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# Through a Hazy Lens: A Teen's Surprising Struggle with Juvenile Cataracts

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**Abstract**

A juvenile cataract is a condition in which the eye's lens gets cloudy, affecting children and teenagers and considerably impairing vision. It accounts for approximately 5% to 20% of childhood blindness worldwide. A 16-year-old male patient came with his parents to the Pediatric Ophthalmology and Strabismus Department of RSUD dr. Zainoel Abidin with complaints of blurred vision in both eyes. The patient admitted that his visual acuity was deteriorating, and he had difficulty seeing the blackboard when the teacher explained it at school. There were no factors that aggravated or relieved the patient's complaints. The ophthalmologic examination showed the visual acuity of both eyes was 6/30, and the bilateral lenses were opaque. The patient was diagnosed with juvenile cataract oculi dextra et sinistra. Subsequently, the patient was planned for aspiration irrigation with intraocular lens (IOL) insertion in both eyes, membranectomy, primary posterior capsulectomy (PPC), and anterior vitrectomy (AV). Following the surgery, the visual acuity of both his eyes was improved to 6/7 and 6/10. The patient was also prescribed oral and topical antibiotics and topical anti-inflammatories to prevent infection and persistent inflammation after surgery. After surgery, the patient was also planned for optical rehabilitation one month postoperatively by being prescribed glasses with the best correction of 6/6 in both eyes.



## 1. Introduction

A juvenile cataract is a condition in which the eye's lens becomes cloudy. It occurs in children and adolescents and can significantly impair vision. This condition differs from adult cataracts, which are generally caused by aging. A variety of factors, including genetics, congenital infections, eye trauma, or systemic diseases such as diabetes or metabolic disorders, can cause juvenile cataracts. In some cases, juvenile cataracts can occur as part of certain syndromes, such as Down's or Lowe's syndrome. Although cataracts are more common in adults, cataracts in children deserve special attention because of their impact on a child's visual development and quality of life [1].

Juvenile cataracts usually appear throughout the first decade of life. Epidemiologically, juvenile cataracts are one of the leading causes of preventable visual impairment in children worldwide. Its prevalence varies

(a) (b)

**Figure 1.** The clinical images before surgery a) right eye; b) left eye.

(a) (b)

**Figure 2.** The clinical images on the next follow up examination after surgery. a) An IOL is implanted in the patient's right eye. b) the patient's left eye.

Globally, the prevalence of childhood cataracts varies depending on region and access to health services. In developing countries, the prevalence is higher, largely due to delays in diagnosis and limited access to health services. Juvenile cataracts account for approximately 5% to 20% of childhood blindness, with an incidence rate of 1.8 to 3.6 per 10,000 children per year. Prompt and appropriate treatment can prevent permanent blindness and improve a child's visual development [2, 3].

Early detection and appropriate intervention are critical to the management of juvenile cataracts. Surgery, usually to remove the cloudy lens and replace it with an intraocular lens (IOL), is the primary treatment for restoring vision in children with juvenile cataracts. This case report aims to demonstrate the unexpected conditions that can be encountered during surgery. This may influence considerations in managing juvenile cataract cases [1].

## 2. Cases

A 16-year-old male patient was brought by his parents to the Pediatric Ophthalmology and Strabismus Department of RSUD dr. Zainoel Abidin on September 26th, 2024, with complaints of blurred vision in both eyes (figure 1). The patient had consulted an ophthalmologist, and surgery was planned 4 years ago, but the family and patient disagreed. The patient admitted that his visual acuity was deteriorating, and he had difficulty seeing the blackboard when the teacher explained it at school. There were no factors that aggravated or relieved the patient's complaints. The complaint was not accompanied by red eyes, swelling, eye pain, or excessive tearing. History of trauma and previous diseases were denied.

A general physical examination revealed that the patient was conscious, with blood pressure of 110/85 mmHg, heart rate of 80 beats per minute, respiratory rate of 20 beats per minute, and temperature of 36.7°C. Ophthalmologic examination showed that the visual acuity in the right and left eyes was 6/30 without strabismus. The conjunctiva was not inflamed, the cornea was clear, and the crystalline lenses of both eyes were opaque. Based on the examination results, the patient was diagnosed with juvenile cataract oculi dextra et sinistra. Subsequently, the patient was planned for aspiration irrigation with Intraocular lens (IOL) insertion in the right eye. After irrigation aspiration, a membranous lesion was seen in the central part of the posterior capsule. Therefore, after irrigation aspiration, the patient received a membranectomy, primary posterior capsulectomy (PPC), and anterior vitrectomy (AV). Following the procedure, the patient received medicamentous therapy such as oral antibiotic twice daily, oral analgetic three times daily, gastroprotector twice daily orally, and eyedrops such as antibiotic six drops per day, anticholinergic three drops per day, and anti-inflammatory six drops per day. On Friday, October 4, 2024, the patient returned to the Pediatric Ophthalmology and Strabismus Department of RSUD dr. Zainoel Abidin for a follow-up. The ophthalmologic examination showed that the visual acuity of the right eye began to increase to 6/10, and the IOL had already been implanted (Figure 2).

In addition, the patient was scheduled to undergo the same procedure on his left eye as on his right eye on October 9$^{th}$, 2024. Upon follow-up one week later, the patient's visual acuity improved to 6/7 on the right and 6/10 on the left. Postoperatively, the patient received the same medication as in the previous procedure. The patient was also scheduled for optical rehabilitation one month postoperatively, and he was prescribed glasses with the best correction of 6/6 in both eyes.

## 3. Discussions

Juvenile cataracts are defined as cataracts that occur in childhood after infancy, regardless of the underlying etiology [1]. Approximately 50% of all cataracts in children are caused by gene mutations that code for proteins involved in the structure or the clarity of the lens. Most of these genes are inherited dominantly, while others are inherited autosomal recessively or linked to the X chromosome [3]. Other common causes of childhood cataracts include idiopathic disorders, congenital syndromes, ocular damage, metabolic disorders, and

systemic abnormalities [4]. Emmetropization in children's eyes is normally complete by age 12, with axial length growing from an average of 16.5 mm at birth to 23 mm at age 13. This process can be separated into three stages: fast (0.46mm/month from birth to 6 months), infantile (0.15mm/month from 6 to 18 months), and juvenile (18 months to 12 years). The average axial length of the eye increases from 16.5 mm at birth to 23 mm by age 13 [5].

Based on the history findings of the 16-year-old male patient in this case, the patient came with bilateral hazy vision complaints that had worsened for 4 years. The complaint was accompanied by decreased visual acuity and difficulty seeing the blackboard when the teacher explained at school. The chief complaint and additional complaints of foggy vision and decreased visual acuity are classic symptoms of cataracts, often caused by opacities in the eye's lens. Symptoms of cataracts in children are often not immediately apparent, especially if the cataracts are bilateral and develop gradually. A common early sign is leukocoria, or the appearance of a white reflex in the pupil. Blurred vision, strabismus, or difficulty focusing on objects may also be signs of cataracts. The child may experience nystagmus or uncontrollable eye movements in severe cases due to a lack of visual stimulation [1]. Cataracts can block light from reaching the retina. This can lead to blurred vision or seeing through fog. The mechanisms behind lens opacification are complex and involve various biological processes. Protein aggregation, caused by mutations or metabolic imbalances, causes crystallin proteins to unfold and aggregate, resulting in light dispersion and lens opacification. Osmotic imbalances, such as those found in diabetes and galactosemia, cause an accumulation of osmotic agents within the lens, resulting in cell enlargement, membrane rupture, and protein leakage. Calcium homeostasis abnormalities also contribute to lens opacity by altering cell signaling and protein stability [6, 7].

Pediatric cataract surgery is a complicated procedure. The procedure is considerably different from cataract surgery in older patients. Pediatric cataract surgery differs from adult cataract surgery in several ways. One is the potential for increased postoperative inflammation and capsular opacification. This refractive state constantly changes due to eye growth, difficulty documenting anatomic and refractive changes due to poor compliance, and susceptibility to amblyopia. Furthermore, the lack of a solid nucleus drastically decreased scleral and corneal rigidity. It increased posterior vitreous pressure in children's eyes, so a surgical technique that differs significantly from adult surgery is needed. Ocular growth complicates the determination of an intraocular lens (IOL) power. Normal childhood behavior can make it difficult to follow postoperative instructions, and postoperative eye exams might also be difficult [8].

Irrigation Aspiration (I/A) procedure was performed on this patient. This procedure involves making a small incision in the cornea or sclera and then using a special device to deliver an irrigation solution into the eye's anterior chamber. This process helps to soften the cataract, which is then removed by aspiration. Aspiration is done carefully to minimize trauma to the eye tissue and keep the structure of the eye intact [1]. During surgery, the posterior capsule membrane was found. Therefore, after irrigation aspiration, the patient was considered for membranectomy, primary posterior capsulectomy (PPC), and anterior vitrectomy (AV). In children, a membrane or fibrosis in the posterior capsule commonly causes a blurred visual axis. After membranectomy, there is a hole in the posterior capsule. This becomes a challenge during IOL implantation. Choosing the wrong lens type can cause the lens to pass through the hole and drop into the posterior segment. To prevent this, a three-piece foldable IOL was selected to provide a more stable fixation on the existing capsular support [9]. After the cataract is removed, an appropriate intraocular lens (IOL) is inserted to replace the original lens. IOLs are usually designed to replace the function of the natural lens, and the selection of the type and power of the IOL is critical for optimal vision [10, 11]. The Patient was administered oral and topical antibiotics and topical anti-inflammatories to prevent infection and persistent inflammation after the surgery [12].

## 4. Conclusions

Juvenile cataracts are one of the leading causes of preventable visual impairment in children worldwide. Symptoms of cataracts in children are often not immediately apparent, especially if the cataracts are bilateral and develop gradually. Surgery is the gold-standard option when the location or size of the cataract significantly affects vision. Prompt and appropriate treatment can help children perform their daily activities optimally.

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## References


1. Gupta, P., Gurnani, B., and Patel, B. . (2024). *Pediatric Cataract*, StatPearls Publishing, Treasure Island.
2. Gilbert, C. (n.d.). Worldwide Causes of Blindness in Children, *Pediatric Ophthalmology*, Springer Berlin Heidelberg, Berlin, Heidelberg, 47–60. doi:10.1007/978-3-540-68632-3_5.
3. Katre, D., and Selukar, K. (2022). The Prevalence of Cataract in Children, *Cureus*. doi:10.7759/cureus.30135.
4. Nischal, K. K., and Medsinge, A. (2015). Pediatric Cataract: Challenges and Future Directions, *Clinical Ophthalmology*, 77. doi:10.2147/OPTH.S59009.
5. Li, Y., Tan, Y., Xu, C., Jin, G., Chen, H., Jin, L., Luo, L., Chen, W., Lin, H., Liu, Y., and Liu, Z. (2024). Association Between Preoperative Ocular Parameters and Myopic Shift in Children Undergoing Primary Intraocular Lens Implantation, *Translational Vision Science & Technology*, Vol. 13, No. 5, 24. doi:10.1167/tvst.13.5.24.
6. Böhm, E. W., Buonfiglio, F., Voigt, A. M., Bachmann, P., Safi, T., Pfeiffer, N., and Gericke, A. (2023). Oxidative Stress in the Eye and Its Role in the Pathophysiology of Ocular Diseases, *Redox Biology*, Vol. 68, 102967. doi:10.1016/j.redox.2023.102967.
7. Schmid, P. W. N., Lim, N. C. H., Peters, C., Back, K. C., Bourgeois, B., Pirolt, F., Richter, B., Peschek, J., Puk, O., Amarie, O. V., Dalke, C., Haslbeck, M., Weinkauf, S., Madl, T., Graw, J., and Buchner, J. (2021). Imbalances in the Eye Lens Proteome Are Linked to Cataract Formation, *Nature Structural & Molecular Biology*, Vol. 28, No. 2, 143–151. doi:10.1038/s41594-020-00543-9.
8. Ledoux, D. M., Trivedi, R. H., Wilson, M. E., and Payne, J. F. (2007). Pediatric Cataract Extraction with Intraocular Lens Implantation: Visual Acuity Outcome When Measured at Age Four Years and Older, *Journal of American Association for Pediatric Ophthalmology and Strabismus*, Vol. 11, No. 3, 218–224. doi:10.1016/j.jaapos.2006.11.003.
9. Mohamed, G. S., and Abdallah, M. G. (2024). One-Piece Foldable Intraocular Lens Versus 3- Piece IOL in Scleral Fixation Running Title, *Journal of Medicine in Scientific Research*, Vol. 7, No. 4. doi:10.59299/2537-0928.1411.
10. Khokhar, S., Rani, D., Wahi, A., and Sharma, D. (2022). Membranectomy with Optic Capture in a Paediatric Patient with VAO, *BMJ Case Reports*, Vol. 15, No. 1, e247666. doi:10.1136/bcr-2021-247666.
11. Imelda, E., Nuzhatuddin, F., Jannah, S. R., Adev, S. M., Adev, A. M., and Toshniwal, N. S. (2023). From Bright to Brightness: Mastering the Management of Bilateral Congenital Cataracts, *Indonesian Journal of Case Reports*, Vol. 1, No. 2, 24–28. doi:10.60084/ijcr.v1i2.97.
12. Zafar, A., Shaheen, F., Afzal, T., Ahmad, S., and Amjad, M. (2023). Role of Prophylactic Oral Antibiotics in the Prevention of Post-cataract Surgery Acute Infective Endophthalmitis, *Cureus*. doi:10.7759/cureus.42662.