

# Postoperative Outcomes of “Optic Capture” Technique of IOL Implantation In Pediatric Cataract Surgery

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## Abstract

**Purpose:** To evaluate the efficacy of posterior continuous curvilinear capsulorhexis (PCCC) with optic capture of the posterior chamber intraocular lens (PC IOL) without anterior vitrectomy in preventing secondary opacification of the visual axis following pediatric cataract surgery in age more than 2 years.

**Methods:** In a prospective evaluation, preoperative and postoperative visual acuity and refractive error were recorded. Intraoperative and postoperative complications were observed. The surgical technique was posterior curvilinear capsulorhexis with optic capture with three piece hydrophobic IOL (MA60AC) after cataract extraction. The incidence of posterior capsular opacification and other complications of pediatric cataract surgery were studied. The follow-up period was from 6 to 36 months.

**Results:** In 75 consecutive eyes of 45 children operated with age range 2 to 8 years (mean, 3.3 years), there was no significant opacification of the visual axis at a mean follow-up of 19 months after surgery (range, 6-36 months).

**Conclusion:** The posterior continuous curvilinear capsulorhexis with posterior optic capture with three-piece hydrophobic lens without anterior vitrectomy is safe and effective in the treatment of pediatric cataract in the prevention of secondary opacification of the visual axis.

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**Keywords:** Pediatric cataract, Posterior Continuous Curvilinear Capsulorhexis, Visual Axis Opacification

## Introduction

Over the years, there have been considerable improvements in surgical techniques, technology, instrumentation as well as a surgeon's understanding of pediatric cataract management. A primary concern in pediatric intraocular lens (IOL) implantation surgery is the common occurrence of posterior capsular opacification (PCO). Lens epithelial cells proliferate and undergo myofibroblastic transformation. Secondary membranes result that use a scaffold of the anterior vitreous face or the anterior/posterior capsules. Today, performing a posterior capsulotomy/capsulectomy along with an anterior vitrectomy has become a part of the routine surgical strategy for paediatric cataract management in infants and children younger than 5 or 6 years of age. However, the long term effects of vitrectomy on the development of glaucoma, axial growth and peripheral retina are not well known in these young eyes. Gimbel reported that posterior optic capture of the IOL without any anterior vitrectomy could prevent Visual Axis Opacification (VAO) in children.

Capturing of the IOL through both anterior and posterior capsulotomy openings allows fusion of the capsular bag and thus prevention of lens epithelial migration to the central visual axis.

The purpose of this study was to report the incidence of VAO in children above 2 years of age undergoing cataract surgery with IOL implantation by posterior optic capture technique through PCCC without anterior vitrectomy.

## Material and Methods

This study comprised of 75 eyes of 45 children of more than 2 years of age with congenital cataract who underwent

phacoaspiration at M & J Western Regional Institute of Ophthalmology, Civil Hospital, Ahmedabad between January 2015 to August 2015.

The exclusion criteria: associated ocular anomalies (uveitis, microphthalmos, persistent foetal vasculature, preexisting posterior capsular defect, Aniridia, glaucoma, iris coloboma), traumatic cataract, subluxated cataract and intraoperative complications like incomplete anterior and posterior capsulorhexis.

Proper pre-operative workup was done. The preoperative & postoperative best corrected visual acuity (BCVA) was taken on picture charts & Snellen's chart according to co-operation of child.

The same surgeon (KPS) performed all the surgeries under general anesthesia and by strictly adhering to the principles of the closed chamber technique.

A standardized surgical procedure was performed in all the eyes, i.e. corneal tunnel, anterior continuous curvilinear capsulorhexis, bimanual lens aspiration, implantation of a three-piece hydrophobic acrylic IOL (Acrysof, MA60AC) in the capsular bag, posterior continuous curvilinear capsulorhexis under a high viscosity ophthalmic viscosurgical device (OVD). Thereafter, the IOL optic was gently pressed posteriorly and was captured through the posterior capsulorhexis opening using a spatula/Leister hook. The haptics were placed in the capsular bag fornix and the shape of the posterior capsulorhexis opening was observed, in which case, a complete capture was confirmed by the round opening stretching into an elliptical one. All the incisions were sutured with 10-0 nylon suture. The anterior chamber was reformed with a balanced salt solution. The pupil was then constricted by intracameral injection of 0.5%

w/v pilocarpine nitrate (Sunways Pharma, India) followed by intracameral injection of 0.5% moxifloxacin hydrochloride (Alcon, Texas, USA).

Postoperatively, children were given a standard regime: 0.5% Moxifloxacin hydrochloride (Intas, India) eye drops tapered over 6 weeks, 0.05% Difluprednate (Vision Pharma, India) eye drops tapered over 6 weeks, 0.1% Nepafenac (Valiants, India) eye drops thrice a day for 4 weeks, 0.5% Timolol maleate (Nutrilis, India) eye drops twice a day for 4 weeks, and 1% Atropine sulphate eye ointment (Bell pharma, India) thrice a day for 2 weeks followed by once a day for 2 weeks. At each follow up visit, the assessment of VAO (as assessed by a hand-held or table mounted slit-lamp), refraction, intraocular pressure (IOP), axial length measurement, corneal diameter measurement, position of IOL, presence or absence of cell deposits on IOL and presence and extent of posterior synechiae at 1,3,6,12 and 18, 24, 36 months postoperatively was done. Significant VAO was defined as VAO encroaching on the central visual axis, thereby making it not possible to perform refraction due to poor fundal glow, thus requiring secondary vitrectomy / membranectomy.

### Results

The age distribution varied from 2 to 8 years of age with mean age  $36 \pm 3$  months. There were 75 eyes of 45 children recruited in this study, out of which, there were 16 female and 29 male children (Table-1).

Out of 45 patients included in our study, 22 belonged to low, 20 to medium, while 3 belonged to high socioeconomic status.

The IOP was taken at each visit with rebound tonometer (I-care). At the final follow up, all eyes had a normal IOP without the need for glaucoma medication. Also, none of the eyes showed significant increase in the corneal diameter as compared to the preoperative measurements.

The inflammation was studied in form of cell deposits on IOL and posterior synechiae. Regarding the VAO, out of 75 eyes operated, mild anterior vitreous phase(AVR) response was found which was non-significant (not obscuring visual axis). There was no significant posterior synechiae in any of the eyes on follow up. All eyes had maintained a clinically well-centered IOL until the last postoperative follow up. The edge of the IOL optic was not visible through a normal sized pupil in any of the eyes (No Decentration).

There were no major intraoperative and postoperative complications. The loss to follow up cases were not included in our study.

### Discussion

In the study by Gimbel in 1994, 18 cases (2-12 years) underwent surgery by optic capture technique without anterior vitrectomy. A clear visual axis was reported in 16 eyes at  $35.5 \pm 9.45$  months. He had used heparin coated single-piece PMMA IOLs.<sup>1</sup> In 1996, in the 13 consecutive eyes operated on in children aged 2 to 12 years (mean, 5.8 years), there was no opacification of the visual axis at a mean follow-up of 19 months after surgery (range, 8–30 years).<sup>2</sup> In 1997, Posterior continuous curvilinear capsulorhexis with optic capture of

the IOL was performed in 18 of 19 consecutive pediatric cataract patients (ages 2 1/2 to 12 years). Heparin-coated IOLs with 6 degree angulation of the haptics were implanted in all eyes. Only eyes with a minimum of 18 months follow-up (n=16) were analyzed. Till that time, the visual axis remained clear in all eyes. No anterior vitrectomy was purposefully performed in any eye.<sup>3</sup> In the study by Vasavada et al in 2000, Primary posterior continuous curvilinear capsulorhexis, anterior vitrectomy, and IOL implantation were performed in all eyes.<sup>4</sup> Eyes were randomly assigned to 1 of 2 groups of 20 each: in 1 group, optic capture was used and in the other, the noncapture technique. Permanent optic capture was achieved in 14 eyes, and 26 eyes had no optic capture. All eyes in both groups maintained a clear visual axis. One eye in the optic-capture group developed a membrane in front of the IOL that required a secondary procedure. Posterior synechia formation was significantly greater in the optic-capture group ( $P = .04$ ), as were deposits on the IOL optic ( $P = .0086$ ). Although all eyes in both groups maintained a clinically centered IOL, geometric decentration was more common in the no-capture group ( $P = .0000$ ). In our study, there was no posterior synechiae at all and centration was well maintained. In the most recent study by Vasavada et al, patients were randomized to Group 1 (in-the-bag 3-piece hydrophobic acrylic IOL [Acrysof MA60AC] with anterior vitrectomy) or Group 2 (optic capture of the same IOL without anterior vitrectomy). Postoperative VAO, glaucoma, cell deposits on the IOL, and posterior synechiae were compared at 1, 3, 6, and 12 months. The study comprised 61 children (61 eyes). Overall, only 1 eye in Group 1 developed a VAO requiring membranectomy 4 months postoperatively, and 2 eyes in Group 1 developed glaucoma over 12 months ( $P=.49$ ). Intraocular lens cell deposits and posterior synechiae were comparable between groups. The IOL could not be captured in 5 eyes (16.1%); no complications occurred in these eyes. They concluded the posterior optic capture of an IOL is an alternative surgical technique that can be used to avoid vitrectomy, even in children younger than 4 years.<sup>5</sup> However, the disadvantages are a technically difficult procedure and difficult future IOL exchange.

### Conclusions

The posterior optic capture technique of IOL implantation without anterior vitrectomy is a good option for paediatric cataract surgery in children above 2 years of age.

### Limitations

The small cohort and short follow-up period.

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