images, and if any displayed measurement point is not well formed, it's an indication the information in that quadrant may not be accurate.

This precision makes the Lenstar an excellent device for surgeons who are looking to optimize their outcomes for all patients, as well as expand their premium lens patient population.

The Lenstar provides the key biometry readings.

Please refer to page 8 for important safety information about the Alcon products described in this supplement.
Achieving optimal outcomes with multifocal IOLs

by David F. Chang, MD

Preop evaluation and intraop astigmatism management are critical to success

Particularly as new IOLs become available, and as more Baby Boomers require cataract surgery, interest in refractive options will continue to climb. Most ophthalmologists believe that appropriate cataract patients should be informed about these options as part of the surgical informed consent. Determining which patients are good candidates for a multifocal IOL is a complex process, but if properly selected and informed, a certain percentage of our cataract population will be thrilled with the results.

Careful patient selection and effective preoperative education and counseling are time consuming, but extremely important. Patient satisfaction is very much a function of preoperative expectations, and our messaging competes with the internet, boastful friends, comparison to LASIK, and the power of suggestion that they will be rid of eyeglasses. Understandable and effective communication about expectations is just as important as the ability to make a proper capsulorhexis. I begin preoperative education by mailing handouts and my modification of the Dell refractive questionnaire to all cataract patients prior to their appointment. These carefully worded handouts explain presbyopia and astigmatism and the non-covered elective refractive options, so that patients will be better prepared to make a decision regarding their IOL.

Creating a multifocal optic with two disparate focal points entails some optical compromise. Preoperative preparation and the patient’s personality and motivation can facilitate adaptation to unwanted images such as halos. Summation from bilateral multifocality helps to

The Lenstar is, in short, changing how we approach the process of IOL power calculations. By allowing the user access to every part of the measurement process, along with the ability to edit the results against validation criteria, there is a significant increase in the control over the final accuracy. This precision makes the Lenstar an excellent device for surgeons who are looking to optimize their outcomes for all patients, as well as expand their premium lens patient population.

References

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"Determining which patients are good candidates for a multifocal IOL is a complex process, but if properly selected and informed, a certain percentage of our cataract population will be thrilled with the results."

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Attention to detail

by Brad Black, MD

Minimizing compromise with the ReSTOR IOL +3 add

Both perioperative and intraoperative approaches to optimizing outcomes with multifocal IOLs have evolved significantly over the past few years, largely due to our increased knowledge of how to ensure maximum patient satisfaction. While we know patient selection is a major influence, other factors such as capsulotomy size and shape, IOL positioning and orientation, and aggressive treatment of ocular surface disorders as well as even small amounts of residual refractive error are equally important. Advances in technology, such as the +3 multifocal IOLs (including the AcrySof ReSTOR IOL +3, Alcon, Fort Worth, Texas), offer the advantage of excellent near vision with minimal compromise of intermediate acuity.

The astigmatism factor

There is no question that the optical performance of multifocal IOLs is much less tolerant of residual refractive error compared to monofocal IOLs. Adaptive optics wavefront studies from Scott MacRae, MD, and colleagues at the University of Rochester show that this is particularly true for astigmatism.

Astigmatic keratotomy is an important adjunct technique for eyes undergoing multifocal IOL implantation. Preoperatively, it is important to discuss the possible need for postoperative excimer laser enhancement of residual astigmatism and spherical error.

Intraoperative aberrometry

Intraoperative wavefront aberrometry offers the potential to improve the refractive outcome for any eye. For multifocal IOL patients, intraoperative pseudophakic measurements may help surgeons to minimize residual refractive cylinder.

These intraoperative wavefront aberrometry devices attach directly to the operating microscope and have the advantage of assessing not just the cornea, but the entire ocular refractive state. Pseudophakic measurements allow surgeons to make intraoperative adjustments, such as toric IOL alignment. Three potential shortcomings of relying on preoperative keratometry or topography are addressed by an intraoperative measurement. First, the wavefront refraction will include the contribution of any posterior corneal astigmatism. Second, any astigmatic change induced by the surgical incision should be accounted for. Finally, the surgeon will not be misled if the patient’s head was tilted during preoperative keratometry or topography measurements by the technician. The refractive cylinder axis will be apparent without the need for external reference landmarks.

The value proposition

With multifocal IOLs we walk a fine line in an effort to maximize functional eyesight while minimizing optical compromise. The IOL technology alone doesn’t assure good results because this delicate balance can be upset by residual refractive error, subtle macular, corneal, or ocular surface abnormalities, and insufficient neuroadaptation to unwanted images. Overly optimistic patient expectations are potentially problematic because of our inability to fully control all of these factors. Nevertheless, premium refractive IOLs are the patient value added proposition that restores proper value to our skills as cataract surgeons and clinicians. Many patients want to have refractive options and expect us to help them decide what might best meet their needs.

References


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way of thinking, that means we tell patients we’re confident the lens will allow for their best chance of spectacle freedom. We explain that if the lighting is not adequate, the print is very small, or the contrast is inadequate for what they’re reading, they might require some help with magnifiers. While those scenarios are rare occurrences, patients need to know that this is a possibility. We also want them to anticipate a distinct ring around lights at night. We tell patients that this isn’t a matter of “if it happens,” but “when it happens,” and that it means “the implant is working.” Explain that these “rings,” which may seem particularly bothersome prior to the adaptation process, become almost unnoticeable over time; that is very reassuring to patients.

Identifying contraindications

As opposed to looking for things that might “qualify” a patient for a multifocal IOL, we suggest the surgeon look at every patient as a potential candidate for a multifocal lens, and then determine if there any contraindications to the lens. I recommend surgeons start at the back of the eye and work forward when evaluating the clinical qualifications of a potential multifocal patient. We look for retinal issues—such as diabetic retinopathy, macular degeneration, or epiretinal membranes—that might reduce contrast sensitivity. We look at the optic nerve, assessing it for glaucoma, damage, neuropathy, or optic atrophy. We evaluate the lens for loose zonules or traumatic subluxation. Finally, we look for anything problematic on the cornea, such as ectasia, ocular surface disease, high degrees of astigmatism (which are better treated with toric IOLs), or even previous refractive surgery. Patients with expected postoperative astigmatism >1.0 D may not achieve optimal visual outcomes. It’s been my experience that, even if treated, there is enough reduction in contrast sensitivity to interfere with the patient’s quality of vision.

Pearls for multifocal lenses

It is generally felt that reducing incision size will lessen surgically induced astigmatism (SIA). In converting to a 2.2- or 2.4-mm incision, the surgeon may simply use the same technique, instrumentation (except for a smaller phaco tip and sleeve), and even fluidic parameters as used with a larger incision. In my experience, the smaller incision has resulted in more predictable outcomes by reducing SIA.

 Orienting a multifocal lens vertically (with the footplate at the 12 and 6 o’clock positions) allows for better consistency in maneuvering the lens to the visual axis. With a vertically oriented lens, it’s much easier to “nudge” the IOL nasally when needed. I ask the patient to look directly at the microscope light. Because of the central diffractive zone the lens has a “bull’s eye” that allows for easy alignment. My advice to those without a great deal of multifocal IOL experience: Don’t be afraid to rotate the lens away from the vertical axis. Orient the lens however necessary to ensure the light reflex is directly centered on the lens.

Another pearl: Avoid touching the optic of the implant at all times. I recommend maneuvering the implant with a soft tip I/A instrument rather than forceps or hooks.

It is very important that the anterior capsule overlap the optic for 360 degrees. Some excessive overlap or even a slightly smaller capsulotomy is preferable to a larger capsulotomy that might not ensure overlap. Without this anterior capsule overlap, centration and effective lens position may be significantly affected.

ReSTOR +3: A “quantum leap” forward

In my experience, the aspheric ReSTOR +3 multifocal IOL is a significant improvement over earlier versions. The range of vision the +3 provides is much more in line with the needs of today’s patient—vision that is not only excellent at near but also at intermediate distances.1 The +4 simply didn’t provide adequate intermediate vision for our premium lens patients. In Figure 1, the defocus curve of the +3 clearly provides patients a much better range of vision than the +4, with intermediate vision “only” dropping to the 20/25-30 level. The +3 is a quantum leap forward, a significant improvement over previous lenses, and certainly worth trying for any surgeon previously disinclined with the earlier multifocal IOLs.

Surgical timing

With multifocal IOLs, I prefer performing bilateral surgery a bit closer together. It’s been my experience that patients adapt better to the technology if the implants are done a week or two apart, even sooner when schedules permit. The closer together the surgeries, the faster the patient seemingly adapts to the technology. There are some surgeons who argue that bilateral surgeries spaced weeks apart allow the patient to determine whether or not the multifocal lens was a good choice and if not, convert the contralateral eye to a monofocal lens. In my opinion, maybe these patients (similar to those who require an hour-long discussion about the multifocal IOL) are not good candidates for the implant in the first place. I would agree, however, that unilateral multifocal IOLs can, at times, be very well tolerated with an opposite eye that is either phakic or pseudophakic with a monofocal IOL.

Minimizing compromise

No matter which method of correcting “surgically induced, pseudophakic presbyopia” we are choosing right now, there are some compromises you—and your patients—will need to accept. What we’re trying to do is minimize compromises and find those that patients can adapt to most readily. That’s why I’m a strong believer in multifocal lenses. Cataract surgeons who are not yet embracing these lenses are missing a big opportunity.

*AcrySof, ReSTOR, and IQ ReSTOR are trademarks of Novartis.

Reference

1. AcrySof ReSTOR IOL +3 Directions For Use

Dr. Black is founder of Eye Associates, Jeffersonville, Ind. He can be contacted at dbr@drblack.com.

Figure 1: The best case mean defocus curves in cataract patients at six months postop who had received either the AcrySof IQ ReSTOR IOL +3.0 D or +4.0 D

Source: AcrySof IQ ReSTOR Directions For Use

Figure 2: The ranges of visual acuity achievable with the AcrySof IQ ReSTOR IOL +3.0 D and +4.0 D models

Source: AcrySof IQ ReSTOR Directions For Use
The AcrySof IQ monofocal: a platform IOL

by James McCulley, MD

Offering an excellent standard lens to cataract patients

The AcrySof® (Alcon, Fort Worth, Texas) line of IOLs is, in my opinion, a fantastic design platform for monofocals, multifocals, and toric lenses. The AcrySof IQ monofocal IOL has lived up to its promise not only as a monofocal, but also a foundation upon which presbyopic and astigmatic correction can be applied in the multifocal and toric platforms.

The basic platform features a single-piece design with excellent biomechanics and unsurpassed biocompatibility in the lens materials. 1,2,3 For patients seeking excellent distance vision who don’t want to pay out of pocket and/or do not mind wearing glasses after surgery, using a monofocal lens for their cataract surgery is economically feasible and easy. Knowing I’m using a lens that has advanced optics for maximum refractive clarity for my patients gives me even more peace of mind. For these and many more reasons, the AcrySof IQ IOL is my lens of choice.

Biomechanics and design

The AcrySof IQ monofocal IOL has traditionally been the true platform of the AcrySof line. Biomechanically, it centers in the bag and adheres rapidly, something particularly important for premium lenses. The lens has a square edge, which, combined with the excellent centration, reduces the incidence of posterior required YAGs. 4 In fact, the Nd:YAG rates published in the AcrySof IQ IOL Directions For Use are lower than the rates included in other manufacturers’ product labeling (although not all manufacturers include this information in their product labeling). 5,6

Also minimizing YAG rates is the bioinert hydrophobic acrylic material used in the AcrySof line. This proprietary material is neither fibronectin affinity to the anterior capsule, 1 which increases the chance of adhesion to the capsular bag. When the capsulorhexis overlaps the optic of the lens by as little as 1 mm, the result is a “sandwich” structure, with the lens sandwiched in place between the anterior and posterior capsules. According to this theory, the overlap prevents further proliferation of lens epithelial cells. 3

The AcrySof lens platform features an aspheric design, which was developed with a negative spherical aberration to counteract the positive spherical aberration in the average cornea. This improves quality of vision and contrast sensitivity.

The incidence of glistenings in IOLs has been a hot topic recently. To some degree, all lens materials have microvacuoles that can be observed under the slit lamp and are called “glistenings.” 7 I’ve observed them in the AcrySof lens material, but in my hands, they have never had any clinical significance. I’ve never had a patient complain about them. AcrySof lenses manufactured today have reduced the incidence of these microvacuoles by 87%. 8

Ideal lens design

In an ideal world, any lens we place in the eye would recreate the characteristics of a natural lens present in a young person. The blue light filtering chromophore mimics light transmissibility of the natural human lens and has been added onto the AcrySof IQ IOL platform. Without the chromophore, blue light is transmitted through to the retina that the retina was not designed to see, nor has adapted to see. I opt against creating an unnatural situation in the eye. Implanting the AcrySof IQ IOL to avoid blue light makes sense.

A “go-to” lens

The AcrySof IQ IOL is my go-to monofocal lens and has been my preferred lens for years. It offers advanced design, excellent visual quality, and the lowest labeled Nd:YAG rates of all lenses currently on the market. For cataract patients, it is a sensible and financially viable choice.

Moreover, the AcrySof IQ IOL platform offers exciting possibilities for premium lens technology. I firmly believe the high quality design, biomechanics, and biocompatibility make AcrySof an excellent platform for all existing lenses and offer unparalleled promise for premium lenses of the future.

*AcrySof is a trademark of Novartis.

References

5. AcrySof IQ Directions For Use
8. Data on file

AcrySof IQ IOL

Source: Alcon

Dr. McCulley is chair of ophthalmology, University of Texas Southwestern Medical Center, Dallas. He can be contacted at 214-648-3407.
Toric IOLs: Are they all the same?

by John Berdahl, MD

**Toric lens success depends on stability**

Toric IOLs are an ideal option for astigmatic cataract patients with .75 D of corneal astigmatism or greater. They address a known problem, one that is intuitive and logical to patients. Just as I would not prescribe spectacles to patients without correcting astigmatism, it would make no sense to me not to offer a toric lens to my cataract patients.

Toric lenses are more predictable than limbal relaxing incisions (LRIs) or astigmatic keratotomy (AK) in patients with more than .75 D of astigmatism. Incisional techniques have a less predictable healing response, and (if using a manual LRI technique) surgeons need to consider the variability in incision depth, arc, and angulation.

The AcrySof® IQ toric IOL (Alcon, Fort Worth, Texas) features the aspheric technology and refractive clarity of the AcrySof platform. Its excellent rotational stability makes treating corneal astigmatism in cataract patients very simple.

**Rotational stability, lens placement**

There cannot be enough emphasis on how crucial rotational stability is in a toric lens.

The AcrySof lens material has a unique “tackiness” and has been shown to have greater fibronectin binding than other IOL materials, which promotes adhesion to the capsule (Figure 1).1 This bond between the anterior and posterior capsule helps to stabilize the lens in place and contributes to the rotational stability of the lens.2

Delivering the lens in the capsular bag is equally important. We want a lens that’s flexible enough to be easily positioned to align on the axis. At the same time, we want a lens that is stable enough that the contraction forces of the capsular bag won’t vault or distort the lens.

The AcrySof platform is a nice balance between these two features. The single-piece platform’s combination of material and Stableforce haptics keep the AcrySof IQ toric lens stable and centered in the capsular bag, while the flexible haptic design allows for optimal placement in the bag, regardless of size.

**Unfolding of the haptics**

An aspect of the AcrySof platform I particularly appreciate is the speed at which the haptics open in the bag. Surgeons have the appropriate time (about 10-20 seconds) to manipulate the lens into its rough position before it is fully unfolded; those of us using intraoperative aberrometry to refine outcomes enjoy that the lens unfolds relatively quickly.

One pearl: Ensure the haptics are entirely unfolded when the case is finished, and completely remove the viscoelastic from behind the IOL. Then just “tap” the center of the lens posteriorly, so there is contact between the posterior capsule and the lens. If a surgeon realizes in the OR the lens has not been properly aligned, my advice is to put a little viscoelastic under the lens, and rotate (always clockwise as the haptics move more freely in that direction) the lens to the proper position.

**Clinical pearl: Finding the ideal axis**

Finding the ideal axis is the most important and sometimes the most challenging aspect of toric IOL implantation. Although this does not occur often, sometimes the lens is exactly where we intended to place it—but that location is not the ideal axis. Differentiating between the intended and ideal axis is necessary for these lenses.

If there is residual astigmatism postoperatively, there are two options: perform laser vision correction or return the patient to the OR and rotate the lens. David Hardten, MD, and I developed an online tool that is hosted by ASCRS that can help surgeons, www.ascrs.org/toric-results-analyzer. Surgeons input the manifest refraction, what toric lens is being used and its axis, and the site will calculate where the lens should be rotated to and estimate the new refraction. The key issues for surgeons to consider are whether the spherical equivalent is acceptable and whether the residual astigmatism is acceptable. I personally find that anything under 0.50 D of residual astigmatism is usually not noticeable to patients.

**A quality lens platform**

In my hands, the AcrySof IQ toric lens tackles some of the most challenging issues of toric lenses through its material and design, and produces great alignment, adhesion to the bag, and most importantly, excellent rotational stability. As we continue to advance into more sophisticated toric lenses and multifocal torics, I believe this lens platform will evolve seamlessly with us.

*AcrySof is a trademark of Novartis.*

**References**


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Please refer to page 8 for important safety information about the Alcon products described in this supplement.
When should you use a toric IOL for visually significant corneal astigmatism?

by James A. Davison, MD, FACS

Patients with low cylinder—as well as higher levels of astigmatism—can benefit from toric lenses

Warren Hill, MD, evaluated 6,000 cataract patients and found 18% had at least 1.5 D of keratometric astigmatism. He also found that 52.6% had at least 0.75 D. So if we confine ourselves to thinking about toric IOL correction only for patients with at least 1.5 D astigmatism, we may be missing more than half the patients who could benefit from the technology. It has been shown that refractive cylinder becomes substantially visually significant somewhere around 1.0 D. But when prescribing spectacles or performing LASEK, 0.75 D is normally considered significant. In those cases, correction is fairly easily achieved because those technologies are direct, extremely accurate, and additional individual variables are few.

Implanting a lens to do the same job is similar but has a couple of additional variables that need to be considered to produce good results. In order to predict the best result, the equation variables that need to be included are: preoperative measurements of corneal astigmatism and surgically induced astigmatism. Further, to achieve good uncorrected vision, we must minimize the residual spherical equivalent in addition to minimizing refractive cylinder. Without the use of intraoperative aberrometry, my own data, using Wolfe Eye Clinic’s best machines and practices, show 70% of my patients have residual spherical equivalent of 0.75 D or more.

Toric lenses are quite appropriate for patients with keratometric astigmatism between 0.75 and 1.38 D. Even when using an average SIA of 0.25 D and anterior keratometric astigmatism measurement, the mean postoperative refractive astigmatism was statistically significantly lower with toric IOLs than with spherical IOLs (0.31 D versus 1.06 D; P < 0.001). Hill reported SIA becomes a more significant issue for patients with lower levels of cylinder. Intraoperative aberrometry on each case may be an ideal option, but those of us without the technology use an average SIA derived from our own experience. I’ve found 2.2 to 2.4 mm incisions will induce about 0.25 D of astigmatism on average; that’s what I use in toric calculations. As Ernest and Potvin found: “the lower the degree of astigmatism induced at the time of surgery, the more precise the postoperative correction is likely to be because the variability in that SIA will be lower and lower.”

Flipping axes

If we ignore the SIA, we can say that postoperative refractive cylinder magnitude is independent of preop corneal astigmatism axis orientation. In essence, that means that a patient with a 0.75 D of preop astigmatism may be corrected with a toric IOL value of 1.0 D—leaving him with 0.25 D in the other direction. Some may argue that “flipping” the axis creates more of an issue or that astigmatism provides increased depth of focus. I believe that it’s more the magnitude of astigmatism that affects uncorrected vision rather than the axis of cylinder.

Corneal vs. lens-based correction

Compared with limbal relaxing incisions (LRIs), toric IOLs are more reliable, which translates to better postop vision for our patients. Toric lenses are manufactured to tight laboratory specifications that are extremely consistent and thus predictable. LRIs, however, are notoriously unpredictable because they are so variably performed, because of the various amounts the diamond knife will penetrate, and because the locations of the arcs are not consistent. In addition, LRIs have a less direct effect than toric IOLs, i.e., operating on the cornea’s periphery while trying to effect a change of shape at the visual axis.

Conclusions

The key to toric lenses and astigmatic correction is to discuss with patients that we’re trying to predict their results. Surgeons are happier with higher toric powers because we know we’ll be able to help someone improve his/her vision (assuming we properly insert and align, of course). But with proper measurements including accurate preoperative measurements and equipment and accurately determined variables, we should be able to reduce even smaller amounts of astigmatism as well.

References


Dr. Davison is in private practice, Wolfe Eye Clinic, Marshalltown and West Des Moines, Iowa. He can be contacted at 641-754-6200 or jdavison@wolfeclinic.com.

“Even when using an average SIA of 0.25 D and anterior keratometric astigmatism measurement, the mean postoperative refractive astigmatism was statistically significantly lower with toric IOLs than with spherical IOLs (0.31 D versus 1.06 D; P<0.001).”
Important safety information

LENSTAR LS 900*

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

Indications: The LENSTAR LS 900 is a non-invasive, non-contact OLCR (optical low-coherence reflectometry) biometer used for obtaining ocular measurements and performing calculations to assist in the determination of the appropriate power and type of IOL (intraocular lens) for implantation after removal of the natural crystalline lens following cataract removal. The LENSTAR LS 900 measures:
- Axial eye length
- Corneal thickness
- Anterior chamber depth
- Aqueous depth
- Lens thickness
- Radii of curvature of flat and steep meridian
- Axis of the flat meridian
- White to white distance
- Pupil diameter

Warnings: Measurements can be carried out with dilated or undilated pupils. The A-scan (axial eye length, corneal thickness, anterior chamber depth and lens thickness), keratometry and white-to-white distance measurements are not influenced by dilatation status. Dilatation status, however, does have a bearing on pupillometry. The light from this instrument may be dangerous. The risk of eye damage increases with the irradiation period.

Precautions: Users should check measurement readings for plausibility. This includes the verification of the A-scan and the cursors. The operator should also take into account the type (e.g., posterior subcapsular cataract) and density of the cataract when evaluating plausibility. For best results, patients should keep the eye as wide open as possible during measurements. Blinking is permitted, but should be kept to a minimum.

Attention: Reference the Instructions for Use for a complete listing of indications, warnings, and precautions.

*LENSTAR is a registered trademark of Haag-Streit.

AcrySof IQ Intraocular Lenses

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

Indications: The AcrySof IQ posterior chamber intraocular lens is intended for the replacement of the human lens to achieve visual correction of aphakia in adult patients following cataract surgery. This lens is intended for placement in the capsular bag.

Warning/precaution: Careful preoperative evaluation and sound clinical judgment should be used by the surgeon to decide the risk/benefit ratio before implanting a lens in a patient with any of the conditions described in the Directions for Use labeling. The lens should not be implanted if the posterior capsule is ruptured, if the zonules are damaged, or if a posterior capsulotomy is planned. Rotation can reduce astigmatic correction; if necessary lens repositioning should occur as early as possible prior to lens encapsulation. All viscoelastics should be removed from both the anterior and posterior sides of the lens; residual viscoelastics may allow the lens to rotate.

Studies have shown that color vision discrimination is not adversely affected in individuals with the AcrySof Natural IOL and normal color vision. The effect on vision of the AcrySof Natural IOL in subjects with hereditary color vision defects and acquired color vision defects secondary to ocular disease (e.g., glaucoma, diabetic retinopathy, chronic uveitis, and other retinal or optic nerve diseases) has not been studied. Do not resterilize; do not store over 45 degrees C; use only sterile irrigating solutions such as BSS or BSS PLUS Sterile Intraocular Irrigating Solutions.

Attention: Reference the Directions for Use labeling for a complete listing of indications, warnings and precautions.

AcrySof IQ Toric Intraocular Lenses

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

Indications: The AcrySof IQ Toric posterior chamber intraocular lenses are intended for primary implantation in the capsular bag of the eye for visual correction of aphakia and pre-existing corneal astigmatism secondary to removal of a cataractous lens in adult patients with or without presbyopia, who desire improved uncorrected distance vision, reduction of residual refractive cylinder and increased spectacle independence for distance vision.

Warning/precaution: Careful preoperative evaluation and sound clinical judgment should be used by the surgeon to decide the risk/benefit ratio before implanting a lens in a patient with any of the conditions described in the Directions for Use labeling. Toric IOLs should not be implanted if the posterior capsule is ruptured, if the zonules are damaged, or if a primary posterior capsulotomy is planned. Rotation can reduce astigmatic correction; if necessary lens repositioning should occur as early as possible prior to lens encapsulation. All viscoelastics should be removed from both the anterior and posterior sides of the lens; residual viscoelastics may allow the lens to rotate.

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