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Managing Bilateral Congenital Cataracts in Early Childhood: A Clinical and Surgical Perspective

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Abstract

Congenital cataract is a leading cause of childhood blindness that demands prompt surgical intervention to prevent irreversible visual impairment. This case report presents an infant with bilateral congenital cataracts whose diagnosis and treatment were delayed beyond the optimal intervention window. The patient underwent cataract extraction using irrigation aspiration, primary posterior capsulotomy, and anterior vitrectomy. Intraocular lens (IOL) implantation was deferred due to considerations of the patient's age and corneal diameter, and aphakia was managed with high-powered spectacles. Postoperative follow-up revealed improved visual responses, including fixation and following of light and objects, indicating positive visual development. This case highlights the importance of timely identification, appropriate surgical technique, and tailored postoperative visual rehabilitation in managing pediatric cataracts to optimize functional outcomes.

1. Introduction

Congenital cataract is a clouding of the lens that is detected at birth or shortly after birth. Congenital cataract is the leading cause of blindness in children worldwide. Pediatric cataract accounts for approximately 5% to 20% of blindness and significant visual impairment in children worldwide, with an annual incidence rate of 1.8 to 3.6 cases per 10,000 children. The worldwide prevalence varies between 1 and 15 cases per 10,000 children [1]. A systematic review and meta-analysis by Wu X et al. found that the highest rate of congenital cataracts was recorded in Asia at 7.43 cases per 10,000 individuals, followed by the United States at 4.39 per 10,000, Europe at 3.41 per 10,000, and Australia at 2.25 per 10,000 [2]. A study in Indonesia by Muhit et al. reported that the prevalence of cataracts was 0.07 per 1,000 children in Sumba and 0.05 per 1,000 children in Yogyakarta [3]. Another retrospective study (January 2017–December 2019) by Eriskan at the Cicendo Eye Hospital in Bandung reported 224 cases of cataracts, of which 94.64% were congenital and 5.36% were developmental [4].

Congenital cataracts not only cause cloudiness in the lens but also interfere with lens growth, axial length of the eyeball, and refractive properties, resulting in loss of visual function. The management of congenital cataract is to remove cataract as early as possible - ideally by 6 weeks of age in unilateral cases and by 8–10 weeks in bilateral cases to reduce the risk of amblyopia. Amblyopia in children with congenital cataracts who are not promptly operated on results from impaired visual

development due to insufficient visual stimulation during a critical period of development. Although the affected eye is structurally normal, the brain does not receive or process visual information from the affected eye correctly [5]. Late diagnosis and management will have a negative impact and can lead to severe permanent blindness. Therefore, rapid and appropriate identification and treatment are needed to prevent worsening in the future.

2. Cases

A seven-month-old girl was brought by her parents with a complaint of a white spot on both of her eyes. At first, the parents noticed a white spot forming on the right eye when she was 2 months old. Three months later, the white spot became thicker and also appeared on the left eye. Her mother said that she only responded to noise and light at all times. She didn't respond to toys and hand-waved. She could not make eye contact with people around her. She already had her first cataract surgery for the right eye in March 2025. Now the right eye is aphakic.

The patient is the third child of 3 siblings. She was born at full term by cesarean section due to the sterilization of the mother, cried immediately and loudly, with active movements. Birth weight was 2900 grams, and current weight is 7000 grams. The patient's mother said that during pregnancy, she had regular check-ups, and based on the examination results, no history of maternal infection was found. No history of fever. No family history of cataract.

The visual acuity result was that she could fix and follow the light. From the ophthalmological examination, we found that the palpebrae and conjunctiva were calm, there was neither conjunctival injection nor sillier injection. The cornea was clear, and the anterior chamber was normal. The pupils measured 4 mm in diameter with a positive light reflex. The left lens was cloudy, and aphakia was present in the right eye (Figure 1).

The patient was diagnosed with a congenital cataract of the left eye, aphakia in the right eye, and esotropia. She underwent a surgical procedure, including aspiration-irrigation with primary posterior capsulotomy (PPC) and vitrectomy anterior (VA) on 9 April 2025 (Figure 2). She had her first cataract surgery for the right eye on 26 March 2025 with the same procedure. After the surgery, the patient was given an antibiotic eye drop 8x1 and oral systemic antibiotic 2,5 ml three times daily. Oral analgesic 2.5 ml, three times daily, and an anti-inflammatory eye drop, 8x1.

On the first day of follow-up, the patient's left eye had a visual acuity of 20/20, fixating and following the light. Intact heeding, minimal subconjunctival bleeding, clear cornea, and an air bubble in the COA were found. The patient was diagnosed with aphakia in both eyes. A week later, the patient came to the polyclinic for a check-up. The visual acuity is fixed and follows the object; we found intact hatching, a clear cornea, aphakia, and a round pupil. One month after surgery, refractive cycloplegic and posterior segment examination using indirect fundoscopy were performed; the posterior segment of the left eye was normal, and spherical lens correction with a power of +20.00 D was given.

3. Discussions

Normally, the eye lens is a clear and transparent structure. In cataract patients, blurred vision is caused by the cloudiness in the lens that interferes with the refraction of the eye. Light impulses from external objects cannot pass through the refractive media because the cloudy lens blocks them. In addition to a decrease in visual acuity, cataracts also cause impaired quality of visual function, such as decreased contrast sensitivity and glare disorders [6].

In congenital cataracts, lens opacities begin to occur during protein formation. If there is an abnormality during this process, the lens cannot maintain its transparency and becomes cloudy. This can cause decreased vision in children [7]. Surgical intervention is performed as soon as possible in situations involving cataracts with significant opacities that interfere with visual function, the presence of strabismus in unilateral cataracts, or nystagmus in bilateral cataracts. For unilateral congenital cataracts, the optimal age of surgery is between 4 and 6 weeks; performing the surgery before 4 weeks carries a significant risk of developing aphakic glaucoma. The optimal age of surgery for bilateral cataracts is between 8 and 10 weeks. Cataract surgery is postponed until more than 10 weeks of age, as a result of which a poor visual prognosis (20/100 or worse) is expected. Almost all children who are not treated beyond 2 months of age will develop sensory nystagmus. Cataract surgery performed at the optimal age period will have a good prognosis and can prevent amblyopia (lazy eye). In general, surgical procedures for bilateral congenital cataracts performed before 2 months of age have a good visual prognosis with approximately 80% of patients achieving visual acuity of 20/50 or better [8].

In this case, the initiation of treatment was postponed as the diagnosis was not established during the optimal intervention window. Delayed diagnosis may be attributed to several factors, such as limited parental knowledge and awareness of the child's condition, as well as parental anxiety regarding the need for surgical

Figure 1. The clinical photos of ophthalmological examination.

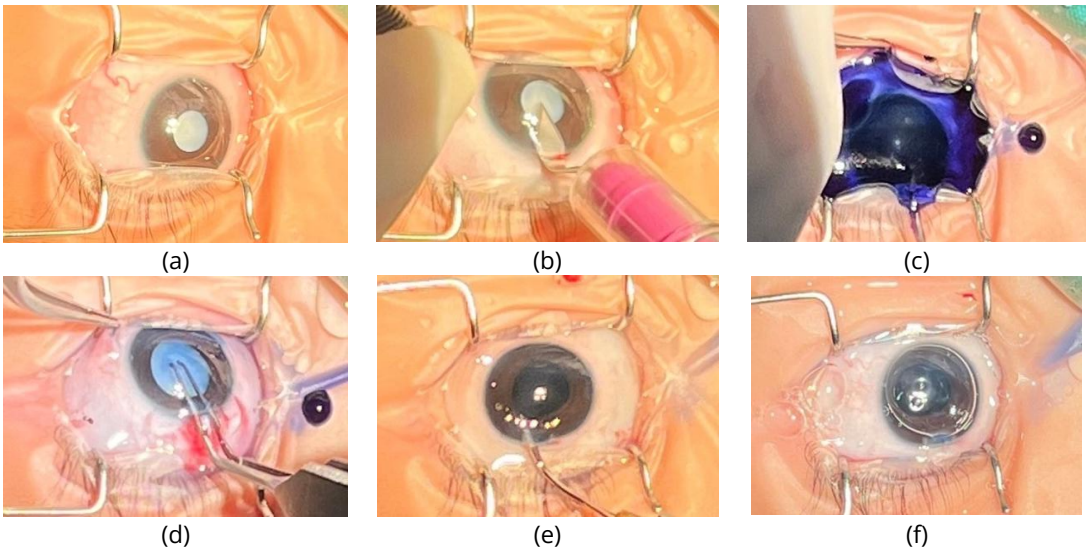

Figure 2. Intra-operation photos. (a) cloudy lens, (b) clear corneal incision (corneal diameter is 10 mm), (c) trypan blue filled the COA for staining the anterior capsule, (d) opening anterior capsule with the Continuous Curvilinear Capsulorhexis (CCC), (e) aspiration-irrigation, PPC with anterior vitrectomy (f) lens already clear, procedure completed by 1 suture of nylon and air bubble in the COA.

intervention. In this case, the parents first noticed an abnormality in the patient's eyes at the age of 2 months, and by 5 months, they recognized a visual issue. As clinicians, appropriate management should still be provided regardless of when the diagnosis is made. However, diagnosis at 5 months is already considered late. The patient had developed complications, including strabismus, as a result of disrupted binocular vision during the first two months of life. It is crucial to educate the public to enhance awareness regarding the significance of monitoring children's growth and development, especially their visual abilities from an early age.

Patient management was performed with irrigation aspiration, primary posterior capsulotomy (PPC), and anterior vitrectomy (AV) OS. These combinations are the most common types of surgery performed in pediatric cataract cases under 1 year old. Differences in the types of cataract surgery in children can be caused by differences in the age of the patient at the time of surgery and the diameter of the cornea. This patient was 7 months old, with a corneal diameter of 10 mm. Intraocular lens (IOL) implantation is typically recommended in patients with a corneal diameter greater than 10.5 mm to avoid space-related complications that could lead to postoperative glaucoma. The lens nucleus in children is relatively softer than that of adult lenses, so that cataract surgery can be performed with an aspiration technique easily. Lens irrigation aspiration in pediatric cataracts can be performed manually or using a phacoemulsification machine. It can be done through a single port or a bimanual approach [9].

Posterior capsule management (PPC) is performed to prevent visual axis opacification (VAO). Opacity may occur due to residual lens epithelial cells remaining after removal of the lens nucleus and cortex, and is further exacerbated by the high rate of cellular proliferation and epithelialization in children. Infants under the age of one year are at nearly 100% risk for VAO compared to older children. Generally, primary posterior capsulotomy (PPC) is performed with vitrectomy in children aged <5 years. Posterior capsulotomy can be performed manually or using a vitrector machine. The procedure will be

performed after lens aspiration [10]. Based on both the literature and clinical experience, the authors selected a combination of irrigation–aspiration, primary posterior capsulotomy (PPC), and anterior vitrectomy (AV) for this patient. A deliberate and well-centered posterior capsular opening was created to reduce the risk of membrane formation and prevent the development of VAO.

In this patient, an intraocular lens (IOL) was not installed. A study conducted by Eriskan A.L. & Amiruddin P.O. explained that the considerations for not installing IOL at a younger age are that the risk of inflammation and complications is higher, and the risk of re-operation is also higher. The high refractive error due to eyeball development and the low accuracy of the formula for calculating IOL power in children are other reasons to delay IOL installation [11]. Furthermore, in infants under 1 year of age, the implanted IOL may be perceived as a foreign body, potentially triggering increased proliferation and fibrosis of the posterior capsule. The use of glasses or contact lenses is an option for patients who cannot undergo IOL implantation.

Patients were given systemic and topical antibiotics. These are given to prevent postoperative infections as the likelihood of such infections rises with the existence of a surgical wound. An analgesic was provided to alleviate postoperative discomfort and enhance the child's comfort level, while a topical steroid was given to suppress inflammatory reactions [12]. The dosage prescribed is greater than what is typically given to adults, at 8 times a day, compared to the usual dose of 5-6 times daily. This adjustment is due to children exhibiting a stronger inflammatory response compared to adults.

The patient's preoperative visual acuity was limited to fix and follow the light, which improved postoperatively to fix and follow objects. This case presented with a likelihood of amblyopia, necessitating immediate postoperative optical rehabilitation to address the condition. Infants with unilateral aphakia are given contact lenses because the size of the contact lens power is easy to change. Infants with bilateral aphakia are given glasses as a safe and easy correction option. This patient was given glasses with a lens power of +20.00 D. Evaluation was done at least 1 day, 1 week, and 1 month after surgery. Furthermore, evaluation can be done every 3 months. Vision correction with glasses should be done within 2-4 weeks after surgery [9, 12]. Due to the delayed diagnosis, the patient had already begun to develop amblyopia, which may prolong the rehabilitation process and consequently increase the overall treatment costs.

4. Conclusions

Early identification and prompt surgical intervention are crucial in addressing congenital cataract to avoid permanent visual loss. In this instance, although the diagnosis was made later than the ideal treatment timeframe, the combination of aspiration–irrigation, primary posterior capsulotomy, and anterior vitrectomy along with quick postoperative optical correction, resulted in a positive visual outcome, demonstrated by the infant's enhanced ability to fixate and track light and objects. This case highlights that even with delayed presentations, tailored surgical techniques and ongoing visual rehabilitation can still provide meaningful visual improvement. Clinicians should remain alert in their screening processes and take swift action when they notice signs of lens opacity, particularly in areas where early pediatric eye care is limited.

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