Iris fixation of posterior chamber intraocular lenses

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We introduce a technique for iris fixation of a posterior chamber intraocular lens (IOL) in which most of the procedure is done outside the eye. This minimizes intraocular manipulation, maximizes corneal endothelial preservation, and avoids the risk for IOL drop into the vitreous cavity intraoperatively. The IOL is fixated to the most peripheral part of the iris, resulting in a rounder pupil. Sutures are placed at exact positions on the haptics, resulting in a well-centered IOL.

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Online Video

Several methods have been devised to implant an intraocular lens (IOL) in the absence of capsule or zonule support, including the use of anterior chamber IOLs (AC IOLs) (angle-supported or iris-claw) and posterior chamber IOLs (PC IOLs) with iris or scleral fixation. Endothelial cell damage with AC IOL implantation is a significant concern.[1,2] Therefore, in the presence of low endothelial cell function or when Descemet-stripping automated endothelial keratoplasty (DSAEK) is performed concurrently, iris fixation of a PC IOL may be preferred even though this may also have complications.[3] Iris fixation of a PC IOL has the advantage of being closer to the nodal point and rotational axis of the eye.[4] We introduce a technique for iris fixation of a PC IOL with a low complication rate.

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SURGICAL TECHNIQUE

Preoperatively, the patient is asked to withhold blood-thinning drugs for 1 week. Retrobulbar or peribulbar anesthesia is required for the procedure. The surgeon is positioned at a right angle relative to the line crossing the fixation points, which is also where the main incision is made. Two paracenteses about 1.5 mm in width are made 180 degrees apart from each other and above the sites where the haptics are to be fixated to the iris (Video 1, available at http://jcrsjournal.org). The stab knife for creating the paracenteses enters the limbus perpendicular to the cornea. A 3.2 mm clear corneal incision is made 90 degrees from the paracenteses proximal to the surgeon (Figure 1). A generous anterior vitrectomy is performed if there is any vitreous in the anterior chamber or behind the iris. The eye is then filled with a dispersive ophthalmic viscosurgical device (OVD).

A double-armed 10-0 polypropylene (Prolene) suture on a long straight needle (STC-6, Ethicon, Inc.) is used to fixate each haptic. Each needle is bent approximately 45 degrees two-thirds away from the tip. Each needle enters from 1 side of the paracentesis; after it is in the anterior chamber, the needle is rotated so it goes through the most peripheral part of the iris perpendicularly. This maneuver fixates the haptics to the most peripheral part of the iris. The needle is then turned so the tip passes under the iris, through the pupil toward the main 3.2 mm incision, and exits the eye guided by the lumen of a hydrodissection needle that is introduced through the main incision. The other

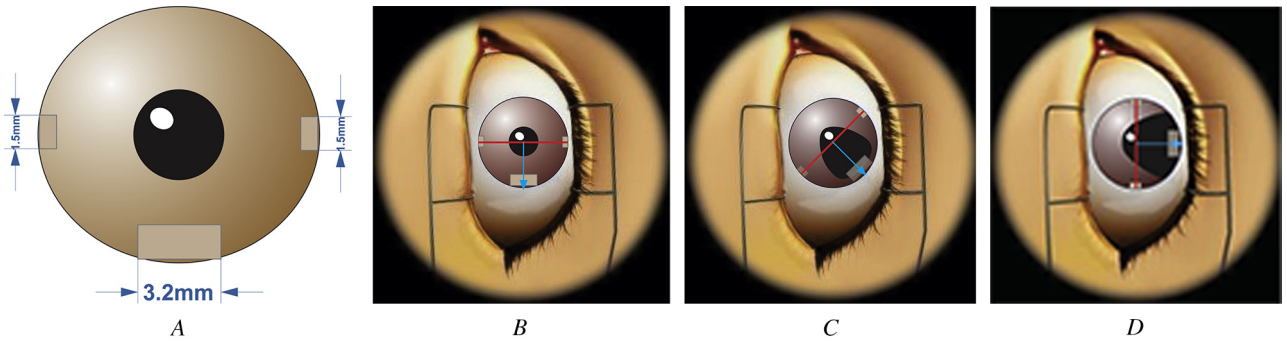

Figure 1. *A*: Positions and sizes of stab and main wound incisions. Stab incisions are created at the sites where the haptics are to be fixated. *B*: If the pupil is round, the stab incisions are at 6 o'clock and 12 o'clock and the main incision is temporal. The 3.2 mm main incision and surgeon positions are perpendicular to the line crossing the stab incisions (*red line*). The blue arrow shows where the surgeon should sit and where the main incision should be made. *C*: In cases with iris defects (as may happen after trauma), the positions of the stab and main incisions are placed accordingly. *D*: In a large iris defect, which may be seen in intracapsular cataract extraction, the surgeon's position is superior.

arm of the suture enters from the other side of the same paracentesis and passes through the iris about 1.0 mm from where the first arm was passed and then through the pupil and out of the eye through the main incision. A suture loop must remain outside the paracentesis. Both needles are then cut from the sutures. These steps are repeated with another double-armed polypropylene suture from the other paracentesis (Figure 2). Care is taken to ensure the suture from 1 incision is not twisted with the suture of the other incision.

After the sutures have been placed, the IOL is laid on the cornea to determine where each suture end should be tied to the haptic relative to the fixation sites; as shown (Figure 3, *A*), the tie should not be placed at the most curved part of the haptic. Each end of the suture is tied to the determined spot on the haptic with a 3-1-1 knot (Figure 3, *B*). The IOL is then manually folded with a lens folder. The main incision can be extended to 4.0 mm to facilitate manual insertion of the IOL. In a case with concomitant DSAEK, the main incision may have to be extended to 5.0 mm to enable atraumatic insertion of the graft. While inserting the IOL into the eye, the loop of the suture that is out of the paracentesis relating to the leading haptic is pulled away and the IOL is directed to go under the iris until the trailing haptic is also behind the iris. After the trailing haptic is behind the iris, the loop of the suture relative to it is pulled away. Pulling each loop will rotate the IOL 90 degrees behind the iris and place it in its exact position for the final step; that is, the IOL is behind the iris and a loop of each suture is outside the respective paracentesis (Figure 4). Each loop is then cut to make 2 free ends. After the free ends are tied together, the knot will slide down to fixate the haptic correctly behind the iris (Figure 5). A 3-1-1 knot is preferred.

Because the most peripheral part of the iris is engaged, the pupil will be round with no iris peak at the conclusion of surgery. Engagement of the immobile peripheral iris also results in a reactive pupil with less pigment dispersion. Because the fixation point on the haptic is determined before the IOL is inserted into the eye, the IOL is well centered at the end of surgery.

The OVD is removed and the main incision closed with interrupted 10-0 nylon sutures. A subconjunctival injection of antibiotic and steroid is given at the end of the case. Postoperatively, topical antibiotic drops are used for a week and topical steroids ± topical nonsteroidal antiinflammatory drops, for 1 month.

Results

The iris-fixation technique was performed in 9 aphakic eyes (Table 1). The endothelial cell density (ECD) was good in 6 of the eyes. Four of the 6 eyes had no capsule support (Group A), and 2 had a capsule remnant that was used for sulcus implantation of 1 haptic with iris fixation of the second haptic (Group B). Two eyes had endothelial decompensation, and iris fixation was combined with DSAEK (Group C). One eye with a low ECD but no corneal edema had iris fixation alone (Group D).

In Groups A, C, and D, a round pupil and well-centered IOL were achieved. In Group B, the IOLs were decentered 1.0 to 2.0 mm from the pupil center. After iris fixation of the IOLs in Group C, uneventful DSAEK was performed with excellent results (Figure 6). In the eye in Group D, the ECD was 847 cells/mm^2 preoperatively and 820 cells/mm^2 at 6 months after surgery, with no corneal edema.

DISCUSSION

The common technique for iris fixation of PC IOLs involves capturing the IOL optic by the pupil.