Evolution of Indications for Presbyopia-Correcting IOLs

Are we close to achieving true multifocality?

BY FRANCESC DUCH, MD

Refractive, diffractive, accommodating, bifocal, trifocal—today, presbyopia-correcting IOLs are available in many different designs, for almost every indication. But which is the best IOL to treat presbyopia? Are these premium lenses suitable for all patients? Can we finally be rid of all possible associated side effects? Can we guarantee 100% spectacle or contact-lens independence?

Attending some meetings and listening to certain speakers, the answers are resounding yeses. I feel like a kid in Disneyland when reports indicate that every new IOL is better and brighter than the previous generation, and the best refractive results and patient satisfaction are always guaranteed.

However, when I look at my results with presbyopia-correcting IOLs, my efficacy index is not as high as what has been reported by my colleagues and, in some cases, UCVA has fallen to 20/30 because of a mere 0.50 D of residual astigmatism. Some of my patients continue to complain of visual disturbances and unsatisfactory quality of vision, even after achieving 20/20 UCVA. Is it the IOL's fault, or is it surgeon-induced error? I will be back to attend more meetings, making every effort to understand whatever it is that I might be missing. Meanwhile, I continue to appreciate the evolution of indications for multifocal and accommodating IOLs to their current advanced state.

LESSONS LEARNED

In more than 95% of patients I treat for presbyopia, I perform refractive lens exchange (RLE) and implant a presbyopia-correcting IOL. However, this was not always the case. More than 15 years ago, I implanted monofocal IOLs for RLE—and for standard cataract surgery—because of the night vision problems (halos and glare) associated with older refractive IOL models. But after experiencing the benefits of modern presbyopia-correcting IOLs, including the AcrySof ReStor AD1 (Alcon), Lentis Mplus (Oculentis), FineVision (PhysIOL), Crystalens AO (Bausch + Lomb), and Sulcoflex (Rayner Intraocular Lenses Ltd.), my indications for presbyopia-correcting IOLs have progressed from 0% to a 99% implantation rate (Figure 1). This evolution involved learning a few valuable lessons.

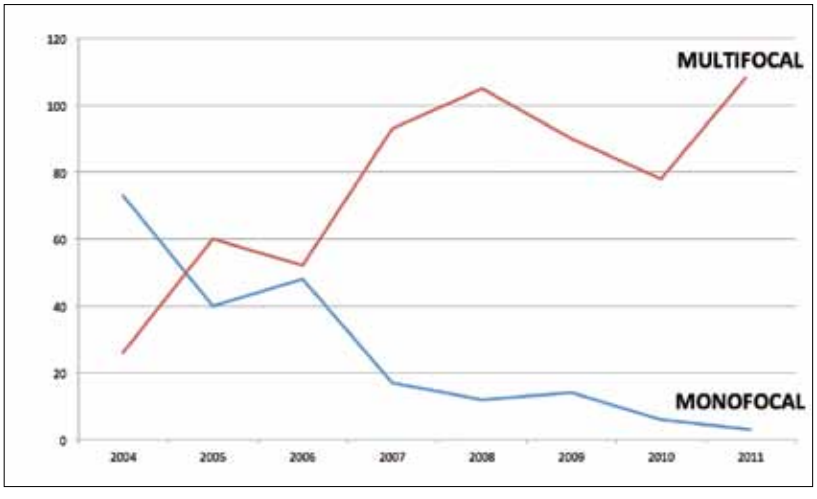

Figure 1. Personal data for RLE surgery: Monofocal (blue) versus multifocal (red).

Lesson No. 1: Newer multifocal IOL designs represent a major step toward achieving optimal presbyopia correction. The current crop of multifocal IOLs provides better, more predictable,

TABLE 1. REFRACTIVE RESULTS AFTER RLE AND FINEVISION IOL IMPLANTATION (41 EYES)

	1 month	3 months	6 months
Sphere	0.02	0.09	0.10
Cylinder	-0.51	-0.45	-0.42
Spherical equivalent	-0.14	-0.11	-0.01
Predictability / Spherical equivalent (Percentage of eyes)	±1.00 D (100%0	±0.50 D (79%)	±0.25 D (62%)

and more stable outcomes compared with other surgical procedures such as presby-LASIK, Intracor, intrastromal corneal inlays, and scleral techniques. Although I perform presby-LASIK in selected cases, I am waiting for reports of better results with other procedures before proceeding. I prefer newer multifocal and accommodating IOLs over corneal surgical correction because these lenses have demonstrated positive impacts on patient quality of life.

Lesson No. 2: Targeting emmetropia is mandatory. My initial experience with multifocal IOLs was with the diffractive apodized technology of the AcrySof ReStor SN6AD3. Like many other surgeons, I soon realized that the good results I obtained were not good enough, and problems with intermediate vision and halos were quite common. But most of all I found that, if my goal was to fulfill patient expectations, I had to plan my surgery based on a refractive target of emmetropia. However, targeting emmetropia was not popular among many surgeons at the time, and concepts such as aiming for a low amount of residual against-the-rule astigmatism, micro-monovision, and mix-and-match were prominently defended.

Still, it became evident to me that eyes with diffractive apodized multifocal IOLs did not tolerate any residual refractive defect. In other words, a seemingly perfect surgical procedure could result in 20/30 distance UCVA because of 0.50 D of astigmatism.

Achieving emmetropia with a multifocal IOL requires careful biometry, precise IOL power calculation, and a well-planned incision size and position (clear cornea, temporal, steep meridian). In some eyes, a toric multifocal IOL is indicated. Additionally, patients must be informed that laser retreatment may be needed in case of undesirable residual refractive defects. Preoperative topography and pachymetry are recommended to assist in potential laser enhancement planning.

I believe that we should present our refractive results based on the percentage of cases that achieve residual spherical equivalents within ±0.25 D of target, rather than 0.50 or 1.00 D (Table 1). New devices for intraoperative wavefront measurements and biometry may help us to improve our results.

Lesson No. 3: Accommodating IOLs provide excellent quality of vision and are a great alternative in eyes with corneal irregularities. At the same time I started implanting modern multifocal IOLs, I also started implanting accommodating IOLs such as the Crystalens HD and AO in selected patients. Although binocular near UCVA was only sufficient with these lenses (J3–J5), overall visual quality was excellent and distance UCVA was very good.

I tend to implant accommodating IOLs in eyes with myopia or hyperopia associated with corneal irregularities, such as eyes that previously underwent radial keratotomy or excimer laser treatment with a decentered or small optical zone, or in eyes with poor contrast sensitivity due to glaucoma or macular degeneration. In these situations, an accommodating IOL provides good overall quality of vision, good far vision, and acceptable near vision.

Lesson No. 4: Let time and experience redefine your indications for presbyopia-correcting IOL designs. The first consideration in IOL selection is to understand your patient's expectations. What are his or her profession and hobbies? Is near, intermediate, or far vision most important? During this discussion, I always adopt the attitude of a physician, not a salesman.

Second, determine whether the patient is a candidate for cataract surgery or RLE. Although the goal is the same, I prefer not to implant a multifocal IOL in cataract patients with concomitant age-related macular degeneration, glaucoma, or pseudoexfoliation—common findings among patients of this age group. Additionally, patients 65 years of age and older who I see in my practice are generally not as interested in spectacle independence as younger patients, and therefore a monofocal IOL may be a better choice. Over the past few years, 30% of my cataract surgery patients have opted for a multifocal IOL. I predict this proportion will change when the baby boomers are ready for cataract surgery, as they are more demanding than the current generation of patients presenting for cataract surgery.

On the other hand, I always recommend multifocal IOL implantation for RLE, as long as the patient is a suitable candidate with good BCVA, regular corneal topography, no signs of dry eye, good contrast sensitivity with a perfect macula, and a good dynamic pupil range (3–7 mm).

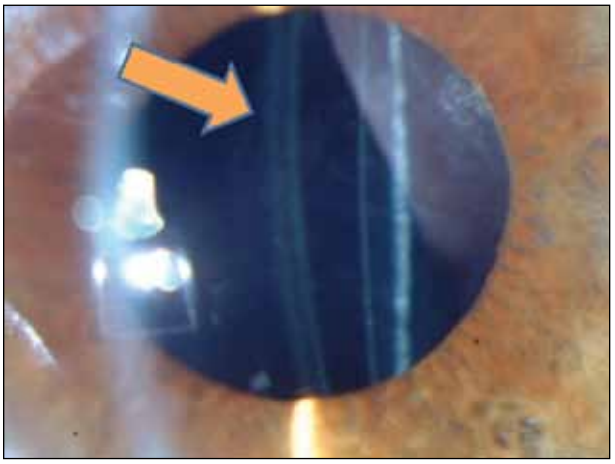

Figure 2. The Sulcoflex refractive multifocal supplementary IOL in situ.

I perform RLE in hyperopic patients who are older than 45 years and, to minimize the risk for retinal problems, in myopic patients who are over 50 years of age. I always remind them that, although the surgical objective of RLE is spectacle independence, supplementary correction with glasses may be required for certain jobs, hobbies, or activities. I do not perform RLE in emmetropic patients. When the emmetropic patient does not understand why I did not recommend surgery, I suggest he or she ask a better surgeon for a second opinion—I am still not good enough to guarantee the maintanence of perfect distance UCVA with plano refraction.

PERSONAL PREERENCES

I prefer the AcrySof ReStor AD1 when a patient's main objective is outstanding near UCVA. I like the Lentis Mplus for patients with astigmatism because of its stable outcomes; however, I avoid implanting this IOL in eyes with small pupils. I recommend the FineVision as my first choice because of its excellent vision outcomes at all distances, and I also recommend this IOL for patients with moderate reduced contrast sensitivity. I prefer the Crystalens AO when good overall quality of vision is mandatory. I have also implanted the Sulcoflex as a supplementary refractive lens in patients with monofocal pseudophakia (Figure 2).

Besides their use in standard cataract surgery patients, indications for presbyopia-correcting IOL implantation have expanded in new directions. Now, young patients with monocular cataracts, those with anisometropia, and even patients with amblyopia can benefit from these technologies. I have had excellent results with high patient satisfaction in these situations, as long as the patient understands the performance limitations in certain conditions such as dim light.

Although strict patient selection is advised, we should be open to investigating other new indications for presbyopia-correcting IOLs. For example, I recently implanted a Lentis Mplus toric IOL in a 51-year-old woman with bilateral high astigmatism and a 5.00 D spherical anisometropia and amblyopia in her left eye. After surgery, she achieved binocular distance UCVA of 20/25 and near UCVA of J1. In the amblyopic eye, her BCVA improved from 20/60 to 20/30. She is much happier than many of my patients who achieve 20/20 distance UCVA and J1 near UCVA.

TAKE-HOME MESSAGE

- Achieving emmetropia with a presbyopia-correcting IOL is mandatory; it requires accurate biometry, precise IOL power calculation, and a well-planned incision size and position.
- There is no one-fits-all presbyopia-correcting IOL, but the availability of multifocal IOLs with different characteristics helps us to select the best lens for every patient and provide good overall near and far UCVA.
- Although strict patient selection is advised, we should be open to investigating new indications for presbyopia-correcting IOLs such as monocular implantation, amblyopia, and anisometropia.

CONCLUSION

Presbyopia-correcting IOLs are, in my opinion, currently the best lens-based surgical method to obtain maximal visual quality and increase the likelihood of spectacle independence. Indications have evolved in new directions, allowing us to treat more patients and different types of eyes. However, modifications can still be made to further improve quality of vision.

I do not trust radical *never use* or *always use* recommendations, as there is enough variety of presbyopia-correcting IOLs to find the best lens for every patient. In the future, it is my hope that we can achieve complete and natural restoration of accommodation by refilling the capsular bag with an appropriate material. Although currently available multifocal IOLs achieve excellent postoperative results, I am eager to find a lens that achieves true multifocality, an optical design that does not diminish contrast sensitivity, and a haptic design that guarantees perfect stability, centration and, highly predictable refractive results. ■

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