

Late dislocation of in-the-bag intraocular lenses in uveitic eyes: An analysis of management and complications

Sudha K Ganesh, Parveen Sen, Hitesh R Sharma

Aim: An analysis of late in-the-bag dislocation of intraocular lenses (IOL), in uveitic eyes. **Setting:** Referral uveitis clinic. **Design:** Retrospective case series. **Materials and Methods:** All case records of eyes with chronic uveitis that had phacoemulsification with IOL implantation, at a referral uveitis clinic between February 1997 and January 2015 were retrieved and analyzed. Only those eyes with no documented intraoperative complication and no predisposing risks to IOL dislocation, such as pseudoexfoliation, high myopia, trauma, and prior VR surgery were included in this study. **Results:** A total of 581 eyes with chronic uveitis underwent phacoemulsification with IOL implantation under steroid cover from February 1997 to December 2015. Out of these 581 eyes, 10 patients (11 eyes) had experienced late in-the-bag IOL dislocation (1.89%). All 11 eyes had chronic intermediate uveitis. The mean duration from the time of cataract surgery to IOL dislocation was 11.24 years. 5 out of 11 eyes had pars plana vitrectomy (PPV) with IOL removal with 4-point sutured scleral fixated IOL. Two out of 11 eyes had PPV with in-the-bag IOL re-fixation. Out of 11, 2 eyes had PPV with IOL removal only. Remaining 2 eyes of 2 patients did not opt for surgery. Out of 11, 8 eyes had improved vision at last follow-up. **Conclusions:** In-the-bag dislocation of IOL is a rare late complication in uveitic eyes. With tight perioperative inflammatory control, scleral-fixated posterior chamber intraocular lens or IOL re-fixation are good options of restoring vision in these high-risk eyes.

Key words: Complications, intermediate uveitis, late in-the-bag dislocation, scleral fixated Intra-ocular lens, uveitic cataract

Phacoemulsification and in-the-bag placement of intraocular lenses (IOL) represent the standard of care for uveitic cataract surgery. Several studies in the recent past report excellent surgical outcomes following cataract surgery in uveitis with strict perioperative control of inflammation, appropriate surgical technique, improved IOL design, and material and in-the-bag placement of IOL.^[1-7]

Secure in-the-bag fixation of the IOL is considered a safe surgical option with optimal surgical outcome in these high-risk uveitic eyes. However, it does not guarantee an uncomplicated postoperative course. Recurrence of uveitis, secondary glaucoma, anterior or posterior capsule opacification, capsule shrinkage, and cystoid macular edema (CME) decentration or dislocation of a posterior chamber IOL are some well-known complications that can occur after complicated uveitic cataract surgery. The incidence of decentration or dislocation of a posterior chamber IOL ranges between 0.2% and 3%.^[6,8] The causes of early onset IOL dislocation are loss of capsular or zonular integrity during surgery or asymmetric placement of the haptics. However, late in-the-bag dislocation of the IOL has been reported in recent years. In-the-bag-IOL dislocation occurs as a result of progressive zonular dehiscence many years after uneventful surgery. There are few reports of this complication in the literature, probably due to delayed clinical manifestation. Various preoperative risk factors for IOL

dislocation following an uneventful cataract surgery have been identified. Pseudoexfoliation was the most common, followed by uveitis, trauma, vitrectomy, and increased axial length.^[9-12] Other factors include intraoperative surgical trauma to the zonules, postoperative anterior capsular contraction syndrome, and postoperative trauma. However, there are few articles in the literature reporting late in-the-bag dislocation of IOLs in uveitic eyes.^[9,10,12-15]

The management of dislocated IOL especially in high-risk uveitic eyes can be very challenging. Surgical removal of the dislocated IOL and insertion of another IOL may be associated with recurrent inflammation and elevated intraocular pressure (IOP). Surgical options in the absence of capsular support include vitrectomy with IOL removal with implantation of, anterior chamber intraocular lens (ACIOL), iris fixated intraocular lens (IFIOL) and scleral-fixated posterior chamber intraocular lens (SFIOL). Transscleral sulcus fixation of posterior chamber IOL was first described by Malbran *et al.* in aphakic eyes following intracapsular cataract extraction in 1986.^[16] The advantage of SFIOL over ACIOL and IFIOL with regard to complications such as corneal endothelial damage, raised IOP, chronic recurrent uveitis,

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and CME are well documented. Complications of SFIOL include high postoperative refractive errors, suture-related complications such as knot erosion, broken sutures, tilted/subluxated or dislocated SFIOL, increased IOP, vitreous hemorrhage, retinal detachment, and endophthalmitis.^[17,18] Although studies have shown the safety and complications of SFIOL,^[17-19] similar studies of SFIOL are not available in high-risk uveitic eyes, where IOL dislocations are recently being reported.

Our study reports, late in-the-bag-IOL dislocation in 11 uveitic eyes with intermediate uveitis (IU) and the surgical outcome and the long-term complications of SFIOL in late in bag dislocation of IOL in patients with uveitis.

Materials and Methods

We reviewed retrospectively medical records of all eyes with uveitis who underwent phacoemulsification cataract extraction and posterior chamber intraocular lens implantation by a single surgeon at a referral uveitis clinic from January 1997 to January 2015. All eyes that had late in-the-bag dislocation in the operated eye during their regular follow-ups were identified and included in the study. Any ocular comorbidity which could risk IOL dislocation such as pseudoexfoliation, axial myopia; previous vitreoretinal surgery, trauma and retinitis pigmentosa, and connective tissue disorders were excluded from this study.

Complete detailed data were retrieved and analyzed, included age at presentation, diagnosis, gender, clinical features, management, relevant ocular and systemic history, complications and details of cataract surgery, postoperative course, and details of IOL dislocation, management, complications, best-corrected visual acuity (BCVA) following surgical management with SFIOL and final visual status and uveitis status at last follow-up.

Uveitis diagnosis and classification of uveitis was based on standardization of uveitis nomenclature criteria and International Uveitis Study Group recommendations.^[20,21] Phacoemulsification cataract extraction and posterior chamber intraocular lens implantation were done by a single experienced uveitis specialist, and the surgical management of the dislocated IOL was done by a single experienced vitreoretinal surgeon, in coordination with the uveitis expert during the pre- and post-operative period. Informed consent was obtained before any treatment and surgical procedure.

Preoperative management

The uveitis controlled for at least 3 months before any surgery. Corticosteroids were given orally, in doses of 1 mg/kg/day, and topically before and after surgery. Some patients were additionally given systemic immunosuppressives to control the inflammation before surgery. Patients developing secondary glaucoma due to the disease process or as a response to steroids were started on anti-glaucoma medications to control the intraocular tension.

Surgical management

All surgical procedures were performed under local anesthesia using a standard phacoemulsification technique by a single surgeon, using a standard, superior scleral tunnel incision. Flexible self-retaining iris hooks were used when intraoperative

pupillary dilatation was poor due to posterior synechiae. Posterior synechiae when present were lysed by simply injecting viscoelastic against the adherent iris, or by sweeping the pupil free from the lens capsule with a cannula. Trypan blue was used to stain the anterior capsule when required. Particular attention was paid to achieve a continuous circumferential capsulorhexis of approximately 5.5 mm. After hydrodissection, phacoemulsification of the nucleus and a good cortical cleanup was carried out. A posterior chamber hydrophobic acrylic IOL was placed in the capsular bag. Surgical peripheral iridectomy was performed in one case. All patients had nil surgical complications.

Following IOL dislocation with the bag into vitreous cavity: surgical management included pars plana vitrectomy (PPV) with IOL removal along with or without SFIOL (Hanita, PMMA posterior chamber IOL) implantation or PPV along with IOL refixation. Four-point suture fixation of SFIOL was done using a double-armed 10-0 polypropylene (prolene) suture with straight 16 mm long needles (Ethicon STC6) after making sclera flaps at 180 degree to each other. Suture knots were rotated and buried under the sclera flap, and the scleral flaps were sutured with a 10-0 nylon suture (Ethicon Inc) to avoid suture related complications [Fig. 1]. All aphakic cases were given contact lenses after the surgery. Postoperative complications were managed appropriately.

Postoperative management

All patients treated with topical prednisolone acetate 1% eye drops and oral prednisolone that was started preoperatively was gradually tapered postoperatively. Patients were also continued on a regimen of systemic immunosuppressive therapy similar to that used preoperatively.

Patients were examined at postoperative day 1, day 3, week 3, week 6, month 3, and month 6. Postoperative anterior chamber reaction, the presence of keratic precipitates and deposits on IOL, was recorded. Fundus evaluation was performed at each visit to look for CME and recurrence of uveitis. A retrospective analysis was done with respect to the

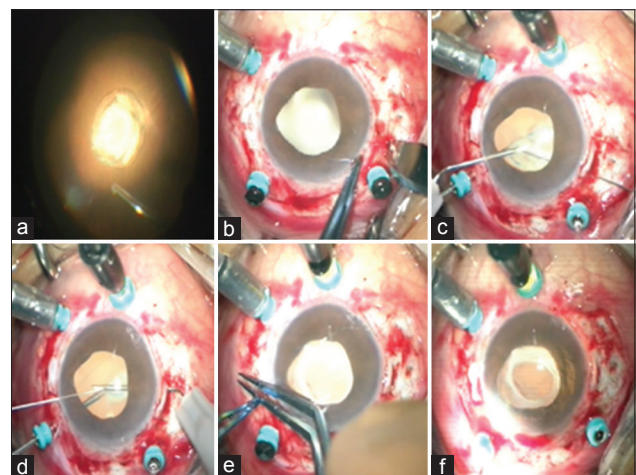


Figure 1: (a) Dislocated intraocular lenses with the bag in the vitreous cavity. (b) 25-Gauge pars plana vitrectomy ports implanted with flaps created for scleral fixated posterior chamber intraocular lens. (c and d) Intraocular lenses with bag being held and sutured with rail-road technique. (e) Flaps been placed back in position. (f) Final picture showing the refixated intraocular lenses with the bag in the visual axis

final visual outcome and postoperative complications, CME, IOL decentration, and reactivation of uveitis.

Results

A total of 581 eyes with chronic uveitis underwent phacoemulsification with IOL implantation under steroid cover from February 1997 to December 2015. All the cataract surgeries were performed by a single experienced uveitis expert at our center. There was no documented intraoperative complication, and none had any predisposing risks to IOL dislocation. Out of these 581 eyes, 11 eyes had experienced late in-the-bag IOL dislocation (1.89%).

All 11 eyes of 10 patients had chronic IU. Out of these ten patients, 6 were males and 4 were females. Ten patients had unilateral, and one had bilateral, in-the-bag dislocation of PCIOL. Mean age at the time of onset of uveitis was 35.5 years (range from 28 to 46 years). Mean age at the time of cataract surgery was 39.73 years (range from 32 to 48 years). Mean age at the time of dislocation of PCIOL was 51 years (range from 43 to 58 years). The mean duration from the time of cataract surgery till the time when the IOL dislocation was first noted was 11.24 years (range from 5.58 to 16 years). Average follow-up after SFIOL ranged from 12 to 44 months [Table 1].

Five eyes of five patients underwent PPV with IOL removal with 4-point sutured scleral fixated IOL (SFIOL). Two eyes of one patient underwent vitrectomy with in-the-bag IOL re-fixation [Figs. 2-4]. Two eyes of two patients underwent vitrectomy with IOL removal and were given aphakic correction. Two patients did not opt for surgery and were using aphakic correction.

The mean BCVA of five patients underwent SFIOL fixation improved from 4/60 (log MAR1.17) to 6/18 (log MAR0.49) and was statistically significant ($P < 0.05$). BCVA of one patient with bilateral IOL re-fixation did not show improvement as she had chronic inflammation with CME. BCVA of two patients with vitrectomy and IOL removal were 6/12, N6 and 6/7.5, N6 with

aphakic correction, in the operated eye. One patient who did not opt for surgery had BCVA was 6/9, N6 with contact lens and was comfortable with it. The other patient who did not undergo any surgery had CF vision due to optic atrophy [Table 1].

Out of the 11 eyes, 5 had associated glaucoma during their uveitic course. Three eyes were maintained on anti-glaucoma medications. One eye underwent trabeculectomy with mitomycin C and one had Ahmed glaucoma valve implantation [Table 1]. All the patients who underwent surgical intervention had a stable uveitic course in the postoperative period. Fig. 5 shows the Kaplan–Meier survival of these 11 eyes of ten patients from the 1st day of presentation up to the last final visit. It shows 100% of these patients maintained good vision up to 8 years of follow-up and 90% maintaining vision till 10 years of follow-up and 69% of patients maintaining their vision even after 22 years of follow-up from the initial presentation.

Discussion

Surgical management of cataract in uveitic eyes requires optimal management of uveitis, including appropriate diagnostic workup and scrupulous attention to control of inflammation perioperatively, meticulous intraoperative technique, and postoperative management. Recent literature reports excellent outcomes, following placement of IOLs in uveitis.^[2-7] Several recent studies suggest that the incidence of postoperative complications may be lower in eyes receiving acrylic IOLs compared with other materials.^[4] However, postoperative complication rates remain higher in the uveitic population. Rahman I, Jones NP, reviewed the long-term follow-up of cataract surgery in uveitic patients and found that after a minimum of 5 years follow-up, 82% of eyes maintained a visual improvement, 74% with 20/40 or better. They found that a quarter of patients developed macular edema or scarring postoperatively, and 15% required subsequent glaucoma drainage surgery.^[5] More recently, Elgohary *et al.*, retrospectively analyzed the outcomes of 101 patients undergoing cataract surgery in the setting of uveitis and found that approximately 71% of patients had visual improvement. However, 14% of patients in this study had reactivation of their

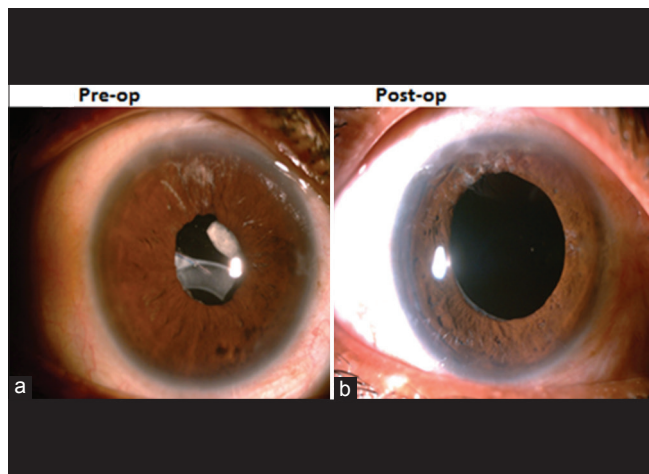


Figure 2: A 47-year-old female, operated for her right eye complicated cataract in 2003; lost to follow-up for 9 years presented to our clinic on August 2014 with (a) inferior dislocation of the intraocular lenses with the bag. She had undergone pars plana vitrectomy + intraocular lenses removal + scleral fixated posterior chamber intraocular lens implantation as seen in the postoperative picture (b)

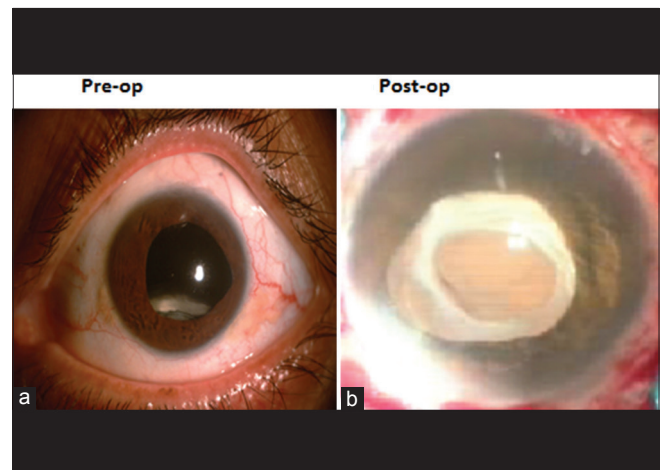


Figure 3: A 54-year-old female, operated for her left eye complicated cataract in January 2005; lost to follow-up for 10 years presented to our clinic on March 2015 with (a) inferior dislocation of the intraocular lenses with the bag. She had undergone pars plana vitrectomy + intraocular lenses re-fixation as seen in the postoperative picture (b)

Table 1: Characteristic of each patient in this study

Sex	Type of uveitis	Age at onset of uveitis (years)	Age at cataract surgery (years)	Time to dislocation (months)	Eye in which dislocation was noted	BCVA at the time of dislocation	Intervention	BCVA at Last visit	Follow-up post-PPV with or without SFIOL surgery (months)	Comments
Male	Intermediate uveitis	30	35	192	OD	CF 1 m, <N36	PPV + IOLR + SFIOL	6/7.5, N6	22	Transient steroid responder, lost to follow-up for 8 years, before IOL dislocation had a course of ATT 9 months
Female	Intermediate uveitis	46	48	118	OD	6/36, N18	PPV + IOLR + SFIOL	6/15, N6	18	-
Female	Intermediate uveitis	32	36	128	OD	6/36, N8	PPV + IOLR + SFIOL	6/9, N6	22	Secondary glaucoma, lost to follow-up for 9 years before IOL dislocation
Male	Intermediate uveitis	34	42	158	OD	2/60, <N36	PPV + IOLR + SFIOL	6/9, N6	38	Lost to follow-up for 5 years before IOL dislocation
Female	Intermediate uveitis	41	44	96	OD	6/36, N12	PPV + IOL re-fixation	6/36, N8	38	OU had chronic resistant CME
Female	Intermediate uveitis	41	45	123	OS	3/60, <N36	PPV + IOL re-fixation	3/60, N18	14	OU had chronic resistant CME
Male	Intermediate uveitis	38	38	116	OS	6/18, N6	PPV + IOLR + SFIOL + trabeculectomy with mitomycin C	6/18, N6	15	Secondary glaucoma, OS disc pale
Female	Intermediate uveitis	28	32	176	OS	6/60, N36	PPV + IOL removal	6/12, N6	14	-
Male	Intermediate uveitis	34	41	144	OD	CF 1 m, <N36	PPV + IOL removal	6/7.5, N6	44	-
Male*	Intermediate uveitis	36	38	67	OS	6/9, N6	No surgical intervention	6/9, N6	12	Secondary glaucoma, AGV implantation
Male*	Intermediate uveitis	36	38	165	OD	CF 50 cm, <N36	No surgical intervention	CF 50 cm, <N36	12	Secondary glaucoma

*Same patient having bilateral in-the-bag IOL dislocation. PPV+IOLR+SFIOL: PPV with IOLR with 4-point sutured SFIOL, PPV+IOL re-fixation: PPV with IOL re-fixation, PPV+IOLR: PPV with IOLR, BCVA: Best corrected visual acuity in snellens, CF: Counting fingers, CME: Cystoid macular edema, AGV: Ahmed glaucoma valve, ATT: Antituberculous therapy, IOL: Intraocular lenses, PPV: Pars plana vitrectomy, IOLR: intraocular lens removal, SFIOL: Scleral fixated IOL, OU: Both eyes, OD: Right eye, OS: Left eye



Figure 4: A 54-year-old female, operated for her left eye complicated cataract in January 2005; lost to follow-up for 10 years presented to our clinic on March 2015 with (a) inferior dislocation of the intraocular lenses with the bag. She had undergone pars plana vitrectomy + intraocular lenses refixation as seen in the postoperative picture (b)

uveitis within 3 months of cataract surgery, 21% developed postoperative CME, and 39% developed posterior capsular opacity.^[6]

Late in-the-bag dislocation of IOL is a rare, but serious complication following uneventful cataract surgery. In-the-bag dislocation of IOL occurs several years after an uneventful cataract surgery. Several predisposing conditions identified in literature include trauma, pseudoexfoliation, vitrectomy, increased axial length and uveitis.^[9,10,12,14,15,22] IOL dislocation is an uncommon late complication in patients with uveitis. In-the-bag-IOL dislocation in uveitis has been recently reported in literature.^[10,14,15] Conservative management may be appropriate in patients with tolerable symptoms, or in those with recalcitrant uveitis. Alternatively, fixation of the existing IOL, or removal and implantation of a secondary IOL, may be necessary in others. Angle-supported, or iris-enclaved IOLs, may not be safe, in these high-risk uveitic eyes. Zonular weakness is one of the proposed mechanisms predisposing to in-the-bag-IOL dislocation. Zonular instability may occur in uveitis, where the inflammation could extend to the pars plicata. Inflammation of the ciliary body could further destabilize the zonules at their insertion sites.^[10] Capsular contracture shrinkage and fibrosis are the other proposed mechanisms that can weaken the zonules.^[9]

In this study, we have described 11 eyes with chronic IU who had an uneventful cataract surgery and had late in-the-bag IOL dislocation, several years later and their management. A total of 581 eyes with chronic uveitis underwent phacoemulsification with IOL implantation under steroid cover by a single surgeon over a period of 18 years. There was no documented intraoperative complication, and none had any preexisting factors which could cause IOL dislocation. Out of these 581 eyes, 11 eyes had experienced late in-the-bag IOL dislocation (1.89%). The mean duration from the time of cataract surgery to the time, when the IOL dislocation was first noted was 11.24 years. Two recent case series of in-the-bag IOL dislocation in uveitic eyes had shown a mean duration between 6.75 years and 10.3 years, from the cataract surgery and the IOL dislocation.^[14,15]

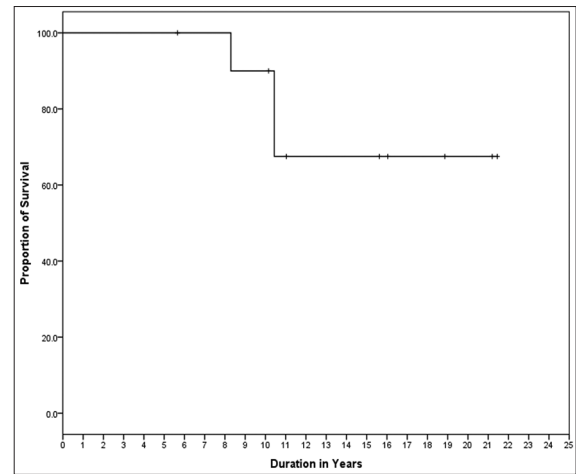


Figure 5: Kaplan–Meier survival of these 11 eyes from the 1st day of presentation up to the last visit. It shows 100% of these patients maintained good vision up to 8 years of follow-up and 90% maintaining vision till 10 years of follow-up and 69% patients maintaining their vision even after 22 years of follow up

There are reports in the literature, of spontaneous dislocation of crystalline lens in uveitic eyes.^[23,24] Brilakis and Lustbader describe in-the-bag-IOL dislocation in both eyes of a single patient with IU, Gimbel *et al.*, in their large series of in-the-bag-IOL dislocation, report the same in seven eyes with uveitis, of which three had pars planitis. Steeples *et al.*, report in-the-bag-IOL dislocation in six eyes with uveitis, of which one eye had IU.^[9,10,15] Interestingly, in our present study, all 11 eyes had IU. The cause for this late IOL dislocation in uveitic eyes may be multifactorial. Davanger and Pedersen have shown in animal models that inflammation around the ciliary body could weaken the zonules.^[25] As all our patients had chronic IU, the recurrent inflammation near the zonules could probably be a major factor leading to the IOL dislocation. Recurrent, uncontrolled intraocular inflammation, especially when patients do not report for regular follow-ups, as it had happened in few of our patients, could have possibly contributed to further weakening of the zonules.

Capsular contraction may also lead to additional stress on zonules as suggested in earlier reports.^[11,12,22] In-the-bag IOL dislocation results from zonular weakness, which may result from a progressive zonular weakening, and a zonular dehiscence induced by capsular fibrosis.^[8,12,26] The combined mass of IOL and capsular material may also contribute to zonular stress.^[15,22] Studies have identified the sphincter effect of a capsular fibrosis that causes contraction around an intact capsulorhexis, which is reported to be severe in uveitic eyes.^[11] We observed in our study, an inferior IOL dislocation in all 11 eyes with some amount of capsular fibrosis. Although we did observe anterior capsular fibrosis, none of the eyes has capsular phimosis. Tao and Hall in their study state that the frequent use of topical and intravitreal steroids could weaken the zonules in these high-risk eyes.^[14] It is possible that in uveitic eyes, many factors such as type of uveitis (IU), recurrent inflammation, and inadequate control of inflammation, capsular bag contraction and chronic use of corticosteroids could weaken the zonules and play a major role in contributing toward late in-the-bag IOL dislocation.

The management of late in-the-bag-IOL dislocation should be individualized and based on the present clinical status of the patient. Re-fixation of the existing IOL was described as safe procedure in late in-the-bag IOL dislocation by Oshika^[19] Iris fixation of these IOL have also been described, but this procedure has significant uveal tissue contact leading to recurrence of uveitis.^[27,28] At present, the decision of ACIOL or scleral/iris-sutured PCIOL in uveitic eyes is controversial and depends on surgeon's preference, however, Gimbel *et al.*, have shown that ACIOLs in uveitic eyes are not a good option, as there are chances of exacerbations and recurrences of uveitis, that may lead to vision-threatening complications.^[9] A recent study by Suelves *et al.* shows that ACIOL can still remain an important option in uveitic eyes.^[29]

Our preferred method of management of a dislocated IOL in uveitic eyes was pars plana vitrectomy with IOL refixation with the bag or IOL removal and pars plana scleral fixated IOL. As all our patients had IOL dislocation deep into the vitreous, pars plana approach was only possible. In this study, five eyes had PPV with IOL removal with 4-point sutured scleral fixated IOL, which is probably, the single largest case series of SFIOL in uveitic eyes. Table 1 shows that patient 1, 3, and 4 had a better BCVA post-SFIOL as compared to predislocation BCVA; this may suggest the role of pars plana vitrectomy in controlling the inflammation too. The postintervention follow-up ranged from 12 months to 44 months. In terms of complications, two out of these five eyes had secondary glaucoma, and one required trabeculectomy with mitomycin C. One patient with bilateral dislocation also had bilateral chronic nonresolving CME. However, other complications such as recurrences or worsening of uveitis, vitreous hemorrhage, retinal detachment, suture exposure and IOL tilt were not seen in any of the patients until the last follow-up. The Kaplan-Meier survival chart shows that around 69% eyes maintaining their vision even after 22 years of follow-up.

Conclusions

Thus, in-the-bag dislocation of IOL is a possible late complication in uveitic eyes, especially with IU. Tight perioperative inflammatory control with immunosuppressives and steroids and surgical management with PPV with SFIOL or IOL re-fixation may be good options of restoring and maintaining vision in these high-risk eyes.

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Conflicts of interest

There are no conflicts of interest.

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