Corneal topography is one of several very important tests that need to be performed prior to every cataract evaluation. In cataract consultations, I use topography for three general reasons:

1. To rule out a corneal cause for the patient’s visual blur
2. To support corneal curvature measurements for implant power calculation
3. To ensure that the cornea is healthy for any potential additional corneal surgery during the patient’s cataract surgery journey

Corneal topography should first be considered to rule out keratoconus. If there is any evidence of this corneal cause of blur, a gas permeable contact lens over-refraction can be performed. The gas permeable contact lens will nullify most corneal irregularities and allow the examiner to assess how much of the patient’s blur is corneal vs. lenticular in nature. For example, if the topography looks suspicious for a visually significant irregularity in a cataract patient with 20/60 best corrected vision, a gas permeable contact lens over-refraction can be performed. If the contact lens improves vision...
What Pre-existing Conditions Could Make Replacement Surgery with a Multifocal Lens Inadvisable?

Contributing Writer: Steven Vold, MD

Lens replacement surgery continues to evolve as a life changing procedure. In the past, the limitations of available treatment options would require the patient to settle on glass dependence. With emerging lens technology, the surgeon can now provide someone with a new view on life – literally! To determine if this is a possibility, a patient in the pre-consulting stage must first undergo a series of necessary tests and examinations, including but not limited to keratometry, laser corneal topography and biometry. This is an important first step to confirm their candidacy since pre-existing conditions must be identified that could affect the outcome of surgery.

Although a multifocal lens such as AcrySof® IQ ReSTOR® provides true performance at all distances, not every patient is an ideal candidate for multifocal lenses. Patients who may not be appropriate candidates include those who present with at least one of the following:1

- Macular degeneration
- Advanced glaucoma
- Diabetic retinopathy
- Corneal scarring
- Corneal disease
- Chronic dry eyes

To determine if the patient is indeed a candidate for a multifocal intraocular lens (IOL), it is important that a surgeon performs the necessary tests to ensure that nothing is missed and that ocular disease or any conditions that preclude the use of a multifocal IOL are identified. Dry eye can reduce the performance of multifocal IOLs. Treating dry eye disease and blepharitis pre-operatively will contribute to a better outcome.2

1. AcrySof® IQ ReSTOR® IOL [Directions for Use]. Fort Worth, TX: Alcon; 2009.

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patients and surgeons must collaborate and communicate to achieve the best possible outcomes for the patients’ visual goals, and failing to completely address these key steps can lead to a less than ideal result.

In my opinion, AcrySof® IQ ReSTOR® lenses are currently among the best family of intraocular lenses on the market and are designed to help patients reduce their dependency on glasses. However, it is important to keep in mind that not every patient is a best option for everyone. Therefore, when faced with a patient who is not a candidate for a multifocal lens, surgeons should be ready to discuss alternative options. The surgeon must consider each case individually, including medical factors and identified lifestyle priorities, as this is critical when the physician begins the conversation about available IOL options.

Although many patients might have a specific lens in mind, ultimately the surgeon must help each patient choose the best lens that is specific for their case. As much as a surgeon would love to give a patient the lens that is their preferred option in all cases, the surgeon must remain a trusted advocate who can explain to patients the IOL option that they truly need rather than what they simply want. The surgeon needs to remind their patients that he or she is fully committed to achieving their visual goals.

ReSOURCE
The Importance of Biometry to Obtain Optimal Results with a Multifocal IOL

The refractive power of the human eye depends on a combination of four factors: the power of the cornea, the power of the lens, the distance of the lens from the cornea and the length of the eye. Therefore, biometry, the measurement of axial length (AL), is one of the key measurements required to calculate IOL power before patients undergo lens-based refractive surgery. Along with other measurements such as keratometry and topography, these pre-operative diagnostic tests assist the surgeon in selecting the ideal intraocular lens (IOL) for the patient.

The refractive outcome following cataract surgery depends on the measurements required for the calculation of IOL power. As a result, care must be taken to ensure that these measurements are carried out as accurately as possible. The technician can guarantee consistent, accurate measurements by following physician-directed validation guidelines and instructing the patient prior and during the measurement process. Validation guidelines allow the technician to determine when a measurement may not be correct. The technician should instruct the patient before each measurement and reinforce these instructions during the examination process. Accurate measurements can be achieved if the patient simply follows the instructions of the technician and asks questions on any part they may not understand. Most measurement devices have something to assist with patient fixation in addition to the technician’s efforts directed at helping the patient to maintain fixation during the measurement process.

IOL power calculation formulas offer the most predictable results for normal eyes.

With optical biometry, the application of validation guidelines and the use of an advanced theoretical formula—such as Haigis, Holladay 2 or Olsen—should put the refractive accuracy of the post-op spherical equivalent to within ±0.50 D for 80% of patients. Apart from achieving the most accurate preoperative measurements possible, along with using a recent generation theoretical formula, one other important preoperative evaluation to consider is obtaining an aberration profile to screen for a significant elevation of one or more higher order aberrations. Diffactive optics are sensitive to the presence of coma, for example, as well as other elevated higher order aberrations. A pre-operative coma value of 0.32 microns or more may result in intolerable dysphotopsia following the implantation of a diffractive multifocal IOL. Similarly, significant elevation of other higher order aberrations will reduce contrast and compromise visual quality with a diffractive multifocal IOL.

IOL power calculation formulas offer the most predictable results for normal eyes. This insight can be used to assist in managing patient expectations. When there is an unusual combination of central corneal power, anterior chamber depth (ACD) and axial length, the overall refractive accuracy begins to decrease. The majority of ophthalmology practices typically have up to 20% of patients who are still outside a ±0.50 D level of accuracy. For this reason, a plan should be in place to address a refractive miss when it occurs.

How preoperative measurements are carried out differs from practice to practice and often depends on the patient flow of the office. Some practices that have already identified a patient as needing cataract surgery will have all of the measurements made prior to the patient seeing the physician, while other practices perform preoperative measurements after the decision for cataract surgery has been made.

Ultimately, both surgeons and their patients need to keep in mind that current technology limitations in refractive accuracy still exist for cataract surgery. Physicians need to be comfortable with the various ways to move the spherical equivalent back-to-plano. Physicians should think of every patient as a multifocal IOL candidate and carefully screen for situations in which a multifocal may not be the best option, such as prior keratorefractive surgery, moderate to high levels of corneal astigmatism and the presence of elevated higher order aberrations, especially coma.
It is equally important to know what amount of surgically induced astigmatism (SIA) is introduced during the procedure and what the surgeon can do to reduce the amount of SIA. Multiple methods of astigmatism measurements should be employed to obtain the most accurate assessment of pre-operative astigmatism. Factors that affect SIA include the size, location, and configuration of the surgical incisions.

Under lower levels of astigmatism, SIA is important as the more SIA introduced, the more it will affect the levels of astigmatism that the surgeon is trying to correct. For example, if a surgeon is attempting to correct 0.75 D of astigmatism but 0.5 D is introduced during surgery, the SIA introduced is already two-thirds of the astigmatism to be corrected. While SIA is more important at lower levels of astigmatism, it becomes less so at higher levels of astigmatism (3.5 to 4 D). At higher levels of astigmatism, the orientation of the lens is far more important. For these surgeons who are hesitant to use lower power lenses, it is important that they realize that it is their surgical incisions, which may be causing the variable outcomes and not the lenses themselves.

Surgeons can reduce SIA if the wound geometry is square and placed at the posterior limbus. In my results, the SIA is 0.25 D with a standard deviation (SD) of 0.14 D for a square wound that originates at the posterior limbus.

Many surgeons are hesitant to use the AcrySof® Toric IOL lenses, which correct from 0.75 D to 1.5 D. Surveys show that surgeons are not using these lenses in the numbers that they should. Instead, they will use lenses beginning at T4 and above. However, in the population, the greatest number of people who need astigmatism correction fall into the low astigmatism range. As the power goes down, the number of people who become lens candidates goes up. For these surgeons who are hesitant to use lower power lenses, it is important that they realize that it is their surgical incisions, which may be causing the variable outcomes and not the lenses themselves.

Important Safety Information

AcrySof®-IQ ReSTOR® Intraocular Lenses

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

INDICATIONS: The AcrySof® IQ ReSTOR® Posterior Chamber Intraocular Lens (IOL) is intended for primary implantation for visual correction of aphakia secondary to removal of a cataractous lens in adult patients with and without preoperative, who desire near, intermediate and distance vision with increased spectacle independence. The lens is intended to be placed 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. Physicians should target anastomosis, and ensure that IOL implantation is achieved. Care should be taken to remove viscoelastic from the eye at the close of surgery.

Some patients may experience visual distortions and/or discomfort due to multifocality, especially under dim light conditions. Clinical studies with the AcrySof® ReSTOR® lens indicated that postoperative visual function (VFD), when present, developed earlier into a clinically significant VFD. Prior to surgery, physicians should provide prospective patients with a copy of the Patient Information Brochure available from Alcon for this product informing them of possible risks and benefits associated with the AcrySof® IQ ReSTOR® Intraocular Lenses.

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°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 the 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 and without preoperative anastomosis, 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.

Optical theory suggest, that, high astigmatic patients (i.e. > 2.5 D) may experience spatial distortions. Possible toric IOL related factors may include residual cylindrical error or astaxanthin pigments. Prior to surgery, physicians should provide prospective patients with a copy of the Patient Information Brochure available from Alcon for this product informing them of possible risks and benefits associated with the AcrySof® IQ Toric Cylinder Power IOL.

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°C; use only sterile irrigating solutions such as BSS® or BSS PLUS® Sterile Intraocular Irrigating Solutions.

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