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CRST EUROPE

Cataract & Refractive Surgery Today

# The Teleon Optical Journey

## From enhanced monofocal to high performance varifocal toric optics.

LENTIS® | FEMTIS® | ACUNEX®

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## Enhanced Monofocal IOLs: The New Standard of Care

These IOLs have many advantages over monofocal IOLs with an aspheric design.

**BY ANDREAS F. BORKENSTEIN, MD**

About 34 million cataract surgeries are performed worldwide every year, but only about 10% of the lenses implanted are premium IOLs.[1] Some cataract surgeons are apprehensive about incorporating premium IOL technology into their armamentarium because of the potential associated side effects such as dysphotopsia (ie, halos and glare), but newer premium lens technologies have been designed to avoid them.

I have experience with a variety of IOLs from different manufactures and use a large portfolio of lenses in order to provide patients with the best option for their individual needs. Many patients enjoy the advantages associated with multifocal IOLs, but monofocal lenses are the better and safer choice in some cases. Historically in my private practice, we preferred aspheric monofocal lenses and targeted mini-monovision to achieve satisfactory binocular vision for distance and near vision. Within the past 3 years however, we transitioned first to extended depth of focus (EDOF) IOLs and now to enhanced monofocal IOLs, which I believe are the new standard of care. Here, I share my overall experience with enhanced monofocal IOLs and detail one case in which the benefits of the LENTIS Quantum (L-333; Teleon Surgical) IOL were especially impressive.

### BACKGROUND

The LENTIS Quantum bridges the gap between standard aspheric monofocal IOLs and premium refractive EDOF IOLs like the LENTIS Comfort (Teleon Surgical). This enhanced monofocal, aberration-neutral IOL is designed with Q-zone technology, which is a progressive surface profile that provides a smooth, stepless transition between zones to avoid any undesirable visual sides effects such as halos and glare. The IOL provides patients with more vision in the intermediate distance (80 cm) compared with traditional monofocal IOLs but with comparable contrast sensitivity. To achieve better intermediate vision (up to 60 cm), a true EDOF IOL like the LENTIS Comfort or ACUNEX Vario (Teleon Surgical) is recommended.

The LENTIS Quantum with plate haptic design is easy to implant, and it unfolds smoothly, reliably, and consistently.

Figure 1. Schematic of the LENTIS Quantum IOL.

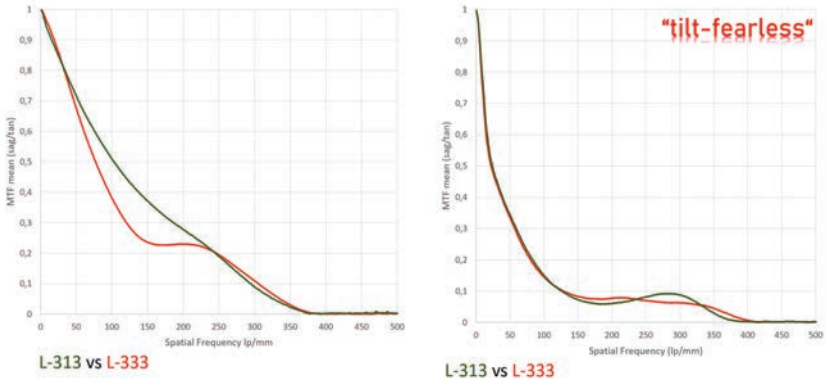


Figure 2. There was no significant difference in the modular transfer function at centration between the monofocal aspheric L-313 (green) and the enhanced monofocal L-333 (red). Even at a tilt of 5° and a large aperture (4.5 mm), the lenses performed similarly (right).

I have had no complications with the implantation or unfolding of the lens, even in challenging cases such as a shallow or flat anterior chamber and intraoperative floppy iris syndrome. Lastly, the lens can be implanted through a 2.2-mm clear corneal incision with the same gentle touch regardless of the IOL power. In my hands, the Viscojet Bio 2.2 Injector (Medicel) works well.

## OPTICAL BENCH TESTING

A great variety of lenses are on the market, all with unique advantages and disadvantages. In collaboration with a colleague from another clinic, we conducted optical bench testing to evaluate several innovative and new optic designs in an objective and unbiased manner in order to evaluate how to best choose the ideal IOL for each individual case.[2-4]

We recently tested and compared the LENTIS Quantum (L-333) to the monofocal LENTIS design (L-313; Teleon Surgical) and with other standard aspheric monofocal IOLs (publication in press). Figure 2 summarizes our results. In short, the LENTIS Quantum had a very good performance and no degradation compared to the LENTIS monofocal and other standard aspheric monofocal IOLs. Additionally, the innovative Q-zone design of the LENTIS Quantum was forgiving of decentration and tilt. The benefits of the design were most noticeable in measurements with larger apertures, which indicates that the lens is appropriate for younger patients with large pupils.

The study was designed to evaluate the modulation transfer function, Strehl and wavefront measurements, and defocus curves at different aperture sizes (3.0 and 4.5 mm). The study is ongoing, but current results confirm that the behavior of the LENTIS Quantum is very tolerant of decentration and tilt. This is unlike diffractive multifocal and trifocal IOLs, where the quality of vision degrades in direct correlation to the amount of any misalignment.

## CLINICAL CASES AND PATIENT SELECTION

Optical bench analysis is important, but patient satisfaction counts most in the end. In my early experience with the Eyhance (Johnson & Johnson Vision), LENTIS Quantum, and other enhanced monofocal IOLs, I was very selective with patients and only used them in healthy eyes with no additional ocular pathology because I was concerned about possible side effects.

After a short learning curve, I expanded my inclusion criteria to include eyes with coexisting conditions such as glaucoma and macular disorders—depending on the patient's individual needs and the results of their preoperative examination—because it was apparent that the lens is tolerant, much like standard monofocal lenses.

Again, there is no single IOL that works for all patients. I have found, however, that most patients are good candidates for an enhanced monofocal IOL like the LENTIS Quantum. In addition to standard preoperative diagnostics like biometry, corneal topography, and wavefront measurements, I am also sure to ask about their occupation, hobbies, and typical working distances to help me select the best IOL for their lifestyle and visual needs.

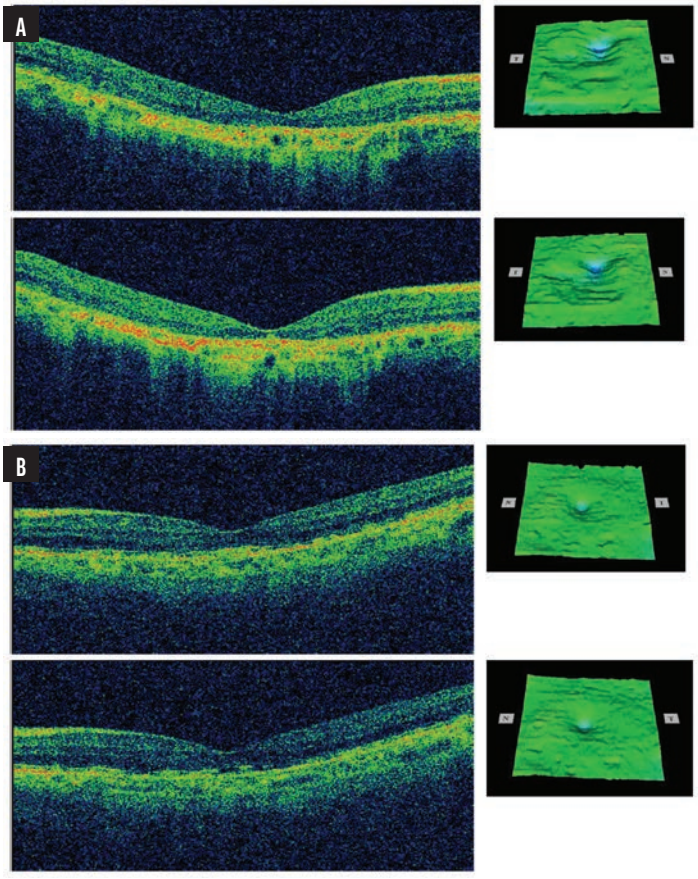


Figure 3. OCT and fundus photographs of the patient's right eye preoperatively and 4 months postoperatively (A) and of the patient's left eye preoperatively and 4 months postoperatively (B).

## CASE PRESENTATION

The following case demonstrates the versatility of the LENTIS Quantum in challenging cases.

An 84-year-old woman with mature cataracts in both eyes presented for a cataract evaluation. Her refraction was -1.25 +0.50 x 135° OD and -1.50 +0.75 x 140° OS. Her uncorrected distance visual acuity (UDVA) and best corrected distance visual acuity (BDVA) in the right eye was 0.1 and 0.3, respectively. In the left eye, it was 0.05 and 0.2 respectively. Dry age-related macular degeneration was noticeable on macular OCT, and geographical atrophy was also noticeable but in a relatively small area. The central scotoma was noticeable when testing monocularly.

In addition to her ocular condition, the patient mentioned that she was experiencing some dizziness. She was also having increased difficulty wearing glasses due to the positioning of her hearing aids and mentioned a few recent injuries she sustained because she could not see properly without her glasses. The patient was therefore very interested in spectacle independence postoperatively.

In the past, I would never have tried to use a premium (ie, multifocal/trifocal) IOL in this specific case due to the macular pathology but would have rather implanted an aspheric monofocal IOL with a refractive target of emmetropia for distance. This would have, however, required the patient to wear glasses for near and intermediate vision tasks. If she chose not to wear them, her risk for falls and other accidents at home would remain high.

With the availability of the LENTIS Quantum, however, I felt comfortable that the benefits of an enhanced monofocal IOL would outweigh the risks, and after patient counseling we decided to proceed with this option (Figures 3 and 4). I explained to the patient that she should achieve improved distance and intermediate without sacrificing her near acuity.

## POSTOPERATIVE OUTCOME

At 4 months postoperatively, the patient's refraction was -0.50 +0.50 x 20° OD and -0.25 +0.50 x 85° OS. When testing visual acuity, the scotoma was sometimes noticed but with some eye movements not bothering her. The UDVA was 0.8, BDVA was 0.9, uncorrected near visual acuity (UNVA) at 40 cm was 0.5, and UIVA was 0.63 in the right eye. With an addition of 1.50 D, the patient's best corrected near visual acuity (BCNVA) was 0.63.

In the left eye, UDVA was 0.63, BDVA was 0.8, UNVA at 40 cm was 0.4. With the addition of 1.50 D, the patient's BCNVA improved to 0.5, and UIVA at 80 cm was 0.63. She had no complaints of dysphotopsia.

The patient does not wear the 1.50 D corrective glasses for her daily activities because of the difficulties it presents with her hearing aids. Nevertheless, she is extremely happy with her visual outcomes without spectacle correction. She can get around her house without any glasses, and there has been no progression of her macular degeneration through 4 months of follow-up.

It should be noted that enhanced monofocal IOLs are not only advantageous for typical cases in which spectacle independence is desired, but it is especially useful in patients with medical concerns because it can vastly improve their overall quality and prevent falls, as shown in this example.

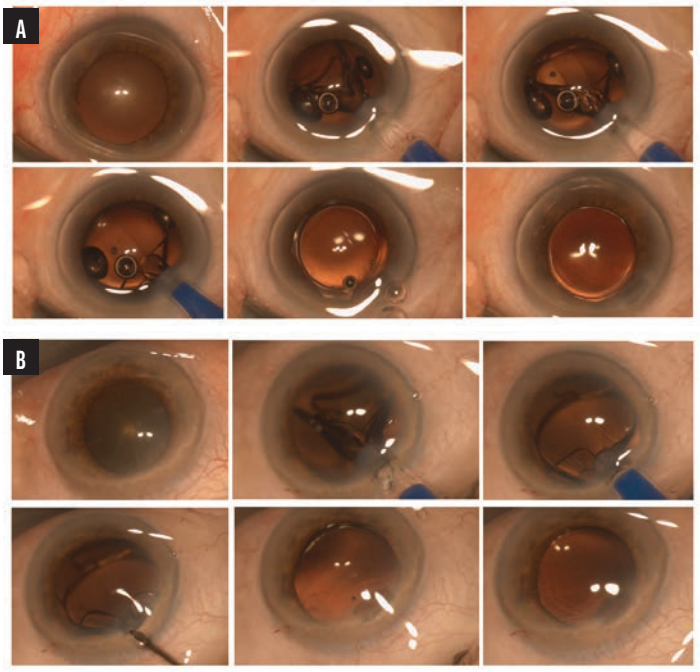


Figure 4. The IOL is inserted into and unfolds within the capsular bag of the patient's right eye without any additional instrumentation (A) and left eye with a spatula to position the trailing haptic and center the IOL in the bag (B).

## CONCLUSION

The case presented here demonstrates how the LENTIS Quantum can provide patients with very good intermediate visual acuity up to 80 cm without glasses. The case also highlights the broad range of indications for the lens, including those with other ocular pathologies.

In conclusion, the LENTIS Quantum can be implanted not only in normal eyes but also special and challenging cases as well. Additionally, in some cases the lens is well suited for mixing and matching opportunities with other EDOF or multifocal IOLs. The LENTIS Quantum is the newest standard of care in my basic IOL portfolio because it achieves excellent postoperative results and, most importantly, patients are happy after surgery. ■

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# Indications for the FEMTIS IOL

This lens clamps into the automated capsulotomy, ensuring proper centration and positioning.

**BY DETLEF HOLLAND, MD**

Laser cataract surgery has gained widespread acceptance. It offers the potential for better safety, predictability, and efficacy compared to traditional phacoemulsification cataract surgery. Today, we can use the advantages of laser cataract surgery to enhance the outcomes for our patients and ensure proper centration and positioning of the IOL. This article describes the use of a novel lens design created to clamp into the laser capsulotomy and outlines one challenging case in which this lens was used.

## IMPLANTING A LASER LENS

Proper centration and positioning of the IOL during cataract surgery is fundamental to achieving the best possible outcomes with premium lens technologies. The femtosecond laser can be used to create a capsulotomy that is both perfectly sized and positioned, leading to an improvement in the centration of the IOL. The FEMTIS IOL (Teleon Surgical) is designed with a special haptic system that allows the lens to be clamped into the capsulotomy. The lens therefore stays in position, eliminating the risk of postoperative decentration.

The FEMTIS IOL platform is available with three different optic designs: the FEMTIS Monofocal, the FEMTIS Comfort MF15 extended depth of focus, and the FEMTIS MPlus MF30 multifocal. Both the Comfort and Mplus are also available in toric models.

A multicenter study has shown that the centration, rotational stability, and tilt of the FEMTIS IOL are superior to that with standard intracapsular IOLs.[1] In my experience, which extends to more than 700 cases with a mean follow-up of more than 5 years, the FEMTIS IOL is easy to implant, stable in the capsular bag, and provides patients with exceptional visual quality. I use the FEMTIS IOL in approximately 30% to 40% of my patients.

Outside of clinical trials, I have also looked at the incidence of intra- and postoperative complications with the FEMTIS IOL. After a short learning curve, the implantation technique is fast to perform and free of complications. I have not had any incidences of posterior capsular rupture or tear during implantation. Iris capture occurred in a few of my early cases, but the use of an intracameral miotic at the end of surgery eliminated it completely. No other lens-related postoperative complications like iris shaving or secondary glaucoma were documented.

We have also compared the patient-reported presence of glare and halos with the FEMTIS Comfort MF15 and the LENTIS Comfort MF15 (Teleon Surgical) IOLs. Regarding night driving, the results reported by patients with the FEMTIS Comfort were

## CASE STUDY

A 68-year-old patient underwent uneventful laser cataract surgery with implantation of the FEMTIS IOL (Teleon Surgical) in his first eye. Surgery and implantation of the FEMTIS IOL was planned for his second eye the following months later. During the second procedure, a large rupture of the posterior capsule occurred while performing irrigation and aspiration of the remaining cortex.

The capsule was first cleaned extensively by avoiding vitreous prolapse; the anterior capsule and capsulotomy both remained intact. After the capsule was stabilized with an OVD, the FEMTIS IOL was implanted first in the sulcus and then carefully into the bag without problems. Enclavation was performed in a standard fashion.

The small notches at the optic edge of the FEMTIS IOL were helpful for carefully removing the OVD from behind the IOL, even after enclavation. Because the IOL remained in the exact same position it was implanted, it was possible to proceed with surgery in the same manner as a standard case.

Another benefit of the FEMTIS IOL in challenging cases such as this one is that the refractive outcome can still hit or be very close to the intended correction. In this case, the patient's eye healed tremendously without any complications.

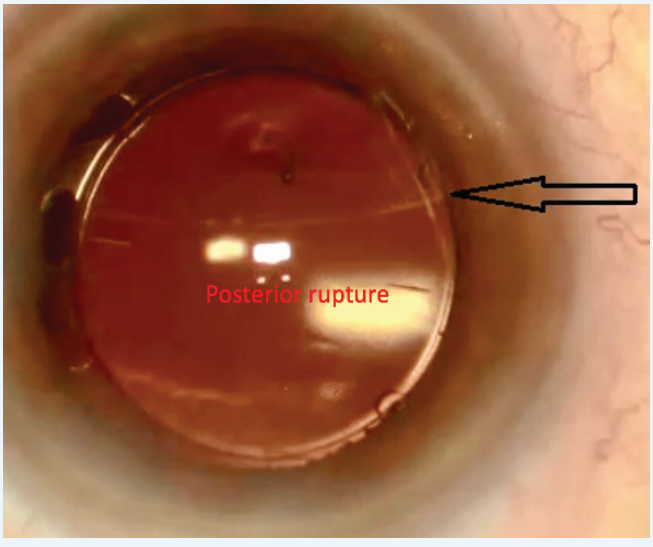


Figure. The FEMTIS IOL implanted in an eye with a PCR.

even better compared to those who received the LENTIS Comfort IOL—a lens that also has excellent results during night driving.

## AVOIDING COMMON COMPLICATIONS

Posterior capsular rupture (PCR) is one of the most common complications during cataract surgery with a reported incidence of up to 7.9%.[2] PCR is a significant risk factor for poor visual outcomes. Additionally, complications such as vitreous loss in the postoperative period can increase the risk for a retinal detachment, uveitis, or cystoid macular edema.

Creating a perfect barrier between the posterior and anterior segments is crucial after a PCR. The FEMTIS IOL is fixated in the capsular bag, offering a perfect barrier between the two segments of the eye, reducing the risk of a vitreous prolapse even after a PCR or Nd:YAG capsulotomy. Even in cases of severe PCR, the FEMTIS IOL can still be safely implanted in the capsular bag and enclavated in the capsulotomy without any additional side effects. The accompanying sidebar outlines one of these cases.

## CONCLUSION

The FEMTIS IOL can be implanted safely in any eye, even those that have experienced PCR. The IOL can act as a barrier between the anterior and posterior capsules, essentially avoiding the risk for vitreous prolapse.

I believe that the FEMTIS IOL has the potential to reduce complications associated with cataract surgery, such as IOL decentration and tilt. In my experience, there are many benefits of combining laser cataract surgery or automated capsulotomies with an IOL designed to clamp into the capsulotomy because it provides perfect centration every time. It can also, however, be safely implanted in a manual capsulorhexis, expanding the indications for the FEMTIS IOL. ■

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# Refractive Multifocal IOLs

Premium care with the ACUNEX Vario brings peace of mind.

**BY FLORIAN T.A. KRETZ, MD**

Over the past decade, cataract surgery has evolved into a more precise and effective form of the procedure that many of us refer to as *refractive cataract surgery*. The combination of new IOL designs, advanced diagnostic technologies, and better strategies for patient selection have helped patients to achieve excellent visual acuity at all distances.

Premium IOL technologies like extended depth of focus (EDOF), multifocal, trifocal, and enhanced monofocal lenses are now commonly used in refractive cataract surgery, but it can sometimes be intimidating to consider using them in more challenging cases. With just a little experience, however, surgeons can gain confidence in the ability of premium IOL technologies to deliver excellent outcomes even in challenging cases.

When I agreed to contribute to this supplement, I was asked to share a case that highlights the advantages of a nondiffractive, rotationally asymmetric EDOF IOL for challenging indications. But because I use the ACUNEX Vario (Teleon Surgical, Figure) as the preferred IOL for all of my private patients, I decided it was more impactful to explain why this IOL, for me, is the standard of care. About 75% of my patients receive the Vario.

Figure. The ACUNEX Vario (A) and the ACUNEX Vario Toric (B) IOLs.

## BACKGROUND

I have been using refractive IOLs with a rotationally asymmetrical IOL design as the standard of care for my patients since 2017. I began by implanting the LENTIS Comfort IOLs (Teleon Surgical), and I transitioned to the ACUNEX Vario once it became available in 2019. I like the ACUNEX because of its hydrophobic material, because it includes a blue light filter, and because the nondiffractive optic does not separate light, which avoids dysphotopsias such as halos and glare.

I have compared the LENTIS Comfort and ACUNEX Vario to both aberration-neutral and aberration-correcting monofocal IOLs and found no difference between the lenses in terms of dysphotopsias (ie, halos and glare), which was all the proof I needed to consider nondiffractive rotationally asymmetrical IOLs as a standard of care for my patients.

## A VERSATILE LENS

I have implanted more than 1,000 ACUNEX Vario and ACUNEX Vario Toric IOLs, and I have not explanted a single one. It is a very versatile lens. Careful patient selection is crucial with any type of premium IOL, but I have found the ACUNEX Vario to be one of the most forgiving premium lenses on the market today. The safety profile is similar to that of standard monofocal IOLs, and there are no real contraindications or exclusion criteria. It should be noted that the presence of dry eye disease or related ocular surface conditions should be treated before cataract surgery regardless of the IOL type.

Regarding challenging conditions, there is no reason to shy away from implanting the ACUNEX Vario. I have implanted it in eyes with macular degeneration and scarring, irregular astigmatism, small pupils, uveitis, epiretinal membrane, and corneal irregularities.

**Macular degeneration and scarring.** The optical design of the ACUNEX Vario avoids the potential decrease in peripheral vision that can be seen with other premium lenses in patients with macular conditions. There are also no changes in visual field in patients with glaucoma because the rotationally asymmetric optic of the ACUNEX Vario has a low amount of add power (1.50 D).

**Irregular astigmatism.** There is no contraindication for this IOL in the presence of irregular astigmatism. These patients should be counseled, however, that they may still need to wear glasses after surgery. The benefit of the ACUNEX Vario for these patients is that the lower near add required in their progressive glasses after surgery makes their life at least easier. If they wear contacts to compensate for the corneal irregularity, they can even benefit from the near add and only need glasses for reading.

**Small pupils.** The ACUNEX Vario has some advantages when it is implanted in eyes with small pupils. First, the lens unfolds very smoothly, which is particularly helpful when going through a smaller pupil. Second, the optic can still be captured by a capsulotomy that is smaller in size.

**Uveitis.** I like the hydrophobic material of the ACUNEX Vario for patients with a history of anterior or intermediate uveitis because I feel more confident that the material will keep its high level of light transmission over time.

**Epiretinal membrane.** The hydrophobic material of this lens is also appropriate for those patients who might require epiretinal membrane peeling later on. Again, I can be certain that the material will keep its clarity in the long term.

**Corneal irregularities.** The ACUNEX Vario is great for patients with corneal irregularities, including those who might require a corneal transplantation in the future. The lens can also be used in eyes with a low endothelial cell count; the placement of a gas bubble in the anterior chamber is not contraindicated with the hydrophobic material.

## ESTABLISHING THE REFRACTIVE TARGET

The refractive stability and outcomes with both the ACUNEX Vario and ACUNEX Vario Toric are excellent. In my practice, patients typically achieve spectacle independence for distance and intermediate while maintaining good near visual acuity. These patients, in my experience, achieve true intermediate vision and are more independent of spectacles than patients who receive a standard monofocal IOL.

For patients with myopia who wish to maintain their excellent near vision, I will target approximately -1.00 to -1.50 D of myopia binocularly so that they will be independent of glasses for intermediate and near. In patients with anisometropia before cataract surgery, I prefer a mini-monovision strategy, targeting plano on the distance-dominant eye and between -1.00 and -1.50 D on the contralateral eye.

## PATIENT COUNSELING

Patients are counseled on all available lenses and educated on the options that would work best for them. In general, when patients express concern about any level of dysphotopsias, I prefer to use a rotationally asymmetric IOL with a low add power. When patients have no strong preference for one IOL over others, I prefer the ACUNEX Vario. The true benefit is that patients have a closer near vision and an even smoother transition from distance to near.

The ACUNEX behaves more like a monofocal IOL than it does a multifocal. There are fewer side effects with this nondiffractive IOL versus multifocal IOLs with diffractive optics, which simplifies patient counseling. In my experience, patients appreciate that the lens is free from the risks of dysphotopsias while still providing an excellent chance for spectacle independence. That gives them a lot of confidence in their surgeon, which can lead to increased patient referrals after surgery when they are happy with their outcomes.

## CONCLUSION

The ACUNEX Vario is a versatile IOL that is perfect for many patients. In my practice, it is the standard of care because there are really no contraindications, and it can also be used in challenging conditions including eyes with macular degeneration and scarring, irregular astigmatism, small pupils, uveitis, epiretinal membrane, and corneal irregularities. Patients can achieve good distance and intermediate vision, and they only need readers that can be purchased from their local pharmacy. ■

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# Customized Blended Vision With the LENTIS Mplus Toric

Implanting two different models of the same IOL family in patients' eyes can provide many advantages.

**BY SIMON LEICHT, FEBO**

Patients today have high expectations for their vision after cataract surgery. In most cases, patients see the procedure as an opportunity to achieve spectacle independence, and their satisfaction after surgery depends on whether it is achieved. For this reason, customizing the procedure with IOLs that give patients the greatest chance for spectacle freedom is mandatory. One strategy that I find especially helpful is to create a blended vision system that utilizes IOLs with different optical designs to achieve exceptional vision across the entire range of distances.

I have experience implanting different versions of the LENTIS Mplus IOLs (Teleon Surgical) to create a system of customized blended vision. This family of lenses has a rotationally asymmetrical design with an innovative sector-shaped near vision segment characterized by seamless transitions between the near and distance vision zones. This design results in many benefits for patients, including fewer side effects, like halos and glare, and achieves high patient satisfaction after surgery. What I like most about these IOLs is that they can be customized for any patient, which means there is a wide range of indications for their use.

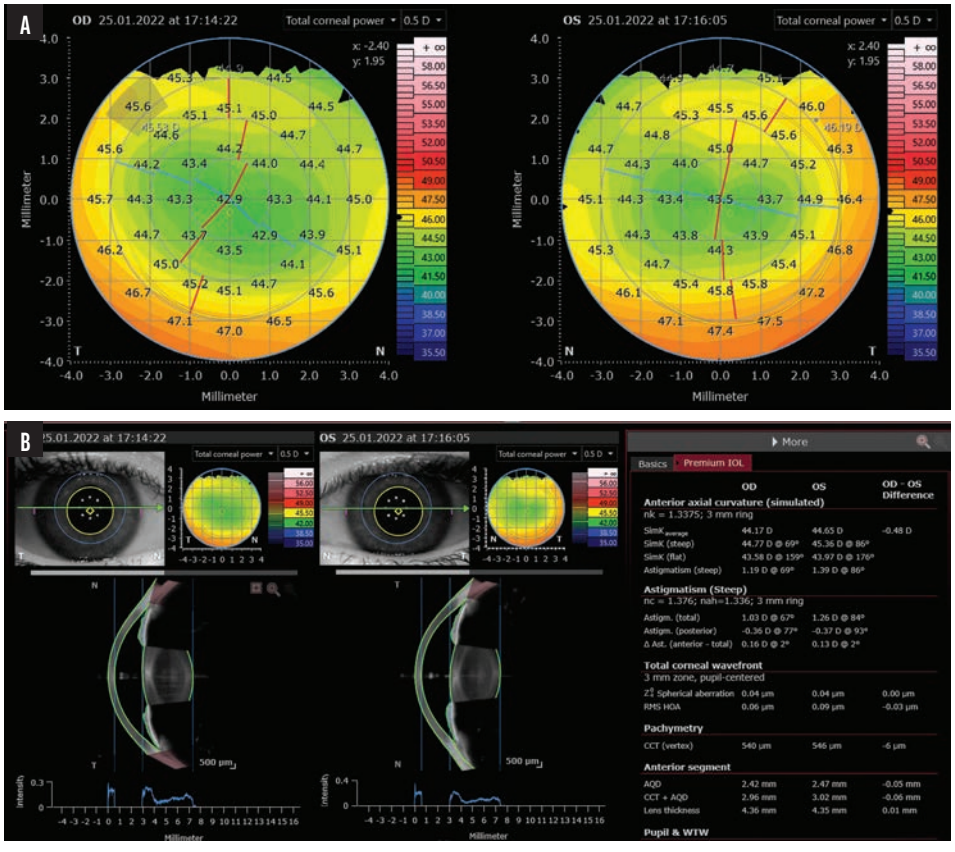


Figure. Preoperative topography (A) and corneal astigmatism (B) measurements.

The LENTIS Mplus IOL is available in two models, the MF20 and MF30. The MF20 has a 2.00 D near add and provides a softer transition between the two optical zones to result in excellent distance and intermediate vision with very good near vision. The MF30 has a 3.00 D near add to provide excellent distance and near vision and very good intermediate vision.

Both the MF20 and MF30 are available in toric versions that can be fully customized for each patient to produce individual and highly accurate astigmatism correction to precisely 0.01 D as well as excellent visual acuity at near, intermediate, and distance. Additionally, these IOLs boast very high rotational stability thanks to its haptic design. IOL calculations for the toric IOLs can be performed at www.teleon-toric.com.

## CONFIDENCE IN THE LENS DESIGN

I am extremely confident in the design of the LENTIS Mplus, and I know that my staff is as well. In fact, an employee of Teleon Surgical recently underwent refractive lens exchange (RLE) at my practice and specifically asked for the LENTIS Mplus for herself.

This employee had been thinking about undergoing refractive surgery for years to correct her hyperopia, but she was not sure what procedure would be best for her. In the meantime, her symptoms of presbyopia started to worsen, and her motivation to undergo refractive correction for both hyperopia and presbyopia increased. When she finally approached me to ask if I would perform refractive surgery, she was certain she wanted to undergo RLE with the LENTIS Mplus. She was interested in this technology specifically due to its segmented design, allowing a customized addition for near vision and eliminating the risk for negative dysphotopsias such as halos and glare.

### SURGICAL PROCEDURE

In addition to her hyperopia and presbyopia, preoperative testing revealed 1.03 D OD and 1.26 D OS of corneal astigmatism (Figure) and an axial length of 21.99 mm OD and 21.98 mm OS. Lens-based surgery in short eyes can present challenges, but luckily in this case it was not an issue.

The patient desired that the procedures for her right and left eyes were performed as close together as possible, so the surgeries were scheduled only 2 days apart. We chose to use a blended vision strategy with different near additions for the right and the left eyes (2.00 D OD and 3.00 OS) so that she would achieve excellent vision at all distances. Originally, we planned for a near addition of 3.00 D OU; however, because she drives a lot at nighttime, in the end, we decided to use a near add of 2.00 D for the right (dominant) eye to reduce the risk for halos and glare as much as possible. The LENTIS Mplus family of IOLs has nearly no chance for dysphotopsias, but there is a slight risk with the 3.00 D add.

After surgery, the patient recovered quickly and ended up with a UCVA of 20/20 OU and a plano refraction. She experienced an improvement in her continuous vision due to the blended vision strategy, which provided her with good distance vision in her nondominant eye and good intermediate and near vision in her dominant eye. Another advantage here is that the LENTIS Mplus has less loss of contrast and less incidence of halos and glare compared to a trifocal IOL.

### CONCLUSION

The LENTIS Mplus family of IOLs has many advantages, the biggest being that they can be used to create customized vision with or without a blended vision strategy. In my experience, patient satisfaction with the LENTIS Mplus is extremely high. My confidence in this IOL technology is very high, and this is reflected by the recent decision of a Teleon Surgical employee to undergo RLE with these lenses for herself. ■

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# Astigmatism Management

It's not as challenging as one might think.

**BY FRANCIS ROY, MD, AND MINAS CORONEO, BSC (MED) MB BS MSC SYD, MD MS UNSW, FRACS, FRANZCO, FARVO**


The prevalence of astigmatism is well described; it is the most common refractive error in the world. According to one meta-analysis, about 40.4% of the world's adult population over the age of 30 years has at least 0.50 D of astigmatism.[1] Other studies have indicated that about 60% of cataract surgery patients have at least 0.50 D and 47% have more than 1.00 D of preexisting astigmatism.[2,3] Taking into account posterior astigmatism can further increase these percentages.

Astigmatism can contribute to the decline of visual acuity. Patients with 0.50 D or more of astigmatism, therefore, can benefit greatly from its correction during cataract surgery. This can be achieved with incisional tactics (eg, limbal relaxing incisions) and with toric IOLs.

In this article, we share our experiences with two different families of toric IOLs manufactured by Teleon Surgical, one that is made of a hydrophilic material and one that is made of a hydrophobic material.

## LENTIS MF20 AND MF30X

Francis Roy, MD

Today, surgeons have numerous toric IOLs to choose from, including monofocal toric and various multifocal toric designs. I have moved away from incisional tactics because of its tendency to increase the risk for dry eye disease.

I prefer toric IOLs with a refractive and rotationally asymmetric design, like the LENTIS MF20 and MF30X (Teleon Surgical) in a mix-and-match fashion. The IOL, made of a hydrophilic material, is available in additions from 1.50 to 3.00 D, allowing the surgeon to tailor the refractive correction for the individual patient's needs. The MF20 and MF30X are custom made to order in 0.01 D steps.

## FIVE PEARLS

Herein, I share five pearls for the use of these lenses.

► **No. 1: Treat irregular astigmatism before surgery**. Eyes with foreign body scars, epithelial membrane dystrophy, and pterygium and those that have previously undergone refractive surgery commonly have irregular astigmatism. If the astigmatism is induced by a pathology like epithelial membrane dystrophy, phototherapeutic keratectomy should be performed before proceeding with cataract surgery or refractive lens exchange (RLE) with a rotationally asymmetric toric IOL. Likewise, eyes with defects left by corneal scars or a foreign body should undergo transepithelial PRK or phototherapeutic keratectomy, and any higher-order aberrations that are greater than 1.00 D (to validate in µm) secondary to previous refractive surgery should be treated with topography-guided transepithelial PRK. Lastly, any Salzman dystrophy should be peeled off before proceeding with cataract surgery or RLE. Treatment of irregular astigmatism after the latter procedure can be challenging.

► **No. 2: Always order the IOL add to be positioned infero-temporally to achieve good distance and near vision, especially if the angle kappa is positive in the right eye and negative in the left**. The biggest advantage of a rotationally asymmetrical IOL design is that the center of the optic is dedicated to distance vision, which compensates for angle kappa (95% nasally) without compromising distance and near vision. Avoid positioning the visual axis in the transition zone of the IOL by placing the add either inferiorly or superiorly with a large angle kappa. Do not position the IOL add away from the angle, as this will decrease the uncorrected near vision. I typically remove 45° to the steep axis on the right eye and add 45° to the steep axis on the left eye when ordering the lens on the Teleon Toric Lens Configurator to achieve an inferior nasal placement of the lens in both eyes.

► **No. 3: If the eye has some residual cylinder at 1 week postoperative, the patient should return for a repeat refraction at 2 weeks postoperative**. If the refraction has not improved, the IOL can be rotated into the correct position using the astigmatism fix calculator available at www.astigmatismfix.com.

Because of the hydrophilic plate haptic lens design, they can be easily rotated in a closed system using just a Sinskey hook and a 0.5-mm paracentesis without OVD. Data from the astigmatism fix software will be used to calculate the ideal axis.

Use manifest refraction rather than autorefraction measurements to judge residual cylinder after surgery with this lens. This is because the astigmatism is induced by the asymmetric add. Before any further intervention is considered, perform a spectacle lens trial to assess the potential visual improvement at distance and near vision objectively. Fortunately, the plate design offers a very stable astigmatism correction with a low percentage of rotation (<1%).

► **No. 4: Corneal cylinder of 0.75 D or more should be corrected if measurements are reliable and reproductible**. The smaller the amount of astigmatism that is treated, the more that posterior corneal astigmatism should be considered. I have implanted more than 10,000 multifocal IOLs. I have found that addressing even small amounts of postoperative corneal cylinder decreases the rate for a postoperative laser enhancement creating a win/win situation.

► **No. 5: Treat dry eye disease before ordering the lens**. Like with refractive surgery, treating dry eye disease (DED) before cataract surgery or RLE will improve patients' postoperative results and level of satisfaction. Because the magnitude and axis of astigmatism can be affected on keratometry readings when DED is present, it must be treated before the IOL is ordered. Punctum plugs can be used to increase the quantity of tears, and the quality can be improved with the use of preservative-free eye drops, ocular surface immunomodulators such as topical cyclosporine, and, meibomian-based treatments.

Axial length is typically unaffected by DED. The Barrett Universal II IOL formula is the best choice; if it is not available, the Barrett preset value based on the axis should be used to compensate for posterior astigmatism.

## CASE PRESENTATION

A 54-year-old woman who works as an administrator presented for a cataract surgery evaluation. The patient had been wearing monovision contact lenses and was asked to discontinue use for 2 weeks before the preoperative evaluation. Her left eye was the dominant eye.

During the consultation, the patient expressed the desire for an improvement of her uncorrected vision at all distances. She works for at least 6 hours per day on her desktop computer (60 cm) and spends about 3 hours per day reading (35 cm). She complained of moderate dryness; her score on a modified SPEED test was 7/28. She also had a significant amount of regular astigmatism. Her preoperative refraction was +3.00 -8.00 x 0° OD and +2.00 -8.25 x 168° OD. BCVA was 20/25 OU. In the right eye, she was J1 with a +2.00 add.

Her referring optometrist wondered if CXL was necessary, but the patient never had a topography done. At her visit to my practice, the topography showed slight corneal abnormalities and higher-order aberrations (0.60 OD and 0.63 OS). The Belin/Ambrósio enhanced ectasia display on the Pentacam (Oculus Optikgeräte) was yellow in both eyes (2.65 OD and 2.46 OS).

Her glasses were 5 years old, but the prescription remained similar to her current refraction. Tear evaluation with the Idra Ocular Surface Analyzer (SBM Sistemi) was slightly abnormal (tear breakup time, 4.8 seconds OD and 5.2 seconds OS), and both eyes had a low tear meniscus height (0.15 mm OD and 0.14 mm OS). Punctum plugs were placed in both eyes, and a lubricant was prescribed for use before surgery.

Together with the patient, we decided that CXL was not warranted before refractive lens exchange (RLE) because she had a

stable refraction. During the RLE procedure, the LENTIS Mplus toric with a +3.00 D add was implanted in the right eye, and a LENTIS MF20 toric with a +2.00 D add was implanted in the left eye to maximize her computer work and decrease the incidence of halos.

Both lenses were customized using the patient's total keratometry measurements, the topography, and IOL power with the Barrett Universal II formula. The IOLs were then ordered with the Teleon Toric Lens Configurator, which uses the Haigis formula to calculate the cylinder. Of note, the K2 and the axis of astigmatism must be adjusted to agree with the Barrett Toric Calculator result and the Barrett residual refraction must be added back at the corneal plane in order for the IOL to be accurate to 0.01 D.

On the day of surgery, another topography was taken to finalize the exact position of the cylinder axis. An intraoperative guidance system was used to show the visual axis, and an axis marker was used at the beginning of the surgery to secure a reliable landmark. The patient's postoperative results are shown in the Table. She was happy with her result, and although she experienced minor halos at night postoperatively, they have decreased and she now enjoys functional vision at night, too.

**TABLE. POSTOPERATIVE RESULTS**

| | | | |
|---|---|---|---|
| Day 1 | OD 20/20 | J2 | |
| | OS 20/25 | J3 | |
| Week 1 | OD 20/25 | | -0.75 -0.50 x 115° 20/20- |
| | OS 20/20- | | plano -0.75 x 90° 20/20- |
| Month 1 | OD 20/20- | J1 | -0.50 -0.25 x 120° 20/20- |
| | OS 20/20- | J1 | plano -0.75 x 85° 20/20- |
| Month 6 | OD 20/20- | J1 (40 cm) | -0.25 -0.50 x 105° 20/20 |
| | OS 20/20- | J1 (50 cm) | plano -0.25 x 90° 20/20 |

## CONCLUSION

Treating even a small amount of corneal astigmatism appropriately at the time of cataract surgery or RLE increases patient satisfaction and the surgeon experience. The main advantage of a toric IOL with a rotationally asymmetric design is that it produces a lower percentage of light loss compared to IOLs with a diffractive design. In return, more patients are potential candidates for the former IOLs, and the lens is more forgiving.

# ACUNEX VARIO TORIC AND ACUNEX VARIOMAX TORIC

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ACUNEX (Teleon Surgical) is a family of one-piece posterior chamber C-loop IOLs made of a hybrid hydrophobic, glistening-free biomaterial. Two of the four models, the ACUNEX Vario—a refractive extended depth of focus (EDOF) IOL that incorporates EDOF comfort optics—and ACUNEX VarioMax—a refractive multifocal IOL—are available in toric versions that can be used for astigmatism correction. The ACUNEX Vario model extends visual comfort and provides patients with a varifocal EDOF power without the usual side effects.[4] The lens behaves like a monofocal IOL for distance but with EDOF and no dysphotopsias. The newest model, the ACUNEX Quantum, is an enhanced monofocal IOL that enables significantly better vision in the intermediate area up to 80 cm. This lens will soon be available in a toric version.

## CASE EXAMPLES

The following four cases provide useful insight into how these IOL can be used to correct astigmatism at the time of cataract surgery, even in challenging cases.

▶ **Case No. 1.** An 83-year-old man presented for a cataract surgery evaluation in 2013 with the chief complaint of decreasing vision in his left eye. The patient was an academic who shared that he spends long hours on the computer.

His preoperative refraction was +0.50 +0.50 x 5° = 6/4 OD and +1.25 +1.25 x 5° = 6/24 OS with an addition of +2.50 D. His visual acuity was N5 OD and N12 OS. A cataract was noted in the left eye, and keratometry confirmed 1.00 D of cylinder at 3°. No toric IOL with this low of a correction was available at that time. After patient counseling, surgery was planned with the implantation of a 22.00 D Tecnis CL Z9002 (now Johnson & Johnson Vision).

At 2 months postoperative, the patient achieved 6/9 UCVA with a residual refractive error of -0.32 D. Subjectively, the postoperative refraction was -1.25 +0.75 x 180°. His UCVA was 6/4, but with an addition of +3.00 D he achieved N5.

The patient returned to our practice in October 2021, reporting decreasing vision in his right eye. I counseled the patient that a toric IOL was now available to correct his astigmatism at the time of cataract surgery. He agreed, and a 21.00 D ACUNEX Vario toric IOL with +1.50 D of cylinder was implanted.

At 1 month postoperatively, the patient reported that he achieved completed spectacle independence. In his right eye, without glasses, his UCVA was 6/4 and N5; in the left eye, his UCVA was 6/18 and N5. Binocularly, the patient sees 6/5. He reported his eyes are sometimes sore with extended computer work, at which point we performed an analysis of the ocular surface. A preservative-free lubricant was prescribed to treat minor tear film instability, and his comfort improved almost immediately.

According to the patient's satisfaction questionnaire, on a scale of 0 being the worst and 10 the best, he rated his vision as follow:

• Current overall vision = 9/10

- Distance vision = 9/10
- Computer vision = 9/10
- Reading vision = 9/10
- Night glare and halos = 5/10

▶ **Case No. 2.** A 53-year-old woman presented for a second opinion after she was not happy with the outcome of cataract surgery in her left eye, performed elsewhere in April 2018. The patient had received a diffractive AcrySof IQ PanOptix Toric (Alcon) with a power of 19.50 D and 1.00 D of cylinder in that eye. She complained of blurry vision at distance, shadowing with intermediate vision, halos, and flickering light temporally.

On presentation, her UCVA was 6/12 OD and 6/9-1+2 OS, and her BCVA and refraction were 6/6-2+1 and -0.75 -0.50 x 3° OD, respectively. BCVA in the left eye was 6/5. The near UCVA was N24 and N5 in the right and left eyes, respectively. The patient had significant dry eye disease (DED); cyclosporine ophthalmic emulsion (Restasis, Allergan) and unpreserved lubricants were prescribed. Once her ocular surface settled, a Nd:YAG capsulotomy was performed on the patient's left eye, yielding an improvement in UCVA to 6/5. The patient continued to complain of persistent halos at night, and she was concerned about having a multifocal lens implanted in her right eye. Visual acuity had deteriorated to 6/18.

The patient was counseled on her options, including the nondiffractive ACUNEX Vario Toric, and there was an in-depth conversation about the lens' material and design. She consented to surgery, and in May 2020, a 19.50 D ACUNEX Vario with a +1.50 D add was implanted. The surgery was uneventful, and the patient was extremely happy with her vision postoperatively. At 1 week, her UCVA was 6/4.5-2 and N8 OD. At 5 weeks, her UCVA was 6/4-1 and N8 OD. Also at the 5-week follow-up, UCVA in the left eye, approximately 2 years out after surgery, was 6/5-1+3 and N6. Subjectively, the patient noted better contrast sensitivity, especially at night and dusk, and seeing colors better in her right eye versus the left.

▶ **Case No. 3.** A 66-year-old avid golfer with high myopic astigmatism and DED presented with the chief complaint of contact lens intolerance that persisted even after treatment with Restasis. On presentation, her refraction was -8.25 +1.75 x 137° = 6/9 OD and -7.25 +0.75 x 43° = 6/12 OS. With an add of +2.25 D, her near vision was N5 OU. She was also able to achieve a near UCVA of N5 OU at 15 cm.

After weighing her options, the patient decided on the ACUNEX Vario Toric IOL. On the day of surgery for her left eye, a 12.50 D IOL with 0.75 D of cylinder was implanted. At 3.5 weeks postoperatively, her UCVA was 6/4-1 and N8. Surgery on her right eye was performed a few weeks later, and at that time a12.00 D ACUNEX Vario Toric with 1.50 D of cylinder was implanted. At 4.5 months postoperative—when she was able to return for follow-up after the COVID-19 lockdown—her UCVA improved to 6/6 and N12, and her refraction was -0.75 +0.75 x 76° = 6/4. She had stopped taking Restasis after surgery, but it was recommended to the patient to resume this treatment for DED. The patient was extremely happy with her outcome and reported being able to play golf without glasses or contact lenses.

▶ **Case No. 4.** A 63-year-old judge who described himself as a heavy reader presented for a cataract surgery evaluation for his second eye. He had previously undergone cataract surgery for the right eye in 2021, at which time she received a 17.50 D ACUNEX Vario Toric IOL with 1.50 D of cylinder.

On presentation, UCVA was 6/12 OU; the refraction in his right and left eyes was +0.50 +1.25 x 14° = N8 and +1.75 +0.50 x 1° = N6, respectively. Because the patient was so happy with the vision in his first eye, he elected to receive the ACUNEX in his second eye. This time, a 21.00 D ACUNEX VarioMax with 3.00 D add was implanted. At 1 month postoperative, he achieved a UCVA of 6/5 and N6. At 3 months, UCVA improved to 6/6 and N6. Binocular UCVA was 6/4 and N5. The patient was ecstatic with his outcome and said he was completely spectacle independent.

According to the patient's satisfaction questionnaire, she rated her vision as follows:

- Current overall vision = 10/10
- Distance vision = 10/10
- Computer vision = 10/10
- Reading vision = 10/10
- Night glare and halos = 10/10

## CONCLUSION

Toric IOLs have many advantages, the main being that they reduce or eliminate corneal astigmatism at the time of cataract surgery. With the right lens design, like the ACUNEX or customized LENTIS IOL models, patients can also achieve spectacle independence for most if not all visual tasks with minimal if any glare or dysphotopsia. ■

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