MANAGEMENT OF POSTERIOR DISLOCATED INTRAOCULAR LENSES IN A TERTIARY HOSPITAL

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ABSTRACT

BACKGROUND

The aim of this study was to assess and compare the visual outcome of different approaches in the management of dislocated PCIOL.

MATERIALS AND METHODS

20 eyes of 20 patients who underwent 3PPPV/anterior vitrectomy to refixate or IOL exchange for dislocation or subluxation of PCIOL from 2012 to 2015.

SFIOLs were implanted in 12 patients, IOL refixation was done in four patients and four were left aphakic.

This is a retrospective study of 20 eyes of 20 patients with dislocated/subluxated PCIOLs in a tertiary hospital from 2012 to 2015.

STATISTICAL ANALYSIS

Paired t-test statistical method.

RESULTS

We retrospectively analysed hospital records of patients who had undergone three PPPV/anterior vitrectomy for posteriorly dislocated/subluxated IOLs 20 eyes of 20 patients were analysed. SFIOLs were implanted in 12 patients, IOL refixation was done in four patients and four were left aphakic. Postoperative BCVA of 6/12 or better was achieved in 66.67% in primary SFIOL, secondary SFIOL and IOL refixation groups. BCVA of <6/60 was seen in all patients left aphakic. Early and late complications were most in aphakic patients. IOL refixation procedure had minimum early and late complications. Subluxated PCIOLs do better than dislocated lens where a successful SFIOL was placed.

CONCLUSION

IOL refixation procedure has the least complication rate. Early complications of SFIOL management resolve with time. Thus, 3PPPV/anterior vitrectomy with SFIOL and IOL refixation procedures offer a novel approach towards visual rehabilitation of patients with subluxated or dislocated PCIOLs.

KEYWORDS

SFIOL, 3PPPV, Dislocated/Subluxated Posterior Chamber Intraocular Lens.

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BACKGROUND: Intraocular Lens (IOL) malposition is a serious complication of cataract surgery, which range from simple IOL decentration to luxation into the vitreous cavity. Subluxated IOLs involve such extreme decentration that the IOL optic covers only a small fraction of the pupillary space. Luxation involves total dislocation of the IOL into the posterior segment. Decentration of an IOL maybe the result of the original surgical placement of the lens or it may develop in the postoperative period because of external (e.g., trauma, eye rubbing) or internal forces (e.g., scarring, Peripheral Anterior Synechiae [PAS], capsular contraction, size disparity).[1]

During surgical intervention, an important consideration is whether to remove, reposition, fixate with suture or exchange the dislocated IOL after performing a Pars Plana Vitrectomy (PPPV).[2] ACIOL (anterior chamber intraocular lens) implantation may not be feasible due to iris and anterior chamber angle damage. Iris sutured IOLs carry risk of postoperative inflammation (cystoid macular oedema, uveitis) and iris atrophy with pigment dispersion. Scleral Fixated IOL (SFIOL) is a safe and effective option for the visual rehabilitation of an aphakic eye with inadequate posterior capsule support.[3] A comparison between SFIOL,

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IOL refixation or to leave the patient aphakic and the sequelae is studied.

MATERIALS AND METHODS: This is a retrospective study of patients with dislocated/subluxated PCIOLs (posterior chamber intraocular lens) and their management and outcome from 2012-2015 at tertiary ophthalmic hospital.

A total of 20 eyes of 20 patients were included in the study. Of these, 12 underwent SFIOL implantation, 4 underwent IOL refixation and 4 were left aphakic after 3PPPV/anterior vitrectomy and removal of IOLs. All had a minimum follow up of three months.

Inclusion Criteria:

1. Traumatic subluxation/dislocation of PCIOL.
2. Complicated cataract surgery with posterior capsular dehiscence with IOL dislocations.

Exclusion Criteria: Corneal opacity, chronic uveitis, optic nerve pathology and macular pathology interfering with final visual outcome.

Patient Evaluation: The following data was recorded from each patient:

1. Aetiology of lens dislocation.
2. Risk factors for PCIOL dislocation (e.g. pseudoexfoliation).
3. Method of surgical correction.
4. Postoperative visual acuity.

Procedure: All cases which had posterior dislocation were managed with standard three port pars plana vitrectomy with releasing of IOLs from vitreous membranes and intraocular lenses were floated anteriorly with the help of PFCL (perfluorocarbon liquid) and removed through scleral tunnel. 12 cases underwent ab externo two-point scleral fixation and four cases were left aphakic after application of cryotherapy/laser for retinal breaks and internal tamponade. Four cases underwent anterior vitrectomy and IOL refixation using modified McCannel technique. This was done by creating a scleral flap 2 mm posterior to the limbus and passing a 10-0 Prolene suture below the flap such that the suture goes posterior to the superior haptic and comes out through the clear cornea (paracentesis) on the opposite side. The suture is then passed in the reverse direction through the clear cornea, anterior to the superior haptic to form a loop around the haptic and is brought out below the flap and sutured below the scleral flap so that the suture is not exposed. In the similar manner, the inferior haptic is secured. Complications of each procedure has been enlisted in the discussion.

Postoperative Evaluation: Patients were evaluated on first postoperative day, then subsequently at one week, one month and three months postsurgery. At each subsequent visit, all patients were submitted to detailed evaluation including visual acuity, anterior and posterior segment examination and refraction.

RESULTS: This study included 20 eyes of 20 patients. Of these, 17 were males and three were females. 13 (65%) were in the age group of more than 50 years (TABLE 1). Of the 20 patients, 13 were following blunt traumatic dislocation, three were following complicated cataract surgery and four were spontaneous dislocation of PCIOL.

Aetiology of aphakia was predominantly traumatic (65%), while surgical (15%). Others (20%) included a case of retinitis pigmentosa, another high myope status post barrage laser and one anterior dislocation of PCIOL (TABLE 2).

All were posteriorly dislocated PCIOL (95%) except one which was anteriorly dislocated.

12 patients were managed with SFIOL implantation (nine primary SFIOL and three secondary), four were managed with IOL refixation, while four were left aphakic after removal of the dislocated IOL because of high levels of myopia, which reduced the need for IOL implantation or poor visual potential (TABLE 4).

The preoperative BCVA for subluxated and decentered IOLs (30%) had preop BCVA of 6/12 to 6/9, whereas the dislocated IOLs (70%) was <1/60 to 6/24 (logMAR 1.778-0.602) (TABLE 5).

The postoperative BCVA varied depending on the surgical management. At the end of three months, the SFIOL group had BCVA of 6/24-6/9 (logMAR 0.602-0.176), which was equivalent to IOL refixation group of BCVA ranging from 6/36 to 6/6 (logMAR 0.778 to 0). Postoperative BCVA was worst in those left aphakic (<1/60) (TABLE 6).

The preoperative BCVA and postoperative BCVA were compared using the paired t-test statistical method and p-value calculated was <0.05 in the SFIOL group and IOL refixation groups, which is statistically significant. The same did not hold for those patients left aphakic.

Of the patients managed with SFIOL, two patients had hyphaema of which one patient had early postoperative vitreous haemorrhage (transient), one developed hypotony (transient), one developed retinal break intraoperatively. One patient developed late postoperative endophthalmitis (TABLE 7, 8, 9).

Of the patients in whom IOL refixation was done, one patient had retinal break intraoperatively, which was managed effectively with cryotherapy.

Retinal breaks were noted in two patients who were left aphakic. They were managed with cryotherapy +/- endolaser. One underwent SF6 (sulphur hexafluoride) injection intraoperatively and the other underwent silicon oil injection as internal tamponade. Both patients progressed to retinal detachment as late postoperative complication. One patient had corneal oedema in the early postoperative period who progressed to secondary glaucoma in the late postoperative period.

Age Group	Males	Females	Total	Percentage
<10 years	0	0	0	0%
11-20 years	1	0	1	5%
21-30 years	0	0	0	0%
31-40 years	3	0	3	15%
41-50 years	1	2	3	15%
51-60 years	6	1	7	35%
>60 years	6	0	6	30%
Total	**17**	**3**	**20**	**100%**

Table 1: Patient Demographics

Aetiology	No. of Eyes	Percentage
Traumatic	13	65%
Surgical	3	15%
Others	4	20%

Table 2: Aetiology of Aphakia

Indications For Surgery	No. of Eyes	Percentage	BCVA
Subluxated	5	25%	6/12-6/9
Decentered IOL	1	5%	6/9
Dislocated IOL	14	70%	Mixed

Table 3: Indications for Surgery

Procedure	No. of Eyes	Percentage
SFIOL	12	50%
IOL Refixation	4	25%
Other	4	25%

Table 4: Procedure

Preop Visual Acuity	logMAR	Primary SFIOL	Secondary SFIOL	IOL Refixation	APHAKIA
<1/60	>1.778	0	1	1	1
1/60-2/60	1.778-1.477	6	2	3	3
3/60-4/60	1.301-1.176	2	0	0	0
5/60-6/60	1.079-1	0	0	0	0
6/36-6/24	0.778-0.602	1	0	0	0

Table 5: Preoperative Visual Acuity

Postop Visual Acuity	logMAR	Primary SFIOL	Secondary SFIOL	IOL Refixation	APHAKIA
<6/60	>1.778	1	0	0	4
6/60-6/36	1-0.778	0	0	1	0
6/24-6/18	0.602-0.477	2	1	0	0
6/12-6/9	0.301-0.176	6	2	2	0
6/6	0	0	0	1	0

Table 6: Postoperative Visual Acuity

Intraop Complications	Primary SFIOL	Secondary SFIOL	IOL Refixation	Aphakic
Hyphaema	2	1	0	0
Hypotony	1	0	0	0
Retinal break	1		1	2
Total	**4**	**1**	**1**	**2**

Table 7: Intraoperative Complications

Early Postop Complications	Primary SFIOL	Secondary SFIOL	IOL Refixation	Aphakic
Postop uveitis	2	1	1	2
Corneal oedema	0	0	0	1
Hyphaema	0	0	0	0
Vitreous haemorrhage	1	0	1	0
Choroidal detachment	0	0	0	0
Hypotony	0	0	0	2
Total	**3**	**1**	**2**	**5**

Table 8: Early Postoperative Complications

Late Postop Complications	Primary SFIOL	Secondary SFIOL	IOL Refixation	Aphakic
Secondary glaucoma	0	0	0	1
Pupil deformation	0	0	0	0
Persistent uveitis	0	0	0	1
CME	0	0	0	0
IOL decentration	0	0	0	NA
Retinal detachment	0	0	0	2
Endophthalmitis	1	0	0	0
Total	**1**	**0**	**0**	**4**

Table 9: Late Postoperative Complications

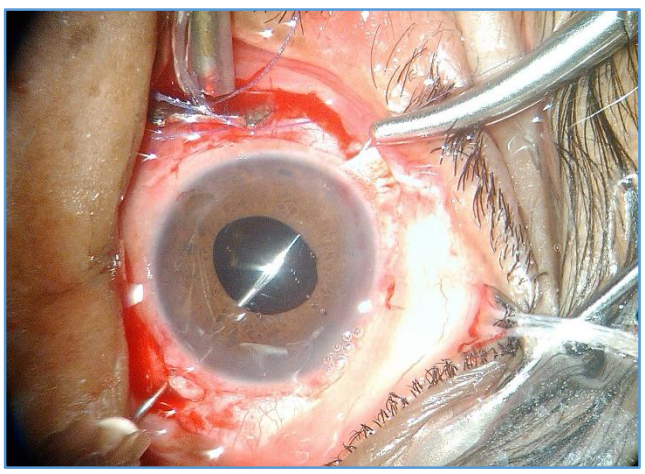

Figure 1

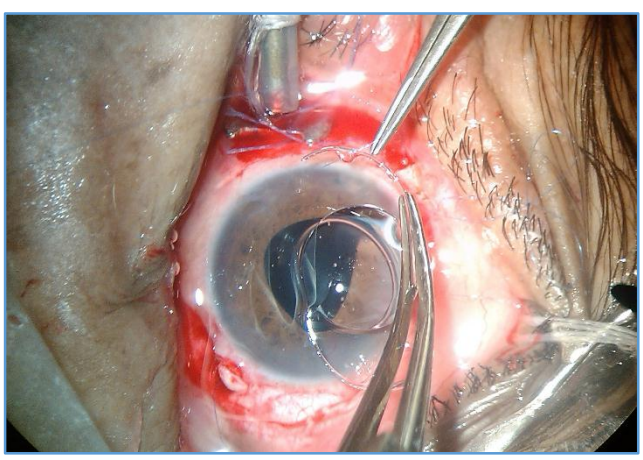

Figure 2

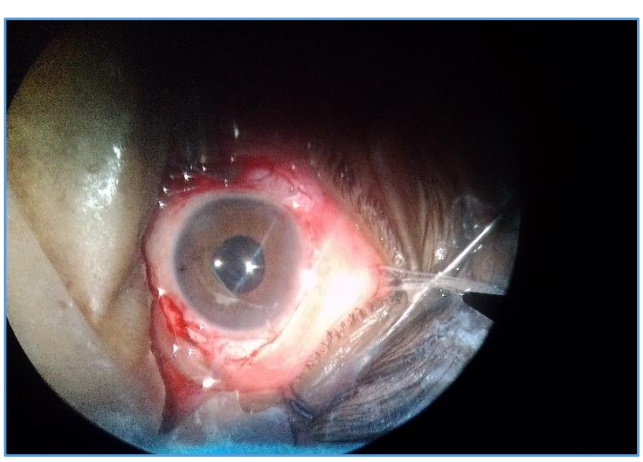

Figure 3

DISCUSSION: Posteriorly dislocated lens can cause visual loss due to retinal detachment or macular damage by IOL or by aphakic refractive conditions and requires surgical management.

Our study found there to be more men (85%) than women (15%) with dislocated PCIOLs. This association has been reported in other studies and subsequently previous authors have suggested zonular weakness related to gender.[4,5]

Clinically significant decentration occurs in about three percent of the cases. The frequency of IOL dislocation ranges from 0.2-1.8%.[1]

Several reports documented excellent outcomes after secondary PCIOL implantation in patients with intact posterior capsules.[6,7] Good short-term results were initially reported with early closed-loop Anterior Chamber Intraocular Lenses (ACIOLs), but unfortunately numerous complications including uveitis, glaucoma, hyphaema, cystoid macular oedema, endothelial cell loss and corneal decompensation.[6] To avoid them, methods to transsclerally fixate posterior chamber lenses to ciliary sulcus were developed.

Gess first described scleral fixation of one haptic of a posterior chamber lens. In 1986, Malbran and colleagues described an open-sky technique for sutured PC IOLs and in 1988 Cowden and Hu reported secondary PC lens implantation with scleral fixation of both haptics through scleral stab incisions.

Transsclerally fixated Posterior Chamber Intraocular Lens (PCIOL) is an effective way to correct aphakia especially for those patients with corneal disease, iris tissue damage, angle abnormalities or glaucoma. Being located in a position closest to the original lens, PCIOL possesses several inherent advantages: It does not contact with corneal endothelium or trabecular meshwork; acts as a mechanical barrier between vitreous cavity and anterior chamber. However, tie erosion and suture exposure remains to be a potential problem in transsclerally sutured PCIOL.[8] Certain circumstances warrant removal of an IOL without secondary IOL implantation. This is determined on an individual basis and taking into account the patient's expectation.[1]

Our study is a retrospective review of 20 eyes of 20 patients who underwent scleral fixated intraocular lens implantation, IOL refixation and those in whom a secondary IOL could not be implanted were left aphakic.

IOL dislocation can be subdivided into early and late dislocation. Early dislocation refers to dislocation occurring within three months of cataract surgery, whereas late dislocation occurs more than three months after cataract extraction.[9]

In early dislocation, posterior capsular rupture or zonular dialysis usually is present. It occurs because of improper fixation within the capsular bag and instability of the IOL-capsular bag complex.[10] Late IOL dislocation results from zonular weakness since the IOL is adequately fixed within the capsular bag. Several risk factors including pseudoexfoliation syndrome,[11] trauma, prior vitreoretinal surgery and connective tissue disorders have been associated with zonular weakness.

In our study, six out of 20 patients come in the criteria of early dislocation of PCIOL, four out of six patients have good visual outcome. One patient with SFIOL implantation had postoperative endophthalmitis, which is the most dreaded complication of SFIOL implantation.[12] Another patient in whom IOL explant and anterior vitrectomy was done was left aphakic.

The postoperative BCVA varied depending on the surgical management. At the end of three months, the SFIOL group had BCVA of 6/24-6/9 (logMAR 0.602-0.176), which was equivalent to IOL refixation group of BCVA ranging from 6/36 to 6/6 (logMAR 0.778 to 0). Postoperative BCVA was worst in those left aphakic (<1/60) (Table 5). The preoperative BCVA and postoperative BCVA were compared using the paired t-test statistical method and p value calculated was <0.05 in the SFIOL group and IOL refixation groups, which is statistically significant. The same did not hold for those patients left aphakic.

The various complications encountered were grouped as intraoperative, early postoperative and late complications.

The intraoperative complications were seen in five patients with SFIOL, one patient with IOL refixation and two patients left aphakic. Three patients with SFIOL had hyphaema due to passage of needles with vitreous haemorrhage in one patient postoperatively. The cause of the bleeding is due to damage to long posterior ciliary arteries, iris circle artery and hypervascular tissue of ciliary body.

Hypotony was noted in one case with SFIOL implantation. Retinal breaks were noted in one patient with SFIOL implantation, one with IOL refixation and two patients who were left aphakic. They were managed with cryotherapy +/- endolaser. Of the two patients who were left aphakic, one underwent SF6 injection intraoperatively and the other underwent silicon oil injection. Both patients progressed to retinal detachment as late postoperative complication. Retinal breaks may result from both posterior vitreous detachment and traction of the peripheral vitreous base. Patients should be followed with routine peripheral fundus examination after SFIOL surgery.[13]

The early postoperative complications were seen in four patients with SFIOL, two patients with IOL refixation and five complications in who were left aphakic. Postoperative uveitis was seen in two cases with primary SFIOL, one case of secondary SFIOL, one case of IOL refixation and two cases left aphakic. Postoperative uveitis is a result of extensive intraoperative uveal tissue manipulation. Extensive postoperative uveitis is seen in patients when eye is already inflamed due to previous trauma/surgery or diabetes. Kwong and Kanigowska K in their study documented anterior uveitis in 16.7%, which was mainly due to iris manipulation.[14]

In our study, 13 out of 20 patients had a traumatic aetiology, which explains the postoperative uveitis.

Corneal oedema was seen in one patient in whom the PCIOL was dislocated into anterior chamber. The endothelial-lenticular touch would have led to endothelial cell loss contributing to corneal oedema. This patient progressed to develop aphakic bullous keratopathy and secondary glaucoma postoperatively.

Vitreous haemorrhage was seen in one case of SFIOL and one case of IOL refixation. Intraoperative trauma to ciliary body could be the cause for the same. The vitreous haemorrhage cleared in all patients within one to three weeks with no residual complications.

The incidence of intraoperative and early postoperative complications was higher in the primary SFIOL group as compared to the secondary group with a total of seven complications in primary and two complications in secondary SFIOLs, which is comparable to the study done by Luk AS et al.[15] The lower incidence could be attributed to the increased interval between the initial and secondary procedure in secondary SFIOL, which helped in the inflammation to subside.

The late postoperative complications were observed in one patient of primary SFIOL group who progressed to postoperative endophthalmitis. Suture-related complications are unique to SFIOL. To avoid erosion of the knots through conjunctiva, scleral flaps can be used to cover the knots or they can be rotated into scleral tissue without flaps. The partial thickness scleral flaps can atrophy overtime and expose the Prolene knot. Endophthalmitis has been reported and remains a real risk in patients undergoing SFIOL.[3]

The two cases who were left aphakic with SF6 injection and silicon oil injection respectively for intraoperative retinal breaks slowly had progressive hypotony and retinal detachment. The case with anterior dislocation of PCIOL progressed to secondary glaucoma and aphakic bullous keratopathy.

Cystoid macular oedema was not reported in any of the above cases. IOL decentration was not seen in any of the patients included in the study.

On comparing the incidence of complications, SFIOL group and those left aphakic had more complications in early postoperative period, but they gradually subsided in the SFIOL group with progressive improvement in BCVA. The patients left aphakic had more severe and sight threatening complications, which progressively led to diminution in final visual outcome.

CONCLUSION: When there is insufficient capsular support for IOL placement, both modern anterior chamber lenses, transsclerally sutured sulcus lenses and SFIOLs have showed excellent results. In our study, IOL refixation procedure seems to have the least complication rate than the other procedures. The visual outcomes after SFIOL implantation to correct aphakia have showed favourable results. Early complications of SFIOL management seem to resolve with time. However, the suture-related problems following SFIOL implantation and risk of endophthalmitis must always be borne in mind and explained to the patient before surgery. Thus, SFIOL and IOL refixation procedures offer a novel approach towards visual rehabilitation of patients with subluxated or dislocated PCIOLs.

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