# Solving Multifocal Mysteries

Surgeons should not be quick to blame the design and function of presbyopia-correcting IOLs when patients are dissatisfied with their postoperative vision.

**BY ROBERT J. CIONNI, MD**

When faced with patients who are unhappy after receiving multifocal IOLs, surgeons may be tempted to assume immediately that the problem is primarily caused by the lenses themselves. A wide range of factors, however, can affect patients' satisfaction with presbyopia-correcting IOLs.

## CASE EXAMPLES

**No. 1**

A 67-year-old hyperopic female who was diagnosed with clinically significant cataracts desired independence from spectacles for distance and near vision after phacoemulsification. One week after uneventful cataract surgery and the placement of an AcrySof Restor IOL (model SN60D3; Alcon Laboratories, Inc., Fort Worth, TX) in her right eye, the patient stated that she was unhappy with her vision, especially at distance.

Her manifest refraction was significantly myopic with a refractive error of -2.50 + 0.50 X 167 = 20/20. The patient's keratometry readings (obtained manually, topographically, and with the IOLMaster [Carl Zeiss Meditec, Inc., Dublin, CA] and axial length were unchanged from preoperatively. A slit-lamp examination showed a normal anterior segment. Although the posterior capsule was against the back surface of the IOL (ruling out a

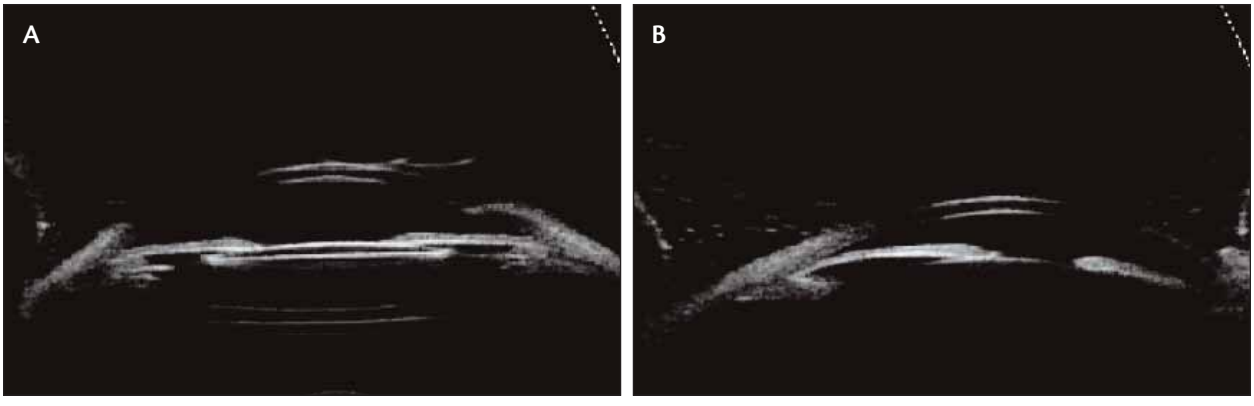


**Figure 1. Ultrasound biomicroscopy (UBM) of a patient's right eye showed anterior displacement of the IOL and an almost complete closure of the angle (A). Her cataractous left eye also had a shallow anterior chamber and angle (B).**

capsular distension syndrome) and the IOL was completely inside the capsular bag, the optic appeared to be in very close proximity to the posterior surface of the iris. UBM clearly showed that the IOL was displaced anteriorly and demonstrated a nearly complete closure of the angle (Figure 1A). The patient's IOP remained normal, however, and the only symptom of her nearly closed angle was myopia. UBM of the patient's fellow cataractous eye revealed a shallow chamber and angle (Figure 1B).

If the patient had not requested a spectacle-free outcome, my colleagues and I would have recommended that she wear eyeglasses to address her postoperative refractive error. Because she was obviously concerned and unhappy with the result of her cataract surgery, we discussed her symptoms with glaucoma and retina specialists who agreed that her myopia could be caused by mild aqueous misdirection syndrome.

We decided against the implantation of a piggyback IOL, because the ciliary sulcus was too small to accommodate another lens. We also considered performing an IOL exchange but concluded that the outcome would be too uncertain. We instead observed the IOL for 1 month to see if it would spontaneously move posteriorly. When it did not, we performed a pars plana vitrectomy to relieve the suspected aqueous misdirection. One week after the procedure, UBM showed the IOL in a normal axial position (Figure 2). The patient's refraction also improved postoperatively to a spherical equivalent of -0.50 D. She expressed happiness with the vision in her right eye.

Based on the UBM examination of the patient's cataractous left eye and the complications resulting from surgery on her right eye, we decided to perform a primary pars plana vitrectomy at the time of the phacoemulsification and implantation of an AcrySof Restor IOL in her second eye.

After the uncomplicated procedure, the IOL remained in the expected position, and the patient did not experience a refractive surprise.

**No. 2**

A 48-year-old male with a history of bilateral cortical cataracts presented for evaluation 2 months after undergoing phacoemulsification and the implantation of an AcrySof Restor IOL (model SN60D3) in his right eye by an outside surgeon. Although the patient had good visual acuity postoperatively (20/25 at distance and J1 at near), he complained that his distance vision was hazy. He was also unhappy with his vision for computer use and resistant to the original surgeon's plan to implant the same type of IOL in his left eye.

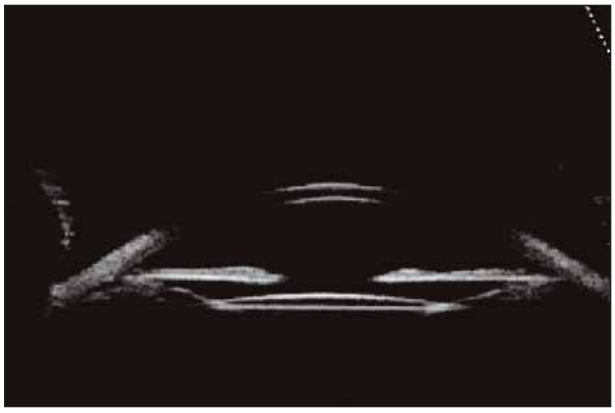

**Figure 2. One week after a pars plana vitrectomy, the IOL shown in Figure 1 was in a normal axial position.**

Upon examination, the visual acuity of the patient's pseudophakic eye was nearly plano with minimal cylinder. His pupils measured 4.5 mm in diameter under normal lighting conditions. After a detailed discussion of his options, the patient underwent phacoemulsification with the implantation of a ReZoom IOL (Advanced Medical Optics, Inc., Santa Ana, CA) in his left eye. By 1 month postoperatively, the patient was happy with the vision in his left eye at distance. He requested that we exchange the AcrySof Restor IOL in his right eye for a ReZoom lens, however, because he preferred the vision provided by the latter.

Despite achieving a nearly plano result and a bilateral UCVA of 20/25 (+2 at distance, 20/25 for intermediate, and J2 at near) after an uncomplicated IOL exchange, the patient stated that the ReZoom lens did not improve the vision in his right eye. The etiology of his visual complaints remains unknown, but it clearly was not due to the design of the diffractive multifocal IOL.

**No. 3**

A 48-year-old female business consultant who had worn rigid gas permeable contact lenses for 33 years was diagnosed with mild-to-moderate cataracts during an evaluation for LASIK at my colleagues' and my practice. She reported that she had stopped wearing her contact lenses 3 weeks prior to the consultation. At the time of her evaluation, her refraction was -6.00 +1.00 X 140 = 20/20 glare = 20/70 OD and -7.00 + 0.50 X 096 = 20/25 glare = 20/50 OS. Her pupils measured 4 mm in ambient light. Keratomety readings were consistent with the refraction of her right eye but somewhat variable for her left eye.

After discussing presbyopia-correcting IOLs with her surgeon, the patient decided that the AcrySof Restor lens (model SN6OD3) would provide the best near visu-

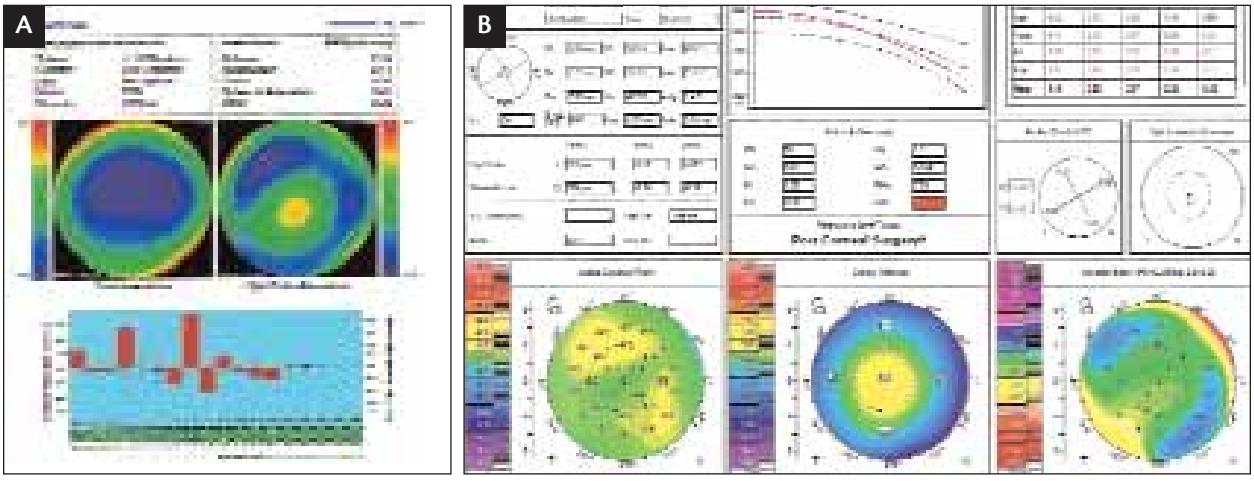


**Figure 3. Wavefront (A) and topographic (B) analyses of the patient's right eye showed a higher degree of astigmatism than described by manifest refraction.**

al acuity and the lowest risk of nighttime glare postoperatively. The AcrySof Restor Aspheric IOL (model SN6AD3; Alcon Laboratories, Inc.) had not yet been cleared for clinical use.

During an uneventful procedure, the surgeon implanted AcrySof Restor IOLs in the patient's right (12.00 D, goal = +0.25 D) and left (11.00 D, goal = +0.29 D) left eyes. He operated on the steep axis of the right eye and placed a small limbal relaxing incision in the left eye.

One month postoperatively, the patient expressed unhappiness with her visual outcome. She had a UCVA of 20/50 and J3 in both eyes. Her manifest refraction was +0.50 +0.75 X 140 = 20/20 OD and +1.25 +0.75 X 65 = 20/20 OS.

A slit-lamp examination showed significant folds and mild haze in the patient's posterior capsules bilaterally. Fundoscopy and optical coherence tomography were normal for both eyes. After a lengthy discussion with the patient, the surgeon performed a YAG capsulotomy bilaterally. The patient did not report any improvement in her vision after this procedure.

She was then referred to a refractive surgeon who treated her residual hyoperopia and astigmatism with bilateral LASIK. The surgeon used a femtosecond laser to create the corneal flaps. By 2 months postoperatively, the patient's manifest refraction measured -0.25 +0.25 X 150 = 20/30- OD and -0.50 +0.50 X 180 = 20/30+ OS. Her bilateral postoperative UCVA was 20/50 and J7 at near. Her BCVA was now diminished without a discoverable etiology, and the patient was becoming more unhappy with her vision.

Wavefront analysis and topographic imaging of the patient's corneas with the Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA) demonstrated a higher degree of astigmatism in her right eye than was reflected by its refraction (Figure 3). In contrast, the left eye had less than 0.50 D of astigmatism and mild myopia (Figure 4). The surgeon also noted spherical aberration in both of the patient's eyes. With her consent, he decided to lift her flaps and treat her residual refractive error with additional LASIK. The treatment was designed to correct astigmatic myopia and aspheric myopia in the patient's right and left eyes, respectively.

By 2 months postoperatively, the patient's second refractive enhancement had not produced the expected results. Despite having open posterior capsules, pristine corneas, normal maculae, and two LASIK enhancements, the patient had a bilateral UCVA of 20/50 and J3 at near (+0.25 +0.25 X 180 = 20/40- OD and -0.25 +1.25 X 172 = 20/25- OS). Bitterly disappointed with her refractive outcome, the patient left our practice to seek a second opinion.

## DISCUSSION

The case examples presented herein highlight several factors that affect patients' satisfaction with presbyopia-correcting IOLs. Cases No. 1 and 2 show that not all of the problems that patients experience can be attributed to the implanted lenses. In most cases, a careful consideration of the patient's complaint and a thorough investigation into its etiology will lead surgeons to possible solutions that do not require explanting the IOL.

The patient described in case No. 2 probably had some degree of amblyopia in his right eye that was not detected before cataract surgery and that prevented him from achieving his desired vision with the ReZoom IOL.

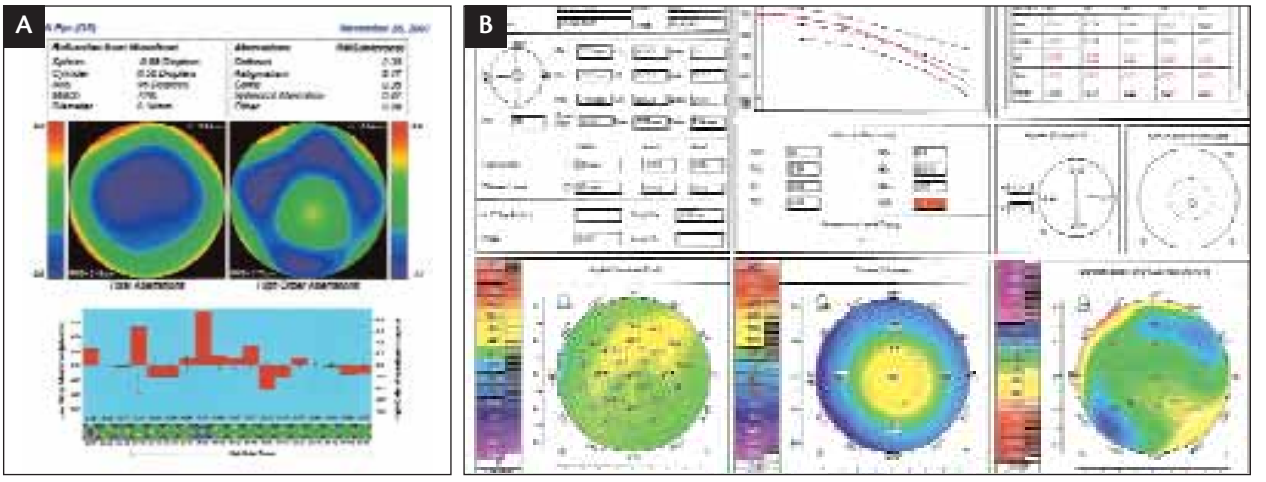


**Figure 4. Wavefront (A) and topographic (B) analyses of the left eye of the same patient described in Figure 3 showed mild myopia and less than 0.50 D of astigmatism.**

Case No. 3 illustrates the importance of careful patient selection. My colleagues and I were not able to meet the patient's expectations, and we overlooked several clues that her demanding personality would influence her surgical outcome. The patient's insistence on wearing hard contact lenses up until 3 weeks before her preoperative consultation indicated that she was not prepared to adapt to the visual changes associated with presbyopia-correcting IOLs. Given her 33-year history of wearing contact lenses, it would have been best for her to have discontinued her lenses at least 6 to 7 weeks before presenting for preoperative testing. Had she done so, we might have been able to better determine the IOL power and need for LRIs during the original procedure.

Although we knew that the refusal of the patient in case No. 3 to suspend contact lens wear for longer than 3 weeks could allow for continued corneal changes after cataract surgery, we felt that her vision would be good enough to preclude her need for contact lenses and, if necessary, would allow us to enhance her vision with LASIK. Due to the patient's travel schedule, however, and her stated difficulty of working after her initial surgery, her first enhancement was expedited. I suspect that her first and second enhancements produced disappointing results because they were performed too soon after the initial cataract surgery.

I believe that a very small subset of patients (<1%) has difficulty processing multifocal vision. Unfortunately, I do not have a method that can help me preoperatively identify individuals who are incapable of adapting to presbyopia-correcting IOLs. Instead, I strive to educate patients about the risks associated with these lenses and inform them that I can always exchange their multifocal IOL with a different model if needed. If the patient from case No. 3 had had clear, smooth posterior capsules and a nearly plano refraction without significant visual complaints after her initial cataract surgery, my colleagues and I probably would have replaced her AcrySof Restor IOL with a monofocal lens instead of trying to improve her vision with laser vision correction.

## CONCLUSION

We surgeons must realize that not every patient will be thrilled with the refractive outcomes provided by presbyopia-correcting IOLs. The most common reason for patients' dissatisfaction is residual (usually cylindrical) refractive error. Patients who report improvement in their vision with trial lenses are candidates for an enhancement with PRK or LASIK. If their complaints do not appear to be caused by refractive error, surgeons should examine other likely etiologies such as dry eye, retinal edema, and posterior capsular opacification before they conclude the presbyopia-correcting IOL is not working properly. ■

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