

A new surgical technique using steel suture for trans-scleral fixation of posterior chamber intraocular lenses

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Background: A new emerging complication of trans-scleral fixation of posterior chamber (PC) intraocular lens (IOL) with polypropylene suture is high rates of spontaneous dislocation of the IOL due to disintegration or breakage of suture. **Materials:** We report a new surgical technique of trans-scleral fixation of posterior chamber intraocular lens (SF PCIOL) with steel suture to eliminate the complication of dislocation of IOL fixed with polypropylene suture in one adult and a child. **Results:** We successfully achieved stable fixation and good centration of IOL after SF PCIOL with steel suture in these patient having inadequate posterior capsular support. Both eyes achieved best corrected visual acuity 20/40 at 18 months follow-up. **Conclusions:** Steel suture is a viable option for trans-scleral fixation of posterior chamber intraocular lens.

Key words: Aphakia, inadequate capsular support, pediatric aphakia, secondary intraocular lens implantation, steel suture, trans-scleral fixation, vanadium steel

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Management options for an aphakic eye with inadequate capsular support are aphakic glasses, contact lenses, and secondary intraocular lens (IOL) implantation using either iris-fixated IOL^[1,2] or anterior chamber IOL with modern, multiplex, open-looped IOL^[3,4] and most commonly used trans-scleral fixated posterior chamber IOL (SF PCIOL) with fewer complications.^[5-10] After long-term follow-up, one of the new emerging complication of trans-scleral fixation of PCIOL with polypropylene suture is unacceptable high rates of spontaneous dislocation of the IOL.^[9,10] Asadi and Kheirkhah^[10] reported 24% of late IOL dislocation due to breakage of polypropylene sutures after 7 to 10 years. We report a new surgical technique of trans-scleral fixation of PCIOL with steel suture to eliminate this complication of dislocation of IOL fixed with polypropylene on one adult and one pediatric patient (post-traumatic aphakia) having inadequate posterior capsular support.

Surgical Technique

Fornix-based conjunctival flap was made from around 2 o'clock and 8 o'clock positions (i.e., 180 degree apart). Scleral bed was cauterized, and partial thickness, triangular, limbal-based scleral flaps 3 mm width at base were made. Care was taken to avoid 3 and 9 o'clock positions and previous sclerostomy sites. A 23 G needle was passed through the sclera beneath the scleral flap at 2 o'clock position (2.0 mm behind the limbus) through the center of partial thickness sclera flap. Stainless steel vanadium suture 40 u thick, non-magnetic suture was obtained from Daljit Eye Hospital, Amritsar, India with straight needle 26 Gauge. The

needle was passed from 8 o'clock hour position (2.0 mm behind the limbus beneath the scleral flap) and threaded into the lumen of the 23 G needle in the posterior chamber. The 23 G needle was then withdrawn from the 2 o'clock with steel suture needle threaded within the lumen [Fig. 1]. Two limbal side port incisions were made at 3 and 9 o'clock positions, anterior chamber was formed with sodium hyaluronate 1.4% (Healon GV®, Abbott Medical Optics), and anterior vitrectomy was performed to remove all the vitreous adhesions and tractions. Then, a full thickness limbal corneal incision was made superiorly measuring around 6.5 mm in chord length. The steel suture loop was withdrawn from the limbal incision with a Sinskey hook and was divided into two halves. The two free ends of steel sutures were tied to the eyelets of the two haptics of sclera fixated IOL (PMMA IOL, 6.5 mm optic and 13 mm overall diameter, Aurolab SC6530 model, Aravinda, Madurai, India) [Fig. 2]. The steel suture ends were gently pulled out of the scleral entry site, and the PMMA IOL was placed into the anterior chamber and guided behind the iris by gently pulling the suture ends from beneath the scleral flaps. Each end of the steel suture was then anchored to the scleral bed using curved needle [Fig. 3]. The limbal incision was closed with 10-0 nylon interrupted sutures and buried. The globe was reformed with the help of viscoelastic. Viscoelastic was aspirated out from the anterior chamber using automated irrigation and aspiration. The scleral flap was adhered to the scleral bed with fibrin glue. The IOL was well-centered. [Fig. 4]. Conjunctival flap was glued with fibrin glue. Sub-conjunctival injection of gentamicin 20 mg and dexamethasone 4 mg was given. We have performed this surgical technique successfully in two patients (one adult and one child) with aphakia with inadequate posterior capsule support.

Results

We performed trans-scleral fixation of PCIOL with steel in one adult (55-years-old male) and one child (10-years-old female) with aphakia having inadequate posterior capsular support.

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Adult patient achieved best corrected visual acuity (BCVA) of 20/40 in the operated eye. Intraocular pressure in the operated eye was 17 mmHg, and posterior segment was normal. The IOL was well-centered. Scheimpflug imaging of the right eye revealed well-centered IOL and sutured haptic image in the ciliary body region.

The child achieved BCVA of 20/40 in this eye as there was linear corneal scar involving a part of visual axis. This eye had IOP of 15 mmHg, and fundus was normal. The IOL was well-centered. Scheimpflug imaging of the right eye revealed well-centered IOL and steel sutures image in the ciliary body region [Fig. 5, white arrow]. We achieved excellent results in both patients in term of IOL fixation and centration after over 18 months follow-up. We experienced that tying of steel suture with routine forceps was a bit difficult, and it needs special needle to secure the steel suture to the scleral bed.

Both the patients did not have any anterior or posterior segment inflammation or suture-related complications at 18 months follow-up.

Discussion

The management of adult or pediatric aphakia with inadequate capsular support poses a significant challenge to the ophthalmologists. The threat of amblyopia in children with unilateral aphakia signifies the need of rapid optical and visual rehabilitation.^[11] Various surgical and non-surgical options are available for the correction of aphakia.^[11] Children with unilateral aphakia are not suitable for spectacle correction due to marked aniseikonia. The use of contact lens is also associated with multiple disadvantages like contact lens maintenance, frequent change, corneal problems, and poor compliance to name a few.^[11] For the surgical correction of aphakia with inadequate posterior capsule support, IOL may be iris fixated^[1,2] or implanted in the anterior chamber^[3,4] or trans-scleral fixation of PCIOL performed with polypropylene suture.^[5-10] ACIOLs are associated with endothelial damage, glaucoma, and peripheral anterior synechiae.^[3,4] Trans-scleral fixation of SFIOLs is one of the viable options with inadequate capsular support.^[5-10] Long-term results of the SF PCIOLs fixated with

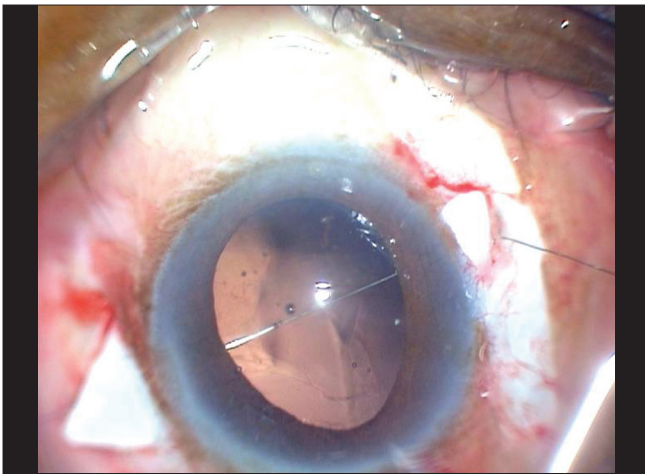


Figure 1: Partial thickness sclera flap 180 degree apart are prepared, 23 gauge needle was passed from the sclera bed of one side flap, approximately 2 mm from limbus and threaded with needle of steel suture into the lumen of 23 G needle in posterior chamber. Then, the 23 G needle was pulled out, and the steel suture passed across the eye through the pars plana

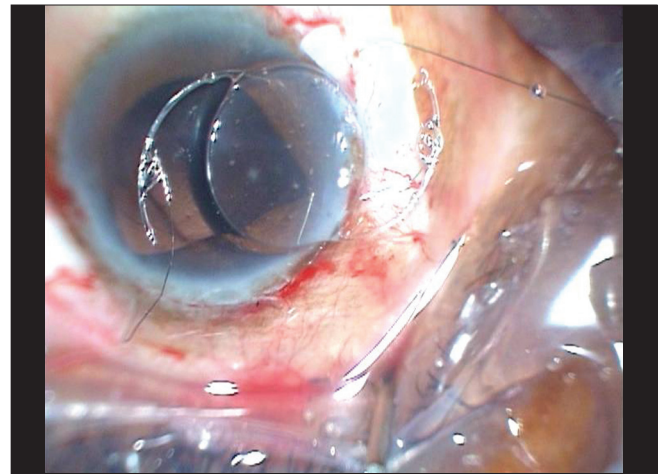


Figure 2: After taking out the steel sutures from the section constructed superiorly, IOL haptics with eyelet was threaded with steel suture on each side, and knot is tied firmly. A thorough anterior vitrectomy was performed to remove all vitreous tractions. The IOL with its haptic eyelets tied with steel suture

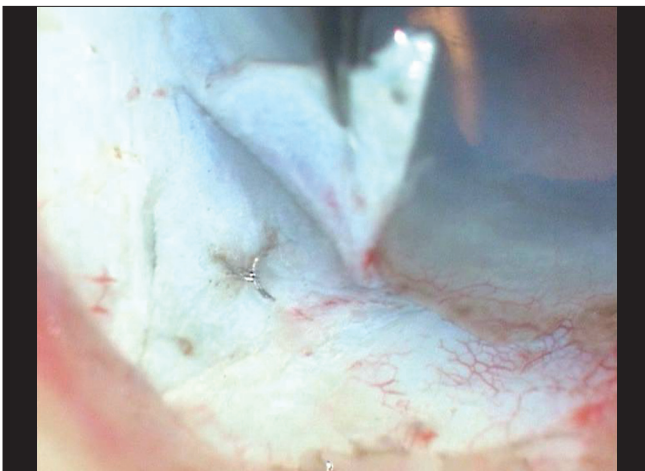


Figure 3: The steel suture anchored to the sclera bed

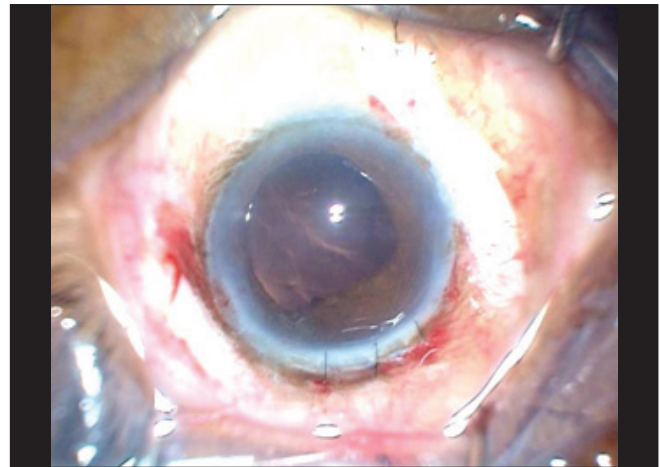


Figure 4: This picture shows well-centered IOL. Section, sclera flap, and conjunctiva sutured

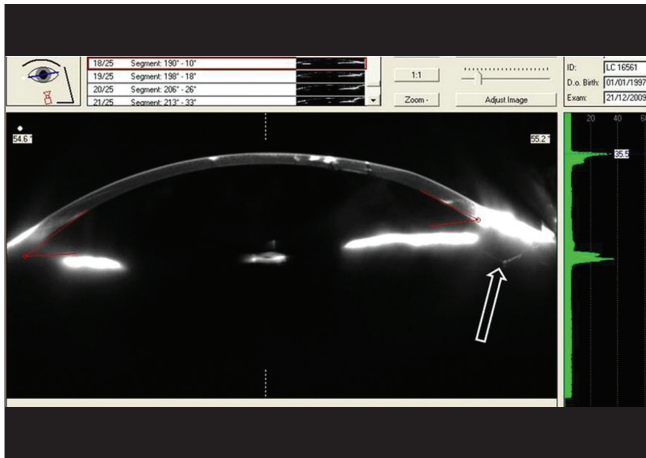


Figure 5: Scheimpflug imaging of the right eye revealed well-centered IOL and steel sutures image in the ciliary body region. Little white dense opacities in the cornea are scar marks left after suturing the corneal wound

10.0 polypropylene sutures is associated with dislocation of the IOLs to the extent of 24%.^[10]

We recommend ab-externo technique of scleral fixation of the SF PCIOLs with steel suture for children or adult with inadequate capsule support. This technique provided excellent centration and very stable fixation of IOL. It will possibly reduce or eliminate any chances of long-term dislocation of the IOL, unlike in IOLs fixed with polypropylene sutures, which may disintegrate in the long-term and may show IOL decentration or dislocation. We encountered some of the problems using steel suture for SF PCIOL are i) Manipulation of the steel suture is a bit difficult with routine tying forceps used for 10-0 nylon, ii) It needs special needle to secure the steel suture to the scleral bed.

Scleral fixation of PCIOL with 10-0 polypropylene sutures is most commonly used for SF PCIOL in eyes with inadequate posterior capsular support with fewer short-term complications. Dislocation of SF IOL due to degradation of polypropylene suture has been reported by several authors.^[9,10] Asadi and Kheirkhah^[10] reported high rate (24%) of late IOL dislocation due to breakage of polypropylene sutures after 7 to 10 years. Vote *et al.* reported late breakage of the polypropylene suture in 16 of 61 eyes (26.2%) of mostly adult patients occurring 50 ± 28 months after IOL fixation.^[9] Assia *et al.* reported late subluxation of a sclerally-fixed IOL after 3 and 9 years in two adult patients.^[12] Though polypropylene is considered to have a longer survival, these sutures undergo slow biodegradation.^[13,14] Steel sutures are safely used without any complications for corneal suturing in human and rabbit^[15] and in cataract extractions, penetrating injuries, and anti-glaucomatous surgeries.^[16]

We propose the use of steel suture for the use of fixation of SF PCIOLs. Steel suture with a good ocular biocompatibility and durability will ensure long-term stability and centration of the IOL. Surgical technique of fixation of SF PCIOL with steel suture can be performed easily with minimal manipulation and ocular trauma. We achieved stable fixation and well-centered IOL after SF PCIOL with steel suture in both our patients with

follow-up of 18 months. Though the follow-up of 18 months in our cases is not adequate to comments at the long-term outcome of this surgical technique, this surgical technique is a viable option to the existing surgical technique using polypropylene sutures to fix IOL.

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