Surgical Technique

Flanged intraocular lens (IOL) implantation with scleral pockets - A modification of flanged IOL technique (E-Flanged IOL) for secondary lens implantation

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The current technique for implanting flanged intraocular lens (IOL) suffers from complications like haptic exposure and tilting of the implanted IOL. We describe a modification of the currently described technique to obviate its shortcomings. Five eyes of five patients with a minimum of 1 year of follow-up were included. In this technique, two scleral pockets were made nasal and temporal to embed the flanged haptics. The primary outcome measure was the improvement in visual acuity (VA) postoperatively and the secondary outcome measures were postoperative complications. The primary objective of this current modification is to simplify the surgical technique for secondary IOL implantation and make it more replicable and predictive. The mean age of the patients was 19.44 years. The mean preoperative VA was 0.44 logMAR which improved to 0.26 logMAR at the 6-week postoperative visit. The mean follow-up was 496+/-80 days. The maximum follow-up was 647 days. There were no postoperative complications such as haptic exposure, hypotony, or IOL tilt in any cases. The new E-flanged IOL technique has good visual outcomes and does not have postoperative complications. It has less intraoperative manipulation and complications.

Key words: Flanged IOL, haptic exposure, IOL tilting, postoperative hypotony, scleral embedding, secondary IOL

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Multiple surgical techniques have been described for secondary intraocular lens implantation in the absence of capsular support like anterior chamber intraocular lens (ACIOL), iris-fixated IOLs,[1] and trans-scleral sutured posterior chamber IOLs.[2] Both ACIOL and iris-fixated IOL techniques are known to have a high rate of sight-threatening complications such as corneal endothelial cell loss (7–8%) or glaucoma (11%).[3,4] A long-term follow-up of trans-scleral IOL fixation has revealed complications of suture erosion as a major concern in 27.9% of the cases after 6 years of surgery.[5-7] Gabor and Agarwal *et al*. had earlier described a new technique of sutureless intrascleral fixation technique of IOL (glued IOL) to avoid suture-related complications, but with a potential risk of postoperative hypotony.[8,9] Kumar *et al*.[10] evaluated the complications and visual outcomes in 208 eyes which underwent glued IOL fixation. They found late complications such as optic capture (4.3%), IOL de-centration (3.3%), haptic extrusion (1.9%), subconjunctival haptic (1.4%), macular edema (1.9%), or pigment dispersion (1.9%).

In 2014 Yamane *et al*.[11] had described a double-needle technique which decreases the size of the sclerotomy to 27 gauge, leading to a lower risk of postoperative hypotony.

Subsequently, the same authors described a flanged IOL technique in 2017 that is glue-free, sutureless, and circumvents hypotony.[12] This technique is, however, associated with the risk of exposure of the flanged haptics, erosion of conjunctiva, or protrusion of the haptics, requiring re-fixation of the IOL. Our study describes a modified version of the same technique where we embed haptics in scleral pockets (E-flanged IOL) that helps in overcoming these complications.

Methods

The study was approved by the institutional review board of LV Prasad Eye Institute and adhered to the tenets of the Declaration of Helsinki (LEC BHR-R-05-20-443). Informed consent was taken from all the patients for surgery. A retrospective analysis of five consecutive cases, who had undergone the E-flanged IOL technique with a postoperative follow-up of more than 1 year, was done. Both primary (at the time of vitrectomy for subluxated IOL or lens) and secondary IOL implantation procedures were included. The parameters recorded were etiology, preoperative and postoperative visual acuity (VA), intraocular pressure, refraction, and postoperative complications. Any patient with scleral thinning, significant corneal scarring, retinal pathology such as retinal detachment and macular scars, was excluded from the analysis.

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The primary objective of this current modification is to simplify the surgical technique for secondary IOL implantation and make it more replicable and predictive.

The outcomes measure was the improvement in the uncorrected VA and change in the refractive power and to note the complications of the surgical procedure. All the outcomes were studied at postoperative day 1, 3 and 6 months, and 1 year.

Surgical Technique

All the surgeries were performed by a single surgeon (HA). A three-piece foldable IOL (MA 60 AC, Alcon Lab. Inc.) was used for the IOL implantation owing to its easy availability in our institute [Surgical Video 1 and Fig. 1]. A 25-gauge three-port pars plana vitrectomy (Alcon CONSTELLATION® Vision System) is done in cases of subluxated IOL or crystalline lens. A complete anterior vitrectomy is done for all cases with special care taken to remove any vitreous at the ciliary region which is the site of haptic insertion. A localized conjunctival peritomy is done nasally and temporally. Two partial-thickness scleral pockets parallel to the limbus are made with a 2 mm crescent knife blade 2 mm from the limbus. A three-piece foldable IOL is subsequently injected into the anterior chamber carefully in the way that leading haptic and optic remain in the anterior chamber and trailing haptic outside the corneal incision. A 27-gauge needle is inserted through the left side pocket, initially in the tangential direction and subsequently turned toward the center of the pupil. A 25-gauge Maxgrip forceps (Alcon lab Inc.) is then used to insert the leading haptic into the lumen of the needle. The needle is externalized with the leading haptic. Cauterization of the haptic end is done with a heated muscle hook or Bard-Parker handle tip. In this way, the haptic is flanged to prevent it from slipping. Alternatively, the haptic end tip may be heated with electric cautery if available.

A 27-gauge needle is then inserted through the right scleral pocket, similar to the procedure done on the left. The trailing haptic is held with a McPherson tying forceps, inserted through the corneal entry, and fed into the lumen of the needle. Next, the trailing haptic is externalized and cauterized in the same way as the leading haptic. The lens is centralized and both the haptics are inserted and embedded into the scleral pockets.

The conjunctival peritomy is closed either with fibrin glue or by cauterizing the conjunctival flap end. Thus, the embedding of the flanges haptics in the scleral pockets helps in reducing the chances of haptic exposure and conjunctival erosion in the future.

In cases of IOL tilting during the surgery, the scleral pockets can be extended sideways and the haptics can be replaced in the opposite direction of the tilt. The pocket can be sutured with a 10-0 nylon suture to prevent re-displacement of the haptic to correct the tilt of the IOL. This we have done in one case where we notice the IOL tilt at the end of surgery and corrected it successfully.

Results

Five patients (5 eyes) were included in the study. Table 1 shows the baseline characteristics of the study subjects. The mean preoperative VA was 0.44 logMAR (Snellen equivalent 20/55). The vision improved to 0.26 logMAR (Snellen equivalent 20/36) at the 6 weeks' postoperative visit. None of the patients had intraocular pressure (IOP) above 21 mmHg in any of the follow-up visits. None of the patients had any complications

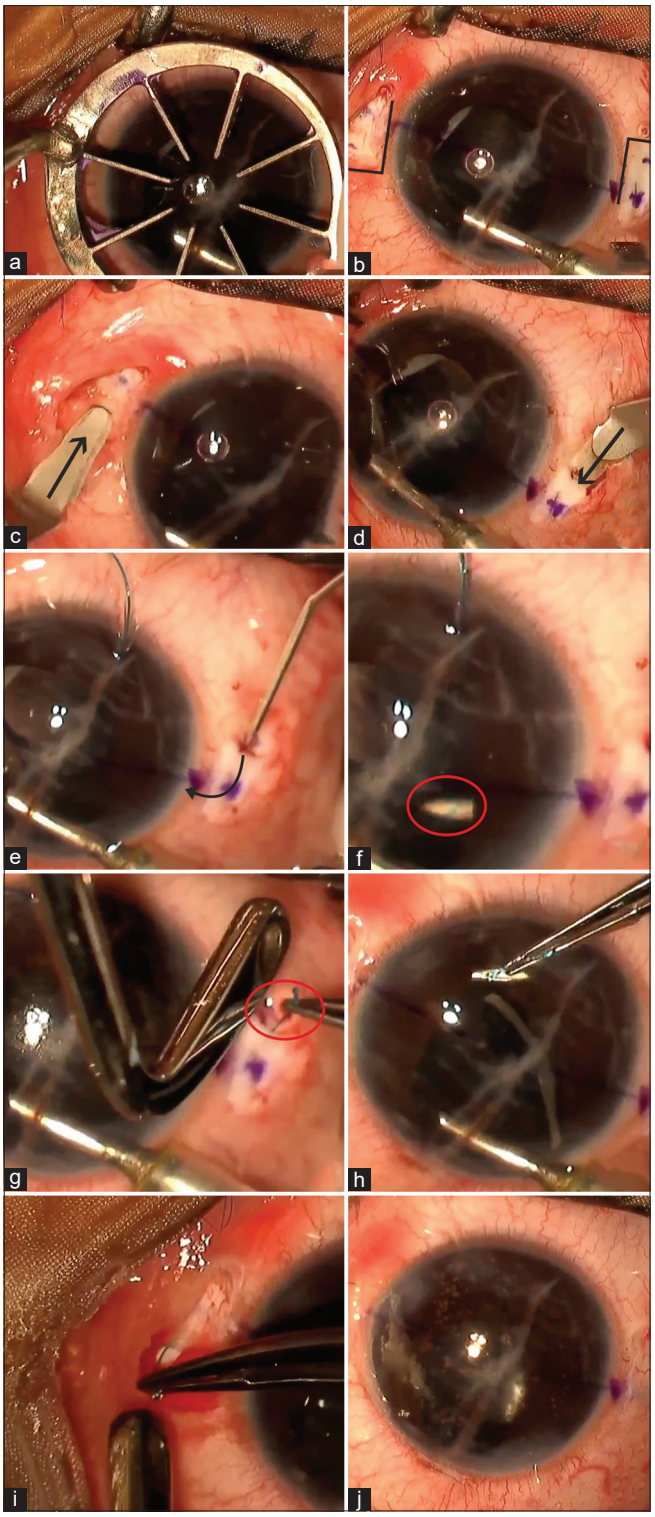

Figure 1: (a): Corneal marking. (b) Conjunctival peritomy and scleral bed are marked 2 mm from the limbus and tangentially. (c,d) Partial-thickness scleral pockets prepared. (e) 27-G needle inserted. (f) Leading haptic fed into the needle. (g) Haptic tip cauterized. (h) Trailing haptic held with forceps and fed into the needle. (i) Haptics cauterized and placed into the scleral pocket. (j) Peritomy closed

Table 1: Baseline characteristics of the study subjects

Age/ sex	Etiology	Pre-op BCVA (LogMAR)	Spherical equivalent	Postop BCVA (LogMAR)	Spherical equivalent	Follow-up duration (days)
49/F	Subluxated lens	0.3	–1.5	0.1	0.75	501
57/F	Surgical aphakia	0.4	10	0.1	0.25	445
35/M	Subluxated IOL	0.5	9	0.1	–0.25	647
10/M	Subluxated lens	0.5	12	0.5	0.75	471
10/M	Subluxated lens	0.5	8	0.5	–1	414

including vitreous hemorrhage, hypotony, haptic exposure or conjunctival erosion, retinal detachment, or endophthalmitis at 1 week, 1 month, 6 months, 1 year, and at the last follow-up visit. The mean ± SD follow-up duration was 496+/80 days. The maximum follow-up period was 647 days. None of the eyes had cystoid macular edema.

Discussion

Aphakia can be a result of complicated cataract surgeries, post-trauma lens subluxation, or lens dislocation. Leaving a patient aphakic is a nightmare for most ophthalmologists. This has led to the development of several techniques and options to overcome the problems of secondary IOL implantations. The anterior chamber or iris-claw IOL has been tried but it suffers from complications of corneal endothelial damage, glaucoma, and rarely Uveitis-Glaucoma-Hyphema (UGH) syndrome.[1,3,4] The use of trans-scleral fixation of the IOL helped in overcoming the pitfalls associated with the anterior chamber lens implantation but the use of sutures has been known to lead to complications of suture erosion and IOL re-dislocation in the long term. The incidence of suture erosion and re-dislocation has ranged between 3 and to even 26% in some studies.[5-7]

The introduction of a sutureless surgery like glued IOL/ flanged IOL was aimed at overcoming these problems.[8,9] However, there were complications such as IOL haptic slippage and haptic erosion.[10] Yamane *et al*.[11] described a technique of sutureless, glue-free intrascleral IOL fixation.[12] But their study also had iris capture, vitreous hemorrhage, and cystoid macular edema.

Bonnell *et al*.[13] had described a modification in Yamane's technique. They modified the technique by placing a 25-gauge trocar and externalizing the trailing haptic with the help of a 25-gauge forceps and guiding it into the lumen of a 30-gauge needle in the posterior chamber. Through this modification, they made the surgery more easily repeatable and decreased the chances of haptic breakage. Recently, Bonnell *et al*.[14] also published the long-term outcome of their modified technique. Out of the nine operated eyes, one patient had haptic exposure by the 49th day of the surgery.

We modified the flanged IOL technique described by Yamane *et al*. with the aim of overcoming these complications. The addition of scleral pockets to embed the haptics beneath the flaps of the scleral pockets helped in avoiding the complications of conjunctival erosion and haptic exposure. Any IOL tilt noted intraoperatively could also be corrected easily as mentioned in the technique.

Our study results compared well with those of the earlier described flanged IOL technique. The VA improved from a preoperative mean of 0.44 logMAR (Snellen equivalent 20/55) to 0.26 logMAR (Snellen equivalent 20/36) at the 6 weeks' postoperative visit. We did not notice any major complications like hypotony or haptic exposure and conjunctival erosion following surgery even at 1 year of follow-up.

Limitation

Our study does suffer from the limitation of a small sample size. However, it may be asserted that with five patients who had a follow-up of more than 1 year, no complications were noticed. Most of the complications associated with the flanged IOL technique have been described to occur in the early follow-up period within the initial 2 months.[14] Thus, we presume that a period of more than 1 year without any complications is promising.

Conclusion

To conclude, this modified flanged IOL technique (E-flanged IOL) is simple, uses fewer instruments, and is more predictable. Our modification of Yamane's technique helps in obviating the complications encountered with the currently described techniques.

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Conflicts of interest

There are no conflicts of interest.

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