



Case Report

Secondary Glaucoma after Traumatic Hyphema: A Case Report

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Abstract	Manuscript Information
<p>Introduction: Hyphema refers to an accumulation of blood in the anterior chamber of the eye. Diagnosis of hyphema is often confirmed by a slit lamp examination and grading of hyphema is crucial in guiding management and determining prognosis. The goal of this study is to give a case report of secondary glaucoma caused by traumatic hyphema</p> <p>Material and methods: A case report of 37-year-old male, with traumatic hyphema-induced secondary glaucoma.</p> <p>Result: By Day +10, visual acuity significantly improved, corneal conditions normalized, and intraocular pressure returned to normal after received medical treatment, including eye drops and medications.</p> <p>Discussion: Hyphema is identified with history taking and a series of physical examination, this patient was diagnosed with secondary glaucoma caused by grade II hyphema and was prescribed with timolol 0.5% eye drops, combination of Polymyxin B and dexamethasone eye drops, atropine sulphate 1% eye drops, tranexamic acid injection, acetazolamide tablet, potassium chloride, and was recommended to do head elevated position. The patient's vital signs were stable, the complaints had disappeared, and the blood in the anterior chamber had been fully resorbed and was discharged seven days later.</p> <p>Conclusion: This case report describes a case of traumatic hyphema due to sports injury and was diagnosed with secondary glaucoma after blunt ocular trauma from the signs and symptoms felt by the patient and a series of physical examinations. We provide the appropriate therapies following the guidelines, and the outcomes are favorable.</p>	<ul style="list-style-type: none"> ▪ ISSN No: 2583-7397 ▪ Received: 06-02-2023 ▪ Accepted: 05-03-2023 ▪ Published: 09-03-2024 ▪ IJCRM:3(2);2024:25-28 ▪ ©2024, All Rights Reserved ▪ Plagiarism Checked: Yes ▪ Peer Review Process: Yes <p>How to Cite this Manuscript</p> <p>Dyah Ayu Eliza. Secondary Glaucoma after Traumatic Hyphema: A Case Report. International Journal of Contemporary Research in Multidisciplinary. 2024; 3(2): 25-28.</p>

Keyword: Glaucoma, Hyphema, Trauma

1. Introduction

An accumulation of blood in the eye's anterior chamber is known as hyphema. Blood builds up because of injury or underlying medical issues disrupting the iris or ciliary body's blood vessels. Aqueous humor that is produced by the ciliary body and drained through the Canal of Schlemm fills the anterior chamber. The obstruction of this space prevents aqueous drainage, increasing intraocular pressure.^[1,3]

According to a study, industrial accidents (34.2%) and sports-related trauma (42.1%) are the main causes of hyphema. Adults

and adolescents are prone to get eye injuries from high-energy blows, most frequently during an assault. Paintball guns, airsoft weapons, and airbag deployment are among more causes.^[4] Hyphema is most caused by blunt trauma. Ocular trauma leads to tear of blood vessels in the anterior chamber and injury to the iris, ciliary body, and their associated vasculatures. When these tissues are damaged, blood can gather in the anterior chamber and cause hyphema. The most common reason for ophthalmological emergency consultations is trauma. Between 30 and 60% of traumatic hyphema cases in various series may

be attributed to blunt trauma typically occur during athletic activity. [1] The primary cause of photophobia in hyphema patients is a history of ocular trauma. Patients with hyphema usually experience a decrease in visual acuity. There is a propensity for blood to accumulate in the anterior chamber of the eye. In the supine position, where blood accumulates in the inferior anterior chamber of the eye, visual acuity declines. We describe what happened to a 37-year-old man with hyphema due to blunt trauma caused by sport practice. The goal of this study is to give a case report of secondary glaucoma after blunt ocular trauma.

2. Material and Methods

A 37-year-old male, came to the Emergency Department of Universitas Sebelas Maret Hospital with sudden onset of blurred vision, pain, glare, and watering in the right eye. He was referred from another hospital to Universitas Sebelas Maret Hospital due to equipment limitations. The patient was playing badminton, and his right eye was hit by a shuttlecock. Following the incident, he could only see hand movements. There is no history of previous eye disorders or other health issues. Examination in the Emergency Department revealed a basic visual acuity of 1/300 in the right eye and 6/6 in the left eye. Intraocular pressure in the right eye was noted as N+++ (checked by palpation). There was no edema or spasm in the eyelids. Eye movement was free in all directions, with no obstruction. Palpation did not reveal crepitus in the orbital structures.



Figure 1: Ocular Examination (Day 0) showed anterior chamber filled with clot and fibrin

Slit lamp examination of the right eye showed conjunctival hyperemia, corneal edema, the presence of a Grade II hyphema covering approximately 1/3 - 1/2 of the anterior chamber volume, and the presence of clot and fibrin. The pupil was round, central, and with mid dilatation, a pupil diameter of 6 mm, and decreased light reflex. Examination of the left eye was within normal limits. The diagnosis for this patient is secondary glaucoma in the right eye due to traumatic hyphema. The medical management provided includes Timolol 0.5% eye drops twice a day, a combination of Polymyxin B and dexamethasone eye drops three times a day, Atropine sulfate 1% eye drops twice a day, tranexamic acid injection three times a day,

Acetazolamide tablets three times a day, Potassium chloride once a day, and an elevated head position. Two days later, from the anamnesis, a decrease in blurred vision was reported, with slight persistent pain. Visual and anterior segment examinations showed significant changes. Visual acuity in the right eye increased to 20/200, corneal edema decreased, subconjunctival hemorrhage and hyperemia persisted. Accumulation of blood in the anterior chamber decreased, showing improvement to Grade I hyphema, but the intraocular pressure remained quite high at 28 mmHg.

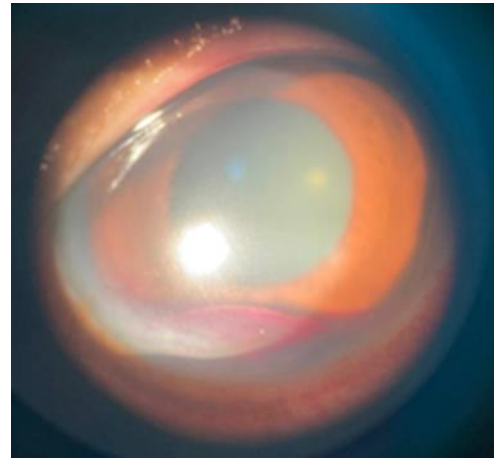


Figure 2: Ocular Examination (Day 2) showed decreased subconjunctival bleeding

On Day +10, the visual acuity in the right eye improved to 20/40, the cornea was clear with minimal subconjunctival hemorrhage, and the intraocular pressure improved to 21 mmHg. Fundus examination of the right eye was within normal limits, with a positive fundus reflex, a cup-disc ratio of 0.3, a vein-artery ratio of 2/3, positive fovea reflex, and no retinal detachment or hemorrhage.

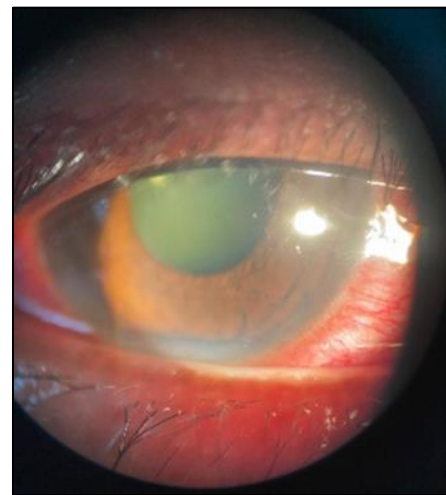


Figure 3: Ocular Examination (Day 10) showed minimal subconjunctival bleeding



Figure 4: Funduscopy Examination (Day 10) was within normal limits

3. Discussion

Hyphema is a collection of blood in the anterior chamber of the eye that can occur due to blunt trauma that tears the blood vessels of the iris or ciliary body. Contusive forces often tear blood vessels in the iris and damage the anterior chamber. Secondary glaucoma occurs when the trabecular meshwork is obstructed by fibrin or blood clots, causing pupillary block and increased intraocular pressure. [2] The causes of hyphema can be divided into three categories: spontaneous, iatrogenic, and traumatic. Spontaneous hyphema is bleeding in the anterior chamber due to neovascularization, neoplasm, hematological disorders, or drug consumption that disrupt the hematological system. Iatrogenic hyphema is hyphema that arises as a complication of a medical process, such as surgery that can occur intraoperatively or post-operatively. Traumatic hyphema is the most common type, which occurred due to the damage of blood vessels on the periphery of the iris or anterior ciliary body. Trauma can be caused by blunt objects, such as balls, stones, children's toys, toy bullets, paintball. [5] Blunt trauma causes antero-posterior compression of the globe and simultaneous equatorial expansion. When its pressures are applied to the anterior globe, the intraocular pressure instantly rises, putting strain on the structures of the anterior chamber angle and shearing the ciliary body and iris. [4] Grade I hyphemas most often occur in males (75%), especially in school-age individuals. In general, uncomplicated hyphemas can be absorbed and disappear spontaneously in less than 1 week (5-6 days). [6] Slit lamp examinations are frequently used to establish the diagnosis of hyphema, and the grading of hyphemas is essential for defining therapy and prognosis. The severity of the anterior chamber bleeding was taken into account while assessing hyphema. The term "micro-hyphema" refers to the presence of barely perceptible floating red blood cells in the anterior chamber; "grade I" refers to the anterior chamber's visible blood occupying less than 1/3 of its volume; "grade II" refers to the anterior chamber's visible blood occupying more than 1/3 – 1/2 of its volume; Grade III is defined when more than half, but not the whole volume of the anterior chamber is occupied, while grade

IV refers to "Eight-ball" (or, as Bansal et al. proposed, "red-ball") hyphema, which is when the anterior chamber is completely filled with blood. [4] This patient was identified as having traumatic hyphema grade II, with a blood buildup of 1/3 - 1/2 the capacity of the anterior chamber. Patients may have impaired or lost vision with the development of hyphema, and discomfort and photophobia are often proportionate to the volume of blood in the anterior chamber. [4] As with this patient, pain, watery and sudden vision loss were experienced in the right eye. The symptom of eye pain may occur due to elevated intraocular pressure, a complication of hyphema. The intraocular pressure was measured and found that right eye pressure was N+++; it showed an increase of right eye intraocular pressure. The complications that need to be anticipated when encountering cases of hyphema are, in fact, much more dangerous than the presence of blood in the anterior chamber of the eye itself. The most frequently encountered complications in traumatic hyphema include secondary bleeding, secondary glaucoma, and hemosiderosis, in addition to complications from the trauma itself, such as lens dislocation, retinal detachment, cataracts, and iridodialysis. The magnitude of complications also depends significantly on the height of the hyphema. Secondary glaucoma must be anticipated because it can progress to total hyphema that usually occurs 3-6 days after the initial trauma. This complication usually occurs in grade 3 and 4 hyphema. Secondary glaucoma is a complication that arises due to the obstruction of the trabecular meshwork by particles or clots of blood. The presence of blood in the anterior chamber can impede the flow of fluid in the anterior chamber, as the blood components cover the angle of the anterior chamber and trabecula, leading to an increase in intraocular pressure. Secondary glaucoma can also occur as a result of contusion to the ciliary body, resulting in angle recession and disruption of the aqueous humor flow. Corneal hemosiderosis occurs when there is deposition or accumulation of hemoglobin and hemosiderin; it can enter the corneal layers, causing the cornea to turn yellow, known as hemosiderosis, corneal imbibition, or corneal blood staining. In this patient, complications include secondary glaucoma, where there is an increase in intraocular pressure. With the administration of anti-glaucoma medication, the patient's intraocular pressure gradually return to normal. [8]

The management of hyphema is dependent on the degree of hyphema, the complications that occur, and the patient's response to treatment. This also serves as a parameter in determining whether the patient needs to be hospitalized or can be treated on an outpatient basis. The goals of medical and supportive management in hyphema patients are to reduce the risk of secondary bleeding, promote the absorption of hyphema, minimize the risk of damage to surrounding tissues, and minimize the risk of lingering long-term symptoms. Surgical management is indicated when there is unresponsive increased intraocular pressure to treatment and when corneal blood staining begins to occur.

Non-pharmacological management includes limiting physical activity, with permitted activities being sitting and walking. Additionally, providing protection to the traumatized eye using

an eye patch or eye cover is recommended.⁹ Elevating the head at a 30–45-degree angle while sleeping is recommended to allow blood to collect in the inferior part of the anterior chamber, without obstructing visual acuity. This position also facilitates daily evaluation of the anterior chamber for hyphema resolution, indicating therapeutic progress. The initial management provided to this patient involves positioning the head at an elevation of 30 degrees. This position accelerates blood resorption, reduces intraocular pressure, lowers venous pressure in the eyeball, and enhances the formation and dissolution of clots.^[6]

The therapeutic goals are tailored to address potential complications. To manage increased intraocular pressure, topical antiglaucoma agents such as timolol (beta receptor antagonist) can be administered. All these agents aim to reduce aqueous humor production and help lower intraocular pressure. If the pressure remains high, combination therapy with oral carbonic anhydrase inhibitor (CAI) like acetazolamide at a dose of 20 mg/kg/day may be considered. Other pharmacological therapies include topical corticosteroids, cycloplegia, and antifibrinolytics. The most commonly used drugs are steroids and cycloplegics. Steroids can be employed to reduce inflammatory reactions, while cycloplegia is often used to decrease the risk of posterior synechiae and enhance patient comfort by reducing the incidence of ciliary muscle spasms. The administration of antifibrinolytics such as tranexamic acid and aminocaproic acid promotes coagulation, reducing the risk of further bleeding.^[10]

The patient is administered Timolol 0.5% eye drops twice a day and acetazolamide 250 mg three times a day to lower intraocular pressure. This has proven effective, as the initial eye pressure (N+++) decreased to 21 mmHg by day 10. A combination of Polymyxin B sulfate and dexamethasone eye drops is given three times a day to reduce the risk of infection and inflammation post-trauma. Atropine sulfate 1% eye drops are provided twice a day for the right eye, and tranexamic acid injections are given three times a day.

Traumatic hyphema has a good prognosis because the condition can resolve without leaving any lasting sequelae. The prognosis in cases of hyphema is determined by the restoration of the patient's visual acuity. The recovery of visual acuity should be the primary goal in managing patients with hyphema.

4. Conclusion

Hyphema is the accumulation of blood in the anterior chamber of the eye. Slit lamp examination is performed to assess the degree of hyphema and determine the therapy and prognosis for the patient. Hyphema treatment includes non-pharmacological approaches (activity restriction, head elevation of 30–45 degrees) and pharmacological approaches (topical corticosteroids, cycloplegics, antifibrinolytics, antiglaucoma medications).

This case report presents a secondary glaucoma case resulting from traumatic hyphema caused by sports injury. Based on the patient's history of sudden vision loss in the right eye, photophobia, tearing, and pain, the patient was diagnosed with secondary glaucoma due to traumatic hyphema of degree II.

Hyphema is the most typical clinical manifestation of traumatic eye injury. Typically, hyphema does not cause permanent vision loss. Although most hyphemas can resolve on their own, it is important to monitor complications and vision accurately.

The patient was re-examined at the clinic on day 10 with a right eye vision of 20/40 and minimal clot in the anterior chamber of the eye. The patient's vital signs were stable, complaints were reduced, and blood in the anterior chamber of the eye appeared minimal. The prognosis for traumatic hyphema tends to be good in the long term with appropriate and prompt treatment after trauma.

5. Conflict of interest

The author has no conflict of interest relate to the presentation.

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