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Cataract & Refractive Surgery TODAY

EUROPE

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CONTENTS

Cataract Surgery: The Complete ZEISS Portfolio

There are many benefits associated with using a suite of products from the same manufacturer.

BY NORBERT KÖRBER, MD, FEBO

Today, the success of cataract surgery is largely dependent on managing patient expectations. Because many components of the procedure have the potential to affect postoperative outcomes and, in return, patient satisfaction, we must carefully select the technologies, devices, and IOLs that we routinely use. When these products are available from the same manufacturer, it not only simplifies our clinical routine but also enhances our patients' confidence in the procedures we offer.

For this reason, we dedicate a large part—nearly 90%—of our inventory to products manufactured by ZEISS, including the ones described at length below.

ELEMENTS OF THE ZEISS CATARACT SURGERY PORTFOLIO

IOLMaster 500. Our patients demand the highest precision and best postoperative results and, therefore, selecting the most appropriate IOL is more important than ever before. For many years, surgeons have relied on the IOLMaster for accurate biometry, and today the IOLMaster 500 is our benchmark for precise biometry. This product is the first component of cataract surgery that can affect patient satisfaction and ensure excellent postoperative outcomes.

I like the IOLMaster 500 because its advanced design allows me to analyze more data with fewer clicks, including measurement of axial length and keratometry without the need for manual interaction. The IOLMaster 500 also has a comprehensive set of IOL power calculation formulas, including the fourth-generation formulas of Haigis and Holladay 2. I also like that the acquisition time with the IOLMaster 500 is faster than it was with previous models, allowing me to capture measurements in a shorter time. This aids in creating a positive patient experience and reducing preoperative assessment times.

CALLISTO eye. With CALLISTO eye, I can perform precise computer-assisted cataract surgery and implant premium IOLs. Therefore, this product is the second component of successful cataract surgery worth mentioning.

An important feature of the high-definition documentation system of the CALLISTO eye is that it has several assistance functions that are projected directly into the surgical field of the operating microscope (OPMI Lumera 700; Carl Zeiss Meditec). These functions include the Z ALIGN toric IOL assistant, an incision/limbal relaxing

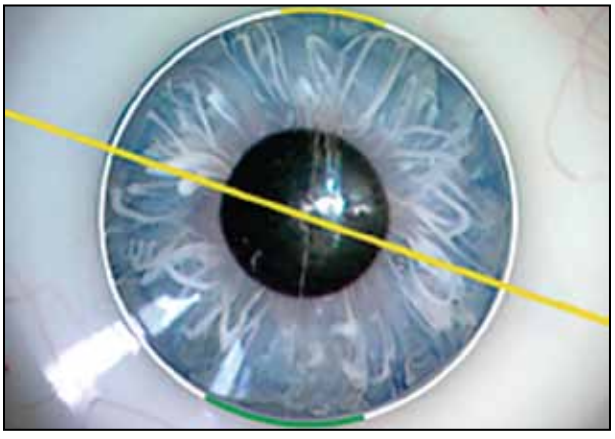

Figure 1. The incision/LRI assistant superimposes the exact position and size of the incision to ensure precise cataract surgery.

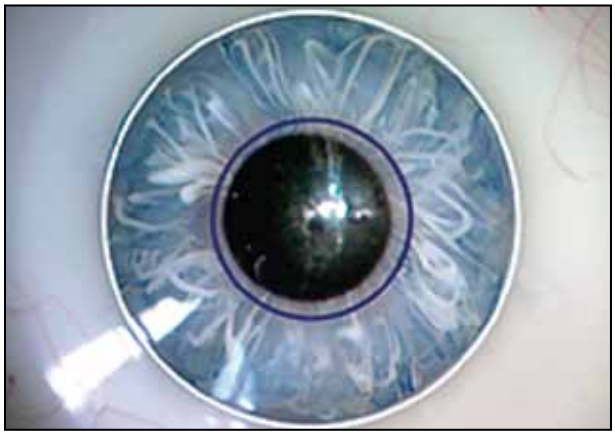

Figure 2. The rhexis assistant superimposes the exact shape and size of the capsulorrhexis and aligns the IOL along the optical axis of the patient's eye.

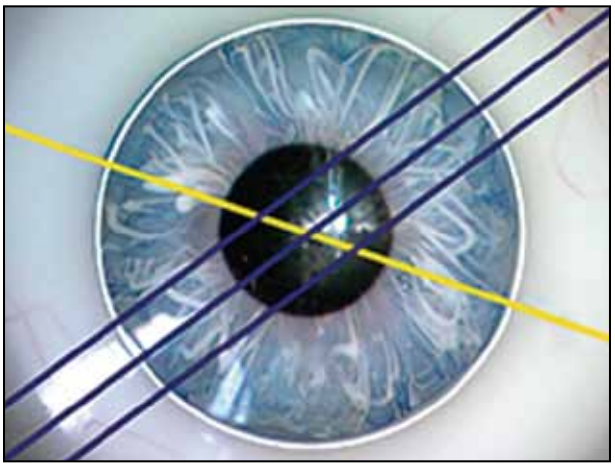

Figure 3. The Z ALIGN toric assistant ensures precise toric IOL alignment without corneal markers.

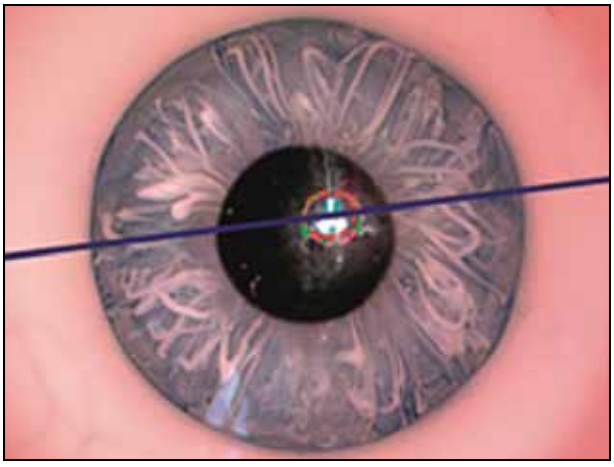

Figure 4. K TRACK visualizes corneal curvature in combination with a keratoscope.

incision assistant, a capsulorrhexis assistant, and K TRACK for visualization of corneal curvature (Figures 1 through 4).

The latest version of CALLISTO eye software allows surgeons to complete markerless toric IOL alignment. We have limited experience using this version; however, from what we have already experienced, lens alignment is easier, astigmatic corrections are more precise, and surgery is completed accurately and quickly. The software also allows us to clearly visualize the capsulorrhexis for alignment.

VISALIS S500. Featuring coaxial microincision cataract surgery (MICS) capabilities, Advanced Power Modulation (APM), and dual-pump (venturi and peristaltic) technology, this phacoemulsification system adapts to my surgical style, making it easier for me to perform precise and effective cataract surgery. The VISALIS S500 is stable, easy to use, and the learning curve is short. A vitrectomy upgrade is also available.

OPMI Lumera 700. The stereocoaxial illumination of this microscope allows me to see the smallest details of the eye. The OPMI Lumera 700 also includes Integrated Data Injection System (IDIS) patterns, allowing me to properly align toric IOLs, incisions, and capsulorrhexes with ease.

ZEISS MICS IOLs. Today, there are many MICS IOLs to choose from, and Carl Zeiss Meditec offers a complete range of preloaded MICS IOLs, including monofocal toric, multifocal toric, and trifocal IOLs—all with an extensive diopter range. I have excellent long-term experience with many of the ZEISS IOLs, and many studies have shown that these lenses have exceptional edge quality compared with other modern lenses.[1]

The latest MICS lens offerings from ZEISS are the trifocal AT LISA tri 839MP and the AT LISA tri toric 939MP (Figure 5), which achieve better intermediate visual performance than multifocal IOLs and high resolution under all lighting conditions. It is also pupil independent.

BLUEMIXS 180. This injector is designed specifically for MICS procedures and is another way that I can enhance my surgical safety and results. The BLUEMIXS 180 allows me to inject MICS IOLs, including the AT TORBI, AT

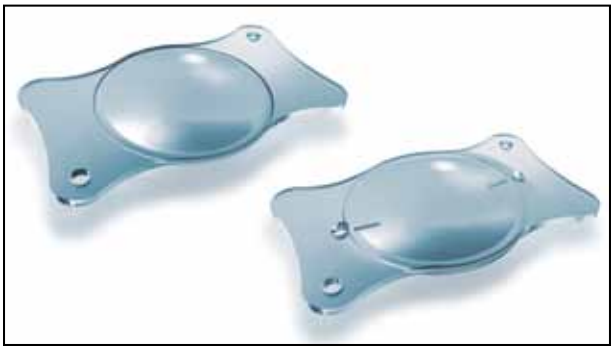

Figure 5. The trifocal AT LISA tri 839MP and the new bitoric trifocal AT LISA tri toric 939MP.

LISA, AT LISA toric, AT LISA tri, and the AT LISA tri toric through an incision size as small as 1.8 mm.

OVDs. Most of us rely on ophthalmic viscosurgical devices (OVDs) to protect the corneal endothelium during cataract surgery. ZEISS produces several OVDs for cataract surgery, including VISTHESIA, TWINVISC, and Z-HYALIN plus, to meet the needs for standard and premium surgeries alike.

In routine cases I prefer Z-HYALIN plus, which is a high-viscosity OVD, but in patients with impaired endothelial function, I use TWINVISC, which is a combination of a dispersive and cohesive OVD in one vial.

FORUM eye care data management. The major benefit of this system is that it streamlines surgical workflow, providing surgeons with paperless data transfer and access to patient examinations, both locally and remotely. Using preconfigured displays and combined reports, FORUM displays clinically relevant findings immediately upon acquisition. It can also facilitate surgical assessments of patient data with case-specific clinical applications.

Integrating this software is the next step for our clinic in the coming months. I am confident that using FORUM will allow me and my colleagues to not only streamline our clinical processes but also focus our assessments, master our data, and reduce the time we spend on diagnosis, meaning more time with our patients.

THE ADVANTAGES OF MICS AND VISALIS

The advantages of MICS are plentiful. For starters, an incision of 2.0 mm—which is 1.8 mm deep into the cornea before entering the eye—is more stable than an incision of 3.0 mm—which is also 1.8 mm deep into the cornea. As a result, the astigmatic change is less with MICS than it is with a larger incision. Additionally, MICS allows a surgeon to plan corrections more accurately, especially in toric patients, because the wound is more stable, as is the anterior chamber during phacoemulsification.

Figure 1.
The VISALIS S500.

Luckily, ZEISS has an array of available products for MICS, including many MICS lenses and the BLUEMIXS 180 injector, which can fit through an incision as small as 1.8 mm. However, even when performing 2.8-mm surgery we use these products. ZEISS also has various phaco tip sizes that can be used to facilitate coaxial surgery through incision sizes ranging from 1.8 to 2.8 mm.

The new APM (Advanced Power Modulation) provided by the VISALIS S500 (Carl Zeiss Meditec; Figure 1), allows surgeons to better control the energy entering the nucleus. In addition to reducing the amount of phaco energy needed to break up the nucleus, the APM also helps to balance fluidics, increase followability of the nucleus, and maintain anterior chamber stability and cutting efficiency.

TABLE 1. PHACO SETTINGS USED IN THE NORMAL PHACO MODE AND APM MODE

Settings	Normal Phaco Mode	APM Mode
Equipment U/S-1		
IVP (cm^2 H2O / mm Hg)	90	90
Vacuum / Mode / Pump	350 LV	350 LV
Power / Mode	35-40 L	35-40 L
Emission Pulse	40 Hz	APM
Equipment I/A1		
IVP (cm^2 H2O/mm Hg)	85-95	85-95
Vacuum / Mode / Pump	350 LV	350 LV
Abbreviations: U/S, ultrasound; IVP, intraventricular pole; L, linear; LV, linear venturi.		

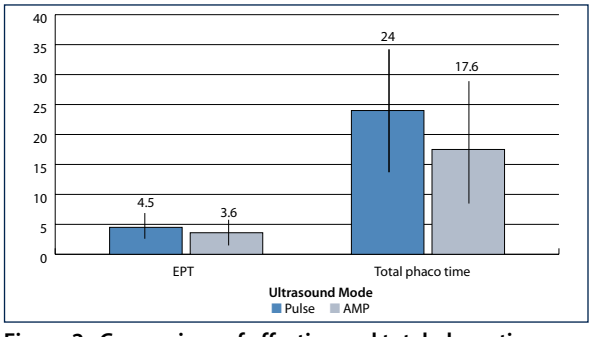

Figure 2. Comparison of effective and total phaco times with normal phaco and APM modes.

It is important to mention that, in a study of 70 eyes undergoing sutureless cataract surgery with a coaxial phaco technique and an incision size of 2.4 or 2.8 mm, we were able to reduce both effective phaco time (EPT) and total phaco time (TPT) by using the new APM mode of the VISALIS S500 (Figure 2).

We concluded that the APM provided a 20% reduction in EPT, and even with very hard cataracts there were clear corneas and no Descemet reactions the day after surgery. Additionally, a moderate but statistically significant correlation was found between EPT and cataract density in the APM group (normal phaco, r=0.68, *P*=0.01). These results are especially important for MICS, as shorter effective phaco time equates to shorter procedural time, which can enhance patient satisfaction.

CONCLUSION

All of the components mentioned above work together to ensure that my patients achieve the best outcomes.

Although we own a variety of products from different manufacturers, we favor the use of ZEISS products, as not only is it practical but using a complete portfolio has helped us to maximize and improve our outcomes. ■

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IOLMaster 500: The Gold Standard

Good refractive outcomes start with precise IOL calculation.

BY SABONG SRIVANNABOON, MD

For the past 10 years, the IOLMaster (Carl Zeiss Meditec) has provided surgeons a precise approach to measuring the length and surface curvature of the eye—two of the most crucial components for planning cataract surgery. Using partial coherence interferometry, this device calculates the distance from the corneal vertex to the retinal pigment epithelium with five times more accuracy than A-scan ultrasonography using a standard transducer (10 MHz).[1,2] Not only is the IOLMaster widely used today, but it has come to be known as the gold standard, and its axial length measurement is consistently accurate to within ±0.02 mm. In total, more than 100 million IOL power calculations have been successfully performed worldwide with the IOLMaster.

BACKGROUND

By now, most if not all surgeons know that the IOLMaster is a noncontact optical biometer designed to measure axial length, anterior chamber depth, and white-to-white and to perform keratometry. These functions of the IOLMaster comprise all the necessary components for modern IOL power calculations. IOLMaster's software is also designed to allow personalization of lens constants by inputting personal postoperative data.

The IOLMaster is the first of its kind for optical biometry. Not long after the concept of partial coherence interferometry was introduced to the ophthalmic community,[3] Wolfgang Haigis, MS, PhD, published a comparative study of immersion ultrasound biometry and partial coherence interferometry for IOL power calculations.[4] This was the first published study on the IOLMaster, but since this time many publications have followed showing the repeatability, reproducibility, and accuracy of the IOLMaster. Additionally, in the 2012 survey of ASCRS members conducted by David Leaming, MD, 72% of respondents said that they used the IOLMaster as their preferred IOL power calculation method.[5]

The true testament to the IOLMaster being the gold standard in biometry is that most of today's newcomer optical biometers are validated against the IOLMaster. The most recent refinements of this technology are featured in the IOLMaster 500 (Figure 1) and include the integration of more than 200 optimized lens constants and unique telecentric keratometry for precise refractive outcomes,[6] up to a 20% higher success ratio for measurements in dense cataracts compared with other technologies,[7] the ability to perform markerless toric IOL alignment, and a universal ultrasound interface that connects to the ultrasound A-scan device for better workflow and improved quality. This device, exclusively, also includes the Holladay 2 IOL power calculation formula.[8]

Figure 1. The IOLMaster 500 integrates more than 200 optimized lens constants, has distance-independent telemetric keratometry, and can be used to perform markerless toric IOL alignment.

PERSONAL USE

We started using the IOLMaster (version 4) in 2005, and we had planned to validate the results with ultrasound biometry until we were confident in the accuracy of the new technology. To our surprise, it did not take long, and our technicians were quickly impressed with the ease of use. Even in our earliest experiences, the time required to complete a single measurement with the IOLMaster was shorter than with conventional ultrasound biometry (2.77 vs 9.63 minutes).[9] Now that we have the latest model, the IOLMaster 500, the automatic functions have further improved the speed of measurements to approximately 1 minute. This is important for a high-volume clinic like our government hospital that serves between 200 and 300 patients per day.

Going back to ease of use, the IOLMaster's traffic light guidance software helps the inexperienced technician to align the measurement properly and achieve the best outcome. As the optimum measurement position is dialed in, the traffic light changes from red to yellow to green, with the green light signifying the optimum measurement setting. Once reached, three consecutive measurements are taken by depressing the knob on the IOLMaster's joystick. If the optimum setting wavers, the automatic measurement is interrupted until it is reinstated.

CASE IN POINT

Good refractive outcomes start with a precise IOL power calculation. Some cases are more challenging than others to achieve the necessary measurements to calculate IOL power. Below are examples of two interesting scenarios in which the IOLMaster 500 can be crucial in selecting the lens power.

Scenario No. 1. In eyes with posterior dislocation of the crystalline lens, the lens will sink in front of the retina when the patient lies down. This makes immersion ultrasound biometry nearly impossible, because the ultrasound will reflect back from the crystalline lens. In these cases, inexperienced technicians are likely to measure the axial length too short. But, with the IOLMaster, the patient sits down during measurements. Therefore, the lens will fall inferiorly and will not block the macula.

Scenario No 2. In eyes with an epiretinal membrane, the IOLMaster will show a retinal spike with a double peak. This allows our technicians to easily detect the membrane, even with an undilated pupil.

EXCELLENT AGREEMENT

The IOLMaster 500 is the only optical biometer with distance-independent telecentric keratometry. In a recent study by Bullimore et al,[10] corneal astigmatism measurements taken with the IOLMaster 500 were compared with those taken using one- and two-position manual keratometry in order to establish the repeatability and validity of the IOLMaster 500 in patients with astigmatism.

In 72.1% and 77.1% of eyes, respectively, the IOLMaster 500 measured the axis of astigmatism within 5° of that measured by the one- and two-position manual keratometers. Additionally, the cylindrical power and mean corneal power were within ±0.18 and ±0.33 D, respectively, of those measured by the one-position device. Bullimore and colleagues also determined that the mean difference in cylindrical power was close to 0.00 D and the difference in mean corneal power between the devices was 0.34 D; however, the IOLMaster 500 had better repeatability.

These results indicate that the IOLMaster 500 not only has excellent agreement with manual keratometry in terms of mean corneal power, cylindrical power, and axis of astigmatism, but it also has superior precision. Therefore, Bullimore and colleagues concluded that the IOLMaster 500 is an excellent choice for IOL power calculation of toric lenses, as it is both repeatable (intra-observer) and reproducible (inter-observer). This will reduce the inconsistency between the measurements taken by different time or technicians.

CONCLUSION

Over the years, the IOLMaster has revolutionized how we calculate IOL power. With the click of a button, we can accurately measure the axial length and surface curvature of the eye. The latest design of the IOLMaster 500 also has many features that will help us to determine the most appropriate lens power for toric IOLs, as proven by Bullimore in his recent study. ■

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Markerless Toric IOL Alignment

Eliminating steps saves time and allows a more efficient surgical procedure.

BY OLIVER FINDL, MD, MBA

In a department like ours, where our surgeons perform about 6,000 cataract surgeries annually, clinical workflow—from preoperative diagnosis to postoperative follow-up and care—is especially important. We have evaluated many technologies over the years that offer us the opportunity not only to be more efficient but provide our patients with better outcomes.

One of the more recent technologies we have evaluated is a markerless system for toric IOL alignment (Figure 1). Seeing as how 5% of the lenses we implant are toric IOLs, trading the pre- and intraoperative manual marking steps for a markerless approach can translate into considerable time savings in the operating room. Additionally, it can offer our patients more reproducible astigmatism correction.

Trading the pre- and intraoperative manual marking steps for a markerless approach can translate into considerable time savings in the operating room and offer patients more reproducible astigmatism correction.

FROM BIOMETRY TO INTRAOPERATIVE ALIGNMENT

A conventional approach to toric IOL alignment includes marking the eye before surgery, with the patient in an upright position. This can be done either at the slit lamp or with a special marking device. Intraoperatively, the surgeon uses a marking device to identify and mark the target meridian. Thereafter, the marks on the IOL are aligned to the marks on the target meridian, and the IOL is implanted in this position.

In addition to the time it takes to perform a conventional alignment approach, what can happen from time to time is that we forget to mark the eye preoperatively. With the patient already in the operating

Figure 1. ZEISS Cataract Suite markerless includes the IOLMaster 500 (left), CALLISTO eye (center), and the OPMI Lumera 700 (right), which are all connected by the data management system ZEISS FORUM.

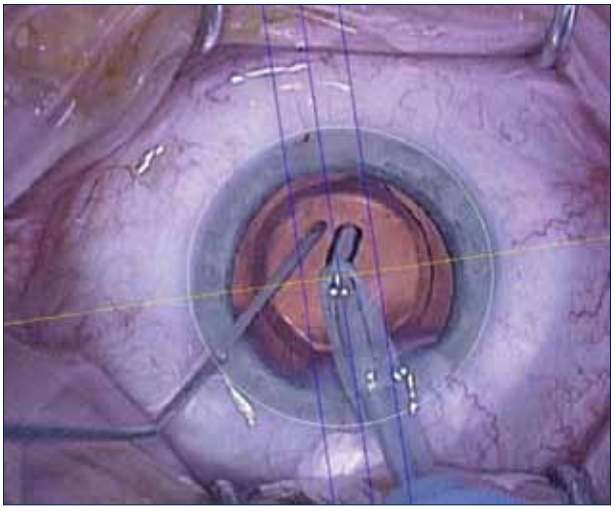

Figure 2. Overlay as seen by the surgeon through the eyepiece of the OPMI Lumera 700 operating microscope. The lines depict the target meridian (blue) and the horizontal meridian (yellow).

room, and already draped, we suddenly realize that he or she has not been marked. With a markerless alignment system, we no longer lose the time it would take to undrape and mark the patient in these cases. In fact, we no longer need to mark patients at all. Rather, a photograph of the limbal conjunctival vessels, taken during biometry, is used intraoperatively to guide toric IOL alignment. For surgeons who implant a lot of toric lenses, this approach makes life easier on even the busiest surgical days.

There are three main components to the **ZEISS Cataract Suite** markerless: the IOLMaster 500, CALLISTO eye, and the OPMI Lumera operating microscope, all connected by the data management system ZEISS FORUM for seamless data transfer and storage. The first step to optimized toric IOL alignment is precise biometry. Using the new Option Reference Image built into the IOLMaster 500 and with the patient in a seated position, a photograph is taken of the limbal conjunctival vessels at the same time that keratometry is done during biometry. That image is then imported to CALLISTO eye, a computer-assisted cataract surgery system used to create overlays of the target axis for the OPMI Lumera surgical microscope. Once in the operating room, the surgeon can rely on the CALLISTO eye to recognize, match, and track the vessels from the preoperative photograph in real time. It displays the target axis as an overlay seen by the surgeon inside the eyepiece of the OPMI Lumera operating microscope (Figure 2), aiding in precise toric IOL aligment without the need for manual corneal marking or to look at an external monitor with an overlay.

With the **ZEISS Cataract Suite** markerless system, a photograph of the limbal conjunctival vessels, taken during biometry, is used intraoperatively to guide toric IOL alignment.

OTHER BENEFITS

Although the key function of the **ZEISS Cataract Suite** markerless system is to allow the surgeon to identify the exact meridian for toric IOL alignment and finely tune the lens' position at the end of surgery, this technology is useful for other purposes as well.

For starters, the CALLISTO eye assistance functions can also be used to help create a perfectly sized and placed capsulorrhexis. This can be especially helpful for eyes that may benefit from a slightly decentered capsulorrhexis, such as short, astigmatic eyes with a large angle kappa (ie, the line of sight traveling through the pupil and pupillary axis).

The CALLISTO eye tracks eye movements, so the overlay ring will always move with the eye. Surgeons can also use another assistance function to mark their incisions, such as the paracentesis and limbal relaxing incisions.

CONCLUSION

Toric IOL alignment has come a long way, and the precision offered with the **ZEISS Cataract Suite** markerless system is impressive. Today, intraoperative matching precision is within ±1° of the mean, and there is not much more that a surgeon can desire. ■

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Bitoric MICS IOLs

Precise tools in our quest for emmetropia in patients with astigmatism.

BY DETLEV R.H. BREYER, MD

Emmetropia after cataract surgery is an achievable expectation for myopic and hyperopic patients, mainly due to today's advanced lens technologies, improved IOL power calculation formulas, and a wide range of lens powers. However, addressing preexisting astigmatism can be a bit more challenging, as the surgeon must choose between refractive surgery procedures such as PRK, LASIK, and ReLEx smile; limbal relaxing incisions; astigmatic keratotomy; clear corneal incisions; and toric IOLs to achieve the best correction. As approximately 15% of cataract patients have at least 2.00 D of astigmatism, it is imperative that we select the most appropriate strategy in each and every case.

When toric IOLs are the chosen method of astigmatic correction, the surgeon must also decide on various aspects of the lens design, such as deciding between bitoric and monotoric models. In short, bitoricity is a term used to describe IOLs that symmetrically correct cylindrical errors (ie, astigmatism) on both the front and back sides of the lens. As a result, there is a reduction in the radial distance between sphere and plus cylinders.

Compared with a monotoric principle, which aims to correct astigmatism on only one surface of the lens, lenses with a bitoric principle have better imaging quality and modulation transfer functions in eyes with larger pupils and higher cylindrical and spherical errors. This results in better visual performance. Therefore, generally speaking, bitoric lenses allow surgeons to safely and accurately correct even extreme cylindrical errors.

BACKGROUND

Since 2007, the Acri.Comfort bitoric IOL, now known as the AT TORBI (Carl Zeiss Meditec), has been available for correcting astigmatism and is compatible with a microincision cataract surgery (MICS) technique. It was the first available monofocal bitoric IOL model, with symmetrical distribution of cylinder on its front and back surfaces. It can be implanted through an astigmatically neutral incision size of 1.6 to 1.8 mm, using a coaxial MICS technique.

Another advantage of the AT TORBI is that it has a four-point haptics design, which is a better design for toric IOLs. This is because IOLs with four-point haptics are easier to rotate in either direction and explant in a worst-case scenario compared with toric IOLs with a C-loop design.

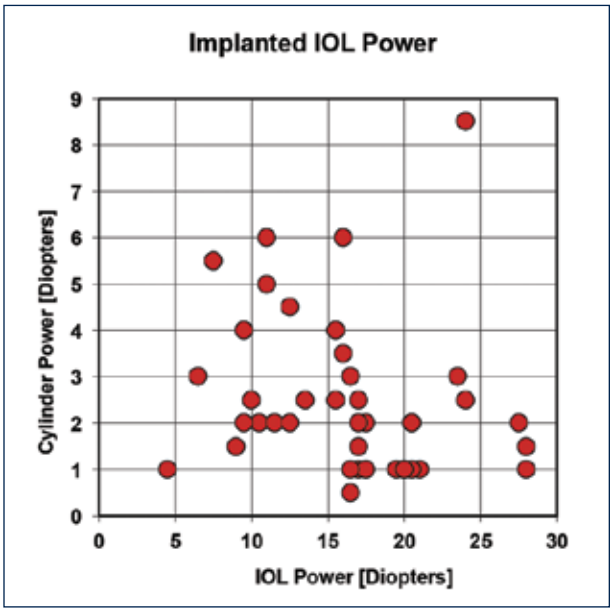


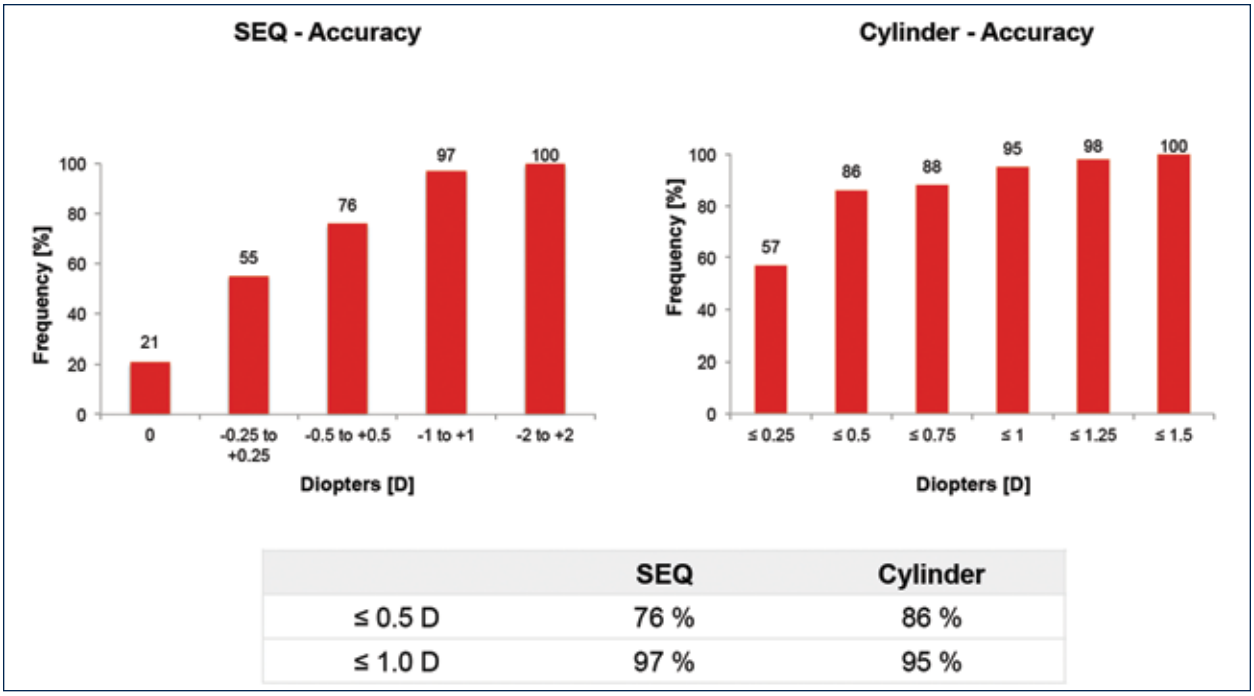
Figure 1. Implanted IOL power in 41 eyes.

THREE TORIC DESIGNS

The AT TORBI, AT LISA toric, and AT LISA tri toric (Carl Zeiss Meditec) are available for astigmatism correction. They are all one-piece, foldable IOLs with optic diameters of 6.0 mm and overall diameter of 11.0 mm. The AT TORBI and AT LISA toric are available in sphere powers ranging from -10.00 to +32.00 D and cylinder powers up to 12.00 D.

AT TORBI. Available as both standard 709M and preloaded 709MP models, from my experience the AT TORBI offers astigmatism correction with greater precision and better postoperative outcomes and provides high rotational stability postoperatively. It is also compatible with MICS, allowing surgeons to perform astigmatically neutral surgeries. The lens' bitoric optic provides up to 12.00 D of cylinder correction in 0.50 D increments, and precise lens calculations can be performed using the Z CALC online tool (Carl Zeiss Meditec).

In tricky situations, the surgical team can call a ZEISS



	SEQ	Cylinder
≤ 0.5 D	76 %	86 %
≤ 1.0 D	97 %	95 %

Figure 2. Accuracy of spherical equivalent (SEQ) and cylindrical precision.

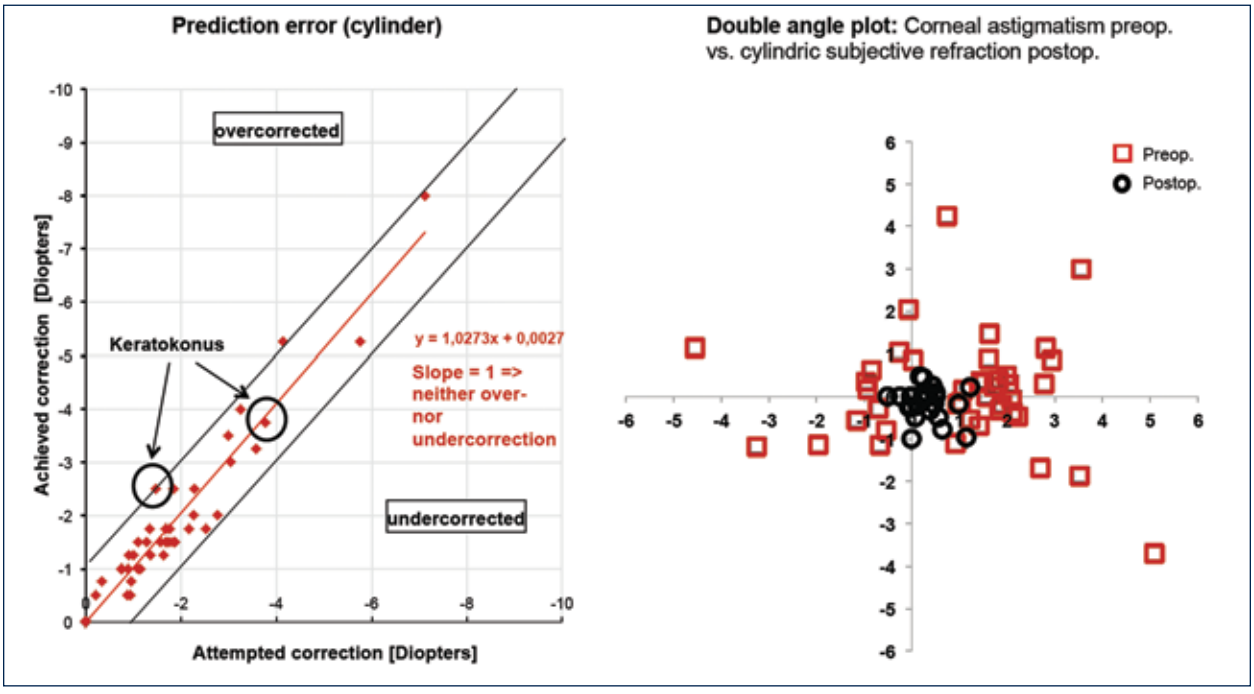


Figure 3. Attempted versus achieved astigmatism correction.

optometrist and ask for his or her opinion.

I have long-term experience implanting the AT TORBI. Recently, I conducted a retrospective analysis of the AT TORBI 709M in 41 eyes of 24 patients with at least 0.75 D of astigmatism. The chosen IOL power is detailed in Figure 1. Preoperatively, the average sphere was -1.50 D, the average cylinder was -1.70 D, and the average spherical equivalent (SEQ) was -2.38. Up to 48 months postoperatively, the average sphere, cylinder, and SEQ improved to 0.08 D, -0.35 D, and -0.05, respectively. The accuracy of the SEQ and cylindrical correction is detailed in Figure 2, and the attempted versus achieved astigmatism correction is detailed in Figure 3.

Postoperative examinations included analysis with the Pentacam (Oculus Optikgeräte GmbH), subjective refraction, and aberrometry (KR-1W; Topcon), and the IOL position was determined in mydriasis and at the slit lamp. What we concluded is that the postoperative

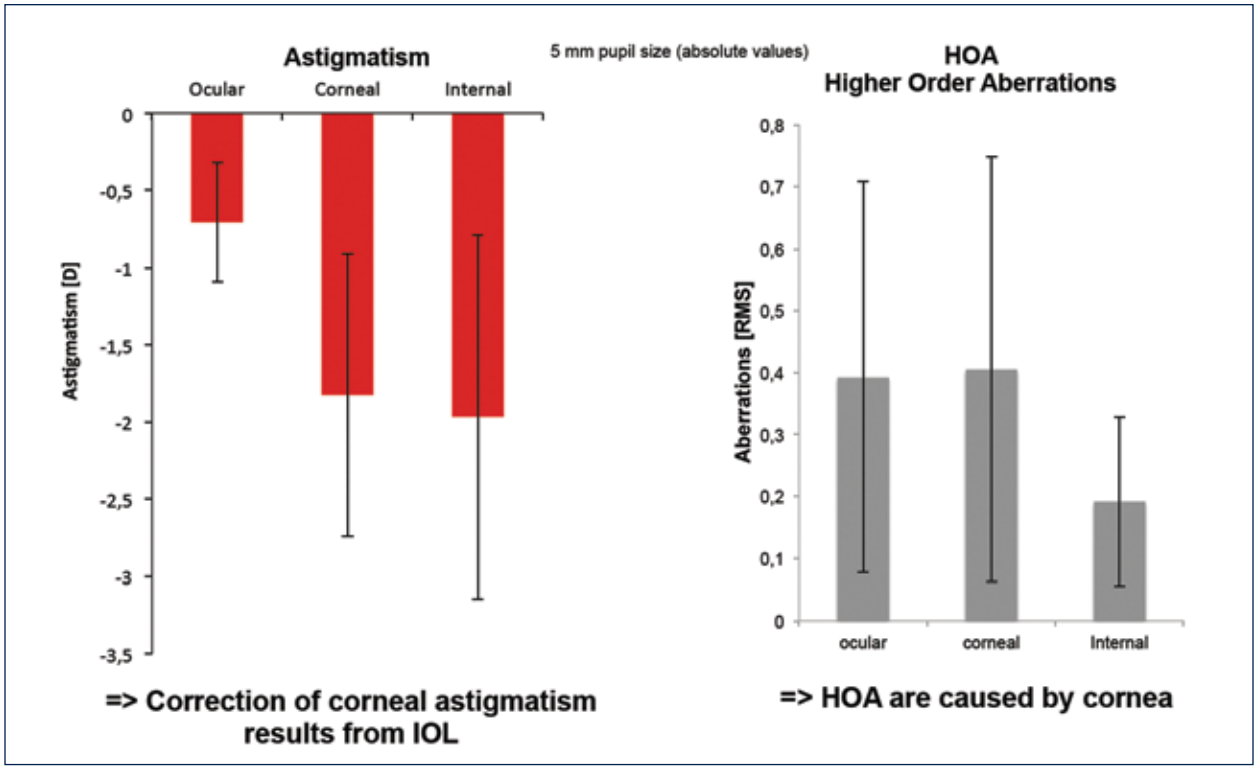


Figure 4. Higher-order aberrations (HOAs) are caused by the cornea, not the IOL.

> The postoperative refraction after implantation of the AT TORBI 709M is highly predictable for both lower and higher corneal astigmatisms.

refraction after implantation of the AT TORBI 709M is highly predictable for both lower and higher corneal astigmatisms. Additionally, any higher-order aberrations are mainly dependent on the cornea and not the IOL (Figure 4). We also observed a stable lens position in the bag, with no rotation postoperatively in our series.

AT LISA TORIC. The AT LISA toric is the world's first aspheric multifocal toric IOL that is compatible with MICS. It combines the optical performance of the AT LISA with the reliable astigmatism correction of the AT TORBI. Although the bifocal AT LISA toric 909MP has a monotoric principle, a trifocal toric lens with a bitoric design is now available. At this time, we have satisfying long-term experience with the bifocal monotoric AT LISA toric, and promising early knowledge with the trifocal bitoric, AT LISA tri toric. In our short-term experience, we have come to appreciate that the IOL covers a large range of cylindrical errors, making it suitable for a variety of astigmatic patients presenting for cataract surgery. The postoperative refraction is exceptionally on target.

Figure 5. A metal blade is used to create an incision size of 1.8 mm.

FOUR IMPLANTATION PEARLS

Implanting the AT TORBI and AT LISA toric IOLs is straightforward, and below I offer four basic suggestions for optimizing surgical outcomes:

No. 1: Use Z CALC and Z ALIGN for toric IOL calculation and alignment. The easiest way to calculate the IOL power for either the AT TORBI or the AT LISA toric IOLs is with Z CALC. The online software provides immediate postoperative refraction data for the calculation of these toric IOLs. The calculator provides color-coding to indicate if the eye is irregular, either within or

Z ALIGN video-supported intraoperative alignment tool allows the user to define the horizontal reference axis and provides real-time eye tracking to support alignment of the marks on the toric IOL with the target axis.

beyond the limits for a regular calculation. The Z CALC summary screen displays the biometry data, results of the IOL calculation, and an image of the lens at the target orientation.

Likewise, the alignment feature Z ALIGN in CALLISTO eye (Carl Zeiss Meditec) is also an integral part of implanting the AT TORBI and AT LISA toric IOLs. This video-supported intraoperative alignment tool allows the user to define the horizontal reference axis and provides real-time eye tracking to support alignment of the marks on the toric IOL with the target axis.

No. 2: Use a coaxial MICS technique. Aim for an on-meridian incision size of 1.8 mm using a metal blade or a diamond knife, thus creating an inner opening of 1.5 mm and an outer opening between 1.7 and 2.0 mm (Figure 5). Special attention should be paid to creating a stable anterior chamber, properly using fluidics, and avoiding stretching of the incision.

No. 3: Create a perfectly centered capsulorrhexis. A perfectly centered capsulorrhexis of 5.0 mm and extensive polishing of anterior and posterior capsular bag will help to avoid late decentration. With that said, these toric IOLs are relatively insensitive to decentration.

No. 4: Use a capsular tension ring (CTR). When a CTR is implanted in conjunction with either the AT TORBI or the AT LISA toric IOLs—as well as with all other premium IOLs—there is less postoperative aberrations and risk of capsular folds.

Additionally, in the event that the IOL must be explanted, having a CTR in place simplifies the explantation procedure and, if used in patients undergoing refractive lens exchange, it is easier to suture the IOL to the sclera.

The last reason that I like using CTRs is that there is almost no chance for the IOL to rotate in a round capsular bag.

CONCLUSION

In the quest to achieve emmetropia in our patients, the AT TORBI, AT LISA toric, and AT LISA tri toric IOLs are excellent tools for the correction of astigmatism, as they provide good rotational stability and highly predicable correction of astigmatism for both lower and higher corneal astigmatism. I suggest also using Z CALC and Z ALIGN software to ensure perfect IOL alignment in every case. ■

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