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Real world outcomes of sutureless and glueless sclerally fixated intraocular lens implantation

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PURPOSE: To report the outcomes of sutureless intrascleral fixation of a 3-piece intraocular lens in the ciliary sulcus, in a large cohort of patients with aphakia of various aetiology

METHODS: Retrospective, non-comparative, single centre interventional study of 250 aphakic eyes of various causes, which underwent sutureless and glueless intrascleral fixation of 3-piece intraocular lens (IOL). All patients were required to have at least 3 months of follow up post procedure to be included in the study. Anatomical and functional outcomes obtained were statistically analysed for significance.

RESULTS: A total of 250 eyes of 246 patients were included in the study population. The average age was 56.5 years \pm 16.4 (range 6–86 years). The mean best-corrected visual acuity (BCVA) significantly improved from 0.74 ± 0.6 logMAR (approx. Snellen equivalent 20/110) to 0.48 ± 0.36 logMAR (approx. Snellen equivalent 20/60), ($p < 0.001$) following surgery. Early postoperative complication (<2 weeks) included hypotony ($n = 10$, 4%), ocular hypertension ($n = 38$, 15.2%) and vitreous haemorrhage ($n = 50$, 20%). Late complications included retinal detachment ($n = 14$, 5.6%), cystoid macular oedema ($n = 24$, 9.6%), scleral erosion ($n = 1$, 0.4%), haptic extrusion to subconjunctival space ($n = 3$, 1.2%) and IOL subluxation or dislocation ($n = 5$, 2%)

CONCLUSION: This cost-effective and easier technique of sutureless scleral fixated 3-piece IOL implantation provided good visual acuity outcomes in a large cohort of patients and was well tolerated.

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INTRODUCTION

Visual rehabilitation in aphakia remains a unique surgical challenge where implanting of secondary intraocular lens implantation (IOL) is required. Placement of an IOL in the bag or ciliary sulcus is not possible especially when there is inadequate or absent capsular support, that can occur in the eyes following blunt or penetrating ocular trauma, metabolic and inherited conditions like Marfan's syndrome, in pseudo-exfoliation, and also commonly following complicated cataract surgery.

Such a situation warrants other choices of IOL placement that include anterior chamber IOL (ACIOL), iris fixated IOL, iris claw IOL, sutured scleral fixated IOL (SFIOL) and suture less scleral fixated IOL (SLFIOL) [1]. Each of these techniques has their pros and cons. ACIOL has the advantage of being technically easy but has a risk of causing corneal endothelial decompensation and damage to the angle structures [1, 2]. Iris fixated and iris claw IOL's can have increased intraocular inflammation and pigment release [2]. SFIOLs are placed at a point closest to the nodal point of the eye and at a greater distance from the cornea. SFIOLs are technically difficult to perform and have disadvantages of suture-related complications such as suture knot exposure, suture breakage, and IOL subluxation [3].

To avoid these obstacles, sutureless technique for scleral fixation of IOL was introduced by Gabor et al where a 3-piece IOL is fixed by incarcerating the IOL haptics in a scleral tunnel parallel to the limbus. It combines the control of a closed eye

system with post-operative axial stability. In this technique, a sharp 24-gauge cannula is used to make sclerotomies at 1.5–2 mm from the limbus and 180 degrees from each other as well as make a limbus parallel tunnel of approximately 50% scleral thickness. A 25 gauge forceps is used for externalisation of haptics which is then introduced and placed into the scleral tunnel [4]. In this study, we have analysed the postoperative visual outcomes and possible complications utilising modification of Gabor technique of SLFIOL, the IOL tuck technique, in the largest cohort of patients to date, to the best of our knowledge.

MATERIALS AND METHODS

This interventional retrospective study was conducted in the vitreo-retina department of a tertiary eye care hospital in South India. The study included consecutive patients with aphakia of various causes who had undergone SLFIOL implantation between January 2018 to December 2019 and having at least three months of follow-up. The medical record database was searched for eligible patients and their medical records were further reviewed thoroughly for relevant data abstraction. This study adhered to the tenets of the declaration of Helsinki and was approved by the institutional ethics committee.

Basic demographic data, preoperative and postoperative data including early and late complications were obtained for statistical analysis. The patients underwent SLFIOL implantation either as a primary surgery, a standalone secondary surgery, or in combination with anterior vitrectomy, pars plana vitrectomy (PPV) with lens, nucleus or IOL explanation, or along

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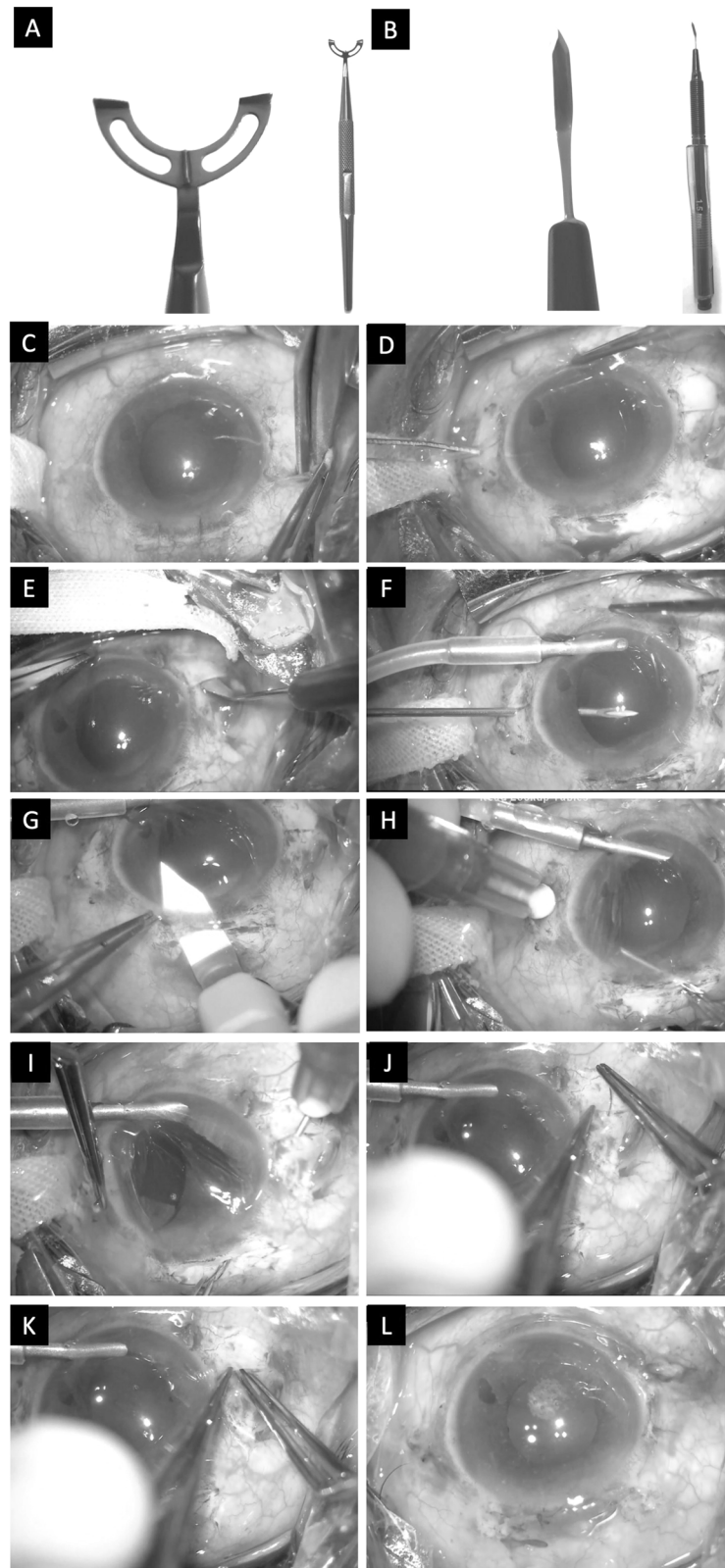


Fig. 1 Key Instruments and surgical steps of sutureless scleral fixated IOL. Main instruments for modified Gabor technique of Scleral fixated IOL; **A** Toric Marker, **B** 1.5 mm Keratome; Serial pictures elaborating the surgical steps of Scleral fixated IOL implantation, **C** Localized conjunctival peritomy at 9'o clock, **D** Scleral incision being made with a Bard-Parker blade, **E** Lamellar scleral tunnel dissection with a 1.5 mm Keratome, **F** Introduction of a 24-gauge needle into the ciliary sulcus 1.5 mm behind the limbus, **G** Anterior chamber entry with a 3.2 mm keratome via the superior corneoscleral tunnel, **H** Introduction of a bent 26-gauge needle 1.5 mm behind limbus at 3'o clock and threading of 4 mm of the 3 piece IOL leading haptic into the lumen of the needle using a McPherson forceps and externalization, **I** Threading of the trailing 3 piece IOL haptic into the lumen of the 26-gauge needle and externalization, **J** Holding of the externalized haptic of the 3 piece IOL with a McPherson forceps, **K** Tucking of the 3 piece IOL haptic into the scleral tunnel with McPherson forceps, **L** Well centred IOL seen at end of surgery.

Table 1. Pre-existing conditions.

	Diagnosis	Number of Eyes (%)
1	Surgical Aphakia (PCR, ZD, Dislocated lens/lens matter, post RD surgery)	84 (33.6)
2	Traumatic Aphakia (Blunt trauma, Corneoscleral tear repair, post RD surgery)	75 (30)
3	IOL related causes (Dislocation/Decentration/Opacification)	84 (33.6)
4	Ectopia Lentis (Microspherophakia/Marfans syndrome)	7 (2.8)

IOL Intraocular lens, PCR Posterior capsule rent, ZD Zonular dialysis, RD Retinal detachment

Table 2. Surgical procedure.

	Type of Surgery	Number of Eyes (%)
1	SFIOL implantation only	53 (21.2)
3	AV with lens matter or IOL removal with SFIOL	34 (13.6)
4	PPV with SFIOL	27 (10.8)
5	PPV with lens matter or IOL removal with SFIOL	103 (41.2)
6	SOR with SFIOL	33 (13.2)

SFIOL Scleral fixated intraocular lens, AV Anterior vitrectomy, IOL Intraocular lens,

PPV Pars plana vitrectomy, SOR Silicone oil removal

with silicone oil removal (SOR). Different surgeons from the department of vitreo-retina performed an identical surgical technique and the post-operative outcomes were analysed. Surgeons were categorized according to the number of practice years into two subgroups ≤ 2 years (junior) and ≥ 2 years (senior) and the complication rates between them were also analysed.

Surgical technique

Surgery was performed under subtenons anaesthesia for all patients except in those belonging to less than 18 years of age, where a general anaesthesia was required. Two points 180 degrees apart (3 o'clock and 9 o'clock) were marked on peripheral cornea with a Henderson alignment toric marker (Epsilon surgicals) [Fig. 1A]. Localized conjunctival peritomy were performed at these sites along with a fornix based peritomy from 11 o'clock to 1 o'clock and adequate cautery was done. A corneoscleral tunnel was made superiorly around 6 mm in length. A radial incision was made using a no 15 Bard-Parker blade perpendicular to the limbus at the marked points. Partial thickness scleral tunnels were made with the help of 45 degree bevelled 1.5 mm keratome (Primeline surgicals) of around 4 mm length parallel to the limbus beginning at the radial incisions [Fig. 1B]. Anterior vitrectomy or 25 gauge three-port PPV was done depending on requirement. SLFIOL along with SOR was done in patients planned for the same. About 1–1.5 mm from limbus sclerotomies were made with a 24-gauge needle near the radial incisions. A 3-piece IOL polymethyl methacrylate (PMMA) optic and prolene haptics, (Aurolens, Aurolab, model number B3602, India) of 6 mm optic diameter with overall size of 13.5 mm was used for implantation. A bent 26-gauge needle (bent to 60 degrees about 1 mm from hub) was used to exteriorize the haptics. The needle was introduced into the ciliary sulcus through the sclerotomy at the 3 o'clock meridian. When the needle is visible at pupillary area, it is redirected and brought out through the corneoscleral tunnel wound. Around 4 mm length of leading haptic was threaded into the lumen of needle with the help of a McPhersons forceps and the needle was then withdrawn out of sclerotomy along with the haptic following its curve. The haptic was then removed from the lumen of needle and the needle was introduced into the ciliary sulcus through the opposite sclerotomy at 9 o'clock meridian and the trailing haptic was exteriorized similar to that of leading haptic. The exteriorised haptics were tucked into the scleral tunnels with the help of McPhersons forceps. The superior corneoscleral tunnel was sutured with 10-0 nylon suture, sclerotomies were secured with 8-0 vicryl cross sutures and followed by suturing of the conjunctival flaps [Fig. 1 C–L].

All data was entered on an Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA). Statistical analysis was performed using Jamovi 1.6.

statistical software (Jamovi, Sydney, Australia). For statistical analysis, Snellen's best-corrected visual acuity (BCVA) was converted to logarithm of the minimum angle of resolution (logMAR). For the comparative and correlational analysis, various factors measured preoperatively and post-operatively were included and analysed using the paired t-test and Wilcoxon matched-pairs test. A p -value < 0.05 was considered significant. A chi-squared test was applied to test the significance of complications between senior and junior surgeons.

RESULTS

A total of 250 eyes of 246 patients (172 males and 74 females) were included in the study. The mean age of the patients enrolled was 56.49 \pm 16.4 years, range (6–86 years). The mean follow-up period was 6.22 \pm 4.6 months, range (3–27 months). Blunt or penetrating trauma was the cause for aphakia in 30% eyes (75/250) and other non-traumatic causes attributed to aphakia in 70% of eyes (175/250). The most common indication for SLFIOL implantation was dislocated or subluxated IOL, seen in 26.4% eyes (66/250). Table 1 elaborates the various causes of aphakia as well as the indications for performing an SLFIOL implantation.

Table 2 elaborates the various surgical procedures performed in aphakic eyes which included SLFIOL implantation as a standalone procedure seen only in 5.6% eyes (14/250), whereas it was combined with other procedures in 94.4% eyes, (236/250).

The mean preoperative logMAR BCVA was 0.74 \pm 0.61 (approx. Snellen equivalent 20/110) which significantly improved to 0.48 \pm 0.35 (approx. Snellen equivalent 20/60) postoperatively at the time of last follow up ($p < 0.001$). BCVA improved in 67.6% eyes (169/250), remained same in 10.8% eyes (27/250), and deteriorated postoperatively in 21.6% eyes (54/250). There was significant visual improvement in mean BCVA from logMAR 0.72 \pm 0.59 (approx. Snellen equivalent 20/105) to 0.47 \pm 0.35 (approx. Snellen equivalent 20/59), ($p < 0.000$) in non-traumatic aphakic eyes. Based on the aetiologies of deficient capsular support a subgroup analysis with respect to visual outcomes in aphakic patients was performed and showed significant visual improvement in each subgroup. This has been elaborated in Fig. 2A.

Table 3 elaborates the postoperative complications. There were no significant intraoperative complications. The post-operative complications were studied as early (< 2 weeks) and late complications (> 2 weeks). The early complications noted were hypotony in 4% eyes (10/250) which normalized in a week without need for any surgical intervention, raised IOP in 15.2% eyes (38/250) and vitreous haemorrhage (VH) in 20% eyes, (50/250).

High IOP was observed post-operatively in patients with pre-existing treatment for glaucoma. Out of 38 eyes with high IOP, 16 eyes (42.1%) were already on anti-glaucoma medications or had undergone trabeculectomy surgery for either primary or secondary glaucoma. Out of the 212 eyes with a normal IOP, 36 eyes (17%) were already on antiglaucoma medications or had undergone trabeculectomy surgery.

All the eyes with early post-operative VH cleared spontaneously without any need for surgical intervention.

The late postoperative complications were retinal detachment (RD) in 5.6% eyes (14/250), cystoid macular oedema (CMO) in 9.6% eyes (24/250), IOL tilt in 6.4% eyes (16/250), scleral erosion in 0.6%

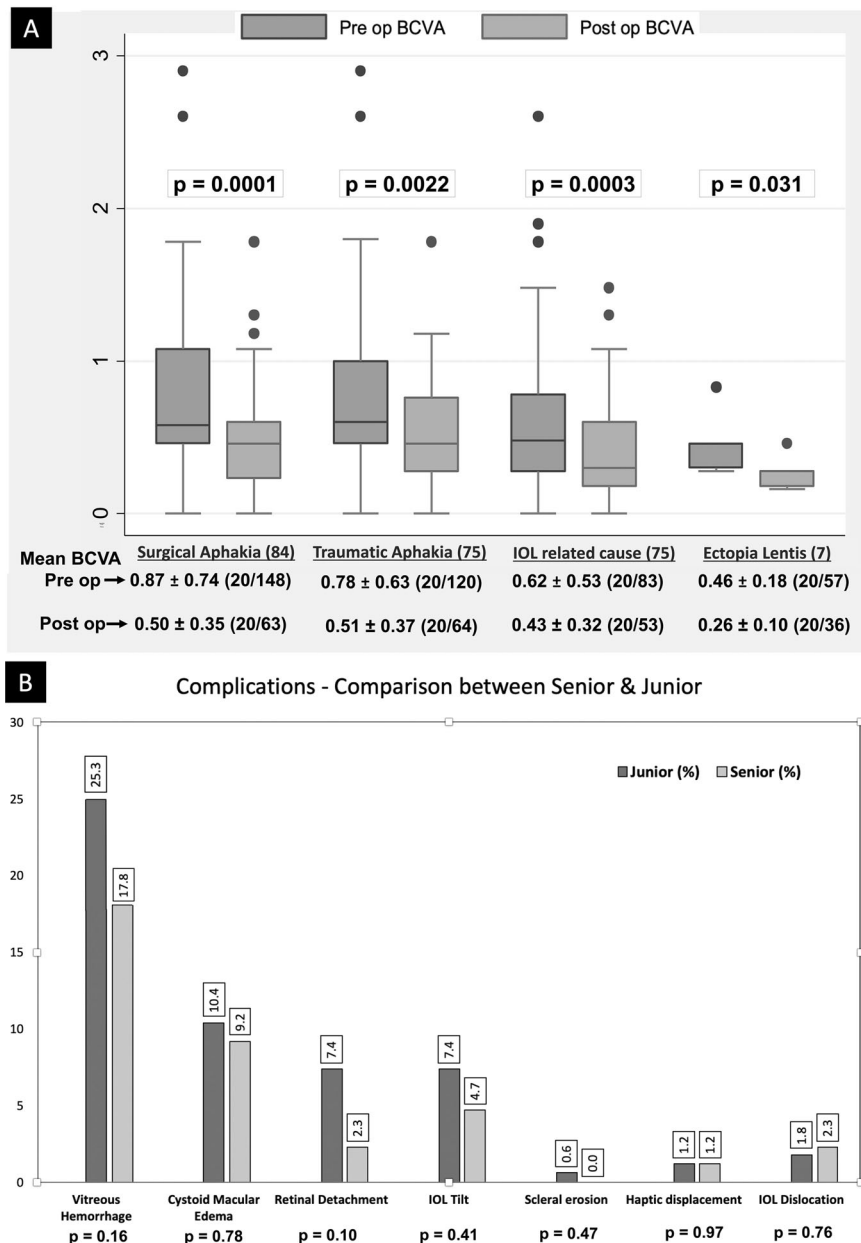


Fig. 2 (A) Box and Whisker plot showing comparison between preoperative and postoperative best-corrected visual acuity (BCVA) in different subgroups. A Significant improvement in mean BCVA is seen in each subgroup, B Bar diagram elaborating the comparison between junior and senior surgeons with respect to various surgical complications. No significant difference was seen between both groups.

eyes (1/250), IOL haptic extrusion into the subconjunctival space in 1.2% eyes (3/250), IOL subluxation or dislocation in 2% eyes (5/250).

IOL tilt was seen in 16 eyes of 250 (6.4%). There was no significant visual improvement in eyes with postoperative IOL tilt with mean preoperative BCVA 0.55 ± 0.3 (approx. Snellen equivalent 20/71) and mean postoperative BCVA 0.54 ± 0.32 (approx. Snellen equivalent 20/69), ($p = 0.36$). The mean postoperative spherical correction was -1.0 ± 0.71 , range (-1.5 to -0.5) and the mean postoperative cylindrical correction was -1.4 ± 2.9 , range (-7.0 to $+1.25$).

All SLFIOL surgeries were performed by different surgeons in the vitreo-retina department, of which 167 eyes were operated by junior surgeons and 87 eyes were operated on by senior surgeons. Mean preoperative BCVA was 0.86 ± 0.73 log MAR (approx. Snellen equivalent 20/144) that improved to 0.49 ± 0.38 log MAR (approx.

Snellen equivalent 20/61), ($p = 0.00$) in the eyes operated by junior surgeons. Mean preoperative BCVA was 0.69 ± 0.58 log MAR (approx. Snellen equivalent 20/97) that improved to 0.48 ± 0.33 log MAR (approx. Snellen equivalent 20/60), ($p = 0.00$) in the eyes operated by senior surgeons. There was no significant difference in visual acuity improvement between both groups, ($p = 0.068$). The postoperative complication rate among the junior surgeons was compared with senior surgeons and there was no significant difference in the two groups with respect to complications ($p > 0.05$). This has been elaborated in Fig. 2B.

DISCUSSION

The technique of SLFIOL has been reported by many investigators for the management of aphakia as well as is being widely followed [5–13]. There are numerous advantages of this procedure over

Table 3. Early and Late Post-operative complications.

Complications	Number of eyes (%)
Early (<2weeks)	
Hypotony	10 (4)
High IOP	38 (15.2)
Vitreous haemorrhage	50 (20)
Late (>2weeks)	
Retinal detachment	14 (5.6)
Cystoid macular oedema	24 (9.6)
IOL tilt	16 (6.4)
Scleral erosion	1 (0.4)
Haptic extrusion to subconjunctival space	3 (1.2)
IOL subluxation or dislocation	5 (2)

IOL Intraocular lens

SFIOL techniques as it mainly avoids suture-related complications such as suture knot erosion and exposure, IOL dislocation due to suture degradation or breakage, and IOL tilt due to inaccurate suture placement [8–11]. In this study we have used a modification of the Gabor technique of SLFIOL, the IOL tuck technique, and performed it in a large cohort of eyes with aphakia of varying aetiology.

We have used a 1.5 mm keratome for making the lamellar scleral tunnels parallel to the limbus, providing adequate width, to tuck the haptics of the 3-piece IOL. A similar technique has been described in other studies with a 20-gauge, 23-gauge, or 24-gauge microvitrectomy (MVR) blade [10, 12] [14], a 24-gauge cannula [15] and using 26-gauge needles [13]. Different types of tunnels have also been described including T-shaped tunnels [16], Y-shaped tunnels [9], linear thin tunnels [11] and partial-thickness scleral flaps [8]. A 3-piece PMMA IOL was used for implantation and IOL haptic exteriorization was performed using a bend 26-gauge needle, increasing the ease of exteriorization and reducing the risk of haptic breakage or loss. There was no requirement of any other unique instrument, making it a cost-effective, safer and easier technique. Other studies have used the handshake technique of IOL haptic exteriorization using a 23-gauge micro-rhexis forceps [8] or threading the IOL haptic into a 26-gauge or 27-gauge needle and exteriorizing it [12, 14, 17]. Use of bio-adhesives like fibrin glue was used by Agarwal et al to close the scleral flaps as well as conjunctiva [8]. It avoids the suture-related complications, however, it is expensive and sometimes not easily available. We have utilized this modified Gabor technique of SLFIOL and combined it with anterior vitrectomy in 25.6% eyes, three-port PPV in 52% of eyes, or during silicone oil removal in 13.2% eyes. This was similar to other studies where SLFIOL was combined with either an anterior vitrectomy [13, 18] [9], [16], or a 23-gauge or 25-gauge three-port PPV [10, 12, 15].

In the current study of 250 eyes, the mean preoperative BCVA was 0.74 logMAR (approximate Snellen equivalent 20/110) improved significantly to 0.48 logMAR (approximate Snellen equivalent 20/60) postoperatively, ($p < 0.001$). Shekhawat and Goyal in their study on SLFIOL in 50 eyes reported a significant improvement in mean BCVA, preoperatively logMAR 0.6 ± 0.2 (approx. Snellen equivalent 20/80) and at final visit logMAR 0.3 ± 0.2 (approx. Snellen equivalent 20/40), ($p = 0.0000$) [16]. Walia et al in their study of 30 eyes showed a significant improvement in mean BCVA from logMAR 1.37 ± 0.37 (approx. Snellen equivalent 20/469) and postoperatively at 3 months to logMAR 0.37 ± 0.29 (approx. Snellen equivalent 20/47), ($p < 0.05$) [13]. Baskaran et al in their study of 30 eyes using the X-nit technique of SLFIOL implantation showed improvement in the mean BCVA [logMAR

0.5 ± 0.3 (approx. Snellen equivalent 20/63)] by one or more line postoperatively in all patients except one [12]. Gabor et al. in their study on 63 eyes with aphakia also reported significant visual improvement in mean BCVA logMAR 1.25 (approx. Snellen equivalent 20/355) to logMAR 0.40 (approx. Snellen equivalent 20/50) [15]. Our visual outcome was comparable to the above reports with regards to improvement in mean BCVA, however in a larger cohort of patients.

We also found an overall significant improvement in the mean pre and postoperative BCVA in the subset of patients with traumatic aphakia, ($p < 0.0002$). Additional evaluation revealed BCVA improved postoperatively in 67.6% eyes (169/250), remained same in 10.8% eyes (27/250), and deteriorated in 21.6% eyes (54/250). Among the cases which did not experience visual improvement included those which underwent an IOL explanation followed by SLFIOL implantation as well as those with a pre-existing corneal scar post penetrating trauma. Visual deterioration can be attributed to the complications such as RD and post-operative CMO which were seen in our large cohort of patients. Other cause of visual deterioration could be a high postoperative astigmatism. Hascz et al studied the visual outcomes of posterior chamber intrascleral fixation in postoperative and post-traumatic aphakia. In this study of 42 eyes, BCVA improved in 26 eyes (62%), did not change in 5 eyes (12%) and worsened in 11 eyes (26%) out of which most were post-trauma eyes (8 eyes) [18]. Kejka et al. in their study reported visual worsening in 8.8% eyes that underwent sutureless SFIOL [19]. Kumar et al. reported visual worsening in 11% of eyes that underwent glued IOL [20].

In the current study the most common early postoperative complications encountered were VH seen in 20% of eyes, raised IOP in 15% of eyes, and postoperative hypotony in 10%. VH and hypotony were encountered in the immediate postoperative period. The postoperative VH in our study could be from the pars plicata region which is vascular, especially while introducing a 24-gauge needle into the ciliary sulcus 1.5 mm from the limbus. Another probable source of this bleed may be from the superior corneoscleral tunnel made for inserting the 3-piece PMMA IOL. VH in our study cleared spontaneously without requirement of any surgical intervention, mostly within 2 weeks. Wilgucki et al. in their series created ciliary sulcus-based sclerostomies using 20-gauge blades to facilitate passing of the IOL haptics [10]. There is a high potential for VH and hypotony with this technique. Our cases of hypotony were probably due to leaks from the sclerostomies or from the superior corneoscleral tunnel. There was no case of persistent hypotony in our series and no surgical intervention or a globe reformation procedure was required for the same. 15.2% eyes (38/250) in our study had elevated IOP in the early postoperative period. 42.1% (16/38) of these eyes were being treated for primary or secondary glaucoma and were already on anti-glaucoma medications. 57.9% eyes (22/38) were not on any anti-glaucoma medications. The probable cause for raised IOP in these eyes may be to be post-operative inflammation or a steroid response which reduced following short term treatment with anti-glaucoma medications. Gabor et al in their study have noticed persistent IOP elevation in 2 patients (3.17%), persistent hypotony in 1 eye (1.59%), and VH in 2 patients (3.17%) [15]. Baskaran et al noticed dispersed VH in 1 patient (5.2%), hypotony in 1 patient (5.2%), and transient corneal oedema in 3 patients (15.7%) of 19 patients they studied [12].

Among the late postoperative complications, the most commonly seen was CMO in 9.6% (24/250) in our series. Gabor et al in their study reported postoperative CMO in 1.59% eyes [15] and about 1.6% eyes in the study by Agarwal L et al. [14]. Wilgucki et al in their series reported CMO in 4% eyes [10]. Healed macular oedema was seen in 7.5% of glued IOL eyes [8]. The incidence of CMO was reported to be high (42.9%) in the studies done using SFIOL technique [21, 22].

RD in our series was identified in 5.6% eyes (14/250) which could be attributed to the complexity of some of eyes which were post-trauma, and post multiple surgeries. Ohta et al in their comparative study between SLFIOL fixation and SFIOL fixation reported RD to occur in 2% and 3% of eyes respectively [9]. Kumar et al in his study reported RD to occur in 1% of eyes undergoing glued IOL technique [8].

Tilting of the IOL was seen in our study in 6.4% eyes (16/250) which could be attributed to a mismatch between the lamellar scleral tunnel made for tucking the IOL haptics. Ohta et al reported 5% eyes which underwent SLFIOL to have IOL tilting and 18% in eyes that underwent SFIOL [9]. Incarceration of a longer part of the IOL haptic into the scleral tunnels could prevent an IOL tilt, as suggested by Gabor et al [15].

In our series, IOL subluxation or dislocation was seen in 2% eyes (5/250). Gabor et al have noted IOL dislocation in 3.17% eyes [15]. Kumar et al in their study reported IOL dislocation in 3.2% eyes postoperatively [8]. Other IOL and haptic related complications included IOL decentration (2.6%), scleral thinning (0.5%), haptic displacement (2%), haptic tip extrusion (0.5%) and haptic extrusion into subconjunctival space (1.5%). For the eyes with haptic tilt or IOL decentration, a localised peritomy was done and new scleral tunnels were created and haptic was repositioned within them and these eyes remained stable thereafter.

As multiple surgeons performed this SLFIOL technique, we compared the complication rate between them based on their years of experience and found no significant difference ($p > 0.05$). This may indicate the current technique is relatively easy and safe, with a lower learning curve.

Eyes with previous complicated cataract surgery and trauma are the most common causes of aphakia that are likely to require multiple surgical interventions and are at increased risk of developing postoperative complications like corneal decompensation, glaucoma, uveitis, and retinal detachment. Multiple studies have shown good visual and anatomical outcomes of SLFIOL implantation, however in a small cohort of patients. We have reported similar outcomes in a large cohort of patients with an adequate follow-up (6 months). Although eyes in our cohort were complex with pre-existing ocular comorbidities with comparable postoperative complications, there was a significant improvement in the mean BCVA. There were no significant serious complications like corneal decompensation, haemorrhagic choroidal detachment, postoperative endophthalmitis or uveitis-glaucoma-hyphema syndrome. Though the outcomes and complications cannot be attributed to IOL fixation alone, our subgroup analysis based on the aetiologies of deficient capsular support including surgical aphakia, traumatic aphakia, IOL related causes and ectopia lentis for visual outcomes showed significant improvement in each subgroup. Based on the current results, this sutureless IOL tuck technique of SLFIOL is reliable, easy and reproducible providing good anatomical and visual outcomes in a large cohort of patients. Use of foldable 3-piece IOLs can help in reducing the size of the corneoscleral wound, reduce the intraoperative manoeuvres as well as prevent postoperative hypotony. However, it may not be cost effective in our setting.

The main limitations of this study are its retrospective nature, lack of long follow-up, no control group, and presence of confounding factors such as traumatic complications which could have resulted in postoperative visual deterioration seen in a few patients. To the best of our knowledge, this is the largest study till date, to report the real-world outcomes following sutureless and glueless IOL tuck technique of SLFIOL implantation.

CONCLUSIONS

To summarize, this modified IOL tuck technique of sutureless, glueless scleral fixated 3-piece IOL implantation is cost-effective,

safe and easier technique of aphakia rehabilitation in the absence of posterior capsule and provided good visual acuity outcomes in a large cohort of patients and was well tolerated.

Summary

What was known before

- Sutured SFIOL is technically more demanding and has more complications than sutureless SFIOLs
- Sutureless IOL techniques has been shown to have good outcomes in small studies

What this study adds

- Our modified SFIOL technique using a 1.5 mm keratome and bent 26-gauge needle has good postoperative visual outcomes, is well tolerated and remains stable in a large study cohort
- This modification makes it an easier technique with a small learning curve and less complications
- This technique is also a cost effective alternative to glued SFIOL

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AUTHOR CONTRIBUTIONS

SG – Conception and Design, Data collection, Analysis and Data Interpretation, Writing the paper. GJM – Conception and Design, Analysis and Data Interpretation, Critical Revision of paper, Supervision. SV – Data Collection, Analysis and Data

Interpretation, Writing the manuscript, Statistical expertise. SVR – Conception and Design, Analysis and Data interpretation, Supervision, Material and Technical support. KN – Conception and Design, Supervision, Administrative, technical and material support. VN – Conception and Design, Supervision, Administrative, technical and material support

COMPETING INTERESTS

The authors declare no competing interests.

ADDITIONAL INFORMATION

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