

## Penetrating Keratoplasty with Yamane Intrasccleral Haptic Fixation of Intraocular Lens - Can it Work?

Radhika Natarajan<sup>1\*</sup>, Prabhat Nangia<sup>1</sup> and Ekta Rishi<sup>2</sup>

<sup>1</sup>CJ Shah Cornea Services, Sankara Nethralaya, Medical Research Foundation, Chennai, India

<sup>2</sup>Sri Bhagwan Mahavir Vitreoretinal Services, Sankara Nethralaya, Medical Research Foundation, Chennai, India

\*Corresponding Author: Radhika Natarajan, CJ Shah Cornea Services, Sankara Nethralaya, Medical Research Foundation, Chennai, India.

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### Abstract

**Purpose:** Penetrating keratoplasty (PK) is often combined with scleral fixated intraocular lens (IOL) implantation for single stage visual rehabilitation in eyes with corneal scarring and decompensation with poor capsular support. We describe here a combination of PK with sutureless intra scleral haptic fixated intraocular lens (ISHF) implantation with the help of 27-gauge needles and flanged haptic fixation as described by Yamane., et al [1].

**Methods:** We performed this technique in three cases wherein we removed the host cornea first followed by adequate anterior or pars plana vitrectomy and open sky Yamane intra scleral haptic fixation (ISHF) of a three piece IOL. The donor corneal suturing was completed after the IOL haptics were exteriorised.

**Results:** In our experience, this technique was not time consuming which is an important advantage in open sky conditions. The IOL was very stable due to the intrasccleral type of fixation. The leading haptic in two cases was noted to have protruded out from the scleral tunnel in the post operative period. One patient required a scleral patch graft after 6 months to cover the haptic while the exposed haptic was trimmed in the other patient. Extending the intra scleral tunnel length solved this issue.

**Conclusion:** This technique provides a viable alternative in cases where IOL fixation is required concomitantly with a PK when capsular support is poor. The procedure is quick and the IOL stability is good.

**Keywords:** Penetrating Keratoplasty; Scleral Fixated Intraocular Lens; Corneal Decompensation; Combined Procedure

### Introduction

Eyes with bullous keratopathy or post traumatic corneal decompensation with significant corneal scarring require combined procedures of full thickness corneal transplant along with IOL implantation. They often lack good posterior capsular support precluding implantation of a posterior chamber IOL (PCIOL) in the capsular bag.

A new technique for "sutureless glueless SFIOIOL" fixation was described by Yamane [1], which entails externalisation of the haptics of a three piece IOL and creation of what the authors have described as a flange at the end of the haptic for IOL fixation. This technique of intra scleral haptic fixation (ISHF) has been combined with Descemet-stripping endothelial keratoplasty (DSEK) and other lamellar endothelial keratoplasties.

We describe a novel technique of combining the ISHF-IOL with penetrating keratoplasty and a limited anterior vitrectomy and its advantages and disadvantages in the specific context of PK.

**Materials and Methods**

We performed this procedure in three eyes of three patients. One eye had a failed corneal graft and aphakia, and two other pseudophakic eyes had bullous keratopathy and poor capsular support.

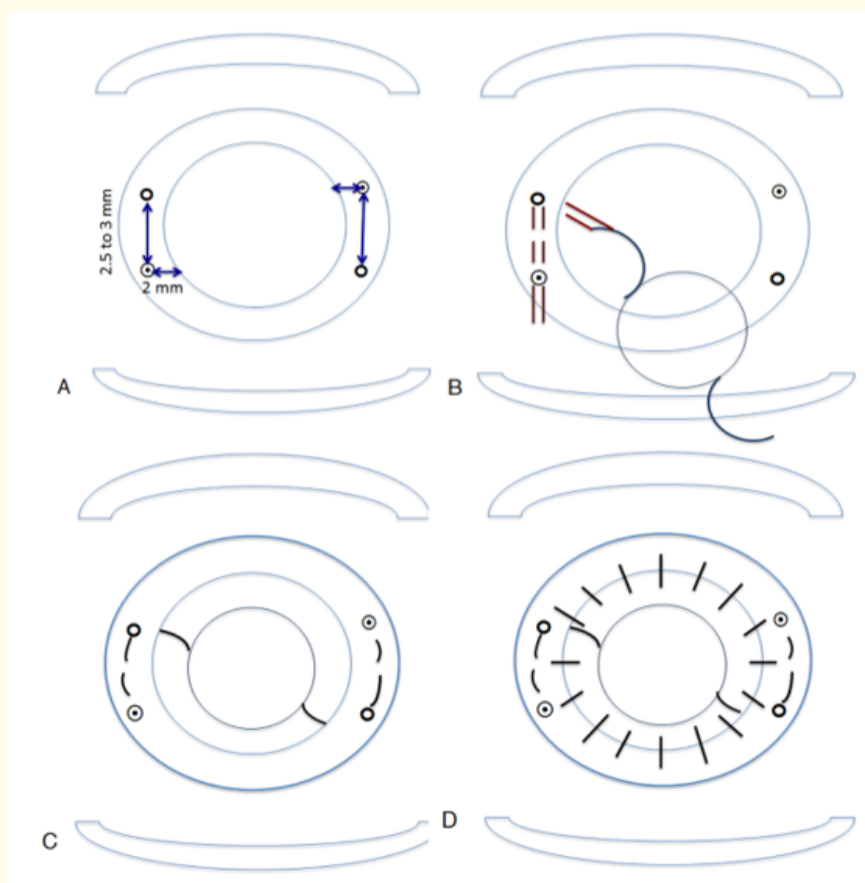
All 3 cases needed full thickness penetrating graft because of significant stromal scarring and endothelial dysfunction. Poor capsular support precluded in-the-bag or sulcus fixation of the intraocular lens.

**Surgical technique**

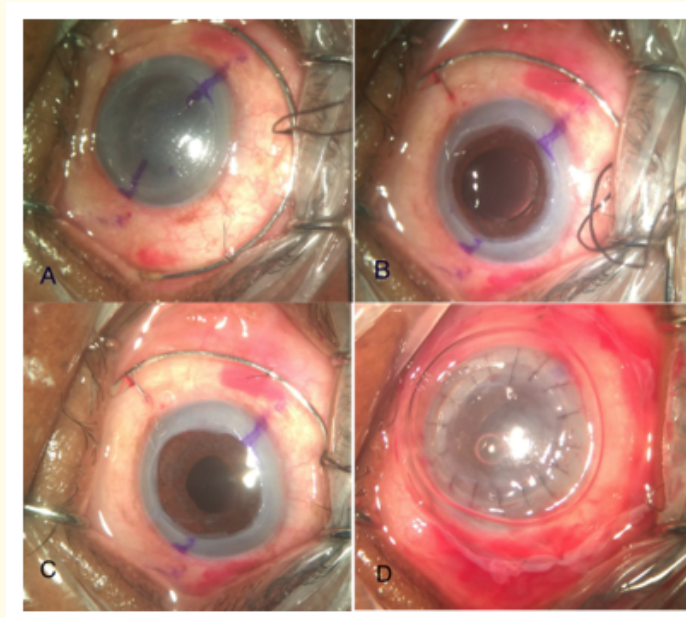
In all cases, a Flieringa ring was first anchored to the sclera with 8-0 nylon sutures. This was followed by marking of the host cornea with a Radial Keratotomy marker at diametrically opposite points (4 and 10 o'clock, or 5 and 11 o'clock; Figure 1A). The host cornea was then trephined to full thickness. An unstable IOL was explanted (case 2) or the same IOL was used for scleral fixation (case 3; Figure 2). Adequate anterior vitrectomy was done.

A 3 piece IOL (Sensar®, AR40e, Abbott Medical Optics Inc, Santa Ana, California) with hydrophobic acrylic optic with a diameter of 6 mm and an overall IOL diameter of 13 mm, with haptics made of polymethylmethacrylate (PMMA) was used. In case 3, the 3 piece IOL present in the eye was not explanted, instead used for the scleral fixation.

An angled sclerotomy was made transconjunctivally using a 27-G needle along the marked axis, 2 mm from the limbus, with an oblique insertion into the sclera at an angle of 45 degrees before entering the globe perpendicularly at the ciliary sulcus (Figure 1B). The intended intrascleral tunnel length was at least 2 mm. This was increased to 2.5 to 3 mm in the third case. The leading haptic of the IOL was threaded into the needle and another sclerotomy was made 180 degrees away from the first with the help of the markings and using another 27-G needle, similar to the first sclerotomy. The trailing haptic was threaded into second needle and both haptics were exteriorised simultaneously using the Yamane double needle technique (Figure 1C). The donor corneal graft was punched (diameter 0.5 mm more than host trephination) and was sutured to the host bed using 16 interrupted 10-0 nylon sutures (Figure 1D). The ends of the haptics were cauterised using an ophthalmic cautery device (Accu-Temp®, Beaver-Visitec International, Inc. Waltham, MA). In case the thermal effect was found to be insufficient, the cautery tip was brought closer or touched to the haptic to form a flange. The flanges were pushed back to fix the haptics within the scleral tunnels



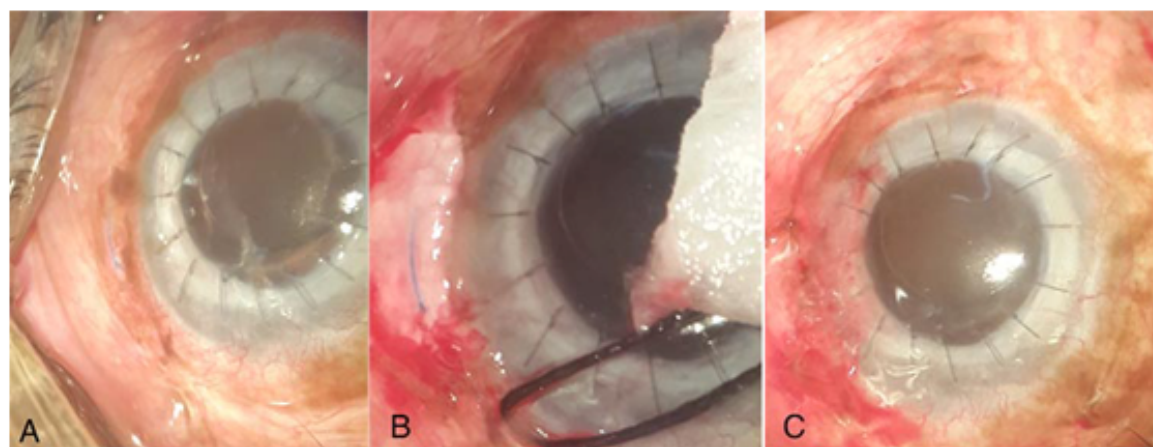
**Figure 1:** Schematic diagram showing steps of the surgical procedure. 1A: Marking 4 points on the sclera. 1B: Threading the leading haptic into the 27 G needle. 1C: Well centered scleral fixated intraocular lens after both haptics are exteriorised. 1D: Penetrating keratoplasty done.



**Figure 2:** Intraoperative images from Case 3. 2A: Decompensated host cornea. 2B: After removal of the host corneal button, 3 piece intraocular lens seen with one haptic in anterior chamber. 2C: After intrascleral haptic fixation of the same intraocular lens. 2D: After penetrating keratoplasty and placement of bandage contact lens.

**Results**

The ISHF-IOL was found to be stable and well centered in all 3 eyes. In case 1, the leading haptic was seen in the subconjunctival space in the late post operative period and required a scleral patch graft to cover the same as a precautionary measure (Figure 3). In case 2, the haptic had protruded out of the conjunctiva in the early post operative period and it was trimmed and then pushed back and the overlying conjunctiva was cauterised. As the first patient presented some weeks after the procedure, possibilities of scleral tunnel fibrosis and introduction of infection made us decide on a patch graft rather than resort to haptic trimming. In case 3, the scleral tunnel was made longer by 1 mm and overlying conjunctiva cauterised intraoperatively and no haptic extrusion was seen.



**Figure 3:** Surgical management of exposed leading haptic in Case 1. 3A: Exposed haptic. 3B: Scleral patch placed over the haptic and anchored with fibrin glue. 3C: Conjunctiva closed over the scleral patch.

Six months post operatively, case 1 had stable best corrected visual acuity. Case 2, which had glaucoma pre operatively, developed an IOP spike, but was lost to follow up. Case 3 was doing well two months post operatively.

### Discussion and Conclusion

Indications for combining a PK with an SFIOL implantation include aphakic or pseudophakic bullous keratopathy with deficient capsular support [2,8], eyes with previously done therapeutic penetrating keratoplasties and surgical aphakia with failed corneal grafts and post traumatic corneal scars with aphakia or cataract with poor capsular support.

In a suture-fixated SFIOL, the IOL rests within the ciliary sulcus suspended from the sutures like a hammock, predisposing it to pseudophacodonesis. Many of these eyes undergoing such combined procedures lack adequate iris support due to previous trauma or traumatic cataract surgery, increasing the chances of an unstable IOL touching the cornea from time to time and resulting in progressive endothelial loss. In ISHF, the IOL stability is much better due to the intra scleral nature of fixation, even when anterior iris support is inadequate. The lens moves less which offers better protection for the graft endothelium.

While the use of the intrasccleral haptic tuck technique with fibrin glue to seal the overlying flaps (“glued IOL”) along with PK has also been described [6], the cost of the glue makes this procedure difficult to perform on a routine basis in developing economies.

The advantages of the ISHF-IOL technique are the significantly reduced surgical time, particularly the “open sky” time when the eye is always at risk of expulsive haemorrhage. This is due to the limited number of steps and less steep learning curve of the ISHF-IOL technique than the sutured SFIOL technique. Manipulation of the trailing haptic which is considered difficult in the Yamane technique is actually easier when done with a PK, due to the access conferred by opening the host cornea! When the corneal condition allows some visibility, the IOL fixation can be done under a partially trephined host corneal button to avail the closed chamber advantage.

This technique provides a viable alternative in cases where IOL fixation is required concomitantly with a PK when capsular support is poor. The procedure is quick and the IOL stability is good.

### Conflict of Interest

There is no conflict of interest in this study.

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There were no sources of external funding for this study.

### Bibliography

1. Yamane S., *et al.* “Flanged Intrasccleral Intraocular Lens Fixation with Double-Needle Technique”. *Ophthalmology* 124.8 (2017): 1136-1142.
2. Price FW and Whitson WE. “Visual results of suture-fixated posterior chamber lenses during penetrating keratoplasty”. *Ophthalmology* 96.8 (1989): 1234-1240.
3. Brunette I., *et al.* “Penetrating keratoplasty with anterior or posterior chamber intraocular lens implantation”. *Archives of Ophthalmology (Chicago, Ill.: 1960)* 112.10 (1994): 1311-1319.
4. Gonnermann J., *et al.* “Visual outcomes and complications following posterior iris-claw aphakic intraocular lens implantation combined with penetrating keratoplasty”. *Graefe’s Archive for Clinical and Experimental Ophthalmology* 251.4 (2013): 1151-1156.

5. Rüfer F, *et al.* "Implantation of retropupillar iris claw lenses with and without combined penetrating keratoplasty". *Graefe's Archive for Clinical and Experimental Ophthalmology* 247.4 (2009): 457-462.
6. Prakash G, *et al.* "Femtosecond-assisted keratoplasty with fibrin glue-assisted sutureless posterior chamber lens implantation: new triple procedure". *Journal of Cataract and Refractive Surgery* 35.6 (2009): 973-979.
7. Karadag R, *et al.* "Trocar-Assisted, Sutureless, Scleral-Fixated Intraocular Lens Implantation Combined with Penetrating Keratoplasty". *Cornea* 35.9 (2016): 1261-1265.
8. Sethi HS, *et al.* "26-G needle-assisted sutureless glueless intrasccleral haptic fixation for secondary ciliary sulcus implantation of three-piece polymethylmethacrylate intraocular lens during penetrating keratoplasty". *Taiwan Journal of Ophthalmology* 6.3 (2016): 141-144.

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