

## CASE REPORT

**MANAGEMENT OF PEDIATRIC TRAUMATIC CATARACT WITH AN OPEN GLOBE INJURY****Levandi Mulja<sup>1,2</sup>, Mayasari Wahyu<sup>1,2</sup>, Irawati Irfani<sup>1,2</sup>, Primawita Oktarima<sup>1,2</sup>**<sup>1</sup>Ophthalmology Department, Faculty of Medicine, Padjajaran University, Bandung, Indonesia<sup>2</sup> Cicendo National Eye Hospital, Bandung, Indonesia

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**ABSTRACT**

**Introduction:** Traumatic cataract is one of the leading causes of monocular blindness in children. The management of pediatric traumatic cataract is challenging; the growing size of the affected eyes and the risk of amblyopia further complicate things. The timing of cataract removal and IOL implantation remain controversial until today.

**Case Report:** A thirteen-years-old boy came with his left eye punctured by a pencil tip. He came in with a visual acuity of 1/300, a full-thickness 5 mm paracentral corneal laceration and traumatic cataract. The patient went through a two-step surgery. Cataract surgery and IOL implantation was conducted one week following corneal laceration suture.

**Discussion:** Two-step surgery was performed on this patient with consideration being cataract removal performed when the inflammation of the eye was subside and also a more accurate IOL calculation. One study stated, even with 43.4% of patient's anterior capsule ruptures, it would postponed cataract surgery for 2 days up to 6 months. In this case, a week after first surgery, it revealed anterior capsule rupture and the lens material was touching corneal endothelium. Therefore, lensectomy was performed because it touches the corneal endothelium causing further damage

**Conclusion:** The two-step procedure performed was a preferable surgery for a traumatic cataract in a quiet eye, because it has better potential for visual improvement and IOL calculation. However, since the anterior lens capsule ruptured and the lens material prolapsed into the anterior chamber, it would have been even better to perform lensectomy as an early procedure to prevent inflammation.

**Keywords:** pediatric traumatic cataract, open globe injury, anterior capsule rupture

**INTRODUCTION**

Ocular trauma is the most common cause of monocular blindness in children. It is the cause of 12 - 29% unilateral cataract cases in children. Thirty five percent of all ocular trauma cases are children under the age of 17 years old, and of these cases 18% are children under the age of 12 years old.<sup>1-3</sup>

Traumatic cataract with obstruction of the visual axis in children, needs to go through surgery because of fear of development of deprivation amblyopia. Factors such as the risk of amblyopia, severe inflammation, and size growth of the eye (anatomically and physiologically) make traumatic cataract such a challenging case. To this day, the optimal timing for cataract

removal remains debatable; simultaneously with treatment of the open globe injury or postponed until inflammation has subsided.<sup>4-5</sup>

Despite the difficulties in achieving accurate IOL calculation and deciding the optimal timing for IOL implants, IOL Implantation is still the method of choice as visual rehabilitation post-traumatic-cataract surgery in children.<sup>4-6</sup>

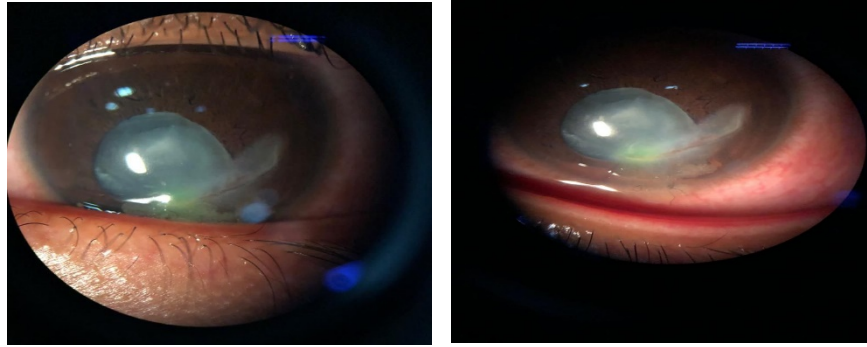
### CASE ILLUSTRATION

A thirteen-years-old boy came with his left eye punctured by a pencil tip a day prior. According to the patient, immediately after his sight becomes blurry but did not bleed and has no history of wearing corrective spectacles nor going through special treatment.

An ophthalmic examination revealed visual acuity on his right eye (VOD) to be 1.0, and on his left (VOS) 1/300. The posterior segment of the examination found the right eye to be in normal condition, while on his left eye; a full-thickness 5 mm paracentral corneal laceration was found with a positive seidel test, shallow anterior chamber, severe inflammation, irregular pupil, negative reverse RAPD, and a cloudy lens (**Figure 1**). The result of Ultrasonography (USG) on his left eye shows its posterior segment to be normal. Patient was then scheduled for exploration and corneal laceration suturing with general anaesthesia.

Intraoperatively, five corneal sutures was performed with nylon 10-0. Intraoperative examination found cloudy lens with no subluxation (**Figure 1**). Since there was no sign of anterior lens capsule rupture, irrigation-aspiration of the lens was not performed. The patient's post-operative therapy includes eye drops and oral medication; one drop of levofloxacin six times a day, one drop of prednisolone acetate eight times a day, one drop of homatropine 2% three times a day, and orally two times 500 mg cefadroxil tablet and three times 500 mg paracetamol tablet.

One day after surgery examination reveals no feasible changes on his left eye visual acuity of 1/300. The corneal sutures remains intact, anterior chamber was formed by air bubble with moderate inflammation and a cloudy lens with suspicion of anterior capsule rupture in the inferonasal. With these in mind, patient continued with the prescribed post-surgery therapy.



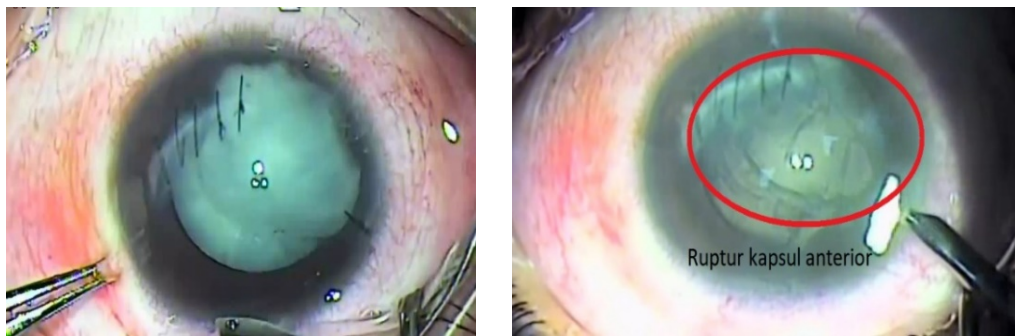
**Figure 1.** a full-thickness 5 mm paracentral corneal laceration and cloudy lens is observed, but no signs of anterior capsule rupture.

One week after surgery, the examination reveals his VOS stays at 1/300, with intraocular pressure of OD 18 mmHg and OS 15 mmHg. The corneal sutures stays intact with moderate inflammation and the lens material was found in the anterior chamber, touching the corneal endothelium, cloudy lens and a ruptured anterior capsule (**Figure 2**). Patient was then scheduled for further treatment of irrigation-aspiration (IA), anterior vitrectomy, and IOL implantation with general anaesthesia. Biometric and keratometric evaluation on his right eye reveals an axial length of 23.48 mm, with K1 41.00 D, K2 42.00 D; while an axial length of 23.16 mm with K1 39.50 D, K2 43.00 D, corneal diameter of 11.5 mm, refractive target of +0.32 D, and the IOL implanted has power of +23.5 D on his left eye.



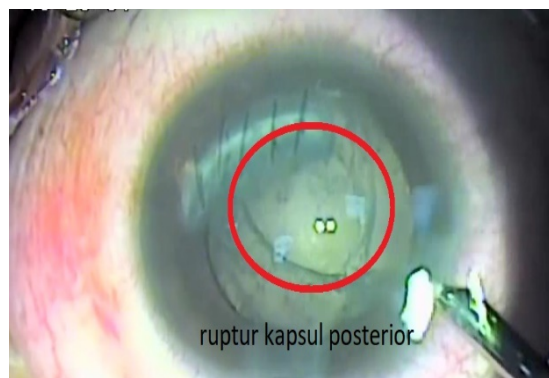
**Figure 2.** Ophthalmology examination on one week after surgery, anterior lens capsule ruptured, touching the corneal endothelium.

The follow-up surgery was performed three weeks after the first surgery. Intraoperative examination on the left eye discovers the lens material present in the anterior chamber with its ruptured capsule in the inferonasal (**Figure 3**). The procedure started with an incision in 12 o'clock. Continued with irrigation-aspiration of the lens material using a simcoe cannula. Since the anterior capsule has ruptured, capsulorhexis is not done.

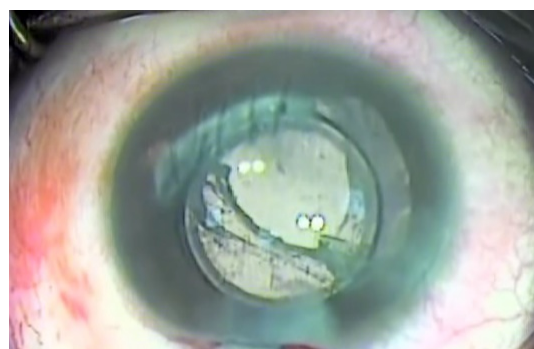


**Figure 3.** Lens material was found at the anterior chamber with a ruptured anterior capsule.

After the lens material has been cleaned, the posterior capsule found to be ruptured as well; it is believed the rupture happened prior to this surgery (**Figure 4**), so anterior vitrectomy was conducted. Three-piece foldable hydrophobic acrylic intraocular lens with length of 12.5mm and optical diameter of 6mm was set on the ciliary sulcus (**Figure 5**). The surgical incisions were sutured with 10-0 nylon.



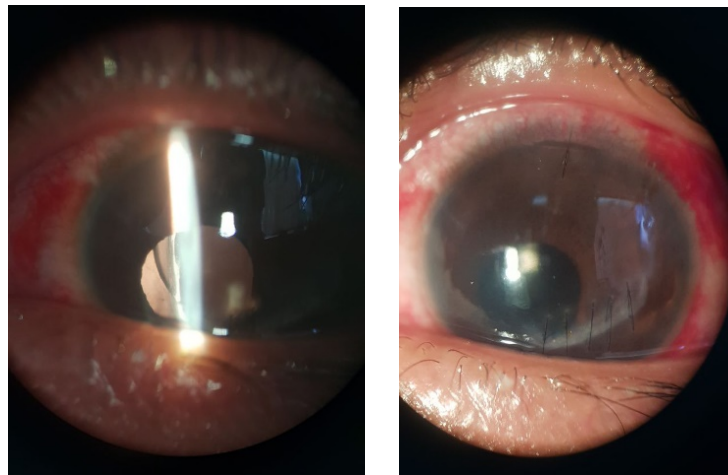
**Figure 4.** The ruptured posterior capsule found intraoperatively.



**Figure 5.** Intraocular lens implanted in the ciliary sulcus.

One day after surgery, the examination reveals his VOS stays at 3/60, IOP of ODS 15 mmHg, corneal edema, corneal sutures remain intact, VH gr III, f/s +4/+4 filled with air bubble, centrally-positioned IOL. While, the week after; his VOS stays at 0.4, with C -3.00 x 90 = 0.5 correction, IOP OD 18 mmHg & OS 13 mmHg, corneal sutures remain intact, VH gr III, f/s +1/+1, centrally-positioned IOL(**Figure 6**). One month after; VOS S+1.50 C-4.50 x 65 = 0.8,

IOP OS 13 mmHg, corneal sutures intact, anterior chamber looks stable and no further complication on the IOL. Patient is then scheduled to remove his corneal sutures followed by maximum correction with spectacles.



**Figure 6.** One week after surgery: the intraocular lens looks centrally positioned.

## DISCUSSION

In an open globe injury situation, immediate and proper procedure during the first 24 hour is crucial. This type of injury on children tends to be more severe; more complications requiring more surgical procedure, longer hospital stay and worse visual prognosis. The main objective of surgery on an open globe injury case is to close the wound, repositioning of prolapsed intraocular tissues, extraction of foreign bodies intraocularly, and to prevent further complication.<sup>7-9</sup>

This patient suffered from a corneal laceration with a prolapsed iris. Corneal sutures and iris repositioning was performed 24-hour post-accident. Post-operative examination shows sealed corneal wound with no signs of complication in forms of endophthalmitis nor posterior segment abnormality.

The best treatment of traumatic cataract with an open globe injury remains debatable regarding the optimal timing and surgical steps taken to perform the procedure. One-step surgery is a cataract removal performed simultaneously with laceration suture on the open globe injury. The advantages of one-step surgery are cost- and time efficient, with hope visual rehabilitation can be done sooner. However, one-step surgery may cause a more severe inflammation reaction post-operatively. A surgeon may consider to perform one-step surgery in the event of ruptured anterior capsule because the rupture causes the prolapse of lens material into the anterior chamber. The presence of lens material in the anterior chamber causes lens-induced uveitis and glaucoma. Two-step surgery is preferable in cases where the eye-condition considered to be “quite”, able to do an accurate IOL calculation post-suture removal and able

to determine potential visual acuity improvement by evaluating other eye conditions (ruptured posterior capsule, vitreous hemorrhage, and retinal detachment). A mutual consensus has yet to be reached regarding the proper time interval between first and second phase procedure. Multiple studies stated 3-6 weeks is a sufficient time interval for the intraocular inflammation to subside and form tissues regeneration. Wilson E, et al, postponed cataract and IOL implant surgery if inflammation subsides with steroid therapy alone. In his research, even with 43.4% of patient's anterior capsule ruptures, he would postponed cataract surgery for 2 days up to 6 months (with an average of 20 days).<sup>4-6,10,11</sup>

Two-step surgery is performed on this patient with consideration being cataract removal performed when the inflammation of the eye was subside and also a more accurate IOL calculation. Sen P., dkk stated that the challenges in IOL calculation on a one-step surgery are hypotonic condition and corneal laceration. Since during the first surgery there is no sign of anterior capsule rupture, it was decided irrigation aspiration not needed and thus not performed at that time. However, a week after surgery, the lens material was touching corneal endothelium with moderate intraocular inflammation. Therefore, irrigation-aspiration of the lens material was performed because it touches the corneal endothelium causing further damage.<sup>6</sup>

Intraocular lens implantation becomes the first choice for optical correction in children going through cataract surgery. In developing countries, the use of contact lens after lens removal is usually not recommended; because of its cost, risk of infection, and poor compliances. The other thing to be considered is the proper timing to perform IOL implants. Some surgeons choose to extract the lens simultaneously with implanting IOL; while others prefer to conclude the procedure with an aphakia eye and reschedule for a secondary IOL implantation at another time. Primary IOL implantation is especially crucial for children within the age that are susceptible to develop amblyopia. However, it is important to note that, primary IOL implantation may increase the severity of inflammation post-operatively. Chuang dkk, stated that 56.6% of patients only reached a visual acuity of 20/40 after IOL implant is conducted. Seventy six percent of the patient measured biometrically has post-operative error with one dioptre off the target; compared to 60% of the patient with target reached on the other eye.<sup>6,12,13</sup>

This particular patient was treated by implanting the IOL simultaneously with irrigation-aspiration of the lens material. Biometric measurement was taken on the operative eye.

In-the-bag IOL implantation is the ideal strategy because it stabilizes the IOL position. However, since the posterior capsule rupture found to be quite large, it is not possible to do the implantation inside the bag. A large optical diameter of IOL helps stabilize it; 6mm is

recommended. Intraocular lens material that can be used in patients with traumatic cataract is polymethylmetacrylate (PMMA); hydrophobic, hydrophilic or heparin-coated acrylic. This particular patient was implanted with three-piece foldable IOL with 12.5mm in length and 6mm optical diameter made of hydrophobic acrylic. One month after surgery shows good results; best visual acuity of 0.8, anterior chamber looks stable and IOL is positioned centrally.<sup>14-17</sup>

Traumatic cataract in children has a better prognosis compared to unilateral congenital cataract. Post-operative visual acuity is highly dependent on the age in which the trauma happened, the onset of cataract and the presence of other ocular complications. Trauma often happened to children over the age of 10 years old, where the chance of developing amblyopia is significantly lower. Note that, since the patient is 13 years old, the possibility of him developing amblyopia is low.

This patient's ocular trauma score is 70, which mean he has 44% chance to have visual acuity of 20/40 within 6 months after trauma. His best-corrected visual acuity one month after surgery is 0.8.

## CONCLUSION

The primary advantage to perform a two-step surgery on an open globe injury case is its performed on a "quite" eye condition; providing better visualization of the cataract and lowering the occurrence of complication intraoperatively. At the event where the anterior capsule ruptures and the lens material touches endothelium, surgery needs to be performed immediately to prevent further damage in corneal endothelium. Calculation of the IOL power could be more accurate if measurement was taken biometrically on the operative eye. Hence, IOL Implantation is best performed on the second phase of the surgery.

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