The Perils of Piggybacking

BY MARK PACKER, MD

The procedure was nearly complete. I was about to remove the viscoelastic and seal the incisions. The irrigation stream had barely entered the anterior chamber, and the irrigator was still outside the eye. The capsule collapsed, and the implant swung mercilessly backward. The lyrics of Marty Robbins' song "El Paso" illustrate my feelings at that instant: "Just for a moment I stood there in silence, shocked by the foul evil deed I had done. Many thoughts ran through my mind as I stood there; I had but one chance and that was to run."

CASE PRESENTATION

A 41-year-old male database programmer presented with disabling dysphotopsia. He described "chronic glare at night," much greater in his left than right eye, since his cataract surgery at another practice. There were at least two aspects to this glare. The first involved spokes radiating from sources of light, especially those in his office. A second peripheral component, especially along the temporal side of the left visual field, disturbed him greatly and was present in many different lighting conditions, both indoors and outdoors.

The patient's past ocular history began with vitreous floaters. Extremely frustrated by their occurrence, to the point of wearing a patch at times, he had undergone an attempted Nd:YAG vitreolysis in Florida in 2002 without any real benefit. In 2003, he had undergone sequential bilateral vitrectomies in California. The patient was not satisfied with the results of this surgery because of residual peripheral visual disturbances in both eyes. Seeking a solution, he eventually found a surgeon in Europe willing to remove the remaining vitreous from both eyes. Feeling that any lenticular opacities would worsen secondary to the multiple vitreous surgeries, this surgeon had also performed bilateral cataract surgery.

On initial examination in my office, the patient's manifest refraction and BCVA measured -0.25 +0.50 X 67 = 20/20 and +2.25 J1+ in his right eye and -0.50 D sphere = 20/20 and +2.25 J1+ in his left eye. His scotopic pupils were 6.7 mm OD and 6.8 mm OS (NeurOptics Pupillometer; Neuroptics Inc., San Clemente, CA). The slit-lamp examination demonstrated bilateral pseudophakia with a three-piece, round-edged, silicone SI40NB IOL (Abbott Medical Optics Inc., Santa Ana, CA) in his right eye and a single-piece, hydrophilic acrylic, square-edged Akreos Adapt IOL (Bausch & Lomb, Rochester, NY) in his left eye. An Nd:YAG capsulotomy had been performed on the patient's right eye, and a few pits in the lens' optic were visible. The posterior capsule of the left eye was perfectly clear. In both eyes, the vitreous was optically empty, and the fundus appeared normal.

> "It appeared to me that the temporal component of the glare in his left eye was related to the square edge of the [IOL]."

The patient and I discussed a few options. It appeared to me that the temporal component of the glare in his left eye was related to the square edge of the Akreos IOL's optic. I suggested reducing the mydriatic pupillary diameter with Alphagan (Allergan, Inc., Irvine, CA) or constricting the pupil with pilocarpine. I also mentioned an article by Paul Ernest, MD, that I had recently read that described the successful use of a piggyback IOL to reduce edge-related glare. The theory behind this procedure was that, "by implanting the secondary lens in the sulcus, the light distribution to the edge of the primary lens was altered and resulted in less reflected light reaching the retina."[1] I was also aware that Howard Fine, MD, had recently performed a piggyback lens procedure in a case of dysphotopsia with good results. I gave the patient a copy of Dr. Ernest's article to read at home.

After a few months' consideration and failed trials of both topical medications, the patient decided to proceed with the piggyback procedure.

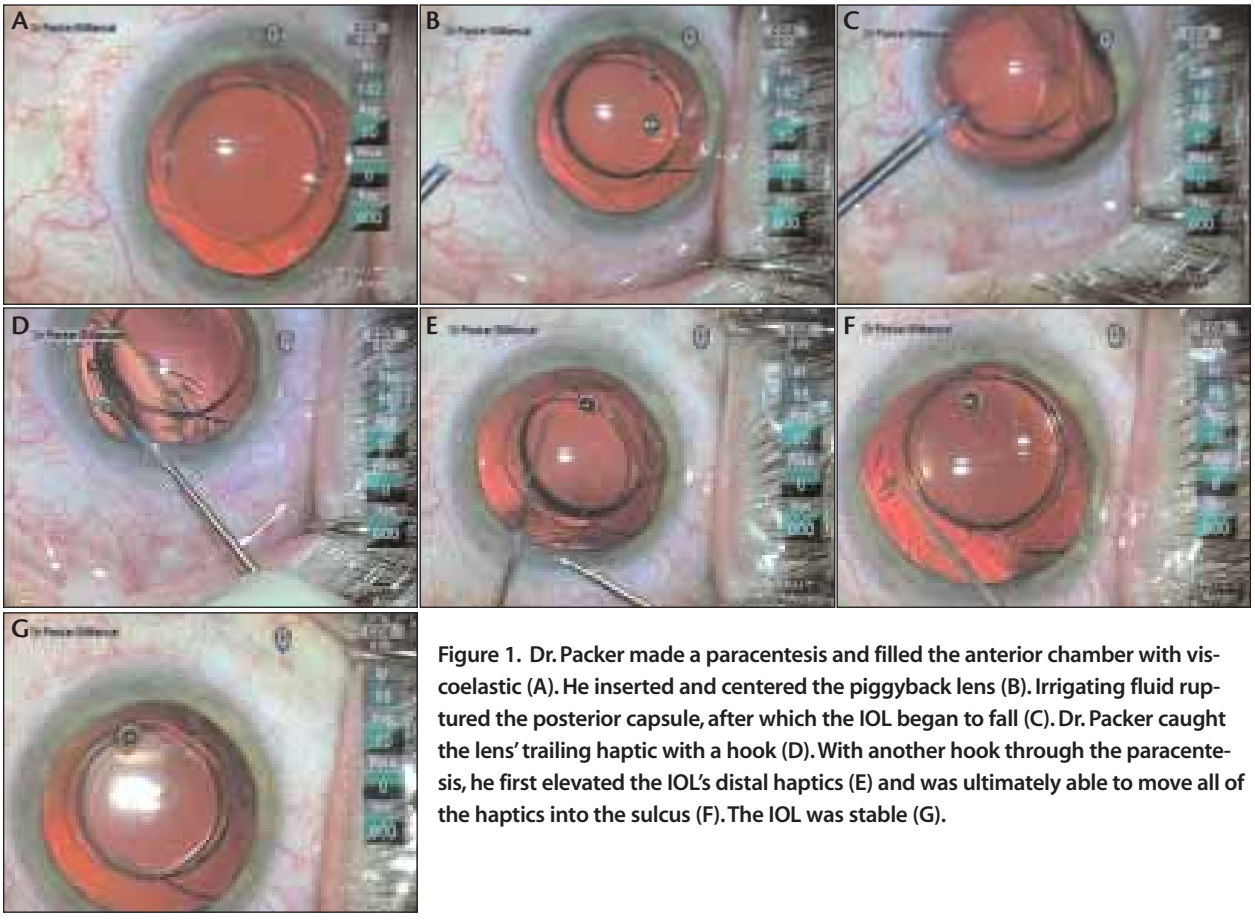

Figure 1. Dr. Packer made a paracentesis and filled the anterior chamber with viscoelastic (A). He inserted and centered the piggyback lens (B). Irrigating fluid ruptured the posterior capsule, after which the IOL began to fall (C). Dr. Packer caught the lens' trailing haptic with a hook (D). With another hook through the paracentesis, he first elevated the IOL's distal haptics (E) and was ultimately able to move all of the haptics into the sulcus (F). The IOL was stable (G).

SURGICAL COURSE

Given the mild spherical refractive error in the patient's left eye, I decided to implant a CLRFLX C IOL (Abbott Medical Optics Inc.) with -0.50 D power. I made a 1-mm paracentesis to the left, and after I filled the anterior chamber with Provisc (Alcon Laboratories, Inc., Fort Worth, TX), the posterior capsule was clear (Figure 1A). I then constructed a 2.8-mm temporal clear corneal incision with the Rhein 3D diamond knife (Rhein Medical Inc., Tampa, FL). The piggyback IOL slipped in easily and centered well (Figure 1B).

I lowered the bottle height and brought in the irrigator to remove the viscoelastic. Before the tip of the irrigator even entered the eye, the pressure from the stream of irrigating fluid instantly popped the posterior capsule, and the Akreos IOL began to fall (Figure 1C). When I later described this sequence of events to Dr. Fine, he asked, "But do you realize what that means?" That I may be the subject of litigation? I wondered. Instead, I said, "No idea. What?" "That capsule had absolutely no elasticity!" he replied. This exchange explains why he is an engineer and I am not.

Unlike in Marty Robbins' song, I did not run but cried for a hook. I was able to snag the trailing haptic of the Akreos before it got away, and then I sat and thought (Figure 1D). Clearly, the Akreos lens is not designed to sit in the sulcus. The anterior capsular rim was present. I decided as a first step to try to get the lens safely anterior to the iris and then to consider its explantation.

As I held on to the IOL with the hook in my right hand through the temporal incision, I passed another hook through the paracentesis with my left hand. I maneuvered this hook under the falling lens and levered its distal haptics anteriorly (Figure 1E). Finally, I got all four haptics into the sulcus (Figure 1F). I was amazed and relieved that the lens actually looked stable (Figure 1G). I left the viscoelastic in the eye, ordered some intravenous Diamox (Duramed Pharmaceuticals Inc., Cincinnati, OH), and sealed the incisions. No unexpected midnight pressure spike to 30 mm Hg occurred postoperatively.

The two lenses remained stable in the sulcus for 3 months. The patient's BCVA had stabilized at -1.00 +0.75 X 80 = 20/20, but the persistent edge-related glare was relieved only for 5 to 6 hours by pilocarpine 2%. The patient also had some new and persistent floaters. I discussed with him possible solutions, including an exchange for an ACIOL or a suture-fixated PCIOL. I was not at all sure that I could safely remove both lenses or

that I could place a new lens in the sulcus without suture fixation. I described many risks in detail, including the loss of the eye due to an expulsive choroidal hemorrhage. I told the patient that long-term problems could include suture erosion or breakage with a PCIOL. Ultimately, I suggested that the ACIOL was the better alternative due to a lower risk and shorter surgical procedure. I also discussed a possible loss of endothelial cells during past procedures and recommended obtaining an endothelial cell count prior to further surgery (it was 2,339 cells/mm^2). I reassured the patient that further surgery would not necessarily create more floaters.

After making a 5.5-mm clear corneal incision, I was able to remove both IOLs, implant an ACIOL, perform a peripheral iridotomy, and suture the incision. On postoperative day 1, the patient's UCVA was a remarkable 20/15-2, and the IOP was 18 mm Hg.

Over the next year, the refraction slid to -0.50 +0.75 X 90 = 20/20. The patient continued to complain about severe glare and new floaters. His examination now demonstrated a moderate, fine dusting of pigment on the corneal endothelium of his left eye. The ACIOL was in place, a small peripheral iridotomy was visible, and the anterior capsular rim was intact with an approximate internal diameter of 6.5 mm. Biometry demonstrated an axial length of 24.68 mm by partial coherence interferometry (IOLMaster; Carl Zeiss Meditec, Inc., Dublin, CA) and a keratometry reading of 43.10 x 44.58 @ 69°. Corneal topography showed regular astigmatism.

By this point, I was thinking that perhaps a PCIOL with a 7-mm optic offered the best chance of eliminating the glare. From the size of the anterior capsular rim, it appeared that a 7-mm optic could be captured posteriorly with the haptics anterior to the capsule in the sulcus.[2] Using this technique would ensure good centration and avoid the need for suture fixation. Removing the ACIOL would require a 5-mm incision, and I preferred not to open the eye to 7 mm if possible.

I discussed the case with Advanced Vision Science (Goleta, CA), a company I knew to be developing a foldable, acrylic, 7-mm three-piece IOL (XACT X-70; Santen, Inc., Napa, CA). As an investigational device in

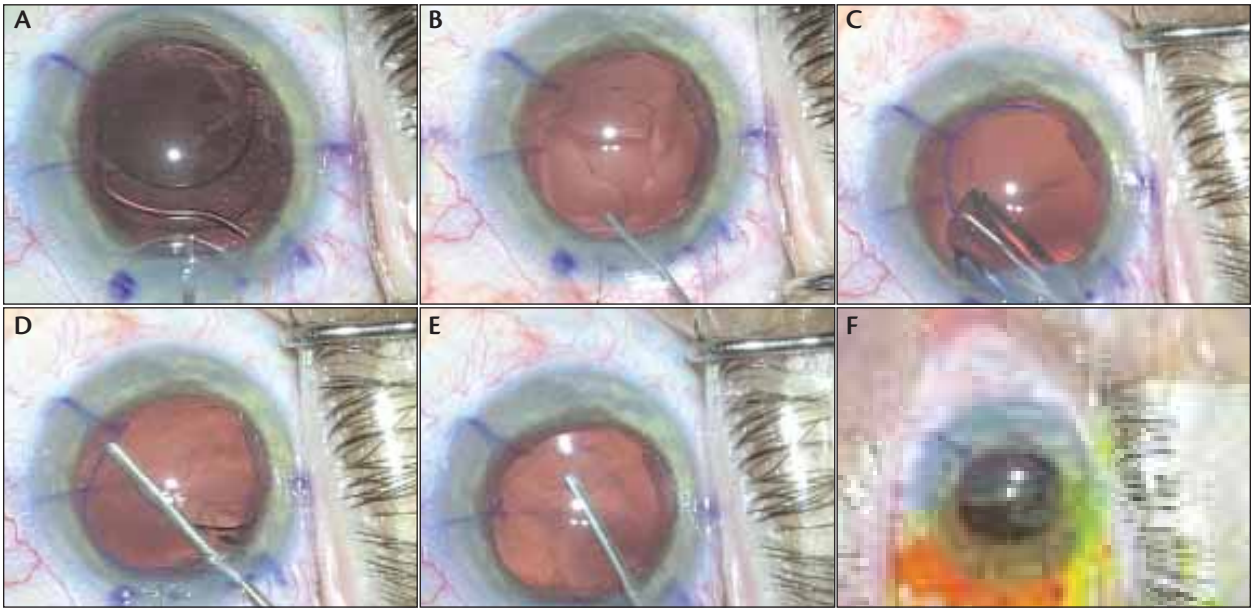

Figure 2. Dr. Packer performed limbal relaxing incisions (A). After explanting the IOL, he closed the incision to 3.5 mm to allow the replacement IOL's insertion (B). He introduced the leading haptic of the three-piece acrylic lens with a forceps behind the iris and rotated its trailing haptic into the ciliary sulcus (C). The optic is captured behind the capsular rim (D and E). The eye's appearance at the conclusion of surgery (F).

the United States, its use required that the patient obtain an independent second opinion and that we receive the approval of my Institutional Review Board as well as the FDA. The surgeon who offered a second opinion told me, "This patient has dodged a bullet five times. Do you really want to play Russian roulette with his eye?" In retrospect, I think I was in too deep; it seemed that success might be just around the corner. After again discussing all the risks I could imagine with the patient, he decided to proceed with the surgery.

To address the corneal astigmatism, I performed limbal relaxing incisions as marked in Figure 2A. I then initiated a 5-mm single-plane clear corneal incision with the Rhein 3D Knife and enlarged it with the Triamond knife (Mastel Precision, Inc., Rapid City, SD). After instilling Viscoat both in front of and behind the ACIOL, I gently pushed the lens nasally with a hook to free it from the subincisional angle. It easily slid out of the incision, which I then reinforced with a single temporary suture of 10–0 nylon, while leaving a 3.5-mm opening for the foldable IOL's insertion (Figure 2B). I widened the ciliary sulcus with Provisc (Alcon Laboratories, Inc.) in preparation for placing the new IOL. I inserted the three-piece acrylic lens, manufactured with angulated PVDF haptics, into warm balanced salt solution to facilitate folding. Since there was no shooter for the IOL, I had to fold it with a forceps.

After making sure that it was anterior to the capsule, I introduced the leading haptic behind the iris. Then, I rotated the trailing haptic into the ciliary sulcus (Figure 2C). I prolapsed the optic posteriorly so that it was captured behind the rim of the capsule (Figure 2D and E). Optic capture ensures the centration of the IOL and reestablishes a bicameral eye, thus effectively sealing the vitreous cavity from the posterior chamber. In this postvitrectomized eye, I had no concern regarding vitreous incarceration; when one performs optic capture after posterior capsular rupture in cataract surgery, however, the use of triamcinolone staining is recommended to ensure a vitreous-free environment.[3]

I was very pleased with the appearance of the eye at the end of the case (Figure 2F). On the day after surgery, the patient's UCVA measured 20/25. He made no immediate complaint of glare, although he noticed "tiny bubbles" in his vision. The slit-lamp examination demonstrated a clear cornea and only trace anterior chamber reaction. The IOL was perfectly centered.[4] The patient instilled topical prednisolone acetate and ketorolac for 2 months.

OUTCOME

Although the edge-related glare appears to have resolved, the tiny bubbles have persisted and, in fact, have become more bothersome with each passing month. Eventually, the patient sought the opinions of retina surgeons and returned to Europe, where he may undergo another vitrectomy.

He has also noted a new streak of glare in his vision that the retina surgeon and he feel is related to a crease in the new IOL.

LESSONS LEARNED

I have mixed feelings about the role I have played in this patient's life. I did him no harm, but I took significant risks and have not really done him much good. The patient feels that I have "tried."

In the beginning, I felt that he demonstrated an unusual combination of intelligence, visual sensitivity, and perseverance. I have come to believe, however, that I perpetuated his unrealistic goals. I acted the codependent, enabling his addiction to the illusion of perfect vision. I admit now that one of the hardest things for me to overcome is my own feeling of failure when I cannot win a patient's approval. In this case, it would have been wiser to speak the truth and nourish myself with my own internal approval for doing the right thing rather than to persist in pursuing something that has proved unobtainable—a successful result in the estimation of this patient.

Professional development expert Ken Foster recently reminded me that, after God created heaven and earth, he looked upon creation and said it was good. He did not claim that it was perfect, and neither should we. ■

Mark Packer, MD, is a clinical associate professor at the Casey Eye Institute, Department of Ophthalmology, Oregon Health and Science University, and he is in private practice with Drs. Fine, Hoffman & Packer, LLC, in Eugene, Oregon. He is a consultant to Abbott Medical Optics Inc., Advanced Vision Science, and Bausch & Lomb, and he has received honoraria from Allergan, Inc. Dr. Packer may be reached at (541) 687-2110 mpacker@finemd.com.

1. Ernest PH. Severe photic phenomenon. J Cataract Refract Surg. 2006;32(4):685-686.
2. Gimbel HV, DeBroff BM. Intraocular lens optic capture. J Cataract Refract Surg. 2004;30(1):200-206.
3. Burk SE, Da Mata AP, Snyder ME, et al. Visualizing vitreous using Kenalog suspension. J Cataract Refract Surg. 2003;29(4):645-651.
4. Guyton DL, Uozato H, Wisnicki HJ. Rapid determination of intraocular lens tilt and decentration through the undilated pupil. Ophthalmology. 1990;97(10):1259-12