Original Article

Uveitis and deficient lens capsules: Effect of glued intraocular lens on the visual outcome and the reactivation of inflammation

Dhivya Ashok Kumar, Amar Agarwal, Wasim Raja Kader Ali

Purpose: To evaluate the visual outcome and complication profile after glued intraocular lens (IOL) in post uveitic eyes. **Methods:** Patients with history of uveitis who had glued IOL with 3 months antecedent quiet anterior chamber (AC) were included in this prospective observational case series. Visual acuity, slit-lamp examination, fundus evaluation, optical coherence tomography, intraocular pressure, specular count and AC inflammation were analyzed before and after glued IOL procedure. Glued IOL eyes were also compared with their fellow normal capsular bag IOL. **Results:** Overall 17 eyes (50.7 ± 16.1 years) were analyzed. It included 41.8%, 23.5%, and 35.29% anterior, posterior, and pan uveitis, respectively. The etiologies were tuberculosis (23.53%), toxoplasmosis (11.77%), Fuch's heterochromic cyclitis (5.88%), HLA B27 (11.77%), psoriatic arthritis (5.88%), Rheumatoid arthritis (5.8%), sarcoidosis (11.77%), herpetic kerato-uveitis (5.88%), and idiopathic (17.65%). Cataractous subluxated lens (35.3%), aphakia (23.5%), decentered IOL (23.5%) and intraoperative capsular rupture (17.6%) were the surgical indications. A significant improvement in the mean uncorrected and best corrected visual acuity ($P < 0.001$) was recorded. The complications were IOL pigment dispersion (47%), macular edema (41%), and epiretinal membrane (24%). There was significant rise in AC reaction on day 1 ($P < 0.001$) and normal AC was attained by 88.2% eyes at 6 months. AC inflammation reactivation was noted in 11.7% of eyes. Though inflammatory reactivation was similar to the normal IOL, macular edema was higher in glued IOL. **Conclusion:** Glued IOL can cause inflammation in uveitis eyes which can be managed medically with minimal complications.

Key words: Glued IOL and uveitis, glued IOL in post uveitic eyes, reactivation of uveitis

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Uveitis is an inflammatory disorder of the vascular tunica of the eye, which can lead to decreased visual acuity. It happens either by direct involvement of the retina-choroid complex or indirectly affecting the lens leading to cataract. The development of cataract in uveitic patients is also attributed to the use of long-term steroids. These cataractous lens needs to be replaced with intraocular lens (IOL) to restore visual acuity after the inflammation has been quiescent for a considerable period of time.[1-4] Extraction of these cataractous lenses and placement of the IOL poses a challenge to the surgeon due to the post-inflammatory squeal. Phacoemulsification with implantation of foldable IOL has been the procedure of choice in these eyes.[5-8] At times, when placement of the primary IOL becomes difficult due to deficient posterior capsular support, secondary IOLs come in hand to provide some useful vision to these patient's.[9-12] In terms of intraocular stability and visual acuity, the glued IOL has shown to provide better outcomes in non-uveitic eyes with deficient capsules.[13-16] The implantation of a glued trans-scleral fixated posterior chamber IOL poses a major challenge to the surgeon when the vascular coats of the eye have already suffered the brunt of an inflammation. In the current study, we present the visual outcome and complication profile in uveitic eyes following glued IOL procedure.

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Methods

The prospective observational case series was performed in the tertiary eye care set up. After obtaining the approval from the Institutional Review Board (IRB) and the informed consent from the patients, the cases were included and the tenets of Declaration of Helsinki were followed. The eyes with antecedent history of uveitis with 3 months quiescent period which had trans-scleral fixated glued IOL implanted during the time period of January 2016 to January 2017 were included. Eyes with prior history of uveitis was only included and those eyes which developed uveitis (for the first time) after glued IOL has been excluded. The preoperative and postoperative evaluation included the best corrected visual acuity (Snellen's distant visual acuity charts), Intraocular pressure (IOP) (Goldmann applanation tonometry), slit lamp examination, dilated fundus examination, ocular biometry (IOL master, Zeiss), ultrasound Bscan and optical coherence tomography of macula (Cirrus, Zeiss) and corneal specular count (Topcon, Tokyo). Anterior chamber reaction was graded by standardization of uveitis (SUN Classification) by a single examiner D.A.K. Anterior chamber inflammation

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reaction of </=0.5 grade was considered quiescent and eligible for inclusion. Preoperative blood analysis included the complete hemogram (total and differential counts), hemoglobin, erythrocyte sedimentation rate, blood sugar, C-reactive protein, rheumatoid factor, anti-nuclear antibody, C ANCA, Angiotensin converting enzyme, Mantoux test, and chest X-ray. Quantiferon TB gold, HLA B27, High resolution Computerized tomography, serology for toxoplasmosis, Cytomegalovirus, herpes Simplex virus was performed in suspected cases. Physician opinion in patients with co morbid systemic illnesses like tuberculosis and rheumatoid arthritis were obtained accordingly. All patients were started on steroid (Prednisolone acetate 1%) topical medications 4 q.i.d about 2 weeks prior to the surgery. All eyes underwent glued IOL procedure as described in the literature.[16]

Under peribulbar anesthesia and sterile precautions, the surgeries were performed.[16] Eyes requiring elective glued IOL like aphakia underwent the glued IOL implantation with anterior vitrectomy. Eyes with preexisting cataract with subluxation required initial cataract extraction followed by the glued IOL implantation. Eyes with decentered IOL, malformed AC IOL, and iris claw IOL underwent initial IOL explantation and then proceeded with the anterior vitrectomy along with the glued IOL procedure.

Surgical technique

The infusion cannula or an anterior chamber maintainer was inserted as an initial step in all the eyes. The cannula was positioned in the pars plana about 3 mm from the limbus in aphakia and 3.5 in pseudophakic eyes. Anterior segment surgeons can use an AC maintainer or 23G trocar cannula infusion. The infusion cannula prevents the globe from collapsing. Two partial thickness limbal based scleral flaps of about 2.5 × 2.5 mm size were made 180° apart about 1-1.5 mm from the limbus. A sclero-corneal tunnel incision was made for introducing the IOL in case of PMMA non-foldable IOL or corneal tunnel in case of injectable three-piece foldable IOL, followed by an anterior vitrectomy (anterior/pars plana route) to remove all vitreous traction. Two straight sclerotomies with a 20G needle were made about 1 mm from the limbus under the existing scleral flaps. The needle was directed towards the center of the globe. While the IOL was being introduced with one hand, an end gripping 23G micro rhexis forceps (Micro Surgical Technology, USA) was passed through the opposite sclerotomy with the other hand. The tip of the leading haptic was grasped with the MST forceps and pulled through the sclerotomy following the curve of the haptic and was externalized under the scleral flaps by handshake technique.[13] Similarly, the trailing haptic was also externalized through the other sclerotomy under the scleral flap. The haptic tips were then tucked into the intra-lamellar scleral tunnel made with a 26G needle at the point of externalization of the haptics on either side. The reconstituted fibrin glue was injected through the cannula of the syringe delivery system under the scleral flaps. The corneo-scleral wound was sutured with 10-0 monofilament nylon in eyes with PMMA IOL implantation and the corneal incision was closed with fibrin glue in eyes with foldable IOL. The flaps and conjunctiva were secured with fibrin glue irrespective of the type of IOL.

All patients were started on topical steroid (1% prednisolone acetate) and antibiotic drops four times daily for 4 weeks followed by T.I.D for 2 weeks and B.D for 2 weeks and then stop. Topical cyclopentolate 0.5% were administered once a day for a week. Topical steroids were tapered on seeing the anterior chamber inflammation on each visit. The usual schedule was T.I.D (after 1 month) for 2 weeks and B.D for 2 weeks and then stop. Patients with more than 2 + anterior chamber reaction were started on hourly steroids for 1 week and then shifted to Q.I.D dose later. The patients were followed up the subsequent day, at 1 week, 1 month, 3 months, and 6 months intervals. Oral prednisolone at 1 mg/kg body weight was started in cases showing severe inflammation in the post-operative period as determined clinically. Early or immediate postoperative period was considered from Day 1 to 30 and late postoperative period is more than 1 month.

Statistical analysis

Data were entered in a Microsoft Excel Sheet (Microsoft Corp, Redmond, Washington, US), and were analyzed using SPSS version 16.1 (SPSS Inc, Chicago, Illinois, USA). Continuous variables were expressed as means (± standard deviations), and categorical variables were expressed as individual counts. After testing for normality distribution of data, the statistical tests were allotted. Non-parametric tests were used for intergroup comparison. Pearson's correlation test was used for calculating correlation coefficient. Differences were considered statistically significant when the *P* value was less than 0.05.

Results

Overall 17 eyes of 17 patients with prior history of treated and quiescent uveitis underwent trans-scleral fixated glued IOL for various indications were evaluated. There were 41.2% (n = 7), 23.5% (n = 4), and 35.3% (n = 6) anterior uveitis, posterior uveitis and pan uveitis respectively. There were (n = 5) 29.4% males and (n = 12) 70.6% females in the study group with OD (52.9%, n = 9) and OS (47.1%, n = 8) included. The mean age was 50.7 ± 16.1 years. The etiological associations were tuberculosis (23.5%, n = 4), toxoplasmosis (11.7%), Fuch's hetero chromic cyclitis (5.8%, n = 1), HLA B27 associated (11.7%), psoriatic arthritis (5.8%, n = 1), rheumatoid arthritis (5.8%, n = 1), sarcoidosis (11.7%), herpetic kerato-uveitis (5.8%, n = 1), and idiopathic (17.6%, n = 3). Systemic morbidity like diabetes and hypertension without ocular complications were seen in 35.3% (n = 6) of the eyes. The most common indication for glued IOL was found to be preoperative and intraoperative subluxation (n = 6) 35.3%, followed by aphakia (due to deficient capsules) (n = 4) 23.5% and decentered IOL (n = 4) 23.5%. The explantation of other types of secondary IOLs like ACIOL or iris clip lens for either a defective vision or flare up of uveitis also contributed significantly (n = 3) 17.6%. Preoperative irregular pupil was observed in 23.5% (n = 4) eyes. The preoperative inflammation (3 months prior to surgery) was mild (grade 1 and 2) in 6 eyes, severe (grade 4) in 11 eyes respectively. Out of 17 eyes, the type of uveitis was 11 eyes (chronic), and 6 eyes (recurrent).

Three-piece foldable acrylic hydrophobic IOL and poly methyl methacrylate (PMMA) was implanted in 35.3% (n = 6) and 64.7% (n = 11), respectively. The positions of scleral flaps were horizontal in 88.2% and vertical in 11.7% of the eyes. Pars plana vitrectomy was required along with glued IOL to remove vitreous membranes and opacities in 23.5% (n = 4) of eyes. No prophylactic peripheral iridectomy was performed in any of the eyes.

Post-operative inflammation

Immediate postoperative flare was noted in 41.1% (n = 7) of eyes [Table 1] and there was significant increase in AC flare on day 1

($P = 0.007$) and day 7 ($P = 0.003$) from the preoperative status. At 1 month the flare reduced and reverted to preoperative levels [Table 1] and remained stable at 6 months. There was significant increase in AC inflammation reaction on day 1 ($P < 0.001$) from the preoperative status. Normal AC was seen in 41.1% (n = 7) eyes and 58.8% (n = 10) showed postoperative AC reaction on Day 1. A significant difference in AC reaction was observed till 3 months. However, at 6 months 88.2% (n = 15) eyes recorded normal AC. Immediate postoperative day 1 boggy edematous iris was seen in 29.4% (n = 5) of the eyes. Iris edema resolved by 1 week on subsequent medical management and atrophic iris patches were observed in 23.5% (n = 4) eyes at 6 months. Hypopyon measuring 2 mm was recorded in 5.8% (n = 1) on day 1 postoperative period which resolved with medical therapy.

Visual outcome

The mean preoperative uncorrected visual acuity (UCVA) improved from 1.5 ± 0.5 LogMAR to 0.91 ± 0.5 LogMAR postoperatively [Fig. 1]. There was significant improvement ($P < 0.001$) in the mean best corrected visual acuity (BCVA) from 1 ± 0.8 LogMAR to 0.5 ± 0.5 LogMAR at 6 months [Fig. 2]. A drop in the post-operative uncorrected and best corrected visual acuity was noted in the immediate post-operative period, which improved significantly in the subsequent follow-up visits. The immediate drop in the postoperative visual acuity was due to the transient fibrin membrane and corneal edema. The mean preoperative and postoperative IOP was 13.2 ± 2.3 mmHg and 15 ± 2.7 mmHg, respectively [Table 2]. There was no significant change in the preoperative and the postoperative IOP. Out of 5 eyes that developed ocular hypertension in the post-operative period, 3 eyes had transient ocular hypertension were treated successfully with anti-glaucoma medications and control of inflammation. However, 2 eyes with uncontrolled IOP with anti-glaucoma therapy developed significant secondary glaucoma with changes in the visual field and optic nerve head cup-disc ratio. These 2 cases were managed medically with two drug combination and followed with serial field tests. The preoperative corneal endothelial count density reduced from 2397.7 ± 486.4 cells/sqmm to 2317.1 ± 476.3 cells/sqmm postoperatively at 6 months. The mean percentage loss was 3.3%. The clinical slit lamp [Fig. 3] and OCT evaluation of IOL showed, good IOL centeration in all the eyes with subscleral haptics [Fig. 4].

Complications profile

The most commonly encountered post-operative complication [Table 3] in the uveitic eyes undergoing glued IOL implantation was deposits over the IOL (47%), followed by cystoid macular edema (CME) (41%), and epiretinal membrane formation (ERM) (24%). There was reduction in BCVA due to macular edema.

The mean visual acuity in eyes with macular edema was 0.1 ± 0.2 LogMar (range 0.02-0.5). Other noted complications

Table 1: Comparison of Preoperative and postoperative follow up changes in the anterior chamber reaction

	Cell *n* (%)	Flare *n* (%)
Day 1		
Normal	7 (41.2)	10 (58.8)
Grade 0.5	1 (5.9)	0
Grade 1	1 (5.9)	0
Grade 2	1 (5.9)	1 (5.9)
Grade 3	6 (35.3)	3 (17.7)
Grade 4	1 (5.9)	3 (17.7)
Statistic: *P* (Pre vs. Day 1)	<0.001***	0.007**
Day 7		
Normal	9 (52.9)	9 (52.9)
Grade 0.5	5 (29.4)	5 (29.4)
Grade 3	3 (17.7)	3 (17.7)
Statistic: *P* (Pre vs. Day 7)	0.003**	0.003**
1st month		
Normal	12 (70.6)	13 (76.5)
Grade 0.5	2 (11.8)	2 (11.8)
Grade 1	1 (5.9)	0
Grade 2	2 (11.8)	2 (11.8)
Statistic: *P* (Pre vs. month 1)	0.044*	0.102 (NS)
3rd month		
Normal	10 (58.8)	10 (58.8)
Grade 0.5	7 (41.2)	7 (41.2)
Statistic: *P* (Pre vs. month 3)	0.007**	0.007**
6th month		
Normal	15 (88.2)	15 (88.2)
Grade 1	0	1 (5.9)
Grade 2	2 (11.8)	1 (5.9)
Statistic: *P* (Pre vs. month 6)	0.485 (NS)	0.485 (NS)

Fisher exact test: *Significant at 5% Level ($P<0.05$), **Significant at 1% level ($P<0.01$), ***Significant at 0.1% level ($P<0.001$), NS- Not statistically significant ($P>0.05$), pre: Preoperative

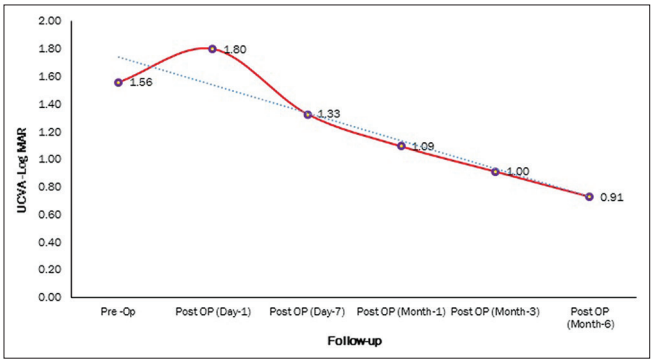

Figure 1: Line diagram showing the changing trend in the uncorrected visual acuity

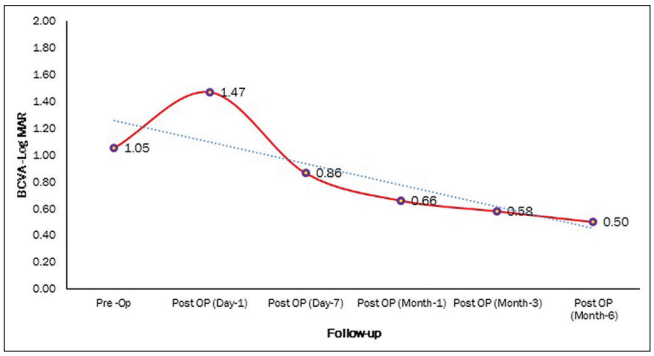

Figure 2: Line diagram showing the changing trend in the best corrected visual acuity

were rise in intraocular pressure, development of secondary glaucoma (11.7%), pseudophakic bullous keratopathy (11.7%), and anterior chamber inflammation reactivation (11.8%). One eye developed postoperative rhegmatogenous retinal detachment (RD) (6%), which underwent an immediate surgical intervention; while one patient required glued IOL explantation for persistent pigment dispersion. There was no case of choroidal detachment, hypotony or pthisis bulbi. Visual loss due to significant inflammation as a complication of CME, ERM, and IOL pigment dispersion has been noted to be 52.9%. Out of 7 eyes with CME, 3 eyes required posterior subtenon injection and 4 eyes resolved with anti-inflammatory and steroid therapy. The mean central foveal thickness in the CME eyes was 384.1 ± 188.7 microns. All 7 eyes with CME had grade severe uveitis 3 months prior to surgery. All eyes with inflammation reactivation required step-up treatment of topical steroids and tapered as per the response. There was no difference ($P = 0.92$) between the post-operative BCVA between the group with first time surgery (group 1, n = 8) and the group with second time (group 2, n = 9) surgery. There were 2 eyes with ERM in group 1 and group 2 respectively. However, macular edema was seen in 5 eyes in group 2 as compared to 2 eyes in group 1. Those 2 cases of glaucoma were seen in group 2. None of the patient required more than 1 month oral steroid and one patient required immunomodulator therapy (Tab Methotreaxate 5 mg weekly once along with tablet folate).

Table 2: Comparison of change in visual acuity and intraocular pressure

Variable	*n*	Median (IQR)	Min-Max	*P*
UCVA				<0.001*
Pre OP	17	1.6 (1-1.8)	0.8-2.4	
1st month	17	1.8 (1.6-2)	1.0-2.4	
3rd month	17	0.7 (0.6-1)	0.3-2.4	
6th month	17	0.6 (0.3-0.9)	0.3-1.8	
BCVA#				
Pre OP	17	0.7 (0.3-1.8)	0.2-2.4	<0.001*
1st month	17	1.8 (1.0-2.0)	0.6-2.4	
3rd month	17	0.3 (0.2-0.8)	0-1.8	
6th month	17	0.3 (0.2-0.8)	0-1.8	
		Mean (SD)	Min-Max	
IOP*				
Pre OP	17	17.1 (5.3)	10-33	0.3869
1st month	17	15.6 (6.6)	6-32	
3rd month	17	15.5 (6.3)	6-30	
6th month	17	15.0 (4.7)	8-26	

*(Significant at 0.1% level $P<0.001$) -One way repeated measures ANOVA, #Friedman test, OP: Operative

Table 3: Complications in the operated eyes

Complication	No. of cases (%)
Early increased IOP	3 (17.6)
Secondary Glaucoma	2 (11.8)
Epiretinal membrane*	4 (23.5)
IOL deposits	8 (47.1)
Uveitis flare up*	2 (11.8)
Worsening/New CME*	7 (41.2)
Need for IOL explantation	1 (5.9)
Pseudophakic Bullous Keratopathy	2 (11.8)
Hypotony	1 (5.9)
Hyphema	1 (5.9)
Retinal Detachment	1 (5.9)

IOP: Intraocular pressure, CME: Cystoid macular edema, IOL: Intraocular lens. *Preoperative severe uveitis (Grade 4)

Table 4 shows the post-operative anterior chamber inflammation in eyes with autoimmune uveitis after excluding 3 eyes with defective IOL which required explantation. The eyes with glaucoma had mean BCVA of 0.7 ± 0.5 LogMar. There was comorbid ERM in 2 out of 5 eyes with high IOP. Only 2 patients had field changes and optic disc abnormality. The two patients had BCVA less than 20/200.

Comparison with fellow normal PC IOL eye

Five out of 17 patients (29.4%) had their fellow eye operated for cataract with normal capsular bag posterior chamber IOL implantation. There was no significant difference ($P = 0.222$) in the final visual outcome at 6 months between the eyes in those 5 patients [Fig. 5]. However, the incidence of CME which required posterior subtenon injection was more (n = 2) in the glued IOL

Table 4: Comparison of the postoperative reaction in eyes with comorbid uveitis and glued IOL (*n*=14) excluding the IOL explantations

	Cell *n* (%)	Flare *n* (%)
Day 1		
Normal	7 (50)	10 (71.4)
Grade 0.5	1 (7.1)	0
Grade 1	1 (7.1)	0
Grade 2	1 (7.1)	1 (7.1)
Grade 3	3 (21.6)	2 (14.4)
Grade 4	1 (7.1)	1 (7.1)
Statistic: *P* (Pre vs. Day 1)	<0.001***	0.008**
Day 7		
Normal	9 (64.3)	9 (64.3)
Grade 0.5	4 (28.6)	3 (21.4)
Grade 3	1 (7.1)	2 (14.3)
Statistic: *P* (Pre vs. Day 7)	0.003**	0.003**
1st month		
Normal	12 (85.7)	13 (92.9)
Grade 0.5	2 (14.3)	1 (7.1)
Statistic: *P* (Pre vs. month 1)	0.024*	0.281 (NS)
3rd month		
Normal	10 (58.8)	10 (58.8)
Grade 0.5	7 (41.2)	7 (41.2)
Statistic: *P* (Pre vs. month 3)	0.007**	0.007**
6th month		
Normal	13 (92.9)	13 (92.9)
Grade 1	0	1 (7.1)
Grade 2	1 (7.1)	0
Statistic: *P* (Pre vs. month 6)	0.515 (NS)	0.515 (NS)

Fisher exact test: *Significant at 5% Level ($P<0.05$), **Significant at 1% level ($P<0.01$). ***Significant at 0.1% level ($P<0.001$), NS- Not statistically significant ($P>0.05$), pre: Preoperative

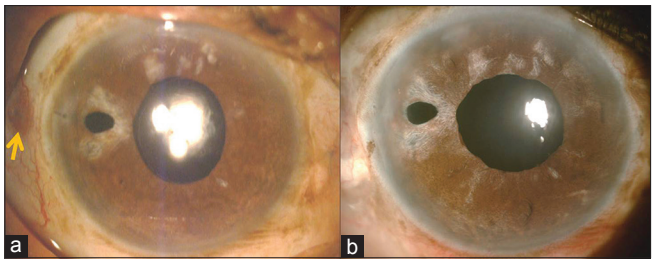

Figure 3: (a) Preoperative sutured scleral fixated IOL (arrow shows exposed prolene knot) has been explanted and (b) glued IOL performed (postoperative 6 months)

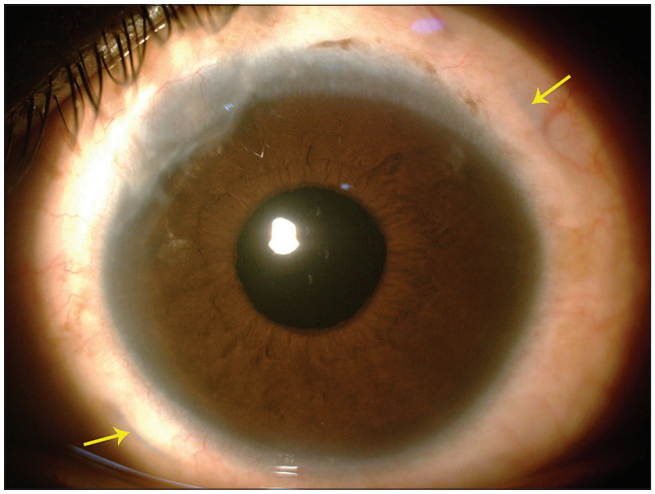

Figure 4: Centered glued IOL in an uveitic eye showing good centeration

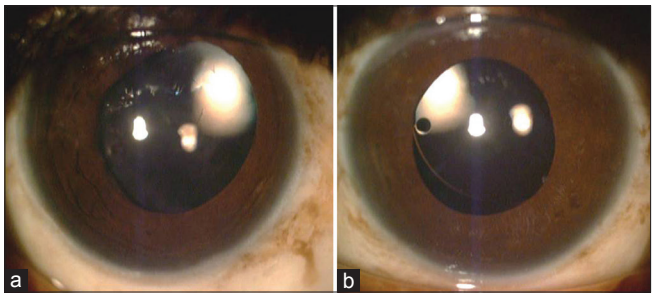

Figure 5: Comparison of glued IOL at 6 months (a) and the fellow eye (b) of the same patient with normal in-the bag IOL

eyes as compared to the PC IOL (n = 0). Immediate postoperative reaction was similar (fibrin noted in 3 eyes of glued IOL and their fellow eyes with PC IOL) in both the eyes and transient ocular hypertension was noted in both the groups which resolved after the control of inflammation. Reactivation of uveitis was similar in both the glued IOL (n = 3) and their fellow eyes (n = 2).

Discussion

Uveitis is often underestimated in many countries as a cause of significant visual loss and blindness.[17,18] Postuveitic squeal such as cataract and glaucoma, were cited as the main cause of visual loss.[17-19] The fact that uveitis is the primary offender is often overlooked. The type of uveitis, the control of inflammation, the surgical technique, the intraocular lens design, and the management of complications altogether have determined the surgical outcome.[20,21] Fuchs heterochromic irido-cyclitis (FHI) is often associated with excellent outcome after cataract surgery. Uveitis associated with Behcet's disease, pars planitis, Herpes simplex and herpes zoster, Vogt-Koyanagi-Harada (VKH) syndrome and sarcoidosis, may have a good result provided the inflammation was well controlled before surgery.[22] On the other hand, chronic recurrent uveitis associated with juvenile rheumatoid arthritis and recurrent granulomatous uveitis have poorer outcome.

Foster CS, *et al*. have already described four common indications for cataract surgery in uveitis.[3,4] Rojas B, *et al*. suggested that pre-operative control of inflammation is the most essential step in cataract surgery.[23] A quiescent eye for at least three months (preferably longer) before surgery has been highlighted repeatedly by several authors. The rule of thumb is to operate only when cells are absent (0 to 5) in the anterior chamber as assessed by the slit lamp examination. Foster *et al*. recommended a peri-operative supplementary inflammatory therapy of oral prednisone 1 mg/kg/day, along with topical Prednisolone acetate 1% eye drops, eight times a day, started two days before the surgery.[4-7] Other protocols included the pre-treatment with dexamethasone (0.01%) four times a day, started a week before surgery in milder cases, and step-up dose of oral steroids to 1 mg/kg or immunosuppressive agents.

Loss of posterior capsule and its support for IOL implantation is one of the most difficult challenges faced by the cataract surgeons. Efficient management of this complication is important for the long-term prognosis. Anterior vitrectomy is a crucial tool in the skill set of the anterior segment surgeon. Although a planned anterior vitrectomy may be performed in post-traumatic cataract, subluxated lens or secondary IOL; it is often an unplanned and unwelcome surgical procedure in uveitic eyes. One has to know, that even the most experienced surgeon may infrequently has to face the vitreous inadvertently prolapsing into the anterior segment in uveitic eyes intraoperatively. Thus, the surgeon's expertise in anterior vitrectomy and management skill can recover the intraoperative stress and thereby improve the outcomes.

The anterior chamber IOLs the existing alternative in eyes with deficient capsules may cause complications due to its close proximity to the angle recess, corneal endothelium, and iris leading to Uveitis-Glaucoma-Hyphema syndrome.[24,25] On the other hand, the Iris clip lenses induce iris chaffing, pupillary peaking and occasionally dislocate due to improper insertion into the peripheral iris.[26] Though the other alternative surgery, namely the sutured scleral fixated IOLs has eliminated the corneal, iris, and angle trauma, they still suffer from complications related to pseudophacodonesis leading to decreased IOL stability.[27] Pigment dispersion, recurrent hemorrhage, ciliary body erosion, hypotony, supra choroidal hemorrhage, choroidal effusion, CME, RD, external suture erosion, episcleritis, and endophthalmitis are the other complications noted in prolene sutured scleral fixated IOLs. Furthermore, the haptic of these IOLs need to posses eyelets for the insertion of sutures, there by needing a special design in the lens structure.[27] Late dislocation of capsular bag IOL has been reported in uveitic eyes.[28,29] Since uveitic eyes are more prone for zonular dehiscence on long term, there can be decenteration or tilt induced by zonular weakness. Transscleral fixated IOL has shown better outcomes compared to sutured scleral fixated IOL as studied by Sinha *et al*.[30] Todorich *et al*. reported 5 eyes with uveitis showing good visual outcomes after intrascleral IOL fixation.[31]

Glued IOL have stood the test of time as the preferred secondary IOL of choice in routine practice. Since glued IOL optic is placed similar to a posterior chamber IOL behind the iris, there is minimal inflammation due to iris chaffing.[32] No incidence of scleral melts or sutural erosion has been reported, unlike suture fixated IOL. A greater IOL stability is a prerequisite for a better visual outcome. A greater stability of the IOLs with the haptics secured in the scleral tunnel without pseudophacodonesis was observed. Three -piece acrylic hydrophobic lenses for glued IOL could be a preferred option in uveitic patient, due to the advantage of attracting the lesser amount of IOL deposits compared to the acrylic hydrophilic lenses.[33] The one year follow up study of glued IOL in non-uveitic eyes, showed no recurrent uveitis and 7.5% incidence of post operative macular edema.[34] Another trial in the pediatric eyes reported no recurrent inflammation and had 4.5% incidence of macular edema following glued IOL.[35] Fibrin glue is a biological tissue adhesive which imitates the final stages of the coagulation cascade when a solution of human fibrinogen is activated by thrombin. The commercially available products are produced from pools of plasma, that usually contain high yields of fibrinogen and consequently produce firm coagulums.[36] No additional exacerbations are induced by fibrin glue as reported in our study. In our series, cyclospasm was relieved by cyclopentolate 0.5%; the other alternative would be Homatropine 2% in acute inflammation.

A longer post uveitic quiescent period before the surgery has been repeatedly talked as the prerequisite for a better postoperative visual outcome. The most common complication in uveitic eyes with capsular bag IOL has been the posterior capsule opacification, which has been noted to occur in 62% of eyes. However, in eyes with deficient capsules, this will never happen. Nevertheless, the incidence of macular edema and epiretinal membrane has been recorded higher in our study than the normal PC IOL reported.[37-39] The recurrence rate of clinically significant inflammation was noted to be 41% in an report by Estafonous *et al*. after PC IOL in uveitic eyes. In our trial, significant visual loss due to inflammation and its complications like CME and ERM was recorded to be 52.9%. The probable reason being, that the uveitic eyes with excess surgical manipulation via the pars plana sclerotomy were more prone for higher release of proinflammatory mediators. This is higher than the CME recorded in phacoemulsification in uveitis.[40] In uveitic eyes, active inflammation increased the risk of CME when compared with eyes without inflammation (RR, 6.19; $P = 0.04$). CME was significantly associated with poorer vision ($P = 0.01$). Small study group, short study period, absence of control and mono-centric type are the limitations of the current study. Moreover, cyclopentolate can also be a confounding factor which can be a limitation in assessing postoperative inflammation. A single center's practice and approach to treatment protocols could vary from the universal standardized approach to a particular condition and patient. As there are limited or no studies on the outcome of trans-scleral glue fixated IOL's in uveitis eyes; we believe that this case series will add on to the vacuum on the literature and initiate further research in the specific field.

Conclusion

Glued IOL can cause exacerbation of inflammation in eyes with uveitis, and is associated with higher incidence of pigment dispersion, macular edema and epiretinal membrane formation. Anticipation of these complications, close follow-up and prompt initiation of treatment are warranted in patients with uveitis and deficient lens capsule when glued IOL surgery is performed.

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Conflicts of interest

There are no conflicts of interest.

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