

When My Time for Cataract Surgery Comes

Five surgeons were asked to choose an IOL for their own cataract procedure and explain the rationale for their choices.

Modified Monovision Works for Me



By Neiel Baronberg, MD

Before acknowledging a medical opinion regarding one's personal implant preferences, it is useful to share something about the surgeon and the source of his or her perspective. What is his or her background, surgical style, and attitude toward the atmosphere surrounding any controversy regarding IOLs? The nonpeer-reviewed journals are replete with opinions, generally from high-volume, comanaging surgeons. These individuals do not have the pulse of the average general ophthalmologist serving Middle America. Perhaps my take is a bit more grounded than the attitudes of the rest of us. Then again, maybe not.

BACKGROUND

I am 70 years old and have been in practice for 40 years. My participation in innovation can be called conservative. I have usually waited to see reported results before forging ahead with new technology. My transition from extracapsular surgery to phacoemulsification and then to IOLs has been a slow but steady trajectory incorporating all innovations when I felt appropriate, not when industry assured me of what the modern surgeon should be using. At this time, I am performing less surgery than previously in my career, and I have not implanted multifocal lenses. I am not alone, as published surveys indicate that a substantial number of my colleagues are also adopting a wait-and-see attitude with respect to bifocal IOLs. In fact, at national meetings, it is not unusual to see less than 50% of hands raised in favor of bifocal lenses when ophthalmologists are queried about their preference for themselves.

PREMIUM IOLs

The attraction of multifocal (or as the industry wants to label them, *premium IOLs*), seems to me quite aggressive given the current rates of satisfaction. The thrust toward the use of these lenses is gaining adherents despite only a limited vigorous evaluation. This is my conservative observation; I accept that many of ophthalmology's notable technological advances stem from greater risk-taking and innovation among the leaders in the field. That alone provides the track record, and for me, it is insufficient.

That is not the way I make decisions as I practice medicine. Anecdotal reports of explanation, of dissatisfaction, of results less than expected, and of unhappy patients are not rare among multifocal lens recipients. Patients' reported preference for monovision are out there. Concerns regarding glare, diminished contrast sensitivity, higher-order aberrations, and inadequate vision indicate to me that multifocal lenses need more work. I read with skepticism about the nebulous concept of neuroadaptation, and it seems to me a high-minded way of saying, "go home and get used to it." Pilocarpine or brimonidine should not be needed after cataract surgery to deal with unexpected aberrations postoperatively.

I am part of a generation that does not cherish convenience and does not have difficulty accepting the aging process. Throwing away my glasses has never entered my consideration, and my minimal myopic and bifocal correction has never interfered with my participation in sports. Not nearing the need for cataract surgery yet, I will have enough time to watch the scene unfold before leaping on the so-called premium bandwagon.

CONCLUSION

If I needed cataract surgery today, I would opt for monofocal implants providing modified monovision and

leaving me with 1.25 D of myopia in my nondominant eye. This result would cover a large percentage of my needs, and I would be happy to wear overcorrecting progressive bifocal spectacles to fill in the gaps if necessary. My second choice would be bilateral Crystalens IOLs (Bausch + Lomb). I would accept the probable lack of perfect near vision. I would have surgery performed on my nondominant eye first. If not completely happy, I would want a monofocal distance lens in my second eye.

Neiel Baronberg, MD, is an associate clinical professor at the University of Colorado Health Sciences Center in Denver, and he is in private practice part time. He acknowledged no financial interest in the product or company mentioned herein. Dr. Baronberg may be reached at njbaron@frii.com.

An Aspheric Presbyopia-Correcting IOL Suits My Needs



By Steven J. Dell, MD

I have had the opportunity to operate on several ophthalmologists, and I always appreciate it when the physician-patient avoids the huge temptation to micromanage his or her own case. As a patient, I do not know if I would have the discipline to avoid offering my two cents. If I were to require cataract surgery, my choice of IOL would be governed by my desire for high visual quality coupled with some degree of presbyopic correction.

COMPARISON

At one end of the spectrum lie bilateral aspheric monofocal implants that are targeted for distance correction; this type of lens would provide me with optimum visual quality. I do not think there are convincing data to support the notion that any type of IOL in this category is superior to any other in terms of performance. Another reasonable alternative for me would be to receive monofocals for monovision. This approach compromises distance vision somewhat, and if the near eye is set for a normal reading distance, intermediate vision would be difficult.

MULTIFOCAL

If I could tolerate a reduction in visual quality in exchange for increased visual quantity, a diffractive multifocal lens would be an option. I implant diffractive

multifocals unilaterally, which is an amazingly well-tolerated and underused application of this technology. I typically place these lenses in nondominant eyes, but this seems to be less important than I originally thought.

Having used all of the available diffractive multifocals, I favor the Tecnis Multifocal IOL (Abott Medical Optics Inc.) for its excellent near acuity, even in dim light, and overall good visual quality. Coupling a diffractive multifocal in the patient's nondominant eye with an accommodating IOL in his or her dominant eye works well; the patient's intermediate vision is excellent with the latter, and his or her near vision is excellent with the former. Distance vision is superior with an accommodating IOL. Essentially, these two lenses beautifully complement one another. As with any presbyopia-correcting solution, achieving the refractive target is critical to make this work.

MY CHOICE

My preference would steer me away from a diffractive multifocal in my eyes, because I have a difficult time tolerating reduced visual quality. I can adjust to a bit of monovision. Although bilateral accommodating IOLs such as the Crystalens (Bausch + Lomb) provide good-quality distance and intermediate vision, the near vision is insufficient for most tasks, unless some amount of monovision is employed. Most of my patients do very well with a target of -0.75 D in their nondominant eye, but I believe I could adapt to even a bit more than that. Contact lens simulation of the planned degree of defocus (-0.75 to -1.25 D) would be helpful.

I would opt for the Crystalens because of its long track record. Using this IOL for mini-monovision allows spectacle independence for nearly all tasks. The flexibility of this system is excellent. If, for example, I planned a long drive at night and I desired optimal distance vision, a daily disposable soft contact lens for the monovision eye would be an option.

My first choice for an IOL model would be the Crystalens AO, simply because, in my experience, it provides the best overall visual quality of any presbyopia-correcting IOL. The Crystalens HD provides slightly better near vision than the Crystalens AO, but the former may slightly reduce image quality for some patients when compared with the Crystalens AO. This difference in image quality is essentially imperceptible to most patients, but it would cause me to rank the HD as my second choice for an IOL. Importantly, I would want to be sure that my surgeon either hit my refractive target with cataract surgery or enhanced my outcomes postoperatively with laser vision correction to achieve that goal.

CONCLUSION

I think it is important to mention that this theoretical recommendation is specifically individualized for me. I might have a very different set of suggestions for someone else. After an exhaustive discussion of every conceivable IOL option (and a few inconceivable ones as well), a patient recently asked me what I would do for my own eyes if I had her cataracts. I replied that I am a 6' 3" man with long arms who performs microsurgery. She is a 4' 11" woman who, evidently, spends 10 hours a day researching IOL options on the Internet. Our visual demands are totally different, and our IOLs should be, too. When she inevitably reads this article at www.CRSToday.com, I hope she is smiling.

My genuine wish is that, by the time I require cataract surgery, accommodating IOLs will have improved to the point that no degree of defocus is needed to achieve fully functional near vision.

Steven J. Dell, MD, is the director of refractive and corneal surgery for Texan Eye in Austin and chief medical editor of Cataract & Refractive Surgery Today's sister publication Advanced Ocular Care. He is a consultant to Abbott Medical Optics Inc.; Alcon Laboratories, Inc.; and Bausch + Lomb. Dr. Dell may be reached at (512) 327-7000.

My Selection of a Multifocal IOL Is Supported by Data



By Mark Packer, MD, CPI

For all of the reasons I will outline here, I would choose the Tecnis-1 Multifocal IOL (Abbott Medical Optics Inc.) if I were having cataract surgery today.

I have had ophthalmologists as patients, and I have also operated on optical scientists and engineers with a substantial knowledge of cataract surgery. Particularly memorable are the well-informed patients who come to me for a second opinion after already having had surgery on one or both eyes. They are unhappy with their outcomes and want my perspective and advice.

What I say to these patients comes from clinical investigations and peer-reviewed publications. I may mention that, although 3.3% of 333 subjects in the Tecnis Multifocal IOL's FDA study complained of "night vision difficulty" at 4 to 6 months, by 1 year, not one of

these 116 subjects noted any difficulty.¹ Knowing that piece of information may prevent an unnecessary IOL exchange by giving the individual hope that his or her situation will get better.

PREOPERATIVE COUNSELING

Scientific data also inform preoperative counseling. Of the 294 subjects who received a Tecnis Multifocal IOL, 88% stated that they never wear glasses for any purpose 4 to 6 months postoperatively. That is still the highest percentage ever recorded in any clinical investigation submitted to the FDA. Very close to 80% simultaneously achieved an uncorrected binocular distance acuity of 20/25 or better and an uncorrected binocular near acuity of 20/32 or better. With distance correction, that percentage increased to 94.2%.

I always explain to patients that, in this study, investigators were not allowed to correct astigmatism, which accounts for most of the difference. In the real world of clinical practice, my colleagues and I will correct astigmatism, and in my OR, I will use intraoperative aberrometry to increase the accuracy of the outcome. With the use of intraoperative aberrometry, my postoperative enhancement rate for the correction of astigmatism has dropped to only 3%.²

QUALITY OF VISION

Contrast Sensitivity

The consideration of multifocal lenses always leads to concerns about quality of vision and contrast sensitivity. Fortunately, the Tecnis Multifocal IOL's aspheric design has significantly reduced these problems. Although this lens reduces contrast sensitivity compared with a monofocal IOL, the reduction does not reach a level of clinical significance (0.3 log unit) under any testing condition at any spatial frequency (Table).³

Material

The IOL's material also plays a significant role in achieving crisp contrast. With optical materials, the Abbe number is used to quantify chromatic aberration. The Tecnis-1 IOL has an Abbe number of 55, which compares favorably with those of other materials on the market today. A higher number equates to less dispersion and therefore reduced chromatic aberration. Most pseudophakic longitudinal chromatic aberration arises from the chromatic dispersion of IOLs rather than the cornea and other ocular media. Increasing the Abbe number of optical materials improves overall pseudophakic optical performance and synergistically improves contrast sensitivity when combined with an aspheric lens design.

TABLE. MEAN BEST CASE BINOCULAR LOG CONTRAST SENSITIVITY AT 4 TO 6 MONTHS^a

(Tecnis Multifocal IOL and monofocal control mean log scores, N = 110 ZM900; N = 109 monofocal)

Spatial Frequency	Lens Model	Mesopic Without Glare	Mesopic With Glare	Photopic With Glare
1.5 cpd	ZM900	1.54	1.25	Not tested
	Monofocal	1.64	1.36	Not tested
3.0 cpd	ZM900	1.63	1.29	1.60
	Monofocal	1.75	1.50	1.75
6.0 cpd	ZM900	1.56	1.23	1.64
	Monofocal	1.70	1.49	1.80
12.0 cpd	ZM900	0.95	0.85	1.23
	Monofocal	1.14	0.99	1.43
18.0 cpd	ZM900	Not tested	Not tested	0.77
	Monofocal	Not tested	Not tested	0.96

^aContrast sensitivity results for the Tecnis Multifocal IOL (Abbott Medical Optics Inc.) demonstrate the absence of a clinically significant reduction at any spatial frequency or testing condition as compared to the monofocal control IOL.

Glistenings

I worry that studies of glistenings to date have not described the potential impact of increased light scatter on functional vision in patients who receive multifocal IOLs. Because multifocal optics tend to be more sensitive to disruptions in light's path, I believe that consideration should be given to the potential interaction between glistenings that develop in hydrophobic acrylic material and multifocal IOL designs. Tecnis IOLs are made with a proprietary cryolathing method that limits the formation of microvoids and high temperature fluctuations for reduced glistening formation.⁴

FULL VISIBLE SPECTRUM OF LIGHT

Transmission of the full visible spectrum of light also supports my choice of the Tecnis-1 Multifocal IOL. There is no compelling reason to filter out blue light, despite the popularity of blue-blocking IOLs. As Mainster noted in a recent editorial, "Roughly 25% of IOLs implanted currently worldwide are blue-blockers."⁵ He also pointed out, "The phototoxicity-AMD [age-related macular degeneration] hypothesis has stimulated useful retinal research over the past 3 decades but languished clinically. Epidemiological studies on this subject have limitations, but 10 of 12 major evaluations of this conjecture failed to support it. Furthermore, compelling epidemiological evidence now demonstrates that cataract surgery does not accelerate development or progression of AMD, as it should if light were a significant risk factor for AMD.

Nevertheless, the phototoxicity-AMD hypothesis endures as the rationale for blue-blocking IOLs."⁶ Although there is no reason to block blue light, there are good reasons to transmit the full spectrum of visible light, including enhanced scotopic contrast sensitivity.

FUNCTIONAL VISION

Functional vision translates as contrast sensitivity in the clinical world. Regarding multifocal IOLs and spectacle independence, however, it is more about being able to read a restaurant menu in dim light or to peruse the newspaper on a nighttime flight without

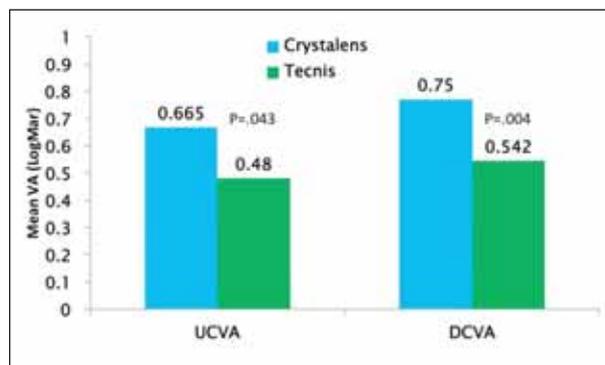


Figure. A study comparing mesopic reading acuity at near with the Tecnis Multifocal and the Crystalens (Bausch + Lomb) revealed statistically significantly better results with the former.

having to resort to reading glasses or a penlight. I performed a study to examine just such conditions; I measured mesopic (3 cd/m²) reading acuity at near in 20 subjects implanted binocularly with Tecnis Multifocal IOLs.⁷ These individuals achieved a mean uncorrected mesopic logMAR acuity of 0.48. In this group, 56% stated that “reading small print in dim light” was easy or very easy. A group of 69% said the same thing about “working on a computer,” and 80% said that the reading distance is “perfect” (10% each felt it was “a little too far” or “a little too close”) (Figure).

WHAT I WOULD CHOOSE FOR MYSELF

I would choose the Tecnis-1 Multifocal lens if I were having cataract surgery today. Although I expect all of the benefits of complication-free surgery, I do accept the possibility of trouble. Therefore, I realize I need to choose a backup lens. If for some reason, it were contraindicated to implant a Tecnis-1 Multifocal (or even a three-piece Tecnis Multifocal), I would then opt for a Tecnis aspheric acrylic three-piece monofocal lens and find some reading glasses that looked vaguely professional without being too nerdy. There is a large body of evidence that this aspheric monofocal IOL enhances functional vision by reducing spherical aberration. Night-driving simulator studies have demonstrated improvements in detection and identification distances more significant than those occasioned by the addition of the centered high-mounted brake light that was mandated for all vehicles years ago. I would be happy with the clarity and contrast despite the reading glasses.

Mark Packer, MD, CPI, is a clinical associate professor at the Casey Eye Institute, Department of Ophthalmology, Oregon Health and Science University, Portland, and he is in private practice with Drs. Fine, Hoffman & Packer, LLC, Eugene. He is a consultant to Abbott Medical Optics Inc. Dr. Packer may be reached at (541) 687-2110; mpacker@finemd.com.

1. Packer M, Chu YR, Waltz KL, et al. Evaluation of the aspheric Tecnis Multifocal intraocular lens: one-year results from the first cohort of the Food and Drug Administration clinical trial. *Am J Ophthalmol.* 2010;149(4):577-584.e1.
2. Packer M. Effect of intraoperative aberrometry on the rate of postoperative enhancement: retrospective study. *J Cataract Refract Surg.* 2010;36(5):747-755.3.
3. Summary of Safety and Effectiveness Data (SSED) Tecnis Multifocal Intraocular Lens, Models ZM900 and ZMA00. http://www.accessdata.fda.gov/cdrh_docs/pdf8/P080010b.pdf. Accessed November 27, 2011.
4. Miyata A, Yaguchi S. Equilibrium water content and glistenings in acrylic intraocular lenses. *J Cataract Refract Surg.* 2004;30:1768-1772.
5. Mainster MA, Turner PL. Blue-blocking IOLs vs. short-wavelength visible light: hypothesis-based vs. evidence-based medical practice. *Ophthalmology.* 2011;118(1):1-2.
6. Mainster MA, Turner PL. Blue-blocking IOLs decrease photoreception without providing significant photoprotection. *Surv Ophthalmol.* 2010;55:272-289.
7. Packer M. Comparative study of visual acuity, spectacle independence and patient satisfaction with aspheric diffractive multifocal IOL and blended aspheric hinged accommodating IOL. Presented at: The XXIX Congress of the ESCRS; September 19, 2011; Vienna, Austria.

An Accommodating Lens With a Femtosecond Laser Procedure



By Audrey R. Talley-Rostov, MD

When my friend Stephen Slade, MD, asked me to write an article on which IOL I would choose if I were to have cataract surgery, my first thought was, “Really, Steve, I’m not that old!”

EARLY CATARACT SURGERY

If I had cataracts, I would choose to undergo surgery when they were interfering with my quality of life. Having 20/20 vision currently, I would opt for surgery when my BCVA decreased to 20/25 or 20/30 or potentially if I had a similar decrease in BCVA with glare, leading to reduced contrast sensitivity. Early surgery may increase the safety of the procedure, because it is potentially associated with less endothelial cell loss and less risk of vitreous loss (cataracts are softer).

I would choose laser cataract surgery, due to the improved accuracy and safety profile for completing a capsulorhexis, dividing nuclear material, and creating clear corneal incisions. I would want the cataract incisions made at the steep axis of my astigmatism, with additional relaxing incisions created by the femtosecond laser to diminish my 1.25 D of astigmatism.

ACCOMMODATING IOLs

With respect to IOLs, I would choose an accommodating lens, the improved clarity of which I prefer compared with a multifocal. Although the multifocal IOL technology has improved, it still decreases contrast sensitivity compared with accommodating lenses. The modulation transfer function is also more favorable with the accommodating IOLs under mesopic conditions. I am an avid athlete, so functioning under a variety of reduced lighting/contrast conditions is a priority. Snowboarding in flat light; cycling and/or running in the rain, often on uneven pavement; and open-water swimming are activities in which I regularly engage. An accommodating IOL would allow me to maximize my performance even under these variable conditions.

Like most of my cataract patients, I would love to have a complete range of perfect 20/20 uncorrected distance, intermediate, and near vision. I would, however, settle for uncorrected distance and intermediate vision as a realistic option, and I would be willing to wear a pair

of reading glasses for prolonged close work and/or reading fine print. Although currently available multifocal IOLs provide better uncorrected near vision for reading compared with accommodating implants, I would not want to endure the decrease in contrast sensitivity for improved near visual acuity.

SELECTION

Of the IOLs currently available here in the United States, I would choose to have the Crystalens AO (Bausch + Lomb) implanted bilaterally, with a target of plano in my dominant left eye and -0.50 to -0.65 D in my nondominant right eye. I would also consider implantation with the toric Crystalens (currently in US clinical trials), due to my astigmatism. If the Synchrony IOL (Abbott Medical Optics Inc.) were available at the time that I needed my cataract surgery, I would consider that lens as well.

Audrey R. Talley-Rostov, MD, is in private practice with Northwest Eye Surgeons, PC, in Seattle. She is an investigator for the Synchrony and Tecnis Multifocal IOLs (Abbott Medical Optics Inc.). Dr. Talley-Rostov may be reached at (206) 528-6000; atalley-rostov@nweyes.com.

A Diffractive Multifocal IOL Is the Best Choice Today



By Robert J. Cionni, MD

One of the most challenging tasks we face as cataract surgeons is choosing the most appropriate type of IOL for each patient.

Although many patients desire complete spectacle freedom, not all are well suited to it. Some have pathology that renders success less likely, which makes our recommendation easy. The real challenge, however, is trying to understand our patients' visual needs, daily activities, expectations, and ability to compromise. Because the patient this article is concerned with is me, that part will be easy.

READING GLASSES ARE A PAIN IN THE NECK

Ten years ago, my good friend and mentor Robert Osher, MD, looked at me over the top of his new reading spectacles and said, "Bob, you're too young to realize this yet, but presbyopia is a horrible disease, and reading glasses are a real pain in the neck." I am no longer too young to understand this. Now age 52, I need readers for most near tasks,

and I hate them! I lose them, I break them, and I forget them. My typical tasks involve both distance and near activities, which require me always to have my readers. I despise this dependence when I never needed glasses in the past. My passion outside the office is fly-fishing, and I need readers to see my flies, tie them onto the tippet, tie the tippet onto the leader, and tie the leader onto the fly line. It is lousy!

I have tried monovision, even mini-monovision, and dislike this solution more than readers. Therefore, when I need cataract surgery, I will choose an IOL that provides both distance and near vision without the need for glasses. There are only a few possibilities currently. None of the "accommodating-style" IOLs has been shown to truly accommodate; in my opinion, they seem to function more like monovision IOLs than accommodating IOLs. In addition, nailing the refractive target has been proven to be more difficult with IOLs such as the Crystalens (Bausch + Lomb).¹

DIFFRACTIVE MULTIFOCAL BEST OPTION TODAY

The best option today is a diffractive multifocal IOL. My choice would be the same IOL I choose for most of my patients: the AcrySof IQ Restor +3.0 D (SN6AD1; Alcon Laboratories, Inc.). This aspheric IOL has a yellow tint to mimic my lens' natural color transmission, filtering not only the harmful ultraviolet light but also potentially damaging high-frequency blue light.^{2,3} The apodized optic provides excellent near and good intermediate vision while minimizing glare and halos. I am more than willing to accept a mild decrease in contrast sensitivity to gain freedom from readers most of the time. I have very little astigmatism and therefore do not need to consider a toric lens.

I cannot wait until I get my cataract so I can lose my readers once and for all! If I were found not to be a candidate for the SN6AD1, however, my second choice would be the AcrySof SN60WF single-piece acrylic monofocal IOL. I would use both eyes for distance vision and wear readers for near work. The SN60WF has attributes similar to those of the AcrySof IQ Restor but without the diffractive grating. ■

Robert J. Cionni, MD, is the medical director of The Eye Institute of Utah in Salt Lake City, and he is an adjunct clinical professor at the Moran Eye Center of the University of Utah in Salt Lake City. He is a consultant to Alcon Laboratories, Inc. Dr. Cionni may be reached at (801) 266-2283.

1. Lane S. Visual acuity with spectacle wear with presbyopia-correcting intraocular lenses. Poster presented at: The AAO Annual Meeting; October 15, 2010; Chicago, IL.

2. Marshall J, Cionni RJ, Davison J, et al. Clinical results of the blue-light filtering AcrySof Natural foldable acrylic intraocular lens. *J Cataract Refract Surg*. 2005;31(12):2319-2323.

3. Kernt M, Walch A, Neubauer AS, et al. Filtering blue light reduces light-induced oxidative stress, senescence, and accumulation of extracellular matrix proteins in human retinal pigment epithelium cells [published online ahead of print June 13, 2011]. *Clin Experiment Ophthalmol*. doi:10.1111/j.1442-9071.2011.02620.x.