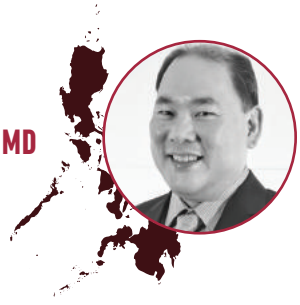
GLOBAL PERSPECTIVES

NEW TECHNOLOGIES I'M USING IN 2021

Surgeons from around the world share their latest practice additions.

BY ROBERT EDWARD ANG, MD; DETLEV R.H. BREYER, MD; ALINE S. MORIYAMA, MD; ROBERTO PINEDA, MD; PATRICK VERSACE, MD; AND DAGNY ZHU, MD

GREATER CONFIDENCE WITH TRIFOCAL TORIC IOLS



BY ROBERT EDWARD ANG, MD

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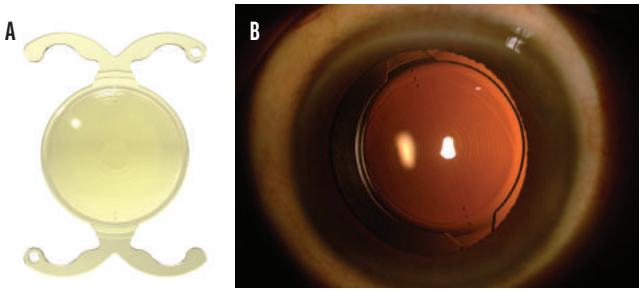
Trifocal IOLs have become my primary choice for presbyopia correction during cataract surgery. The rate of spectacle independence is very high, and surprisingly, complaints of glare and halos and problems with contrast sensitivity are minimal. The key to achieving a successful outcome and high patient satisfaction is minimizing residual refractive error after surgery.

The latest generation of IOL formulas has increased the accuracy with which spherical refractive error is corrected. Correcting astigmatism is trickier because of patients' varying degrees of preexisting corneal astigmatism and because the effects of the incision and corneal wound healing can be unpredictable.

Five years ago, I considered a toric lens if the eye had at least 1.00 D of corneal cylinder. Two years ago, I began using the Barrett Toric Calculator for eyes with at least 0.50 D of corneal cylinder to see if it suggests a toric IOL—a recommendation I follow most of the time. A study published in 2019 convinced me that 0.75 D of astigmatism or more affects patients' vision with trifocal IOLs.[1] I therefore find myself implanting more trifocal toric IOLs than trifocal nontoric IOLs (at a rate of approximately 70% vs 30%, respectively).

DESIGN PREFERENCES

Of the available lenses, my usual preference is the FineVision Toric IOL (model POD FT, PhysIOL). The main reason is the ease of dialing the lens to the intended axis inside the capsular bag (Figure 1). Because of its double C-loop haptic design, this lens fits snugly into the equator and does not spin uncontrollably inside the capsular bag, even in an eye with a long axial length or large capsular bag. After removing the OVD from behind the lens, I can gently and easily rotate the IOL clockwise or counterclockwise.



Courtesy of Robert Edward Ang, MD

Figure 1. The design of the FineVision Trifocal Toric IOL (A). A lens in situ (B).

I can get irritated with C-loop toric IOLs because, if I mistakenly rotate the lens beyond the desired axis, I have to rotate the IOL around 180° to reposition it. Sometimes, I have to reinflate the capsular bag with an OVD to reposition the lens without stretching the bag or the zonules.

STUDY RESULTS

My colleagues and I are currently performing a prospective study to evaluate outcomes with the FineVision Toric IOL in eyes that have at least 1.00 D of corneal astigmatism. Of the 118 eyes enrolled, 98 have reached the 6-month follow-up visit. Mean preoperative corneal cylinder was 1.36 D, and the highest amount of cylinder was 4.56 D. Six months after surgery, mean sphere was 0.17 ±0.39 D, mean cylinder was -0.51 ±0.41 D, and the mean manifest refractive spherical equivalent was -0.08 ±0.31 D. Mean monocular uncorrected distance visual acuity was 0.06 ±0.11 logMAR, mean uncorrected intermediate visual acuity was 0.08 ±0.13 logMAR, and mean uncorrected near visual acuity was 0.10 to 0.12 logMAR. An independent reading center graded mean IOL rotation at 1.16 ±1.17° from hour 1 to day 1 and 1.66 ±2.69° from hour 1 to month 6.

Ease-of-use, my experience, and our study results thus far give me confidence in using this trifocal toric IOL more often in clinical practice.

1. Ang RE. Comparison of tolerance to induced astigmatism in pseudophakic eyes implanted with small aperture, trifocal, or monofocal intraocular lenses. *Clin Ophthalmol*. 2019;13:905-911.

A SURGEON-CHANGING EXPERIENCE: THE DEVELOPMENT OF THE PRESBYEDOF FORMULA

In 2019, I was invited by the International Society of Presbyopia to lecture on decision-making in presbyopia correction. When preparing my talk, I thought about Albert Einstein, who famously said that one should isolate the problem before finding a solution, and about Warren Buffet, who has urged presenters to imagine an auditorium filled not with peers but with lawyers, judges, and journalists. I crafted my talk with these principles in mind and focused on presenting research and scientific evidence.

ISOLATING THE PROBLEM

▶ **Problem No. 1.** Considering the complication rate, depth of treatment, potential for reversibility, and retreatment options for presbyopia-correcting procedures, I believe the only logical order is to consider laser vision correction (LVC) first, then phakic IOL implantation, and finally refractive lens exchange. LVC is generally safer than wearing contact lenses,[1] whereas intraocular surgery carries a greater risk for complications and has worse retreatment options.

▶ **Problem No. 2.** Photopic phenomena are the most common causes of patient dissatisfaction and IOL explantation. I have found that the best strategy by which to overcome this optical photopic dilemma in the correction of presbyopia is to split the near addition between both eyes and extend depth of focus by adding negative or positive spherical aberration. This can be achieved with PresbyMax (Schwind eye-tech-solutions) and Presbyond LVC (Carl Zeiss Meditec) procedures, which convert monovision into more tolerable blended vision.

PROOF OF (A NEW) CONCEPT

Blended vision is my preferred presbyopia-correcting strategy for patients. When I began developing presbyopia, however, the question became whether I was ready to put my money where my mouth was.

In 2020, I decided to undergo Presbyond. I asked Dan Z. Reinstein, MD, MA(Cantab), FRCSC, DABO, FRCOphth, FEBO, to perform the procedure, but the start of the COVID-19, pandemic forced us to postpone surgery. This delay gave me time to consider other options.

Around that time, I began using the Amaris laser (Schwind eye-tech-solutions). I modified the original PresbyMax formula to a more negative near target refraction (ie, from -0.89 to -1.50 D) and increased the induced negative spherical aberration (ie, from 1.25 to 1.75 D). I found that these modifications helped my patients to achieve better reading vision. As a result, I decided that the best procedure for me, at 53 years of age, was Smart Surface transepithelial PRK with this new PresbyEDOF Formula (Figure 2).

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RESULTS

Three days after my surgery, I was carrying my usual surgical case load (20–30 cases per day) and seeing 30 patients in my private practice. My near vision was not perfect, but it was good enough to allow me to perform my daily tasks without a problem. When looking at a distant target, the vision in my near eye was foggy. Nevertheless, I was enthusiastic about my freedom from glasses and my improved quality of life.

At the time of this writing, 9 months after surgery, I do not use glasses—although I admit that reading small print is possible only in very good lighting conditions. Luckily, I rarely read small print.

Here is a fun fact: Covering my far-dominant eye, I experience 6/10 photopic phenomena, but as soon as I uncover that eye, they vanish. Neural adaptation is impressive.

If I had to do it all over again, I would surely elect the same procedure. Interestingly, since undergoing transepithelial PRK, I find myself

Figures 2 and 3 courtesy of Detlev R.H. Breyer, MD

Figure 2. Dr. Breyer undergoes presbyopia correction with the Amaris laser.

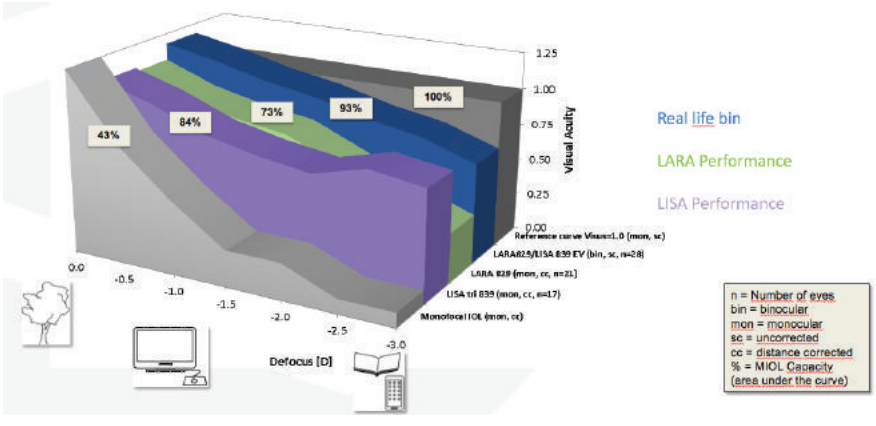

Figure 3. The Trifo + Vision strategy.

recommending the procedure to more of my patients. I have also recommended it to friends.

NEW IN 2021

This year, I find myself using a similar strategy with IOLs. I have been implanting the diffractive AT LARA IOL (Carl Zeiss Meditec) in the far-dominant eye and the trifocal AT LISA IOL (Carl Zeiss Meditec) in the near-dominant eye. I call this strategy Trifo + Vision (Figure 3) because it also provides the best binocular defocus capacity and homogenous vision of any trifocal IOL I have measured.[2]

1. Masters J, Kocak M, Waite A. Risk for microbial keratitis: comparative metaanalysis of contact lens wearers and post-laser in situ keratomileusis patients. *J Cataract Refract Surg*. 2017;43:67-73.
2. Tarib I, Diakonis VF, Breyer D, Höhn F, Hahn U, Kretz FTA. Outcomes of combining a trifocal and a low-addition bifocal intraocular lens in patients seeking spectacle independence at all distances. *J Cataract Refract Surg*. 2019;45(5):620-629.

PROGRESSIVE-THICKNESS ICRSS FOR KERATOCONUS TREATMENT

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Visual disturbances in patients with keratoconus often can be managed with spectacles and rigid contact lenses.[1] Visual rehabilitation, however, in patients with unsatisfactory BCVA who are intolerant of contact lenses can be challenging.[2] I am excited this year to enhance surgical outcomes with new intrastromal corneal ring segments (ICRSs) with a thickness that becomes progressively greater.

BACKGROUND

ICRSs are PMMA implants that promote localized corneal flattening adjacent to where they are implanted.[3] Greater flattening effect is seen in thicker implants with smaller apical diameters. ICRSs can help to regularize corneal shape, reduce the amount of astigmatism in the eye, and improve visual acuity.[3,4] They can be removed if necessary, and surgery is relatively straightforward, especially when a femtosecond laser is used to create the implantation tunnel.[5]

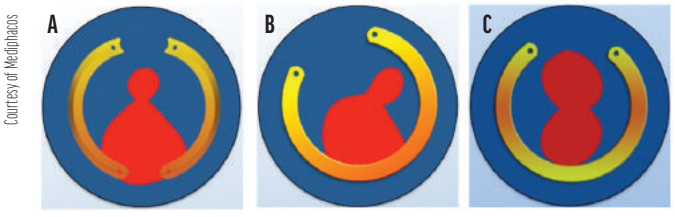
In my experience, ICRSs are appropriate for patients with keratoconus who meet the following criteria:

- Unsatisfactory BCVA and contact lens intolerance;
- No visually significant corneal opacity;
- A desire to avoid or postpone corneal transplantation or live in regions where access to corneal tissue for transplantation is poor; and
- Realistic expectations and an understanding of ICRS surgery, its limitations, and the predictability of its outcomes.

In Brazil, where I practice, the most widely used ICRSs are the Keraring (Mediphacos) and the Ferrara Ring (Ferrara Ophthalmics). Traditionally, these devices have triangular arcs with angles between 90º and 330º and a thickness between 150 and 350 µm. ICRSs with a smaller angle are generally used to treat astigmatism by either implanting a single segment or a combination of two segments. ICRSs with 320º or greater arc usually generate maximal central applanation with minimal astigmatism alterations. The best indications for an ICRS of this arc angle is central keratoconus with low astigmatism.

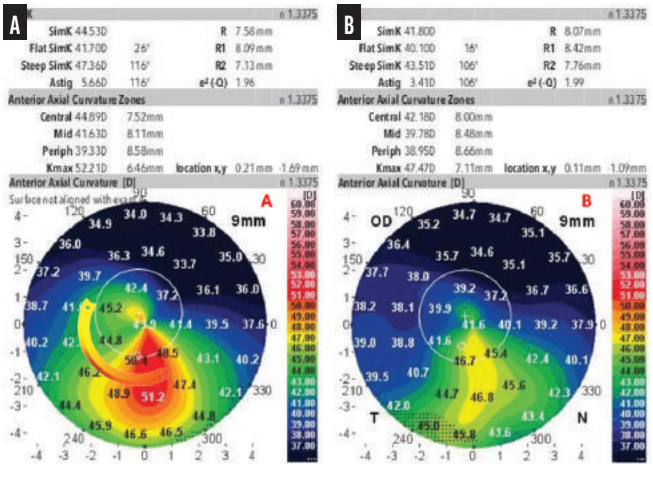
Over the past few years, newer ICRS models have come to market with variable thickness along the length of the arc.[6,7] Most patients with keratoconus have asymmetric astigmatism with an inferior corneal steepening. As the amount of corneal flattening is related to ICRS thickness, progressive-thickness ICRSs are preferred to treat astigmatism with significant asymmetry.

I have been using 160º Keraring arcs for a few years (Figure 4A), and my results thus far are encouraging. The thickness of the



Courtesy of Mediphacos

Figure 4. Keraring variable-thickness ICRS models have a 100-µm difference in thickness along the arc. In this diagram, the thinnest part of the ICRS is represented in yellow and the thicker part in orange. Combination of ICRSs with a 160º arc whose thickness varies along the length of the arc (A). An ICRS with a 330º arc has thinner tips and a thicker central area (B). An ICRS with a 320º arc is thinner centrally and thicker laterally (C).



Courtesy of Aline S. Moriyama, MD

Figure 5. A preoperative anterior axial curvature map shows irregularity and asymmetry in a patient who is intolerant of contact lenses (A). The thickness of the selected ICRS with a 160º arc increases from 150 to 250 µm. The postoperative examination showed a reduction in astigmatism and keratometry (B). BCVA improved from 20/80 with a manifest refraction of -3.50 -4.00 x 25º to 20/30 with a manifest refraction of -0.75 -2.50 x 10º.