



ANALYSIS OF INCIDENCE, RISK FACTORS AND VISUAL OUTCOMES OF POSTERIOR CAPSULAR RUPTURE IN MANUAL SMALL INCISION CATARACT SURGERY

Ophthalmology

Hitesh Patel Fellow, Sankara Eye Hospital, Anand.

Nisha Ahuja* CMO, Sankara Eye Hospital, Anand. *Corresponding Author

ABSTRACT

Posterior capsular rupture (PCR) is a potentially sight threatening intra-operative complication in manual small incision cataract surgery (MSICS). A prospective analysis of incidence, risk factors and visual outcome of PCR is done during one year fellowship period. Exclusion criteria included age < 30 yrs, congenital cataract, traumatic cataract and patients with previous intraocular surgery and intravitreal injection. Mean age 59.27 and male female ratio 1.7:1. 33 cases (1.25%) had PCR out of 2623 patients. Retropupillary fixed iris claw lens (RPICL) implanted in 12 patients with no capsular support and PCIOL implanted in 21 patients with capsular support. Out of 21 PCIOL, 18 implanted in ciliary sulcus and 3 in the bag. Mean logMAR BCVA was 0.48 (at 4 week post op). Mean logMAR BCVA was 2 line higher in group with PCIOL compare with RPICL group and 1 line higher in group with bag PCIOL compare with ciliary sulcus PCIOL. HMSC, PPC, black cataract, small pupil and PXF are major preexisting risk factors in our study.

KEYWORDS

INTRODUCTION

Posterior capsular rupture is a potentially sight threatening intra-operative complication in manual small incision cataract surgery. The incidence rate of PCR is said to be experience related and it is 5 to 10% for many surgeon but less than 3% in experienced surgeon (1).

Certain risk factors predisposed to PCR and these risk factors may be broadly classified as patient related, surgeon related, intra-operative factors and those related to machines (2, 3).

A. Patient related

1. General factors

Uncooperative anxious elderly patients with inadvertent head movement

2. Extra-ocular

Deep set eye
Prominent eye brow
Poor visibility: corneal opacity, band keratopathy, pterygium and thick arcus senilis.

3. Intra-ocular

Small pupil
Shallow anterior chamber
High myopia
Cataract type (PPC and hyper-mature cataract)
Pseudo-exfoliation

B. Surgeon related

Inexperienced surgeon
High volume camp surgery

C. Intra-operative

Small capsulorhexis
Rhexis radial tear

D. Machine related

Unfamiliar to microscope

The occurrence of PCR during manual SICS can have serious implications in visual recovery. However recognition of PCR and proper management can yield a successful visual outcome. This study analysed the visual outcome of case with PCR and compare visual outcome in the group with PCR with vitreous loss and PCR without vitreous loss.

In this prospective study all the cases with PCR were analysed to examine visual outcome and also analysed the risk factors and incidence of PCR.

MATERIALS AND METHODS

This prospective observational study was performed at tertiary care center in Gujarat and included 2623 cataract patients which were operated by single surgeon using manual small incision cataract surgery (MSICS). The time frame to address study ranged from July-

2019 to June-2020. Patients aged > 30 years and with a minimum follow up of 4 weeks were included and patients aged < 30 yrs, congenital cataract, traumatic cataract and patients with previous intraocular surgery and intravitreal injection were excluded in the study. All the visual acuities were converted to Log MAR scale.

In addition to basic information like patient's age, sex name and operated eye surgical details also describing cataract type (immature, mature, hyper-mature, posterior polar, nuclear), pseudo-exfoliation and small pupil. IOL type and position along with additional procedure such as anterior vitrectomy and use of intracameral miotic were also recorded. The incidence of PCR was noted with respect to operating step during capsulorhexis/nucleus delivery/irrigation and aspiration (I/A) of cortex/IOL insertion.

Surgical technique of temporal manual SICS is summarised below:

1. Fornix based conjunctival flap
2. Corneoscleral tunnel
3. Side port at 3 o'clock hour and reformation of anterior chamber with viscoelastic substance (2% HPMC)
4. Continuous curvilinear capsulorhexis
5. Anterior chamber entry made with keratome
6. Corical cleaning hydrodissection or hydrodelineation
7. Nucleus prolapse in anterior chamber
8. Inject viscoelastic substance above and below nucleus and nucleus deliver by Wire vectis
9. Manual irrigation and aspiration with simcoe canula
10. Capsular bag filled with viscoelastic substance
11. IOL implantation in the bag or sulcus
12. Removal of viscoelastic substance
13. Intra cameral vigamox

Additional step in some cases of PCR:

1. Anterior vitrectomy
2. Intracameral pilocarpine or carbachol for pupillary constriction
3. Retropupillary fixed Iris claw lens

RESULTS

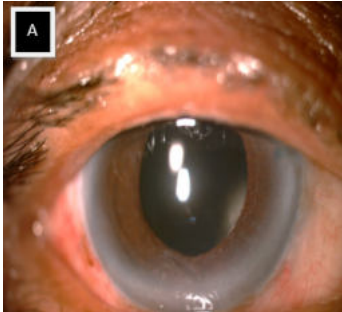
A prospective study of 2623 patient performed over one year period. Each patient had operated by single based surgeon. Manual small incision cataract surgery was performed in each case. Posterior capsular rupture was noted in 33 eyes. The age range of patients from 30 to 80 years with mean age 59.27 years and the male female ratio is 1.7:1. IOL implanted in all cases and no case leave aphakic for secondary IOL implantation.

Hyper-mature cataract, posterior polar cataract, black cataract, pseudo-exfoliation syndrome and small pupil are common preexisting risk factors to an increase incidence of PCR.

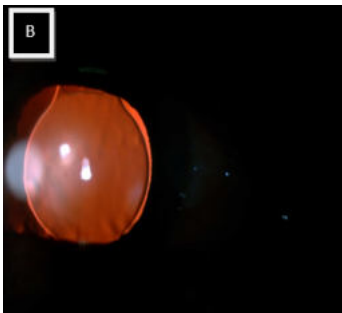
Out of 33 PCR patients, hyper-mature cataract was noted in 9 patients, PPC and small pupil (without PXF) was noted in 3 patients each,

pseudo-exfoliation (2 with small pupil) was noted in 4 patients and black cataract was noted in 1 patient. Preexisting risk factors was not presented in 13 patients.

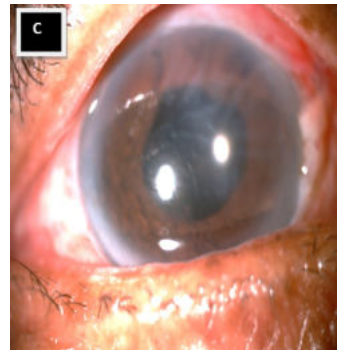
Maximum rupture occur during I/A and radial extension of capsulorhrxis. Retropupillaryfixed iris claw lens (RPICL) was implanted in 12 patients with no capsular support and PCIOL was implanted in 21 patients with capsular support. Out of 21 patients With PCIOL implementation, 18 PCIOL was implanted in ciliary sulcus and 3 PCIOL was implanted in the bag. Average post operative (at 4 weeks) mean logMAR BCVA was 0.48 in group with posterior capsular rupture. Mean logMAR BCVA was 0.63 in group with retropupillaryfixed iris claw lens and 0.45 in group with PCIOL. So mean logMAR BCVA was 2 line higher in group PCIOL compare with the group with RFICL. Mean logMAR BCVA was 0.36 in group within the bag PCIOL and 0.46 in group with CSPCIOL. So it was 1 line higher in group within the bag PCIOL.



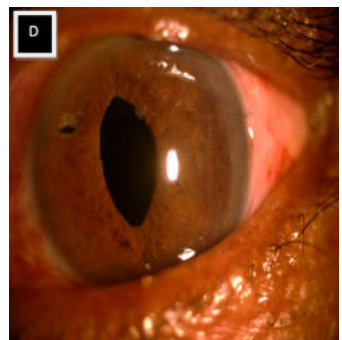
A. RPICL In diffuse illumination



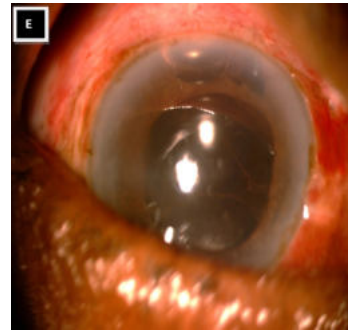
B. RPICL in retro-illumination



C. Post op Striate keratopathy in RPICL



D. Oval Pupil and iris atrophy in RPICL



E. Post op pupillary fibrinous membrane in patient with RPICL

DISCUSSION

Since ECCE with IOL implantation, posterior capsular rupture is most common problem that faced by surgeon. Natchair G et al described incidence of PCR in India was 1.7% (4) and Johnson J et al described incidence of PCR in ECCE was 3.02% (5) comparable to our study in which mean incidence of PCR was 1.25%.

Utmost care taken to prevent further tear and subsequent vitreous loss:

1. Sudden withdraw of I/A tip from the eye should be avoided because this cause rapid enlargement of PCR and vitreous prolapse, so AC should be filled first with OVD through the side port incision to block vitreous prolapse before removal of I/A tip.
2. Early recognition of PCR and prompt prophylactic measure will prevent expansion of tear size, nucleus drop and vitreous prolapse.

Sign of early PCR recognition (3):

- Sudden deepening or shallowing of AC with momentary pupillary dilatation (snap sign)
- Torn capsule and vitreous gel may directly visible
- Tilting of one pole of nucleus
- Sudden brightening of fundus glow
- Previous mobile nucleus loss their mobility

Test to detect presence of vitreous in AC:

- Swab stick test
- Swab stick move along the site of incision

If ∇ vitreous present
Can be seen as a strand

- Sweep the spatula from AC angle under incision toward the rent
If vitreous present that getting dragged as it has tendency to come toward the wound
- Staining of vitreous with 0.1 ml of 40mg/ml of triamcinolone.

Hyper-mature cataract, PPC and black cataract are at high risk for developing PCR. Drosalum et al found that eye with PXF syndrome had a 2.6 fold increase in capsular complication compare to eye without PXF (6). In our study all these factors are high risk for PCR. In our study Maximum rupture occur during I/A and extension of radial tear.

If the rent is small with no vitreous loss PCIOL can be placed in bag but if large rent, check the posterior capsular support if capsular support present PCIOL placed in ciliary sulcus and if capsular support not present and pupil could be constricted retropupillaryfixed iris claw lens was used.

A Ionides et al described that eyes with PCR were 3.8 more likely to have final BCVA < 6/12 (7) which is almost equal to our study. Sanitha et al described that no significant difference in BCVA between group with sulcus PCIOL and retropupillaryfixed iris claw lens (8) but in our study significant difference in BCVA between two groups were found. Long term complications of PCR included striate keratopathy, pupillary defect, persistent cyclitis, cystoid macular edema and pseudophakic bullos keratopathy.

CONCLUSION

The bête noire of cataract surgeon throughout his/her career is posterior capsular rupture. By identifying the presence of risk factors and appropriate surgical plan modification can be reduced the

incidence of PCR. Early PCR recognition and prompt prophylactic measure will prevent tear size enlargement and vitreous prolapsed is key to good visual outcome.

REFERENCES

1. G.Chaing, ASM Lim and BC Ang. Posterior capsule rupture in posterior chamber implantation: visual results. *Implants Ophthalmol* (1987), 1, 63-64.
2. Narendran N, Jaycock P, Johnston RL, Taylor H, Adams M, Tole DM, et al. The cataract national dataset electronic multicentre audit of 55,567 operations: Risk stratification for posterior capsule rupture and vitreous loss. *Eye (Lond)* 2009;23:31-7. [PubMed] [Google Scholar]
3. Arup Chakrabarti and Nazneen Nazm Posterior capsular rent: Prevention and management: *Indian J Ophthalmol*. 2017 Dec; 65(12): 1359-1369.
4. Natchiar G, Robin AL, Nalgirkar AR, Krishnadas R. Posterior capsule tears during extracapsular cataract surgery in India. *Arch Ophthalmol* 1993 May; 111(5): 706-8. 4.
5. Johnson J, Theodorsen FP, Corydon L J. Visual outcome following complicated extracapsular cataract extraction. *Cataract Refract Surg* 1992 Nov; 18(6): 577-81.
6. Drolsum L, Haaskjold E, Sandvig K. Phacoemulsification in eyes with pseudoexfoliation. *J Cataract Refract Surg*. 1998; 24:787-92. [PubMed] [Google Scholar]
7. A Ionides, D minassian, S Tuft. Visual outcome following posterior capsular rupture during cataract surgery. *Br J ophthalmol*. 2001 Feb; 85(2):222-4.
8. Sanitha Sathyan, Renjini kurian. Comparison of retropupillary fixed iris claw lenses and sulcus placed intraocular lenses for the treatment of aphakia. *Kerala journal of ophthalmology*. 2017;29(3) 207-212.