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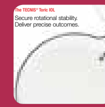


Amico Yasna Pars

Ophthalmology Newsletter

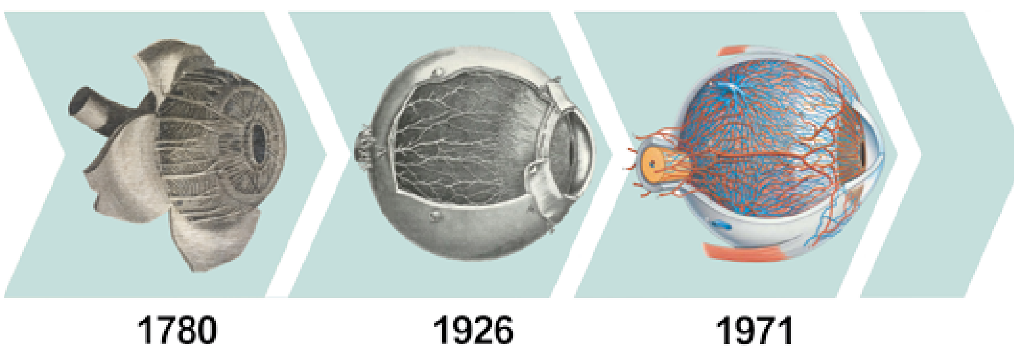
What's Inside

Dear valued partner

This special edition of our newsletter is about 27th annual congress of Iranian society of Ophthalmology which will be held on 4-7 December 2017. Like any other active company in this field, we cherish the opportunity to be a part of this great event. Without a doubt this is the biggest and most prestigious Iranian Ophthalmologists gathering that we all were waiting for it.

Amico Yasna Pars as the official representative of many ophthalmic top brands such as Johnson and Johnson vision, Optos, Gueder, Alcon Vision Care, Huvitz and many others has an obligation to actively participate in such a unique convention. As a gold sponsor it's an unexampled chance for us to meet with you dears in person, having your feedback and introducing our vast portfolio.

We believe that with such a respectable partnership between us, we can hope to improve the quality of our products and services as they truly should meet the expectations of our partners, the great ophthalmologists.



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THE LITERATURE

BY JAY S. PEPOSE, MD, PhD, AND JOSHUA BURKE, DO

Special Report: American Academy of Ophthalmology Task Force Consensus Statement for Extended Depth of Focus Intraocular Lenses

MacRae S, Holladay JT, Glasser A, et al[1]

ABSTRACT

This report establishes the criteria defining extended-depth-of-focus (EDOF) lenses, a new class of IOLs. The consensus was that three criteria at minimum define EDOF IOLs:

1. a monocular mean distance BCVA comparable to that of monofocal IOL controls
2. a monocular depth of focus that is at least 0.50 D greater than the depth of focus achieved with a monofocal IOL at logMAR 0.2 (20/32)
3. a mean monocular distance-corrected intermediate visual acuity tested under photopic conditions at 66 cm at 6 months that is statistically significantly superior to that of the monofocal control IOL group, with at least 50% of eyes seeing better than or equal to logMAR 0.2 (20/32) at 66 cm

The task force also outlined specific methodology for acquiring defocus curves.

Visual acuity measurements should be taken in dark or dim lighting. Monocular defocus curve testing is conducted with distance refraction in place, after which the visual acuity is measured in 0.50 D defocus steps in the range of +1.50 and -2.50 D and in 0.25 D steps between +0.50 D and -0.50 D. The depth of focus is then graphically represented as the range of lens powers over which the mean acuity is 0.2 logMAR (20/32) or better. Both pupillary size and axial length can influence defocus measurements and should be evaluated by stratifying the data accordingly.

Contrast sensitivity testing at specified spatial frequencies must be performed with and without glare conditions, preferably with gratings using the Michelson criteria. The distance-corrected intermediate low-contrast acuity must be assessed at 66 cm under suboptimal conditions using the Weber definition of 10% monocular contrast, and these results should be compared to those with the monofocal control.

DISCUSSION

The importance of creating uniform criteria to govern study design and outcomes involving EDOF IOLs cannot be overemphasized. A standardized protocol allows accurate and objective measurement to help the FDA and clinicians understand visual outcomes with these IOLs and their performance under photopic, mesopic, and glare conditions.

Extending the Range of Vision Using Diffractive Intraocular Lens Technology

Weeber HA, Meijer ST, Piers PA[2]

ABSTRACT

Weeber and colleagues described an EDOF IOL and its function under experimental conditions. Two principal technologies are at work in this lens, which was developed commercially as the Tecnis Symfony IOL (Johnson & Johnson Vision). The first uses the principle of diffractive optics to achieve EDOF. Modifying specific geometrical parameters of a series of echelettes (eg, depth at the center and edge, diameter, and surface shape) can expand the focal range. Unlike multifocal IOLs, which disperse light energy to discrete primary focal lengths, the EDOF IOL creates a single elongated focus.

The second technology combines diffractive and refractive optics. In this hybrid design, the entire posterior optic surface is covered in a diffractive profile to offset corneal chromatic aberration and thereby increase retinal image quality, while the refractive optic provides a base power for the IOL and corrects the mean corneal spherical aberration. The echelettes are embedded seamlessly within the achromatic

AT A GLANCE

- A task force established the minimal criteria for defining an extended-depth-of-focus (EDOF) IOL. They include a distance BCVA comparable to that of a monofocal lens, a depth of focus greater than 0.50 D at logMAR 0.2, and more than 50% of eyes seeing better than logMAR 0.2 at 66 cm 6 months postoperatively.
- An experimental study described the two principal technologies used in one EDOF IOL. Diffractive optical elements increased depth of focus and offset corneal longitudinal aberration. Refractive optics provided a base power and corrected for average corneal spherical aberration.
- A prospective comparative study of EDOF and monofocal IOLs found a high rate of spectacle independence and patient satisfaction with the former.

> "Predictive bench outcomes must be carefully compared to ... achieved clinical outcomes."

diffractive profile on the posterior optic surface, which does not result in extra visible diffractive rings.

Weeber and colleagues examined the EDOF IOL's optical performance in a model eye using a modulation transfer function (MTF). They concluded that, in the range of -1.00 to -3.00 D defocus, the lens could improve visual acuity by 0.2 logMAR more than a monofocal IOL. The investigators predicted that the EDOF IOL would not carry some of the drawbacks associated with multifocal lenses such as reduced contrast sensitivity and a higher incidence of dysphotopsia.[3]

DISCUSSION

The investigators looked at the technologies that compose the Tecnis Symfony IOL and the clinical outcomes predicted by simulations in a clinically verified eye model. The important finding of this study is the improvement in visual acuity over a wider range of vision compared with a monofocal IOL, as determined with a through-frequency MTF and a 3-mm pupil. The MTF describes how the transfer of contrast information by an optical system decreases with increasing spatial frequency.[4]

In addition, the IOL did not demonstrate reduced contrast or the degree of glare or halos frequently associated with multifocal IOLs.[3] Presumably, the counterbalance of corneal spherical aberration and the reduction in chromatic aberration of the eye offset the potential decrease in contrast from spreading light energy over an extended focus. Using the image of a small light source and imaging techniques with a high dynamic range, the investigators determined the extent of halos. Of note, when Gatinel and colleagues compared an EDOF IOL with a bifocal and a trifocal IOL in an optical bench study using point spread function to analyze halos, they found the relative amount to be similar among the three lenses.[4]

Longitudinal chromatic aberration can cause blur and reduce contrast vision.[5,6] A diffractive achromatic profile offsets the refractive optic's and cornea's contributions to longitudinal chromatic aberration. Another study found that the EDOF IOL had a higher MTF when a +0.28-µm spherical aberration ISO2 model cornea was used.[4] This finding likely reflects the IOL's offsetting -0.27 µm of spherical aberration. Improvement in overall optical image quality is significant when both chromatic and spherical aberration is corrected.[7]

Of interest, a bench study comparing an EDOF IOL with a trifocal IOL with a +1.75 D addition for intermediate vision and a second power addition for near vision found that the trifocal IOL had a larger depth of focus than the EDOF IOL, which seemed to show some energy peaks at discrete foci. This MTF testing was done only at one spatial frequency, however, in the setting of monochromatic rather than polychromatic light. Moreover, the model included spherical but not chromatic aberration.[4] The predictive bench outcomes must be carefully compared to the achieved clinical outcomes.

Comparative Analysis of the Clinical Outcomes With a Monofocal and Extended Range of Vision Intraocular Lens

Pedrotti E, Bruni E, Bonacci E, et al[8]

ABSTRACT

In a prospective study, Pedrotti and colleagues compared the clinical outcomes of a monofocal IOL versus the Tecnis Symfony lens in 80 eyes. The investigators took standard preoperative measurements, and the postoperative data collected included monocular and binocular uncorrected and corrected distance visual acuities, intermediate and near visual acuities, contrast sensitivity, and defocus curves. Postoperative examinations occurred at 1 day, 1 month, and 3 months.

Postoperatively, both groups achieved a binocular distance UCVA of 0.2 logMAR (20/30) or better. A binocular intermediate UCVA of 0.2 logMAR or better was obtained in 100% of EDOF eyes compared to 13.3% of monofocal eyes. Near UCVA was 0.2 logMAR or better in 100% and 6.7% of EDOF and monofocal eyes, respectively. Contrast sensitivity in photopic, mesopic, and scotopic light was found to be statistically the same in both groups. Defocus curve measurements in 0.50 D steps from +1.00 to -4.00 D confirmed that the EDOF group had superior visual acuity in most steps compared to the monofocal group. Study participants completed NEI RQL-42 quality-of-life questionnaires. Responses showed that the patients with the EDOF IOL were less dependent on optical correction without demonstrating a statistically significant increase in glare or dysphotopsia.

DISCUSSION

This study confirmed the outcomes predicted in prior studies such as that by Weeber et al.[2] When discussing IOL options with patients, clinicians can derive confidence from the strong correlation between (1) the experimental studies and visual simulation with EDOF IOLs and (2) the measured clinical objective data and subjective responses obtained from patients who received EDOF IOLs. Activities of daily living have changed in the cataract patient population.

Discussion

Smartphones, tablets, and desktop computers place a greater emphasis on intermediate vision in varied lighting conditions.[1] Patients who received the EDOF IOL in this comparative analysis by Pedrotti and colleagues were highly satisfied.

Prospective studies on a larger scale and of longer duration are required to evaluate the performance of implanted EDOF IOLs, including under mesopic conditions and in settings with glare stimuli. Other potential research of note includes testing the IOL in various levels of tilt and decentration and further comparisons of EDOF to multifocal IOLs with regard to spectacle independence.[4,8] Because of the central ring's wider diameter, EDOF IOLs may be less likely than multifocal lenses to cause photic phenomena in patients with a large angle kappa.[9-11] ■

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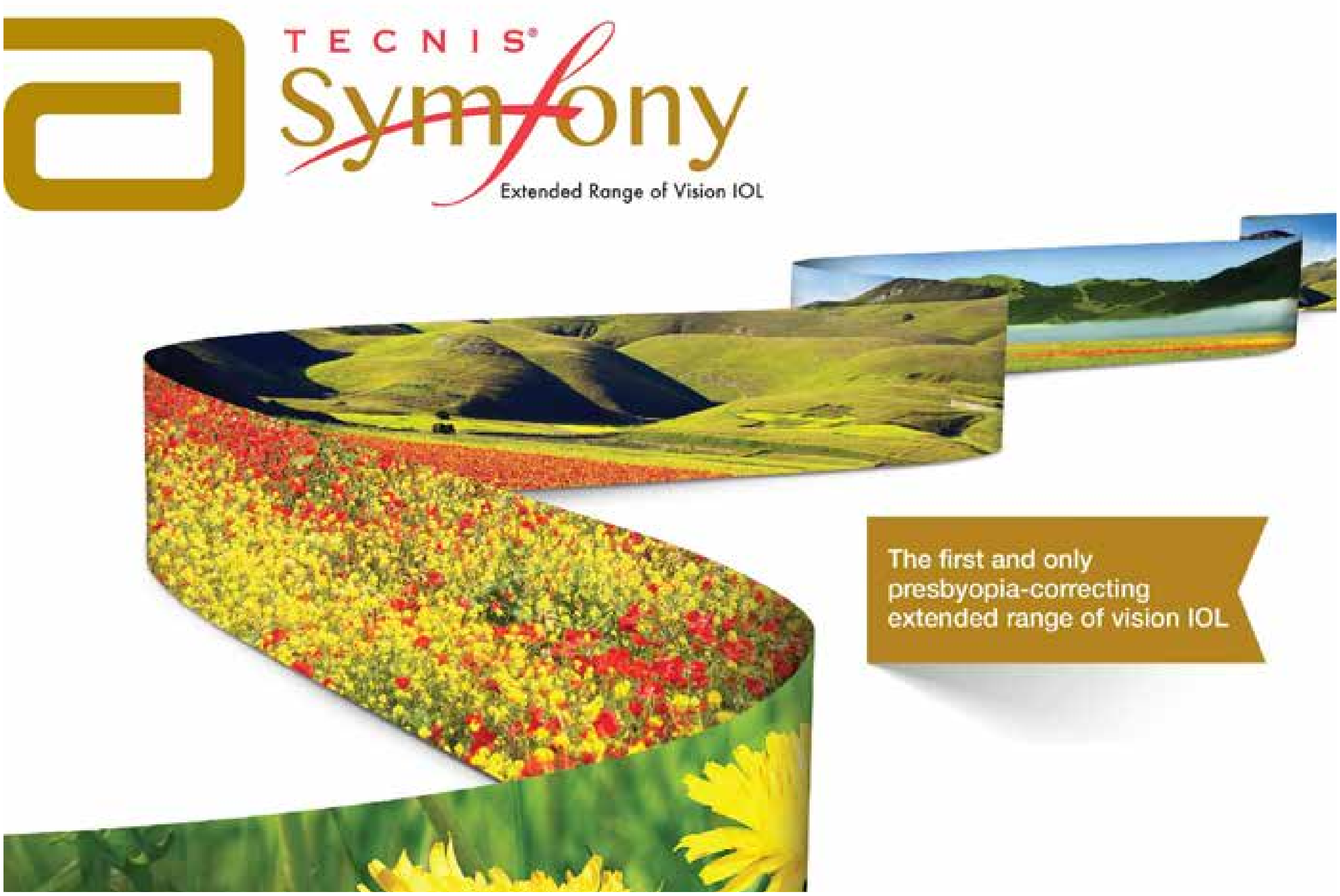
Section Editor Edward Manche, MD
- director of cornea and refractive surgery, Stanford Laser Eye Center, Stanford, California
- professor of ophthalmology, Stanford University School of Medicine, Stanford, California
- edward.manche@stanford.edu

Joshua Burke, DO
- cornea and refractive fellow, Pepose Vision Institute, St. Louis, Missouri
- financial interest: none acknowledged

Jay S. Pepose, MD, PhD
- founder and director, Pepose Vision Institute, St. Louis, Missouri
- professor of clinical ophthalmology and visual sciences, Washington University School of Medicine, St. Louis.
- (636) 728-0111; jpepose@peposevision.com
- financial disclosure: consultant to AcuFocus, Bausch + Lomb, and Johnson & Johnson Vision



USER REPORT REFRACTIVE SURGERY

ANALOG AND DIGITAL METHODS IN COMPARISON

THE ANALOG CORNEAL AXIS MARKING TOMARK

Dr. med. Tobias H. Neuhann
Medical Director of the Ophthalmic
Clinic Am Marienplatz Munich

The renaissance of toric premium lenses due to improved nomograms as well as to improved lens designs, making the achievement of the desired target refraction considerably easier than it was just 20 years ago.

The third equally important improvement is the precise placement of the toric implant on the corneal axis, since only cornea-astigmatism can and should be corrected.

The classic marking method employs three different instruments – a 0° or horizontal axis marker, a protractor and a target axis marker – can lead to a greater chance of error in each of the three individual steps. To minimize these three possible sources of error, the steps were combined in "all-in-one" markers, the first successful example being the Pendulum Marker by Gerten which was developed in cooperation with Geuder. The pendulum determines the horizontal axis while the desired axis has been pre-set with the integrated pivoting protractor. In daily routine this procedure has been quite successful, but for exceptional patients with a specific anatomy, marking was and still is difficult. However, further developments have made a virtue out of necessity: Should marking with the pendulum not, or only hardly, be possible, the marker with the graduation scale can simply be taken from the holder and attached to the tonometer holder of the slit lamp. The procedure for marking at the slit lamp is then similar to measuring pressure, whereby the desired corneal axis has been pre-set. The precise and centered application of the marker on the cornea is simplified by a central high-lumen opening, through which marking can be controlled perfectly via the slit lamp.

In the context of a pilot study at the Ophthalmic Clinic Am Marienplatz Munich in 2011, the axes of the corneal torus were measured against the axes of the toric implants on 50 eyes of 50 patients on the first day post-op. The results were 5° for 8 different toric premium lenses. The precision of the ‚analog' Tomark was thus equivalent to measurement by a topographer. It was concluded that equally good results could be achieved with the manual "analog" cornea marker as with current digital methods. The only significant difference between the analog TOMARK and digital methods is the approx. 100 times higher cost factor for the digital methods. Thus, preference for a digital method cannot be based on superior marking precision but rather on other criteria which should also be discussed.

Toric IOLs: Myth Versus Reality

Debunking some of the conventional wisdom about the implantation of these lenses.

BY IKE K. AHMED, MD, FRCSC

A large percentage of the people presenting for cataract surgery have visually significant astigmatism. A recent analysis of corneal cylinder concluded that more than 36% of the population has at least 1.00 D of astigmatism,[1] and another found that 41% have 0.75 D or more.[2]

For good uncorrected distance vision, we surgeons must achieve a refractive result of less than 0.75 D of astigmatism. In truth, I want to get that amount as close to zero as possible. Studies have shown that astigmatism of as little as 0.50 D can reduce visual acuity by 1 line and that its impact on dynamic, functional visual acuity and low-contrast acuity is even greater.[3] Moreover, ocular surface problems and computer usage—both common in the cataract population—magnify the impact of even minimal residual astigmatism on patients' ocular comfort and performance.[4-6]

For low levels of astigmatic correction, limbal relaxing incisions or laser arcuate incisions at the time of cataract surgery may suffice. In many cases, however, a toric IOL represents the best option for full correction.

Canadian surgeons such as myself have access to a number of toric lenses, including the AcrySof Toric (Alcon Laboratories, Inc.), the STAAR Toric (STAAR Surgical Company), the Rayner T-Flex Toric (Rayner Intraocular Lenses Ltd.), the Zeiss Acri.Lisa Toric, and the Tecnis Toric (Abbott Medical Optics Inc.; Figure 1). This article examines five pieces of conventional wisdom about the implantation of toric IOLs that may not serve us (or our patients) well.

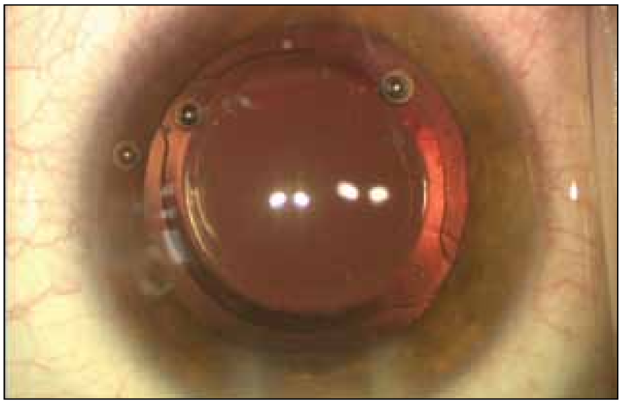


Figure 1. A Tecnis Toric IOL in the eye.

No. 1. NEVER FLIP THE AXIS

Most of us were taught never to flip the axis in cataract surgery. This is generally good advice when we are prescribing spectacles, because patients have difficulty tolerating astigmatism in the axis opposite their accustomed axis. When we are reducing the astigmatism nearly to zero with a toric IOL at the nodal point of the eye, however, this optical principle is less useful.

In a study of 40 eyes with high preoperative keratometric cylinder (> 2.50 D), Hoffmann and colleagues found that overcorrection leading to a flipped axis was well tolerated and typically still provided spectacle independence.[7] Flipping occurred in 42.5% of the eyes with an average residual cylinder of 0.77 D.

In Figure 2, the red arrow points to my IOL choice for a patient. Although model ZCT225 of the Tecnis Toric IOL flips the axis to 110º, it leaves the eye with only 0.02 D of cylinder, which is better than 0.43 D, the best result I can obtain if I keep the axis at 20º. The residual cylinder in this case will be so close to zero that it will be imperceptible to the patient, who will easily tolerate the flipped axis. I always choose the IOL that will provide the smallest absolute astigmatic error, even if that means flipping the axis.

No. 2. GET WITHIN 10° OF THE INTENDED AXIS

With modern patients' expectations for cataract surgery—especially refractive cataract procedures for which they are paying out of pocket—a result within 10° of the intended axis simply is not good enough. Misalignment of a toric IOL significantly decreases its efficacy. The approximately 3.3% loss of effect for every degree of misalignment means that being 10° off will result in an undercorrection of nearly 35%.[8] When implanting a toric IOL, we should be aiming for as pre-cise an alignment of the axis as possible, ideally within 5° of the intended axis.

Such precision demands that we address all potential sources of error in the power and axis calculation. Some of these are under our direct control, including preop-erative biometry measurements, marking, assumptions about the surgically induced astigmatism (SIA), and the IOL's alignment. Other factors such as posterior corneal astigmatism, corneal anatomy, capsular healing, and effective lens position may be more difficult to control.

We can improve our accuracy by using the IOLMaster (Carl Zeiss Meditec, Inc.) or Lenstar LS900

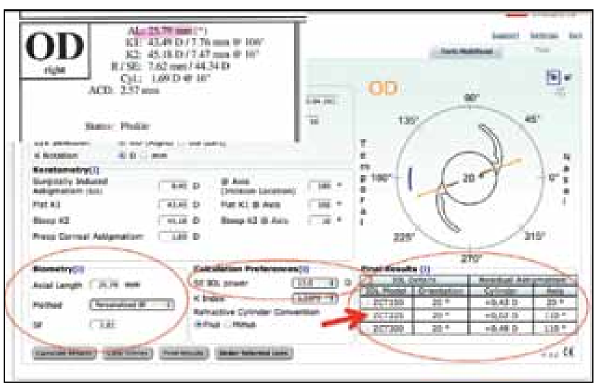


Figure 2. A toric IOL calculator that incorporates the Holladay 1 formula and allows the surgeon to pick from sev-eral IOL power choices, including flipping the axis if desired, is advantageous.

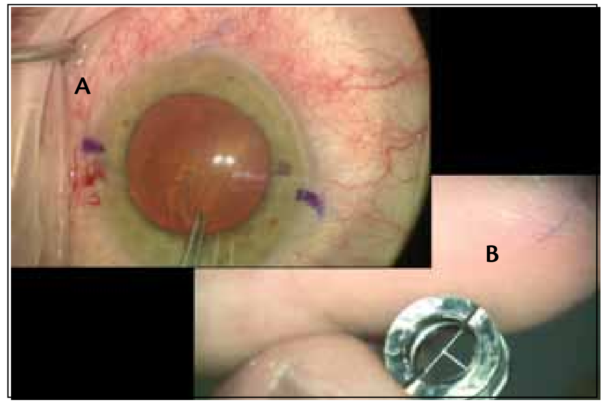


Figure 3. Ink marks on the cornea sometimes provide less benefit in terms of the precise orientation of the axis (A). Dr. Ahmed instead uses an inkless, beveled marking tip to indent the epithelium (B).

(Haag-Streit AG) for keratometry and by verifying the location of the axis and magnitude of astigmatism on topography. Dry eye disease can dramatically affect astigmatism, so whenever the measurements do not agree, I instill artificial tears to improve the repeatability of the measurements. Our surgical technique must be very consistent, particularly the capsulorhexis. Finally, we should choose lenses that offer excellent rotational stability.

No. 3. PREOPERATIVE MARKING IS NOT THAT IMPORTANT

Preoperative marking of the axis to account for cyclotorsion and to facilitate the correct alignment of a toric IOL is essen-tial. Although most of us place marks, many of us often do so haphazardly.

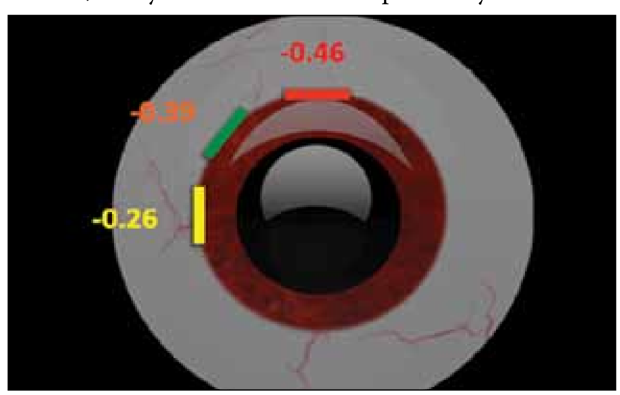


Figure 4. Smaller, more limbal incisions tend to induce less astigmatism. As in this example, a temporal incision pro-duces less SIA than a superior incision. Data adapted from Rho et al.[9]

Numerous tools are available for marking the axis. Some surgeons identify the 3-, 6-, and 9-o'clock posi-tions preoperatively and then mark the steep axis intra-operatively. I prefer to use a one-step system to mark the steep axis preoperatively. Whatever the approach, it is important to make a careful and precise mark. Too thick an ink mark (Figure 3A) can itself have several degrees of variance, so I prefer an inkless, beveled mark-ing tip (Figure 3B) to indent the epithelium.

No. 4. THE STEEP AXIS SHOULD DETERMINE THE INCISIONS' PLACEMENT

A common belief is that adjusting making the entry wound on the steep axis is an effective way of correct-ing astigmatism. An on-axis incision can flatten the cornea by 0.20 to 0.80 D and may be appropriate when we do not intend to use a toric IOL or to make limbal relaxing or arcuate incisions. The downside to using this approach is that it greatly reduces the predictability of each ophthalmologist's SIA.

SIA varies considerably based on the location and type of incision. For example, Rho et al found that superior incisions induced nearly twice as much SIA as temporal ones (Figure 4).[9] Others have shown that larger and more central incisions induce more astigma-tism.[10-12] To achieve the best results, we should each determine our personal SIA. The calculator (www.doctor-hill.com) of Warren Hill, MD, is a very useful tool for this purpose.

I prefer to make incisions that are temporal, limbal, less than 2.4 mm wide, and 2 mm long. It is impossible to know exactly how much astigmatism will be induced in a given eye, but consistency in wound architecture and the incision's placement will certainly increase the predictability of the SIA.

No. 5. TORIC IOL CALCULATORS ARE ALL THE SAME

Every manufacturer of a toric IOL provides a calculator program for choosing which lens to use for a given patient. Some of these calculators incorporate more data than others, so it is important to understand what assumptions the calculators make. Most assume a fixed ratio between the IOL and the corneal plane, based on the average pseudo-phakic human eye (ie, 1.46 D at the IOL plane = 1.00 D at the corneal plane, and 1.00 D at the IOL plane = 0.68 D at the corneal plane). Unfortunately, these assumptions do not always hold true for large or small eyes or those with an unusually deep or shallow anterior chamber.

Perhaps a better approach is to use vergence equations based on the Holladay 1 formula. For example, the Tecnis Toric IOL calculator (Figure 2) incorporates the Holladay 1 formula, with the cylindrical cor-rection based on the calculated effective lens position. It also provides me with several IOL power choices and the anticipated residual cylinder for each so that I can decide whether I wish to flip the axis to achieve the lowest residual cylinder.

CONCLUSION

As we strive to improve surgical outcomes for astigmatic patients, it is important that we critically evaluate the conventional wisdom on toric IOLs. Much of it does not hold true for the latest generation of lenses and today's expectations.

Ike K. Ahmed, MD, FRCSC, is an assistant professor and direc-tor of the Glaucoma and Advanced Anterior Surgical Fellowship at the University of Toronto. Dr. Ahmed is also a clinical assis-tant professor at the University of Utah in Salt Lake City. He is a consultant to and has received research support and/or speak-ers' fees from Abbott Medical Optics Inc., Alcon Laboratories, Inc., and Carl Zeiss Meditec, Inc. Dr. Ahmed may be reached at (905) 820-3937 ext. 161; ike.ahmed@utoronto.ca.

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Upcomming Events

10-13 September 2017
European Neuro-Ophthal-mological Society 2017 (EUNOS 2017)
Budapest

27-30 September 2017
European Association for Vision and Eye Research Annual Meeting 2017 (EVER 2017)
Nice

6 October 2017
International Society of Presbyopia 2017 (ISOP 2017)
Lisbon

7-11 October 2017
European Society Of Cata-ract And Refractive Surgeons 35th Congress 2017 (ESCRS 2017)
Lisbon

2nd Floor, No.1698, Shariati Ave.,Tehran, Iran Postal Code: 1914744755
Tel: +9821-22645870-71 Fax: +9821-22645872
Email: info@amicoyasnapars.com
Website: www.amicoyasnapars.com