ORIGINAL ARTICLE

COMPARISON OF SECONDARY AC-IOL IMPLANTATION ON APHAKIA PATIENTS WITHOUT CAPSULAR SUPPORT AFTER PARS PLANA VITRECTOMY VERSUS COMPLICATED CATARACT SURGERY

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ABSTRACT

Introduction and objectiv: *Capsular support is often absent in cases of aphakia secondary to ocular trauma or previous complicated intraocular surgery**.** This study aims to compare the short-term efficacy and safety of secondary AC IOL implantation for aphakia patients who underwent pars plana vitrectomy and complicated cataract surgery*

Method: *Retrospective, comparative, case series of 72 aphakic eyes without capsular support after pars plana vitrectomy (Group 1 =37 eyes) and complicated cataract surgery (Group 2=35 eyes) who underwent secondary AC-IOL implantation (Iris Claw and Anterior Chamber) in Yap Eye Hospital and Air Force Central Hospital Hardjolukito. Basic characteristics such as age, sex, laterality, visual acuity, intraocular pressure (IOP), central corneal thickness, endothelial count, axial length, anterior chamber depth and keratometry were recorded*

Results*: There were no statistically differences at baseline characteristics between the two groups. Despite the proportion difference of lens type used in both group (p=0.04), the mean visual acuity outcome at day 1 and month 3 were found similar. However, on day 7 and month 1 the difference of postoperative visual acuity showed a trend. The difference of postoperative mean IOP was also not significant at day 1, month 1 and month 3, but showed a trend in day 7 (p=0.06). The proportion of complication cases were found different in both group (p=0.01), with secondary glaucoma was found highest (18%).*

Conclusion: *The outcomes of secondary anterior chamber IOL implantation after pars plana vitrectomy and complicated cataract surgery were found similar, although there was a significant difference in the proportion of complication in both groups*

Keyword: *Aphakia, AC IOL, vitrectomy, complicated cataract extraction, outcome*

INTRODUCTION

Secondary intraocular lens (IOL) implantation is often a challenging surgical procedure especially in patients with aphakia. Aphakia patients usually have a history of eye trauma or complicated intraocular surgery.[1]

Pars plana vitrectomy (PPV) often done in patients with a history of complicated cataract extraction with retained lens material in the posterior segment, IOL dislocation, or patients left aphakic at the time of prior vitrectomy.[2] The management of aphakia in a vitrectomized eye can pose some problems because of frequent lack of capsular support or changes in the anatomy of the anterior chamber, angle, or cornea .[3]

In patients who sustain capsular damaged during cataract surgery but have adequate capsular support, monofocal IOLs can be placed in the sulcus in the posterior chamber. In patients with inadequate capsular support or dislocated intraocular or crystalline lens due to zonular damage, options include the use of an angle-supported anterior chamber IOL (ACIOL), a posterior chamber IOL fixated to the sclera or sutured to the iris, or iris-claw IOL (ICIOL) .[4] Transscleral fixation of a PC IOL is technically challenging, requires more surgical time, and is associated with a higher incidence of intraoperative complications. AC IOLs can be iris-(iris-claw) or angle-supported. The angle-supported IOL is fixed with four haptic points in the anterior chamber, while the iris-fixed IOL is trapped in the anterior iris surface.[5] Anterior chamber IOLs are also associated with short- and long-term complications, some of which are a direct consequence of the presence of haptics in the AC angle.[6]

This study aims to measure the efficacy and safety of secondary AC IOL implantation for the correction of aphakia without capsular support in patients who underwent pars plana vitrectomy and complicated cataract surgery

SUBJECT AND METHOD

Medical records of 72 aphakia patients (72 eyes) who were performed secondary AC-IOL implantation surgery at Dr Yap Eye Hospital and Hardjolukito General Yogyakarta, from January 2017 to August 2018 were retrospectively reviewed. Patients were divided into two groups. Group I (37 eyes) who underwent previous PPV or vitrectomized eyed and Group II (35 eyes) who underwent previous complicated cataract surgery or unvitrectomized eye. The study was approved by the hospital's institutional review board.

Pre-operative data include gender, age, laterality, visual acuity, intraocular pressure, endothelial count, central corneal thickness, keratometry, axial length and anterior chamber depth. Follow up was done on day 1, day 7, month 1, and month 3. Visual acuity, intraocular pressure and complication were documented. The lens used was AC-IOL Angle Supported IOL Iris Claw IOL. The operation was done under local anesthesia.

For the iris-claw IOL insertion, vertical paracentral paracenteses were performed at 10- and 2-o'clock positions. Acetylcholine 1% was injected intracamerally as a miotic agent, followed by injection of a dispersive cohesive viscoelastic material. A biplanar 5.2-mm

posterior vascular corneal incision was made at 12 o'clock with slit knife. The iris-claw IOL was inserted, rotated with lens manipulator to a horizontal position, and centered over the pupil. Special lens fixation forceps were introduced through the main corneal incision. While holding the IOL, an enclavation needle was introduced, and 1 mm of iris tissue located in the middle was trapped by applying gentle pressure over it through the slotted center of the lens haptic. The same maneuver was performed for the second haptic.

For the angle supported AC IOL, 7-mm peritomy was created superiorly. Make a scleral incision 6-mm long, 1 mm from the limbus using a bent crescent blade. The anterior chamber was entered using a keratome blade. McPherson forceps were used to grasp the lens including the trailing haptic and about halfway across the optic and the lens was inserted into the anterior chamber. The scleral tunnel was closed using 10-0 nylon. a Sinskey hook was used to rotate the ACIOL The ACIOL should ideally be positioned in the iridocorneal angle with the footplates in contact with the scleral spur.

RESULTS

The baseline characteristic of the patients in this study was summarized in Table 1. The mean visual acuity was at baseline 1.9 ± 0.5 in Vitrectomy Group and 1.08 ± 0.5 in Cataract extraction Group. The visual acuity changes were shown in Figure 1. The mean intraocular pressure was found similar preoperatively in both groups. The changes in intraocular pressure changes during follow up was shown in Figure 2.

The indication of previous surgery in both groups was shown in Table 2. The mean number of previous surgeries in Vitrectomy Group was 1.67±0.47 and in Cataract Extraction Group was 1.02±0.16. The mean number of previous surgeries were significantly different in both groups ($p<0.05$)

Table 1. Baseline Characteristic

	Vitrectomy	**Cataract Extraction**	***p value***
Gender			
Male	28 (75.7)	25 (71.4)	0.7
Female	9 (24.3)	10 (28.6)	
Age	60 ± 9.9	59 ± 14.1	0.3
Laterality			
OD	18 (48.6)	20 (57.1)	0.5
OS	19 (51.4)	15 (42.9)	
Visual Acuity	1.9 ± 0.5	1.8 ± 0.5	0.6
Intraocular Pressure	16.2 ± 3.9	17.7 ± 6.5	0.35

Endothelial Count	2260 ± 425	2331 ± 649	0.7
Central Corneal Thickness	537 ± 30.4	561 ± 26.5	0,045
K1	43.16 ± 1.7	43.82 ± 1.81	0,17
K2	45.17 ± 2.4	44.39 ± 2.0	0,2
Axial Length	23.68 ± 1.04	23.63 ± 1.06	0,8
Anterior Chamber Depth	3.47 ± 0.63	3.21 ± 1.1	0.6

Table 2. Indication of previous surgery

	n (%)
Pars Plana Vitrectomy	
Posterior Lens dislocation	18 (48)
Nucleus Drop	5 (13)
IOL dislocation	12 (32)
Diabetic Retinopathy	1 (2)
Cataract Extraction	
Senile and diabetic cataract	26 (74)
Traumatic cataract	2 (5)
Anterior Lens subluxated	6 (17)
Complicated cataract	1 (2)

Table 3. Anterior Chamber Lens Type

	Vitrectomy	**Cataract**	**p value**
*I*ris *C*law	30 (81)	17 (49)	0,04
Angle supported	7 (19)	18 (51)	

The AC-IOL used were iris-(iris-claw) or angle-supported. The angle-supported IOL is fixed with four haptic points in the anterior chamber, while the iris-fixed IOL is trapped in the anterior iris surface. The lens used was shown in Table 3. There is a proportion different in lens type used in both group ($p<0,05$)

Visual acuity was improved significantly in both groups became 1.34 ± 0.89 in Vitrectomy group and 1.47 ±0.76 in Cataract Extraction Group ($p<0.05$) The mean visual acuity outcome at day 1 and month 3 were found similar. Day 7 (*p=0.09*) and month 1 (*p=0.05*) the difference of postoperative visual acuity showed a trend. The difference of postoperative mean IOP was also not significant at day 1, month 1 and month 3, but showed a trend in day 7 (*p=0.06)*. Postoperative complications found during follow up was shown in Figure 3. The most common complications were found on the first day of follow-up where secondary glaucoma was the most common (18%) followed by hyphema, uveitis, and descement fold. All the

complication can be overcome properly with medication. On the last day of follow up (month 3), there were no complications found. The proportion of complication occurrence was shown in Table 4.

Table 4. Complication Occurrence

	Virectomy	*Cataract*	*p*
Complication	13 (35%)	4 (12%)	0,01
No complication	24 (65%)	31 (88%)	

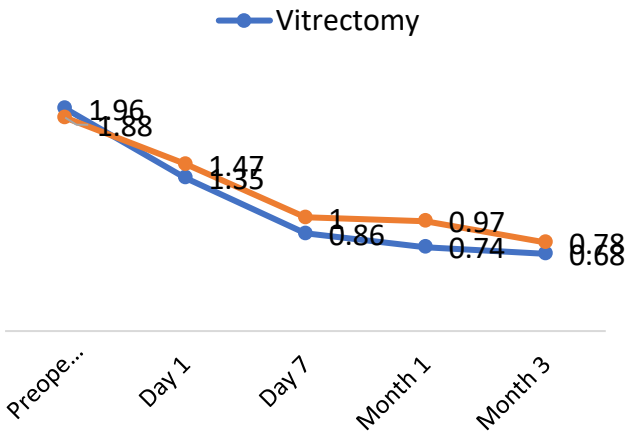

Figure 1. Visual Acuity Changes (LogMar)

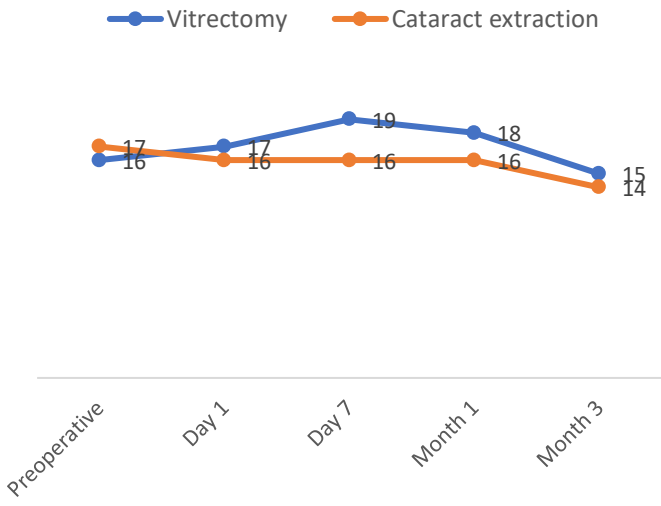

Figure 2. Intraocular Pressure Changes (mmHg)

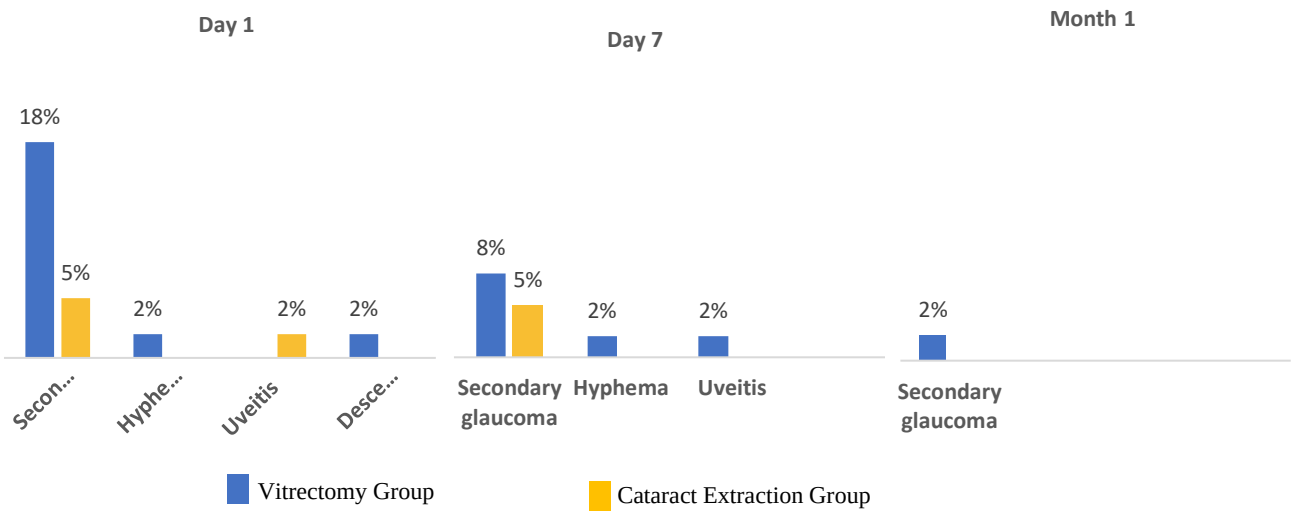

Figure 3. Complication during Follow Up

DISCUSSION

The surgical correction of aphakia without capsular support usually presents a challenging management issue, especially in a vitrectomized eye. In our studies, we implanted AC-IOL in a vitrectomized eye and non-vitrectomized eye. From the baseline characteristic, all the parameters are not statistically different, except in Central Corneal Thickness (CCT). In Cataract extraction group, the mean CCT is higher. Mean CCT in Asian was 539.29±34.1.[7] Central Corneal Thickness (CCT**)** is an indirect indicator of corneal endothelial dysfunction after cataract surgery. The increase in CCT suggests that there was some endothelial cell loss leading to a change in corneal thickness but not to the extent of causing visual impairment.[8] Visual acuity improved in both groups significantly (*p<0,05*). Our study results were in accordance with the previous study that found mean postoperative logMAR UCVA was: 0.78 ± 0.55**.**[1]

The most frequent complication in AC IOL implantation was elevated IOP, which included immediate postoperative to chronic elevation. In the majority of eyes, the IOP was well controlled with topical medication.[9] Increased IOP after Iris Claw IOL implantation has been reported at rates of 2.6-11.4% in the literature .[4] Based on a previous study in Vitrectomy Group. Intraocular rise also found postoperatively, IOP was > 21 mmHg in 1 (8.33%) eye .[3] In our study the presence of increased IOP is higher (18%) because in our study some patients still used anterior chamber angle supported IOL.

The proportion of complication (secondary glaucoma, hyphema, uveitis, descement

fold) cases were found different in both group *(p=0.01*). In the Vitrectomy group, most of the patient got AC-IOL iris-claw implantation where no vitreous support was present. The implantation of the IOL through enclavation of the iris was technically difficult because of iridodonesis.[3] It is more difficult to maintain a stable IOP during surgery in vitrectomized eyes, secondary implantation surgeries are more susceptible to complications.[4]

CONCLUSION

The outcomes of secondary anterior chamber IOL implantation after pars plana vitrectomy and complicated cataract surgery were found similar. There was a significant difference in the proportion of complication in both groups

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