EXTENDING THE RANGE OF FUNCTIONAL VISION FOR CATARACT PATIENTS

Advanced IOL designs are giving patients a better chance of achieving the postoperative vision they want while expanding the indications for customized surgical approaches.

BY SEBASTIAN B. HEERSINK, MD

As cataract surgeons, we are continually refining our approach to give patients a better chance of achieving the postoperative vision they want. Because of the sophisticated lens technology that has come to market over the past 5 to 10 years, the chances of hitting the refractive target have increased. In the end, we should not ask our patients to settle for "good enough" when the capability to achieve "even better" is well within our current skillset.

One of the more intriguing concepts in lens design to come out in recent years is the idea of using depth of focus to correct presbyopia. Presbyopia correction has typically been associated with multifocal and trifocal IOLs. By way of brief background, if the lens provides a single focal point, it is categorized as a monofocal. If the lens provides two or more focal points, it is categorized as a multifocal. Bifocal IOLs have two focal points, and trifocal IOLs have three focal points. An extended depth of focus (EDOF) IOL has a longitudinally extended focal point. The term multifocal is also often applied to EDOF IOLs. The AAO defines depth of focus as the range at which the lens provides a mean acuity of at least 0.2 logMAR.

Presbyopia-correcting implants may be unsuitable for a significant percentage of patients due to cost concerns, because of the risk of dysphotopsias, or because their visual system does not support multifocality. To answer the need for a lens option that would be suitable for patients desiring spectacle independence, but who may not be candidates for a diffractive or refractive trifocal or multifocal IOL for whatever reason, Rayner has introduced RayOne EMV, which launched in October 2020. The technical specs tell us the lens has an induced spherical aberration in the center and a blended edge region with gradually reduced longitudinal spherical aberration to maintain contrast in the peripheral viewing area. Benchtop testing suggests that this design complements the eye's natural spherical aberration, providing approximately 1.25 D of extended range of vision when implanted targeting bilateral emmetropia compared to a standard monofocal IOL. But what really matters is when we bring the technology to the clinic and ask, "are patients satisfied with their final vision?"

So far, our patients are answering in the affirmative.

> "[With RayOne EMV] we were getting around 20/25 distance acuity with a maximum of 1.50 D anisometropia, and yet these patients were measuring reading vision of J1 to J3 at near."

EARLY EXPERIENCE

One reason our clinic was comfortable being an early adopter of RayOne EMV is previous experience with Rayner lenses: RayOne EMV is delivered using the same preloaded injector as other Rayner IOLs, and it has the same double C haptic design, which gave us confidence for centration and stability. Based on what we saw in the clinical data, we decided to start implanting the lens in a limited series of patients to learn about its performance in the real world.

In those early cases in patients who wanted high-quality distance vision, we were getting to around 20/25 distance acuity with a maximum of 1.50 D anisometropia, and yet these patients were measuring reading vision of J1 to J3 at near with an average of 20/40 to 20/50 distance acuity in the eyes targeted for near vision, which was also well tolerated. Overall, RayOne EMV appeared to be delivering extended depth of focus through all viewing zones, and we were able to accomplish that without pushing the offset to a point that risked delayed neuroadaptation or loss of binocular depth perception.

One of the other things we learned in early experience with RayOne EMV was that the patient conversation was quick and straightforward. We did not have to spend a lot of time discussing the potential for glare and halo, and instead, we could focus on learning about postoperative vision goals so we could tailor the surgical plan appropriately.

As part of our cataract evaluation, we use a diagnostic platform that measures corneal spherical aberration to help us

> "When we offer RayOne EMV to patients with preexisting eye conditions, we are giving them an option that can achieve increased range of vision without spectacle dependence."

customize the lens choice and determine whether a patient's optical system will support multifocality. In the past, when the answer was no, we were able to offer monovision but would be compromising either the near vision or risking difficulty with anisometropia in patients who had not used monovision previously. Now, with an EDOF option that provides very good near vision with lesser amounts of monovision, I introduce the option of using monovision with RayOne EMV without having the patients undergo a contact lens monovision trial. This has improved our efficiency and gives patients an option to reduce the need for spectacles with a lesser amount of anisometropia.

The data we gathered from the early experience confirmed our decision to offer RayOne EMV IOLs in monovision patients. While in a small sample size (N = 47 eyes), in our retrospective analysis, it has outperformed my expectations and the feedback from patients has been very positive. After the patient's first eye surgery, which I set for near, patients return for their second eye evaluation less anxious about their visual outcome because many already have functional vision at distance in the near implanted eye, and their satisfaction with the quality of near vision has been very high.

AN OPTION FOR EYES WITH PREEXISTING EYE CONDITIONS?

In order to have a true evaluation of a new lens like RayOne EMV, I prefer to see how it performs for patients with coexisting eye conditions, such as mild anterior basement membrane dystrophy, dry eye, Fuch dystrophy, early age-related macular degeneration, and glaucoma. Because the profile of RayOne EMV is similar to a standard monofocal, it should avoid the loss of contrast and dysphotopsias that make multifocal and trifocal lenses unsuitable in this subset of patients. On the other hand, due to RayOne EMV's extended depth of focus, we can still offer these patients an alternative to a standard monofocal that has a better chance of achieving quality postoperative vision across a range of distance from intermediate to near vision. In essence, because the existence of another eye disease does not obviate need for a refractive outcome, we have used RayOne EMV in patients with mild coexisting eye disease, and it has performed well for patients who were not good candidates for other presbyopia-correcting lens options.

We recently gathered data on a series of 28 patients, 9 of whom had preexisting eye conditions (N = 2 glaucoma treated previously with MIGS; N = 2 retinal disease; N = 4 ocular surface disease; N = 1 Fuch dystrophy). Rayner contraindicates the use of RayOne EMV with active ocular disease such as chronic glaucoma not responsive to medication, but in these cases the patients presented mild comorbidities and I decided to proceed. The mean preoperative target was -0.60 D (range, +0.49 D to -1.58 D). At the week 1 postoperative visit, the mean result was -0.78 D (range, +0.25 D to -2.25 D) and mean uncorrected distance visual acuity was 20/25 (Max, 20/40; Min, 20/20), while the mean uncorrected near visual acuity was J1 (Max, J2; Min, J1+).

Counseling patients with coexisting pathology about outcomes after surgery with RayOne EMV is similar to those patients without pathology. Of course, there is a need to educate them that their preexisting eye condition may be an obstacle in achieving the kinds of results typically associated with cataract surgery. At the same time, these patients are often more appreciative of the functional vision we can provide because they are seeing better than they ever thought they would or could. In my hands, when we offer RayOne EMV to patients with preexisting eye conditions, we are giving them an option that can achieve increased range of vision without spectacle dependence.

CONCLUSIONS

As eye surgeons, we are very fortunate to have access to a steady stream of new lens technologies over the past 5 to 10 years that give us and our patients a wider array of options to individualize IOL choices based on the postoperative vision goals of each patient. The parallel improvement in diagnostic and measurement capability means we have more predictable and accurate outcomes while minimizing refractive surprises.

RayOne EMV is an interesting option that provides patients with the benefits of extended depth of focus. In my hands, it has been a great option for patients targeting emmetropia, as well as those desiring more intermediate or near postoperatively. Although we have only used it in a limited number of patients with preexisting eye conditions to date, the early data suggest it is also a viable option in this subpopulation, implanted either unilaterally or bilaterally. We are looking forward to gathering more data in patients with ocular surface disease, glaucoma, retinal pathologies, and other diseases that typically preclude the use of anything other than a standard monofocal IOL. ■

SEBASTIAN B. HEERSINK, MD
- Cataract and laser refractive surgeon and cornea specialist with Eye Center South, multiple locations in Alabama, Georgia, and Florida
- sheersink@gmail.com
- Financial disclosures: Consultant/Advisor (Iridex, Rayner, Zeiss); Equity Owner/Investor (Iunovus); Research/Grant Support (AbbVie/Allergan, Alcon, EyePoint Pharmaceuticals, Genentech, Glaukos, Johnson & Johnson Vision, Ivantis, Kala Pharmaceuticals, Lenstec, Nicox, Sight Sciences)