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Unilateral Congenital Cataracts: Best Practices and Case Studies for Effective Management

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Abstract

Congenital cataract is a clouding of the eye lens in children, which contributes to blindness in 5% to 20% of children throughout the world. Cataracts can occur unilaterally or bilaterally and can vary in size, morphology, and degree of opacification. This report aims to comprehensively diagnose and treat unilateral cataracts and provide optical rehabilitation. A 3-month-old baby boy was brought by his family with complaints of a white spot on the right eye, which the family had known about since the patient was one month old. The patient was diagnosed with a congenital cataract and underwent surgery, which included aspiration irrigation, primary posterior capsulotomy, and anterior vitrectomy under general anesthesia. The use of glasses is chosen as optical rehabilitation. Collaborative management is also done with pediatric specialists, ENT, and pediatric cardiology. It was concluded that congenital cataract management aims to prevent amblyopia by clearing it as soon as possible (Clear Visual Axis) and optical rehabilitation (Clear Retinal Image) to improve the vision prognosis.

1. Introduction

Congenital cataracts, a clouding of the eye lens in children, contribute to blindness in 5% to 20% of children worldwide, with treatment and prognosis varying [1, 2]. Cataracts can occur unilaterally or bilaterally and can vary in size, morphology, and degree of opacification. So, the effects of visual disturbances and the treatment and prognosis vary [1, 3].

Congenital cataracts can be associated with several conditions, including chromosomal abnormalities, systemic disease and syndromes, trauma infection, and radiation exposure. In almost all cases of cataracts related to systemic disease, cataracts occur bilaterally. On the other hand, not all bilateral cataracts are associated with systemic abnormalities. Cataract surgery in children still has less than optimal results compared to adults due to the immature anatomy and physiology of children's eyes, the potential for a severe postoperative inflammatory response, and a higher tendency for complications [3, 4].

The earlier the onset of cataracts, the greater the possibility of amblyopia if left untreated. There are differences in challenges in treating unilateral and bilateral congenital cataracts. There are different challenges in treating unilateral and bilateral congenital cataracts, such as in treating pupil dilation in bilateral congenital cataracts, pupil dilation treatment with cycloplegic is given for partial bilateral cataracts until cataract surgery can be performed with the installation of

an intraocular lens at the age of 2 or 3 years when the growth of the eyeball is stable Surgical therapy for older bilateral cataracts can be considered if visual acuity is less than 20/40 [2, 3].

Meanwhile, surgical intervention for unilateral cataracts in older children may be warranted if visual acuity fails to reach the 20/40 threshold despite optical treatments and amblyopia management efforts. This case report aims to provide a comprehensive exploration of the diagnosis, treatment, and rehabilitation of unilateral cataracts, elucidating the intricacies of managing this condition within the context of older pediatric patients. Through meticulous examination and analysis, the report endeavors to offer valuable insights into optimal management strategies, thereby contributing to the refinement of clinical practices and ultimately improving outcomes for affected individuals.

2. Cases

On January 16, 2024, a three-month-old baby boy was brought by his family with complaints of a white spot on the right eye, which the family had known about since the patient was one month old. The patient's mother also said that the patient's eyes could not focus on light or objects in front of the patient. The patient has no history of shining eyes like a cat's eyes when exposed to light at night. The patient was born at full term (term) normally with a birth weight of 3400 grams; her current weight is 6800 grams. The patient's mother said that during pregnancy, she never experienced coughing or fever and never had a red rash on her body. The patient is the first child. Family history is that the patient's grandmother had experienced cataracts and had undergone surgery.

The general condition is good, and the eyeball position is orthophoric. An ophthalmological examination revealed a completely cloudy lens in the right eye without any other abnormalities. Due to cloudy refractive media (lens), the posterior segment cannot be assessed. Ultrasound examination showed that the vitreous body of both children's eyeballs was clear, the walls of the eyeballs were intact, and no stalks appeared (Figure 1).

For eye examinations, children aged 0-6 months can be examined to determine basic indicators of eye health, such as whether there are congenital abnormalities, infections, cataracts, and glaucoma [5]. The examination form is divided into two examinations, like the red reflex. Thus, the examination is conducted to detect whether there are refractive disorders, retinoblastoma, cataracts, or retinal abnormalities. The examination result is considered abnormal if the pupillary light reflex shows blackish spots or spots or is not symmetrical between the right and left eyes [2, 6].

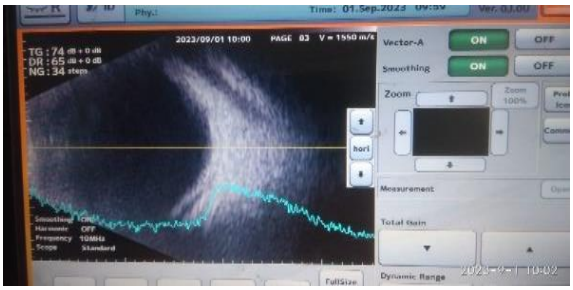

Figure 1. Ultrasonography of the patient's right eye.

On January 17, 2024, surgery was performed on the patient's right eye using the technique of Aspiration irrigation (AI) + Membranectomy + Primary Posterior Capsulotomy (PPC) + Anterior Vitrectomy (VA) on the right eye, with the following steps. First, the corneal diameter was measured, with the results obtained being 10 mm. A corneal incision was made at 12 o'clock using a keratom (three-plane incision), and the corneal was with trypan blue. Then, fill the COA with viscoelastic and carry out CCC aspiration irrigation of the entire lens cortex until clean, followed by filling the COA with viscoelastic, PPC (Primary posterior capsulotomy), and vitrectomy. After that, the procedure hectated the cornea once with 10.0 nylon. Then, inject 1 ml of dexamethasone gentamicin subconjunctivally in a 1:1 ratio. Then, the operation is completed and closed using gauze (Figure 2).

After surgery, the patient was given the following therapy: oral systemic antibiotics 3 x 0.5 cc and anti-analgesic syrup 0.5 cc, then topical antibiotics 6x1 drops, topical anti-inflammatory steroids 8x1 drops, and topical anticholinergic drugs 3x1 drops.

The patient was taken for re-control post-surgery on March 27, 2024. The post-operative inflammatory condition appeared to have subsided, and no visual axis opacity was found, so glasses were measured, which resulted in a spherical +20.00 diopters. Patients are advised to have a re-control one month after wearing glasses, and the schedule for the next re-control will be adjusted to assess complications that may occur after pediatric cataract surgery and to adjust the size of the child's glasses according to growth.

3. Discussions

In this case, the patient was brought by his family at the age of 3 months and eight days, and the surgical procedure was carried out four days after obtaining approval from the pediatric and anesthesia department. The prognosis for visual function in this case is good because no other ocular abnormalities were found. The surgery was carried out at an early age, namely three months of age, and the surgical technique was carried out by cataract surgery procedures for

(a) (b) (c)

Figure. 2 The steps of congenital cataract surgery on a 4-month-old boy's right eye: a) the patient undergoes general anesthesia and aseptic procedures. b) the corneal diameter was measured with the results obtained being 10 mm c) Irrigation and aspiration of the lens nucleus and cortex.

children older one year of age; the healing process was as expected, and post-operative optical rehabilitation was carried out.

Treatment for congenital cataracts is divided into non-surgical and surgical management. Surgical treatment is carried out with indications, namely lens opacity measuring 3 mm or more and lens opacity that is thick and obstructs the red reflex, even though pupil dilation has been carried out [5].

A child's eye is not a miniature of an adult's eye, where anatomical and physiological changes still occur, so there are differences in managing pediatric and adult cataracts [7]. The anatomical condition of the child's eye, such as a thicker and more elastic anterior capsule of the lens, is one of the complications of the surgery. Namely, when performing continuous curvilinear capsulorhexis repair (CCC), the condition of the shallow anterior chamber also makes intraocular maneuvers difficult to overcome this difficulty viscoelastic sodium hyaluronate is used. So that the anterior chamber is formed and the anterior capsule is easier to handle. A CCC that is not too wide is also carried out, considering that the CCC that is formed will automatically become wider due to the anterior capsule still being elastic.

It is expected that the diameter of the CCC formed is approximately five millimeters [8, 9]. Variations in the length of the eyeball, as well as alterations in the cornea and lens, significantly impact the assessment of surgical techniques and the timing of intraocular lens implantation as an alternative to optical rehabilitation. The technique chosen in this case was aspiration irrigation and primary posterior capsulotomy, followed by anterior vitrectomy without IOL implantation.

This technique was chosen considering that the child was under one year of age, and lens implantation was not carried out due to the high epithelialization and inflammation process after pediatric cataract surgery. Lens implantation was also not carried out because it can trigger myopic shift conditions. The entire lens cortex must be clean because the remaining lens cortex can trigger severe epithelialization and inflammation after surgery [9, 10]. Primary posterior capsulotomy and Anterior vitrectomy are carried out to prevent opacification of the posterior capsule caused by post-operative epithelialization and inflammation [11, 12].

Congenital cataracts can occur immediately at birth or in the first year of life, affecting one eye (unilateral) or both eyes (bilateral) [10–12]. Treatment for unilateral cataracts requires surgery under six weeks of age, while bilateral cataracts require surgery under eight weeks [5, 12]. Management of congenital cataracts is divided into non-surgical therapy and surgical therapy. Non-surgical therapy for pediatric cataracts is carried out by observation and pupil dilation. Observations are carried out on cataracts that are less than 3 millimeters in size or located pericentrally so that they do not interfere with the visual axis. Pupillary dilation therapy with cycloplegic is given for partial bilateral cataracts until cataract surgery can be performed with the installation of an intraocular lens at the age of 2 or 3 years when eyeball growth is stable [13].

It is very important to detect early abnormalities in a child's eyes, such as congenital cataracts, so that, with fast and appropriate treatment, the child's vision function can be maintained until adulthood. It is known that the visual function of newborn children is still immature and still requires a process toward mature visual function until the age of 7 years. This process is called the emmetropization process, which requires a clear refractive medium and an orthophoric eye position [5, 6].

The patient came from a distant area, so it was difficult for him to be re-controlled according to the specified schedule. Thus, optical rehabilitation, namely providing a prescription for glasses, was carried out within two months after surgery. Installation of IOLs, glasses, and contact lenses are tools for optical rehabilitation in children after cataract surgery. This patient was chosen to wear glasses because he was still three months old, so he could not have an IOL installed, and it was difficult to wear contact lenses both in terms of the availability of baby contact lenses and concerns about the hygiene and sanitation of the patient's family with a low level of education [2, 14].

There are several complications after cataract surgery in children that can occur long-term, such as glaucoma and visual axis opacity. So, these patients are advised to have a re-control one month after wearing glasses, and the schedule for the next re-control will be adjusted to assess complications that may occur after the child's cataract

surgery and to adjust the size of the child's glasses according to growth [3, 15].

4. Conclusions

This case report is intended to comprehensively diagnose and treat optical rehabilitation of unilateral cataracts. The patient's eye condition is generally very good; the eyeball position is orthophoric. An ophthalmological examination showed that the right eye lens looked cloudy without any other abnormalities. The posterior segment cannot be assessed because the refractive media is cloudy. The post-operative inflammatory condition appeared to subside, and no visual axis opacity was found, so glasses were measured, which resulted in a spherical shape +20.00 diopters. Patients are advised to have another check-up a month after wearing glasses.

Early detection of congenital cataract cases is very important to prevent amblyopia and improve the child's vision function. Appropriate and fast treatment is needed, considering that pediatric cataracts are treated differently from adult cataracts.

Unilateral Congenital cataracts are often associated with other ocular abnormalities and systemic disorders such as congenital rubella syndrome and other syndromes. So, collaboration is needed with pediatric specialists, ENT, and pediatric cardiology.

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