INTRAVITREAL NEEDLE TECHNIQUE FOR INTRASCLERAL HAPTIC FIXATION OF POSTERIORLY DISLOCATED THREE-PIECE INTRAOCULAR LENSES

Tansu Erakgun, MD

Purpose: Double-needle intrascleral haptic fixation (Yamane) technique is a minimally invasive method for posterior chamber intraocular lens (IOL) fixation in the setting of absent or inadequate capsule support. A modified intravitreal needle technique is herein described for the management of three piece IOLs which are dislocated into the vitreous cavity.

Methods: In this technique, after completing pars plana vitrectomy, under the non-contact ophthalmomicroscope, the haptic of the dislocated IOL is docked directly in the vitreous cavity into a 27-G needle which is inserted through a transconjunctival tunneled scleral incision 2 mm. from the corneal limbus, and externalized from the conjunctiva and fixed sclerally.

Results: The technique is described with a case report. A male patient of 65 years old who underwent a complicated cataract surgery was operated using this technique. No preoperative or postoperative complication was seen.

Conclusion: In this technique, the dislocated IOL is not taken in the anterior segment before the scleral fixation. The haptics are threaded into the 27-G needle directly in the vitreous cavity during the vitrectomy. This is a short cut Yamane technique for posteriorly dislocated three-piece IOLs. This technique may shorten the surgical time and minimize surgical trauma in cases with posteriorly dislocated three-piece IOL.

From the Kaskaloglu Eye Hospital, Izmir, Turkey.

Intraocular lens (IOL) dislocations are among the most common complications after cataract surgery with a reported incidence of 0.2%–3%.1 Intraocular lens dislocation can be subdivided into early and late dislocation. Untreated cases could develop severe decrease of the visual acuity because of complete IOL dislocation in the vitreous chamber, chronic cystoid macular edema, and anterior uveitis or retinal detachment.

Current management options include IOL removal, exchange, or repositioning.2,3 Repositioning of dislocated three-piece IOLs by a closed globe approach allows retention of the same IOL and eliminates the need for large limbal incisions, thereby reducing postoperative complications related to large incision size or sutures. Recently, sutureless techniques for the scleral fixation of a dislocated IOL using microincision vitrectomy system (MIVS) and bimanual manipulation of the IOL have been introduced.3–5

Flanged intrascleral intraocular lens fixation with double needle technique was first described by Yamane et al6 for the cases with loss of capsular support. In this technique, after the lens is delivered into the anterior chamber through a keratome incision,
a 30-gauge needle is used to create a transconjunctival sclerotomy incision posterior to the limbus, and an intraocular forceps is used to thread the leading haptic of the IOL into the lumen of the needle. The same maneuver is repeated in similar fashion for the trailing haptic 180° apart from the first sclerotomy. Both needles are externalized from the sclerotomies, and handheld cautery is used to create a flange to secure the IOL. The haptics are pushed into the eye, and the conjunctiva is reapproximated.

The following is a description of an intravitreal needle technique for the management of three-piece IOLs which are dislocated into the vitreous cavity.

**Surgical Technique**

Surgery was performed under retrobulbar anesthesia. Patients underwent a 23-gauge transconjunctival sutureless vitrectomy using the Dutch Ophthalmic Research Center two step-system (DORC, Zuidland, The Netherlands). Angled incisions were made in the conjunctiva and sclera through the pars plana with a 23-gauge 45° angled microvitrectorealine blade in the inferotemporal, superonasal, and superotemporal quadrants 3.5 mm posterior and parallel to the corneal limbus. A 23-G infusion cannula was placed at the inferotemporal quadrant, whereas the superonasal and superotemporal canulas were used for the retinal instrumentation. A chandelier light was placed at the 12 o’clock position by a further 23-G tunneled sclerotomy to enable a bimanual surgery. After completing anterior vitrectomy, noncontact binocular indirect ophthalmomicroscope system (BIOM, Oculus Inc, Petaluma, CA) was used for visualization of the posterior segment.

A full pars plana vitrectomy was performed using triamcinolone to ensure a complete PVD. Peripheral vitrectomy with scleral self-indentation was performed in all cases. Perfluorocarbon liquid was injected to the posterior pole to keep the intraocular lens away from the retina. In the case with nucleus fragment dislocation, vitrectomy hand piece was used to remove all of the nucleus fragments in the vitreous cavity (Figure 1A).

A 27-gauge needle was used to create a sclerotomy incision at 2 o’clock position and 2 mm from the corneal limbus, and the needle was tunneled through the sclera and into the vitreous space (Figure 1B). The BIOM noncontact microscope was flipped down to visualize the posterior segment. Thanks to the chandelier light, it was possible to introduce a microforceps through the opposite 23-G port with the fellow hand to grasp one of the haptics of the IOL and thread it into the lumen of the needle in the vitreous cavity (Figure 1C). The BIOM system was used to visualize posterior segment maneuvers, whereas the operating microscope was used for external eye portions of the procedure. The needle (with the haptic inside the needle) was externalized from the sclerotomy (Figure 1D). The needle was then removed to free the haptic on the conjunctiva. A handheld cautery was used to create a flange at the edge of the haptic, which secured the IOL. A second sclerotomy incision using another 27-gauge needle was created 180° from the first sclerotomy (at 8 o’clock position), and the BIOM was flipped down again to work in the vitreous cavity. The other haptic of the IOL was inserted into the needle using a microforceps in a similar fashion (Figure 1E). The needle was externalized from the sclerotomy, and a handheld cautery was used to create a flange at the edge of the second haptic (Figure 1F). The flanged ends of the haptics were placed subconjunctivally, and the conjunctiva was reapproximated. After the aspiration of the perfluorocarbon liquid, the peripheral retina was inspected carefully with scleral depression, and the scleral ports were removed at the end of the surgery (Figure 1G).

**Case Report**

A 65-year-old man who had undergone phacoemulsification surgery in his left eye two days ago at another hospital presented to our clinic with symptoms of pain and reduced visual acuity in his left eye. His VA was counting fingers (CF) from 1 m. The intraocular pressure was 24 mmHg in his left eye. Slit-lamp examination revealed corneal edema, limbal surgical corneal wound which was closed with 10/0 nylon stiches and aphakia. Posterior segment examination revealed multiple nucleus fragments and a three-piece acrylic intraocular lens dislocated into the vitreous.

The patient underwent pars plana vitrectomy and removal of the dislocated nucleus fragments using vitrectomy hand piece. The haptics of the dislocated IOL were externalized consecutively using the intravitreal needle technique and intraocular fixation of the IOL was performed because it was described in the Surgical Technique section (See Video, Supplemental Digital Content 1, http://links.lww.com/ICB/A120). At final examination at postoperative 1 month, the patient’s corrected VA in the left eye had improved to 20/40 and slit-lamp examination revealed a well centered IOL in its correct position with a normal pupil shape. The retina was attached with a macula without any edema.

**Discussion**

The main advantages of sutureless closed globe procedure are that a dislocated IOL can be effectively repositioned in a minimally invasive manner, without requiring a large incision for explanting the IOL, and without the need for another IOL implant, scleral fixation sutures, or suturing of the surgical incision.
Although the procedure has a brief learning curve, it is reliable, efficient, and provides reproducible results. The Yamane double-needle technique is an elegant approach to IOL fixation because it bypasses the need for significant conjunctival and scleral dissection, scleral flaps, glue, or lassoing.

In the case of a posteriorly dislocated three-piece IOL, levitation of the IOL into the anterior chamber before intrascleral fixation of the IOL is generally the method of choice. Manipulations of the IOL and the haptics in the anterior chamber during levitation and scleral fixation may cause corneal endothelial damage despite the use of viscoelastic materials. Additional haptic manipulation while keeping the IOL in the anterior chamber may also increase the risk for intraoperative haptic dislocation and postoperative IOL dislocation/tilt. This technique describes a modification of the Yamane technique and includes threading the haptics into the 27-gauge needle intravitreally under the BIOM viewing system during vitrectomy. In this technique, there is no need to bring up the IOL into the anterior chamber or to the iris plane to thread the haptics into the lumen of the 27-G needle before externalizing the haptics through the scleral tunnel incision. This maneuver minimizes the risk of iris trauma, inadvertent contact with the corneal endothelium, and haptic deformation. This procedure is also time saving as it bypasses IOL levitation steps of the surgery. Besides, in either the original Yamane technique or in its modifications, the trailing haptic or leading haptic is kept out of the main corneal incision or limbal incision, whereas the other haptic is docked into the needle before exposing it transconjunctivally. In the technique described here, as the haptics are docked into the needle directly in the vitreous cavity under the BIOM noncontact viewing system, there is no need to externalize the haptics out of the limbal incision. In addition, instruments inserted through the sclera do not cause the corneal distortion of limbal instruments while docking the haptics into the needle in the vitreous cavity.

Another advantage is that it is easier and safer to make the manipulations in a larger space such as vitreous cavity rather than working in the anterior chamber. The bent 27-G needle which has a needle length of 13 mm. (1/2") is too short to risk direct retinal trauma in an eye of normal axial length. Besides, perfluorocarbon liquid which is used to keep the IOL away from the retina provides a safer approach.

The use of chandelier light which has been described for dissecting epiretinal membranes, retinal detachments, managing dropped IOLs and nuclear fragments is also essential in this technique. Because this is a bimanual procedure, it would not have been possible to thread the haptic into the needle lumen in the vitreous cavity under the noncontact microscope without the help of the chandelier light.

I have to state that intrascleral haptic fixation using intravitreal needle technique is only applicable when a three-piece IOL is dislocated into the posterior segment. The commonly used one-piece acrylic IOLs would not be suitable for this procedure, where an IOL exchange and a secondary implantation of a proper three-piece IOL would be required.

Sutureless transconjunctival fixation using intravitreal needle technique may provide a simpler, faster, easier, and safer approach in cases with posteriorly dislocated three piece IOLs.

Key words: three-piece intraocular lens, posterior dislocation, pars plana vitrectomy, double needle intrascleral haptic fixation.

References

1. Pueringer SL, Hodge DO, Erie JC. Risk of late intraocular lens dislocation after cataract surgery, 1980-2009: a population-based study. Am J Ophthalmol 2011;152:618–623.
2. Seo MS, Kim CR, Nah HJ, et al. Management of posteriorly dislocated intraocular lens using pars plana vitrectomy. Korean J Ophthalmol 2000;14:80–84.

3. Dajee KP, Abbey AM, Williams GA. Management of dislocated intraocular lenses in eyes with insufficient capsular support. Curr Opin Ophthalmol 2016;27:191–195.

4. Scharioth GB, Prasad S, Georgalas I, et al. Intermediate results of sutureless intrascleral posterior chamber intraocular lens fixation. J Cataract Refract Surg 2010;36:254–259.

5. Agarwal A, Jacob S, Kumar DA, et al. Handshake technique for glued intrascleral haptic fixation of a posterior chamber intraocular lens. J Cataract Refract Surg 2013;39:317–322.

6. Yamane S, Sato S, Maruyama-Inoue M, Kadonosono K. Flanged intrascleral intraocular lens fixation with double-needle technique. Ophthalmology 2017;124:1136–1142.

7. Oshima Y, Awh CC, Tano Y. Self-retaining 27-gauge transconjunctival chandelier endoillumination for panoramic viewing during vitreous surgery. Am J Ophthalmol 2007;143:166–167.