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Total Hyphema with Light Perception Vision Managed by Anterior Chamber Washout: A Case Report

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ABSTRACT

Introduction

Ocular trauma represents a major etiology of monocular blindness and visual morbidity, frequently requiring emergent ophthalmological evaluation to prevent permanent deficits.[1] Traumatic hyphema, defined as the presence of blood within the anterior chamber, typically arises from blunt or penetrating force that disrupts the vascular integrity of the iris or ciliary body.[3] While most hyphemas are self-limiting, high-grade presentations (Grade III and IV) pose a significant risk for secondary complications such as ocular hypertension, secondary glaucoma, and corneal blood staining.[5] The management of these cases is particularly complex in the immediate postoperative period following intraocular surgery, where the structural stability of the eye is already compromised.[8]

Case Illustration

A 64-year-old male presented with a chief complaint of sudden vision loss, severe ocular pain, and redness in the right eye (OD) after an accidental hand strike during sleep. The patient was one week postoperative following a Small Incision Cataract Surgery (SICS). Initial examination revealed a visual acuity of light perception (LP), an intraocular pressure (IOP) of 21.9 mmHg, and a Grade IV total hyphema with evidence of fibrin clots. Slit-lamp biomicroscopy confirmed corneal edema and a hazy anterior chamber. Despite three days of intensive conservative management using postural therapy, topical steroids, anti-glaucoma agents, and systemic antifibrinolytics, the visual acuity did not improve. Consequently, a surgical anterior chamber washout was performed.

Discussion

Total hyphema, often referred to as an "eight-ball" hyphema when clotted and deoxygenated, necessitates a careful balance between medical observation and surgical intervention.[3] In this case, the recent surgical history and the stagnant nature of the clotted blood increased the risk of permanent endothelial damage and optic neuropathy.[6] The choice of an anterior chamber washout as a minimally invasive procedure was pivotal in evacuating the blood and restoring aqueous dynamics.[8] Pharmacological support using Indonesian-branded medications such as Bralifex Plus and Hyaloph, combined with comprehensive antioxidant supplements like Asta Plus and Retivit Plus, facilitated the recovery of the ocular surface and neuroprotection.[13]

Conclusion

Anterior chamber washout is an effective and safe intervention for non-resolving total hyphema in the early postoperative phase.[8] Prompt surgical evacuation, when medical therapy fails to produce clinical improvement within 72 hours, is essential to prevent irreversible complications and ensure significant visual recovery.[6]

Keywords

Hyphema, ocular trauma, anterior chamber washout, secondary glaucoma, cataract surgery.

INTRODUCTION

Background

Ocular trauma is a significant public health issue, accounting for a large proportion of avoidable blindness globally.[1] Traumatic hyphema is a common manifestation of both blunt and penetrating ocular injuries, characterized by the accumulation of red blood cells (RBCs) in the anterior chamber—the space bounded by the cornea anteriorly and the iris/lens diaphragm posteriorly.[3] The incidence of traumatic hyphema is estimated at 12 per 100,000 individuals annually, with approximately 70% of cases occurring in the pediatric population and a marked predilection for males.[3] While many traumatic hyphemas result from high-energy mechanisms such as sports injuries or projectiles, the vulnerability of the eye is significantly increased following intraocular surgery.[3]

The pathophysiology of traumatic hyphema involves the mechanical transfer of energy to the globe.[7] In blunt trauma, rapid anteroposterior compression leads to equatorial expansion, creating shearing forces that can tear the major arterial circle of the iris or the recurrent choroidal arteries.[3] In the context of recent cataract surgery, specifically Small Incision Cataract Surgery (SICS), the presence of a fresh scleral tunnel or corneal incision represents a site of reduced structural resistance.[9] Even a minor impact, such as a hand strike during sleep, can cause transient wound dehiscence or iris manipulation, leading to significant intraocular hemorrhage.[9]

Total hyphema (Grade IV) is the most severe presentation, where the entire anterior chamber is filled with blood.[3] When the blood is clotted and turns a dark, deoxygenated color, it is known as an "eight-ball" hyphema, which carries a near 100% risk of elevated intraocular pressure.[3] If not managed aggressively, this can lead to secondary glaucoma, permanent corneal blood staining, and optic atrophy.[6]

Research Objectives

The primary objective of this case report is to provide an exhaustive clinical documentation of a geriatric patient suffering from total traumatic hyphema in the immediate postoperative period

following cataract surgery. Specifically, the report aims to:

1. Analyze the clinical presentation and diagnostic findings of a Grade IV hyphema in a post-SICS eye.
2. Evaluate the effectiveness of a comprehensive medical regimen including Indonesian-branded pharmacological agents.
3. Examine the indications and optimal timing for surgical intervention via anterior chamber washout in a geriatric patient with profound vision loss.[8]
4. Document the visual and physiological outcomes following successful surgical evacuation of the hyphema.

Research Benefits

This report serves as an expert-level reference for ophthalmologists and healthcare providers managing ocular emergencies. By detailing a successful transition from failed conservative therapy to surgical intervention, the study offers clinical guidance on the management of "eight-ball" hyphemas.[11] Furthermore, it provides specific insights into the use of regional medications such as Bralifex Plus and Hyaloph, and the supporting role of antioxidant supplements like Asta Plus and Retivit Plus in ocular recovery.[13] The report also emphasizes the importance of postoperative safety measures, such as the use of eye shields, to prevent domestic trauma during the critical first week of healing.[3]

Hypothesis

In the management of traumatic total hyphema following recent intraocular surgery, it is hypothesized that early surgical intervention via anterior chamber washout—performed when vision remains profoundly reduced (LP vision) despite 72 hours of intensive medical therapy—results in superior visual recovery and more stable intraocular pressure than continued conservative management.[6] It is further posited that the integration of multi-targeted pharmacology (antibiotics, steroids, antifibrinolytics) and neuroprotective antioxidants facilitates the restoration of the corneal endothelium and retinal function in geriatric patients.[13]

Research Gap

While the general management of traumatic hyphema is well-documented, there is a distinct

lack of detailed literature focusing on low-energy domestic trauma (e.g., hand strikes while sleeping) in the immediate aftermath of SICS in geriatric populations.[20] Most case series emphasize high-velocity trauma in younger cohorts or spontaneous hyphemas.[2] Furthermore, there is ongoing clinical debate regarding the exact timing of surgery for total hyphemas when IOP is only moderately elevated but vision is LP.[3] This report seeks to fill that gap by providing a nuanced analysis of the decision-making process for surgical washout in a post-surgical geriatric eye.

Novelty

The novelty of this case report lies in several areas:

1. **Mechanism of Injury**: It documents a rare but clinically significant mechanism of injury—a self-inflicted hand strike during sleep in a post-SICS patient—highlighting the critical importance of nocturnal eye protection.
2. **Pharmacological Profile**: It provides a detailed evaluation of a therapeutic regimen using Indonesian pharmaceutical formulations (Bralifex Plus, Hyaloph, Asta Plus, Retivit Plus) that are not typically covered in Western medical literature.
3. **Visual Recovery**: It illustrates a dramatic recovery from Light Perception vision to 20/40 through a minimally invasive anterior chamber washout, reinforcing the efficacy of prompt surgical intervention in non-resolving clotted hyphemas.[8]

CASE ILLUSTRATION

Anamnesis and Clinical History

A 64-year-old male patient presented to the Emergency Department of Aminah Islamic Hospital in Blitar with a primary complaint of sudden loss of vision and severe, throbbing pain in his right eye (OD). The symptoms began abruptly at approximately 1:00 AM, following an incident where the patient accidentally struck his right eye with his own hand while he was sleeping. According to the patient, he initially felt a sharp pain, which was followed by a progressive darkening of his vision until he could only perceive flashes of light.

The patient's past medical and ocular history revealed that he had undergone Small Incision Cataract Surgery (SICS) on his right eye exactly seven days prior (February 28, 2026). The surgery

was performed by dr. N, SpM, and was reported to be successful and without intraoperative complications. Prior to the trauma, the patient was experiencing a routine postoperative recovery. He denied any history of systemic diseases such as hypertension, diabetes, or hematological disorders like sickle cell disease or leukemia. He also confirmed that he was not taking any anticoagulant medications such as aspirin or warfarin.

Physical and Ophthalmic Examination

Upon admission, the patient's general physical condition was stable. He was fully conscious with a Glasgow Coma Scale (GCS) of 15 (E4V5M6). His vital signs were recorded as follows: blood pressure 129/82 mmHg, heart rate 80 bpm, respiratory rate 20 bpm, and body temperature 36ºC.

The ophthalmic examination was the focus of the clinical assessment. The initial findings for both eyes were compared to establish a baseline:

Examination Parameter	Right Eye (OD)	Left Eye (OS)
Visual Acuity (VA)	Light Perception (LP)	20/40
Intraocular Pressure (IOP)	21.9 mmHg	10.2 mmHg
Lids/Lashes	Normal, no edema	Normal
Conjunctiva	Severe ciliary injection, hyperemic	Normal
Cornea	Diffuse edema, microcystic changes	Clear and compact
Anterior Chamber	Total Hyphema (Grade IV), fibrin clots	Clear and deep
Iris / Pupil	Obscured by blood and fibrin	Round, reactive
Lens Status	Pseudophakic (obscured)	Normal
Motility	Full, non-painful	Full

Slit-lamp biomicroscopy of the right eye confirmed the presence of a Grade IV hyphema, with blood occupying the entire volume of the anterior chamber.[3] The blood appeared dark and clotted, characteristic of an "eight-ball" hyphema.[3] Fibrin strands were visible across the pupillary

area, and the cornea exhibited significant stromal haze and edema. The IOP of 21.9 mmHg in the right eye was elevated compared to the left eye, indicating early secondary glaucoma due to trabecular blockage.[4]

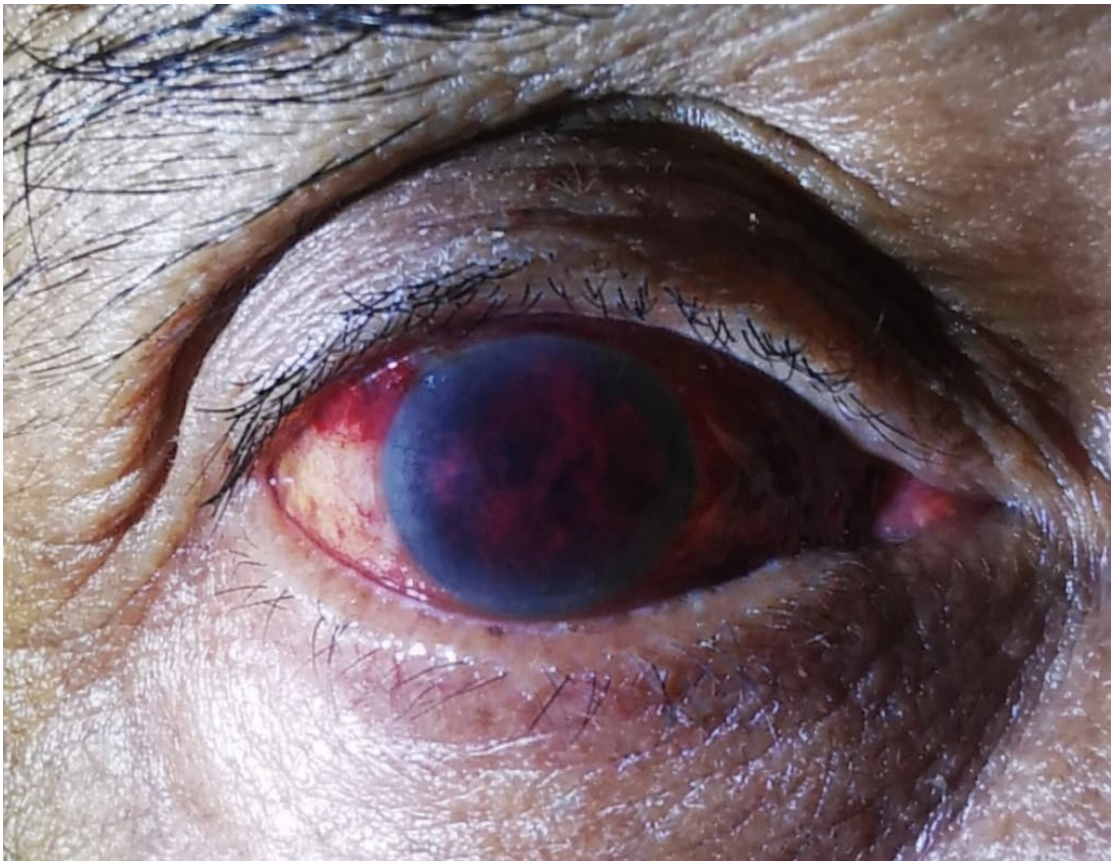


Figure 1. Clinical Presentation

Medical and Conservative Management

The patient was immediately hospitalized (MRS) for observation and intensive medical therapy. The initial management strategy focused on postural intervention, pain control, and pharmacological facilitation of blood absorption.

The therapeutic regimen was prescribed as follows:

- **Postural Therapy**: The patient was instructed to maintain a semi-Fowler (half-sitting) position at 30-45 degrees to allow for gravity-dependent settling of the blood cells.[4]
- **Topical Therapy**:
  - **Bralifex Plus** (Tobramycin 3 mg + Dexamethasone 1 mg): 1 drop every hour to control inflammation and provide antibiotic coverage.
  - **Timopthal** (Timolol 0.5%): 1 drop three times daily to reduce aqueous humor production and lower IOP.[3]
  - **Hyaloph** (Sodium Hyaluronate 0.1%): 1 drop every hour for corneal epithelial lubrication and protection.
- **Systemic Therapy**:
  - **Tranexamic Acid**: 500 mg intravenously/orally three times daily to stabilize the clot and prevent rebleeding.[1]

- **Supportive Supplements**:
  - **Asta Plus** (Astaxanthin 4 mg + Selenium 15 mcg): 1 caplet twice daily for antioxidant support.
  - **Retivit Plus** (Lutein, Zeaxanthin, Vitamins): 1 tablet twice daily for ocular nutrition.

Follow-up and Surgical Decision

On the second day of hospitalization, the patient reported a slight reduction in ocular pain, although his vision remained profoundly blurred. The IOP in the right eye was measured at 14.6 mmHg, reflecting the effective action of the Timolol. However, slit-lamp examination revealed no significant change in the height or density of the hyphema; the anterior chamber was still completely filled with clotted blood and fibrin.

By the third day, the patient continued to complain of vision limited only to light perception. The IOP remained stable at 14.6 mmHg, but clinical observation suggested that the hyphema was "stagnant," with no signs of natural absorption through the trabecular meshwork. Given the patient's recent cataract surgery, there was an increased risk of developing permanent corneal blood staining and peripheral anterior synechiae if the blood remained in prolonged contact with the endothelium.[6]

After careful consideration of the risks and the lack of clinical progression under medical therapy, the ophthalmologist decided to perform a surgical intervention to evacuate the blood from the anterior chamber.

Surgical Procedure: Anterior Chamber Washout

The patient underwent an **Anterior Chamber Washout** under local/topical anesthesia in the operating room.[8] A paracentesis incision was created, and a gentle irrigation-aspiration (I/A) technique was utilized to wash the liquefied and clotted blood from the anterior chamber.[8] Care was taken to avoid over-irrigation or mechanical trauma to the recently implanted intraocular lens and the SICS incision site.[12] Following the washout, the anterior chamber was clear, and the pseudophakic lens was confirmed to be in the correct position.

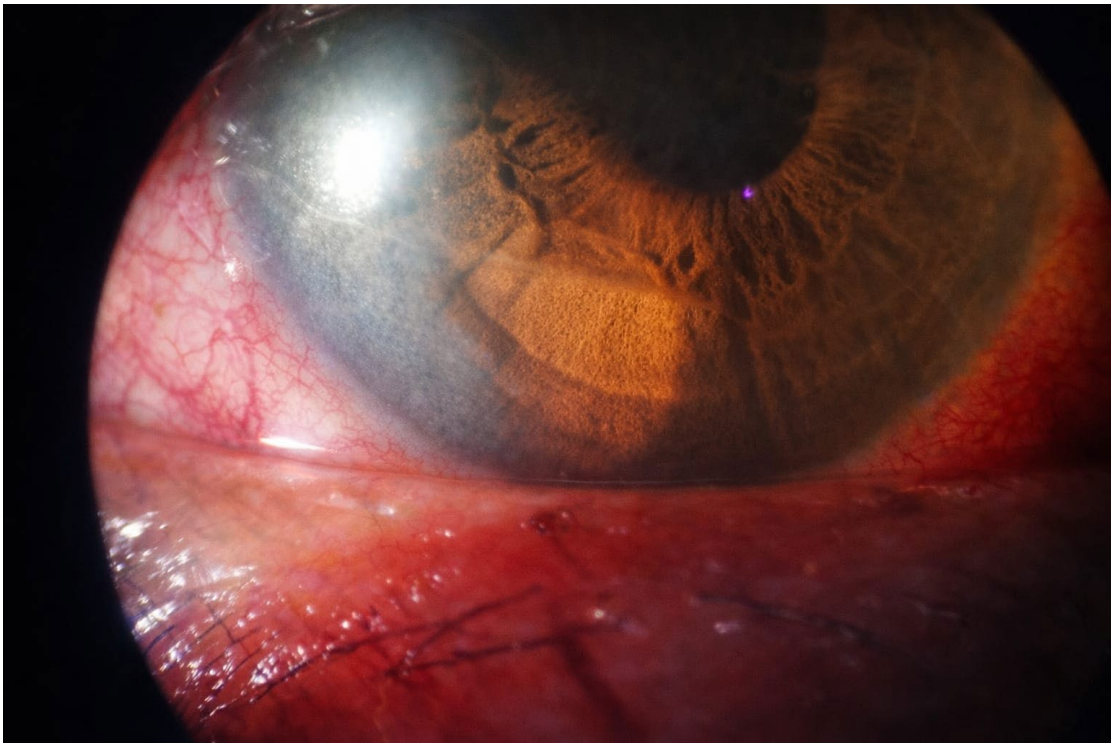
Postoperative Outcome and Recovery

The patient's recovery following the washout was remarkable. One week after the surgery (Day 10 post-trauma), the patient was seen for a follow-up visit. He reported a complete resolution

of pain and a significant improvement in vision.

The clinical results at the 10-day mark were as follows:

- **Visual Acuity (OD)**: 20/40 (improved from LP vision).
- **Intraocular Pressure (OD)**: 12.2 mmHg.
- **Slit-lamp Findings**: The cornea was clear and transparent. The anterior chamber was deep and quiet, with no residual blood. Minimal subconjunctival hemorrhage was noted, but the surgical wound was intact and stable.



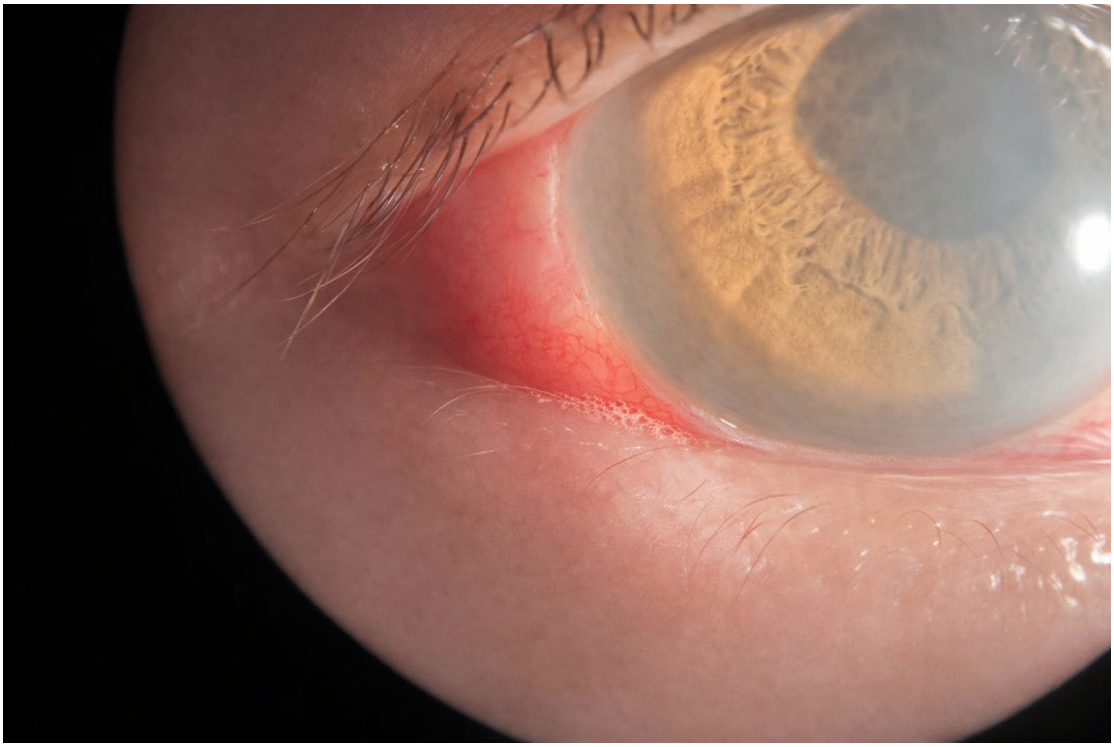


Figure 2. 7 Day Post Surgery

DISCUSSION

Pathophysiology of Postoperative Traumatic Hyphema

The occurrence of a total Grade IV hyphema after cataract surgery is a complex clinical event that combines the mechanical effects of trauma with the biological vulnerability of a healing eye.[8] In a non-surgical eye, blunt trauma causes a rapid anteroposterior compression of the globe, which leads to a compensatory equatorial expansion.[17] This deformation places intense stress on the structures of the anterior chamber angle.[17] Specifically, the "Seven Rings of Trauma" described by Duke-Elder identify sites of potential injury, including the pupillary sphincter (sphincter tears), the iris root (iridodialysis), and the ciliary body (angle recession).[17]

In this patient, the eye was only seven days postoperative from a Small Incision Cataract Surgery (SICS). While SICS is known for its structural stability, the scleral tunnel and the intraocular tissues (iris, ciliary body) are still in a state of early recovery and are highly sensitive to sudden pressure fluctuations.[9] An accidental hand strike during sleep—a mechanism that typically

transfers a low to moderate amount of energy—was sufficient to cause significant vascular rupture. This "iatrogenic-traumatic" synergy occurs because the surgical incision and the recently manipulated iris vasculature represent areas of reduced resistance.[3] The resulting hemorrhage into the anterior chamber quickly filled the space, exacerbated by the patient's prone or supine position during sleep, which prevents the early settling of blood.[4]

Clinical Grading and "Eight-Ball" Hyphema

Hyphema is graded based on the volume of blood occupying the anterior chamber, a classification system that is essential for determining the risk of secondary complications and the prognosis for visual recovery.[3]

Grade	Clinical Presentation	Volumetric Displacement	Risk of Elevated IOP
Grade 0	Microhyphema	Scattered cells; no visible layer	Minimal
Grade I	Layered Hyphema	< 33% (1/3) of the AC	~10%
Grade II	Layered Hyphema	33% to 50% (1/3 - 1/2) of the AC	~10%
Grade III	Layered Hyphema	> 50% but < 100% of the AC	~25%
Grade IV	Total Hyphema	100% of the AC	~50% - 100%

The patient in this case presented with a Grade IV total hyphema. When a Grade IV hyphema becomes clotted and the blood turns dark (black or purple) due to impaired aqueous circulation and the oxidation of hemoglobin, it is clinically termed an **"eight-ball" hyphema**.[3] The "eight-ball" state indicates that the aqueous humor is no longer circulating, creating a stagnant, deoxygenated environment.[3] This condition carries a near 100% risk of ocular hypertension because the trabecular meshwork is entirely blocked by fibrin, blood clots, and plasma proteins.[3]

Mechanisms of Secondary Glaucoma in Hyphema

Secondary glaucoma is the most frequent and serious complication of traumatic hyphema,

affecting up to 30% of patients.[7] The elevation of intraocular pressure (IOP) occurs through several interconnected mechanisms:

1. **Trabecular Meshwork Blockage**: This is the primary acute mechanism.[16] Red blood cells, fibrin strands, and debris from the clotted blood physically obstruct the drainage channels of the trabecular meshwork, preventing the outflow of aqueous humor.[2]
2. **Pupillary Block**: In total hyphema, a large clot can occupy the pupillary space, preventing the passage of aqueous humor from the posterior chamber to the anterior chamber.[3] This leads to iris bombé and potential angle-closure glaucoma.[19]
3. **Inflammatory Response**: Traumatic iritis, characterized by the presence of inflammatory cells and proteins, increases the viscosity of the aqueous and further clogs the trabecular meshwork.[16]
4. **Ciliary Body Shutdown and Recovery**: Immediately after trauma, the ciliary body may experience "shutdown," leading to temporary hypotony.[18] However, as the ciliary body regains function while the drainage pathways remain blocked, the IOP can spike dramatically.[16]

In this case, the initial IOP of 21.9 mmHg indicated early-stage pressure elevation. Although it decreased to 14.6 mmHg with medication, the persistent total blockage meant that the patient remained at high risk for a significant secondary pressure spike once the ciliary body recovered fully.

Risk of Corneal Blood Staining

Corneal blood staining (CBS) is a severe complication where breakdown products of the blood, specifically hemosiderin and hemoglobin, enter the corneal stroma.[6] This leads to a yellowish-brown or reddish discoloration that can take years to clear and may cause permanent visual impairment.[6]

The risk factors for CBS include:

- Total hyphema (Grade IV).[6]
- Persistently elevated IOP (> 25 mmHg for > 5 days).[6]
- Episodes of secondary hemorrhage (rebleeding).[22]

- Corneal endothelial dysfunction.[6]

In a 64-year-old patient who had recently undergone cataract surgery, the corneal endothelium is particularly vulnerable.[6] Surgical manipulation during SICS may have caused a temporary decrease in endothelial cell function or density, making it easier for blood pigments to penetrate the stroma.[6] The prevention of CBS was a primary consideration in the decision to perform an early anterior chamber washout, as even moderate pressures can lead to staining in a compromised cornea.[6]

Evaluation of Pharmacological Management

The medical management of this patient utilized several classes of drugs common in Indonesian ophthalmological practice.

Topical Steroid and Antibiotic Combination

Bralifex Plus contains a combination of Tobramycin (3 mg/ml) and Dexamethasone (1 mg/ml).[13]

- **Tobramycin** is an aminoglycoside antibiotic that provides coverage against common ocular pathogens, which is critical in a postoperative eye where the trauma might have compromised wound integrity.[13]
- **Dexamethasone** is a potent corticosteroid that suppresses the inflammatory response.[13] In hyphema management, steroids are used to reduce ciliary spasm, stabilize cell membranes, and minimize the risk of secondary hemorrhage by preventing premature clot lysis.[3]

Anti-glaucoma Therapy

Timopthal (Timolol 0.5%) was used to control intraocular pressure.[3] As a non-selective beta-blocker, Timolol lowers IOP by reducing the production of aqueous humor by the ciliary body epithelium.[13] This is often the first-line treatment in hyphema-related hypertension, provided the patient has no systemic contraindications such as asthma or bradycardia.[3]

Systemic Antifibrinolytics

Tranexamic Acid was administered to prevent rebleeding.[1] Rebleeding is most likely to occur between 2 and 5 days after the initial trauma and is associated with a significantly worse visual prognosis.[7] Antifibrinolytics work by inhibiting plasminogen activation, thereby stabilizing the fibrin clot at the site of the vascular rupture.[29]

Corneal Lubrication and Recovery

Hyaloph (Sodium Hyaluronate 0.1%) was used for intensive corneal support. Sodium Hyaluronate is a viscoelastic polymer that mimics the properties of natural tears.[32] It promotes epithelial cell migration and wound healing by binding to CD44 receptors, which is particularly beneficial in an eye with post-traumatic and postoperative corneal edema.[26]

The Role of Antioxidants and Nutraceuticals

The patient was prescribed **Asta Plus** and **Retivit Plus**, reflecting a proactive approach to neuroprotection and ocular surface recovery.

- **Asta Plus** contains Astaxanthin (4 mg) and Selenium.[34] Astaxanthin is a powerful carotenoid with potent antioxidant properties—often described as being hundreds of times more effective than Vitamin E.[23] It can cross the blood-retinal barrier and help neutralize free radicals generated by hemorrhage and inflammation.[14] Research suggests that Astaxanthin can improve retinal capillary blood flow and protect retinal ganglion cells from pressure-induced apoptosis, which is vital in preventing glaucomatous damage.[14]
- **Retivit Plus** provides a complex of Lutein, Zeaxanthin, Beta-carotene, and essential minerals (Zinc, Copper, Selenium).[15] These nutrients support the health of the macular pigment and overall retinal metabolism, which may be compromised during the ischemic stress of a Grade IV hyphema.[50]

Surgical Indications and Timing for Anterior Chamber Washout

The decision to transition from medical management to surgery is one of the most critical aspects of hyphema care.[3] The standard indications for surgical intervention, such as an anterior chamber washout, include:

- **Failure of Clot Resolution**: If the hyphema fails to resolve to < 50% of the anterior chamber within 8 days, or if a total hyphema persists for > 5 days.[3]
- **Intractable Ocular Hypertension**: IOP > 50 mmHg for 5 days or > 35 mmHg for 7 days.[11]
- **Prevention of Corneal Blood Staining**: IOP > 25 mmHg for 5 days in Grade IV hyphemas.[6]
- **Profound Vision Loss**: In cases where vision is LP and the hyphema is clotted, early washout

may be indicated to prevent permanent damage.[6]

In this geriatric patient, the combination of a recent SICS procedure, Grade IV "eight-ball" hyphema, and vision limited only to light perception created a high-risk profile. Waiting for the standard 5-to-8-day period might have allowed for irreversible corneal staining or damage to the intraocular lens haptics.[6] The choice of an anterior chamber washout on Day 3 was an appropriate clinical decision to prevent long-term morbidity.

Anterior chamber washout is preferred because it is a minimally invasive technique that effectively removes liquefied blood and fibrin while avoiding the more significant risks associated with trabeculectomy.[8] By using a gentle irrigation-aspiration technique, the surgeon can clear the visual axis and lower the IOP almost immediately.[8]

Visual Recovery and Prognosis

The visual outcome in this patient—recovering from LP vision to 20/40—is excellent. Generally, the prognosis for traumatic hyphema is good if it is uncomplicated.[27] However, Grade IV hyphemas often have a more guarded prognosis.[3] Factors that contributed to the success in this case included:

- **Absence of Posterior Segment Damage**: No retinal detachment or vitreous hemorrhage was observed, which are common concurrent injuries in high-energy trauma.[27]
- **Prompt Intervention**: Clearing the clotted blood on Day 3 prevented the "eight-ball" hyphema from inducing permanent optic nerve atrophy or corneal staining.[6]
- **Intact Wound**: Despite the trauma, the SICS incision remained intact, allowing for a safe surgical environment during the washout.

The long-term prognosis remains positive, although the patient must be monitored for late-onset glaucoma, which can occur years after a traumatic event due to angle recession or trabecular fibrosis.[3]

CONCLUSION AND SUGGESTIONS

Conclusion

This case report details the successful management of a 64-year-old patient who developed a

total Grade IV hyphema after suffering a hand strike only one week after cataract surgery. The presentation of light perception vision and a stagnant clotted hyphema posed a significant risk for permanent vision loss through secondary glaucoma and corneal blood staining.[6]

The patient's recovery was achieved through a timely transition from intensive medical therapy to a minimally invasive anterior chamber washout. The surgical intervention rapidly cleared the visual axis and normalized intraocular pressure. The comprehensive use of topical steroids (Bralifex Plus), lubricants (Hyaloph), and antioxidant supplements (Asta Plus and Retivit Plus) provided the necessary physiological support for ocular surface healing and neuroprotection. This case demonstrates that early surgical intervention in non-resolving high-grade hyphemas is a safe and effective strategy for ensuring optimal visual outcomes in geriatric patients.[6]

Suggestions

Based on the findings of this case, several recommendations are made for the management of similar postoperative ocular emergencies:

1. **Strict Nocturnal Protection**: Postoperative patients, especially in the first 14 days, should be strictly advised to wear a hard eye shield during sleep to prevent accidental self-inflicted blunt trauma.[3]
2. **Early Surgical Consideration**: In Grade IV clotted "eight-ball" hyphemas, clinicians should consider surgical washout as early as 72 hours if there is no clinical improvement in vision or hyphema height, even if intraocular pressure is only moderately elevated.[6]
3. **Holistic Recovery Regimens**: The use of carotenoid-based antioxidants (Astaxanthin, Lutein) and sodium hyaluronate should be encouraged to support retinal health and corneal epithelial integrity during the recovery from severe intraocular hemorrhage.[14]
4. **Long-term Monitoring**: All patients who suffer a significant traumatic hyphema require lifelong annual follow-ups to monitor for the development of late-onset post-traumatic glaucoma.[3]

CONSENT FOR PUBLICATION

Written informed consent for publication was obtained from the patient.

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AUTHOR CONTRIBUTIONS

All authors contributed to study conception, data acquisition, analysis, manuscript drafting, and final approval.

DECLARATION OF COMPETING INTERESTS

The authors declare that they have no competing interests.

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