

Dislocated Posterior Chamber Intraocular Lens Management

A new technique using buried-suture and buried-knot transscleral suture fixation without a scleral tunnel or flap.

BY STEVEN M. COHEN, MD

Posterior chamber intraocular lenses (IOLs) are exquisitely engineered to provide excellent vision when implanted into a stable capsule following extracapsular cataract extraction. If the lens capsule or the supporting lens zonules fail, and the IOL dislocates, vision usually deteriorates.

Unfortunately, just as cars are not designed to be easily fixed after crashing, IOLs are not designed to be easily repositioned after dislocating.

MANAGEMENT OPTIONS

Posterior chamber IOL design varies. Therefore, an IOL exchange is an appealing method of restoring vision in a patient with a dislocated posterior chamber IOL because the same procedure can work in most situations.¹ Whether the dislocated posterior chamber IOL is in the capsule, out of the capsule, lying on the macula, or slightly out of position, an IOL exchange will work. Once the offending IOL is removed, an anterior chamber IOL or secured posterior chamber IOL can be implanted.

There are several disadvantages of IOL exchange. It requires a large incision to remove the dislocated IOL. In addition, maneuvering the dislocated IOL from the posterior chamber to the anterior chamber and out of the eye involves several steps during which the lens could inadvertently injure the retina, iris, or cornea. The corneal endothelium is particularly vulnerable to damage from excessive maneuvers in the anterior chamber that are sometimes necessary to remove a dislocated IOL. Finally, insertion of an anterior chamber IOL involves risks to



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the iris and the angle, and possibly an increased risk of chronic macular edema.²

Because of the issues with anterior chamber IOLs, some physicians exchange a dislocated posterior chamber IOL for a new posterior chamber IOL. The exchange of a dislocated posterior chamber IOL for a sutured or scleral-fixed posterior chamber IOL involves all the risks of IOL removal plus all the risks of scleral or iris fixation of a posterior chamber IOL. If an anterior chamber IOL is contraindicated, it often makes more sense to work with the dislocated posterior chamber IOL already in the eye than to exchange it for a different posterior chamber IOL.

In certain special situations, there are options for rehabilitating an eye with a dislocated IOL that do not involve an IOL exchange or a sutured IOL. One such situation is when a posterior chamber IOL is completely dislocated, stuck in the vitreous base, and not in the visual axis. In this case, the IOL need not be removed from the eye; rather, a contact lens or secondary IOL can be used to rehabilitate vision. Although intuitively it seems dan-

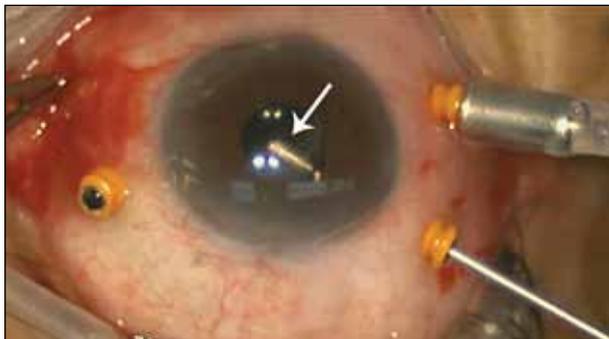


Figure 1. Initial 23-gauge vitrectomy removes vitreous from behind the IOL, allowing subsequent safe passage of needles and instruments. The white arrow indicates position of vitrectomy probe tip clearing vitreous behind the dislocated IOL that could otherwise be engaged by the polypropylene suture.



Figure 2. The blade from the 23-gauge trocar is used to make 2 sclerotomies through which the polypropylene suture will be guided. The white arrow points to 1 of the 2 sclerotomies. The black-handled 23-gauge blade is to the right of the initial sclerotomy, opening the second sclerotomy.

gerous to leave a rogue IOL in the posterior pole where it could wreak havoc, there is no evidence that this course of action incurs any more risk than the surgery required to remove the dislocated IOL. Not removing the dislocated IOL avoids the risks of vitrectomy and IOL removal.

Another special situation is when a slightly decentered lens has enough capsular support so that it can be rotated in the capsule to center it. In addition, a decentered or dislocated posterior chamber IOL in an eye with an intact capsulorrhexis can be centered by either capturing the optic of the IOL in the capsulorrhexis or by maneuvering the entire lens in front of the anterior capsule and into the ciliary sulcus. The best choice in this situation depends on the haptic and optic design of the dislocated posterior chamber IOL.

SUTURED IOLs

When there is inadequate capsular support to allow simple repositioning of a dislocated IOL, sutures can be used to secure the IOL in the visual axis. The IOL can be sutured to the iris or the sclera. Iris sutures are useful when the dislocated posterior chamber IOL has haptics and does not have capsule adherent to the lens. In cases of an in-the-bag dislocated IOL or a plate-haptic dislocated IOL, a transscleral 9-0 polypropylene fixation technique is preferable.

The knots used to tie the transscleral sutures securing the IOL present a vexing problem. If they are covered with only conjunctiva and Tenon capsule, they usually erode through the covering. Once exposed, the knots irritate the eye and pose an increased risk of endophthalmitis. Therefore, scleral tunnels or flaps are used to bury the knot of the polypropylene suture.^{3,4}

Unfortunately, in some patients who have had mul-

tiple surgeries or are highly myopic, the sclera can be too thin to safely create a scleral flap. Furthermore, if the tunnel or flap is too shallow, the suture can erode through the scleral cover; if it is too deep, the globe can be penetrated, and complications such as bleeding from the ciliary body or iris prolapse can ensue.

The technique presented in this article and the accompanying video obviates the need to make a scleral flap or tunnel by using the needle on the 9-0 polypropylene suture to bury the suture in the sclera. The knot can then be rotated into the eye through a preplaced 23-gauge sclerotomy.

CASE REPORT

A 74-year-old man presented with end-stage, poorly controlled glaucoma secondary to pseudoexfoliation. He reported 6 months of gradually blurring vision in the right eye interfering with his visual function. His ocular hypotensive medication regimen included pilocarpine, brinzolamide (Azopt, Alcon) and a brimonidine-timolol combination (Combigan, Allergan). His intraocular pressure in the right eye was 33 mm Hg on presentation, with cup-to-disc ratio of 0.9 and advanced optic nerve pallor. He had an in-the-bag dislocated haptic IOL that was mobile and decentered.⁵

THE PROCEDURE: OVERVIEW

After modifications to his glaucoma treatment regimen to better control his intraocular pressure, the patient underwent 23-gauge pars plana vitrectomy (PPV) with transscleral 9-0 polypropylene fixation of the dislocated IOL. Although the IOL had no positioning holes that could be used to secure the suture, there was enough intact, fibrosed capsule that the 9-0 polypropylene suture could grab the IOL-capsule complex and secure the lens to the sclera.

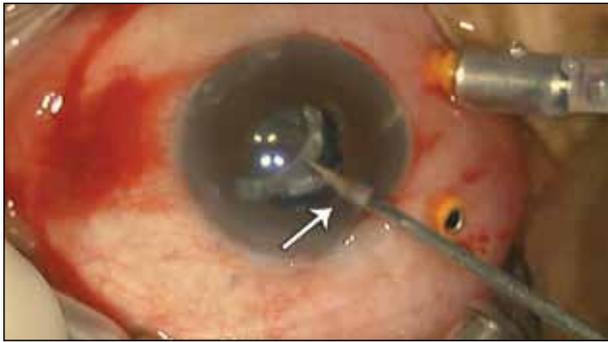


Figure 3. The 20-gauge corneal incision (white arrow) made with an MVR blade is sufficient to allow for passage of the polypropylene suture needle.

The technique involves creating a 23-gauge sclerotomy for each of 4 suture passes. The 23-gauge sclerotomies are large enough to allow rotation of the knot into the eye after the suture has been tied. The needle on the 9-0 polypropylene suture is then used to perform a partial-thickness needle pass through the sclera from sclerotomy to sclerotomy so the suture is entirely buried under sclera at the conclusion of the case. The 3-inch double-armed 9-0 polypropylene suture with a CTC-6L spatula needle is a special-order item (Prolene D8229, Ethicon) and expensive.

THE PROCEDURE: DETAILS

What follows is an illustrated, detailed account of the procedure for suturing the in-the-bag dislocated IOL with a 9-0 polypropylene suture, which is buried in the scleral with the knots rotated into the eye. The Danish physicist Niels Bohr famously said, "An expert is a person who has made all the mistakes that can be made in a very narrow field." Hopefully this will help you become an expert without having to first make any mistakes.

Step No. 1: Trocar placement, infusion, and vitrectomy. This procedure begins with a standard 23-gauge PPV (Figure 1). If the dislocated lens has some zonular support, as in this case, the trocars are placed so that they will not interfere with placement of the sutures necessary to secure the haptics of the dislocated IOL. A thorough PPV reduces the risk of engaging vitreous during manipulation of the IOL. There is a risk of vitreous prolapse into the anterior chamber intra- and postoperatively because of the corneal incisions. A vitrectomy substantially reduces the risk of this complication. Moreover, the vitrectomy ports can be used to manipulate or support the dislocated IOL with forceps and other instruments as needed.

In this case, the IOL was slightly dislocated; therefore a minimal PPV is performed prior to securing the IOL, and subsequently the PPV is completed. The infusion is

on for most of the case, but it is kept very low for all but the vitrectomy part of the surgery specifically to keep the vitreous from prolapsing into the anterior chamber intraoperatively.

Step No. 2: Sclerotomies for polypropylene suture, securing the IOL. The 23-gauge trocar blades are used to make the sclerotomies (Figure 2). These 23-gauge sclerotomies are self-sealing yet large enough to allow rotation of the knot into the globe once the polypropylene suture is tied. The 2 sets of sclerotomies are placed 6 clock hours apart. Each pair is approximately 3 mm to 4 mm apart and about 1 mm to 2 mm posterior to the corneoscleral limbus. All these measurements are important. The 6 clock-hour separation is necessary so that the 2 sutures, when placed, center the lens in the visual axis. The distance between the pair of sclerotomies is necessary to pass the suture, which will be buried, and also to provide 4-point support for the dislocated IOL, which decreases the tendency to tilt. Finally, the anterior placement of the sclerotomies is necessary to prevent tilt of the lens.

To create the anterior sclerotomies, the 23-gauge blade enters the eye as perpendicular as possible, aiming directly toward the posterior pole. Keeping the infusion high for this part of the case reduces the risk of collapsing the eye and inadvertently damaging the retina with the trocars. If the eye is entered obliquely, the iris will be damaged by the blade.

Step No. 3: Corneal incision. A 20-gauge paracentesis corneal incision is made a few millimeters anterior to the limbus, about 5 clock hours away from each set of sclerotomies. This will be used to pass the polypropylene suture in front of and then through the IOL-capsule complex, making a loop that will secure the lens to the sclera (Figure 3).

Step No. 4: Placement of the 9-0 polypropylene suture needle. Clean passage of the 9-0 polypropylene needle through the corneal incision is difficult. Some surgeons pass the needle backward because the blunt end of the needle is less likely to engage cornea.⁵ However, because the suture may later be cut by the docking needle used to guide the needle out of the eye (see below), the needle is passed forward, approaching the incision at the same angle that is used to make the incision with a microvitreoretinal (MVR) blade (Figure 4).

The tip of the needle is watched under high magnification as it penetrates the cornea to ensure cornea is not engaged and Descemet membrane is not dislocated. Sliding the needle from side to side once it is through the cornea confirms that no cornea has been engaged. Sometimes it is extremely difficult to pass the needle

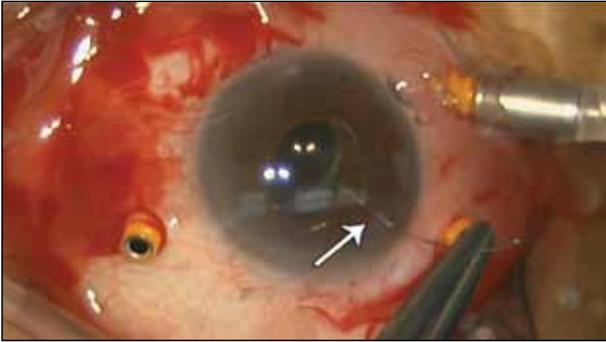


Figure 4. The needle from the polypropylene suture (white arrow) is placed through the cornea taking care to avoid engaging cornea and to avoid detaching Descemet membrane. This is a difficult needle pass, and therefore it is done prior to manipulating the IOL so the needle is ready, without delay, to pass when the 27-gauge docking needle is in proper position.

through the corneal incision. If it will not pass through, it is possible to place something blunt through the incision to gape it open, such as a 27-gauge cannula. The needle can then be slid along the edge of the cannula tip and guided through the corneal incision.

Step No. 5: Suture pass anterior to IOL. The first polypropylene suture is guided through the preplaced 23-gauge sclerotomy using a bent long 27-gauge needle (Figure 5). The needle can be attached to a 3-cc syringe filled with balanced salt solution so it can be held and maneuvered in the eye. Prior to passing the anterior suture, it is sometimes necessary to use viscoelastic to push the IOL posterior to create enough space for a clean suture pass. The 27-gauge needle is then inserted through the 23-gauge sclerotomy, flattened, and moved under the iris and in front of the IOL toward the center of the pupil where it can be seen. Once in view, a needle holder is used to dock the preplaced 9-0 polypropylene suture needle into the bore of the 27-gauge needle.⁶ The polypropylene suture can be pulled out of the eye using the 27-gauge needle, or it can be pushed through with the needle driver using the 27-gauge needle to guide the polypropylene needle out through the sclera.

The infusion pressure should be low for this maneuver so that the eye can be collapsed enough to push the needle all the way out of the eye. The needle tip can then be removed from the eye using a needle holder. One end of the double-armed 9-0 polypropylene suture is now in front of the IOL and through the preplaced 23-gauge sclerotomy.

Step No. 6: Sclerotomy-to-sclerotomy needle pass. A superficial scleral needle pass is made using the poly-

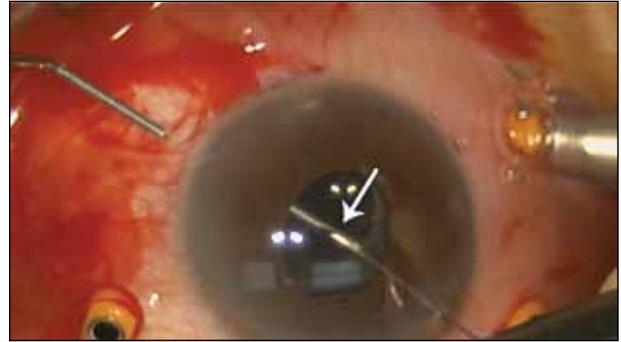


Figure 5. The needle from the polypropylene suture (bottom right) is docked (white arrow) into the 27-gauge needle (top left) preparing to guide the suture in front of the IOL.

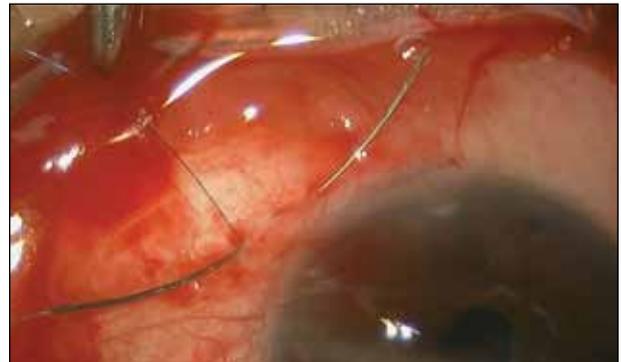


Figure 6. The needle from the first half of the 9-0 polypropylene double-armed suture is passed from sclerotomy to sclerotomy, effectively burying the suture in the sclera so at the conclusion of the surgery no suture is exposed.

propylene needle that was just passed in Step No. 5. The needle is left in the sclera so that the subsequent needle passes of the second half of the double-armed polypropylene suture and 27-gauge docking needle cannot inadvertently cut the polypropylene suture (Figure 6).

Step No. 7: Polypropylene suture pass through the IOL-capsule complex. The second needle on the double-armed polypropylene suture is preplaced through the cornea with care not to engage the cornea or dislocate Descemet membrane with the needle tip. A 27-gauge docking needle is then placed through the second sclerotomy with care to not engage sclera. This is the side where the knot will be rotated into the eye. The 27-gauge needle must be directed toward the posterior pole and then angled flat to capture as much capsule as possible (Figure 7). An iris hook can be used to push the iris out of the way or pull the edge of the IOL into the pupil, so that the optimal site for the suture pass through the IOL-capsule complex can be seen. The needle from the polypropylene suture is then docked into the bore of the 27-gauge needle. Sometimes the capsule is

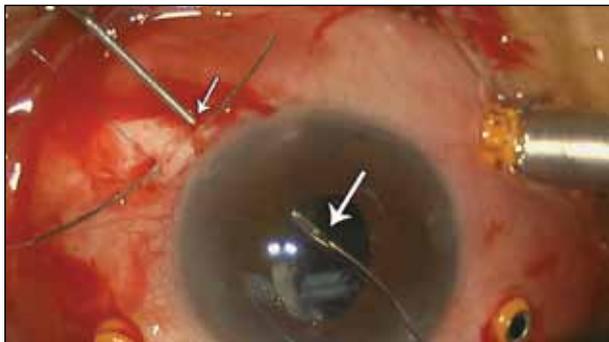


Figure 7. The second half of the double-armed polypropylene suture (top right) is guided through the capsule and behind the IOL and docked (large white arrow) into the 27-gauge needle (top left). Notice the needle from the first suture pass embedded in the sclera is left in place (top left), so that as the 27-gauge needle (small white arrow) is passed into the eye the polypropylene suture attached to the first needle is safe and cannot be accidentally severed.

thick and the pressure of the polypropylene needle pushing into the bore of the 27-gauge needle is necessary to puncture the capsule. Once the polypropylene needle is docked into the 27-gauge needle, the polypropylene needle can be withdrawn from the eye either by pulling it with the 27-gauge needle or by pushing it while guiding it out of the eye with the 27-gauge needle.

Step No. 8: Tying the polypropylene suture. Once the second half of the polypropylene suture is removed from the eye and the first half is pulled through, there is a loop of polypropylene suture holding the IOL, and the 2 ends are outside of the eye next to each other. This polypropylene suture is left untied, or tied with a single throw, until the second polypropylene suture is finished, securing the other half of the dislocated IOL (Figure 8). Each of the polypropylene sutures is then gently tied with enough pressure to hold the dislocated IOL, but not enough to cheese-wire the capsule, which secures the suture to the haptic of the IOL. In the video, a lens hook is used to center the IOL prior to tying the sutures so that excessive tension on the polypropylene sutures is avoided.

Step No. 9: Rotating the knots. The 9-0 polypropylene suture knots are rotated into the eye through the 23-gauge sclerotomy. They can be rotated into the eye using gentle pressure directly on the knot with the tip of a 27-gauge cannula (Figure 9).

Step No. 10: Wrapping up. Once the IOL is secure, the anterior chamber is checked for stray vitreous with a vitreous staining agent such as triamcinolone. A posterior

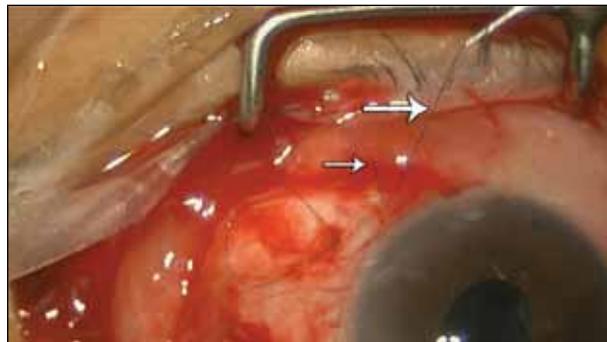


Figure 8. The needle from second half of the double-armed polypropylene suture (small white arrow) is withdrawn from the eye through one of the sclerotomies. Then the needle from the first half of the polypropylene suture (large white arrow) is withdrawn from the eye. The first arm of the polypropylene suture is buried in the sclera.

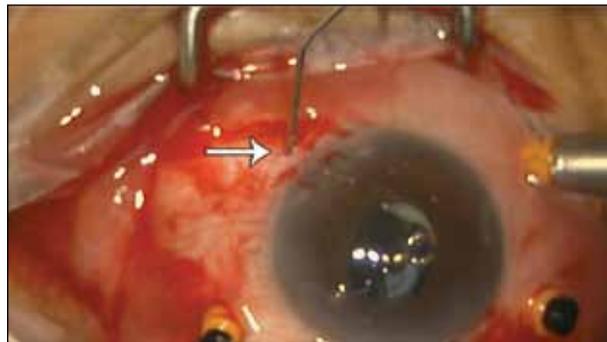


Figure 9. The knot from the polypropylene suture is rotated in the eye using gentle pressure from a 27-gauge cannula tip (white arrow).

vitrectomy can also be completed. Care should be taken not to stress the newly sutured IOL.

IF THE LENS DOES NOT LOOK RIGHT

If all goes well, the IOL will be centered in the pupil and not tilted. Sometimes, at the conclusion of the case, the IOL is tilted or decentered. A little decentering of an IOL is usually tolerable; however, if the tilt or decentering is excessive, further maneuvers can be attempted to salvage the IOL. Sometimes an extra iris suture or an extra suture through the capsule will stabilize the IOL if it is tilted or decentered. Unfortunately, the manipulation necessary to add more sutures to the IOL or capsule can compromise the previously placed sutures or the fragile capsular support. Also unfortunately, rather than sitting better in the eye, the IOL may tilt more or decenter more.

If the lens is too tilted or too decentered and this cannot be fixed with extra sutures, it is sometimes best to proceed with an IOL exchange. Therefore, lens calculations and backup lenses must be ready during these cases.

Transscleral fixation of a dislocated in-the-bag posterior chamber IOL allows rapid vision recovery after surgery.

Because we operate on patients supine, but they spend their days in other positions, sometimes a suture-fixed IOL will sit perfectly in the eye at the end of surgery and subsequently decenter or tilt postoperatively. It is also possible for the lens to dislocate if the sutures break or the capsular support holding the suture to the haptic fails. In these cases, further surgery may be necessary.

Therefore, it is best to prepare patients for these possibilities preoperatively. When planning a surgery on a dislocated IOL, explanation of the risk, and benefits of the procedure should include the possible need for further surgery.

CONCLUSION

This method of transscleral fixation of a dislocated in-the-bag posterior chamber IOL allows rapid vision recovery after surgery. It works best with lenses with holes that can be used as suturing holes, such as many plate-haptic IOLs. It can work for a dislocated haptic IOL when there is enough capsule to keep the suture secured to the haptic. This technique combines anterior segment and posterior segment techniques to accomplish transscleral fixation of a dislocated IOL while allowing the polypropylene suture and knot to be completely buried under the sclera and in the globe. ■

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