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Study of a Modified Hydrodelineation Technique in the Management of Posterior Polar Cataract

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ABSTRACT

Background: Posterior polar cataract (PPC) is known to be associated with an abnormal adhesion of the posterior capsule to the polar opacity, or a preexisting weakness of the posterior capsule, both of which predispose the eye to posterior capsule rupture (PCR) during cataract surgery. Posterior polar cataracts are therefore, a danger zone for all cataract surgeons and several techniques are being propagated to reduce the posterior capsular rent (PCR) rate in these cataracts.

Aim: To evaluate the visual outcome and complications in posterior polar cataracts managed by the technique of Hydrodelineation done inside out.

Methods: A Retrospective study which included total 15 patients with PPC who underwent cataract surgery between January 2016 to August 2019. 13 patients with grade 1 (soft) cataract underwent inside out hydrodelineation by slowly injecting saline into the cortex with 26 gauge cannula and in 2 patients of grade 3 (hard) cataract a partial thickness groove was done in central nucleus followed by inside out hydrodelineation and no nucleus rotation.

Result: Out of 15 patients the Best Corrected Visual Acuity (LogMAR) of 10 patients is 0.00 (6/6), 3 cases with 0.10 (6/6 partial) and 2 cases with 0.20 (6/9). 66.67% patients had 6/6 visual outcome and two patients had posterior capsular rent which were subsequently managed successfully by a vitreo-retinal surgeon.

Conclusion: Inside out Hydrodelineation is a novel technique to manage the dreaded Posterior Polar Cataract. It has a fast learning curve with lesser intra operative complications for the surgeon to handle and a very good visual prognosis for the patients also. Our study warrants this as an ideal management technique for this complicated cataract.

Keywords: Posterior Polar Cataract (PPC), Hydrodelineation, Inside out

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INTRODUCTION

In the medical domain and to be specific from the perspective of surgery, Posterior Polar cataracts (PPC) holds a unique place and can be assumed to be one type of cataracts. It is the continuation of Posterior part of the vascular sheath of lens that usually results into something which is called polar cataract. In a number of instances it has been observed that fibrous tissue has been invading the hyaloids artery to quite deeper extent ultimately resulting into formation of complete cataract. The case relating to posterior polar cataract is not common and it has been found that out of 1000 cases 3 to 5 cases found to be of posterior polar cataract. The range varies from 65 to 80% when it comes to bilateral cases [1]. From the viewpoint of Duke-Elder [2] posterior polar cataract can be both stationary and progressive cataract. In these cases of posterior polar cataract the symptoms that have been formed is that one will find it difficult to read the very prints. In some other cases the patient might feel intolerance towards light. All these issues are happening because the forward light is getting scattered. Posterior polar cataract issue become significant because of the kind of risk is associated during posterior capsular tear as well as possible nucleus drop while surgery is taking place.

MATERIAL

This is a retrospective study conducted on patients who underwent cataract surgery between January 2016 to August 2019 in Krishna institute of medical sciences and follow up was done on post operative day 1, after 1 week, 4 weeks, and 6 weeks. Study included total 15 patients, 9 patients were male and 6 were females. Age group of patients was between 45 years to 60 years. Out of which 13 patients had grade 1 cataract and 2 patients had grade 3 cataract according to Singh classification of posterior polar cataract [3]. Patients with grade 1 cataract underwent inside out hydrodelineation by slowly directly injecting saline in cortex in with 26 gauge cannula, and 2 patients of grade 3 cataract underwent partial thickness groove (trench) in central nucleus followed by inside out hydrodelineation through superficial part of trench into cortex and no hydrodissection or nucleus rotation was done in any of these patients.

Table 1

Sex	No of patients	Age group
Male	9	
Female	6	
Total	15	45-60 years

METHODS

Management of Posterior polar cataract is a task because of its abnormal adhesion of the posterior capsule to the polar opacity. Different modalities have been used to deal with management of posterior polar cataract.

Steps

1. Comprehensive pre operative work up was done along with counseling of the patients about the procedure and associated risks with the procedure.
2. Peribulbar anesthesia was given using preservative free 1.3 ml xylocaine injection.
3. Temporal 2.8 mm clear corneal incision was made with steel keratome.
4. Side port was made at 6 and 12'o clock position with 20 gauge MVR knife.
5. The focal point case was recolored with trypan blue color 0.06%. The infusion is done on the side port under an air pocket to ensure the corneal endothelium. At that point the trypan blue was cleaned out of the eye utilizing adjusted salt arrangement following 20 seconds.
6. Cohesive viscoelastics was injected into anterior chamber to maintain the anterior chamber and avoid the corneal endothelial damage.
7. Continuous curvellinear capsulorhexis of 5.5mm was done with 26 gauge needle.
8. Anterior chamber was formed with 1.4% sodium hyaluronate solution.
9. Hydrodelineation was performed, in 13 cases with grade 1 (soft cataract) the 26 gauge cannula was gently inserted towards central plane and saline was injected in the cortex till epinucleus and nucleus got separated and successful hydrodelineation (inside out) resulted in the form of golden ring.
10. In remaining 2 patients with grade 3 cataract, hydrodelineation was done by inserting the cannula by making a small trench of partial thickness groove in central nucleus followed by injecting saline at superficial plane of trench and successful hydrodelineation was achieved by formation of golden ring.

Phacoemulsification was completed under low aspiration, low vacuum setting with sovereign compact machine (AMO USA). Settings used were, For grade 1 cataract the procedure was completed only on 10% power (continuous mode), 18-20cc/minute aspiration flow rate and 200 mmHg vacuum and For grade 3 cataract 20% power, aspiration flow rate 18-20cc/minute and vacuum 150-200mmHg was used. Cortex aspiration was done at aspiration rate of 20cc/minute and 200mmHg vacuum using bimanual irrigation and aspiration system. At no stage in procedure hydrodissection or nucleus rotation was done. The anterior chamber was washed with balanced salt solution. A hydrophilic foldable posterior chamber IOL was implanted in the bag through the tunnel under saline flow from irrigating port and dialed in. residual Viscoelastic was aspirated and washed out with a bimanual irrigation aspiration system. The paracentesis port was sealed by hydrating the stroma. This was done by injecting balanced salt solution (BSS) steadily into the corners of the incision. Once the port site was sealed, the anterior chamber formed well and eye pad was given.

Post operatively patients were put on :

- Moxifloxacin 0.5% eye drops 6 hourly.
- 1 % prednisolone acetate eye drop 1 hourly.

On following day of surgery and it was slowly tapered over period of 1 and half month and stopped after that.

COMPLICATIONS

Complications occurred in two patients as shown in Table 2. In one patient there was small central posterior capsular rent and it was managed by vitrectomy with three piece (ALCON) PCIOL in bag. In another patient with foldable hydrophilic lens itself touching central thin posterior capsule which led to central posterior capsular rent and capture of optic in the rent. It was managed by vitreoretinal surgeon with vitrectomy and same lens was placed over anterior capsule after vitrectomy.

Table 2

No of cases	Complication	Management
1	Small central Posterior capsular rent	Vitrectomy→ 3 piece IOL in the bag
1	Central posterior capsular rent with capture of optic in rent	Vitrectomy + placement of same IOL in the bag

RESULT

Out of 15 patients the best corrected visual acuity in 10 cases is 0.00 (6/6) i.e 66.6% and in 3 cases best corrected visual acuity is 0.10 (6/6parts) i.e. 20% and in 2 cases best corrected visual acuity is 0.20 (6/9) i.e. 13.33 % as shown in table 3.

Table 3

CASES	LogMAR	METRE
10	0.00	6/6
03	0.10	6/6.5
02	0.20	6/9

DISCUSSION

Posterior polar cataract has always been a task for surgeons as it is associated with complications like posterior capsular rent. Different modalities have been studied over the years in successful management of the posterior polar cataract. Osher et al [4] found no difference in the rate of posterior capsule rupture between phacoemulsification and extra-capsular cataract extraction (ECCE), while Das et al. [5] in a retrospective analysis proved that phacoemulsification is preferred over ECCE in its management. According to the opacity of posterior polar cataract, Hayashi et al. [6] recommended for phacoemulsification if the opacity was <4 mm with soft nucleus and intra-capsular extraction if opacity > 4 mm with a dense nucleus. Vasavada and Vasvada [7] described a technique that was described for dense and posterior polar cataract called inside-out delineation which lowered risk of posterior capsule tear which was used in our study. Allen and Wood [8] avoided rotation of the nucleus and used gentle visco-dissection with low power and low vacuum settings in order to reduce the stress on the posterior capsule. In our study we have managed the posterior polar cataract by using HYDRODELINEATION- INSIDE OUT technique without hydro-dissection and nucleus rotation. Out of total 15 patients, 2 patients led to posterior capsular rent i.e. 13.33% as compared to other studies were incidence was 36.6% which is statistically significant. 10 patients achieved best corrected visual acuity as 6/6 (66.6%), 3 patients achieved 6/6(parts) and remaining 2 patients also had a good visual outcome of 6/9.

CONCLUSSION

Hydrodelineation INSIDE OUT technique lead to a favorable visual outcome in our study. Surgically the Principles that should be followed are:

- Avoid rapid buildup of hydraulic pressure in the capsular bag
- Low aspiration and flow parameters
- Prevent sudden shallowing of anterior chamber

In the event of PCR, immediate and optimum management by a vitreo-retinal intervention is advised. Thus concluding; with modern technology and a better understanding of this technique, the challenging posterior polar cataract can be successfully managed.

LIMITATIONS

In this study one case where foldable intra ocular lens (IOL) touched the central posterior capsule leading to posterior capsular rent could have been easily avoided with proper precautions.

CONFLICT OF INTEREST

None

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