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Brief communication

26-G needle-assisted sutureless glueless intrascleral haptic fixation for secondary ciliary sulcus implantation of three-piece polymethylmethacrylate intraocular lens during penetrating keratoplasty



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ABSTRACT

After tenotomy adjoining 3 o'clock and 9 o'clock limbus, 3-mm-wide partial-thickness scleral tunnels are created at these two diametrically opposite points 3 mm from the limbus such that they reach up to a distance of 1.5 mm from the limbus. Two *ab externo* sclerotomies are created using 26-G needles on the bed of these partial-thickness scleral tunnels. Precaution is taken to ensure that the positions of the sclerotomies are diagonally opposite each other. A scleral niche is made using a 26-G needle to accommodate the intraocular lens (IOL) haptic later. A 7.5-mm trephine is used to excise the corneal button, and anterior vitrectomy is performed. The haptic of a three-piece polymethylmethacrylate IOL is docked in a bent 26-G needle. It is then pulled out under the partial-thickness scleral tunnel and placed securely in the scleral niche opposite to the haptic. An 8-mm donor corneal button is sutured in place using 16 equidistantly placed 10-0 nylon interrupted sutures.

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1. Introduction

Posterior chamber intraocular lenses (IOLs) are generally placed in the capsular bag. However, this may not be feasible in cases with insufficient capsule, capsular tears, trauma, aniridia, pseudoexfoliation, lens subluxation, or loss of zonular integrity. In recent years, evolving techniques have enabled surgeons to perform intrascleral haptic fixation of posterior chamber IOLs with or without sutures.^{1,2}

Aphakic patients undergoing penetrating keratoplasty are partially visually rehabilitated using the keratoplasty procedure. Implanting an IOL in such cases is necessary for better visual recovery. Implanting a scleral-fixated IOL in cases with absent capsular support helps in separating the anterior chamber from the posterior chamber, thus decreasing the chances of late complications, such as cystoid macular edema (CME), vitreous touch leading to graft rejection, etc., effectively.³ This case report truly represents a paradigm shift in the treatment of patients without a posterior

capsule for IOL support, and also improves the visual disability arising from corneal opacification or decompensation.

2. Technique

After tenotomy adjoining 3 o'clock and 9 o'clock limbus, partial-thickness scleral tunnels are created 3 mm from the limbus at these two diametrically opposite points such that they reach up to a distance of 1.5 mm from the limbus (Figure 1A). Two *ab externo* sclerotomies are created using 26-G needles on the bed of these partial-thickness scleral tunnels using the resistance of the tunnel encountered at a 1.5-mm distance as a guide marker (Figure 1B). Precaution is taken to ensure that the positions of the sclerotomies are diagonally opposite each other. A scleral niche is made at one edge (inferior edge of the right-sided scleral tunnel and superior edge of the left-sided scleral tunnel) using a 26-G needle to accommodate the IOL haptic later (Figure 1C). A 7.5-mm trephine is used to excise the corneal button, and anterior vitrectomy is performed (Figure 1D). The haptic of a three-piece polymethylmethacrylate IOL is then inserted through the "open-sky" corneal wound such that it is docked in a bent 26-G needle and pulled out through the earlier marked point under the partial-thickness scleral tunnel at the 3-o'clock position (Figure 1E). It is

Conflicts of interest: None.

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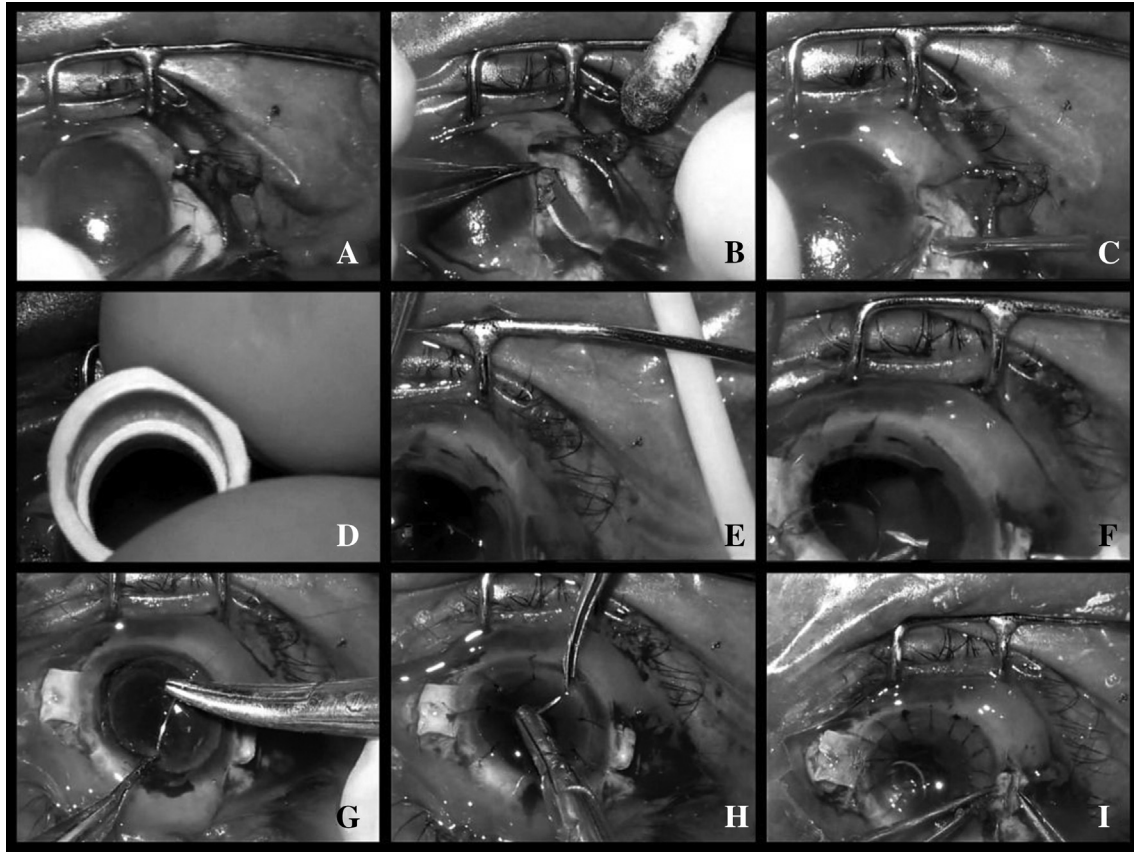


Figure 1. Steps of surgery. A: Partial thickness sclera tunnel being made 3 mm from limbus; B: Scleral niche made to accommodate the haptic of the IOL; C: Ab-externo sclerotomy done at the bed of the partial thickness sclera tunnel; D: 7.5 mm trephine to excise corneal button; E: Status after excision of corneal button; F: Haptic of IOL pulled out by docking in 26-G needle; G,H: Suturing donor corneal button to recipient; I: Suturing scleral tunnels to sclera bed using 10-0 nylon sutures.

then placed securely in the scleral niche opposite to the haptic (Figure 1I). The procedure is repeated for the other haptic, taking care that the initial haptic remains in place (Figure 1F). An 8-mm donor corneal button is sutured in place using 16 equidistantly placed 10-0 nylon interrupted sutures (Figures 1G and 1H). The integrity of self-sealing scleral tunnels is verified, and the conjunctiva is closed using bipolar cautery.

3. Results

Ten eyes of 10 aphakic patients were operated on by a single surgeon using the abovementioned technique. No intraoperative complication was noticed. At 6 weeks' follow up, the best corrected visual acuity was 6/9 in six patients, 6/18 in two patients, and 6/36 in two patients, due to underlying macular pathology (Figures 2 and 3).

4. Discussion

Sutureless intrascleral haptic fixation of a three-piece posterior chamber IOL in eyes with insufficient capsular support was first reported by Scharioth et al³ wherein the IOL was placed in the ciliary sulcus. In addition, in 2007, Agarwal et al¹ introduced a novel innovation to sutureless intrascleral posterior chamber IOL implantation, wherein they made use of fibrin glue to secure the scleral flaps under which the lens haptics were tucked. We now report this novel technique of sutureless glueless intrascleral fixation of a three-piece posterior chamber IOL in eyes with deficient capsular support while undergoing penetrating keratoplasty.

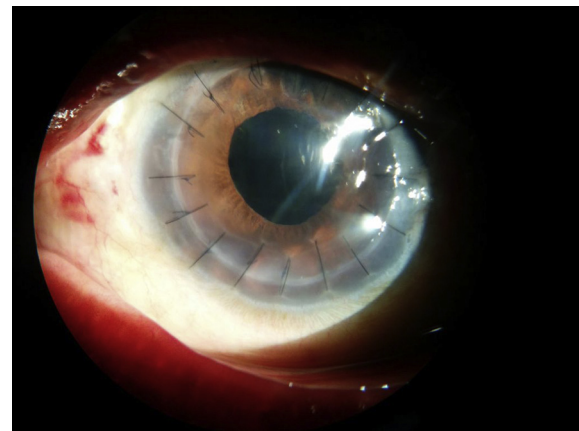


Figure 2. Postop photograph taken 4 weeks after surgery.

Indications for sutureless glueless intrascleral fixation of posterior chamber IOLs with penetrating keratoplasty have widened. They include aphakic bullous keratopathy with deficient capsular support, pseudophakic bullous keratopathy with anterior chamber IOLs, decentered IOLs with insufficient capsular support, etc., which require IOL exchange.^{1–3} The indication scenario, however, has changed. More recently, inadvertently delayed secondary subluxation of the lens-bag complex owing to doubtful zonular integrity, when complicated by corneal scars, has increasingly gained importance.^{1,4} Moreover, penetrating traumatic injuries leading to

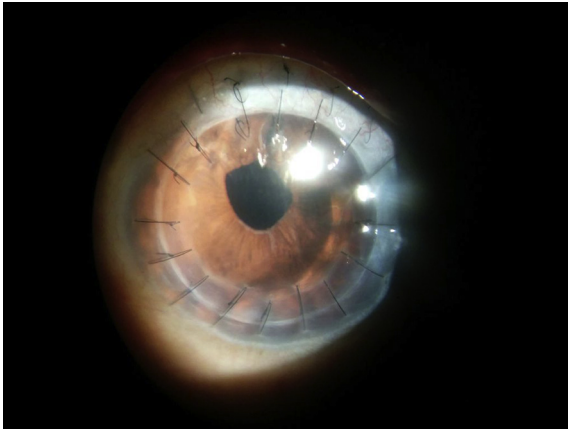


Figure 3. Postop photograph taken 8 weeks after surgery.

corneoid scars with traumatic mature cataracts when the integrity of the capsular bag is jeopardized are candidates for combined surgery.

Our IOL implantation technique has several advantages. First, because it does not involve sutures,² it does away with the problem of suture degradation or cheese wiring over time. In addition, the risk of having sutures that come loose or are inadvertently cut is not witnessed, as seen in sutured scleral-fixated IOLs resulting in tilting or dislocation of optic. Gradual wearing off and resultant erosion of the suture fixating the IOL to the sclera is the most common complication of trans-scleral sutured IOLs. Common to all techniques for sutured scleral fixation is the need to cover, bury, or rotate suture knots created for fixation in order to prevent conjunctival erosion and subsequent endophthalmitis. Second, scleral fixation with sutures^{3–5} is a somewhat cumbersome surgery where long strands of thread are used in the operative field. It is a challenging and frustrating procedure for ophthalmologists to perform in many cases, whereas the present technique is quite elegant and efficient. A persistent suture extending between the intra- and extraocular environments may provide a track for bacteria to enter the eye and establish endophthalmitis.^{1,2,4,5} Third, since this procedure is not only sutureless but also glueless, logistical glue-related problems with respect to procurement, cost, preparation, and usage are easily avoided, especially in developing countries. Lastly, The Scharioth–Agarwal technique claims to have good results because of absence of pseudophakodonesis in such cases, unlike a sutured IOL, which moves like a hammock as verified on high-speed videography and anterior segment Optical Coherence Tomography (OCT).⁶ However, the technique requires 19- or 20-gauge forceps to grasp the haptics, and it leaves the lens “trapped” in the sclera. The use of this intravitreal forceps is difficult in hypotonous eyes after removal of the corneal button.³

The greatest advantage of the combined procedure sclerafixated intraocular lens with penetrating keratoplasty (SFIOL + PK) is that it can obviate the expense and inconvenience of a subsequent second procedure, which is of great benefit for the elderly.^{7–9} Furthermore, a single procedure reduces the risk of damage to the donor endothelium during subsequent delayed surgery.¹⁰ The major drawbacks of the combined procedure, however, may be unreliability and inaccuracy in IOL power prediction. The use of preoperative keratometric readings from the affected or fellow eye, multiple regression analysis with surgeon-specific values, individualized A-constants, or fixed values for keratometry are among the different strategies adopted to reduce the risks.¹¹

The importance of adequate planning cannot be overstressed. It is always important to plan where the haptic will be fixated^{1,6,12–18}

and to make incisions accordingly. This implies that the sclera needs to be of reasonable thickness and reasonable health; thus, this type of technique is contraindicated for all cases of scleral thinning for which aphakic refraction would be a better option.^{1,6,12–18}

For the sclerotomy location, we followed the recommendations of Duffey et al,¹⁶ who reported that the anatomic location of the ciliary sulcus from the surgical limbus was 0.94 mm in the vertical meridian and 0.5 mm in the horizontal meridian. We recommend measuring the white-to-white distance to avoid decentering of the IOL as a result of anatomical disparity between the IOL and the globe.

4.1. What was known

1. In patients with aphakic bullous keratopathy with deficient capsular support, pseudophakic bullous keratopathy with anterior chamber IOLs, and decentered IOLs with insufficient capsular support, the options of visual rehabilitation not only were minimal and difficult to execute, but also yielded unsatisfactory results.
2. Penetrating keratoplasty with suture-fixated posterior chamber IOLs is accompanied by suture-related complications.

4.2. What this paper adds

1. Our technique of “sutureless glueless scleral-fixated IOLs” facilitates better and faster visual recovery of aphakic/pseudophakic patients undergoing penetrating keratoplasty and requiring an IOL placement in deficient capsular support.
2. This technique obviates the expense and inconvenience of a subsequent second procedure, which not only is of great benefit to the elderly, but also reduces the risk of damage to the donor endothelium during subsequent delayed surgery.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.tjo.2016.04.008>.

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