ORIGINAL ARTICLE

Characteristic of Postoperative Visual Acuity and Complications of Surgical Procedure on Posterior Polar Cataract Patients at Cicendo Eye Hospital National Eye Center

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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.
Purpose: The study aims to evaluate the visual outcome and complication of cataract surgery in patients with posterior polar cataract.
Material and Methods: This is an observational 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 acuity outcomes (BCVA) were 6/6-6/18 in 48 eyes (96%) after surgery. 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 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.

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

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. [1-4]

Posterior polar cataract is a challenge for an ophthalmologist. The high incidence of posterior capsule rupture during surgery for those patients might be because of tight adherence of the plaque to

normal capsule. The posterior capsule itself underlying the plaque is exceptionally thin that ruptures to minimal trauma. The incidence of posterior capsular dehiscence has been reported to be 36%.[5-8]

Many techniques have been described to avoid complications and minimize this risk. Vasavada et al recommend performing bimanual microincision phacoemulsification to maintain a closed and stable anterior chamber during surgery (avoid surge and chamber bounce). Viscodissection instead of hydrodissection may protect the posterior capsule at the beginning of the surgery. Minimize capsular stress can be accomplished in a variety of ways including lowering the irrigation bottle height, reducing flow and vacuum settings, and minimizing manipulations of the lens.[1-3,7]

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.

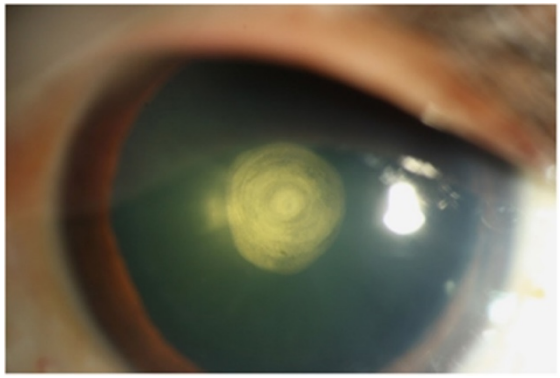

Fig 1. Posterior polar cataracts
Source: Vasavada[3]

SUBJECTS AND METHODS

This is an observational 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 criterias in this study were patients with a diagnosis of posterior polar cataract in the Cataracts and Refractive Surgery unit and had surgery performed. There were multiple surgeon technique in this study. The surgeon used phacoemulsification technique or manual small incision cataract extraction (SICE). The exclusion criterias of this study were patients who did not take full follow up until 30 days postoperative, medical record with uncomplete data 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 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 type of cataract extraction (phacoemulsification / SICE), complications during surgery and treatment of complications.

We recorded visual acuity data preoperative and one month after surgery. 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.[9] Then it was processed using Microsoft Excel Office 2013 software and presented descriptively.

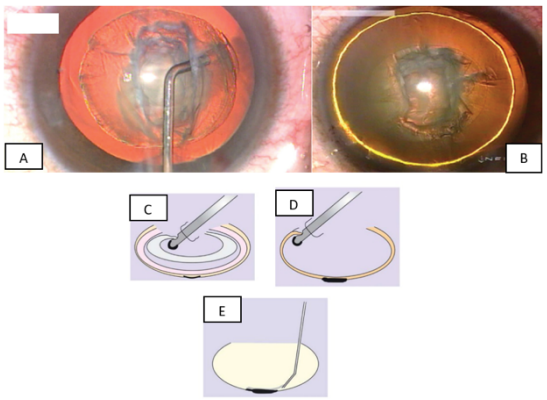

Fig 2. Surgical technique for posterior polar cataract

(A) Hydrodissection is considered a contraindication. Inside-out delineation technique is preferred.
(B) A golden ring within the lens is evidence of successful delineation.
(C) Slow motion phacoemulsification with low parameters for stable chamber. Nuclear rotation and aggressive nuclear cracking techniques.
(D) Better to pull the cortex tangentially rather than centrally to mobilize it.
(E) The posterior chamber can be filled with viscoelastic material and cortex removed using a "dry" (syringe stripping) technique and avoid polishing. The safest option is to leave the plaque untouched for later Nd-YAG laser capsulotomy.

Source: Vasavada Foster[3,6]

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 acceptable data. 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).

The type of surgery are 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 area 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%).

Table 1. Patients Characteristics

Patients Characteristic (n=37)	Total	Percentage (%)
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 area 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

Table 2. Result 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%)

Table 3. Complication

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.

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. 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.[1,2,11]

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 more than 4 mm. 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. [2-4.7]

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 more than 6/18 (0.32) after 6 week follow up. Kumar et al stated that the best visual acuity correction in his study reached more than 6/18 in 55 out of 58 eyes (94.8%). [4,6,11]

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 stated at 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 stated 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]

Posterior capsule rupture was found in 6 eyes in phacoemulsification group and 1 eye in manual SICE group One month after the surgery, anterior chamber IOL was placed in 1 eye that became aphakic 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. PCR occured in both phacoemulsification and sice group as 14.58% and 21.13% respectively. 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, anterior vitrectomy can be performed followed by the implant of an IOL 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. [3,5,7]

The study of Ahmed et al showedthat 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 stated that PCR occurs at the time of irrigation aspiration. A PCR usually occurs following sudden collapse of the anterior chamber, inadvertent hydrodissection, nucleus rotation, or during epinuclear plate removal.[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. Limitation of this study was no documentation written in patient's medical record of stage and time when PCR occured.

CONCLUSIONS

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

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