

Post-Operative Outcomes Of Intraocular Lens Implantation With Both Anterior And Posterior Optic Capture In Paediatric Cataract With Insufficient Lens Capsular Support

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Objective: To assess the post-operative outcomes of intraocular lens implantation with both anterior and posterior optic capture in terms of visual axis opacification, ocular hypertension, centration of intraocular lens and iris and angle structure irritation in paediatric cataracts with either primary posterior capsular defect or traumatic rupture of anterior capsule or fibrotic anterior capsule or extended anterior capsulorrhexis.

Methods: Sixteen (16) eyes of eleven (11) cases of paediatric cataract (5 bilateral and 6 unilateral) of 1 to 4 year of age with either insufficient posterior capsular support or traumatic rupture of anterior capsule or improper anterior capsule to perform anterior continuous curvilinear capsulorrhexis received both anterior and posterior optic capture of posterior chamber intraocular lens (3 piece). Visual axis opacification, intraocular lens centration and intraocular pressure were recorded. The follow up period was 6 to 18 months.

Abstract

Results: Implantation of intraocular lens (3 piece) with both anterior and posterior optic capture was performed successfully in sixteen eyes of paediatric cataract of 1 to 4 year of age. All the eyes had a clear visual axis with no visual axis opacification and maintained clinical centration of intraocular lens with normal intraocular pressure.

Conclusion: Anterior and posterior optic capture of intraocular lens is a safe and effective method of treatment of paediatric cataract of 1 to 4 year of age with insufficient lens capsular support in prevention of visual axis opacification.

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Keywords: Paediatric Cataract, Insufficient Posterior Capsular Support, Traumatic Rupture Of Anterior Capsule, Fibrotic Anterior Capsule, Extended Anterior Capsulorrhexis, Intraocular Lens Implantation, Anterior Capture, Posterior Capture.

Introduction

The implantation of the intraocular lens has become a common method to treat the patients with paediatric cataract.^{1,2,3} A major problem with the implantation of intraocular lens in paediatric cataract is the high incidence of postoperative visual axis opacification, ocular hypertension and decentration of lens due to capsular fibrosis.^{4,5} To prevent the formation of visual axis opacification, various measures like posterior continuous capsulorrhexis with anterior vitrectomy and posterior continuous capsulorrhexis with posterior optic capture have been introduced.^{6,7} The purpose of the study was to evaluate the role of both anterior and posterior optic capture in postoperative visual axis outcome in the patients where there was insufficient lens capsular support to implant the intraocular lens in the capsular bag.

Methods and Materials

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013. This prospective interventional study included 16 eyes of 11 children (5 bilateral and 6 unilateral) from 1 to 4 year with 4 eyes having lamellar cataract with posterior capsular plaque, 4 eyes having cataract with primary posterior capsular defect (PPCD), 6 eyes having traumatic cataract and 2 eyes having cataract with fibrotic anterior capsule and/or extended anterior

capsulorrhexis who underwent cataract surgery with primary monofocal intraocular lens implantation (MA60AC 3-piece Alcon)⁸ with both anterior and posterior optic capture under general anaesthesia at M & J Western Regional Institute of Ophthalmology, Civil Hospital, Ahmedabad from June 2017 to November 2018.

Inclusion criteria

1. Patients from 1 to 4 year of age.
2. Patients having congenital cataract obscuring visual axis of more than 3mm with posterior capsular plaque (centric, size >3mm and <5mm).
3. Patients with insufficient posterior capsular support (primary posterior capsular defect).
4. Patients with traumatic cataract having traumatic rupture of anterior capsule or posterior capsule.
5. Patients with anterior capsular fibrosis and/or extended anterior capsulorrhexis during surgery.

Exclusion criteria

1. Patients less than 1 year of age and more than 4 year of age.
2. Any other associated ocular anomaly.

The same paediatric ophthalmologist performed all the surgeries under general anaesthesia by strictly adhering to the principles of the closed chamber technique. Pupil was dilated with Phenylephrine eye drops (2.5%) + Tropicamide eye drops (0.8%) applied three times at half an hour interval.

A standardized surgical procedure was performed in all the eyes, i.e.

- Sideport entry (1mm) and OVD injected in anterior chamber.
- Corneal tunnel (2.8mm)
- Anterior continuous curvilinear capsulorrhexis
- Aspiration of the lens matter

The anterior chamber and the capsular bag were inflated with OVD (Ophthalmic Viscosurgical Devices), the main incision was extended to 3.2 mm and the intraocular lens (MA60AC 3-piece Alcon) was placed in the sulcus in front of the anterior capsule.

A nick in the posterior capsule was made in the posterior capsule by 26G bent needle below the intraocular lens and posterior continuous curvilinear capsulorrhexis was done under high magnification using utrata forceps without disturbing the vitreous.

The optic of intraocular lens was pushed behind with the help of ainsky hook and iris spatula and captured behind the posterior capsule through the anterior capsule. This manoeuvre allowed both the capsular leaflets to be brought together with the placement of the optic behind the posterior capsule and the haptics in the sulcus.⁹

OVD was removed by bimanual irrigation and aspiration technique. The pupil was then constricted by intra-cameral injection of 0.5% w/v Pilocarpine nitrate followed by intra-cameral injection of 0.5% Moxifloxacin hydrochloride. The main incision was sutured with 10-0 nylon suture. The eye was dressed with antibiotic steroid eye ointment and atropine eye ointment. Postoperatively, children were given a standard regimen: 0.5% Moxifloxacin hydrochloride eye drops for six weeks, 0.05% Difluprednate eye drops tapered over 6 weeks, 0.5% Timolol Maleate + 2% dorzolamide eye drops twice a day for 2 weeks, and 1% Atropine sulphate eye ointment thrice a day for 1 week followed by once a day for 2 weeks. Routine postoperative follow up was done 1st day, 7th day, 1st month, 2nd month, 6th month and 12th month and 18th month. Refraction, slit lamp biomicroscopic examination (through table mounted or hand held slit lamp) and the indirect ophthalmoscopic examination were performed at every follow up visit and intraocular pressure was measured with rebound tonometer at 1st month, 2nd month, 6th month, 12th month and 18th month.

Result

The following results were obtained at the end of 18 months of the surgery: (Figure 1) and (Table 1).

- The lens was found to be clinically centred in all the patients i.e. lens margin outside 6mm of the pupillary margin.
- The visual axis opacification was not found in any of the cases i.e. healthy fundal glow on distant direct ophthalmoscopy.
- Intraocular pressure was within normal limits in all the

cases i.e. less than or equal to 17mm Hg.

- No signs of iris/angle irritation were present in all the cases.
- Iris pigment dispersion over lens was present in 3 cases.
- Posterior synechiae was present in 2 cases.

Discussion

When intraocular lens is placed in the capsular bag in paediatric cataract, the lens epithelial cells migrate between the intraocular lens and the posterior capsule and cause visual axis opacification.¹⁰ In addition, there are increased chances of the posterior capsular fibrosis which may cause decentration of the intraocular lens.

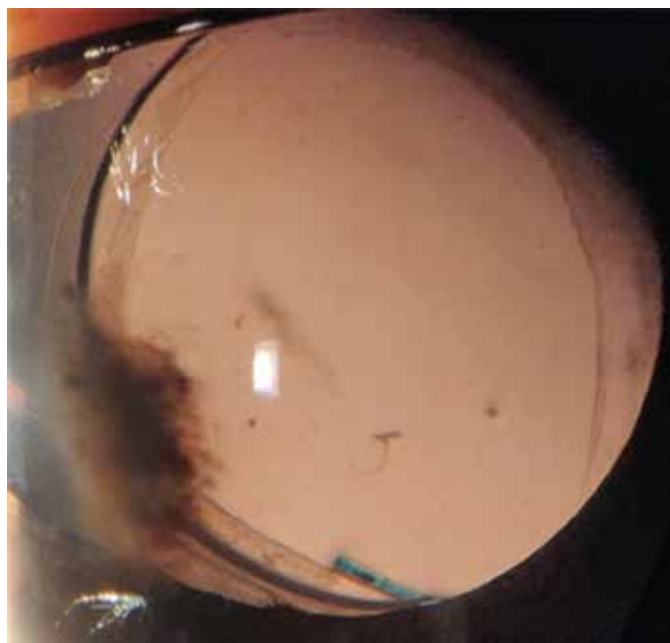


Figure 1: Post-operative image of 3-year old patient having cataract with traumatic rupture of anterior lens capsule showing intraocular lens (MA60AC 3-piece Alcon) implantation with both anterior and optic capture and haptics in the sulcus.

Table 1: A record of postoperative outcomes in the operated cases of paediatric cataracts of 1-4 year age group with either primary posterior capsular defect or traumatic rupture of anterior capsule or fibrotic anterior capsule or extended anterior continuous curvilinear capsulorrhexis with both anterior and posterior optic capture of MA60AC 3-piece Alcon intraocular lens.

Parameter	Result
Visual Axis Opacification	0
Clinically centered lens	16
Ocular hypertension (>17 mm Hg)	0
Corneal haze	0
Posterior synechiae	2
Pigment dispersion over IOL	3
Total no. of eyes	16

In this study, the intraocular lens was implanted with anterior and posterior capture of the optic i.e. the haptics of the lens in the sulcus and the optic behind the posterior capsule in the anterior vitreous. With such implantation of the lens, the space between the anterior and posterior capsule in the visual axis is occupied by the optic of the implanted lens which do not allow the migration of the lens epithelial cells in the visual axis.

Such implantation of lens reduces the chances of visual axis opacification as both the rims of anterior and posterior capsule adhere to each other which prevents the migration of the lens epithelial cells beyond the point of adherence.¹¹

The strong haptic material and decreased capsular fibrosis reduces the chances of decentration of the intraocular lens i.e. the lens margin remains outside of 6mm of the visual axis.¹²

As the optic is behind the anterior and posterior capsule, there are less chances of irritation of iris and angle structures. This reduces post-operative iritis and rise in the intraocular pressure.

Such implantation of intraocular lens offers clear visual axis without doing anterior vitrectomy.¹³ Thus, the barrier between the anterior and posterior segment is preserved as the anterior hyaloid face is not disturbed. In addition, the dependency over the vitrectomy machine is reduced.

The surgery was not preferred in patients of less than 1 year of age as the procedure of optic capture in this age group is difficult. In patients above 4 year of age, the preferred surgery is IOL implantation with posterior continuous curvilinear capsulorhexis without anterior vitrectomy. Hence the comparison between the optic capture and the anterior vitrectomy cannot be analysed.

The anterior vitreous phase was intact in all the patients. The cases where the anterior vitreous phase was abnormal and the vitreous globules were visualised after the lens matter aspiration were excluded from the study.

Timolol and dorzolamide were advised to prevent the post-operative rise in the intraocular pressure. They are advised routinely after any paediatric cataract surgery.

Difluprednate was advised to control the post-operative inflammation as the chances of intraocular inflammation after paediatric cataract surgery are high. It is advised routinely after any paediatric cataract surgery.

Posterior synechiae were formed as a result of pre-existing traumatic injury to the iris tissue and was not a result of complication of surgery.

Conclusion

The treatment of the paediatric cataracts with insufficient posterior capsular support or anterior capsular support

in children of 1 to 4 year of age with implantation of the intraocular lens with both anterior and posterior optic capture is a safe and effective option. The post-operative outcomes following the surgery were within the normal limits with no visual axis opacification, clinically centred lens and normal intraocular pressure.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patients have given their consent for the clinical information to be published in the journal. The patients were well aware of the fact that their names or initials will not be mentioned and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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