Coloured Diaphragm Scleral Fixated IOL in Patients with Traumatic Aniridia and Cataract

Sonal Agrawal[1*], Anil Verma[2]

[1]Department of Ophthalmology, Krishna Institute of Medical Sciences Deemed University, Karad, Satara, Maharashtra, INDIA.

[2]Anupam eye Hospital, Karad, Satara, Maharashtra, INDIA.

[*]Corresponding Address:

sonalagro@gmail.com

Research Article

Abstract: Purpose of our study is to share our experience with coloured posterior chamber scleral fixated intraocular lenses (PCIOL) in patients with traumatic cataract and aniridia. 6 patient presenting with traumatic cataract and partial or total aniridia underwent cataract extraction and scleral fixated aniridia IOL (intraocular lense) after vitrectomy by the same surgeon. IOL was sutured to sclera with help of 10- o nylon at 2 and 8' 0 clocks and knot was buried under partial thickness scleral tunnel. Results were assessed in terms of visual acuity, contrast sensitivity, subjective comfort level in bright and dim light conditions. Results were gratifying in terms of quality of vision, and aesthetic satisfaction. Patient needed IOP (intraocular pressure) monitoring, fundus examination along with slit lamp examination in the follow up visits. In our small volume study we did not notice any major post op complications and minor complications like iritis, increased IOP, cystoid macular edema were managed with the routine post-operative regimen. Other indications for coloured IOL are congenital aniridia or iris coloboma, surgical iris loss, or ocular albinism. Other management options include cosmetic contact lenses, corneal tattooing, iridoplasty but the scleral fixated coloured IOL are closest to normal anatomy of lens iris diaphragm. Aniridia IOL implantation can be done along with penetrating keratoplasty, trabeculectomy or pars plana vitrectomy. There is an initial learning curve but it is not difficult to master it. Limitation after the procedure is the inability to examine peripheral fundus.

Introduction

The pigmented iris tissue plays vital role in visual function. It increases depth of vision and decreases chromatic and spherical aberration from the crystalline lenses. Partial or total aniridia is not only a cosmetic blemish for the patient; it decreases visual function causing glare, photophobia and photopic retinal damage. Patient quality of life is affected; he has to wears sunglasses even on the cloudiest days, limits his exposure to computer screens and is generally troubled with headaches at the end of the day. Management options include corneal tattooing, coloured contact lenses, iridoplasty, foldable artificial iris and various anterior and posterior chamber IOLs. Coloured diaphragm intraocular lenses sutured to the sclera are closest in resemblance to normal eye anatomy. Implants are available in black, brown, blue and green colour to stimulate the look of normal eyes. The first reported use of artificial iris implants was By Sundmacher et al and Reinhard in 1994, where they described using a black diaphragm single-piece IOL in congenital aniridia. Complications documented in previous studies are intraoperative fractured IOL, postoperative chronic uveitis, Hypotony or increased IOP, macular edema, IOL dislocation or rotation, suture exposure, corneal decompensation, choroidal hemorrhage, retinal detachment, Uveitis-glaucoma-hyphema syndrome. Patient needs to be explained about the procedure and possible complications. Other indications for Aniridia IOL are congenital aniridia or iris coloboma, herpetic iris atrophy, surgical iris loss, or ocular albinism. With glued iris prosthesis coming we will have more surgical option for such patients.

Materials and Method

Six eyes of six patients were included in this study, from January 2009 to December 2011. The study was approved by the ethical and research committee in the hospital.

Four patients were males and two were females, their age ranged from 18 to 42 years (Table 1). Patients had traumatic cataract and traumatic aniridia or uveal tissue abscission done during primary repair. 1 patient had lens matter in vitreous cavity post blast injury (Table 2 & 3 respectively).

Table 1: Demographics of the 6 Patients

	AGE	SEX	Mode of Injury
Case 1	21	M	Wooden Stick
Case 2	18	M	Blast Injury
Case 3	35	F	RTA
Case 4	33	M	Steel Wire
Case 5	42	M	RTA
Case 6	34	F	Wooden Stick

[RTA- road traffic accident]

Table 2: Ocular Damage due to Trauma

OCULAR DAMAGE	No. Of PT
Cataract	6
Uveal Tissue Loss	6
Globe Rupture	5
Vitreous Hemorrhage	4
Secondary Glaucoma	1
Retinal Detachment	1
Lens in Vitreous Cavity	1
Keratitis	1

Informed consent was obtained from every patient. Retrobulbar anesthesia was given to all the patients. A conjunctival incision was done 8 to 4 o'clock. Tenon's fascia was dissected and sclera exposed. An AC maintainer was fixed at 6 o'clock position. A 10.0 mm mid limbal lamellar incision was made without entering the eye. Scleral flaps were prepared at 2 o'clock and 8 o'clock for covering the suture for IOL fixation. All eyes received a coloured diaphragm polymethyl methacrylate (PMMA) IOL with an overall diameter of 12.5 mm. Each end of the C-shaped haptics has an eyelet for suture fixation. The 10.0 mm diameter optic has a 5.0 mm clear central optical zone surrounded by a peripheral coloured diaphragm. Anterior vitrectomy was done for all patients, followed by scleral fixation of the intraocular lens using the ab-externo approach. A 10-0 polypropylene double arm straight needle suture was passed into the anterior chamber under the 8 o'clock scleral flap and pulled out under the 2 o'clock scleral flap guided by a 26 gauge needle, both 1.5 mm posterior to the limbus. Second needle was passed horizontally 1mm apart from the previous site and similarly pulled out from 180^ opposite site. The eye was then entered with a 3.2 mm keratome through the lamellar incision. The polypropylene suture was retrieved through the limbal incision using a Sinski hook. The suture was cut in the middle, and the cut ends were secured to the respective eyelet. The loose ends of the suture were pulled at 2 and 8 o'clock. After the IOL was implanted in the ciliary sulcus, its position was adjusted. The IOL was secured to the sclera under the scleral flaps by tying the polypropylene suture. The superior incision and the scleral flaps were closed with 10-0 nylon sutures. The conjunctiva was closed with 8-0 vicryl suture. Dexamethasone 2.5 mg and gentamycin were injected subconjunctivally, and the eye was patched. Postoperatively, patients were seen on day 1, after 1 week, after 2 weeks, after 1 month, and monthly for 3 months. Then every 3 months till completion of 1 year of follow up. Post-operative medication included topical steroids and topical antibiotics 4-6 times daily, gradually tapered over a period of 6 to 8 weeks. Topical anti-glaucomatous medications were added in eyes with elevated ocular tension > 21 mmHg. Cycloplegic eye drops was given for 3 weeks or more if indicated. Postoperative examination in every visit included VA (visual acuity) examination using Snellen's chart, slit lamp examination, ocular tension measurement using Goldmann applanation tonometer, and fundus examination.

Table 3: Ocular Morbidity and the Previous Eye Surgery Done in the Eye of the Individual Case

	OCULAR DAMAGE	PRIMARY SURGERY DONE
Case 1	K Tear, Iris Prolapse, Cataract	K Tear Repair EW
Case 2	Keratitis, Iris Disinsertion, Cataract, VH	PPL +PPV + Vit Lavage
Case 3	Globe Rupture, Uveal Prolapse Cataract in Vitreous Cavity	Globe Repair EW PPL+ PPV+EL+FAX+BB+SF6
Case 4	Globe Rupture, Cataract, Hyphaema, VH, RD	Globe Repair BB+PPV+PFCL-S0I+EL + SOR
Case 5	Globe Rupture, Uveal Prolapse, Cataract	Globe Repair EW
Case 6	Globe Rupture, Uveal Prolapse, Cataract,	Globe Repair EW

[K- Cornea; EW- Elsewhere; VH- Vitreous hemorrhage; RD- Retinal Detachment; PPV-pars plana vitrectomy; PPL- parsplana lensectomy; EL- endolaser; FAX- fluid air exchange; BB- band buckle; PFCL- perfluorocarbon liquid; SOR- silicone oil removal]

Results

All eyes achieved the desired anatomic results. All patients were satisfied with the cosmetic results of the surgery and reported a decrease in glare and photophobia. Pre operative and post operative IOP and visual acuity are compared in table 4 & 5 respectively. Topical steroids for 6-8 weeks were given in all the patients for Postoperative inflammation. Systemic steroids were used in 2 cases with history of previous posterior segment surgery. Two patients developed increased IOP in the immediate postoperative period, controlled by topical antiglaucoma medications. One patient needed topical antiglaucoma therapy with B blocker and A agonist combination, throughout the follow up period (Table 6).

Table 4: BCVA Before and After SFIOL

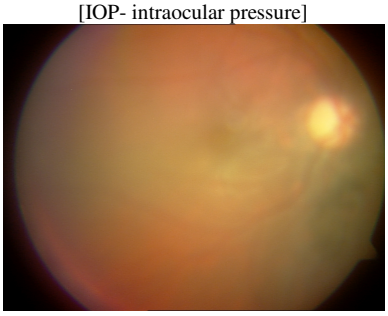
	PreOp Visual Acuity	BCVA After Primary Surg	BCVA after CD SFIOL Implantation
Case 1	PL PR	-	20/30
Case 2	PL PR	20/40	20/40
Case 3	Only PL	20/30	20/40
Case 4	Only PL	20/120	20/80
Case 5	PL PR	CF 2 mt	20/120
Case 6	PL PR	20/200	20/80

[Pre Op- preoperative; Post Op- post operative; BCVA- best corrected visual acuity; CD SFIOL- Coloured Diaphragm Scleral fixated Intaocular Lens]

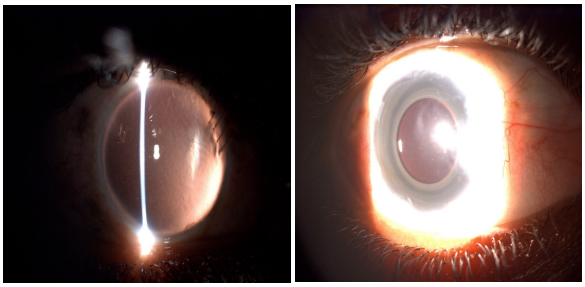
Table 5: IOP Before and After SFIOL

	Pre Op IOP	**Post Op IOP**
Case 1	**17**	**18**
Case 2	**15**	**26**
Case 3	**14**	**16**
Case 4	**12**	**14**
Case 5	**15**	**22**
Case 6	**14**	**18**

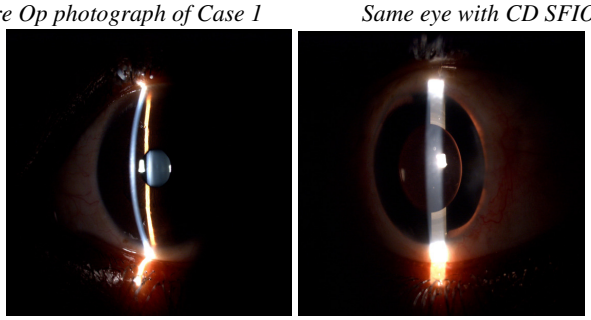
[IOP- intraocular pressure]



Fundus Photograph of the patient with CD SFIOL



Pre Op photograph of Case 1 *Same eye with CD SFIOL*



Operated Eye (left side) in Comparison to the normal eye (right side) of the same patient

Table 6: Complications and their Management after SF IOL surgery

	COMPLICATIONS	MANAGEMENT
Case 1	Not Significant	-
Case 2	Secondary Glaucoma	Anti Glaucoma Drops
Case 3	CME	NSAID E/D
Case 4	Not Significant	-
Case 5	Secondary Glaucoma	Anti Glaucoma Drops
Case 6	Not Significant	-

[CME – Cystoid Macular edema]

Discussion

The coloured diaphragm IOL seems to be a good option for the management of traumatic aniridia and aphakia. Iris reconstruction and optical correction is excellent though few post-operative complications are still a concern. Increased incidence of postoperative inflammation has been reported. The coexisting ocular trauma, eye undergone multiple surgeries, the 10 mm large incision to implant the IOL, the relatively prolonged time of surgery, and the excessive manipulations may all contribute to the intraocular inflammation. Another commonly reported complication of coloured diaphragm IOL implantation is elevated IOP. Increased incidence of glaucoma post scleral fixation IOL can be attributed to the preexisting trauma, the large IOL especially if not properly positioned, friction between the coloured diaphragm lens and the ciliary body causing mild anterior uveitis, or friction with the trabecular meshwork causing damage to aqueous outflow channel. Cystoid macular edema (cme) was observed in one eye, but probably preexisted in this eye, following several earlier surgical procedures. Cme was controlled with topical NSAID drops (Table 6). None of the patients in our study developed hyphema or vitreous hemorrhage. Hyphema and vitreous hemorrhage may result from damage to ciliary body and anterior ciliary vessels during IOL suturing. Haptics were placed obliquely at 2 and 8 O'clock position in these patients. So it is important to avoid the 3-9 O'clock position or the 12-6 O'clock position. We did not notice corneal decompensation in any of the patient and specular microscopy could not be done in our set up.Lifelong regular and careful followup is essential. Surgery can be performed by anterior and posterior segment surgeon though it has an initial learning curve. Aniridia IOL implantation can be done along with penetrating keratoplasty, trabeculectomy or pars plana vitrectomy.

Conclusions

Artificial iris–lens diaphragm implantation restores quality vision with good contrast sensitivity and stereopsis. Our experience with the aniridia lenses has been rewarding in terms of visual and aesthetic rehabilitation. Minor complications post-surgery were managed with medicine. No secondary surgical intervention was needed. Secondary glaucoma is still a concern. Reduced visibility of peripheral fundus if needed is one limitation. Till we have some electronic device with functional iris diaphragm, Coloured diaphragm intraocular lenses are a good option for the management of patient with traumatic cataract and aniridia.

We share our experience with Aniridia posterior chamber intraocular lenses (PCIOL) in patients with traumatic cataract and aniridia.

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