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CRST EUROPE

Cataract & Refractive Surgery Today

PRESBYOPIA CORRECTION

How to Choose the Right Solution for Your Patients

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How to Choose the Right Solution for Your Patients

The needs of cataract patients are changing, and with this change comes an increasing demand for spectacle independence and presbyopia correction. Patients now expect clear and excellent vision at all distances after cataract surgery, with particular emphasis on the near and intermediate ranges.

How do you achieve these expectations in patients who present at your practice, and how do you cater to their individual needs and unique ocular characteristics? The answer is simple: by implementing a treatment approach that incorporates various IOL solutions to meet the needs of all your patients.

Rayner's family of IOLs encapsulates a broad range of innovative presbyopia-correcting solutions, including a new non-diffractive extended range IOL that was developed in collaboration with Professor Graham D. Barrett, the RayOne EMV. This past summer, Allon Barsam, MD, MA, FRCOphth, implanted the world's first RayOne EMV IOL. In this supplement, learn from Mr. Barsam and other leading surgeons who have extensive clinical experience with Rayner's presbyopia-correcting IOL options on how to achieve excellent long-term visual outcomes. The pearls of wisdom shared by these surgeons relay the importance of offering patients a custom vision procedure, which includes not only the premium lens but also a strategy for tear film management and the collection of patient-reported outcomes.

With its total presbyopia correction solution encompassing IOLs, OVDs, eye drops, and patient-reported outcomes software, Rayner is leading the way in ophthalmic innovation and patient satisfaction. Find out more in Rayner's Total Ophthalmic Solution Patient Pathway infographic below and in the following pages. ■

1. Ferreira TB, Ribeiro FJ. Prospective comparison of clinical performance and subjective outcomes between two diffractive trifocal intraocular lenses in bilateral cataract surgery. *J Refract Surg*. 2019;35(7):418-425.
2. RayOne Trifocal & Sulcoflex Trifocal: Leading the way to offer more patients a trifocal solution. Eurotimes. February 2019.
3. Bhogal-Bhamra GK, Sheppard AL, Kolli S, et al. Rotational stsability and centration of a new toric lens design platform using objective image analysis over 6 months. *J Refract Surg*. 2019;35(1):48-53.
4. Data on file with Rayner.

Learn about the latest RayOne EMV clinical outcomes on page 10-11. **RayOne EMV is now FDA approved!**

RayOne Trifocal
- Patented diffractive trifocal design for industry-leading 11% light loss[1]
- Less photic phenomena and increased patient satisfaction[2]

RayOne Trifocal Toric
- Superb centration with only 0.08 mm average centration offset at 3 to 6 months postoperative[3]
- Excellent rotational and torsional stability with only 1.83° mean rotation at 3 to 6 months postoperative[3]

Sulcoflex Trifocal
- A reversible, supplementary trifocal IOL for cataract and pseudophakic patients
- Comparable visual acuity results to Rayner's capsular bag RayOne Trifocal[2]

RayOne EMV
- Up to 2.25 D of extended depth of vision (with 1.00 D offset)[4]
- Developed with Professor Graham D. Barrett to specifically enhance monovision patient outcomes

AEON
- The only eye drop family indicated for use before and after cataract surgery
- All AEON products are preservative- and phosphate-free

RayPRO
- Telehealth solution for collecting patient-reported outcomes
- Supports accreditation, auditing, clinical studies, and the promotion of surgical services
- Designed for GDPR and HIPAA compliance

Patient Selection and Satisfaction With the RayOne Trifocal and RayOne Trifocal Toric

This stable, reliable IOL provides patients with very good vision at all distances.

BY FERNANDO LLOVET, MD, PHD

Presbyopia is the second most common refractive error. Its treatment, however, is a great challenge for refractive surgeons. Some even consider it the last frontier of refractive surgery. Most recently, patient demand for presbyopia correction has increased due to a longer life expectancy, changes in lifestyles, and the evolution of work and entertainment to include more screen-based use. Further, during the COVID-19 pandemic especially, patients are paying closer attention to their own health and to the potential health risks caused by the coronavirus. It seems that more patients than ever before are interested in refractive surgery, including presbyopia correction.

Numerous surgical procedures have been described for the treatment of presbyopia. These include corneal and lens-based surgeries. As of late, the trend for surgical correction of presbyopia is toward the implantation of IOLs, especially trifocal IOLs. The RayOne Trifocal IOL (Rayner) is my lens of choice when performing cataract surgery or refractive lens exchange. A very high percentage of our patients express satisfaction with their vision at all distances with the RayOne Trifocal.

This article reviews patient selection criteria, preoperative considerations, clinical outcomes, and practice pearls with the RayOne Trifocal IOL.

PATIENT SELECTION

Knowledge of multifocality among the different IOL technologies is the first step in proper patient selection. Another crucial element is a thorough preoperative examination to test ocular suitability for a multifocal or trifocal IOL. Lastly, the assessment of patient expectations and a comprehensive explanation of patients' best IOL options are essential in the preoperative period to ensure successful outcomes and happy patients. Postoperatively, adequate follow-up including patient questionnaires will help establish patient satisfaction. When patients are dissatisfied with their vision, having access to enhancement options and other means of addressing residual refractive errors and patient complaints is imperative.

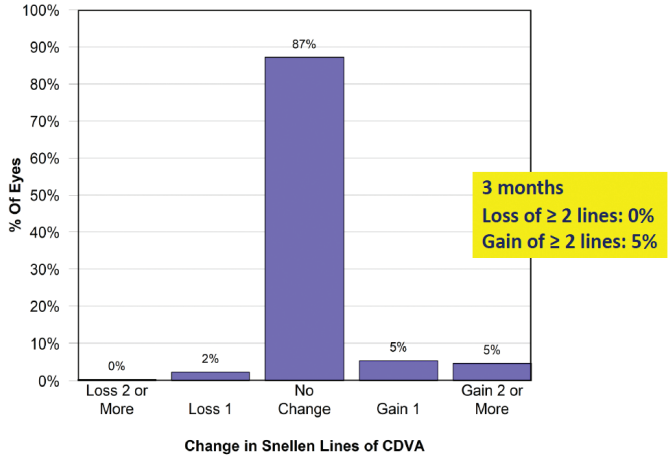

Figure 1. The loss and gain of lines of best corrected distance visual acuity.

Patients with presbyopia and those who use progressive glasses are excellent candidates for the RayOne Trifocal, provided their ocular examination does not uncover ocular surface disease, macular disease, or other contraindications to premium IOLs. Patients must understand the objectives of the treatment and the characteristics of what I like to call useful vision, or vision for normal activities such as walking, using a mobile phone, working on a computer, and reading the newspaper.

PREOPERATIVE CONSIDERATIONS

Biometry. The incorporation of biometry with optical interferometry, the use of new IOL calculation formulas, and the customization of A constants allows surgeons to obtain a highly predictable result. When patients elect the RayOne Trifocal, I target emmetropia in the first eye. If this is not achieved, I will correct it if necessary, during surgery on the second eye.

Target refraction. Regarding postoperative refraction, one piece of advice with the RayOne Trifocal: Never use the values from automatic autorefractometers (measurements are obtained between -1.25 to -1.75 D) but rather from manifest subjective refraction. The reason for this is that, unlike other trifocal diffractive IOLs, the RayOne Trifocal uses order 0 for intermediate vision.

CLINICAL OUTCOMES

We conducted a study to evaluate the refractive and visual outcomes for distance, intermediate, and near vision 3 months after cataract surgery or refractive lens exchange with implantation of a RayOne Trifocal diffractive IOL.

A total of 1,522 patients were included in the study. In 85% of them, the postoperative uncorrected distance visual acuity at 3 months was equal to or better than the preoperative best corrected distance visual acuity. The efficacy index was 0.98, and the safety index was 1.01. Nearly all patients (98.4%) either experienced no change in vision or gained lines of vision. In fact, 5% gained 2 or more lines and no patient lost 2 or more lines (Figure 1). Predictability was also high with the RayOne Trifocal, with 85.36% of patients achieving a postoperative refraction within ±0.50 D of target, and 96% within ±1.00 D (Figure 2).

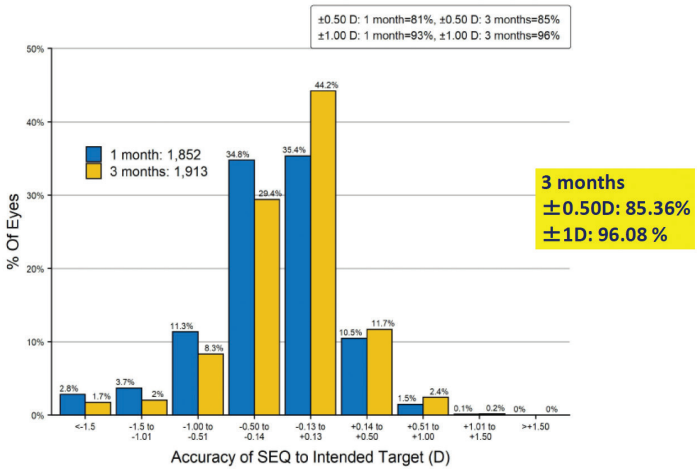

Figure 2. Predictability with the RayOne Trifocal IOL.

According to the patient satisfaction questionnaire, 96% of patients rated reading vision as normal, good, or very good; 97% rated computer vision as normal, good, or very good; and 98% rated driving vision as normal, good, or very good. Further, 97.68% of patients were either satisfied or very satisfied with the overall result of their treatment, and 97.28% said that they would undergo the same surgery again.

COMPARATIVE STUDY

We also conducted a comparative study with two trifocal diffractive IOLs, the RayOne Trifocal and the FineVision (PhysIOL). A total of 4,300 patients were included in the study; 588 received the RayOne Trifocal IOL bilaterally (group 1) and 3,796 received the FineVision IOL (group 2).

At 3 months postoperative, there was no statistically significant difference in the efficacy, safety, or predictability of the IOLs. On average, binocular uncorrected distance visual acuity was 0.03 ±0.41 logMAR in group 1 and 0.04 ±0.41 logMAR in group 2, binocular distance corrected visual acuity was 0.01 ±0.71 logMAR in group 1 and 0.01 ±0.4 logMAR in group 2, and binocular uncorrected near visual acuity was 1.92 ±0.79 Jaeger in group 1 and 1.79 ±0.77 Jaeger in group 2.

When asked about their night vision; night driving; and near, intermediate, and distance vision, patients responded similarly for both the RayOne Trifocal and the FineVision IOLs (Figure 3A). When asked about their dependence on glasses for night vision; night driving; and near, intermediate, and distance vision, again,

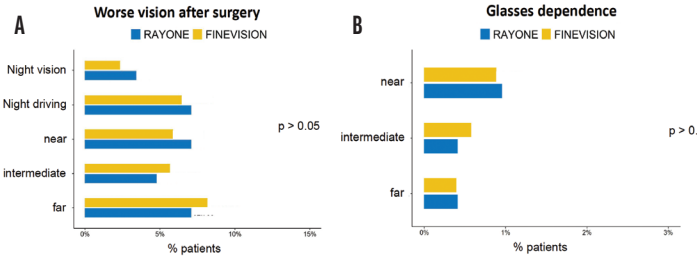

Figure 3. Night vision after surgery (A) and the rate of spectacle independence (B).

Did You Know?

- Clínica Baviera has 80 clinics across 4 countries
- More than 200 ophthalmologists are employed by Clínica Baviera
- To date, more than 1 million procedures have been performed at Clínica Baviera

the answers were similar for both IOLs (Figure 3B). There was also no difference in the number of patients who answered that they would not repeat the procedure or who were dissatisfied with their results. The overall patient satisfaction rate in this comparative study was 97.68% (Figure 4).

From these results, we concluded that these two diffractive trifocal IOL models—the RayOne Trifocal and the FineVision—provided good visual performance at all distances, with a high level of patient satisfaction and spectacle independence for most visual tasks.

PRACTICE PEARLS

Presbyopia correction with a lens-based strategy is refractive surgery. The objectives of this procedure should be to achieve emmetropia and to minimize or eliminate spectacle dependence at all distances. In my experience, this can be achieved with RayOne Trifocal in the majority of patients when proper patient selection is upheld and thorough preoperative examination and consultations are maintained.

Surgeons must counsel patients about their unique visual prognosis and explain the advantages and disadvantages of surgical options. Uncomplicated surgery and an exhaustive follow-up will help to ensure patient satisfaction and good quality vision after surgery. Further, the management of any patient dissatisfaction is mandatory. In most instances, residual ametropia after implantation of the RayOne Trifocal can be addressed easily without the need for secondary procedures.

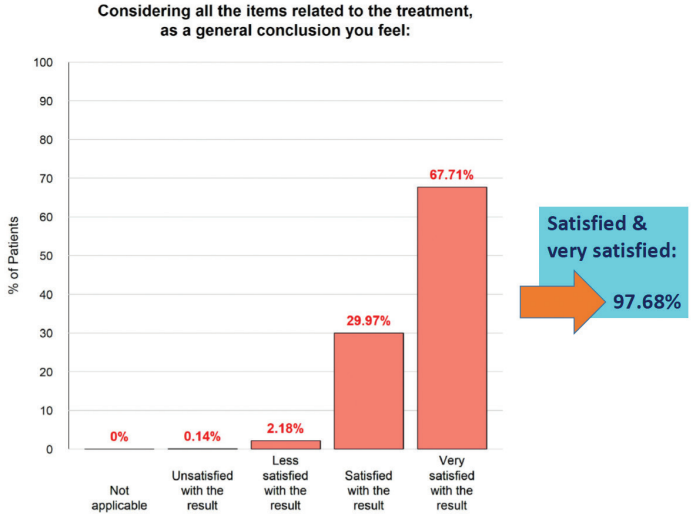

Figure 4. The percentage of patients who were either satisfied or very satisfied with their vision.

CONCLUSION

The RayOne Trifocal is a reliable IOL and my refractive lens of choice. In my experience, patients achieve good distance, intermediate, and near vision and are generally happy with their outcomes. Further, the fully preloaded injector is effortless to prepare, the handling is excellent, the IOL is stable in the capsular bag, and the optical quality is excellent. The high patient satisfaction we have seen with the RayOne Trifocal supports its use in a wide range of patients, including those with astigmatism who can benefit from the RayOne Trifocal Toric. ■

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The Sulcoflex Trifocal DUET Procedure

An overview on the optical performance of a trifocal IOL implanted into the ciliary sulcus.

BY RAMIN KHORAMNIA, MD, FEBO

Patients presenting for cataract surgery have high expectations for their visual acuity after surgery. Oftentimes, patients desire an IOL that will provide them with spectacle independence. Today, a variety of premium IOL designs are available to improve the outcomes of cataract surgery and bring patients closer to the elusive goal of spectacle independence.

Figure 1. Slit-lamp image of a primary monofocal-toric IOL in the capsular bag with a Sulcoflex Trifocal IOL in the ciliary sulcus, anterior to the primary IOL.

Image reprinted with permission. Łabuz G, Auffarth GU, Knorz MC, et al. Trifocality achieved through polypseudophakia: optical quality and light loss compared with a single trifocal intraocular lens. *J Refract Surg*. 2020;36(9):570-577.

Implantation of a trifocal IOL into the capsular bag has become the standard of care for the treatment of presbyopia. In some patients, however, spectacle independence comes at the cost of visual disturbances including halos and glare, which may result in patient dissatisfaction. One option to avoid this risk is to offer patients the option for reversible trifocality by using a two-lens combination.

The DUET implantation technique is a single surgical procedure that combines primary capsular bag lens implantation with supplementary placement of an IOL that contains trifocal elements into the ciliary sulcus.

The Sulcoflex Trifocal (Rayner) is a supplementary IOL implanted as part of the DUET technique that allows patients to achieve very good visual acuity results not only in the distance and near ranges but also the intermediate range.

OVERVIEW

The lens. The Sulcoflex Trifocal IOL is specifically designed for implantation into the ciliary sulcus. It is available in powers ranging from -3.00 to +3.00 D. In addition to using the Sulcoflex Trifocal IOL for the DUET implantation technique with a base power of 0.00 D to achieve reversible trifocality, it can also be used to correct residual refractive errors in a wide range of pseudophakic patients who have a primary monofocal or monofocal toric IOL in the capsular bag.

The surgery. During DUET implantation surgery, a primary IOL is first implanted in the capsular bag. This lens is usually targeted to emmetropia to achieve optimal uncorrected distance visual

Total postoperative cylinder should be < 1.00 D

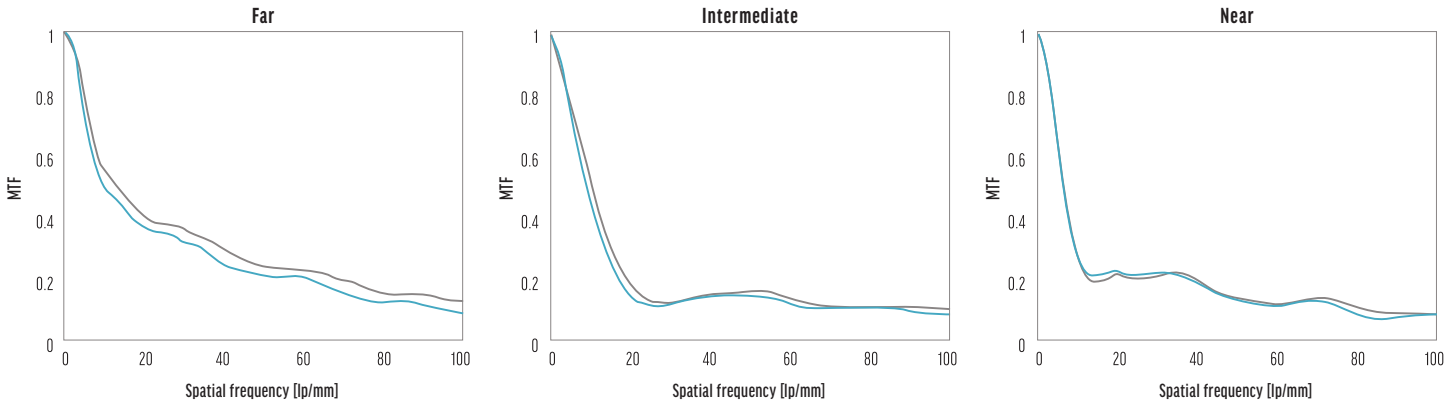

Figure 2. The MTF as a function of the spatial frequency. This graph shows the comparison between a standard trifocal IOL (grey) and a supplementary trifocal and a monofocal IOL (blue). Source: Łabuz G, Auffarth GU, Knorz MC, et al. Trifocality achieved through polypseudophakia: optical quality and light loss compared with a single trifocal intraocular lens. *J Refract Surg*. 2020;36(9):570-577.

acuity. Two paracentesis incisions are created. The main incision should be placed on the steep axis to correct a small amount of astigmatism. For more significant astigmatism, a toric IOL can be implanted in the capsular bag. After removal of the cataract, OVD is injected into the capsular bag and the monofocal or toric IOL is placed into the capsular bag. The OVD is then removed from in front of and behind the IOL. Space is created in the ciliary sulcus by injecting more OVD, and the Sulcoflex Trifocal IOL is implanted in the ciliary sulcus (Figure 1). The OVD is then removed from in front of and behind the supplementary IOL, and the pupil is constricted to prevent an optic capture.

The benefits. A reversible trifocality technique has several benefits. The biggest is that, if patients are unhappy with their vision, experience visual disturbances, or develop eye diseases that make the multifocal IOL a problem, the supplementary Sulcoflex Trifocal IOL can be easily removed from the eye even years after surgery.

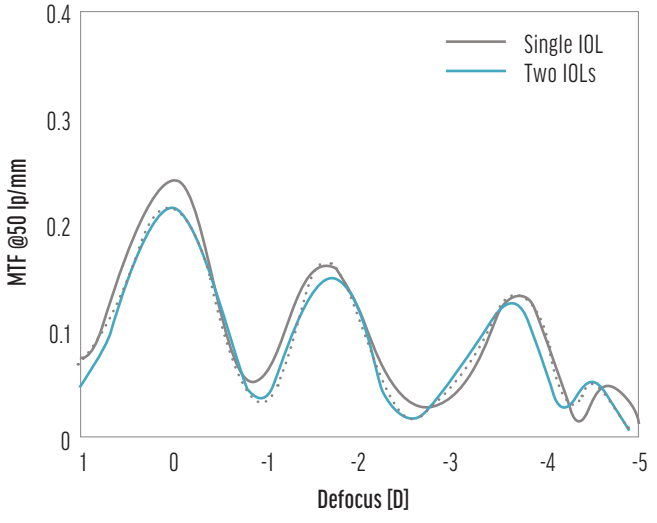

Figure 3. The through-focus MTF of a single trifocal IOL (grey) and two IOLs (blue). The dashed line shows the results of individual IOLs; the solid line shows the average value. Source: Łabuz G, Auffarth GU, Knorz MC, et al. Trifocality achieved through polypseudophakia: optical quality and light loss compared with a single trifocal intraocular lens. *J Refract Surg*. 2020;36(9):570-577.

Another benefit is that postoperative visual acuity results are very good at all distances, including intermediate. Excellent uncorrected visual acuity results in the distance, intermediate, and near ranges are possible after DUET implantation with a primary IOL in the capsular bag and the Sulcoflex Trifocal IOL in the sulcus.

CONSIDERATIONS

Optical quality. One concern with the DUET approach raised by surgeons is that optical quality might suffer when two lenses are implanted in the same eye. Our peer-reviewed research published in JRS, however, shows that this is not the case. We looked at the optical quality on the optical bench achieved with the DUET implantation technique—the RayOne Aspheric (Rayner) monofocal IOL combined with the Sulcoflex Trifocal IOL—and compared it to the optical quality achieved with a standard trifocal capsular bag IOL, the RayOne Trifocal IOL (Rayner).

Figure 2 shows the modular transfer function (MTF) that was achieved for the distance, intermediate, and near ranges with both the DUET implantation technique and with the RayOne Trifocal. The MTF curves lie very close to each other. The Strehl ratio also showed that the optical quality with both strategies was comparable. Further, the through-focus MTF curve (Figure 3) showed that the trifocal pattern is visible in the DUET approach as well as in the standard trifocal IOL that is implanted into the capsular bag.

Light transmission. Another concern with the DUET approach oftentimes raised by physicians is that light transmission might suffer by combining two lens implants in one eye. This, also, is not true. We performed a theoretical assessment of the light attenuation from surface reflections using Fresnel's equations and found that, when two lenses are implanted in the same eye, there is a reflectance of 0.8%. Interestingly, this is less than the reflectance from one hydrophobic IOL with a refractive index of 1.55, due to the lower 1.46 refractive index of Rayner's hydrophilic acrylic material. In an experimental model, again the measurements showed only a minimal decrease in light transmission, by 1.3%, with two IOLs implanted compared to a single lens implanted in the capsular bag.

WHEN TO PERFORM DUET IMPLANTATION

In my opinion, almost all patients suitable for a presbyopia-correcting IOL are suitable for the DUET procedure (an extremely shallow anterior chamber is one of the rare contraindications). It is always advantageous to have at least the option to reverse multifocality. The DUET procedure is also especially interesting for younger patients presenting for cataract surgery. For these patients, the prospect of loss of accommodation and cataract surgery is especially worrisome. Performing the DUET implantation procedure offers them the benefits of trifocality with the option to reverse that trifocality if necessary by explanting the supplementary IOL in the sulcus. Further, the trifocality that is achieved with the Sulcoflex Trifocal IOL has an equivalent optical performance to a standard trifocal IOL implanted in the capsular bag.

A reversible trifocality strategy is also attractive for young patients who might develop other ophthalmic conditions later in life and for older patients at high risk for ocular diseases. In these cases, when surgeons might anticipate potential future developments in the patients' ocular condition, such as retinal diseases, the Sulcoflex Trifocal is a great choice because it does not become enmeshed in intraocular tissue. This makes it much easier to explant than an IOL implanted in the capsular bag; the thin concave/convex Sulcoflex Trifocal lens can be removed safely and in one piece through a very small incision (sub-2.6 mm).

CONCLUSION

The combination of a trifocal Sulcoflex IOL and a monofocal RayOne Aspheric, with the DUET implantation technique, achieves good MTF performance at the distance, intermediate, and near focal points. Further, visual results with this approach are comparable to a standard trifocal IOL implanted in the capsular bag.

In our research, we did not find any disadvantages related to implanting two IOLs in the same eye, such as reduced optical quality or light loss. Therefore, the polypseudophakic approach employed in the DUET implantation technique is a safe, effective, and reversible procedure for presbyopia treatment. ■

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- Financial disclosure: Article honorarium (Rayner)

Tear Film Therapy Is Integral to Pre- and Postoperative Patient Care

BY PURVI THOMSON, BSC (HONS), MCOPTOM, DIPTP (IP)

The pursuit of successful postoperative outcomes starts well before cataract surgery. It begins before IOL power calculation, before IOL selection, and even before knowing patients' visual requirements and what they expect to achieve after surgery. Successful postoperative outcomes start with optimization of the ocular surface and tear film.

DED IS COMMON

Dry eye disease (DED) is a common condition in cataract patients. In fact, about two-thirds of patients presenting for cataract surgery have clinical signs of DED.[1] When DED is not addressed preoperatively, the risk for suboptimal surgical outcomes increases significantly. A poor tear film can affect the quality of preoperative measurements, including the amplitude and axis of astigmatism, and can lead to selecting the wrong IOL power.

At my practice, patients undergo a thorough preoperative workup that includes topography, biometry, and a DED evaluation. If signs of ocular surface disease are present, patients must undergo proper treatment and further evaluation before proceeding with cataract surgery. Treatment typically consists of gels and artificial tears such as AEON Protect Plus (Rayner), warm compression of the lids, and vitamin supplements. A short course of steroids is also considered in some patients with more severe symptoms.

We typically begin patients on artificial tears because it is the quickest way to help relieve their symptoms. Further, artificial tears help to promote a healthy tear surface layer, allowing us to obtain accurate presurgical measurements. Oftentimes, the limiting factor for the use of premium IOLs is DED. When we are able to control DED symptoms with artificial tears and other treatments, patients may then become suitable candidates for these lens technologies.

POSTOPERATIVE CARE

Patients who received DED therapy preoperatively are less likely to experience symptoms postoperatively. Some, however, will experience related symptoms including uncomfortable eyes and fluctuating vision after cataract surgery. In our practice, all patients are sent home with artificial tears such as AEON Repair (Rayner) to prevent DED symptoms and to promote wound healing and a stable tear film for optimum visual clarity. This is especially important in patients who receive toric, multifocal, and trifocal IOLs because DED can reduce contrast sensitivity.

In my experience, the combination of a thorough preoperative evaluation, selection of the appropriate IOL, and careful follow-up with inclusion of patient-reported outcomes helps to ensure that excellent visual outcomes are obtainable and patient satisfaction is high.

CONCLUSION

The treatment of DED pre- and postoperatively with artificial tears such as AEON Protect Plus and AEON Repair, two preservative- and phosphate-free eye drop formulations, helps to widen the pool of patients who are suitable for premium lens technologies. It also increases the opportunity for patients to achieve excellent and lasting outcomes after cataract surgery. ■

1. Trattler WB, Majmudar PA, Donnenfeld ED, et al. The Prospective Health Assessment of Cataract Patients' Ocular Surface (PHACO) study: the effect of dry eye. *Clin Ophthalmol*. 2017;11:1423-1430.

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Sulcoflex Trifocal in Clinical Practice

This IOL can be useful for pseudophakic enhancements and in special cases.

BY SHERAZ M. DAYA, MD, FACP, FACS, FRCS(ED), FRCOPHTH

The option of a supplementary or sulcus-fixated trifocal IOL is welcomed. I have been using the Sulcoflex Trifocal (Rayner) since early 2019 and have found it useful in many situations, including the following:

1. Primary cataract and refractive lens exchange surgery combining a monofocal or monofocal toric lens implanted in the capsular bag with the Sulcoflex Trifocal lens implanted in the ciliary sulcus (DUET procedure; see pages 5-7 for more information about this technique);
2. Pseudophakic eyes with or without a small residual refractive error;
3. Patients undergoing IOL exchange, such as those with a calcified lens or poorly performing multifocals (bifocals and extended depth of focus) in the presence of an open capsule; and
4. A posterior capsule break.

In the last situation, two IOLs are placed in the ciliary sulcus. A monofocal three-piece lens is first implanted with optic capture behind the anterior capsule, followed by a Sulcoflex with the haptics placed 90º away from the monofocal IOL.

Of the 41 cases of DUET procedures I have performed, I have not had to remove the lens due to dysphotopsias that have not been tolerated. The Sulcoflex Trifocal IOL performs similarly to competitor trifocal lenses, with no more incidence of dysphotopsias. I only removed one lens in a patient who had protracted inflammation following surgery. In this patient, who turned out to have diabetes, I elected to remove the lens because I felt the iris in contact with the lens might be the cause of the inflammation. Removal of the lens was straightforward and resolved the problem.

GOOD CANDIDATES

The majority of my patients (> 95%) undergo laser lens replacement and receive a trifocal lens. A subgroup of patients who may or may not be perfect candidates for a trifocal IOL, however, are those who may not adapt or tolerate positive dysphotopsias including halos, starburst, and glare or may be adversely affected to them based on their occupation, such as heavy goods vehicle drivers. I find that the Sulcoflex Trifocal IOL is an excellent option in these patients because the lens can be removed if necessary in a fairly straightforward manner.

The DUET implantation procedure can also be considered in patients who may develop ocular problems that affect visual performance with a trifocal lens, such as those with a strong family history of age-related macular degeneration or glaucoma. It is also an excellent option in patients who might be apprehensive about the development of visually debilitating dysphotopsias. It is reassuring for them to know that this "additive" lens technology can be removed in a facile manner, avoiding the complexities of an IOL exchange, especially in the presence of an open capsule. Further, in patients with astigmatism, the surgeon's favored toric monofocal IOL can be placed in the capsular bag in the correct orientation with the Sulcoflex Trifocal IOL implanted on top.

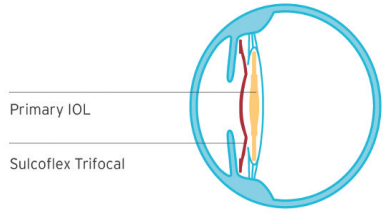

Figure 1. The placement of the Sulcoflex Trifocal IOL in the ciliary sulcus.

Lastly, providing trifocality in patients with monofocal pseudophakia is an excellent option, especially if they have a residual refractive error that is mainly spherical in nature. Surprisingly, not many pseudophakes have sought this option at my clinic (despite constant patient counseling and education). Of the 56 Sulcoflex Trifocal procedures I have performed, only four were in pseudophakic patients, which I suspect is because patients are overall pleased with their vision and unwilling to take on further risks or additional costs. The pseudophakic patients in whom we have performed this procedure were pleased because they achieved spectacle independence.

Pseudophakic patients seeking spectacle independence can find their local Sulcoflex Trifocal surgeon at www.sulcoflex.com

IOL EXCHANGE IN THE PRESENCE OF AN OPEN CAPSULE

A three-piece trifocal lens has not yet been manufactured. Therefore, a traditional trifocal IOL cannot be implanted in an IOL exchange procedure, leaving patients to make do with a monofocal lens and spectacle correction for near and intermediate vision. The opacified multifocal or unsatisfactorily performing multifocal lens is explanted. Today, however, another option for IOL exchange procedures in the presence of an open capsule is to implant the Sulcoflex Trifocal IOL. We have performed this procedure in 11 eyes, placing a three-piece monofocal lens in sulcus with posterior optic capture and the Sulcoflex Trifocal IOL on top. This in spite of a vitrectomy has provided patients with exceptionally good outcomes.

There is no need to make any alterations in lens calculation for the monofocal lens when performing the DUET procedure for IOL exchange cases. It can be quite challenging, however, to figure out the power of the monofocal implant when there is no record of the previous lens calculation or actual power of lens used. In cases where this information is available, we have not encountered any

postoperative refractive errors and have not made any adjustments to the lens power if the lens optic is situated as planned behind the anterior capsule.

IMPLANTING THE SULCOFLEX TRIFOCAL: TIPS AND TRICKS

The Sulcoflex Trifocal IOL is a large hydrophilic acrylic implant with posteriorly angulated haptics to avoid pupil block (Figure 1). During the DUET procedure, therefore, it is best to first remove any OVD posterior to the monofocal lens to simplify the maneuver and reduce the risk of decentering the posterior implant.

It is also important to ensure good pupil dilation and deepen the anterior chamber with an OVD to displace the anterior capsule posteriorly away from the iris. The latter can be achieved by first injecting the OVD behind the iris and in front of the peripheral anterior capsule and then deepening the overall anterior chamber.

I use a Lester Pusher as a second instrument to control implantation of the lens. This instrument helps to both manipulate the very large haptics as they enter the eye and to prevent the optic from inadvertently touching the endothelial surface (Figure 2). After irrigation and aspiration, I like to constrict the pupil with acetylcholine chloride intraocular solution, which helps to reassure the lens is well centered without risk of optic capture by iris tissues.

Lastly, we keep a bank of plano Sulcoflex Trifocal lenses in stock. This provides the reassurance that, in the event of a capsule break, we still have the option of providing trifocality to patients. As trouble-shooters, we regularly perform IOL exchange. Availability of a plano trifocal lens off the shelf saves us the trouble of having to place a special order for the lens.

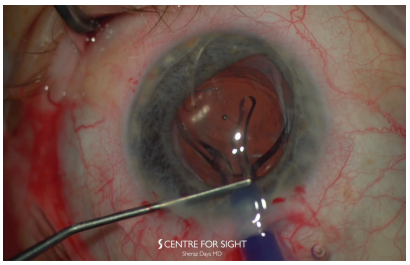

Figure 2. The use of a Lester Pusher as a second instrument helps to control implantation of the Sulcoflex Trifocal lens, manipulate the haptics as they enter the eye, and prevent the optic from inadvertently touching the endothelial surface.

CONCLUSION

In my practice, the Sulcoflex Trifocal IOL is used for a variety of situations, including those described herein. The option to implant a supplementary IOL, which we explain to patients is an additive technology that can be easily explanted if necessary, is one that I am using with increased frequency. ■

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RayOne EMV: Extended Range of Vision for Patients With or Without Monovision

When a trifocal IOL is not the answer, there are other options.

BY ALLON BARSAM, MD, MA, FRCOPHTH; AND MASARA LAGINAF, MBBS BSC (HONS), FRCOPHTH

Over the past several years, we have seen increasing interest in trifocal IOLs. These lenses represent the new gold standard of care in many instances, but they are not indicated for every patient. Those with recalcitrant ocular surface disease, irregular corneal astigmatism, macular pathology including epiretinal membranes and age-related macular degeneration, high corneal astigmatism, pseudoexfoliation, glaucoma, and Fuchs dystrophy and other corneal diseases, for instance, typically should not receive a trifocal IOL. For that matter, they probably should not receive any other kind of traditional presbyopia-correcting IOL.

Trifocal IOLs should also not be forced on patients who do not have a strong desire for complete spectacle independence or for those who do not mind wearing reading glasses. For these patients, my IOL of choice is now the RayOne EMV (Rayner).

PERSONAL EXPERIENCE

This past summer, one of us (A.B.) performed the world's first implantation of the RayOne EMV. What drew me to this lens is that it represents a premium option for monofocality; it is designed for patients to achieve more range of vision and less dependence on glasses than they typically would with a standard monofocal lens.

The advantages of monofocal IOLs are plentiful. They are cheap, forgiving of ocular pathologies, independent of pupil size, and generally do not produce glare or halos. In order to give a useful range of vision with these lenses, many surgeons target a level of monovision. This approach, however, can have downsides. Among these are a loss of stereopsis, loss of vision in the intermediate range, and anisometropia/aniseikonia. For these reasons, many patients will not accept a modest (traditional) monovision set-up with a standard monofocal IOL, and preoperative testing for acceptance with glasses or contact lenses can be necessary.

The RayOne EMV represents an alternative to standard monofocal IOLs and also to multifocal and trifocal IOLs. Developed in collaboration with Professor Graham D. Barrett, this lens is built on Rayner's RayOne fully preloaded platform. The lens extends a patient's range of vision with a patented nondiffractive optic profile that provides a depth of field similar to many presbyopia-correcting IOLs but with reduced risk of visual symptoms including dysphotopsia and a shorter time for neural adaptation. In my experience, the lens provides reliable outcomes with high patient satisfaction. An added bonus is that it is more affordable for patients than trifocal IOLs.

CLINICAL RESULTS

To date, I have implanted the RayOne EMV in more than 100 eyes. Results with this lens are excellent. If we look at the cumulative vision in the first 24 bilateral implantations I performed with a target of emmetropia, uncorrected intermediate vision (UIVA) was N6 (J4) or better in 70% of patients. These patients all achieved N8 (J6) or better uncorrected intermediate and near vision with no loss of distance vision. Based on our results (Figures 1–3), I feel comfortable advising patients that they will be independent of glasses for intermediate tasks and for social reading tasks. I also explain to patients that they should not expect to be spectacle independent for reading small print. Some patients are able to read small print without correction, with 20% of our bilateral implantations achieving N5, but it is always better to underpromise and overdeliver.

Mean Binocular UDVA (LogMAR) -0.04 ±0.05 n=24 eyes

Binocular UDVA LogMAR	No. of patients	Cumulative %
-0.1	5	41.70%
0	7	100%

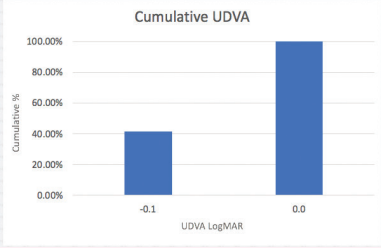

Figure 1. Uncorrected distance visual acuity at 2 weeks postoperative.

n=20 eyes

Binocular UIVA	No. of patients	Cumulative %
N6	**7**	**70%**
N8	3	100%

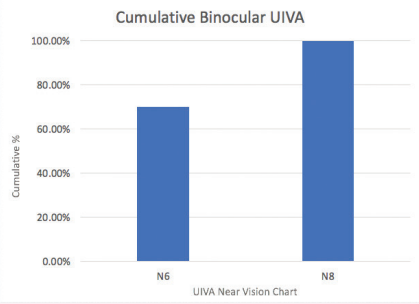

Figure 2. Uncorrected intermediate visual acuity at 2 weeks postoperative.

n=20 eyes

Binocular UNVA	No. of patients	Cumulative %
N5	2	20%
N6	**5**	**70%**
N8	3	100%

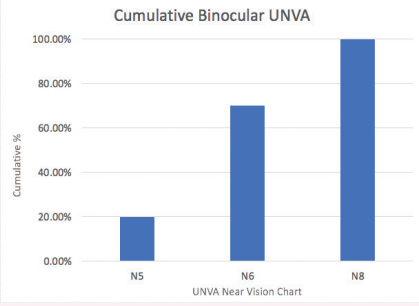

Figure 3. Uncorrected near visual acuity at 2 weeks postoperative.

There have been no complaints from patients about dysphotopsias or quality of vision and no compromise in distance vision. Overall, I have found that this lens achieves the distance vision one would expect with a monofocal lens. Additionally, I have not needed to perform a single refractive enhancement with the RayOne EMV.

The refractive accuracy with this IOL is also encouraging. Even in my earliest cases, 42% of patients were between -0.50 to -0.14 D and 46% were between -0.13 and +0.13 D of the target refraction.

PATIENT COUNSELING

Many patients understand that a standard monofocal IOL will either provide good distance vision or good reading vision, but they don't think about the consequence of the loss of intermediate vision, particularly in a traditional monovision set-up. In my experience, patients who are not counseled on this loss will be unhappy about that postoperatively.

Another important part of the informed consent process is counseling patients on the benefits and drawbacks of all IOLs. The aspheric optic of the RayOne EMV induces a small amount of extra positive spherical aberration designed to give patients increased depth of focus without compromising their quality of vision. Patients must understand, however, that spectacle correction may be required for reading small print.

The RayOne EMV is my go-to lens because it provides almost all patients with good uncorrected intermediate vision without sacrificing distance vision, and patients may also gain useful near vision. I don't believe that there's another monofocal IOL available like this. An added benefit is that it does not require the chair time that is typically spent counseling patients on a trifocal IOL.

If using a traditional monovision approach, the best patient population to start with would be those who do well with monovision contact lenses or spectacles. Personally, I do not like to target significant monovision—in other words, more than 1.50 D of anisometropial difference between the two eyes—because it can increase the chance that a refractive enhancement will be needed (Table).

The only patients for whom I would shy away from using this lens would be those with specific contraindications, such as when there is concern over the centration of the lens (zonular problems), those who want total spectacle independence, and those with significant corneal astigmatism (a toric version is not currently available).

PREOPERATIVE CONSIDERATIONS

With the RayOne EMV, I use the same A constant that I use for all of the IOLs on the RayOne platform, which is 118.6 with the SRK-T formula. I've found that the postoperative refraction can be slightly more myopic than you might expect. The manufacturer has confirmed that this is an expected function of the extra positive spherical aberration on the optic. I have observed that, with this lens, a plano outcome is not required to achieve excellent distance vision. This is presumably due to the broader refractive landing zone. Rather than targeting 0 or the closest negative number to what is expected in the dominant eye, with this lens I target the closest positive number to what is expected. I now target about -0.25 to -0.50 D in the nondominant eye.

TABLE. TYPES OF MONOVISION

Type of Monovision	Mini	Modest	Full/Traditional
Diopter Offset (differential in refractive target)	0.25 to 0.75 D	0.75 to 1.50 D	1.50 to 2.50 D

Using the RayOne EMV with this low amount of monovision will still give the patient good distance vision if the refractive target is not spot on in the dominant eye. It is a very forgiving IOL.

PRACTICE PEARLS

Initially, I targeted emmetropia bilaterally with the RayOne EMV. Over time, I found that the lens is forgiving of mini-monovision. Now, I target on average -0.37 D in the nondominant eye. With this target, the lens provides about an extra 1.50 D of depth of focus compared to a standard monofocal IOL. This amount of extra depth of focus, paired with a slightly myopic aim, helps patients achieve significantly more reading vision in their nondominant eye, without compromising intermediate and distance vision. Patients also have a better chance of achieving spectacle independence for near-vision tasks. I wouldn't expect them to be able to read small print in a newspaper or book for extended lengths of time, but they may be able to scan text or see something up close. Most patients are ecstatic with this.

I have also been using the RayOne EMV more often in my laser vision correction patients. I find that patients who already have some negative spherical aberration do well with this lens because it improves their quality of vision. And in patients with a small amount of positive spherical aberration, this lens will amplify that and increase their depth of focus.

There remains a huge unmet need in presbyopia correction. Many patients and even some cataract surgeons don't think about refractive cataract surgery as a treatment for presbyopia. But patients' visual demands and expectations can be met with a variety of IOL designs, including the RayOne EMV. Lens technologies can make a huge difference to the lives of our patients, and I think they should always be considered as a strategy for refractive correction, including presbyopia.

CONCLUSION

The RayOne EMV can easily be the lens that helps surgeons go from being a standard lens surgeon to a premium lens surgeon. It is a natural, easy transition for most surgeons to make, and it provides patients with good quality distance and intermediate vision along with useful near vision for many, particularly with a mini-monovision approach. ■

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Catering to the individual needs and ocular characteristics of cataract patients is crucial. The only way to meet the expectations of all patients is to incorporate a treatment approach that includes a broad range of IOL solutions. Rayner's line of innovative presbyopia-correcting IOLs ensures that you have a solution for every patient (Figure). To learn more about the company's market-leading presbyopia-correcting lens portfolio and total IOL solution, contact your local Rayner representative today or email *marketingteam@rayner.com*.

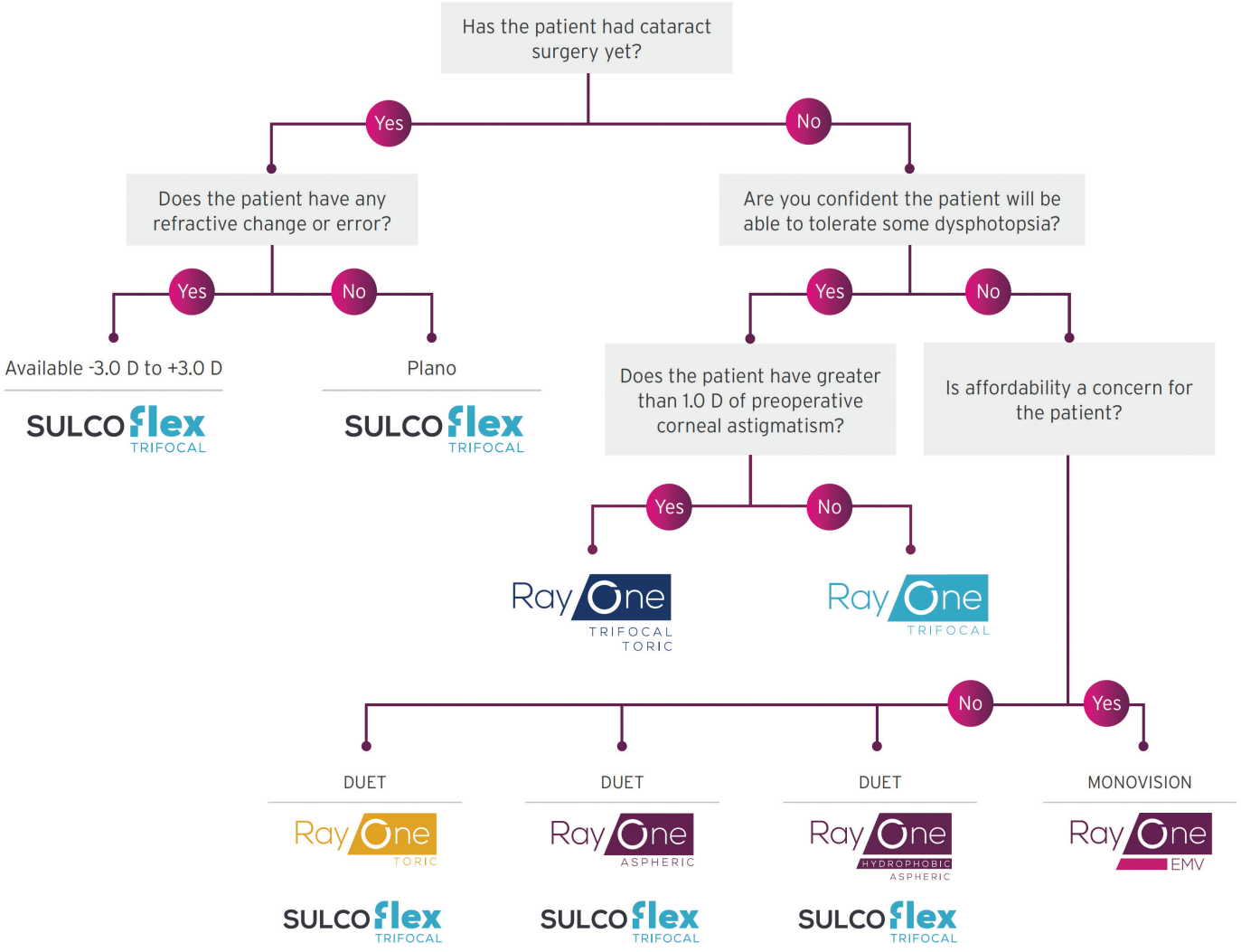

Figure. Rayner's line of innovative presbyopia-correcting IOLs.

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