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Visual Outcome and Complications of Late Implanted Anterior Chamber Intraocular Lens

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Abstract:-

- ***Aim:***

To observe the visual outcome and complications of late implanted anterior-chamber intraocular lens (ACIOL) in eyes with insufficient or absent posterior capsular support.

- ***Material and Methods:***

Observational study of 52 eyes of 51 patients over a period of 2 years. All eyes underwent late implantation of ACIOL after 3 months of primary surgery (aphakia), which were not eligible for posterior chamber IOL implantation due to different causes. Patients were kept aphakic with good anterior vitrectomy or pars plana vitrectomy for 3 months to reduce inflammation. ACIOL was then implanted with clear corneal incision after that period. Patients were observed for 18 to 48 months.

- ***Result:***

Mean age of the patients was 57.69±14.64 years with a female predominance (55.8%). Major indications for surgery were posterior capsular tear (57.70%) and subluxated crystalline lens (19.2%). Pre- and post-operative LogMar visual acuity was 1.51±0.29 and 0.31±0.28 respectively. Ninety percent (90.04%) eyes achieved 6/18 or better vision in the Snellen chart. A total of 9 eyes (17.30%) developed some complications. No patients developed persistent raised IOP finally.

- ***Conclusion:***

Late implantation of secondary ACIOLs results in good visual outcome and greatly reduced some complications such as persistent rise of intraocular pressure (IOP), persistent uveitis and cystoid macular edema.

Keywords:- *Late Implanted Anterior Chamber Intraocular Lens (ACIOL), Posterior Capsular Support, Persistent Rise of IOP, Persistent Uveitis and Cystoid Macular Edema.*

I. INTRODUCTION

Posterior capsular tear is a common intraoperative complication during cataract surgery. Most of the time, posterior capsular tear is associated with vitreous loss, which increases the risk of expulsive hemorrhage, cystoid macular edeme, corneal edema due to endothelial decompensation, secondary glucoma and retinal detachment that compromise the visual outcome [1]. After vitreous loss, it is mandatory to do limited anterior vitrectomy and placement of a posterior chamber intraocular (PCIOL) lens if capsular support is sufficient. In the case of insufficient capsular support, ACIOL, iris claw lens or scleral fixation lenses are alternative procedures for these patients [1]. Other clinical scenarios, such as previous aphakic patients, dislocated lens, decentered IOL, zonule degeneration and capsular dialysis which also need anterior vitrectomy and secondary ACIOL implantation [2, 3]. But ACIOL implantations has several complications such as persistent uveitis, persistent rise of IOP, hyphema, corneal endothelial loss etc. which ultimately results in poor visual outcome. Most of these complications are associated with immediate ACIOL implantation in cases of huge posterior capsular tear and vitreous loss [1,4]. To give a better visual outcome and to minimize the worse complications like secondary glaucoma and uveitis in cases of large PC rent with vitreous loss, we did delay ACIOL implantation after 3 months of primary surgery in 52 eyes of 51 patients. In this article we are sharing our experience of delayed ACIOL implantation in the vitrectomized aphakic eye, which has been less frequently discussed in literature.

II. MATERIAL AND METHODS

This is an interventional study done at Chittagong Eye Infirmary & Training Complex during the period of 2 years starting from 01.04.2019 to 31.03.2021. Fifty-two eyes of 51 patients underwent late implantation of ACIOL after 3 months of primary surgery (aphakia). All patients who were not eligible for PCIOL due to big per operative capsular tear, subluxated lens, late onset capsular block syndrome, ectopia lentis, decentered IOL, zonular dialysis were kept aphakic for 3 months. Among those who had good vision with +10 diopters were included in the study. Aphakic patients with retinal disease, corneal disease, known cases of glaucoma, and optic nerve diseases were excluded. Included

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patients have a history of good anterior limited or core vitrectomy with dropped nucleus or cortical matter removal, surgical peripheral iridectomy, good suturing of sclera-corneal wound. The study was approved by the local institutional review board (IRB) and conducted according to the principles of the 2013 revision of the Declaration of Helsinki.

- *Surgical Technique of Primary Surgery*:

Done in case of only a huge posterior capsular tear which is insufficient for implantation of PCIOL and subluxated lens, good anterior vitrectomy with a surgical peripheral iridectomy, suturing of corneo-scleral/corneal wound, thus patient left aphakic. In the case of dropped nucleus/cortical matter, pars plana vitrectomy with removal of nucleus/cortical matter with one surgical peripheral iridectomy, was done as primary surgery. All patients were left aphakic for at least 3 months for resolving inflammation with oral ciprofloxacin 500mg twice daily for 7 days, cycloplegic eye drop for 2 weeks, topical broad spectrum antibiotic for 2 weeks and topical corticosteroid a tapering dose for a total of 2 months. After 3 months follow up, we checked the anterior chamber for anterior evidence of inflammation, fundus evaluation and vision improvement with aphakic spectacles. In favourable cases, ACIOLs are implanted as secondary surgery.

- *Surgical Technique of Second Surgery:*

A 6 mm clear corneal incision was done at superior limbus with keratome under local anesthesia. A tunnel of 6 mm was done in the clear cornea with the help of a crescent knife and entered into the anterior chamber with a keratome. A small amount of viscoelastic material (dispersive) material was put in the anterior chamber and the open-loops ACIOL was placed into the anterior chamber with the help of McPherson forceps. ACIOL was placed horizontally and removed all viscoelastic materials. The wound was closed with a 10-O nylon suture [fig. 01]. Subconjunctival broad spectrum antibiotics and corticosteroids were given to every patient and they closed the eye with a pad and bandage for 24 hours. Post operatively, all patients were treated with oral ciprofloxacin 500mg twice daily for 7 days, cycloplegic eye drop for 1 week, topical broad spectrum antibiotic for 2 weeks and topical corticosteroid in a tapering dose for a total of 2 months. Patients received spectacles after refraction and followed from 18 months to 48 months.

III. RESULTS

Fifty-two eyes of 51 patients were included in this study. The mean age of the patients was 57.69±14.64 years. Majority of the patients were female (55.8%, n=29) and males were 42.3%, [n=22] [fig. 02]. One male patient had both eyes operated due to subluxated lens. Major indications for surgery were posterior capsular tear (57.70%, n=30) and subluxated crystalline lens (19.2%, n=10), other causes were zonular dialysis (n=2), ectopia lentis (n=1), late onset capsular block syndrome (n=1), membranous cataract (n=1), decentered intraocular lens (n=4) and traumatic cataract (n=1) [fig. 03]. Preoperative LogMar visual acuity uncorrected and corrected was 1.51±0.29 and 0.47±0.35. The postoperative final corrected LogMar visual acuity was 0.31±0.28. More than ninety percent (90.04%) eyes achieved 6/18 or better vision in the best corrected Snellen chart in the final follow up [Table 01, fig. 04]. A total of 9 patients (17.30%) developed some complications as shown in figure 05. No patients developed persistent raised IOP finally.

IV. DISCUSSION

It is common practice to implant an open loop haptic ACIOL after performing a limited anterior vitrectomy in a large posterior capsular tear with compromised capsular support to a PCIOL in the sulcus and also in the absence of posterior capsule in some clinical situations such as dislocation of lens, decentration of IOL, ectopia lentis. Various literature demonstrates vitreous loss during surgery can lead to visual impairment, but modern management with partial anterior vitrectomy followed by ACIOL implantation by an expert surgeon can minimize the complications and visual outcome is good. But still, some immediate and delayed complications are also reported. Increased incidence of glaucoma, persistent uveitis, retinal detachment, cystoid macular edema are associated with immediate implantation of ACIOL [1].

Here we left the eyes aphakic for 3 months to resolve inflammation and then implant an ACIOL with a clear corneal tunnel followed by suturing. On the first post-operative day, 50 eyes (96%) showed minimal signs of inflammation, one patient (1.95%) developed toxic anterior segment syndrome (TASS) and the patient was treated accordingly, but in final follow up patient was dropped out and one patient (1.95%) had moderate inflammation with mild hypopyon which was subsequently resolved with topical corticosteroid. One patient (1.95%) had raised IOP on the first postoperative day due to vitreous hemorrhage and subsequently reduced it to normal level after treatment with antiglucoma medication but finally developed pseudophakic bullus keratopathy with poor visual outcome with counting finger 3 meters. Striate keratopathy occurred in 2 patients (3.84%), which was resolved within 2 weeks. Focal retinal detachment with macular edema was seen in one patient (1.95%) and after 5 months, one patient (1.95%) was suffering from rhegmatogenous retinal detachment, which subsequently underwent retinal detachment surgery and achieved good (6/12) vision. One patient (1.95%) having corneal scar and anterior chamber IOL was tilted due to an irregular pupil with poor visual outcome. Pale optic disc was seen in one patient (1.95%) with a cup disc ratio of 0.8 having moderate vision. In our study we compared the outcome of late implantation of ACIOL with other studies. Mean log MAR visual acuity in our study was comparable to other studies and the complications in our study were surprisingly low compared to others (Table 02). Different studies showed the range of macular edema from 8-24%. In our study, the macular edema was 1.9 % which is lower than other studies [4,5,6]. Different studies show a very wide range of short and long term IOP rise from 4.1% to 100%. Kwong et al. showed all patients with primary ACIOL developed secondary glaucoma finally [7]. In

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another study by Evereklioglu et al., where 4.1% of the patients developed delayed secondary glaucoma with secondary ACIOL done with adequate vitrectomy [8]. A study conducted by GS Negre ei et al., in vitrectomised eye, 32% of patients developed late onset glaucoma after ACIOL implantation [6]. In our study of 52 eyes with late implantation of ACIOL (after 3 months of primary surgery), one patient (1.92%) developed postoperative IOP rise for a short period resulting from vitreous hemorrhage and subsequently developed bullus keratopathy with poor vision. Here the retinal detachment was 1.92% (n=1), which is comparable to other studies that range from 0-6% [5,6,9]. Different literature describes that implantation of ACIOL increased corneal endothelial cell loss [10]. We did not perform the endothelial cell count of corneas pre- and after ACIOL implantation to assess the endothelial cell loss. In our study, only 2 patients (3.84%) developed striate keratopathy, which subsequently resolved and gained 6/12 vision.One patient with vitreous hemorrhage and post-operative rise of IOP subsequently developed bullus keratopathy, most probably due to endothelial decompensation.

V. CONCLUSION

Delayed implantation of secondary ACIOL may be a good option in attaining good visual acuity and minimization of severe complications like persistent rise of IOP, persistent uveitis, cystoid macular edema. A controlled primary anterior vitrectomy and remaining aphakic for 3 months to control inflammation will facilitate the outcome.

➢ *Tables*

Table 1 Pre- and Postoperative Visual Acuity

Visual Acuity Range	Preoperative UCVA	Preoperative BCVA	First PO UCVA	Final UCVA	Final BCVA
6/6 – 6/18	00	73.10%	48.10%	67.30%	90.40%
6/24 – 6/60	00	23.10%	28.80%	30.80%	7.70%
<6/60	100	3.80%	23.10%	1.90%	1.90%
Total	100	100%	100%	100%	100%

Note:, UCVA-uncorrected visual acuity, BCVA-best corrected visual acuity, PO- post operative.

Table 2 Comparison with Other Studies.

Parameters	Our Study	Mahapatra et al.[4]	Khan M A et al.[9]
Sample size (n)	52	90	33
Preoperative mean Log Mar VA	1.51±0.29	1.59±0.44	1.66±0.74
Preoperative mean Log Mar VA	0.31±0.28	0.36±0.33	0.4±0.39
Complications (%)			
Retinal detachment	1.92	2.2	-
Corneal decompensation /PBK	1.92	-	-
Toxic anterior segment syndrome-TASS	1.92	-	-
Persistently raised IOP	-	4.4	3
Persistant uveitis	-	2.2	-
IOL tilt	1.92	1.1	-
Cystoid macular edema	1.92	8.8	3
Epiretinal membrane	-	-	6.1
Pale disc	1.92	-	-

Note: PBK-pseudophakic bullus keratopathy

➢ *Figures*

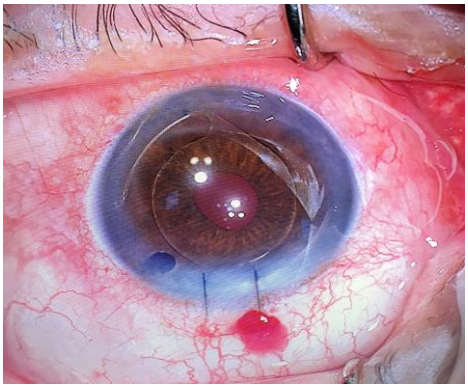

Fig 1 ACIOL Implanted with Wound Closure with 2 Nylon (10-O) Sutures.

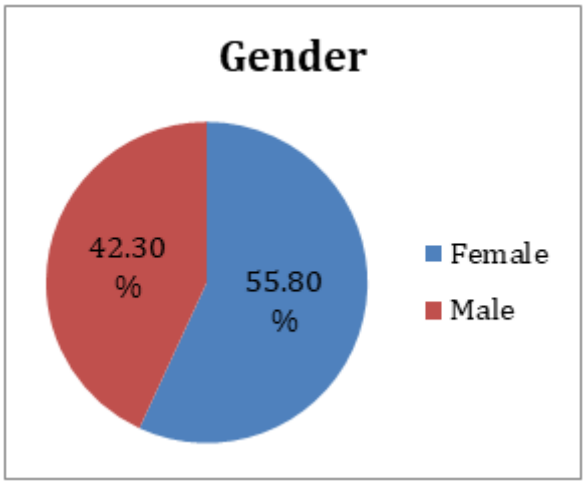

Fig 2 Gender Distribution

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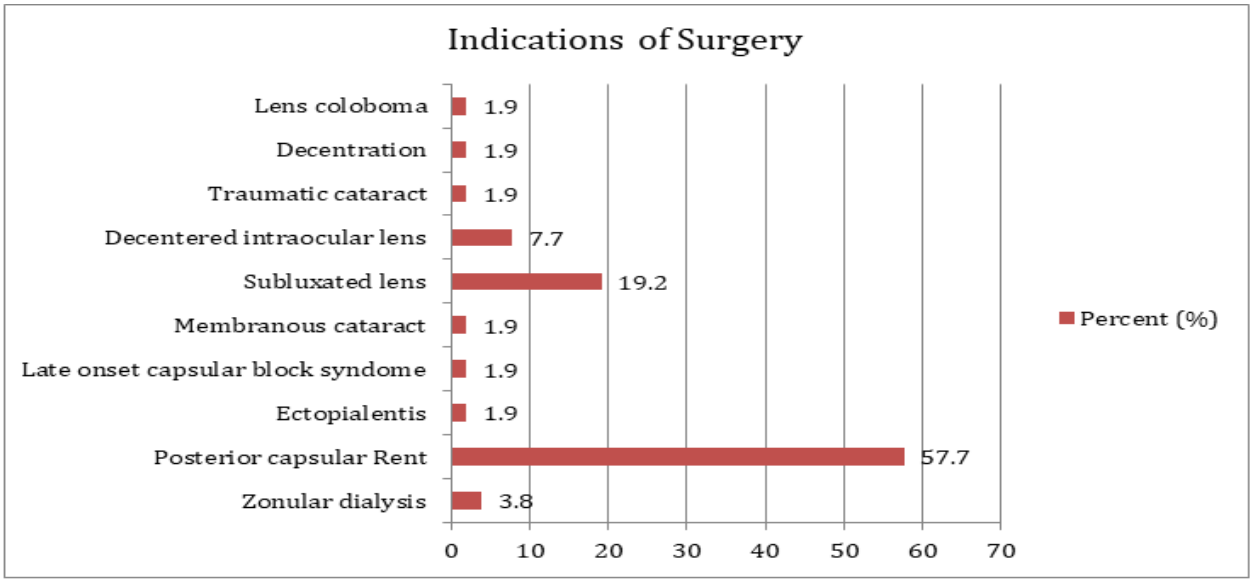

Fig 3 Indications of Surgery

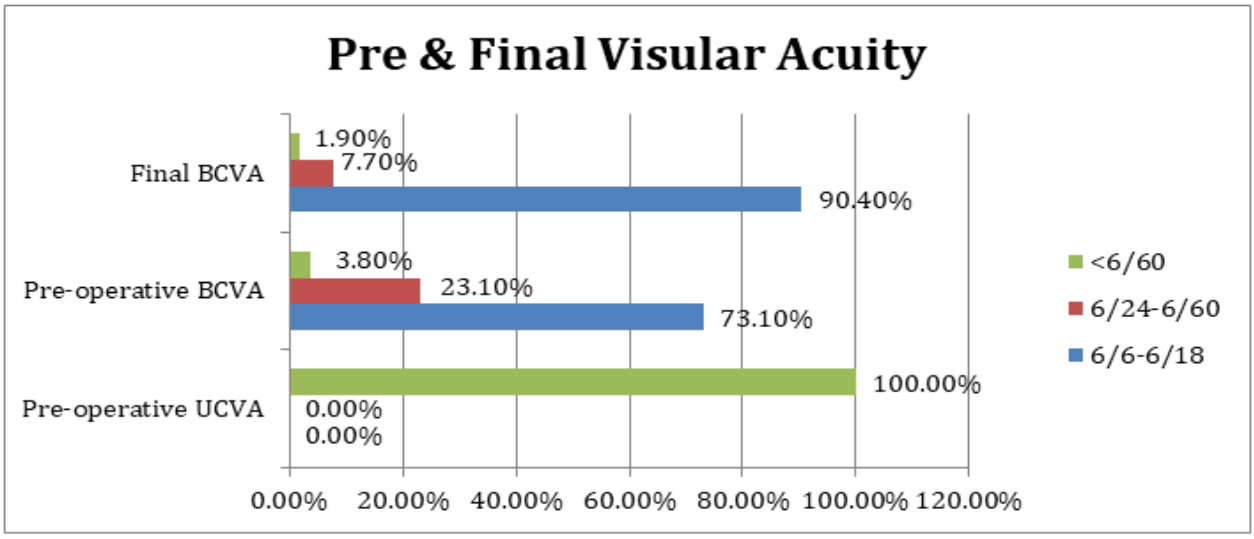

Fig 4 Pre- and Postoperative Visual Acuity

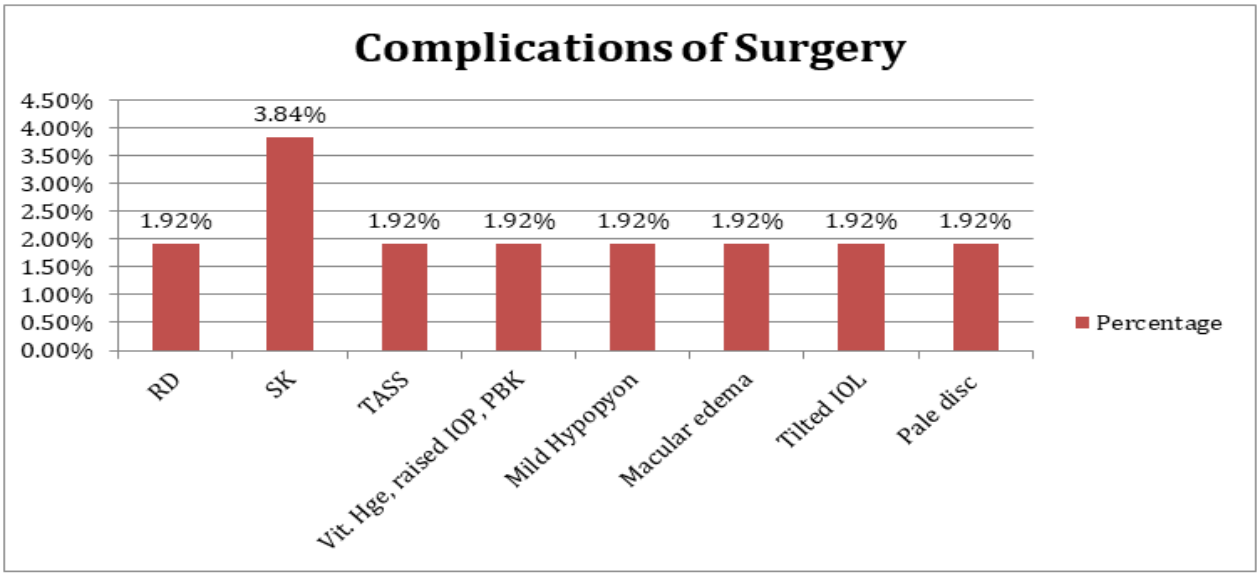

Fig 5 Complications of Surgery.

Note: PBK-Pseudophakic Bullus Keratopathy.Ote: RD- Retinal Detachment, SK-Striate Keratopathy, TASS-Toxic Anterior Segment Syndrome

- *Limitation:* No endothelial cell count in pre- and postoperative period.

- *Conflict Of Interest:* No commercial/financial interest.

- Authors Contribution

- Sujit Kumar Biswas- Concept, design, manuscript preparation
- Soma Rani Roy-Manuscript review, grammatical correction
- Aparajita Raihan- Literature review
- Tangila Mohona- Statistical analysis

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REFERENCES

[1]. P Andrew Pearson, Douglas G Owen, Maureen Maliszewski, And Thomas J Smith. Anterior chamber lens implantation after vitreous loss. British journal of Ophthalmology, 1989,73,596-599
[2]. NSD Raju. Anterior chamber intra ocular lens implantation. Indian journal of ophthalmology. Year : 1989 | Volume : 37 | Issue : 2 | Page : 73--74
[3]. K M Waddell, B C Reeves, G J Johnson. A comparison of anterior and posterior chamber lenses after cataract extraction in rural Africa: a within patient randomised trial. British Journal of Ophthalmol 2004;88:734–739. doi: 10.1136/bjo.2003.031187
[4]. Mahapatra SK, Mannem N. Anterior chamber intraocular lens - An elective alternative in traumatic and surgical aphakia in the era of scleral-fixated intraocular lens. Indian J Ophthalmol 2021;69:1404-8.
[5]. Finn AP, Feng HL, Kim T, Mahmoud TH. Outcomes of anterior chamber intraocular lens implantation in patients undergoing pars plana vitrectomy. Ophthalmol Retina 2018;2:895-9.
[6]. Negre i GS, Lai M, Petrou P, Walker R, Charteris D. Anterior chamber lens implantation in vitrectomised eyes. Eye (Lond) 2018;32:597-601.
[7]. Kwong YY, Yuen HKL, Lam RF, Lee VY, Rao SK, Lam DS. Comparison of outcomes of primary scleral-fixated versus primary anterior chamber intraocular lens implantation in complicated cataract surgery. Ophthalmology 2007;114:80-5.
[8]. Evereklioglu C, Er H, Bekir NA, Borazan M, Zorlu F. Comparison of secondary implantation of flexible open-loop anterior chamber and scleral- fixated posterior chamber intraocular lenses. Journal of Cataract Refractive Surgery 2003;29:301-8.
[9]. Khan MA, Gupta OP, Pendi K, Chiang A, Vander J, Regillo CD, et al. Pars plana vitrectomy with anterior chamber versus gore-tex sutured posterior chamber intraocular lens placement: Long-Term Outcomes. Retina 2019;39:860-6.
[10]. Pechméja J, Guinguet J, Colin J, Binder PS. Severe endothelial cell loss with anterior chamber phakic intraocular lenses. J Cataract Refract Surg 2012;38:1288-92.