My Worst Surgical Nightmare: A Subluxated Cataract

A suture alone did not provide sufficient support.

BY SOOSAN JACOB, MS, FRCS, DNB

Of all the cataracts I have faced, the ones I used to dread the most were subluxated cataracts. These are inherently challenging at each step, from construction of the capsulorhexis to IOL implantation and centration.

One case that I found exceptionally difficult was a 67-year-old patient with a subluxated cataract due to zonular dialysis of about 180º. After I created the capsulorhexis with difficulty, I performed hydrodissection and injected a sutured endocapsular ring (ECR), which I anchored to the sclera by tying a knot under a scleral flap. Passing the long, thin needle across the width of the anterior chamber while holding it at one end was challenging; however, I finally managed to bring the suture out and tie a knot. I was not entirely satisfied with the centration I achieved, as the flap was not exactly centered on the dialysis, but I opted to accept the decentration instead of starting over to create a new flap. Thereafter, I experienced difficulty performing in-the-bag maneuvers. The bag tended to move in its entirety (Figure 1), and I was not satisfied with the amount of support provided by the sutured ECR. All of these issues resulted in a tough surgery for me.

ACHIEVE ADEQUATE SUPPORT

The lesson I learned is that a suture alone does not provide sufficient support to perform all intraoperative maneuvers, especially in larger subluxations. Some other form of sturdier transscleral anchorage, such as the use of capsular hooks, is required. The disadvantages of these devices, however, include the need for additional paracenteses and explantation once surgery is over. Additionally, capsular hooks provide vertical support but not expansion of the capsular fornix. Without an ECR in place during phaco maneuvers, fornical aspiration and other complications associated with a lax posterior capsule can result.

Keeping these problems in mind, I now use a glued ECR for most cases of subluxation with zonular dialysis encompassing more than one quadrant. I designed a device (manufactured by Epsilon Eye) to allow fibrin–glue-assisted sutureless transscleral fixation of the capsular bag and its contents. This device eliminates sutures and achieves sturdier scleral fixation of the capsular bag through an extension of the endocapsular ring. The extension exits the eye through a sclerotomy and is tucked into an intrascleral tunnel to provide transscleral fixation.

Figure 1. Movement of the entire bag during an attempted chop in a case in which a sutured endocapsular ring was implanted.
The glued ECR is a one-piece device with three parts: (1) arms on either side to expand the fornix, (2) a Malyugin-type scrolled mechanism to engage the capsulorrhexis, and (3) a haptic that goes through the sclerotomy to anchor the device, and thereby the capsular bag, to the sclera. It is made of polyvinylidene fluoride (PVDF), a material used in the haptics of many IOLs. The reasons for choosing this material include its known biocompatibility, little to no risk of erosion or degradation, good flexibility and shape memory, and sturdiness—a promise of long-term stability. The device is available in different lengths depending on surgeon preference and the extent of subluxation (Figure 2A).

The advantages of the device include simplicity of use and shorter duration of surgery compared with suturing a ring to the sclera. Two videos demonstrating the use of the glued ECR are available at eyetube.net/?v=kateb and eyetube.net/?v=cheez.

**IMPLANTATION PROCEDURE**

Implanting the glued ECR is simple and does not require passage across the chamber of long, thin needles, as with sutured rings. First, a scleral flap is

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**Figure 2.** (A) The glued ECR segment has two arms, a scrolled rhexis-engaging mechanism, and a haptic for transscleral fixation. (B) A subluxated cataract with zonular dialysis of about 180° is seen. A lamellar scleral flap and sclerotomy are created in the area of dialysis. Capsulorrhexis creation is followed by gentle hydrodissection. (C) The arms of the ECR are introduced via the anterior chamber under the rhexis. The haptic is then exteriorized through the sclerotomy using the handshake technique. (D) Pulling the haptic causes the scroll to engage the rhexis rim and centers the entire capsular bag.

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**Figure 3.** (A) The haptic is cut to an appropriate length and tucked into a coathanger-shaped intrascleral Scharioth tunnel. (B) Phacoemulsification is performed. Good capsular bag support is seen during in-the-bag maneuvers such as vertical chopping. (C) The bag is seen well-supported and well-centered, and (D) a well-centered IOL is seen at the end of surgery. Fibrin glue is applied, and the flap is sealed over the haptic. The conjunctiva is also closed with fibrin glue. (E) A well-centered IOL with a clear cornea, a round pupil, and a quiet eye is seen at the 3-month postoperative visit. (F) Six-month postoperative picture of same patient. (G) Ultrasound biomicroscopy at 6 months shows a well-centered IOL with no tilt.
centered on the dialysis. Completion of the capsulor-hexis and cortical cleaving hydrodissection are then performed (Figure 2B), and a 20-gauge sclerotomy is made underneath the flap. After instilling an ophthalmic viscosurgical device, the ECR is introduced into the anterior chamber by flexing it in. Once inside, it regains its shape immediately.

Next, both arms of the device are placed underneath the hexis margin and into the capsular fornix. Two microforceps are used in the handshake technique to withdraw the haptic of the device through the sclerotomy (Figure 2C). Pulling gently on the haptic causes the scroll to engage the hexis margin, and the entire capsular bag moves toward the side of zonular loss (Figure 2D).

The haptic is then trimmed and tucked into a coathanger-shaped intrascleral Scharioth tunnel created at the edge of the scleral flap with a 26-gauge needle (Figure 3A). Because the arms of the device are within the capsular fornix, they expand the fornix similarly to a traditional capsular tension ring, and the tuck of the haptic provides scleral fixation. Hence, the same device provides both vertical and horizontal support as well as fornicial expansion. Additional paracenteses are not required, and the device does not require explantation at the end of surgery.

Following placement of the device, the surgeon may proceed with phacoemulsification, cortex aspiration, and in-the-bag IOL placement (Figures 3B through 3D). At the end of surgery, IOL centration can be adjusted, if required, by changing the degree of the haptic tuck within the scleral tunnel. The flap and conjunctiva are closed using fibrin glue to create a hermetic seal during the period that it takes for surgical fibrosis to set in (Figures 3E through 3G).

**ADDITIONAL ADVANTAGES**

Another advantage the glued ECR gives over sutured ECRs is in avoiding sutures and their related complica-

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tions such as suture erosion, degradation, knot exposure, and late IOL subluxation and dislocation. Because it is thicker (130 µm thick) and sturdier than a suture, the device offers superior support during surgery. It also provides greater stability postoperatively, as it locks firmly to the sclera (Figure 3E).

I also find that centration of the bag can be tweaked at any point by adjusting the degree of haptic tuck. With sutured rings, once the knot is tied, any error in centration requires cutting the suture and starting over. The glued ECR also offers easy adjustability in case of an error in scleral flap placement, unlike sutured ECRs, for which more complicated maneuvering is needed after cutting the suture to begin again.

In one case of a subluxated IOL in which I was using a glued ECR, I faced the problem of an incorrectly placed flap (Figures 4A through 4C). Pulling on the haptic brought the bag and IOL toward the flap, but the IOL did not center satisfactorily (Figure 4D). It was then that I realized that my flap was not centered on the extent of dialysis—the same situation I faced with the sutured ECR case that I described earlier.

In case of unsatisfactory final position of a sutured ECR after tying the knot, the suture must be cut and complicated maneuvering reinitiated. With the glued ECR, however, I was able to solve the problem easily by creating a new flap in the desired location, interiorizing the haptic through the sclerotomy into the anterior chamber, and reexteriorizing it through a correctly positioned sclerotomy. This easy and quick maneuver resulted in a well-centered IOL (Figures 5A through 5D).

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