

Why I Am Not Implanting Multifocals

Each surgeon must determine the approach to premium-channel IOL surgery that will work for him or her.

BY J. E. "JAY" McDONALD II, MD

I believe that finding one's personal and one's practice's "final destination" in the universe of premium-channel lens surgery will be among the most critical journeys upon which each ophthalmologist will embark during the next decade. The choices entailed represent a significant challenge. This article details how I decided to offer monofocality rather than multifocality to my patients.

BACKGROUND

For many years, I had been using a version of monovision to help my patients possibly depend less on glasses. Until 4 years ago, I did not consider this approach anything other than a value added. I did not tell patients that they would not need spectacles after surgery, but many times they did not. My staff and I celebrated these individuals' newfound freedom with a pat on their back and a request that they share the good news with their friends.

I began implanting a few multifocal lenses. I carefully selected patients, and because I emphasized reasonable expectations for the procedure, many of them were happy. Some needed a lot of reassurance, most needed some handholding, but all did well. The turning point for me occurred when I implanted a multifocal IOL in the eye of a woman to whose husband I had provided monovision. Although she had an emmetropic result, she complained constantly of poor vision and not seeing as well as her husband. I was confused by her response.

At that time, I attended an ophthalmic meeting. In a large forum, the speaker asked, "Who has removed a multifocal lens because of an unhappy patient?" The

hands raised revealed that almost all of the attendees had experienced this problem. I wondered why. I have a large contact lens practice, and despite the release of numerous multifocal designs, my staff and I almost always returned to a monovision approach. LASIK monovision was also quite successful in my practice. I wanted to know why monofocality trumped multifocality. I suspected that the answer related to the way each worked at the neurocognitive level.

AN INVESTIGATION

Three years ago, I met Randolph Blake, PhD, centennial professor of psychology, a fellow of the Vanderbilt Kennedy Center for Research on Education and Human Development, and a member of the Vanderbilt Vision Research Center and the Vanderbilt Center for Cognitive and Integrative Neuroscience in Nashville, Tennessee. Dr. Blake had written about how people see and the role of the neurocortex and binocular rivalry.¹⁻³ I had also been intrigued by lectures by Marty Sereno, PhD, a professor of psychology and chair of cognitive neuroimaging at Birkbeck, University of London, and an adjunct professor of cognitive science at the University of California, San Diego. Dr. Sereno stated that functional MRI descriptions reveal how people see.

I convinced Dr. Blake to visit my practice to compare multifocality and monovision in my patients. What was the basic science of these two processes? After reviewing the clinical results, he discovered that the monofocal image gives the brain the best signal for constructing the final visual image. By challenging the receptors with split

Mini-monovision with the Tecnis 1-Piece provides better-than-expected near vision with minimal compromise at distance.

BY JOHN R. WITTPENN, JR, MD

Not long after I started implanting the Tecnis 1-Piece IOL (Abbott Medical Optics Inc., Santa Ana, CA), I noticed that a significant number of patients were claiming they did not need glasses for near or distance after surgery. I was surprised, because I had not targeted (or achieved) a monovision outcome. I decided to conduct a prospective observational study of the lens. A summary of my results follows.

STUDY DESIGN

Twenty-six patients (ages, 58-90 years) with cataract, no macular problems, and less than 0.75 D of astigmatism received Tecnis 1-Piece monofocal aspheric IOLs bilaterally. The target refraction was "mini-monovision" (plano to -0.25 D in their distance eye and -0.50 to -1.00 D in their near eye). I find this approach preserves good distance vision in the patient's near eye and avoids the problems related to adaptation and depth perception that are associated with full monovision.

The subjects in this study would have been good candidates for, but had already declined, premium IOLs. I counseled them to expect to wear spectacles after surgery but explained that I would do what I could to minimize their dependence on glasses.

RESULTS

Patients' uncorrected binocular distance vision was very good (Figure 1). Most subjects (89%) saw 20/20 to 20/25; a few saw 20/15. One patient had 20/30 distance vision (refracting easily to 20/20) but was still very satisfied with his vision without glasses. Uncorrected distance vision was 20/40 or better in all near eyes except for one that ended up 20/70 with a refraction of -1.25 D. This patient's near vision was J1, and he was not bothered by the difference between his eyes. Thus, the mini-monovision did not compromise distance acuity.

Binocular uncorrected near vision was J3 or better in 92.3% of patients, with the worst near vision being J5 (Figure 2). Although J3 may not be good enough for the prolonged reading of fine print, it is sufficient for most daily near tasks.

The patients in this study were all extremely satisfied with their outcomes and rarely or never use glasses. For example, a 74-year-old retired physician reads J2 without correction, sees 20/15 at distance, and uses readers for very small print. The refraction in his near eye is -0.50 D, yet the patient somehow reads J2 with this eye.

DISCUSSION

How can these results be explained? It is possible these patients had unusually low spherical aberration and that the Tecnis IOL's 0.27 D of negative spherical aberration pushed them into the negative range of spherical aberration, thus providing some pseudoaccommodative or depth-of-focus effect. This would be unusual, however, in 26 consecutive cases. In addition, when there is nega-

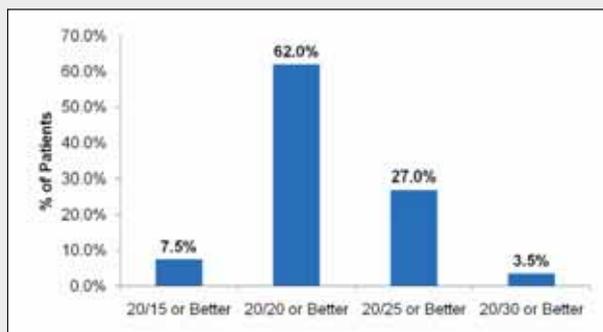


Figure 1. Binocular uncorrected distance acuity.

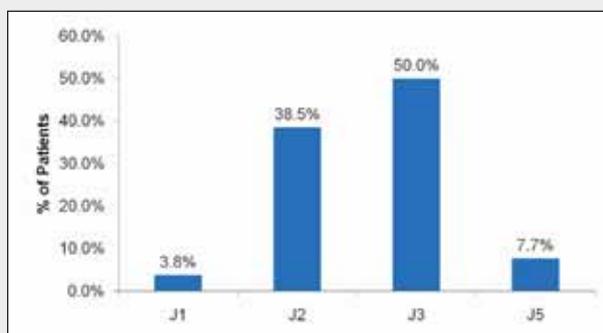


Figure 2. Binocular reading acuity.

tive spherical aberration and the pupil constricts while the patient is reading, the lens becomes more myopic. Alternatively, the optically haptic construction of the Tecnis lens may allow some movement, but even 1 year postoperatively, patients' reading ability does not seem to be diminished, as one might expect to occur with fibrosis.

Perhaps the most likely explanation is simply the pristine optics of this IOL. The Tecnis 1-Piece provides the sharpest distance vision of any lens I have implanted. With the aspheric correction and very low chromatic aberration, the image may be so perfectly focused on the retina that patients can tolerate a greater degree of defocus. In my experience, the IOL centers beautifully and is very stable in the eye. Best of all, the optic material appears to remain crystal clear, with none of the glistenings that have led me to discontinue implanting AcrySof lenses (Alcon Laboratories, Inc., Fort Worth, TX).

Based on my experience, mini-monovision with the Tecnis 1-Piece, with or without limbal relaxing incisions, is a good way to achieve excellent functional vision and reduce spectacle dependence in patients who do not want a premium IOL.

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(Courtesy Martin A. Mainster, PhD, MD, FRCOphth.)

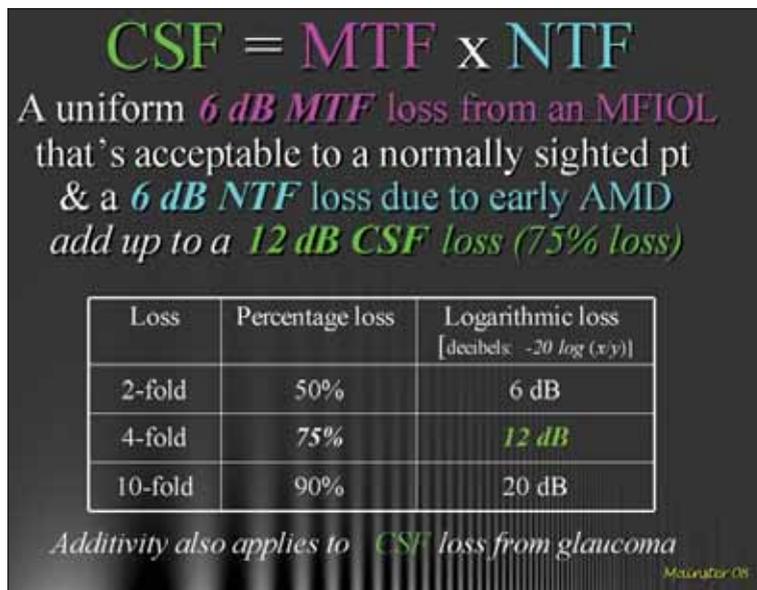


Figure 1. Using a multifocal IOL decreases the reserved visual sensitivity of the neuro transfer function. A person with a normal reserve may not notice this diminution. The additional loss of early maculopathy, however, may deplete the neuro transfer function to a level that is very noticeable clinically. Abbreviations: AMD, age-related macular degeneration; CSF, contrast sensitivity function; MFIOL, multifocal IOL; MTF, modulation transfer function; NTF, neuro transfer function; pt, patient.

images, multifocality robs the visual cortex of the signal strength it needs to consistently construct a clear, sharp image. Dr. Blake thus explained to me why patients who received a multifocal diffractive IOL complained of waxy vision.

MY APPROACH

The pupil's size acts like an f-stop on a camera. After 60 years of age, most people spend little time with pupils larger than 3.2 mm. Monofocality uses this limited sizing as a strength. If I implant a monofocal aspheric optic with 1.25 D offset (distance, plano to -0.25 D; near, -1.25 to -1.50D), the patient will have clear binocular vision from 22 inches to infinity with a small area of very tolerable blur at 4 to 7 feet. I have tested patients for stereopsis, and they have 40 to 60 seconds with this degree of separation and no spectacle correction.

My premium IOL channel involves no multifocal lenses. Instead, I use the Crystalens AO (Bausch + Lomb, Rochester, NY), with mini-monovision of -0.50 D in the patient's nondominant eye and -0.25 D in his or her dominant eye. This technique represents my first tier of premium IOL surgery.

For my second tier, I use an aspheric lens—the Sofport AO (Bausch + Lomb), Akreos AO Micro

Incision (MI60; Bausch + Lomb), or iSymm (Hoya Surgical Optics, Inc., Chino Hills, CA). With aspheric IOLs, patients have clear vision, and the offset of monovision is relatively small. I find that the quality of vision and depth of focus achieved with a small pupil offset the expanded depth of field of a nonaspheric lens. The positive asphericity of the cornea, however, adds some depth of field.

With monofocality, I am not compromising patients' visual reserve by splitting light. Martin Mainster, PhD, MD, has shown that, when someone uses a multifocal IOL, half of his or her visual reserve is gone.⁴ Most of these patients do not complain, but any further retinal deterioration will cause them to become symptomatic (Figure 1). This potential causes me great concern when I consider the average patient's life expectancy and his or her chance of macular functional loss. Moreover, a number of my patients will suffer deficiencies in optic nerve transmission due to glaucoma and general vascular deterioration.

CONCLUSION

When ophthalmologists raise their profile and present themselves as surgeons who can deliver on-target spherical endpoints and eliminate astigmatism, patients expect independence from spectacles. Ophthalmologists can achieve these goals through monofocality or multifocality. I prefer monofocality, which I know can free patients from spectacles while preserving for as long as possible their ability to function at their highest visual potential. As a "steward" of my patients' visual capacity, I believe that I have a responsibility to preserve the greatest amount of their neuro and modulation transfer functions as possible, the product of which is their total visual capacity. ■

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