ORIGINAL ARTICLE

Bali Journal of Ophthalmology (*BJO*) 2020, Volume 4, Number 2: 31-34
P-ISSN. 2581-1258, E-ISSN.2581-1266

Published by DiscoverSys

Surgical and visual outcome of posterior polar cataract in National Eye Center Cicendo Eye Hospital, Indonesia

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ABSTRACT

Introduction: Posterior polar cataract is a rare form of cataract with incidence from 3 to 5 in 1000. It is bilateral in 65–80% of the cases with no gender predilection. Posterior polar cataract presents a special challenge to the surgeon because of its predisposition to posterior capsular dehiscence and possible nucleus drop during surgery. The study aims to evaluate the visual outcome and complication of cataract surgery in patients with posterior polar cataract.

Material and Methods: This is a descriptive study. Data were collected from the medical records within period of January 2016 – December 2018 in National Eye Center Cicendo Eye Hospital and reviewed retrospectively. Subjects in this study are patients with posterior polar cataract who underwent cataract surgery. The outcomes included visual acuity on the fourth week after surgery and complications during cataract surgery.

Results: There were 50 eyes of 37 patients included in the study. The mean age was 55.22±13.86 years. Best corrected visual outcomes (BCVA) before surgery were 6/6-6/18 in 26 eyes (52%) after surgery there were 48 eyes (96%). Complications during surgery were found in 7 eyes (14%), which was posterior capsular rupture with vitreous prolapse. Complications during phacoemulsification technique in 6 patients and 1 patient had SICS.

Conclusion: Posterior polar cataracts are a surgical challenge. In our study, cataract surgery in posterior polar cataract leads to good visual outcome. Appropriate treatment in patients with complications yielding good outcome.

Keywords: Posterior polar cataract, intraoperative complication, visual outcome, posterior capsule rupture

Cite This Article: Pitta, R., Knoch, A.M.W., Sugiarti, E.D. 2020. ASurgical and visual outcome of posterior polar cataract in National Eye Center Cicendo Eye Hospital, Indonesia. *Bali Journal of Ophthalmology* 4(2): 31-34. DOI: 10.15562/bjo.v4i2.72

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Received : 2020-08-17
Accepted : 2020-11-10
Published : 2020-12-01

INTRODUCTION

Cataract is the first cause of blindness in the world. It is estimated at least 36 million people have visual impairment or blindness and 12.6 million of them were caused by cataracts based on the Global Action Plan (GAP) in 2015. The results of the Rapid Assessment of Avoidable Blindness (RAAB) survey conducted in 15 provinces of Indonesia in 2014-2016, found that the biggest cause of blindness was cataract, which was 64.3% - 94.1%. The reduction in the prevalence of blindness and visual impairment caused by cataracts is one of the priorities of visual impairment control programs in Indonesia. Blindness due to cataracts can be managed by increasing the number and quality of cataract surgery to obtain satisfactory vision and improve the quality of life of a person.[1-4]

Posterior polar cataract is a congenital type of cataract. The incidence of posterior polar cataract is 3-5 out of 1000 cases. There is no gender predilection and 65-80% of cases are bilateral. Posterior polar cataract has a morphological form of opacity in the posterior lens in the form of a disc or concentric ring (onion like concentric rings) in the middle of the visual axis. This cataract is formed due to persistent hyaloid arteries or lens invasion by mesoblastic tissue during embryonic period. These conditions begin to cause symptoms at the age of 30-50 years. Posterior polar cataract is a challenge for an ophthalmologist for its possibility of posterior capsule attachment which can lead to tearing of the posterior capsule until the lens nucleus falls posteriorly during surgery.[5-8]

This study was conducted to describe the postoperative visual acuity and complications during the surgery on posterior polar cataract patients at Cicendo Eye Hospital National Eye Center.

SUBJECTS AND METHODS

This is a descriptive study. Data were taken retrospectively from the Cicendo Eye Hospital National Eye Center medical record during the January 2016 to December 2018 period. The inclusion criteria in this study were patients with a diagnosis of posterior polar cataract in the

Cataracts and Refractive Surgery unit and had surgery performed. The exclusion criteria of this study were patients who did not take full follow up until 30 days postoperative and patients with other ocular abnormalities that could affect the results of visual acuity after surgery.

Patients data taken in this study included gender, age, pre and postoperative visual acuity with Snellen's card in decimal notation, anterior examination, posterior examination, supporting examination, and operative report. Cataract types were examined when the pupils are dilated and then assessed according to the Lens Opacities Classification System (LOCS) III. Operative report data taken were type of cataract extraction (phacoemulsification / SICE), location of intraocular lens implantation and complications during surgery and treatment of complications.

Patients had a follow up visit on the first day, seventh day, and forth week after surgery. Spherical equivalent (SE) data from refractometry at the fourth postoperative follow up and the best visual acuity after correction were then recorded. The visual acuity category of preoperative and postoperative follows the study of Bradwaj et al. Namely Category 1 if the best corrected visual acuity (BCVA) 6/6 - 6/18, Category 2 if BCVA <6/18 - 6/60, Category 3 is BCVA <6/60 - 3/60 and Category 4 is BCVA <3/60.[10] Data were later changed into decimal notation. Then it was processed using Microsoft Excel Office 2013 software and presented descriptively.

RESULTS

There were 73 eyes from 57 patients diagnosed with posterior polar cataract from Cataract and Refractive Surgery unit during the January 2016 to December 2018 period. After exclusion, researchers got 50 eyes from 37 patients with posterior polar cataract diagnosis who had performed cataract extraction. There were 12 patients who did not come for the surgery, 4 patients who did not come to follow up after surgery, 1 patient with retinitis pigmentosa (RP), 1 patient with corneal scar and 2 patients with diabetic non-proliferative diabetic retinopathy (NPDR). Most of the patients were male (21 patients, 56.75%) and the average of patient's age was 55.22 years old (range 24-81 years).

Cataract extraction was performed in 50 eyes from 37 patients. There were 17 operators in this study. The type of action consisted of 47 eyes (94%) with phacoemulsification and 3 eyes (6%) with SICE (Small Incision Cataract Extraction). Posterior lens opacity based on the Lens Opacities Classification System (LOCS III) of the patient's medical record showed the most opacity level is P3 for 18 eyes (36%). This was followed by P4 for 16 eyes (32%), P2 for 13 eyes (26%) and P5 for 3 eyes (6%) shown in Table 1.

Table 1. Patients Characteristics

Patients Characteristic	Total	Percentage
(n=37)		(%)
Gender		
Male	21	56.75
Female	16	43.25
Age (years)	Mean = 55.22 (range 24-81)	
Side Of Surgery		
Unilateral	24	64.86
Bilateral	13	35.14
Posterior opacity level		
P2	13	26
P3	18	36
P4	16	32
P5	3	6
Type of extraction		
Phacoemulcification	47	94
SICE	3	6

SICE = small incision cataract extraction
P = posterior

The results showed that the preoperative best corrected visual acuity (BCVA) of patients was in category 1, which was 26 eyes (52%) as presented in Table 2. The best visual acuity with post-surgical correction 30 days after cataract extraction was in category 1, which was 48 eyes (96%) and followed by category 2 for 2 eyes (4%). The two eyes in category 2 were one eye (BCVA 6/24) with deprivative amblyopia and another eye (BCVA 6/45) had posterior capsule opacity (grade 2) but the patient did not perform a laser posterior capsulotomy (Table 2).

Table 2. Results of Visual Acuity

Best Visual Acuity	Pre-operative	Post-operative
Category 1 (6/6-6/18)	26 (52%)	48 (96%)
Category 2 (<6/18-6/60)	15 (30%)	2 (4%)
Category 3 (<6/6-3/60)	6 (12%)	0 (0%)
Category 4 (<3/60)	3 (6%)	0 (0%)

There were 7 eyes (14%) which had cataract extraction that also had a posterior capsule rupture

Table 3. Complications

No	BCVA preop.	BCVA postop.	Grade P	Technique	Complications	Treament	IOL Implant
1	0.5	1.0	3	Phaco	PCR+, PV+	VA manual	Sulcus
2	0.2	1.0	3	Phaco	PCR+, PV+	VA manual	Sulcus
3	0.25	0.8	2	Phaco	PCR+, PV+	VA manual	Sulcus
4	0.2	0.8	5	Phaco	PCR+, PV+	VA mechanical	AC (secondary IOL)
5	0.05	1.0	4	Phaco	PCR+, PV+	VA manual	Sulcus
6	0.125	1.0	4	SICE	PCR+, PV+	VA manual	Sulcus
7	0.5	0.63	3	Phaco	PCR+, PV+, RLM+	VA manual	Sulcus

Phaco = phacoemulsification + IOL implant,
SICE = small incision cataract extraction + IOL implant,
IOL = intraocular lens, PCR = posterior capsule opacification, PV = vitreous prolapse,
VA= anterior vitrectomy, AC = anterior chamber, RLM = retained lens material.

(PCR). In those 7 eyes, a posterior capsule rupture (PCR) was followed by vitreous prolapse into the anterior chamber of eye. They had anterior vitrectomy performed with 6 eyes using manual techniques and 1 eye with help of a machine. This complication occurred in cataract extraction surgery performed with 1 eye using the SICE method and 6 others using phacoemulsification techniques.

DISCUSSIONS

Posterior polar cataract is an opacity of the lens that is white, well-defined, disc-shaped and located in the central part of the posterior lens of the eye. This cataract comes from the residual hyaloid artery that persists. This condition is also associated with genes that are autosomal dominant but various other studies show it can be sporadic. This type of cataract is a challenge for an ophthalmologist because it is a risk factor for the occurrence of tears in the posterior capsule during cataract extraction.[3,8-10]

The mean age in this study is 55.22 years (range 24-81 years). Study of Siatri et al showed the average age of patients is 33.5 years (age range 19-65 years). Another study by Hunakunti et al showed that most ages range from 51 to 60 years. S.Anand et al showed that these cataracts began to cause symptoms in patients aged 30-50 years. This age range condition is based on several studies indicating the condition of opacity with a small size that existed since birth and getting thicker as people get older.[3,7,10-12]

There is a classification of posterior polar cataract. Daljit Sigh classified based on the shape and thickness of the posterior polar cataract. Schroeder's classification is based on polar cataract obstruction of the patient's red reflex. The study of Kumar et al. States that the risk of PCR occurs even if the size of the posterior polar is > 4mm. In this study cataract grading based on LOCS III to assess the condition of posterior opacities. The most preoperative condition was P3 with 18 out of 50 eyes as shown in Table 1. Data in Table 2 shows that from 7 eyes that experienced PCR, 3 of them were P3 grading.[3-4,7]

The best visual acuity with postoperative correction of patients at 30 days follow-up after the most cataract extraction was in Category 1 with 48 eyes (96%) and followed by Category 2 with 2 eyes (4%). There is deprivative amblyopia found in those eyes. Hayashi et al reported 4 out of 10 patients with unilateral posterior polar cataract can experience amblyopia. In unilateral cases opacities can block the visual axis thereby increasing the risk for amblyopia. Hunakunti et al reported in their study that the best visual acuity results 49 of 50 patients with posterior polar cataract who performed cataract extraction is > 6/18 (0.32) after 6th week follow up. Kumar et al stated that the best visual acuity correction in his study reached >6/18 in 55 out of 58 eyes (94.8%).[4,6,11,12]

Posterior polar cataract is a type of cataract that is prone to posterior capsule rupture. The incidence of posterior capsule rupture (PCR) in posterior polar according to Foster et al reaches 26%-36% compared to the condition of cataracts without complications which is <1%. Hua et al states that this is due to the thinner posterior capsule condition and the presence of local defects in the posterior capsule in patients with posterior polar cataracts. Bhardwaj et al states that PCR predisposing factors occur due to the attachment of opacities to the posterior capsule. Posterior capsule rupture occurred in 7 of 50 eyes (14%) in this study.[6,9,12,13]

Posterior capsule rupture found in this study with phacoemulsification technique were 6 eyes and 1 eye with the manual SICE (small incision cataract extraction) technique. In one eye that was originally aphakic accompanied by 3 intact sutures

in the temporal cornea area, a secondary IOL can be placed in the anterior chamber (AC IOL) 1 month after the first surgery. The cornea was found generally clear during the 30th day follow up after the second operative. There was an intact suture in the temporal part of the cornea. Intraocular pressure was good, which was 14 mmHg. Posterior segment examination results obtained 0.4 of cup disk ratio and other posterior segment conditions within normal limits. The result of visual acuity with the best correction in the eye reached 0.8.

In Bhardwaj et al study, 48 eyes underwent phacoemulsification and 71 eyes with SICE. They found 14.58% in phacoemulsification and 21.13% in SICE had PCR. The study of Hunakunti et al showed that there were 3 eyes that experienced PCR from 50 eyes that performed SICE.[9-12]

Vasavada et al stated that if there is a PCR accompanied by prolapsed vitreous (PV), anterior vitrectomy can be performed followed by the implant of an IOL (intraocular lens) in the sulcus or anterior chamber (AC IOL). Cetinkaya et al in their study stated that the implant of IOL in the bag under PCR conditions can be done if the size of the rupture is small. The study also stated the postoperative visual acuity of patients who performed IOL implants in the sulcus were as well as the implant of IOL in the bag. In our study, six eyes had IOL in the sulcus and 1 eye with anterior chamber secondary IOL (AC IOL). The sharpest visual acuity with the best correction reached 1.0 in 4 of the 7 eyes.[3-5,8]

The study of Ahmed et al shows that PCR occurs most frequently during the phacoemulsification stage of the nucleus and irrigation aspiration. This result is also in line with Kapoor et al that states PCR occurs at the time of irrigation aspiration. Our study has a limitation which is not included in the stages at the time of posterior rupture of the capsule in the patient's operative report notes.[8-10,12]

Suggestions for further studies including the stage at the time of the PCR happen in the operative report sheet and measure the opacities diameter of the posterior lens before cataract extraction performed.

CONCLUSIONS

Posterior polar cataract is a type of cataract that has its own challenge for ophthalmologists. Knowledge and strategy of correct surgical techniques regarding this type of cataract can reduce the risk of posterior capsule rupture during cataract extraction. This study shows the results of the visual acuity of patients who performed cataract extraction at Cicendo Eye Hospital are good. The final condition of visual acuity in posterior polar patients who experience complications will remain good if treated appropriately.

CONFLICT OF INTEREST

The authors declare no conflicts of interest regarding the publication of this paper.

FUNDING

No funding to declare

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