Hydroimplantation of a Foldable IOL

Sans OVD, this technique saves time and money, does not induce IOP elevation, and eliminates risk of early capsular bag distension syndrome.

BY HARSHUL TAK, MS

The viscous and elastic properties of ophthalmic viscosurgical devices (OVDs) have numerous benefits in cataract surgery. Not only can they create and maintain space in the anterior chamber, but they can also protect and lubricate the corneal endothelium and displace and stabilize tissue. Most surgeons do not think twice about using an OVD to aid in capsulorrhexis creation, phacoemulsification, and IOL insertion. However, after lens implantation, it is mandatory to thoroughly remove the OVD from the anterior chamber and from behind the IOL optic. If left in the eye, the OVD may induce a postoperative spike in intraocular pressure (IOP).1-2 Additionally, if the surgeon fails to remove OVD from the capsular bag, capsular bag distension syndrome may result.3

Many surgeons shy away from placing the I/A tip behind the IOL optic during cortical clean-up because of the risk of posterior capsular rupture. Additionally, small incision sizes, which today can vary from 1.8 to 1.6 mm with some lenses, make it hard to completely remove the OVD from behind the IOL. Therefore, I have begun implanting one-piece foldable acrylic IOLs without an OVD, using a technique that I call hydroimplantation.4

SURGICAL STEPS

In the hydroimplantation technique, a foldable posterior chamber IOL is implanted without injecting an OVD into the eye. Following is a description of my surgical technique.

Preparation of the incision. After cataract removal and I/A are performed, the automated irrigation cannula of the bimanual I/A phaco machine is left in position in the eye, and no OVD is injected. If needed, a keratome is used to enlarge the incision (Figure 1).

Loading the lens. The lens cartridge is filled with balanced saline solution to lubricate the lens, and a small amount of balanced saline solution is applied to the tip of the lens tip. Two other options are (1) to paint a small amount of OVD onto the cartridge hub and on its tip or (2) to load the nozzle with a small amount of OVD onto the cartridge hub.

Figure 1. With the irrigation cannula still in the eye, the incision is enlarged from 1.8 to 2.8 mm.

Figure 2. A one-piece acrylic lens is loaded into the cartridge hub with only balanced saline solution.
Figure 3. The irrigation cannula is inserted through the sideport incision on continuous irrigation mode.

Figure 4. The tip of the cartridge is inserted into the anterior chamber.

Figure 5. The leading haptic and optic are injected into the capsular bag.

Figure 6. The tip of the irrigation cannula is used to unfold the leading haptic of the lens.

Figure 7. The tip of the irrigation cannula is lying over the IOL optic. This prevents tilting or inversion of the lens.

Figure 8. The trailing haptic of the lens is lying in the anterior chamber.
Figure 9. (A, B) The Lester hook is used to dial the lens into the capsular bag.

Figure 10. A toric IOL is manually rotated to bring it to the final desired position.

Figure 11. The IOL is in its final position in the capsular bag.

Figure 12. Incision wound is hydro-stitched.

Figure 13. Hydroimplantation in a patient with a small pupil.
The IOL is then grasped with the forceps, positioned in the cartridge (Figure 2), properly folded, and brought to the end of the cartridge tip. I prefer to use a one-piece acrylic lens such as Rayner Intraocular Lenses’ aspheric IOL (East Sussex, United Kingdom).

**Hydroimplantation.** Just prior to IOL implantation, the irrigation cannula, on continuous irrigation mode (Figure 3), is introduced through the sideport incision on the surgeon’s nondominant side. The device should be loose enough in the incision to allow enough manipulation to facilitate IOL insertion. I am right-handed, and therefore I position the irrigation cannula in the left sideport. Continuous irrigation through the sideport maintains space in the anterior chamber and capsular bag during injection of the posterior chamber IOL. The irrigation cannula provides excellent stability and positioning of the eye.

Next, the tip of the cartridge is inserted into the anterior chamber (Figure 4) so that the leading haptic and optic can be slowly delivered into the capsular bag (Figure 5). The surgeon may notice some air bubbles during IOL insertion; however, these are quickly washed away by the continuous flow of irrigation fluid. If the leading haptic does not unfold on its own, the tip of the irrigation cannula can be maneuvered to assist with guiding it into the capsular bag (Figure 6). Then, with the tip of the cannula lying over the optic, the IOL should unfold without tilting or becoming inverted (Figure 7); the trailing haptic remains in the anterior chamber (Figure 8) until it is dialed into the capsular bag with a Lester hook (Figure 9), and implantation is complete. Placing the irrigation cannula above the Lester hook prevents damage to the corneal endothelium while dialing the lens.

Irrigation fluid is an adequate source for anterior chamber and capsular bag maintenance during IOL insertion. If the IOL has closed haptics, the Lester hook may become trapped during lens manipulation; in these cases, the lens optic is pushed slightly downward with the tip of the irrigating cannula while the Lester hook is pulled upward.

The following maneuver is especially useful with a toric IOL (Figure 10), but it may be used with any lens: With the tip of the irrigation cannula and the Lester hook, the IOL optic is bimanually rotated to its final position (Figure 11). The final step in most procedures is irrigation and aspiration of the remaining OVD from behind the IOL; however, with hydroimplantation this is unnecessary, as there is no OVD within the eye. The wounds are hydro-stitched for secure incision closure (Figure 12).

**CLINICAL BENEFITS**

Hydroimplantation is an alternative to standard IOL implantation with an OVD. Over the past 2.5 years, I have implanted more than 1,200 foldable IOLs using the hydroimplantation technique in a small pupil case in conjunction with iris hooks.

The hydroimplantation technique allows IOL implantation without OVDs or special instruments.

This technique may prove useful for cataract surgeons using microincisions.

It is best used with one-piece acrylic foldable IOLs using the hydroimplantation technique.
hydroimplantation technique in every case. I have not one complication to report in this series and have experienced clinical benefits including increased efficiency, reduced surgical time and costs, no need for OVD removal from behind the IOL optic, no need for additional instrumentation, no postoperative rise in IOP, and no risk of capsular bag distension syndrome due to the OVD.

Additionally, I have found the hydroimplantation technique to be safe in difficult situations. Once mastered, this technique can be used to implant IOLs in patients with small pupils (Figure 13), with iris hooks (Figure 14) or without, and in patients with hazy corneas (Figure 15).

**CONCLUSION**

Today, most anterior segment surgeons rely on OVDs to maintain space in the anterior chamber during IOL implantation; however, some have described alternative strategies to reduce or eliminate OVD use. Such techniques use specific products, such as an anterior chamber maintainer or the KS-VF injector, and others use specific techniques, such as the empty-bag or ultimate soft-shell technique.

The hydroimplantation technique described in this article can be used without any special equipment other than the irrigation tip of a bimanual I/A phaco machine. The technique can be adapted for use with any one-piece acrylic foldable lens, but I do not recommend its use with any lenses that open abruptly, such as silicone IOLs. This technique should not be used in cases with a compromised capsulorhexis or posterior capsular tears.

With more surgeons choosing to perform small-incision cataract surgery with self-sealing incisions, the viscous and elastic properties of OVDs may become less important. A technique such as hydroimplantation, which allows IOL implantation without OVD or any specialized instrumentation, may fill a niche for future cataract surgeons.

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Harshul Tak, MS, is a Chief Consultant at Rawat Phaco Surgery Centre, Jaipur, India. Dr. Tak states that he has no financial interest in the products or companies mentioned. He may be reached at e-mail: harshultak@rediffmail.com.

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