



Sutureless scleral-fixated intraocular lens: long-term outcomes

Vinaya Felcida ¹ , Anand Chawla ¹, Dimitrios Kalogeropoulos ¹, Ajai K Tyagi ¹

¹ Department of Vitreoretinal Surgery, Birmingham & Midland Eye Centre, Birmingham, UK

ABSTRACT

Background: The purpose of this study was to evaluate the long-term outcomes of sutureless scleral-fixated intraocular lens (SFIOL) implantation at a tertiary referral center.

Methods: This retrospective observational study included 50 eyes of 43 consecutive patients who underwent sutureless SFIOL implantation by a single surgeon from January 2009 to December 2015. Indications for surgery were aphakia, dislocated intraocular lens (IOL), complicated cataract surgery (posterior capsule rupture, zonular dialysis, dropped nucleus), iris-clipped IOL with corneal decompensation, and lens with poor capsular support. Indication for surgery, visual acuity, ocular history, ocular comorbidities, intraoperative and postoperative complications, and the need for further surgery were analyzed.

Results: The analysis conducted on 50 eyes from 43 patients with a mean \pm standard deviation (SD) follow-up of 16.64 ± 9.34 months. Patients were 27 (63%) men and 16 (37%) women with a mean \pm standard deviation (SD) age of 53.36 ± 22.45 years (range 8–90 years). Final visual acuity was 6/18 or better in 39 eyes. SFIOL was stable and well centered in 48 eyes. SFIOL dislocation was noted in 2 eyes, retinal detachment in 1 eye, and worsening of diabetic cystoid macular edema in 1 eye. Two patients with pre-existing corneal decompensation from complicated cataract surgery had worsening of their condition.

Conclusions: Sutureless SFIOL could be considered as a long-term option for the management of aphakia, dislocated IOL, and lens with poor capsular support. However, future studies with more subjects, longer follow-ups, and robust study design are needed to confirm the results of the present study.

KEY WORDS

scleral fixation, sutureless, intraocular lens, aphakia, capsular support, scleral tunnel, sclerostomy

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Correspondence to: Dr. Vinaya Felcida, Birmingham & Midland Eye Centre, Birmingham, UK. E-mail: vinayafelcida@yahoo.co.in

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INTRODUCTION

Scleral-fixated intraocular lens (SFIOL) implantation is one of the surgical options for aphakia in the absence of adequate capsular support [1]. The other surgical options are anterior chamber intraocular lens (ACIOL), iris-fixated intraocular lens (IOL), and scleral sutured IOL implantation. Each has its own benefits and limitations [2]. Patient's age, ocular anatomy, corneal status, and coexisting ocular conditions including glaucoma are important in considering the choice of IOL and implantation technique [1-3]. Complications with ACIOL include corneal decompensation, chronic inflammation, and glaucoma [3]. Complications with iris-fixated IOL include uveitis, cystoid macular edema, and iris erosion of the haptic leading to recurrent hemorrhage [4, 5]. Sufficient iris stroma is

also necessary for iris-fixated IOL implantation. Complications reported with sutured SFIOL include suture erosion, infection, and suture breakage leading to lens subluxation [6, 7].

In recent years, the development of sutureless SFIOL implantation with intrascleral haptic fixation has gained more recognition because it overcomes suture-related problems. Several previous studies have shown favorable short- to medium-term outcomes following sutureless SFIOL [8-10]. However, there is limited long-term follow-up data of patients undergoing sutureless SFIOL implantation [11, 12]. The purpose of this study was to evaluate the long-term outcomes and patient satisfaction after sutureless SFIOL implantation at our institute.



METHODS

This retrospective observational study included 50 eyes of 43 consecutive patients who underwent sutureless SFIOL implantation by a single surgeon from January 2009 to December 2015 at the Birmingham and Midland Eye Centre, UK. Data included the surgeon's learning curve of this operation. The following information was collected: demographics, pre- and postoperative best-corrected visual acuity (BCVA) using Snellen visual acuity in meters, indication for surgery, postoperative complications, duration of follow-up, and indication for any further surgical intervention. Long-term outcomes were recorded. Some patients who had already been discharged from our clinic were contacted by telephone. The telephone survey questions included whether they were satisfied with their final visual outcome (yes or no), any postoperative problems experienced, and if any further eye surgery was needed. An ethical approval was obtained on 27/01/2015 (Number 1278) from the Clinical Effectiveness Department.

The surgical procedure for sutureless SFIOL was as follows: first, a localized conjunctival peritomy was performed at 3:00 and 9:00 o'clock. Two scleral tunnels parallel to the limbus were made using a 20-gauge micro vitrectomy (MVR) blade. Pars plana vitrectomy was performed, if indicated. An Alcon AcrySof MA50BM lens (Alcon Laboratories, Inc., Fort Worth, TX) was then injected into the anterior chamber through a small corneal incision, under a viscoelastic cover. Sclerostomies were made at 2:30 and 8:30 clock hours using a 20-gauge MVR blade. Two end-gripping forceps were used to deliver the IOL haptics through the sclerostomy opening using the handshake technique. Haptics were then tucked into the scleral tunnel using the push-and-pull technique. The sclerostomy opening and the conjunctiva were sutured using 8-0 Vicryl sutures. We presented all collected information about the study subjects with descriptive analysis.

RESULTS

Data from 50 eyes of 43 patients were analyzed. Patients were 27 (63%) men and 16 (37%) women with a mean \pm standard deviation (SD) age of 53.36 ± 22.45 years (range 8–90 years). The right eye was operated in 22 patients and the left eye in 28 patients. The duration of follow-up by telephone interview ranged from 18 to 38 months, and that of clinical follow-up ranged from 3 to 36 months. The indications for surgery included ectopia lentis (40%), complicated cataract surgery (28%), trauma (20%), dislocated IOL (10%), and iris-clipped IOL with corneal decompensation (2%). [Table 1](#) shows the patient demographics and indications for sutureless SFIOL.

As a number of these patients had comorbidities, it was difficult to get an accurate measure of their preoperative visual acuity. Forty-eight eyes underwent vitrectomy and two eyes

underwent only anterior segment procedure, along with sutureless SFIOL. Six (14%) patients had postoperative complications ([Table 2](#)). The final visual acuity was 6/18 or better in 39 (78%) eyes. Twenty-five (50%) eyes had a visual acuity of 6/9 or more. In 48 eyes, sutureless SFIOL remained stable after the initial surgery. The reasons for reduced vision included pre-existing ocular problems ([Table 3](#)).

[Table 2](#) shows the final visual outcome and the surgical complications occurred in the study subjects. Dislocation of IOL (2 eyes), corneal decompensation (2 eyes), retinal detachment (1 eye), and worsening of diabetic macular edema (1 eye). Two patients had a dislocated IOL at the 1-month postoperative follow-up visit. The surgical indication for sutureless SFIOL in these patients was ectopia lentis and previous ocular trauma. There were no intraoperative complications. One of these patients had IOL exchange with another sutureless SFIOL, without any further complications. The second patient had IOL removal and ACIOL implantation, also without any further complications.

Four patients had pre-existing glaucoma and needed to continue anti-glaucoma medications prescribed by the glaucoma team. None of the patients had long-term intraocular pressure-related problems requiring glaucoma surgery. Transient pressure rises were noted in 2 patients, who showed good response to topical anti-glaucoma medications. Two patients developed worsening of their corneal endothelial decompensation. A successful corneal graft was later performed in one patient. The other patient did not consent for further surgery and managed conservatively by the corneal team. The patient with retinal detachment underwent vitrectomy, cryopexy and gas tamponade. Retinal detachment occurred one month after the initial surgery. The indication for sutureless SFIOL in this case was congenital dislocation of the lens. The sutureless SFIOL remained stable throughout the follow-up period of 16 months.

One patient had worsening of diabetic macular edema within 3 months following surgery and received intravitreal anti-vascular endothelial growth factor treatment. [Table 3](#) describes the demographics, ocular comorbidities, indication for surgery, and complications in patients (11 eyes) who had a final visual acuity of 6/18 or worse. Twenty-nine patients (32 eyes) were contacted by telephone. Mean \pm SD follow-up for these patients was 25.12 ± 4.56 months, and postoperative period ranged from 18 to 38 months. Twenty-eight of 29 patients were satisfied with the surgical outcome. However, the patient with worsening of diabetic macular edema in the postoperative period was unhappy with the level of vision. None of these patients required any further surgical intervention.



Table 1. Demographics and indications for sutureless SFIOL.

Preoperative characteristic	
Total number of patients/eyes(OD:OS)	43/50(22:28)
Age (years), mean ± SD (range), median	53.36 ± 22.45 (8–90), 57
Sex (male:female), n (%)	27 (63):16 (37)
Preoperative visual acuity , range	HM to 6/24
Indication for surgery, n of eyes (%)	
Ectopia lentis (Marfan syndrome, Weill Marchesani syndrome, fibrillin gene mutation)	20 (40)
Complicated cataract surgery (posterior capsule rupture, zonular dialysis, dropped nucleus)	14 (28)
Trauma (dropped lens, subluxated or dislocated IOL or lens)	10 (20)
Dislocated IOL (pseudoexfoliation)	5 (10)
Iris-clipped IOL with corneal decompensation	1 (2)

Abbreviations: IOL, intraocular lens; n, number; SD, standard deviation; IOL, Intraocular lens; HM, Hand motion; OD, right eye; OS, left eye; SFIOL, scleral-fixed intraocular lens; %, percentage

Table 2. Postoperative complications and final visual outcome following sutureless SFIOL.

Total number of patients/ patients with complication, n (%)	43/6 (14)
IOL dislocation, n (%)	2 eyes (4)
Corneal decompensation, n (%)	2 eyes (4)
Diabetic macular edema worsening, n (%)	1 eye (2)
Retinal detachment, n (%)	1 eye (2)
Final postoperative visual outcome, range	HM to 6/6

Abbreviations: IOL, intraocular lens; HM, Hand Motion; n, number; SFIOL, scleral-fixed intraocular lens; %, percentage

Table 3. Demographics, ocular co-morbidity, indication, complications in patients who had best corrected VA of 6/18 or or worse.

#	Age (years)	Sex	Etiology	Pre-existing ocular problem	Postoperative complications after sutureless SFIOL	CDVA
1	45	M	Dislocated IOL	Pseudoexfoliation	Corneal decompensation	2/60
2	8	M	Ectopia lentis	Amblyopia	None	6/36
3	70	M	Complicated cataract	Previous RD surgery	None	6/36
4	53	F	Dislocated IOL	Congenital nystagmus	None	CF
5	84	M	Complicated cataract	Macular scar	None	6/60
6	66	F	Dislocated IOL	Retinitis pigmentosa	None	6/24
7	75	M	Dislocated IOL	Diabetic macular edema	Worsening diabetic macular edema	6/36
8	75	F	Dislocated IOL	Previous RD surgery	None	1/60
9	89	F	Dislocated IOL	Atrophic AMD	None	3/60
10	90	F	Complicated cataract	Glaucomatous optic disc atrophy	None	6/24
11	55	F	Ectopia lentis	None	Dislocated IOL	6/36

Abbreviations: AMD, age-related macular degeneration; CDVA, corrected distance visual acuity; CF, counting fingers; F, female; IOL, intraocular lens; M, male; RD, retinal detachment; SFIOL, scleral-fixed intraocular lens

DISCUSSION

SFIOL with or without sutures is frequently used to treat aphakia in the absence of adequate capsular support. The advantages of SFIOL include the proximity of the IOL to the normal anatomical position of lens, lower incidence of long-term damage to the corneal endothelium and angle structures, and reduced postoperative inflammation. The complications of sutured SFIOL are mainly suture-related and therefore eliminated with the sutureless approach.

Numerous techniques and modifications to sutureless scleral fixation have been described, with successful results [8-10, 13]. Glue-assisted scleral fixation of posterior chamber IOL has been described previously [8, 9]; however, fibrin glue may not be accessible to all surgeons. Sutureless scleral tunnel IOL, where the haptics are incarcerated in the tunnel, has been described by Scharioth et al. [10]. A similar technique with variation in instrumentation and tunnel size has



been developed by Prenner et al. [13], where no glue is used and no scleral flap is made. We used a similar technique with no fibrin glue and no scleral flap. The IOL haptics were tucked into the scleral tunnel.

There are limited data on the long-term outcomes of sutureless SFIOL. The short- and medium-term outcomes are 5–15% of IOL dislocation following surgery [8–10]. Kawaji et al. [11] reported outcomes of sutureless SFIOL using lamellar dissection and noted stable SFIOL over a mean follow-up period of 26.7 months. Sindal et al. [12] compared the outcomes between sutureless and sutured SFIOL and found no difference between the two techniques in long-term stability. Agarwal et al. showed good long-term outcomes with low rates of IOL dislocation, but used glue-assisted sutureless SFIOL [8]. In the pediatric case series described by Sindal, 11% of patients had developed complications at the 1-year follow-up of sutureless and sutured SFIOL, but were managed successfully. Haptic exposure or disinsertion was seen in 4.9% at 1-month postoperatively, and refixed with no recurrence. In addition, in one eye, minimal IOL tilt was observed [14]. The findings of the current study are consistent with those of Kawaji et al. [11] and Sindal et al. [12] regarding good long-term stability of sutureless SFIOL.

In the current study, 2 (4%) patients had postoperative dislocation of their sutureless SFIOL. The rate of postoperative dislocation was 0–8% in previous studies [15]. The cause for postoperative dislocation in our two patients was broken haptics. We did not observe any trauma to the haptics during the sutureless SFIOL procedure. They both occurred in the first surgical experiences of the surgeon.

We were specifically interested in the long-term complications following sutureless SFIOL. We did not find any late IOL dislocation (up to nearly 38 months after surgery). In fact, the only cases of IOL dislocation occurred in the early postoperative period. If the lens was stable after 3 months, no subsequent lens-related problems occurred. The final visual outcomes were poor in 11 eyes, due to pre-existing ocular comorbidities.

Sindal et al. reported retinal detachment in 5% of patients after SFIOL [12]. Besides, Vote et al. reported retinal detachment in 8.3% of their patients [16]. In a series by Bading et al, 6 of 63 patients developed retinal detachment [17]. However, in most studies, this rate ranged from 0% to 5% [15]. One (2%) patient in our study developed retinal detachment; this patient had congenital ectopia lentis and developed retinal detachment 1 month postoperatively. None of our patients had choroidal detachment or endophthalmitis.

The limitations of this study are its single-center, retrospective nature; the variable lengths of follow-up; and the inability to contact all patients over telephone. The main strengths of this study are the analysis of the surgical outcomes of a visual rehabilitative procedure, which has added knowledge to the body of previously published work. However, future studies with more subjects, longer follow-ups, and robust study design are needed to confirm the results of the present study.

CONCLUSIONS

This study reports the outcomes of sutureless SFIOL outcomes performed by a single surgeon: long-term IOL stability and good surgical outcome. We believe that our data will be helpful to inform preoperative counseling of patients requiring aphakic surgical correction.

ETHICAL DECLARATIONS

Ethical approval: An ethical approval was obtained on 27/01/2015 (Number 1278) from the Clinical Effectiveness Department.

Conflict of interest: None.

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REFERENCES

1. Wagoner MD, Cox TA, Ariyasu RG, Jacobs DS, Karp CL, American Academy of O. Intraocular lens implantation in the absence of capsular support: a report by the American Academy of Ophthalmology. *Ophthalmology*. 2003;110(4):840-59. doi: [10.1016/s0161-6420\(02\)02000-6](https://doi.org/10.1016/s0161-6420(02)02000-6) pmid: [pubmed/12689913](https://pubmed.ncbi.nlm.nih.gov/12689913/)
2. Yen KG, Reddy AK, Weikert MP, Song Y, Hamill MB. Iris-fixated posterior chamber intraocular lenses in children. *Am J Ophthalmol*. 2009;147(1):121-6. doi: [10.1016/j.ajo.2008.07.038](https://doi.org/10.1016/j.ajo.2008.07.038) pmid: [pubmed/18790471](https://pubmed.ncbi.nlm.nih.gov/18790471/)
3. Kohnen T, Hengerer FH. [Anterior chamber intraocular lenses for aphakia correction]. *Ophthalmologe*. 2014;111(4):310-4. doi: [10.1007/s00347-013-2853-7](https://doi.org/10.1007/s00347-013-2853-7) pmid: [pubmed/24706252](https://pubmed.ncbi.nlm.nih.gov/24706252/)
4. Guell JL, Velasco F, Malecaze F, Vazquez M, Gris O, Manero F. Secondary Artisan-Verysise aphakic lens implantation. *J Cataract Refract Surg*. 2005;31(12):2266-71. doi: [10.1016/j.jcrs.2005.06.047](https://doi.org/10.1016/j.jcrs.2005.06.047) pmid: [pubmed/16473216](https://pubmed.ncbi.nlm.nih.gov/16473216/)
5. Kim KH, Kim WS. Comparison of clinical outcomes of iris fixation and scleral fixation as treatment for intraocular lens dislocation. *Am J*



- Ophthalmol. 2015;160(3):463-9 e1. doi: [10.1016/j.ajo.2015.06.010](https://doi.org/10.1016/j.ajo.2015.06.010) pmid: [pubmed/26116261](https://pubmed.ncbi.nlm.nih.gov/26116261/)
6. Price MO, Price FW, Jr., Werner L, Berlie C, Mamalis N. Late dislocation of scleral-sutured posterior chamber intraocular lenses. *J Cataract Refract Surg.* 2005;31(7):1320-6. doi: [10.1016/j.jcrs.2004.12.060](https://doi.org/10.1016/j.jcrs.2004.12.060) pmid: [pubmed/16105601](https://pubmed.ncbi.nlm.nih.gov/16105601/)
 7. Solomon K, Gussler JR, Gussler C, Van Meter WS. Incidence and management of complications of transsclerally sutured posterior chamber lenses. *J Cataract Refract Surg.* 1993;19(4):488-93. doi: [10.1016/s0886-3350\(13\)80612-8](https://doi.org/10.1016/s0886-3350(13)80612-8) pmid: [pubmed/8355155](https://pubmed.ncbi.nlm.nih.gov/8355155/)
 8. Agarwal A, Kumar DA, Jacob S, Baid C, Agarwal A, Srinivasan S. Fibrin glue-assisted sutureless posterior chamber intraocular lens implantation in eyes with deficient posterior capsules. *J Cataract Refract Surg.* 2008;34(9):1433-8. doi: [10.1016/j.jcrs.2008.04.040](https://doi.org/10.1016/j.jcrs.2008.04.040) pmid: [pubmed/18721701](https://pubmed.ncbi.nlm.nih.gov/18721701/)
 9. Kumar DA, Agarwal A, Agarwal A, Prakash G, Jacob S. Glued intraocular lens implantation for eyes with defective capsules: A retrospective analysis of anatomical and functional outcome. *Saudi J Ophthalmol.* 2011;25(3):245-54. doi: [10.1016/j.sjopt.2011.04.001](https://doi.org/10.1016/j.sjopt.2011.04.001) pmid: [pubmed/23960932](https://pubmed.ncbi.nlm.nih.gov/23960932/)
 10. Scharioth GB, Prasad S, Georgalas I, Tataru C, Pavlidis M. Intermediate results of sutureless intrascleral posterior chamber intraocular lens fixation. *J Cataract Refract Surg.* 2010;36(2):254-9. doi: [10.1016/j.jcrs.2009.09.024](https://doi.org/10.1016/j.jcrs.2009.09.024) pmid: [pubmed/20152606](https://pubmed.ncbi.nlm.nih.gov/20152606/)
 11. Kawaji T, Sato T, Tanihara H. Sutureless intrascleral intraocular lens fixation with lamellar dissection of scleral tunnel. *Clin Ophthalmol.* 2016;10:227-31. doi: [10.2147/OPHTH.S101515](https://doi.org/10.2147/OPHTH.S101515) pmid: [pubmed/26869757](https://pubmed.ncbi.nlm.nih.gov/26869757/)
 12. Sindal MD, Nakhwa CP, Sengupta S. Comparison of sutured versus sutureless scleral-fixated intraocular lenses. *J Cataract Refract Surg.* 2016;42(1):27-34. doi: [10.1016/j.jcrs.2015.09.019](https://doi.org/10.1016/j.jcrs.2015.09.019) pmid: [pubmed/26948775](https://pubmed.ncbi.nlm.nih.gov/26948775/)
 13. Prenner JL, Feiner L, Wheatley HM, Connors D. A novel approach for posterior chamber intraocular lens placement or rescue via a sutureless scleral fixation technique. *Retina.* 2012;32(4):853-5. doi: [10.1097/IAE.0b013e3182479b61](https://doi.org/10.1097/IAE.0b013e3182479b61) pmid: [pubmed/22314201](https://pubmed.ncbi.nlm.nih.gov/22314201/)
 14. Sindal MD, M A. Outcomes of sutureless and sutured scleral fixated intraocular lens in paediatric population. *Eur J Ophthalmol.* 2020;1120672120965493. doi: [10.1177/1120672120965493](https://doi.org/10.1177/1120672120965493) pmid: [pubmed/33073609](https://pubmed.ncbi.nlm.nih.gov/33073609/)
 15. Patel LG, Starr MR, Ammar MJ, Yonekawa Y. Scleral fixated secondary intraocular lenses: a review of recent literature. *Curr Opin Ophthalmol.* 2020;31(3):161-6. doi: [10.1097/ICU.0000000000000661](https://doi.org/10.1097/ICU.0000000000000661) pmid: [pubmed/32235250](https://pubmed.ncbi.nlm.nih.gov/32235250/)
 16. Vote BJ, Tranos P, Bunce C, Charteris DG, Da Cruz L. Long-term outcome of combined pars plana vitrectomy and scleral fixated sutured posterior chamber intraocular lens implantation. *Am J Ophthalmol.* 2006;141(2):308-12. doi: [10.1016/j.ajo.2005.09.012](https://doi.org/10.1016/j.ajo.2005.09.012) pmid: [pubmed/16458685](https://pubmed.ncbi.nlm.nih.gov/16458685/)
 17. Bading G, Hillenkamp J, Sachs HG, Gabel VP, Framme C. Long-term safety and functional outcome of combined pars plana vitrectomy and scleral-fixated sutured posterior chamber lens implantation. *Am J Ophthalmol.* 2007;144(3):371-7. doi: [10.1016/j.ajo.2007.05.014](https://doi.org/10.1016/j.ajo.2007.05.014) pmid: [pubmed/17624290](https://pubmed.ncbi.nlm.nih.gov/17624290/)