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Long-term Assessment of Tilt of Glued Intraocular Lenses

An Optical Coherence Tomography Analysis 5 Years after Surgery

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Purpose: Long-term assessment of the optic position of glued transscleral fixated intraocular lens (IOL) with optical coherence tomography (OCT).

Design: Prospective observational case series.

Participants: Patients with a minimum 5 years' follow-up after glued IOL surgery were included.

Methods: Postoperatively, IOL position was examined by anterior segment OCT (Carl Zeiss Meditec) and the scans were analyzed in 2 axes (180°−0° and 270°−90°) using MatLab (Mathworks). Best-corrected visual acuity (BCVA; Snellen's charts), Orbscan, retinoscopy, refraction, and slit-lamp biomicroscopy were performed.

Main Outcome Measures: The distance between the iris margin and the anterior IOL optic (D1, D2), slope of the line across the iris and IOL, the slope ratio between the IOL and iris, IOL tilt, and optic surface changes were determined and correlated with the astigmatism and vision.

Results: A total of 60 eyes (mean follow-up of 5.9±0.2 years; range, 5−6 years) were evaluated. There was a significant correlation ($P = 0.000$) between the slope of iris and the IOL in horizontal and vertical axes. The mean D1 and D2 were 0.94±0.36 and 0.95±0.36 mm, respectively. Nine of 60 eyes (15%) had pigment dispersed on the IOL surface. Twenty-one eyes (35%) had optic tilt detected on OCT and 65% of eyes had no optic tilt. The mean angle between the IOL and the iris was noted to be 3.2±2.7° and 2.9±2.6° in horizontal and vertical axes, respectively. The mean ocular residual astigmatism (ORA) was 0.53±0.5 diopters. There was no difference in the ORA between the eyes with and without tilt ($P = 0.762$). There was no correlation ($P = 0.348$) between the ORA and BCVA. Position of the IOL was not dependent on the type of lens, age of the patient, or the preoperative surgical indication.

Conclusions: Long-term analysis with OCT demonstrated good IOL positioning without any significant optic tilt in patients with glued IOL fixation. *Ophthalmology 2015;122:48-55 © 2015 by the American Academy of Ophthalmology.*

Transscleral posterior chamber (PC) intraocular lens (IOL) fixation has been a popular method of lens implantation in eyes with deficient capsules.[1,2] In cases of posterior capsule rupture with adequate sulcus support, placement of an IOL in the PC yields better visual outcome compared with anterior chamber (AC) IOL.[3] Sutureless transscleral IOL fixation techniques have been used recently for PC IOL implantation in eyes with deficient capsules with fewer postoperative complications compared with sutured scleral fixated IOL.[4−8] Glued IOL is a type of PC IOL implantation in eyes with deficient capsules in which fibrin or tissue glue is used to adhere the haptics in the intralamellar scleral tunnel.[8] Although intraoperative maneuvers, visual outcomes, and early postoperative complications in glued IOL have been published, there is a dearth of evidence regarding the long-term stability of the IOL.[8−11] In this prospective study of glued IOL patients with a minimum follow-up of 5 years, we analyze the position of the IOL with high-speed anterior segment optical coherence tomography (OCT). Ultrasound biomicroscopy (UBM) has been the standard method of evaluation of IOL position.[12] Ultrasound biomicroscopy provides a resolution of 50 μm and it is a contact method. There have been many studies in the past showing the utility of UBM for evaluating the postoperative position of transsclerally fixated IOLs.[13,14] The advantage with OCT is its higher resolution (18 μm) and noncontact nature. Moreover, there are no reports on the evaluation of IOL tilt with OCT in scleral fixated lenses. This study demonstrates the long-term positioning of transscleral fixation by glued IOL on OCT.

Methods

In this prospective, nonconsecutive, observational case series, data from patients who underwent glued IOL implantation for any 1 of the 3 indications (surgical aphakia, posterior capsule rupture, and

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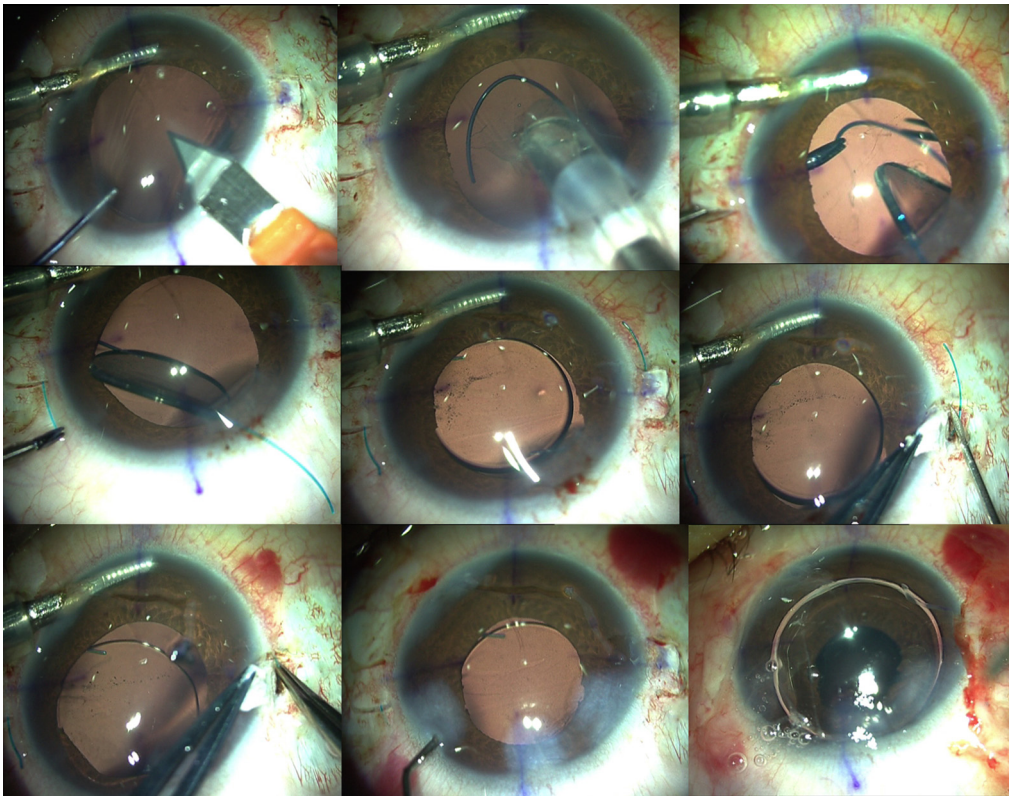

Figure 1. (Top left) Two scleral flaps and sclerotomy are made. Corneal entry is made with a keratome. (Top middle) A foldable intraocular lens is injected into the anterior chamber. (Top right) A glued intraocular lens (IOL) forceps passed through the sclerotomy wound grasps the leading haptic by the handshake technique. (Middle left) The leading haptic is externalized under the scleral flap. (Middle left) Both haptics are externalized under the scleral flaps. An intralamellar scleral tunnel made with a 26-G needle (middle right). Haptics are tucked into the scleral tunnel (bottom left) and the corneal wound is hydrated (bottom middle). Both the scleral flaps are apposed with glue and the peritomy is closed (bottom right).

subluxated cataract) with a minimum follow-up of 5 years and a regular iris configuration were included. Patients who underwent glued IOL for other indications apart from the 3 indications mentioned were not enrolled in the study. Local institutional review board approval was obtained, the study adhered to the tenets of the Declaration of Helsinki, and informed consent was obtained from all the participants. Patients with total aniridia, pediatric patients, and patients who were uncooperative for examination were excluded from the study.

Glued IOL technique has been elaborated in our previous reports.[8–11] In brief, under peribulbar anesthesia, after localized peritomy, 2 partial-thickness, limbal-based scleral flaps about 2.5×2.5 mm were created exactly 180° diagonally apart (Figure 1). Infusion cannula or AC maintainer was inserted for fluid infusion. Sclerotomy incision was made beneath the scleral flaps with a 20-G needle about 1 to 1.5 mm from the limbus under the existing scleral flaps. A 3-mm corneal incision was made with keratome for introducing the foldable IOL; alternatively, a corneal scleral tunnel incision was framed for the introduction of rigid IOL. This was followed by anterior vitrectomy to remove the vitreous in the AC. The cartridge loaded with the foldable IOL was then introduced into the AC. The glued IOL forceps (Microsurgical Technology [Redmond, WA] or Epsilon [Thane, India]) was passed through the sclerotomy incision and the tip of the leading haptic was grasped and externalized, which was then held by an assistant to prevent its slippage into the eye. The second haptic was then flexed into the AC and pulled through the opposite sclerotomy site by the glued IOL forceps using the handshake technique.[15] When both the haptics were externalized under the flaps, they were tucked into the intralamellar scleral tunnel framed with a 26-G needle, which was then followed by vitrectomy at the sclerotomy site to cut down any vitreous strand. The reconstituted fibrin glue (Tisseel; Baxter, Deerfield, IL) was then injected under the scleral flaps and local pressure was given for 10 seconds. The corneal wound was closed with fibrin glue or a 10-0 monofilament nylon suture and peritomy was sealed with fibrin glue.

Anterior Segment OCT

Cross-sectional imaging of the IOL was done with Visante anterior segment OCT (Carl Zeiss Meditec, Dublin, CA). Corneal

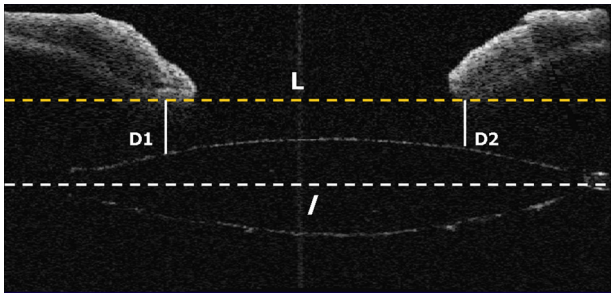

Figure 2. Optical coherence tomography image showing the method of evaluating the intraocular lens (IOL) optic position. L = slope of iris; *l* = slope of IOL; D1, D2 = distance of IOL from iris.