THE POWER OF REVERSIBILITY

How to approach a patient who is dissatisfied with a "perfect" refractive outcome.

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CASE PRESENTATION

A 45-year-old man presents for a refractive surgery evaluation. The patient is a teacher by trade and enjoys hiking in his free time. He has difficulty with contact lens insertion and removal. He has also never found wearing glasses to be comfortable, and the lenses fog up when he is physically active. The patient tried monovision in the past but did not like it. He currently removes his glasses to read and experiences neck pain due to poor posture during this activity.

The patient has a history of high blood pressure, but otherwise, his history and ocular history are unremarkable. He does not rub his eyes or engage in pillow diving, and he has no history of sleep apnea or family history of keratoconus.

Upon examination, the patient's UCVA is counting fingers OU. His BCVA is 20/20 OU with a manifest refraction of -9.00 -1.00 x 180° OD and -10.50 -1.00 x 180° OS. Figure 1 shows the patient's topography. His tomography and epithelial maps are normal. Pachymetry readings are approximately 480 µm OD and 470 µm OS. Measurements with multiple biometers and the Pentacam (Oculus Optikgeräte) show an internal anterior chamber depth (ACD), or aqueous depth, of at least 3 mm in each eye (Figures 2–4).

How would you counsel the patient? If you would recommend surgery, which procedure would you favor, and what would the refractive targets be?

–Case prepared by Arjan Hura, MD

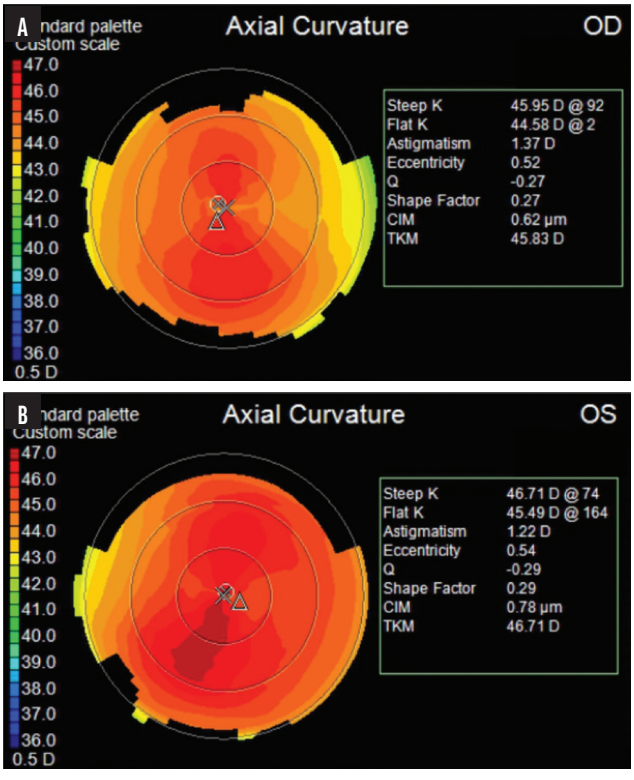

Figure 1. Topography measurements of the right (A) and left (B) eyes.

		OD right eye		OS left eye	
Measuring mode	Mode	Phakic		Phakic	
Axial length	AL	27.05 mm	±0.012 mm	27.30 mm	±0.006 mm
Cornea thickness	CCT	487 µm	±1.0 µm	476 µm	±1.0 µm
Aqueous depth	AD	3.54 mm	±0.005 mm	3.52 mm	±0.003 mm
Lens thickness	LT	4.41 mm	±0.019 mm	4.50 mm	±0.004 mm
Retina thickness	RT	200** µm	±0.0 µm	200** µm	±0.0 µm

Figure 2. Measurements with the Lenstar (Haag-Streit).

AL	26.99 mm	WTW	12.8 mm	AL	27.27 mm
ACD	4.03 mm	Pupil	6.4 mm	ACD	4.02 mm
LT	4.40 mm	lx / ly	+0.1 mm / -0.2 mm	LT	4.49 mm
CCT	494 µm	Kappa	0.2 mm @ 151°	CCT	483 µm

WTW	12.5 mm
Pupil	5.3 mm
lx / ly	-0.2 mm / -0.1 mm
Kappa	0.1 mm @ 48°

Figure 3. Measurements with the IOLMaster 700 (Carl Zeiss Meditec).

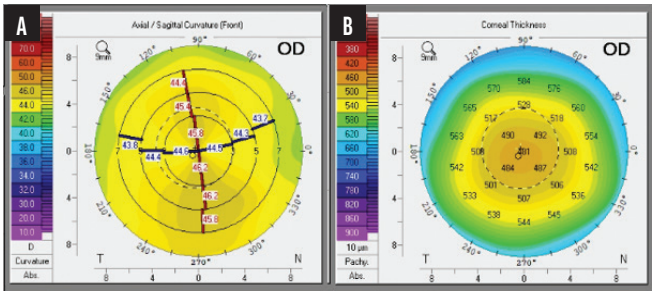

Figure 4. Imaging of the right (A) and left (B) eyes with the Pentacam.


J. MORGAN MICHELETTI, MD, AND KENDRICK M. WANG, MD

There are several options to consider for this highly myopic patient in the early presbyopic period who desires spectacle independence: laser vision correction (LVC), phakic lens implantation, and refrative lens exchange (RLE). Although pachymetry reveals thin corneas, Pentacam imaging does not indicate keratoconus.

Given the patient's age and profession, he is likely to develop presbyopia in the near future if he has not already, and he will need to wear reading glasses if fully corrected. Although monovision might be a solution, he could not tolerate this strategy in the past.

LVC is not a viable choice for this patient given his thin corneas and high myopia. That leaves two possible surgical options: the implantation of an EVO ICL (STAAR Surgical) or RLE. ICL implantation would be less invasive, is associated with fewer dysphotopsias, and would preserve his candidacy for future technologies. Unfortunately, presbyopia-correcting models of this lens are not available in the United States, where we practice. With RLE, a multifocal IOL could be implanted to increase the patient's spectacle independence, but high myopia increases his risk of a retinal detachment (RD). According to the FYEO-Medical RRD Risk Calculator (medisch.fyeo.nl/retinal-detachment/retinal-detachment-calculator), he has a 4.16% yearly RD risk after RLE, but the risk would decrease to less than 0.01% if a posterior vitreous detachment (PVD) is present.

Our recommendation would be to implant an ICL because the procedure is reversible and would allow the patient to undergo an RLE in the future if he is unhappy wearing reading glasses. The decision between procedures is ultimately his and depends on the strength of his desire to be free of reading glasses and his tolerance for the risk of RD.

BRETT MUELLER, DO, PHD

I tell any patient older than 40 years of age that two distinct problems must be addressed: (1) their glasses prescription, which typically stabilizes between the ages of 18 and 21 years, and (2) presbyopia, which generally develops at around 40 years of age. I then explain that many vision correction procedures address only problem No. 1 (ie, ocular maturity). To treat presbyopia effectively, a blended vision approach must be considered. A contact lens trial would be conducted to determine if the patient would be satisfied with some level of blended vision, even mild. In my experience, most individuals can tolerate -0.75 to -1.25 D of blended vision.

Once the refractive targets for both eyes are identified, I would focus on identifying the best procedure for the patient. Given his thin corneas and high myopia, I would not recommend LVC. Nor would I recommend RLE, because high myopia increases his RD risk. In my mind, this leaves only one option: the implantation of an EVO ICL. This lens-based procedure could be highly effective for the patient. It would also preserve the eye's natural anatomy, leaving every option open to him when he develops cataracts.

BRIAN SHAFER, MD

Given the patient's relatively thin but regular corneas and adequate ACDs, EVO ICL implantation would be my procedure of choice. Although he is at the upper age limit per US FDA guidelines, he meets all the parameters for the lens.

The refractive target is a more complex question. A full history of the patient's attempts at blended vision is not provided. Although an abrupt inducement of 2.50 D of anisometropia is generally intolerable for someone his age, a stepwise progressive defocusing of the nondominant eye from -0.50 D upward could be more tolerable.

Because the patient has functioned with high myopia for 45 years, approximately 2 weeks would be dedicated to systematic contact lens trials of blended vision. During this time, his nondominant eye would be undercorrected in progressive 0.50 D steps until the limit of tolerability is reached. Both toric and spherical lenses would be used to gauge his tolerance of the 1.00 D of with-the-rule astigmatism.

The refractive targets and whether to implant a toric model of the EVO ICL would be determined by the results of the contact lens trials. Ideally, the patient can tolerate 1.50 D of anisometropia, which would likely provide an excellent, full range of vision until he requires cataract surgery.

NANDINI VENKATESWARAN, MD

My first and only recommendation would be the bilateral implantation of an EVO ICL. Given the patient's high myopia, astigmatism, and thin corneas, LVC is contraindicated because the procedure would leave a very thin residual stromal bed and significantly affect his postoperative quality of vision. I would also prefer to avoid an RLE until he is older than 50 years of age.

A toric EVO ICL could correct the patient's myopia and astigmatism and provide him with high-quality vision. His age accords with the product's labeling, although, anecdotally, I have implanted the lens in older patients. His prescription falls within the range of available toric EVO ICLs, and his ACDs make him an excellent candidate. Topography suggests regular with-the-rule astigmatism, which is reflected in his manifest refraction, and there are no signs of corneal ectasia.

Specular microscopy would be performed to ensure that the corneal endothelium is healthy. White-to-white distances would be measured manually with digital calipers in my office and compared to measurements obtained with the Pentacam. Using the white-to-white distances and ACDs, I would employ STAAR Surgical's recommended nomogram to determine the appropriate lens size for each eye.

Given the patient's age, I would discuss distance targets for both eyes versus a small degree of blended vision (distance aim for the dominant eye and -0.50 D for the nondominant eye). I would like to know the degree of monovision tried previously and why it was intolerable. Blended vision (less of an offset between the two eyes compared to traditional monovision) would be my preferred strategy so that he retains some uncorrected intermediate visual acuity (UIVA) and uncorrected near visual acuity (UNVA). I would emphasize, however, that he may require reading glasses for certain activities over the next several years.

The patient would be counseled on the risks of surgery, including mild glare and halos in mesopic settings, possible dry eye disease, and, rarely, the need for an ICL exchange. He would also be informed that he will likely develop cataracts in the future and that the ICL must be removed at the time of surgery but that the phakic lens will not affect his candidacy for the various available IOL technologies.

THE CASE CONTINUED

The risks and benefits of EVO ICL implantation are discussed, and the patient decides to proceed with surgery. He has tried various degrees of monovision with spectacles and contact lenses in the past and is adamantly opposed to implementing the strategy with the EVO ICL.

After surgery, the patient's UCVA is 20/20 OU. His manifest refraction is +0.25 -0.50 x 180° OD and +0.50 -0.50 x 176° OS. An examination of each eye is normal and finds a vault of approximately one corneal thickness. The patient is satisfied with the quality of his distance vision but unhappy with his intermediate to near range of vision, and he is having trouble shaving.

How would you proceed?

DRS. MICHELETTI AND WANG

The EVO ICL was an excellent option for correcting the patient's myopia. His current difficulties with his UIVA and UNVA are due to presbyopia. RLE with a trifocal IOL could offer a broader range of spectacle independence. The patient would be counseled on the likelihood of dysphotopsias, including halos and glare at night. He would be at increased risk of RD with RLE, particularly in the absence of a PVD, and this would be discussed with him at length and properly documented.

An option to consider before RLE is the use of pilocarpine HCL ophthalmic solution 1.25% (Vuity, AbbVie), which can be effective for the treatment of mild presbyopia. Although these topical drops can improve a patient's near vision, their efficacy is limited, and they carry a small but noteworthy risk of RD, particularly in someone with a history of high myopia. If treatment temporarily relieves the patient's symptoms of presbyopia, he could consider delaying surgical intervention until technologies currently in clinical trials, such as laser scleral microporation, become available. He may be unwilling to wait, however, in which case RLE is likely the only option to satisfy his desires.

DR. MUELLER

I would carefully review the concepts of refractive error, presbyopia, and cataract with the patient to ensure he understands why he cannot see up close. We would then discuss his dislike of the blended vision simulations performed before EVO ICL implantation. I would remind him of the added benefit of the procedure's reversibility and the possibility of exchanging the current lens for a different power. I would then ask if the patient would like to complete another contact lens trial. If he agrees and a refractive target is found that suits his preference, an exchange for a new EVO ICL of appropriate power would be performed to achieve the desired blended vision. (Scan the QR code to watch Dr. Mueller's preferred technique for exchanging an EVO ICL.)

DR. SHAFER

The patient demonstrates the feared repercussions of not respecting presbyopia intraoperatively. I would advise him that the primary pathway forward involves a repeated contact lens trial now that he is in a state of bilateral emmetropia. If he complies with the recommendation and is successful, an EVO ICL exchange could be performed with a differently powered lens. If the trial is unsuccessful, then he would be counseled on lifestyle modifications for presbyopia such as glasses, magnifiers, and enhanced lighting.

Ultimately, the patient's satisfaction hinges on his ability to temper his expectations reasonably. It is impossible to reason with the unreasonable.

DR. VENKATESWARAN

I would offer the patient a few options. First, he could consider an ICL exchange in his nondominant eye with an aim of mild myopia to permit some range of vision. I would prefer this strategy to hyperopic LVC for two reasons: (1) an ICL exchange would be reversible and more long-lasting, and (2) the effect of hyperopic LVC could regress over time. A contact lens trial would be conducted before proceeding to ensure that a blended vision or monovision strategy can satisfy the patient and determine the degree of near vision he can tolerate. Unfortunately, I suspect he may not tolerate blended vision with an ICL given his history.

The second option would be to perform an RLE with a trifocal or bifocal IOL in the patient's nondominant eye. This would broaden the eye's range of vision, particularly intermediate and/or near, while preserving distance vision. Postoperatively, he could evaluate whether he enjoys the distance vision provided by the EVO ICL in his dominant eye and the increased near vision provided by the presbyopia-correcting IOL in his nondominant eye. The choice of a multifocal IOL would allow him to retain distance and near vision, whereas using a blended vision or monovision strategy with a Light Adjustable Lens (RxSight) could reduce his distance vision somewhat—something to which he objected earlier.

Before surgery, a trial of a multifocal contact lens would be conducted in his nondominant eye. He would also be counseled extensively on the risk of glare and halos at night with multifocal IOLs and the differences in contrast sensitivity and night vision to expect between his eyes after surgery. Additionally, he would be informed of the risks of a retinal tear and RD and assessed for a PVD. Retinal clearance would be obtained before surgery.

The third option would be for him to wear a contact lens for near vision in his nondominant eye or use reading glasses.

WHAT I DID: ARJAN HURA, MD

Despite the patient's excellent UCVA in each eye, he was unhappy about his loss of UIVA and UNVA. Although he had previously trialed and disliked monovision and did not want surgical monovision, we again discussed his undergoing a contact lens trial to see if he could tolerate the near offset. Having now fully experienced presbyopia, the patient agreed to a contact lens trial in his left eye and experienced no diplopia, asthenopia, or dizziness. He ultimately preferred a -1.75 to -2.00 D sphere offset. Because achieving this level of near vision would require a high hyperopic ablation with LVC and regression would inevitably occur, we decided to pursue an ICL exchange instead.

The original lens was exchanged for an EVO ICL with the same diameter as the original implant but a slightly lower power. The patient noticed a positive difference in his vision immediately after surgery; his UIVA was 20/20 OS, and his UNVA was J2 OS.

This case highlights one advantage of the EVO ICL: The procedure is reversible, and the lens can be exchanged if the postoperative vault or refractive outcome is not acceptable. ■

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