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ORIGINAL ARTICLE

VISUAL OUTCOMES AND COMPLICATIONS OF IRIS-CLAW INTRAOCULAR LENS IMPLANTATION IN APHAKIC EYES WITH INADEQUATE CAPSULAR SUPPORT

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ABSTRACT

***Introduction*:** *Aphakia with inadequate capsular support remains a challenge for ophthalmologist. Although there is no consensus on the best method for this case, many studies have been reported using iris claw intraocular lens for secondary implantation.*

***Objective**: To evaluate the various indications, visual outcomes, and complications of iris claw intraocular lens in aphakic eyes.*

***Methods :** This retrospective case study was conducted in Undaan Eye Hospital, Surabaya, collecting data from medical records with a total of 188 eyes of 186 patients between May 2017 and April 2020, that were rehabilitated with prepupillary and retropupillary fixation of an iris claw lens. Patients were followed-up to 9 months for visual acuity and complications.*

***Results:** The most common cause of aphakia was subluxation of lens (spontaneous, trauma or congenital) in 90 of the 188 eyes (47.3%). The mean follow-up was 3 months (range :1-9 month). Most patient had the best preoperative BCVA (0-0.50 logMAR) 63%, ranging 0-2.47 logMAR with a mean of 0.72 logMAR. At final follow up, of the total patients, 72.9 % had the BCVA of 0-0.5 logMAR, with a mean of 0.37 logMAR. Complication included secondary glaucoma 2.12%, uveitis 1.06 %, iridodyalisis 1.06 %, and bullous keratopathy 1.06%.*

***Conclusion**: iris claw IOL implantation is a safe and effective method of rehabilitating aphakic eye with inadequate capsular support.*

Keyword: aphakia, iris claw, intraocular lens

INTRODUCTION

Cataract surgery is the most common ocular surgery procedure performed in the world, including in Indonesia. An intra ocular lens is usually implanted in the capsular bag after performing cataract surgery. But in some cases for example in subluxatio lentis, traumatic lens dislocation, and zonular weakness with inadequate capsular support is considered to remain aphakic until secondary IOL implantation surgery is performed.(1) For these cases, there are several techniques that can be performed, such as angle support anterior chamber IOL (ACIOL) , scleral fixated posterior IOL (SF-PIOL), and Iris claw IOL.(2) Iris claw was first introduced by Worst on 1978 who performed Iris claw secondary IOL on traumatic cataract patients,and after that it had been commonly used for secondary IOL on aphakic cataract surgery complication.(3)

Nowadays, there are many ophthalmologist consider using Iris claw IOL implantation technique because of its better visual results and minimal complication compared to SFIOL and ACIOL.[4][5]

Iris claw can be fixed in retropupillary (RP-ICIOL) or in prepupillary (PP-ICIOL), some recent cases report prefer to fix the iris claw IOL in retropupil position, to maintain the anterior chamber depth and the corneal endhotelial cell loss.[6] In this study, we evaluate the clinical results, visual outcome, and complication of secondary IOL implantation on aphakic patients in various cases with Iris claw IOL (ICIOL).

METHODS

This is a retrospective study, data collected from medical record with a total of 188 eyes of 186 patients from May 2017 to April 2020 at Undaan Eye Hospital, Surabaya. Eyes with subluxated lens, dislocated IOL, posterior capsular rupture, and aphakia due to complicated cataract surgery were included in this study. All patients had at least 1 month follow-up. Exclusion criteria were eyes with no light perception, corneal decompensation, and patient with less than 1 month follow up. Collected data preoperative were demographics, preoperative eye pathology, previous diabetic and glaucoma status, AC Depth, endothelial cell count, and best corrected visual acuity. Postoperative outcomes included slit-lamp examination, IOL position, and best-corrected visual acuity.

Visual acuity value was measured by Snellen chart that being converted to logarithm of the minimum angle of resolution (logMAR). AC Depth was measured by IOL master 500 biometry and endothelial cell count measured by NIDEK CEM 530 specular microscope. Statistical analysis was performed by SPSS. Surgical steps for anterior iris claw lens implantation; (a) Paracentesis at 2 & 10 o'clock using 15 degree stab knife. (b) A 6-mm main incision was perform using keratome. (c) Constrict the pupil with carbachol. (d) Maintain the anterior chamber with ophthalmic viscosurgical devices (OVD). (e) A PMMA iris claw IOL was inserted into the anterior chamber and can be placed horizontally or vertically. (f) Tucked the iris tissue into the haptic claw assisted by needle enclavation. (f) the corneal incision was sutured by 10.0 nylon suture.

Surgical steps for retropupil iris claw lens implantation; (a) Paracentesis at 3 & 9 o'clock using 15 degree stab knife. (b) A 6-mm main incision was perform using keratome. (c) Maintain the anterior chamber with ophthalmic viscosurgical devices (OVD). (d) A PMMA iris claw IOL was inserted into the posterior chamber through pupil (e) Tucked the iris tissue into the haptic claw assisted by fine spatula iris. (f) the corneal incision was sutured by 10.0 nylon suture. All

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the surgery were done in sub tenon or sub conjungtival local anesthesia with lidocaine 2% 2.5-3 cc. Intra ocular lens that used were Liberty and Artisan Iris Claw IOL. Peripheral iridectomy was done in all procedure to prevent intra ocular pressure risen. All data and procedures were collected and performed by a single surgeon.

RESULTS

Table 1. Clinical Characteristics

Clinical Characteristics		Number of patient (%)
Age	<20	2 (1.1)
	20-39	5 (2.7)
	40-59	84 (44.7)
	≥60	97 (51.6)
	Total	188
Gender	Male	127 (67.6)
	Female	61 (32.4)
	Total	188
History of Glaucoma	No	136 (72.3)
	Yes	52 (27.7)
	Total	188
Diabetes	No	151 (80.3)
	Yes	37 (19.7)
	Total	188
Lens position	Prepupil	50 (26.6)
	Retropupil	138 (73.4)
	Total	189
ACD	≤3.20	35 (18.6)
	>3.21	139 (73.9)
	Total	174
Endothelial cell density	<1000	14 (7.4)
	1000-2000	36 (19.1)
	>2000	83 (44.1)
	Total	133

Of the total of 188 eyes, the most common cause was subluxated lens (47.3%) due to spontaneous, traumatic or Marfan syndrome. Followed by IOL dislocation (19.7%) which were removed and exchange with iris claw-IOL. Table 2 show the frequency of each indication for iris claw IOL implantation (Table 2).

Table 2. Indication of Implantation

Etiology	Number of patient (%)
Aphakia post-surgery	26 (13.8)
Subluxatio lens	90 (47.3)
Posterior Capsular Rupture + inadequate support	26 (13.8)
Drop nucleus	10 (5.3)
Dislocated IOL	37 (19.7)
Total	188

The mean preoperative best corrected logMAR visual acuity was 0.72 (ranging 0 – 2.47 logMAR). At the final visited post operative follow-up, the mean postoperative logMAR visual acuity was 0.37 (ranging 0-2.47 logMAR) (Table 3).

Table 3. BCVA Pre vs Post operative

BCVA	Pre-operative	Post-operative
	Number of patient (%)	
0-0.50	108 (57.4)	137 (72.9)
0.52-1.00	51 (27.1)	40 (21.3)
1.02-1.30	2 (1.1)	3 (1.6)
≥1.32	27 (14.4)	9 (4.3)
Total		188

All the patients had at least 1 month follow-up, ranging 1–12-month post-operative follow-up. After the iris claw IOL implantation surgery performed, we found 4 cases with post-operative secondary glaucoma (2.,12%), 2 cases of uveitis (1.06%), 2 cases of PBK (1.06%), and 2 cases of iridodyalisis(1.06%) (Table 4).

Table 4. Postoperative complication

Complication	Number of Patient(%)
Secondary Glaucoma	4 (2.12)
Uveitis	2 (1.06)
Iridodyalisis	2 (1.06)
PBK	2 (1.06)

DISCUSSION

Aphakia without capsular support makes it difficult for patients to get their best vision due to capsular inability to be implanted an IOL. For this reason, there have been many new surgical methods introduced to get maximum vision results such as SFIOL, ACIOL, and ICIOL. Until now, there is still no consensus stated which method of operation is the best for the above cases. In several studies, it is reported that SFIOL has several disadvantages such as the method is relatively difficult, the longer duration of operation, and the possibility causing macular

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edema.[7] In other studies, it is reported that retinal detachment, vitreous bleeding, and chroroidal haemorrhage may occur.[8] the ACIOL surgical technique may be faster to perform but several studies have stated that it has a risk of secondary glaucoma and endothelial cell loss which can later become corneal decompensation. The method that currently being used is iris claw lens implantation, because it is easier to do, short duration of time, and gives good results with minimum complications.[6][8][9]

In this study, we performed the iris claw lens procedure in the prepupillary position of 50 eyes (26.6%) and the retropupillary of 138 eyes (78.4%). Placing the iris claw on the prepupil, not only reducing the endothelial cell density which can lead to corneal decompensation, but also making the ACD become more shallow and triggers glaucoma. Therefore, we did place the iris claw lens more in retropupillary than prepupillary to reduce the influence in the anterior chamber and cell loss prevention. According to Toro et.al (2019), endothelial cell density less than 1200cell / mm^2, preferred to place the iris claw IOL in the posterior of iris, and to be safely placed in the anterior of the iris, the minimum ACD should be more than 3.2 mm.[9] The most common cause of iris claw implantation in this study is the subluxation lens, which can be caused by eye trauma, marfan syndrome or spontaneous. This is different from the Vounotrypidis study, which said most of it was iol dislocation and different from most studies where the most common cause was aphakia post-surgery.[10]

In our study, it was found that there was a significant increase between the mean preoperative BCVA (0.72 logMAR) and the mean postoperative logMAR BCVA was 0.37 (logMAR). This was in accordance with the Scallenberg et al (2013), study with the mean preoperative BCVA was 0.85+0.42 logMAR with changes during post-operative 0.64+0.62 logMAR. According to Jayamadhy (2016), 0.30 ± 0.48 LogMAR and postoperative 1 year 0.27 ± 0.46 Log MAR. With the retropupil insertion, got a mean bcva 1.0 logMAR and then a significant post-operative result of 0.6 logMAR .[5] Basically, this improvement in BCVA actually depends on the patient comorbidity such as history of past illness like diabetic or glaucoma. Due to patients with comorbidity, the post-operative visual acuity most likely will not be optimum.[9]

The most frequent postoperative complication in our study was an increase in secondary glaucoma as much as 4 (%) is the same as according to the Anandhi study also found an intraocular increase of 4% at 1 week follow-up.[11] We treated it with topical drugs to reduce eye pressure. There were also 2 cases of pseudophakia bullous kerathopathy (PBK) who had been done DSAEK and this condition could be because of the previous history of diseases. In another study, it was reported that 2 patients had corneal decompensation but for endothelial

cell examination which was not performed in all patients, 2 cases of uveitis and iridodialis which could have occurred in the early postoperative period.[12] We treated the uveitis patients with topical steroid drug. In our study we did not examine postoperative endothelial cell. Hazar et al (2013), found a decrease in endothelial cell density at postoperative retropupil iris claw implantation as much as 11.4% which is insignificant. In the same way, Forlini et al (2015) found a decrease of 9 to 10 percent after 22 months of post-op, and some studies say if the results pre op and postoperative cell density results were not significantly decreased.[2][5][9]

The limitation of this study is short time of follow-up and a retrospective study. Pre and post operative data from the medical records should be completely done, All patients need to be examined for the posterior segment to determine the condition of the retina or macula in order to maximize the results of postoperative BCVA. Iris Claw IOL position for misplaced or tilting needed to be check periodically because it can impact the BCVA results. ACD and endothelial cell density pre and post-operative should be done, even though several studies shown that there is no significant effect after the surgery.[13]In sum, the co founding factors are retina or macula condition, IOL misplaced or tilting, ACD, endhotelial cell density.

CONCLUSION

Iris claw implantation is a safe, relatively easy procedure, and short duration of surgery. Although there is no consensus as to which is the best method for aphakic cases without capsular support, this technique can be one of the procedures that can be considered because of the good results and minimal postoperative complications.

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