

# Gradual, Spontaneous Decrease in Refractive Surprise

BY GEORGE D. KYMIONIS, MD, PhD; ZAIBA MALIK, MD;  
AND NICOLETTA FYNN-THOMPSON, MD

## CASE PRESENTATION

A 66-year-old man is referred by his ophthalmologist for a cataract evaluation of his left eye. The patient's past ocular history is only remarkable for mild ptosis of the left upper eyelid and mild anisocoria (OS miosis). He was evaluated by a neuro-ophthalmologist and told it was physiologic. There was no evidence of Horner syndrome, myasthenia gravis, or other abnormalities.

The patient undergoes uncomplicated cataract surgery with a refractive target of plano. On the first postoperative day, his UCVA measures 20/200 due to a refractive surprise of -2.25 D sphere (which corrected his visual acuity to 20/25). The examination is unremarkable and shows a centered IOL and no evidence of abnormality in the capsular bag (Figure). Repeat axial length measurements and keratometry confirm that the correct IOL power was chosen. What would you do at this time?

One week later, the patient returns with an improved UCVA of 20/80 and residual myopia of -1.25 D sphere. An examination is again normal. After 2 weeks, his UCVA improves to 20/50 with a further decrease in his residual myopia to -1.00 D sphere. What is happening, and how would you proceed?

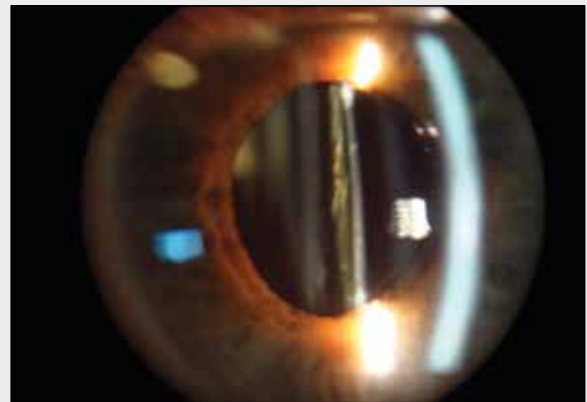


Figure. Appearance of the patient's left eye at the slit lamp on the first postoperative day.

—Case prepared by Bonnie An Henderson, MD.

### GEORGE D. KYMIONIS, MD, PhD

Because the patient's postoperative biometry confirms the preoperative IOL power calculation, it is likely that his postoperative myopia is due to the IOL's position. The lens may be in reverse position,<sup>1</sup> which may cause postoperative myopia through two mechanisms. One is the anteriorly displaced IOL in comparison to normal (which has been taken into account in the IOL power calculation), if the IOL is a three-piece design with angled haptics. The other mechanism relates to the optic's configuration. With a posterior convex or posterior biconvex IOL (with higher power in the posterior side), a reversed position would cause a significant myopic shift.

Both mechanisms have an additive effect. The effect of

the IOL's anterior displacement could regress if the optic moves backward when the pupil constricts and also when the anterior and posterior capsules coalesce postoperatively. In the presented case, the amount of the myopic shift and the small regression can be explained by those mechanisms. An examination of the patient with pupillary dilation will show if the IOL's haptics have the normal Z configuration or the S configuration of the reversed position. With the latter finding, the patient will remain myopic after the IOL takes its final position.<sup>2</sup> The repositioning or exchange of the lens may be needed if the anterior chamber remains shallow and there is a risk of angle closure.

Another possibility is that a small amount of viscoelastic remained postoperatively in the capsular bag and displaced

the IOL anteriorly. This would also explain the gradual regression, which may end up complete. Pupillary dilation to confirm the hypothesis and close observation are needed before any surgery to remove remaining viscoelastic.

### **ZAIBA MALIK, MD**

Intraoperatively, upon encountering a poorly dilating pupil, the surgeon may have elected to perform a small continuous curvilinear capsulorhexis (CCC). This choice along with the aggressive use of viscoelastic both to enlarge and to stabilize the pupil might have trapped viscoelastic behind the IOL. With this myopic surprise, it is important to evaluate the placement of the IOL. Although I can see that the lens is not subluxated anteriorly (optic capture), there appears to be a large space between the anteriorly displaced IOL and the posteriorly displaced posterior capsule. In addition, the IOL appears to have adhered to the anterior capsule.

A poorly dilating pupil will often lead surgeons to perform a CCC that is smaller than usual, thus increasing the likelihood of lens-optic touch and adherence of the IOL's optic to the anterior capsule. This adherence can also contribute to the entrapment of viscoelastic behind the IOL.

Initial observation is reasonable for this patient. Sometimes, these cases resolve on their own. The patient's improving myopia is reassuring. If he is not tolerant of the remaining myopia, a laser capsulotomy of the posterior capsule can be performed and is often needed to clear the viscoelastic and correct the myopic shift.

In addition to capsular block syndrome (CBS)—as mentioned earlier—as an etiology for postoperative myopia, eyes with angle-closure glaucoma display a propensity for a higher-than-normal intracapsular volume.<sup>3</sup> This large capsular bag may cause an intracapsular IOL to tilt or even become decentered. A postoperative myopic shift may be caused by the instability of an IOL implanted in the bag. The large capsular volume and loosened lens zonules in eyes with angle-closure glaucoma has been reported to contribute to this instability.<sup>3</sup> Finally, small wound leaks may allow the anterior chamber to shallow, which could shift the IOL forward, inducing myopia.

### **NICOLETTA FYNN-THOMPSON, MD**

Given the clinical presentation and subsequent history of a shifting refraction after cataract surgery, the differential diagnosis includes corneal edema (frequently seen in patients with a history of refractive surgery [ie, RK]), a displaced and mobile IOL, and CBS (causing the IOL to move anteriorly, inducing myopia). Upon review of the figure, it appears to me that the anterior chamber is shal-

low peripherally, implying an anterior shift of the IOL. Moreover, the space between the IOL and the posterior capsule seems to have increased, thus favoring the diagnosis of CBS. The patient's history of miosis likely contributed to the development of this syndrome.

CBS is a rare complication following cataract surgery in eyes undergoing phacoemulsification with a CCC and implantation of the IOL in the bag. CBS causes capsular hyperextension due to the retention of viscoelastic material or particulate matter. These contents become trapped between the optic of the IOL and the posterior capsule. The IOL is displaced anteriorly as a result, leading to shallowing of the anterior chamber and an unexpected postoperative myopic shift in the refraction. CBS is classified based on its time of onset (intraoperatively, early postoperative period, and late postoperative period).

The treatment of CBS includes an Nd:YAG laser peripheral anterior capsulotomy or posterior capsulotomy. Some eyes with early intraoperative CBS will develop elevated IOP, which requires immediate treatment. ■

*Section Editor Bonnie A. Henderson, MD, is a partner in Ophthalmic Consultants of Boston and an assistant clinical professor at Harvard Medical School. Dr. Henderson may be reached at (781) 487-2200, ext. 3321; bahenderson@eyeboston.com.*

*Section Editor Thomas A. Oetting, MS, MD, is a clinical professor at the University of Iowa in Iowa City.*

*Section Editor Tal Raviv, MD, is an attending cornea and refractive surgeon at the New York Eye and Ear Infirmary and an assistant professor of ophthalmology at New York Medical College in Valhalla.*

*George D. Kymionis, MD, PhD, is a clinical lecturer at the University of Crete, Greece. Dr. Kymionis may be reached at +30 2810 371800; kymionis@med.uoc.gr.*

*Zaiba Malik, MD, is a staff ophthalmologist at Dayton VMC, CEO of EyeMD, LLC, and a clinical assistant professor at Wright State University Boonshoft School of Medicine in Dayton, Ohio. Dr. Malik may be reached at zmalik01@gmail.com.*

*Nicoletta Fynn-Thompson, MD, is a partner at Ophthalmic Consultants of Boston in Boston. Dr. Fynn-Thompson may be reached at (617) 367-4800; nthompson@eyeboston.com.*



1. Nawa Y, Okamoto M, Tsuji H, et al. Dioptric changes in eyes with reversed intraocular lenses. *J Cataract Refract Surg.* 2005;31:586-589.

2. Nawa Y, Tsuji H, Ueda T, et al. Long-term observation of the refraction with a reversed-optic posterior chamber intraocular lens. *J Cataract Refract Surg.* 2004;30:1133-1135.

3. Kang SY, Hong S, Won JB, et al. Inaccuracy of intraocular lens power prediction for cataract surgery in angle-closure glaucoma. *Yonsei Med J.* 2009;50(2):206-210.