TECHNIQUE

Combined double-needle flanged-haptic intrascleral fixation of an intraocular lens and Descemet-stripping endothelial keratoplasty

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A slight modification to the Yamane transconjunctival double-needle flanged-haptic technique of intrascleral fixation of an intraocular lens (IOL) shows the technique's usefulness when combined with Descemet-stripping endothelial keratoplasty (DSEK). The modification uses bipolar cautery to create flanges at the tip of the IOL haptics and delays tucking the haptics into the scleral tunnels until DSEK has been completed. Bipolar cautery enables the technique to be used in situations in which disposable low- or high-temperature cautery, as originally described, might not be possible. Delaying the haptic tuck until after the complete air fill of DSEK means the surgeon can be confident of the IOL position at all times. This combined technique can be a viable option for patients with aphakia and endothelial cell dysfunction.

J Cataract Refract Surg 2017; 43:593–596 © 2017 ASCRS and ESCRS

Online Video

Dysfunctional intraocular lenses (IOL) or aphakia can be accompanied by significant corneal edema indicating endothelial keratoplasty. Secondary IOL implantation combined with Descemet-stripping endothelial keratoplasty (DSEK) is an option for patients and surgeons electing to address the problems simultaneously.[1] Various IOL implantation techniques in this setting have been described. Yamane[A] described secondary IOL implantation using intrascleral fixation of a sulcus-based 3-piece IOL with haptics modified using high-temperature cautery to create bulbous flanged tips, which was an update to his previously described technique.[2] This method is performed without scleral flaps or sutures, instead using tunnels created with a thin-walled 30-gauge or standard 27-gauge needle. The benefits of this derive from the relatively minimal invasiveness. A conjunctival peritomy is not necessary, and the technique can therefore be performed in eyes in which disturbing the conjunctiva could be detrimental. Because most 3-piece IOL models can be used in this technique, a standard clear corneal incision (CCI) can be used to accommodate a folding IOL, minimizing surgically induced astigmatism and corneal denervation.

As originally described, disposable high-temperature cautery is used to melt the haptic tips to create a flange. This article describes the use of bipolar cautery to create the flanged haptics and shows the stability of the fixated IOL in the context of a combined procedure with DSEK by delaying the haptic tuck until complete air fill of the anterior chamber. These modifications are applicable to all variations of the double-needle flanged-haptic and DSEK techniques.

SURGICAL TECHNIQUE

Prior to the procedure, it is recommended that the surgeon verify that (1) the IOL haptic can fit snugly into the lumen of a specially made thin-walled 30-gauge or a standard 27-gauge needle, and (2) if using bipolar cautery, the tip of the planned IOL haptic can be adequately melted to create the flange using a test IOL (Figure 1). The needles are bent in line with the bevel to a length that is approximately the distance from the sulcus to the pupil center. Ensuring IOL centration with haptic placement exactly 180 degrees apart is accomplished by marking the geographic center of the cornea and using an axis marker centered on this point to mark the needle entry points. Corneal markings for DSEK centration are placed as necessary. Two paracenteses are oriented 90 degrees from the anticipated main incision site as access for intraocular forceps. Another paracentesis is made for an

Submitted: November 12, 2016 | Final revision submitted: January 3, 2017 | Accepted: January 10, 2017

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0886-3350/$ - see frontmatter
http://dx.doi.org/10.1016/j.jcrs.2017.04.025

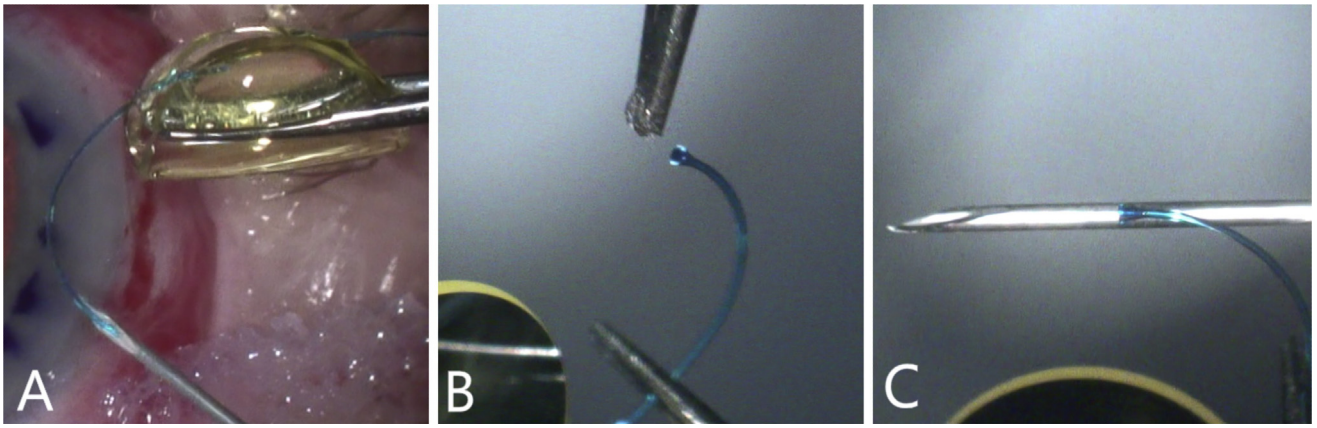

Figure 1. Prior to surgery, verify that (*A*) the haptic fits securely in the needle and (*B*) the cautery creates adequate heat to create the flange. The flange made in this case (*C*) is funnel-shaped and roughly the diameter of a 27-gauge needle.

anterior chamber maintainer (ACM). A CCI is made of adequate size to accommodate the IOL and the DSEK graft. At this time, if needed, an anterior or pars plana vitrectomy can be performed.

The 3-piece IOL is inserted into the anterior chamber with the trailing haptic external to the incision. The first needle insertion site is 1.5 to 2.0 mm posterior to the limbus at the left corneal axis marking and passes through conjunctiva and sclera, creating a beveled intrascleral tunnel 1.5 to 2.0 mm posterior and parallel to the limbus tangent. When it enters the sulcus, the needle is directed toward the lead haptic, which is guided into the needle using an intraocular forceps. With the haptic secure, the needle can be left in the tunnel and a similar procedure can be performed on the trailing haptic. After the haptics are docked, both needles can be removed and the haptics externalized. Bipolar forceps cautery powered by a phacoemulsification system is set to its highest power. With the pedal completely depressed, the closed cautery tips are brought close to the haptic tip, without actual contact, to create a bulbous flange.

Acetylcholine chloride (Miochol) is used to induce miosis, protecting against posterior migration of the DSEK graft or air. The haptic tips remain external to the conjunctiva as the DSEK graft is prepared, inserted, and unfolded using the surgeon's preferred methods. After the main incision has been sutured securely, the ACM removed, and the graft in position, a complete air fill of the anterior chamber is slowly achieved to a high pressure while the position of the haptic flanges are watched. With a secure IOL, there would be no movement of the haptic tips despite significant anterior chamber pressure from the gas fill or from massaging any interface fluid (Figure 2). After the graft has remained adherent under air for an appropriate time and the eye has been brought back to physiologic pressure, the flanged haptics can be tucked into the scleral tunnels. No additional change in the DSEK postoperative course is necessary.

Video 1 (available at http://jcrsjournal.org) shows the technique used and the modifications described.

DISCUSSION

Pseudophakic and aphakic bullous keratopathy are frequent causes of secondary endothelial cell dysfunction and indications for endothelial keratoplasty. Patients with these conditions often require an IOL exchange or secondary IOL implantation, performed in stages or simultaneously with DSEK. Combining the procedures does not appear to have a detrimental effect on the graft or visual outcomes,[3] although in 1 study,[4] the rates of cystoid macular edema were higher than when the procedures were performed alone. Without adequate anterior chamber depth or capsule support for appropriate IOLs, artificial support is necessary and has been accomplished in combination with endothelial keratoplasty in a variety of ways, including iris-sutured, iris-claw, scleral-sutured, and intrascleral-fixated methods.[5–10] The technique presented by Yamane[A] allows intrascleral haptic fixation without the need for conjunctival peritomy, scleral flaps, or an assistant. The technique described in this report shows that the flange tips can be made with bipolar cautery and that the IOL is stable despite high intraoperative anterior chamber pressure, allowing the procedure to be combined with DSEK.

The minimalistic approach of the double-needle flanged-haptic technique enables scleral fixation of an IOL with tools that are readily and inexpensively available in many operating room settings. Most 3-piece IOLs can be used with slight variations in the shape of the resulting flange. The surgeon should test the haptic fit in the needle and the ability to create the flange on a test IOL prior to surgery. The original technique used a thin-walled 30-gauge needle and disposable cautery. However, capture of the haptic can be accomplished with a 27-gauge needle and bipolar cautery can produce enough heat to melt the haptic tip. It should be noted that a thin-tipped jeweler-type forceps cautery (product number K8-7010, Katena