

POSTOPERATIVE INTOLERANCE OF MONOVISION

Surgeons are asked to address a case in two parts.

BY BRANDON D. AYRES, MD; KARA JONES, MD; CLARA C. CHAN, MD, FRCS(C), FACS; JENNIFER LOH, MD; AND GREGORY S.H. OGAWA, MD

CASE PRESENTATION

A 63-year-old woman is referred by her ophthalmologist for evaluation for an IOL exchange. Two years ago, the patient underwent bilateral cataract surgery with a Light Adjustable Lens (LAL; RxSight) and a monovision strategy; the right eye was targeted for distance vision and the left eye for near vision. She has been experiencing headache and nausea because her eyes are not working together properly.

On examination, the patient's UCVA is 20/20 OD and 20/20-1 OS. The manifest refraction is -0.50 +1.00 x 019° OD and -0.75 +0.25 x 008° OS. Pupillary motility is full, and no relative afferent pupillary defect (RAPD) is evident. A slit-lamp examination shows a well-positioned LAL and an open posterior capsule in each eye. A posterior examination of each eye is normal.

How would you approach the patient's intolerance of monovision? Biometry is provided in Figure 1 to assist with decision-making.

— Case prepared by Brandon D. Ayres, MD, and Kara Jones, MD



CLARA C. CHAN, MD, FRCS(C), FACS

Trial frames or a contact lens trial would be used to determine whether it reduces the patient's feeling of imbalance and confirm that she is bothered by the near vision in her left eye rather than the mild astigmatism in her right eye. The next step

would be to rule out a convergence insufficiency and subtle strabismus. Additionally, the patient would be evaluated for a LASIK or PRK enhancement because the posterior capsule is open (laser surgery would be simpler than an IOL exchange).

If residual astigmatism in the right eye is the problem, it would be corrected with a LASIK or PRK enhancement.

If, instead, the vision in her left eye is bothering her, she is not a candidate for a laser enhancement, and an IOL

exchange is required, then data from the IOLMaster (Carl Zeiss Meditec) would be entered in the Barrett online calculator with a refractive target of plano for a three-piece IOL placed in the sulcus. A temporal incision would be created, and optic capture would be performed. If topography confirms that the corneal astigmatism is regular, a limbal relaxing incision would be created 180° away from the main incision to correct 1.59 D of corneal astigmatism at 2°.

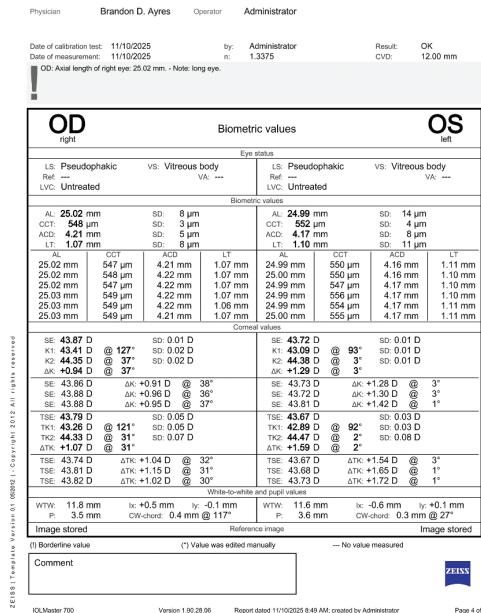


Figure 1. Biometry used to calculate IOL power for an IOL exchange with a refractive target of -0.25 D in the bag.



JENNIFER LOH, MD

For the purposes of this article, I will assume that the final lock-in treatment has been performed on the LALs. To correct the patient's anisometropia, an IOL exchange with an LAL and a refractive target of plano to slight hyperopia would be performed on the left eye. Lock-in treatments would correct any residual astigmatism and target a final refraction of plano.

The patient's anisometropic symptoms are due to a spherical equivalent of plano OD and -0.625 D OS. A refraction closer to plano in the left eye and a reduction of the astigmatism in the right eye via PRK or LASIK should help alleviate those symptoms.



GREGORY S.H. OGAWA, MD

The patient's 0.50 D of anisometropia does not constitute monovision.

It is possible that optical issues arising from the fine-tuning of her LALs is causing her symptoms. Her left eye would be occluded for an hour. If this does not resolve her symptoms, then she would be referred for a systemic evaluation. If the occlusion does resolve her symptoms, then an IOL exchange in the left eye would be offered.

A single-port pars plana vitrectomy with anterior infusion would be performed. Retinal membrane peeling forceps placed through the pars

plana cannula would be used for an attempted conversion of the Nd:YAG laser opening into something akin to a primary posterior continuous curvilinear capsulorhexis. If this maneuver is successful, a tire-to-tire (posteriorly open bag to posteriorly open bag) IOL exchange would be performed, with a monofocal toric IOL placed in the tire (open bag). If the conversion to a primary posterior continuous curvilinear capsulorhexis is not successful, then the original IOL would be removed, a three-piece monofocal lens would be placed in the sulcus, and posterior optic capture would be performed.

The reason to consider a toric IOL is the patient's motivation to achieve crisp vision, as evidenced by her earlier choice of LALs. A low-powered toric IOL could address the approximately 1.00 D of against-the-rule corneal astigmatism in her left eye.

THE CASE CONTINUED

After a long and candid discussion with the patient about the risks and benefits of an IOL exchange and the need for an anterior vitrectomy, she decides to undergo surgery with a distance target in her left eye. She is comfortable with the prospect of wearing glasses for near vision postoperatively.

Multiple IOL calculations are performed. The Kane formula identifies a target refraction of -0.25 D for plano at distance with optic capture of the IOL (Figure 2). A +16.50 D LAL is selected, and the predicted postoperative spherical equivalent is -0.46 D.

In the OR, epi-Shugarcaine solution (epinephrine 0.025% and lidocaine 0.75% in fortified balanced salt solution) is injected into the

anterior chamber for pain control and pupillary dilation. An OVD and microinstruments are used to free the original IOL from its capsular adhesions (Figure 3). A Sinskey hook is then used to rotate the lens into the anterior chamber (Figure 4). The lens is bisected using intraocular scissors (Figure 5). The pieces are removed through a temporal incision,

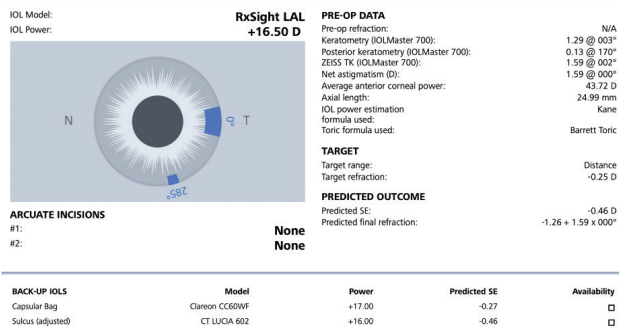


Figure 2. Measurements with the IOLMaster using the Kane formula show a LAL power of approximately +16.50 D for emmetropia with a target refraction of -0.25 D and a predicted spherical equivalent of -0.46 D.



Figure 3. An OVD and microinstruments are used to free the original IOL from the capsular bag.

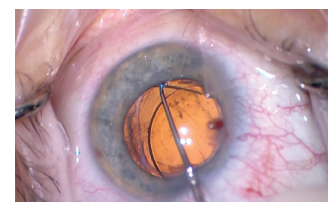


Figure 4. A Sinskey hook is used to rotate the lens from the capsular bag into the anterior chamber.

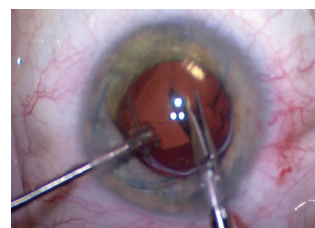


Figure 5. An initial cut is made in the IOL, which is then sheared in half. Each piece is removed from the anterior chamber.

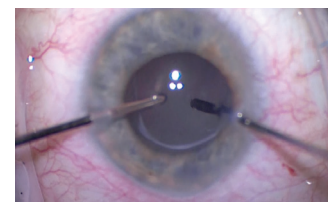


Figure 6. A two-port anterior vitrectomy is performed to remove any vitreous from the anterior chamber. Triamcinolone acetonide is injected to help visualize the vitreous.

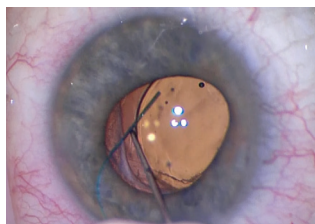


Figure 7. An LAL is placed in the sulcus, its haptics resting on the anterior capsule, and optic capture is performed.

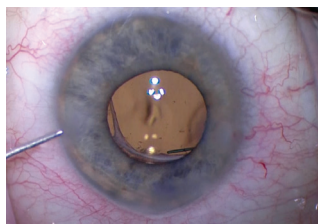


Figure 8. Final appearance of the eye after the IOL exchange and anterior vitrectomy (before the instillation of a miotic agent).

with care taken to prevent lens fragmentation. Triamcinolone acetonide is injected to help visualize the vitreous that has prolapsed into the anterior chamber (Figure 6). An anterior vitrectomy is performed; once the vitreous has been satisfactorily removed from the anterior chamber, an OVD is instilled to prevent further vitreous prolapse.

The opening in the posterior capsule is large, and the sulcus appears to be stable enough to support an LAL. The lens is carefully placed in the

sulcus, and optic capture is performed (Figure 7). Once the implant has been securely positioned, a vitrectomy is completed to ensure that no vitreous has prolapsed into the anterior chamber. To prevent the implant from dislocating or prolapsing, a miotic agent is instilled to constrict the pupil. At the conclusion of surgery, the anterior chamber is deep and free of vitreous, the iris is round, and all wounds are watertight (Figure 8).

In the following hour, the patient states that she cannot see with the operated eye, and she is examined in the postoperative area. Initially, the patient has some peripheral vision, but it quickly deteriorates to no light perception vision. She says she has not experienced pain or stroke-like symptoms, and she has no history of stroke or myocardial infarction. Extraocular movements are full. The cornea is clear, and the IOP is within normal limits.

On dilated examination, the retina is well perfused and has a normal appearance. The right eye shows no changes in vision, and the confrontation visual field is full.

How would you manage the acute change in vision in the patient's left eye?

DR. CHAN

The likely cause of the patient's vision loss is that lidocaine traveled through the open posterior capsule and into the posterior chamber and came into contact with the optic nerve and retina structures. The mechanism of action would be similar to a retrobulbar block but from an intraocular route. This phenomenon is typically transient.

The situation would be calmly explained to the patient, and she would be reassured that her vision should recover in a few hours after aqueous infusion washes the lidocaine out of the eye.

Other potential causes, however, would be considered. For example, excess triamcinolone acetonide could have traveled to the posterior chamber and obscured her vision. Extremely high IOP, a central retinal artery occlusion, and stroke should also be ruled out.

DR. LOH

Based on the second part of the case presentation, the patient's clinical history, and the physical exam (normal retinal perfusion and IOP), I believe that the cause of her

sudden and complete loss of vision is toxicity from the intracameral injection of Shugarcaine (the lidocaine component specifically). The vitrectomy probably allowed the lidocaine to migrate to the posterior pole, causing transient vision loss. This phenomenon was first reported by Hoffman and Fine in 1997.¹ The effects can last up to 48 hours, so the patient would be observed. An RAPD should be present on exam to help confirm the diagnosis.

Although the fundus exam was normal, stroke diagnoses and other emergent events should also be ruled out. I would likely request an evaluation of the patient in the ER that includes brain and carotid Doppler imaging to rule out any other systemic life-threatening causes.

DR. OGAWA

The original capsulotomy was described as large. The lidocaine likely passed through it and settled on the retina, causing direct retinal anesthesia.

I would reassure the patient that her vision should improve substantially by the next day and essentially normalize within 3 days. I would personally assess

her 1 day after surgery and be ready to provide more reassurance, if needed.



WHAT WE DID: BRANDON D. AYRES, MD, AND KARA JONES, MD

The patient was sent to the Wills Eye Hospital ER for further workup. Approximately 4 hours following surgery, her visual acuity was no light perception OS, and a 2+ RAPD was evident. The pupil was constricted following an injection of a miotic agent during surgery. A dilated examination remained normal.

Given the patient's acute vision loss, a code stroke was called. A CT angiogram of the head and neck with contrast was unremarkable. An electrocardiogram showed sinus rhythm. An MRI brain scan with and without contrast showed no acute process. The patient reported no symptoms of giant cell arteritis, and concern for the condition was low. Her C-reactive protein and platelet

Courtesy of Brandon D. Ayres, MD

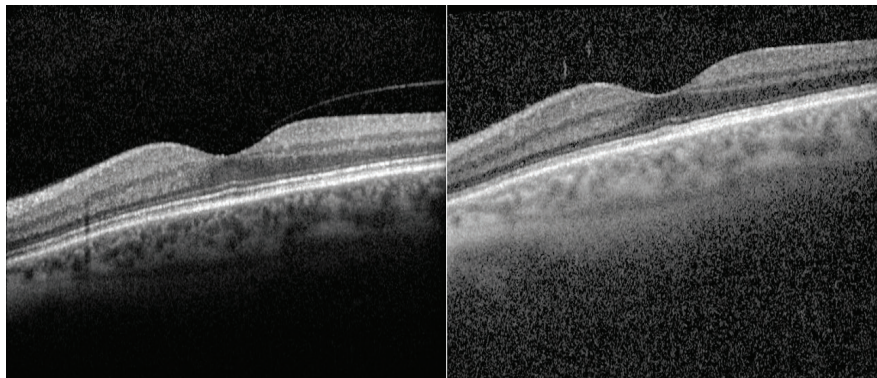


Figure 9. OCT scans (Heidelberg Engineering) of the macula of the left eye obtained 3 months before (right) and 1 week after (left) the IOL exchange.

levels were normal. Her erythrocyte sedimentation rate was elevated (87), but she had a known history of lupus.

The patient was admitted to the stroke service with neurology and began 3 days of treatment with intravenous pulsed steroids in addition to her postoperative regimen of a topical steroid and antibiotic. On postoperative day 1, her corrected near visual acuity (only her near vision could be tested in the hospital room) was 20/20 OS, and a 1+ RAPD was evident. On postoperative day 2, her corrected near visual acuity was 20/20 OS, and the RAPD had resolved. The patient was discharged by neurology with instructions for an oral steroid taper and was directed to continue

her postoperative regimen of a topical steroid and antibiotic.

One week after the IOL exchange, the patient's uncorrected distance visual acuity was 20/20 OS, and the LAL was well positioned. A comparison of OCT scans of the macula obtained 3 months preoperatively and 1 week postoperatively showed no changes (Figure 9).

Two months after the exchange, one LAL adjustment and two lock-in procedures had been performed, and the patient's uncorrected distance visual acuity was 20/20 OS. She was happy with her bilateral distance vision, and her nausea and headache had completely resolved. ■

1. Hoffman RS, Fine IH. Transient no light perception visual acuity after intracameral lidocaine injection. *J Cataract Refract Surg.* 1997;23(6):957-958.

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