Original article

Visual outcome and early complications of sutureless and glueless scleral fixated intraocular lens

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Abstract

Introduction: In the absence of capsular support, anterior chamber intraocular lens (IOL), iris fixated IOL and sutured scleral fixated intraocular lens (SFIOL) implantation have been performed for many years. Recently sutureless glued SFIOL have been used as a primary or secondary procedure to correct aphakia. In this study we have used sutureless and glueless technique of SFIOL implantation. **Methodology:** An interventional case series was conducted. Aphakic patients without capsular support, sub-luxated lens (>180˚), dislocated lens and dislocated IOL were the inclusion criteria. The patients with hazy cornea, non-dilating pupil, macular scar and glaucoma were not enrolled in the study. **Results:** Of 62 eyes who completed 1 month follow-up, 48 were men and 14 women. There was a significant improvement in uncorrected distance visual acuity after surgery ($p<0.001$). One month postoperative best corrected distance visual acuity was 6/18 or better in 45 eyes (72.6%). The common early postoperative complications were hypotony, corneal edema. No serious complications such as endophthalmitis and retinal detachment were seen. **Conclusion:** Our technique of sutureless and glueless SFIOL implantation showed good visual outcome in the absence of serious complications. SFIOL will be the only choice in eyes that have anatomic contraindications like non constricting pupil, large sectoral iridectomy and peripheral anterior synechia in which other types of lens are not suitable.

Keywords: SFIOL, Sclera fixation, Glueless, Sutureless, Aphakia

Introduction

Cataract surgery is the most common surgical procedure in the population aged over 65 years (Panchapakesan et al, 2003). With advancement in technology, in-the-bag placement of intraocular lens (IOL) has become the procedure of choice. The problem of aphakia has been encountered since the era of couching, following intracapsular cataract extraction and as a consequence of complicated extracapsular cataract extraction with no capsular support. In such eyes the choice of IOL implantation include anterior chamber (AC) IOL, iris fixated IOL, iris claw IOL, sutured sclera fixated IOL and sutureless sclera fixated IOL (SFIOL). Each of these IOL has its own advantages and disadvantages. ACIOL is technically less demanding but has potential for increased damage to the corneal endothelium and the angle structures (Por et al, 2005). Iris claw and iris fixated IOLs have increased chances of pigment release and intraocular inflammation (Por et al, 2005). Sutured SFIOL implantation

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is technically more demanding and can have problems like pseudophacodonesis and suture related complications like suture knot exposure, suture breakage and IOL subluxation (Wagoner et al, 2003). However, it has the advantage of more physiological position near the nodal point of eye and greater distance from the cornea.

In this study we have assessed the visual outcome and early complications of a new technique of sutureless and glueless scleral fixation of IOL using a 24 gauge biplanar sclerotomy.

Patients and methods

An interventional case series was conducted. Aphakic patients with absence of capsular support, subluxated lens (>180˚), posteriorly dislocated lens and patients with posteriorly dislocated IOL who had given their consent were enrolled in the study between 1st April 2014 and 31th March 2015. Surgeries were performed at Biratnagar eye hospital by two vitreoretinal surgeons. Patients with hazy cornea, non-dilating pupil, macular scar and glaucoma were not enrolled in the study.

Ocular evaluation included uncorrected distance visual acuity (UCVA), best corrected distance visual acuity (BCVA), intraocular pressure (IOP) (Goldman applanation tonometry), slit lamp biomicroscopy, dilated fundus examination. OCT was done to document macular edema (ME) (Stratus Carl Zeiss).

Intraoperative complications, immediate post operative complications and 1 month post operative complications were recorded. Surgical intervention required for any of the complications was recorded.

Statistical analysis

Data were entered in an Excel spreadsheet (Microsoft Corp.) and analyzed using SPSS software (version 16.1, SPSS, Inc.). Continuous variables were expressed as the mean ± SD, and categorical variables were expressed as individual counts. The Snellen visual acuity was converted into log- MAR units for analysis. Differences were considered statistically significant when the p value was less than 0.05.

Operative procedure

Conjunctival peritomy was done at the site of sclerocorneal tunnel and site of IOL haptic externalization. 6mm sclerocorneal tunnel was made for IOL insertion. 23 gauge infusion was used as anterior chamber (AC) maintainer. Two 0.5 mm partial thickness radial incision were made 1.5mm from the limbus, 180˚ apart. From this incision a 3 mm long sclera tunnel was made parallel to the limbus (anticlockwise direction) using a 24 gauge microvitreoretinal(MVR) knife. From the same radial incisions and using the same MVR knife, biplaner sclerotomy were made in the clockwise direction for haptic externalization. Anterior vitrectomy(AV) was done for aphakic nonvitrectomised eyes. Intracapsular cataract extraction was done for subluxated lens followed by AV. 23 gauge pars plana vitrectomy (PPV) was done for posteriorly dislocated lens and IOL.

A 3 piece PMMA lens (Aurolab, India) was inserted from the sclerocorneal tunnel. An end grasping 23 gauge forcep was passed through the sclerotomy and the tip of the leading haptic was grasped and externalized. An assistant held the tip of the externalized haptic. The trailing haptic was then flexed into the anterior chamber and externalized through the opposite sclerotomy using the same forcep. Tips of the externalized haptics were grasped with the end grasping forcep and tucked into the sclera tunnel. The tucked haptics were adjusted to achieve IOL centration. Sclerocorneal tunnel and conjunctival peritomy were closed with 8-0 polyglactin suture.

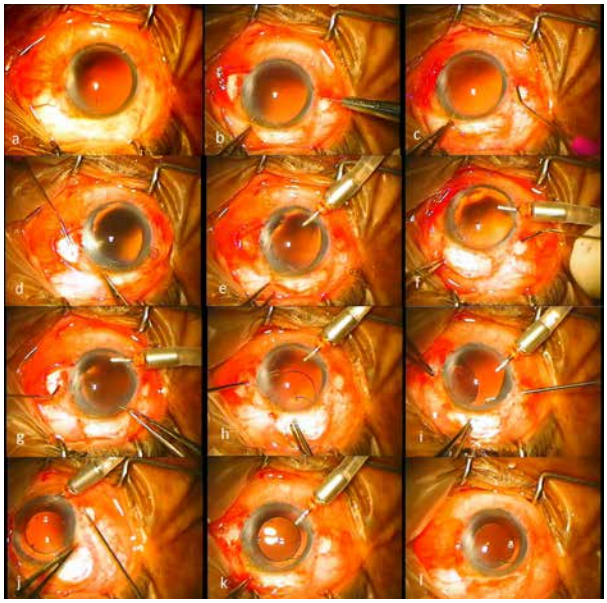

Figure 1: Operative procedure of sutureless and glueless sclera fixation of intraocular lens (SFIOL). (a= aphakic eye, b= radial sclera incision, c & d= creation of sclera tunnel , e= anterior chamber maintainer, f & g= biplanar sclerotomy, h & i = haptic externalization, j= intrascleral tucking of haptic, k & l= well centred SFIOL)

Results

Eighty patients were enrolled in the study, out of which only 62 turned up for 1 month follow up. So only these were included in statistical analysis. Among them, 48 were men (77.4%) and 14 women (22.6%). The mean age was 50.3 ± 16 years (range 9 to 80 years). 29(46.8%) left eyes and 33(53.2%) right eyes were treated. Indications for SFIOL implantation included aphakia, subluxated lens, dislocated lens and dislocated IOL (Figure 2). 19 eyes (30.6%) underwent primary SFIOL implantation and 43 eyes (69.4%) secondary SFIOL implantation.

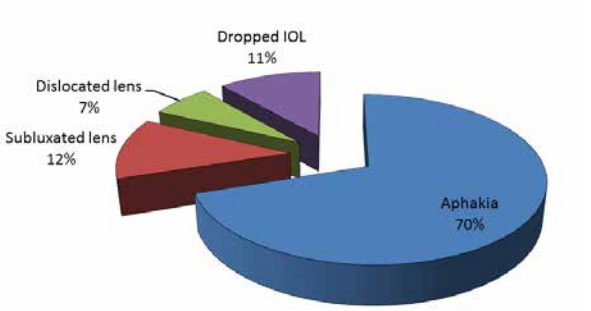

Figure 2: Indications of scleral fixated intraocular lens

Summary of visual outcome is given in figure 3. Comparison of visual acuity at different time of evaluation is shown in Table 1. The UCVA improved significantly after surgery ($p < 0.001$). There was a significant improvement in mean logMAR BCVA (0.38 ± 0.26) at 1 month as compared to preoperative BCVA ($p < 0.001$). One month postoperative BCVA was 6/18 or better in 45 eyes (72.6%) and 6/60 or better in all eyes (100%). None of the eyes showed a drop in vision at 1 month. Mean logMAR BCVA at 1 month for primary SFIOL implantation (0.37±0.22) and secondary SFIOL implantation (0.38±0.28) was not significantly different (p=0.22).

Table 1: Comparison of visual acuity at different time of evaluation

	Time of evaluation		Mean difference in logMAR	p value
UCVA	Preoperative	Postoperative	0.66	< 0.001
		1Month postoperative	0.91	< 0.001
	Postoperative	1 Month postoperative	0.25	< 0.001
BCVA	Preoperative	Postoperative	- 0.1	0.12
		1Month postoperative	0.23	< 0.001
	Postoperative	1 Month postoperative	0.34	< 0.001
UCVA=uncorrected distance visual acuity, BCVA=best corrected distance visual acuity. Differences were considered statistically significant when the p value was less than 0.05 (paired t-test).				

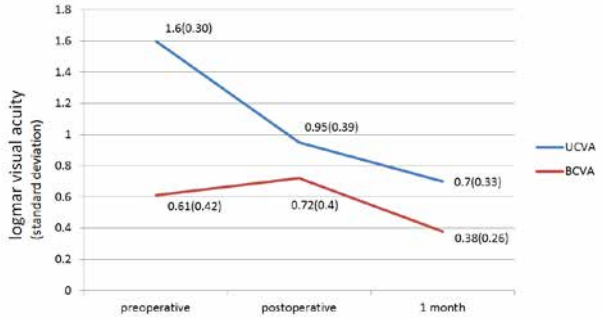

Figure 3: Pattern of preoperative, postoperative and 1 month postoperative change in visual acuity (UCVA= uncorrected distance visual acuity, BCVA= best corrected distance visual acuity)

There were no intraoperative complications like iridodialysis, cyclodialysis, haptic breakage, hyphema and IOL drop. Hypotony was the most common immediate postoperative complication seen in 12 eyes (19.4%). There was 1 case of dislocated haptic which was repositioned on the first postoperative day (table 2).

At one month follow up one (1.6%) case presented with dislocated haptic following trauma, 1 presented with ME and 1 patient had raised IOP (table 2). There were no cases of persistent hypotony, vitreous hemorrhage, uveitis–glaucoma–hyphema syndrome, endophthalmitis, retinal breaks, retinal detachment or choroidal effusion.

Table 2: Postoperative complications after sutureless and glueless SFIOL surgery.

	Complication	Number (%)
Immediate	Corneal edema	4(6.5)
	Hypotony	12(19.4)
	Fibrinous reaction	4(6.5)
	Dislocated haptic	1(1.6)
At 1month follow-up	Persistent Hypotony	0
	Raised IOP	1(1.6)
	Macular edema	1(1.6)
	Dislocated haptic	1(1.6)
SFIOL= scleral-fixated intraocular lens IOP= intraocular pressure		

Discussion

The concept of sutureless scleral fixation of IOL in eyes with absent capsular support was first given by Maggi and Maggi (1997). He had used special IOL with 3 looped haptic for this procedure. Since then there has been reports of various technique of sutureless SFIOL. Gabor et al (2007) reported the intrascleral haptic fixation of IOL using 3-piece foldable PCIOL. Agarwal et al (2007) introduced the glued intrascleral haptic fixation of PCIOL. In his technique limbal based sclera flap was created to cover the sclerotomy along with the externalized haptics and fibrin glue was used to close the flaps. Yamane et al (2014) reported the technique of Sutureless 27G Needle-Guided Intrascleral IOL Fixation in 2014. In the same year came the Y fixation technique of SFIOL by Ohta et al (2014). To the best of our knowledge, there has been no report of SFIOL implantation from Nepal till date.

In our technique we have used 3 piece PMMA IOL without creating scleral flaps or using any glues. No special instruments or IOLs are required. There is no risk of transmission of viral infection from blood products. None of the above mentioned studies reported the outcome of glueless and sutureless SFIOL using PMMA IOL.

Our results have shown promising outcome with 72% eyes having vision better than or equal to 6/18 and no drop in best corrected visual acuity at 1 month follow-up. Kumar et al (2010) reported decrease in BCVA in 11% of eyes following glued SFIOL. Luk et al (2013) recently reported reduction of BCVA in 29% eyes following sutured SFIOL.

IOP was low in 19.4% eyes at immediate postoperative period but none of them had it at 1 month follow up. Persistent hypotony was reported in 1.6% eyes by Scharioth et al (2010). In our study, dislocation of haptic was seen in 2 eyes, one (1.6%) each at immediate

and 1 month postoperative day. Similarly spontaneous dislocation of sutureless SFIOL was reported in 3.17% eyes by Gabor et al (2010) and 3.2% eyes by Kumar et al (2013). Complications of IOL tilt and dislocation ranged from 2.9% to as high as 23% in sutured SFIOL studies (Helal, 1996; Menezo, 1996; Lanzetta, 1998; Luk, 2013). Surface properties of the positioning holes lead to cutting of the suture, and subsequent subluxation of the sutured PCIOL (Parekh et al, 2007).

Healed ME was seen in 7.5% glued SFIOL eyes (Kumar et al, 2010). In the present study postoperative ME was seen in 1.6% eyes. Among the sutured SFIOLs, reported incidence of postoperative ME was as high as 42.9% (Helal, 1996; Menezo, 1996; Lanzetta, 1998).

In a study by Kwong et al (2007), eyes with ACIOLs fared better than eyes with SFIOL in terms of both BCVA and complications. Evereklioglu et al (2003) reported that secondary implantation of the SFIOL will provide more favorable outcome and a lower complication rate than the open-loop ACIOL in complicated cataract cases. In a study by Lee et al (2003) secondary implantation of SFIOL after cataract extraction had a lower early complication rate than primary implantation in complicated cataract extraction although the final visual acuity and late complication rate were not significantly different. Till date there has been no study comparing sutured and sutureless SFIOL.

At this time, there is insufficient evidence to demonstrate the superiority of one lens type or fixation site for correcting aphakia in eyes without adequate capsular support for placement of a PCIOL in the capsular bag or ciliary sulcus (Wagoner et al, 2003).

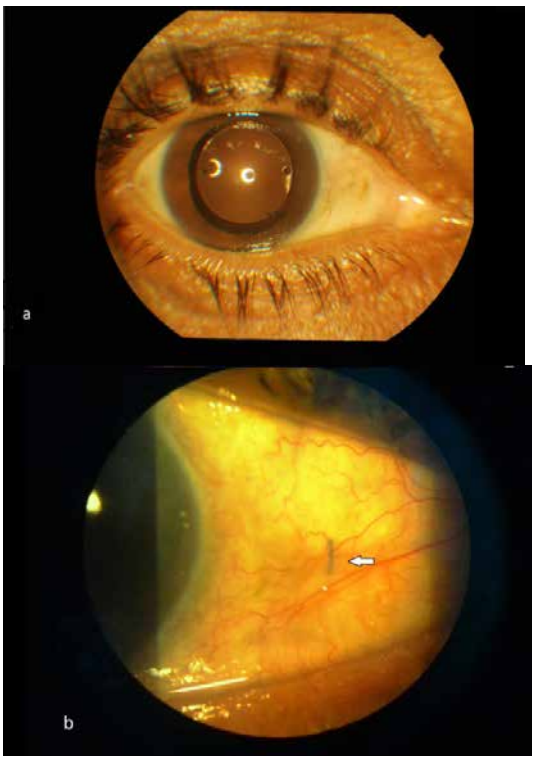

Figure 4: a) Postoperative picture of scleral fixated intraocular lens. b) Tucked intrascleral haptic (as shown by the arrow).

Conclusion

Our technique of sutureless and glueless SFIOL implantation showed good visual outcome in the absence of serious complications. SFIOL will be the only choice in eyes that have anatomic contraindications like non constricting pupil, large sectoral iridectomy and peripheral anterior synechia in which other types of lens are not suitable. Our technique will be very useful for IOL implantation in such eyes without the need of expensive IOL and instruments, negating the use of sutures. Precise determination of small differences in visual outcome or complication rates will require a large prospective, randomized clinical trial.

References

Agarwal A, Kumar DA, Jacob S, Baid C, Agarwal A, Srinivasan S (2008). Fibrin glue-assisted sutureless posterior chamber intraocular lens implantation in eyes with

deficient posterior capsules. J Cataract Refract Surg; 34:1433–1438.

Evereklioglu C, Er H, Bekir NA, Borazan M, Zorlu F (2003). Comparison of secondary implantation of flexible open-loop anterior chamber and scleral-fixated posterior chamber intraocular lenses. J Cataract Refract Surg; 29(2): 301–308.

Gabor SG, Pavilidis MM (2007). Sutureless intrascleral posterior chamber intraocular lens fixation. J Cataract Refract Surg; 33:1851–1854.

Gabor SG, Prasad S, Georgalas I, Tataru C, Pavlidis M (2010). Intermediate results of sutureless intrascleral posterior chamber intraocular lens fixation. J Cataract Refract Surg; 36:254–259.

Helal M, el Sayyad F, Elsherif Z, Maghraby AE, Dabeesl M (1996). Transscleral fixation of posterior chamber intraocular lenses in the absence of capsular support. J Cataract Refract Surg; 22:347–51.

Kumar DA, Agarwal A, Prakash G, Jacob S, Saravanan Y and Agarwal A (2010). Glued posterior chamber IOL in eyes with deficient capsular support : a retrospective analysis of 1-year post-operative outcomes. Eye; 24: 1143–1148.

Kumar DA and Agarwal A (2013). Glued intraocular lens: a major review on surgical technique and results. Curr Opin Ophthalmol; 24:21–29.

Kwong YY, Yuen HK, Lam RF, Lee VY, Rao SK, Lam DS (2007). Comparison of Outcomes of Primary Scleral-Fixated versus Primary Anterior Chamber Intraocular Lens Implantation in Complicated Cataract Surgeries. Ophthalmology; 114(1): 80–85.

Lanzetta P, Menchini U, Virgili G, Crovato S, Rapizzi E (1998). Scleral fixated intraocular lenses: an angiographic study. Retina; 18: 515–20.

Lee VYW, Yuen HKL, Kwok AKH (2003). Comparison of outcomes of primary and secondary implantation of scleral fixated posterior chamber intraocular lens. Br J Ophthalmol; 87:1459–1462.

Luk ASW, Young AL, Cheng LL (2013). Long-term outcome of scleral-fixated intraocular lens implantation. Br J Ophthalmol;97: 1308–1311.

Maggi R, Maggi C (1997). Sutureless scleral fixation of intraocular lenses. J Cataract Refract Surg; 23:1289–1294.

Menezo JL, Martinez MC, Cisneros AL (1996). Iris-fixated Worst claw versus sulcus-fixated posterior chamber lenses in the absence of capsular support. J Cataract Refract Surg;22: 1476–84.

Ohta T, Toshida H, Murakami A (2014). Simplified and safe method of sutureless intrascleral posterior chamber intraocular lens fixation: Y-fixation technique. J Cataract Refract Surg; 40:2–7.

Panchapakesan J, Mitchell P, Tumuluri K, Rochtchina E, Foran s, Cumming RG (2003). Five year incidence of cataract surgery: the Blue Mountains Eye Study. Br J Ophthalmol. Feb; 87(2): 168–172.

Parekh P, Green W R, Stark W J, Akpek E K (2007). Subluxation of Suture-Fixated Posterior Chamber Intraocular Lenses: A Clinicopathologic Study. Ophthalmology; 114:232–237.

Por YM , Lavin MJ (2005). Techniques of Intraocular Lens Suspension in the Absence of Capsular/Zonular Support. Surv Ophthalmol; 50:429--462.

Wagoner M D, Cox T A, Ariyasu R G, JacobsD S,Karp L (2003). Intraocular Lens Implantation in the Absence of Capsular Support. Ophthalmology; 110:840–859.

Yamane S, Inoue M, Arakawa A, Kadonosono K (2014). Sutureless 27-Gauge NeedleeGuided Intrascleral Intraocular Lens Implantation with Lamellar Scleral Dissection. Ophthalmology; 121:61-66.

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