Comparison of sutured versus sutureless scleral-fixated intraocular lenses

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PURPOSE: To compare the intermediate-term anatomic and visual results of scleral-fixated intraocular lens (IOL) implantation using 4-point suture fixation or transscleral sutureless fixation.

SETTING: Tertiary referral eye care center in South India.

DESIGN: Retrospective case series.

METHODS: Medical records of consecutive patients who had scleral-fixated IOL surgery from January 1, 2010, to March 31, 2014, with more than 1 year of follow-up were retrospectively analyzed. Indication for scleral-fixated IOL implantation was aphakia after cataract extraction or trauma. The surgical technique was based on individual surgeon preference. The uncorrected distance visual acuity (UDVA), previous surgery, type of trauma, surgical technique, and complications were analyzed.

RESULTS: One hundred nine cases were analyzed. The mean follow-up was 18.9 months ± 8.7 (SD). The majority of eyes experienced an improvement in UDVA after surgery; 93 eyes (86%) had a Snellen equivalent corrected distance visual acuity of 6/12 or better. The baseline characteristics and final visual outcomes in the sutured scleral-fixated IOL group (n = 52) and sutureless scleral-fixated IOL group (n = 59) were comparable. Patients with previous trauma (n = 52) were predominantly men and were significantly younger than those in the cataract group. The visual and refractive outcomes were comparable between eyes with previous trauma and eyes with previous cataract surgery. Transient cystoid macular edema was the most common complication (12%); retinal detachment occurred in 5 cases (4.5%).

CONCLUSIONS: Scleral-fixated IOLs provided excellent visual rehabilitation of aphakic eyes without capsular support. The sutured technique and sutureless technique appear to be equally good in eyes with aphakia after cataract surgery or trauma.

Financial Disclosure: No author has a financial or proprietary interest in any material or method mentioned.

J Cataract Refract Surg 2016; 42:27–34 © 2016 ASCRS and ESCRS

Damage to the capsular bag and zonular fibers can occur as a complication of cataract surgery or after trauma, which can be open globe or closed globe. Implanting an intraocular lens (IOL) can be challenging in these cases, especially if the capsular support is inadequate to ensure stable placement of the IOL. Multiple options exist for the surgical management of aphakia in eyes with inadequate capsular support, and these can be performed during the primary surgery or as a planned secondary surgery.[1]

Traditional techniques, such as implantation of anterior chamber IOLs (AC IOLs), have less favorable outcomes because of frequent complications, such as corneal decompensation and secondary glaucoma.[2] A scleral-fixated IOL is another option for optical rehabilitation of aphakic eyes that lack adequate capsular support.[3] There are conflicting reports of whether scleral-fixated IOLs are better than open-loop AC IOLs in terms of long-term visual outcomes and complication rates.[1,2,4] Conventionally, scleral-fixated IOLs have been sutured to the sclera using double-armed 10-0 polypropylene sutures; however, this technique is cumbersome, takes considerable time and effort to perform, and is associated with potential long-term complications.[3] Moreover, most will agree that performing sutured scleral-fixated IOL surgery is technically far more demanding and thus surgical experience

http://dx.doi.org/10.1016/j.jcrs.2015.09.019
0886-3350

is the decisive factor in choosing the type of secondary IOL.

Sutureless fixation of a scleral-fixated IOL, because of it is relatively easy to perform, has recently become popular in clinical practice. This technique was first described by Gabor et al.[5] and includes implantation of a 3-piece IOL with exteriorization of the haptics through a scleral opening; the haptics are then buried inside specially created scleral pockets. Because it is technically less demanding, sutureless scleral-fixated IOL implantation is quicker to perform, easier to master, and retains the advantages of the scleral-fixated IOL over the AC IOL.[6] However, there are concerns about the centration of the scleral-fixated IOL and its long-term stability. Complications, such as haptic erosion and degeneration, pupillary capture, retinal tears and detachments, cystoid macular edema (CME), hypotony, and endophthalmitis, have also been reported for sutureless scleral-fixated IOLs.[7]

We are a tertiary referral eyecare center in south India where high-volume cataract surgery is performed at an affordable cost for patients. Although our cataract complication rates are comparable to those in the existing literature,[8] the absolute number of aphakia after cataract surgery is higher as a result of the high volume. Thus, our center offers a good setting to study the outcomes of scleral-fixated IOL implantation. In addition, we receive a large volume of trauma cases that require secondary IOL implantation.

There is abundant literature on the intermediate-term and long-term outcomes and complications in eyes having sutured and sutureless scleral-fixated IOL implantation.[1] However, to our knowledge, there is no literature showing a direct comparison between these 2 techniques. Hence, we performed a retrospective study to compare the intermediate-term visual outcomes of sutured versus sutureless scleral-fixated IOL implantation in the setting of post cataract as well as post trauma aphakia.

PATIENTS AND METHODS

The study was approved by the institutional review board. Medical records of all patients who had primary or secondary scleral-fixated IOL implantation by the sutured or the sutureless technique from January 1, 2010, to March 31, 2014, were retrieved from the medical records department. All eyes with a minimum follow-up of 1 year were included for the analysis.

The indications for surgery included post-traumatic aphakia and aphakia as a complication of cataract surgery with loss of capsular and/or zonular support and preoperative CDVA of at least 6/60 with aphakic correction. The post-trauma cases included dislocation of the crystalline lens after closed-globe injury or those with aphakia after open-globe repair (viz. corneal or scleral tear repair). Eyes that had additional surgical procedures, such as retinal detachment (RD) repair or vitrectomy for traumatic endophthalmitis, before scleral-fixated IOL implantation were also included. Four fellowship-trained vitreoretinal surgeons performed the surgeries. The choice of sutured surgery versus sutureless surgery was based on surgeon preference alone.

Baseline demographic data such as age, sex, and involved eye were noted. Preoperative characteristics such as cause of aphakia (post cataract or post trauma), type of trauma (open versus closed globe), previous surgical procedure (eg, cataract surgery, open-globe repair, pars plana lensectomy, RD repair, vitrectomy for endophthalmitis), and lens status at first presentation to the retina clinic (viz. aphakia; dropped crystalline lens/cortex/IOL) were recorded. Preexisting corneal, retinal or macular pathology, the technique used for scleral-fixated IOL implantation (sutured versus sutureless), the duration between the previous surgery and scleral-fixated IOL implantation, and postoperative complications were also recorded. Uncorrected distance visual acuity (UDVA) and corrected distance visual acuity (CDVA) were recorded at the baseline visit and at 1 year or at the last follow-up, whichever was later.

Surgical Technique

Sutured Scleral-Fixated Intraocular Lens All surgeries were performed under peribulbar anesthesia. A limited limbal peritomy was performed. After a toric IOL marker was used to mark the 3 o'clock and 9 o'clock meridians, 2 partial-thickness triangular or quadrangular scleral flaps were made. A standard 3-port 23- or 25-gauge pars plana vitrectomy (PPV) was performed, with posterior vitreous detachment induction and limited base dissection at the horizontal meridians, in eyes that had not had a previous PPV. A 6.5 mm long superior scleral tunnel was fashioned, centered at the 12 o'clock meridian. A double-armed 10-0 polypropylene suture was cut into equal halves. Each needle was passed separately under the scleral flaps at 3 o'clock and 9 o'clock, 1.5 mm posterior to the limbus and exteriorized from the superior scleral tunnel. The suture was then passed through the eyelets on the haptics of a purpose-designed rigid poly(methyl methacrylate) (PMMA) IOL for scleral fixation (SC6530, Aurolab), and the needle was reintroduced into the eye and exteriorized beneath the scleral flaps by threading through a 26-gauge needle. The IOL was introduced into the eye and centered by adjusting the sutures on both sides, after which the sutures were tied below the scleral flaps and trimmed. The scleral flaps were repositioned, and the conjunctiva sutured with a 7-0 polyglycolic acid suture (Polycryl) at the end of surgery.

Sutureless Scleral-Fixated Intraocular Lens Under peribulbar anesthesia, after a limited limbal peritomy and ensuring a total PPV was performed as described above, a superior

Submitted: June 23, 2015.
Final revision submitted: September 17, 2015.
Accepted: September 17, 2015.

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6.0 mm long scleral tunnel was created. The 3 o'clock and 9 o'clock meridians were marked with a toric IOL marker. Then, partial-thickness linear scleral tunnels were fashioned with a 23-gauge microvitreoretinal blade tangential to the limbus, the right-hand tunnel oriented inferiorly and the left-hand tunnel oriented superiorly. A sclerotomy was created at 3 o'clock and 9 o'clock with a 24-gauge needle, corresponding to the initiation of the scleral tunnels. A 3-piece rigid IOL with a PMMA optic and polypropylene (Prolene) haptics (B3602, Aurolab) was introduced into the anterior chamber. The leading haptic was grasped with the curved Scharioth IOL forceps (Scharioth IOL scleral-fixation forceps, straight and curved, 25-gauge/0.5 mm, 1286 SFD, DORC International BV) introduced at 3 o'clock and 9 o'clock through the previously made sclerotomy and exteriorized. The tip of the haptic was then grasped with the straight Scharioth IOL forceps and tucked into the previously constructed tangential scleral tunnel. The same procedure was repeated for the other side. The conjunctiva was sutured with 7-0 polyglycolic acid suture (Polycryl) at the end of the surgery.

Both Groups Patients in both groups received a topical antibiotic–steroid combination for 6 weeks. The superior scleral tunnel was sutured with 10-0 nylon (Aurolon) if required at the surgeon's discretion.

Statistical Analysis

Continuous variables were described as the mean ± SD or median with interquartile range (IQR), and group comparisons between continuous variables were performed using the Student *t* test or Wilcoxon rank-sum test for nonparametric variables. Categorical variables were described as proportions; differences between groups were determined using the chi-square test or Fisher exact test. Comparisons were made between the sutured versus sutureless scleral-fixated IOLs and between scleral-fixated IOLs placed after cataract surgery versus after trauma. The paired *t* test was used to determine differences between preoperative continuous variables and postoperative continuous variables.

All data were entered into an Excel spreadsheet (Microsoft Corp.) and analyzed using Stata software (IC 12.0, Statacorp LP). A *P* value less than 0.05 was considered statistically significant.

RESULTS

Data from 109 eyes that satisfied the inclusion criteria were analyzed. The mean age of the 63 (58%) men and 46 women (42%) was 55.2 ± 17.8 years (median, 60; IQR, 18; range 8 to 80 years). Of these, 59 eyes (54%) had sutureless scleral-fixated IOLs and 50 had sutured scleral-fixated IOLs. Fifty-two eyes (48%) had a history of trauma; of these 31 eyes (60%) had sustained closed-globe injuries and 21 had previous repaired open-globe injuries. Forty-four eyes (40%) had PPV for indications, such as previous RD (6 eyes), cortex/nucleus/IOL removal (24 eyes), and core vitrectomy for suspected endophthalmitis (7 eyes) before scleral-fixated IOL implantation. Ninety-seven eyes (89%) had a scleral-fixated IOL as a secondary procedure ie, after previous cataract surgery with aphakia or previous vitrectomy/open-globe repair. The remaining 12 had a scleral-fixated IOL as the primary procedure (10 had pars plana lensectomy with a scleral-fixated IOL, and 2 had absorbed cataract post trauma). The mean follow-up was 18.9 ± 8.7 months (range 12 to 55 months). The majority of eyes had an improvement in UDVA after surgery, with 93 eyes (86%) having a Snellen equivalent CDVA of 6/12 or better.

Sutured versus sutureless scleral-fixated IOLs were comparable in terms of baseline characteristics (Table 1). There was a statistically significant improvement in UDVA postoperatively in both groups ($P < .001$, paired *t* test); the CDVA was maintained. Both groups showed equivalent refractive correction, and the mean follow-up was also comparable.

Table 2 shows a comparison between the 2 causes for aphakia—trauma and cataract surgery. Patients in the trauma group were significantly younger with a male preponderance. At presentation, a statistically significantly larger proportion of eyes in the trauma group had a posteriorly dislocated crystalline lens and hence required a pars plana lensectomy before the scleral-fixated IOL surgery. Eyes with trauma also had statistically significantly greater RD than the cataract group. Nine eyes (17%) in the trauma group had self-sealed corneal tears. The incidence of previous PPV and corneal and macular pathology was also was statistically significantly higher in the trauma group. Both groups had improved UDVA and maintained CDVA, and there was no difference in vision parameters between the 2 groups at the last follow-up.

Overall, 13 eyes (12%) experienced CME postoperatively, and 5 (4%) developed RD. Of the 5 cases of RD, 4 had previous trauma and 1 had cataract surgery. One eye developed a full-thickness macular hole after 15 months follow-up, and 1 eye had uncontrolled glaucoma post trauma requiring trabeculectomy at a later date. Nine cases (5 post trauma versus 4 post cataract surgery) had a final CDVA worse than 6/18. Table 3 shows the causes of poor visual outcome in this series. There was no difference in the proportion of complications between the sutured and sutureless scleral-fixated IOL groups. One sutured scleral-fixated IOL dislocated into the vitreous cavity after trauma and was refixated successfully with a good outcome. At the last follow-up, none of the other sutured scleral-fixated IOLs had subluxated or dislocated or had other suture-related complications, and there was no erosion of the subconjunctival haptics in the sutureless group.

DISCUSSION

Management of aphakia in the absence of capsule support remains a challenge. In view of the high patient

Table 1. Comparison of demographics, preoperative characteristics, and postoperative outcomes between sutured IOL and sutureless scleral-fixated IOL.

Variable	Sutured Scleral-Fixated IOL (n = 50)	Sutureless Scleral-Fixated IOL (n = 59)	*P* Value
Preoperative parameters			
Mean age (y) ± SD	55.50 ± 18.3	55.03 ± 17.5	.96
Male sex, n (%)	29 (58)	34 (57.6)	.97
Mean duration* (mo)	33.45 ± 10.2	29.54 ± 6.2	.91
Mean CDVA (logMAR) ± SD	1.76 ± 0.15	1.66 ± 0.31	.03
Mean UDVA (logMAR) ± SD	0.34 ± 0.29	0.31 ± 0.30	.79
Cause, n (%)			.32
Trauma	22 (44)	31 (53)	
Post cataract	28 (56)	28 (47)	
Lens status at presentation, n (%)			.09
Aphakia	37 (74)	34 (58)	
Dislocated crystalline lens	9 (18)	10 (17)	
Dropped cortex	0	3 (5)	
Dropped IOL	4 (8)	12 (20)	
Previous surgery, n (%)			.34
Cataract	23 (46)	23 (40)	
PPV + pars plana lensectomy	7 (14)	9 (15)	
PPV + cortex removal	2 (4)	6 (10)	
PPV + IOL removal	2 (4)	3 (5)	
Open-globe repair	4 (8)	8 (14)	
RD surgery	2 (4)	4 (6)	
Core vitrectomy†	3 (6)	0	
Others	0	2 (3)	
Previous PPV	17 (34)	27 (46)	.21
Previous corneal pathology	8 (16)	12 (20)	.56
Previous macular pathology	6 (12)	10 (17)	.47
Postoperative parameters (1 y)			
Mean CDVA (logMAR) ± SD	0.78 ± 0.45	0.66 ± 0.28	.23
Mean UDVA (logMAR) ± SD	0.34 ± 0.44	0.27 ± 0.25	.19
Mean sphere (D) ± SD (n = 46)	1.05 ± 0.92	0.90 ± 0.74	.68
Mean cylinder (D) ± SD (n = 92)	1.97 ± 1.1	1.92 ± 0.9	.93
Mean follow-up (mo) ± SD	17.28 ± 8.6	20.42 ± 8.7	.06

CDVA = corrected distance visual acuity; IOL = intraocular lens; PPV = pars plana virtrectomy; RD = retinal detachment; UDVA = uncorrected distance visual acuity
*Duration between previous surgery and sulcus-fixated IOL
†Core vitrectomy for previous endophthalmitis

Table 2. Comparison of preoperative characteristics and outcomes between eyes having scleral-fixated IOL after trauma versus after cataract surgery.

Variable	Trauma (n = 52)	After Cataract Surgery (n = 57)	*P* Value
Preoperative parameters			
Mean age (y) ± SD	46.0 ± 20.1	63.6 ± 9.7	<.001
Male sex, n (%)	37 (71)	26 (46)	.009
Mean duration* (mo)	28.87 ± 8.5	33.31 ± 7.7	.65
Mean CDVA (logMAR) ± SD	1.66 ± 0.32	1.74 ± 0.18	.28
Mean UDVA (logMAR) ± SD	0.36 ± 0.32	0.27 ± 0.19	.22
Type of scleral-fixated IOL, n (%)			
Sutured	21 (40)	29 (50)	.32
Sutureless	31 (60)	28 (50)	
Lens status at presentation, n (%)			.001
Aphakia	31 (60)	41 (71)	
Dislocated crystalline lens	16 (30)	2 (4)	
Dropped cortex	0	3 (5)	
Dropped IOL	5 (10)	11 (20)	
Previous surgery, n (%)			<.001
Cataract	6 (12)	41 (72)	
PPV + pars plana lensectomy	11 (21)	5 (9)	
PPV + cortex removal	1 (2)	7 (12)	
PPV + IOL removal	1 (2)	3 (5)	
Open-globe repair	12 (23)	0	
RD surgery	5 (10)	1 (2)	
Core vitrectomy†	3 (6)	0	
Others	2 (4)	0	
Previous PPV	27 (52)	17 (31)	.03
Previous corneal pathology	19 (36)	1 (2)	<.001
Previous macular pathology	11 (21)	5 (9)	.07
Postoperative parameters (1 y)			
Mean CDVA (logMAR) ± SD	0.70 ± 0.43	0.73 ± 0.30	.43
Mean UDVA (logMAR) ± SD	0.34 ± 0.45	0.27 ± 0.23	.59
Mean sphere (D) ± SD (n = 46)	0.93 ± 0.92	0.99 ± 0.72	.38
Mean cylinder (D) ± SD (n = 92)	1.94 ± 1.24	1.95 ± 0.89	.42
Mean follow-up (mo) ± SD	18.42 ± 7.5	19.3 ± 9.8	.92

CDVA = corrected distance visual acuity; IOL = intraocular lens; PPV = pars plana virtrectomy; RD = retinal detachment; UDVA = uncorrected distance visual acuity
*Duration between previous surgery and sulcus-fixated IOL
†Core vitrectomy for previous endophthalmitis

Table 3. Demographics, preoperative characteristics, and postoperative complications in eyes with a final CDVA worse than 6/18.

Eye	Age (Y)	Sex	Cause	Previous Pathology	Scleral-Fixated IOL Type	Postoperative Complication	Final CDVA
1	55	M	Trauma	None	Sutureless	RD	6/60
2	10	F	Trauma	RD surgery	Sutureless	None	6/36
3	70	M	Post-cataract	Corneal scar	Sutureless	ERM	6/36
4	70	M	Trauma	Choroidal rupture	Sutureless	None	6/60
5	65	M	Post-cataract	RD surgery	Sutured	ERM	6/36
6	79	M	Post-cataract	None	Sutured	Persistent CME	6/60
7	65	F	Post-cataract	Macular scar	Sutured	None	6/36
8	61	M	Trauma	None	Sutured	RD	HM
9	13	M	Trauma	RD surgery	Sutureless	None	6/60

CDVA = corrected distance visual acuity; CME = cystoid macular edema; ERM = epiretinal membrane; HM = hand motions; IOL = intraocular lens; RD = retinal detachment

expectations after cataract surgery, the use of aphakic glasses or contact lenses to tackle surgical aphakia is no longer considered ideal. A review by the American Academy of Ophthalmology in 2003[1] showed that the use of open-loop AC IOLs, iris-sutured posterior chamber IOLs, or scleral-fixated IOLs is safe and effective to correct aphakia in eyes without adequate capsular support. Recent reports show a similar trend.[4] The largest series, by Lyle and Jin,[9] compared flexible open-loop AC IOLs with scleral-sutured scleral-fixated IOLs and found that the incidence of corneal decompensation was greater with the open-loop AC IOL (3.5%) than with the scleral-fixated IOL (0.9%), although the difference was not statistically significant. The choice of secondary IOL implantation in eyes with inadequate capsular support also depends on the surgeon's surgical experience and preference. At our institution, most surgeons prefer performing a complete PPV followed by scleral-fixated IOL implantation rather than AC IOL implantation in most instances because we believe scleral-fixated IOLs offer a better ocular safety profile than AC IOLs or iris-fixated IOLs (iris claw or iris sutured). Placement of the IOL in the sulcus region keeps the IOL closer to the natural anatomic position of the crystalline lens and is safer for the corneal endothelium and iris.

Numerous techniques of scleral-fixated IOL implantation have been described. Use of sutures to fixate IOLs to the sclera has been a time-tested method, with various technical modifications, and this approach can yield satisfactory results.[10–13] We used the 4-point fixation technique described above. Fixation of IOLs to the sclera by tucking the haptic of 3-piece IOLs into scleral pockets with glue[14] or without glue has also been described.[5] This method is quickly gaining popularity because it is less time consuming; is versatile, allowing the use of 3-piece foldable and multifocal IOLs; and reduces suture-related complications. Another modification of this technique is described by Feistmann et al.[15] for dislocated IOLs. In this technique, the IOL haptics are bimanually retrieved using a microincision trocar-cannula and are then fixated into intrascleral tunnels.

Our series compared sutured and sutureless scleral-fixated IOL techniques. The method of surgery was based on surgeon preference and not randomized. Despite this, the 2 groups were comparable in baseline characteristics as well as postoperative visual outcomes and complication rates. Once mastered, the relative ease of the sutureless technique might gain precedence over the more cumbersome sutured scleral-fixated IOL technique. Exteriorization of the haptics is especially useful in refixating posteriorly dislocated 3-piece IOLs. However, we believe certain conditions, such as myopic eyes with a large limbus-to-limbus diameter and post-trauma eyes with significant corneoscleral and conjunctival scarring at the limbus, still require sutured scleral-fixated IOLs. In addition, a poorly constructed scleral tunnel during previous cataract surgery can lead to a premature entry during scleral fixation of an IOL, resulting in repeated globe collapse during the procedure. Tucking the haptics into the scleral tunnel requires countertraction provided by a formed globe. Hence, in eyes in which problems are anticipated with the scleral entry wound, the sutured scleral-fixated IOL technique might be easier to perform.

Anterior segment surgeons might find it difficult to perform these techniques in eyes that have had PPV, especially as a result of repeated globe collapse. Using an anterior chamber maintainer can alleviate this and make surgery relatively similar to when using a pars plana infusion port. Another concern about using the limbus-alone route is that when the polypropylene needle or Scharioth forceps is introduced, the instruments pass to the midvitreous cavity and are then tilted upward to allow the surgeon to perform further maneuvers. This can lead to engagement of the

vitreous gel into the instrument tips and inadvertent vitreous traction with resultant complications. Hence, we perform a complete 3-port PPV in all cases. Anterior segment surgeons might perform a limited anterior vitrectomy using high-speed cutters and take extra steps to clear as much vitreous as possible at the 3 o'clock and 9 o'clock meridians before attempting to introduce instruments behind the iris plane. Lowering the intraocular pressure to 10 mm Hg and performing scleral indentation at the horizontal meridians makes visualization of the pars plicata and pars plana easy, enabling complete clearance of vitreous at these locations, where most maneuvers will be performed. Furthermore, it would be beneficial to perform a study comparing the long-term safety profiles of scleral-fixated IOL placement by anterior segment surgeons versus vitreoretinal surgeons.

At our institution, we prefer to defer IOL placement in cases of complicated cataract surgery with capsular loss or after trauma, and scleral-fixated IOL implantation is performed as a secondary procedure. We believe this helps stabilize the surgical wound and reduces inflammation; in addition, elective surgery in a quiet eye results in better outcomes. We performed primary scleral-fixated IOL implantation in approximately 10% of eyes that had subluxated crystalline lenses after a closed-globe injury. Comparing primary and secondary scleral-fixated IOL placement, Lee et al.[16] found that secondary implantation of scleral-fixated IOLs after cataract extraction seemed to have 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.

Suture breakage with dislocation of sutured scleral-fixated IOLs has been described as a common complication. Vote et al.[17] describe a suture breakage incidence of 28% (17 of 61 eyes) in cases having sutured scleral-fixated IOLs; refixation accounted for more than one half of the repeated surgeries. The use of 9-0 polypropylene sutures has been recommended because of the higher tensile strength, with resultant less suture degradation and breakage.[18] Another technique for sutured scleral-fixated IOLs described by Snyder and Perez,[19] uses polytetrafluoroethylene (Gore-Tex) for IOL fixation with a girth hitch; the authors found better centration and the avoidance of torque. In our series, only 1 sutured scleral-fixated IOL dislocated after trauma and was refixated successfully. Vote et al.[17] report maximum suture-related complications approximately 4 years after surgery. In our present study, only 3 patients had a follow-up longer than 4 years; therefore, we are unable to comment on this complication. However, at 2 years almost none of our eyes had spontaneous suture breakage or dislocation of the scleral-fixated IOLs. However, we are mindful of this possibility and have our patients under prolonged follow-up to watch for this complication. Hoffman et al.[20] describe the use of scleral pockets for suture placement as being easier to create than flaps and not requiring suture closure. They later describe a modification of the technique[21] without conjunctival dissection in which the pockets are created from the clear cornea. Using scleral pockets versus flaps might or might not influence long-term suture-related complications. In our series, although we used scleral flaps, they were not sutured. Rather, they were repositioned, and no dislocation was noted. More important, we believe that flap thickness is the main factor influencing suture-related problems. Superficial scleral flaps can lead to gradual erosion and subconjunctival exposure of the polypropylene knots. Deep (thick) flaps leave minimal residual tissue in the scleral bed and can cause cheesewiring and affect the tensile strength of the polypropylene sutures. This hypothesis can be confirmed in future studies that measure flap thickness using anterior segment optical coherence tomography and to determine the influence of this parameter on suture survival.

In a comparative study of sutured versus glued scleral-fixated IOLs, Ganekal et al.[22] studied 50 cases with a 6-month follow-up, in which the majority were after cataract surgery. The visual outcomes were comparable in the 2 groups, with a higher incidence of complications (eg, inflammation and glaucoma) in the sutured scleral-fixated IOL group. We found low and comparable rates of complications in both groups, with transient CME being the most common. Retinal detachment is a potentially vision-threatening complication after any ocular surgery. Almost 5% of our patients developed RD after scleral-fixated IOL placement, despite having concurrent or previous PPV. In a series by Bading et al.,[23] 6 of 63 cases had RD. In a series by Vote et al.,[17] RD developed in 8.3% of cases. These results suggest that the possibility of RD should be discussed with patients before surgery.

The majority of previous series describe the outcomes of secondary IOLs in post-cataract surgery eyes with capsular loss. In our series, nearly one half of cases had trauma. In the series by Bading et al.,[23] 40% of cases were after trauma; while Vote et al.[17] had 30%. However, none of the studies performed a comparative analysis between eyes after trauma and eyes after cataract surgery. In our study, the final visual results were comparable between the trauma group and the cataract group, with similar refractive outcomes. Judicious surgical care in cases of trauma from the outset, with scleral-fixated IOL implantation at a later date, can give excellent visual outcomes. However, the final visual outcome is

dependent on underlying pathology, such as corneal or retinal scarring, as seen in our patients with unsatisfactory visual outcomes.

The drawback of our study is its retrospective nature and lack of randomization and masking. In addition, our study might not have been adequately powered to detect small differences between the 2 techniques of scleral-fixated IOL. However, we found the 2 techniques to be similar in outcomes, but a sutured scleral-fixated IOL is more technically challenging to perform. Based on our results, we do not believe there is a need to perform a more robust randomized controlled trial to determine whether one technique is better than the other. Instead, we suggest surgeon preference when choosing the type of surgical procedure. Relatively large samples in both sutured and sutureless groups with long-term follow-up are the merits of our study.

In conclusion, most patients had significant improvement in uncorrected vision and gratifying results after scleral-fixated IOL implantation. There were no differences in outcomes and complication rates between those having sutured scleral-fixated IOL implantation and those having sutureless scleral-fixated IOL implantation. If judiciously chosen, eyes with trauma having scleral-fixated IOL implantation have visual outcomes similar to those of patient with postcataract aphakia.

WHAT WAS KNOWN

- Scleral-fixated IOLs are a viable and preferred option to manage aphakic eyes with a lack of capsular support. Excellent outcomes have been described for both sutured and sutureless techniques for fixation of the IOL to the sclera.

WHAT THIS PAPER ADDS

- The sutured technique and sutureless technique for scleral-fixated IOLs were equally effective in visual rehabilitation.
- Eyes with aphakia after trauma can have good visual outcomes after scleral-fixated IOL implantation.

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