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POSTERIOR POLAR CATARACT: SURGICAL AND VISUAL OUTCOME ON LONG TERM FOLLOW UP

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ABSTRACT

Background: posterior polar cataract (PPC) is the cataractous changes found to involve the posterior pole of the crystalline lens. The importance of posterior polar cataract lies in its higher risk of management related complications. These cataracts are challenging to surgeons because they carry a higher risk for posterior capsule rupture (PCR) and nuclear drop during cataract extraction.

Materials and methods: Records of patients with PPC who underwent cataract surgery were studied in details. Records were reviewed for epidemiological parameters and ocular examination findings. Intraoperative and postoperative complications were also noted from the records.

Results: 150 eyes of 127 patients who completed at least 1year of follow up were included in the study. Average age of patients was 50.70±14.80 years (range-10 to 76 years). Patients completed average follow up of 30.71±14.60 months (range 12 months to 67 months). Out of total 127 patients 68 were males (53.5%) and 59 were females (46.5%). Size of posterior polar opacity was less than 4mm in 116 (77.34%) eyes and more than 4mm in 34 (22.67%) eyes. Posterior capsular rent (PCR) was noted in 24 (16.00%) eyes. Only 8 (6.80%) out of 116 eyes with size of PPC opacity <4mm had PCR while 16 (47.05%) eyes out of 34 with PPC opacity > 4mm were noted to have PCR (p value >0.01). Posterior chamber IOL was implanted successfully in 149 eyes. IOL in the capsular bag was implanted in 131(87.33%) eyes. In 19 (12.67%) eyes IOL was implanted in sulcus. Posterior capsular plaque was left in place in 5 (3.3%) eyes, which later underwent ND: YAG capsulotomy.

Conclusion: Careful phacoemulsification with modification in surgical techniques has improved the outcomes in posterior polar cataract eyes.

KEYWORDS : posterior polar cataract (PPC), Posterior capsule rupture (PCR), PPC opacity, intraocular lens (IOL).

INTRODUCTION:

Cataract can be defined as complete or partial lens opacification; either congenital or acquired. In posterior polar cataract (PPC) the cataractous changes are found to involve the posterior pole of the crystalline lens. PPC is a form of congenital cataract. Its incidence reported to be ranging from 3-5 in 1000.[1-3] It is found to be bilateral in 65-80 % cases.[4-5] There is no sex predilection. Inherited cataracts accounts up to half of all congenital cataracts, and most common mode of inheritance is found to be autosomal dominant.[6-7] less frequently , autosomal recessive and X-linked inheritance pattern is seen. Many genes have been reported to be linked to development of congenital cataracts.[8]

There are five genes attributed to posterior polar cataract (CTTP) that have been identified. CTPP1 (OMIM 116600) has been mapped to 1p36.[9] CTPP2 has been associated with CRYAB on 11q22-q22.3, and a Pro20- Ser mutation and a deletion mutation (450delA) have also been highlighted.[10,11] The CHMP4B gene on chromosome 20p12-q12 is responsible for CTPP3 (OMIM 605387). Three mutations of PITX3 gene on chromosome 10q25, 38G > A mutation, 17-bp insertion, and 650delG have been reported to cause CTPP4 (OMIM 610623).[12-15] Two loci with unknown genes have similarly been reported, 14q22-q23 for CTPP5 (OMIM 610634)[16] and 16q22.[17]

The importance of posterior polar cataract lies in its higher risk of management related complications. These cataracts are challenging to surgeons because they carry a higher risk for posterior capsule rupture (PCR) and nuclear drop during cataract extraction. The incidence of PCR during removal of polar opacities is reported to be as high as 36%.[5] The incidence of PCR in general cataract surgery is significantly lower (1%).[18] There are many risk factors like grade, size of posterior polar opacity and presence of pre-existing PCR have been found to be associated with greater risk of complications in cataract surgery in these patients.[19]

MATERIALS AND METHODS:

Medical records of all patients with cataract presented to our department of ophthalmology, tertiary care facility in north India, from January 2012 to December 2017 were screened for posterior polar cataract. Records of patients with PPC who underwent cataract surgery were studied in details. The study was performed in accordance with the declaration of Helsinki. Approval for the study was taken from the institute ethical approval committee.

Records were reviewed for epidemiological parameters like age, sex, laterality and ocular examination findings like preoperative best corrected visual acuity, intraocular pressure, size of opacity (less then or greater than 4 mm) , grade of cataract, presence or absence of pre-existing posterior capsular deficiency, posterior segment evaluation. Intraoperative and postoperative complications, type of IOL, site of IOL implantation, secondary surgical intervention, duration of follow up and final visual outcomes were also noted from the records.

Cataract was classified in to one of the types by Singh's classification.

Singh classified posterior polar cataract into 4 types[21]:

- Type 1: the posterior polar opacity is associated with posterior subcapsular cataract.
- Type 2: sharply defined round or oval opacity with ringed appearance like an onion with or without grayish spots at the edge.
- Type 3: sharply defined round or oval white opacity with dense white spots at the edge often associated with thin or absent posterior capsule. These dense white spots are a diagnostic sign (Daljit Singh sign) of posterior capsule leakage with or without repair and extreme fragility the incidence of this type in Indian adult cataract patient population was found to be about one in 300.
- Type 4: Combination of the above 3 types with nuclear sclerosis.

Surgical technique:

All the patients were operated by single surgeon. Patient underwent slow motion phacoemulsification with posterior chamber intraocular lens implantation. Limited hydro-dissection and limited hydro-delineation was done. Machine parameters were kept low throughout the surgery. If PCR was noted intraoperatively, anterior vitrectomy was done. Any modification in surgical technique that was required depending on the type of cataract was documented. In cases where, it was not possible to put IOL in capsular bag, three piece hydrophobic acrylic IOL was implanted in the cilliary sulcus. Intraoperative complications like PCR, nucleus drop, vitreous loss, need of vitrectomy, inability to implant intraocular lens were documented. Post operative complications and final Visual outcome of all the patients were documented in subsequent follow ups at post operative day one, day three, two week and one month and three months then annually. Good visual outcome was defined as visual acuity of +0.2 or more on log MAR scale.

RESULTS:

150 eyes of 127 patients who completed at least 1year of follow up were included in the study. Average age of patients was 50.70±14.80 years (range-10 to 76 years). Patients completed average follow up of 30.71±14.60 months (range 12 months to 67 months). Out of total 127 patients 68 were males (53.5%) and 59 were females (46.5%). Bilateral presentation was seen in 92 patients (72.44%). Only eyes of bilateral patients which got operated in our setting were included in our study. Mean best corrected visual acuity at presentation in log MAR was 0.8±0.3. At the time of surgery 14 (9.33%) eyes were having grade 1 PPC, 92 (61.33%) eyes were having grade 2, and while 17 (11.33%) eyes grade 3 and 27 (18%) eyes were having grade 4 PPC [figure1]. Size of posterior polar opacity was less than 4mm in 116 (77.34%) eyes and more than 4mm in 34 (22.67%) eyes [figure2].

Figure 1:

Grade of PPC	Number of eyes (%)
Grade 1	14 (9.33%)
Grade 2	92 (61.33%)
Grade 3	17 (11.33)
Grade 4	27 (18%)

Figure 2:

Size of PPC opacity	Number of eyes (%)
<4mm	116 (77.34%)
>4mm	34 (22.67%)

All patients underwent phacoemulsification, followed by hydrophobic acrylic IOL implantation in 149 eyes, one patient was left aphakic. Posterior capsular rent (PCR) was noted in 24 (16.00%) eyes. Only 8 (6.80%) out of 116 eyes with size of PPC opacity <4mm had PCR while 16 (47.05%) eyes out of 34 with PPC opacity > 4mm were noted to have PCR (p value >0.01). Posterior chamber IOL was implanted successfully in 149 eyes. IOL in the capsular bag was implanted in 131(87.33%) eyes. In 19 (12.67%) eyes IOL was implanted in sulcus.

One patient who was left aphakic, TSFIOL was implanted in the postoperative follow up with good final visual gain. Three patients with PCR were having retained cortical matter followed by cortical matter aspiration. Posterior capsular plaque was left in place in 5 (3.3%) eyes, which later underwent ND: YAG capsulotomy. Four (2.6%) eyes developed glaucoma in follow up period, one of the eyes needed glaucoma surgery. Six eyes were noted to have diabetic retinopathy, which required specific treatment in form of retinal lasers intravitreal anti VEGFs/steroids. One eye (0.67%) developed retinal detachment, which underwent retinal detachment surgery resulting in good visual gain (visual acuity log MAR value 0.1). Visually significant posterior capsular opacification was diagnosed in 7 eyes at an average follow up visit of 18 months. All patients who underwent ND: YAG capsulotomy followed by good visual gain (visual acuity log MAR value 0.1). Amblyopia accounted for poor visual gain in 6 eyes. Final average log MAR BCVA achieved was 0.2±0.07. Total 122 (81.33%) eyes achieved BCVA +0.2 log MAR or more.

DISCUSSION:

The present study includes largest number of eyes (150) with PPC and provides long follow up (30.71±14.60 months) as compared to other studies till date. The average rate of PCR noted was low (16%) or similar to the previously reported literature.[18-19] The lowered rate of PCR can be contributed to modified surgical techniques like no or minimal hydro dissection, low Phaco parameters to prevent rupture of already weak posterior capsule, careful dissection of posterior plaque or leaving behind the plaque for later removal by Nd:YAG capsulotomy. The significantly higher rate (P value >0.01) of PCR was noted in eyes with size of opacity >4mm as compared to smaller size (<4mm). Previously Kumar et al have noted similar findings.[19] Higher rate of PCR in these eyes suggest that there is high chances of already weakened posterior capsule, and one should be more careful while operating eyes with larger posterior catarctous opacity. Eyes which underwent Nd:YAG capsulotomy had good gain of vision and did not develop any complications (like retinal detachment, macular oedema or raised IOP etc). Hence we recommend leaving posterior plaque if strongly adherent to the capsule, as it can be easily managed with laser capsulotomy in post operative period.

CONCLUSION:

Careful phacoemulsification with modification in surgical techniques has improved the outcomes in posterior polar cataract eyes. Eyes with larger size of posterior polar opacity need special attention and careful manipulation to prevent tear of posterior capsule. The low rate of complications and a good achieved final visual acuity on long term follow up in large number of eyes indicates a good prognosis in experienced hands.

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