

Bilateral Total Cataract in a Young Patient After Septic Shock: Diagnostic and Therapeutic Approach

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Abstract: Cataract secondary to severe systemic conditions is a rare but clinically relevant entity, particularly in young patients exposed to intense inflammatory insults such as septic shock. Early identification and timely surgical management can directly impact visual and functional prognosis. To report a case of rapidly progressing bilateral total cataract in a young patient following septic shock, emphasizing clinical presentation, surgical approach, and visual outcomes. This is a qualitative and descriptive case report based on retrospective analysis of medical records, surgical documentation, and ophthalmologic examinations. The patient underwent phacoemulsification with implantation of a monofocal toric intraocular lens in the left eye. Surgery in the right eye is still pending due to financial constraints. The patient demonstrated satisfactory visual recovery in the left eye, with final visual acuity of 20/30. The right eye remains with mature cataract and severely reduced visual acuity. Postoperative follow-up showed good anatomical recovery without complications. This case reinforces the importance of ophthalmologic screening in critically ill patients and highlights that cataract may represent a significant, yet treatable, visual complication following septic shock. Early intervention and the use of advanced intraoperative technologies contribute to favorable visual rehabilitation. Socioeconomic barriers, however, may delay complete visual recovery in vulnerable populations.

Keywords: Bilateral cataract; Septic shock; Phacoemulsification; Intraocular lens; Ophthalmology.

1. Introduction

Ocular manifestations associated with severe systemic conditions such as septic shock have been increasingly recognized in clinical practice, particularly due to their po-

tential to affect sensitive intraocular structures such as the lens and corneal endothelium [1,2]. Among these complications, the development of secondary cataracts stands out, which may occur acutely or subacutely, significantly impairing visual acuity, especially in young patients who have experienced critical episodes of systemic inflammation.

The literature has described cases of lens opacification associated with insults such as electrical burns [3,4], as well as autoimmune and systemic inflammatory conditions, including hyperferritinemic syndrome or polyarteritis nodosa, in which the inflammatory storm may trigger disorganization of ocular structures [5,6]. Ocular changes have also been reported in patients with rare genetic disorders and acute infectious diseases, suggesting that systemic, immune, or metabolic stress may induce early cataractogenesis, especially in individuals with intrinsic predisposition [7,8,9]. From a surgical standpoint, cataract management in young patients with a history of septic shock or intensive care unit (ICU) hospitalization poses specific challenges, such as assessing endothelial integrity and capsular stability, in addition to choosing the most appropriate intraocular lens (IOL) [2]. The use of high-resolution image-guided technologies has contributed to greater safety and predictability of intraoperative outcomes [2].

In this context, we report the case of a 19-year-old patient who developed rapidly progressive bilateral cataract following an episode of septic shock. We discuss the possible pathophysiological mechanisms involved, highlight the importance of early ophthalmologic screening in critically ill patients, and describe the surgical strategy and outcomes obtained with the use of digital microscopy and toric IOL implantation. While a direct causal link cannot be established, the temporal association and clinical presentation raise relevant considerations for ophthalmologic evaluation in post-ICU patients.

2. Case Report

A 19-year-old male student was referred to a specialized cataract surgery service with complaints of progressive bilateral visual loss following a recent hospitalization for septic shock of infectious origin, which occurred in January 2024. The patient had no prior history of ocular trauma, ophthalmologic diseases, or chronic use of topical medications. At presentation, uncorrected visual acuity (VA) was limited to light perception (LP) in the right eye (RE) and hand motion (HM) in the left eye (LE). Slit-lamp biomicroscopy showed bilateral mature cataracts, with no signs of anterior chamber inflammation and clear corneas. Intraocular pressure was 14 mmHg bilaterally.

Due to the dense lens opacities, direct fundus examination was not possible in either eye. Retinal mapping by B-scan and indirect ophthalmoscopy of the RE revealed turbid media and a normal optic disc appearance. In the LE, the retina was attached, the optic disc had a cup-to-disc ratio of 0.4, and the macula appeared normal. Given the significant bilateral visual impairment. Phacoemulsification was indicated for both eyes, with the LE prioritized based on slightly better baseline visual function. Surgery was performed under topical anesthesia with continuous curvilinear capsulorhexis, soft nucleus phacoemulsification, and implantation of a LEEDSAY +23.50 (-0.60) monofocal toric intraocular lens in the capsular bag, assisted by high-resolution digital microscopy (Figure 1).

At the 30-day postoperative follow-up, the patient achieved corrected VA of 20/30 in the LE. The cornea remained clear, with mild epithelial edema and a well-centered IOL. Specular microscopy showed endothelial cell counts of 3,067 cells/mm² in the LE and 3,086 cells/mm² in the RE, without significant pleomorphism. Retinal mapping confirmed attached retinas and normal optic disc appearance in both eyes. Although phacoemulsification in the RE was indicated, the procedure has not yet been performed due to financial constraints. The patient remains under regular follow-up while awaiting resources to complete surgical rehabilitation.

Later, phacoemulsification was performed in the RE using high-definition image-assisted digital microscopy (Figure 2), enabling detailed photographic documentation. Intraoperatively, good capsular tone, well-centered IOL placement, and absence of complications were observed (Figure 3).

Figure 1. Intraoperative image showing toric monofocal intraocular lens centered in the capsular bag.

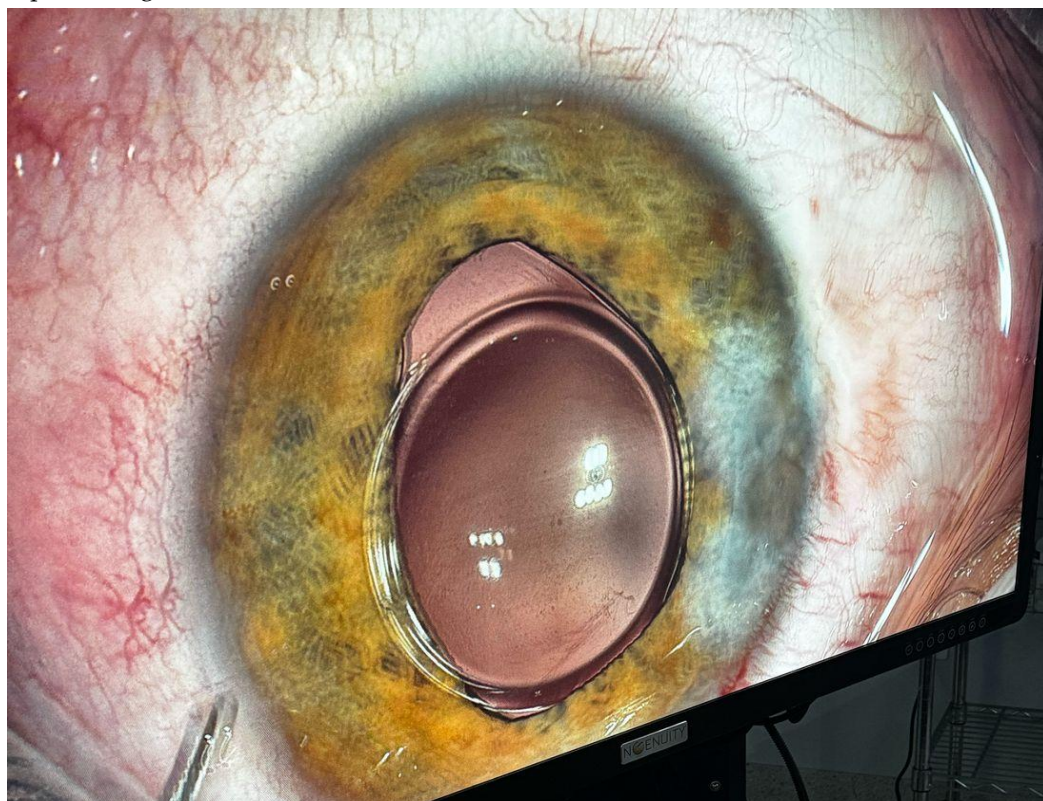


Figure 2. Intraoperative view of the left eye during phacoemulsification.

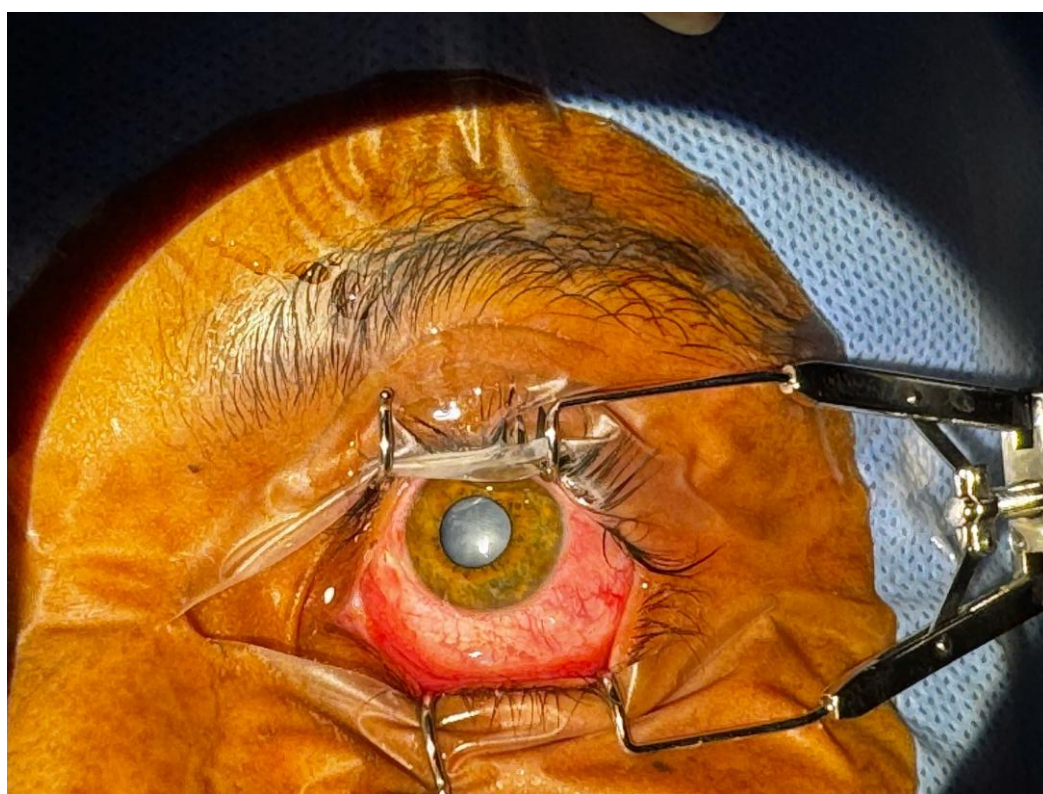


Figure 3. Postoperative appearance of both eyes.



3. Discussion

This report describes a rare case of rapidly progressive bilateral mature white cataract in a healthy young patient following an episode of septic shock. The chronology of lens opacification shortly after intensive care unit (ICU) discharge, in the absence of prior ophthalmologic risk factors, raises hypotheses about ocular complications from severe systemic inflammation. The pathophysiological mechanisms linking sepsis to cataract formation remain incompletely understood. However, it is hypothesized that cytokine storms, oxidative stress, and metabolic dysregulation during critical illness may contribute to lens protein denaturation and disruption of lens capsule integrity [1,2]. Similar patterns of lenticular opacification have been described in patients following electrical trauma [3,4], as well as in association with autoimmune and autoinflammatory syndromes, such as hemophagocytic lymphohistiocytosis or polyarteritis nodosa [5,6].

Despite the strong temporal relationship observed in this case, a direct causal link between septic shock and cataract formation cannot be definitively established. Other differential diagnoses must be considered, including corticosteroid-induced cataract, given the frequent use of systemic steroids in ICU settings, as well as unrecognized metabolic disorders (e.g., diabetes, galactosemia) or prior exposure to viral agents such as cytomegalovirus (CMV) and Epstein-Barr virus (EBV) [7–9]. Although no laboratory or genetic investigation was conducted to exclude these causes, the absence of suggestive clinical history and the bilateral, symmetric presentation support the hypothesis of an acute inflammatory or metabolic insult as a possible triggering factor.

The patient's presentation with mature bilateral cataract at a young age underscores the importance of including ophthalmologic screening in the follow-up of critically ill patients, particularly those with prolonged ICU stays or exposure to high systemic inflammatory burden. Early detection of lens opacification allows early surgery, preventing permanent visual loss and improving quality of life. Surgical management in such scenarios demands careful preoperative planning. Young patients with recent systemic illness may present with increased risks of capsular fragility, endothelial vulnerability, and postoperative inflammation [4,7,10]. In this case, the use of high-resolution digital microscopy allowed greater intraoperative precision and contributed to favorable anatomic and functional outcomes in the left eye.

The choice of a monofocal toric intraocular lens was based on preoperative biometry and the presence of regular corneal astigmatism. Optimizing refractive results in young patients is essential to promote independence from optical correction and visual rehabilitation. Although surgical indication for the right eye was confirmed, the procedure remains pending due to socioeconomic limitations, a factor that often delays full rehabilitation in vulnerable populations. This aspect highlights the importance of integrating ophthalmologic care into broader public health policies, particularly for post-ICU survivors who may face preventable but disabling visual complications.

Finally, while this report is limited by its single-case nature and the absence of biochemical or histological confirmation of etiology, the detailed clinical documentation, surgical strategy, and postoperative evolution contribute relevant insights to the literature. It

reinforces the need for multidisciplinary awareness and coordinated care in the management of visual complications after critical illness.

4. Conclusion

This case highlights a rare occurrence of rapidly progressive bilateral mature white cataract in a previously healthy young patient, temporally associated with a recent episode of septic shock. Although a direct causal relationship cannot be confirmed, the absence of prior ocular risk factors and the close temporal proximity to systemic inflammatory stress suggest a potential link that merits further investigation.

The findings reinforce the importance of early ophthalmologic evaluation in critically ill patients, particularly those recovering from sepsis and prolonged ICU stays. Timely surgical intervention, supported by high-definition intraoperative technologies and appropriate intraocular lens selection, resulted in favorable anatomical and functional recovery of the treated eye. Nonetheless, the delay in surgical treatment of the fellow eye due to financial limitations illustrates the socioeconomic challenges that can hinder complete visual rehabilitation in vulnerable populations. This underscores the need for integrated, equitable health strategies that address both the clinical and social dimensions of care for post-ICU patients.

Comprehensive documentation of this case contributes to expanding knowledge about ocular complications associated with systemic illnesses and emphasizes the role of coordinated multidisciplinary follow-up in preventing avoidable vision loss.

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Conflicts of Interest: None.

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