

TRAUMA-INDUCED GLAUCOMA

How to approach these patients.

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CASE PRESENTATION



A 26-year-old man presented with pain and decreased vision in his right eye following blunt head trauma. The patient's BCVA was 20/80 OD and 20/20 OS, and IOP measured 30 mm Hg OD and 12 mm Hg OS via Goldman applanation tonometry. The exam showed a 2-mm hyphema in the right eye. Gonioscopy revealed angle recession superiorly and nasally; the view inferiorly was obstructed by the hyphema. A dilated fundus exam showed a 0.2 cup-to-disc ratio in both eyes.

The patient started therapy with topical timolol and brimonidine. His IOP improved to 16 mm Hg. The hyphema resolved after 1 week with conservative therapy. He currently does not have glaucoma but will be monitored closely, given the degree of angle recession.

BACKGROUND

Ocular trauma is frequently seen in the emergency room setting.¹ Often, the patient is a young man who sustained injury during a sporting or domestic accident. Glaucoma is a feared complication.² The 6-month incidence of developing posttraumatic glaucoma can be as high as 3.4% and 2.7% after blunt and penetrating ocular trauma, respectively.^{3,4} Traumatic glaucoma can be related to iris/angle trauma or hyphema in the anterior segment.

IRIS/ANGLE TRAUMA

Types of Injury

The most common injuries after blunt ocular trauma are iridodialysis, cyclodialysis, and angle recession.

Iridodialysis is disinsertion of the iris root, resulting in corectopia and possibly associated angle damage. If there is accompanying angle damage, the IOP may be low or high, depending on the extent of aqueous outflow and the presence or absence of a hyphema. If the lens is anteriorly



AT A GLANCE

- The 6-month incidence of developing posttraumatic glaucoma can be as high as 3.4% and 2.7% after blunt and penetrating ocular trauma, respectively. Traumatic glaucoma can be related to iris/angle trauma or hyphema in the anterior segment.
- The most common injuries after blunt ocular trauma are iridodialysis, cyclodialysis, and angle recession. IOP control is the cornerstone of management.
- The incidence of developing glaucoma after traumatic hyphema relates to the size of the hemorrhage.

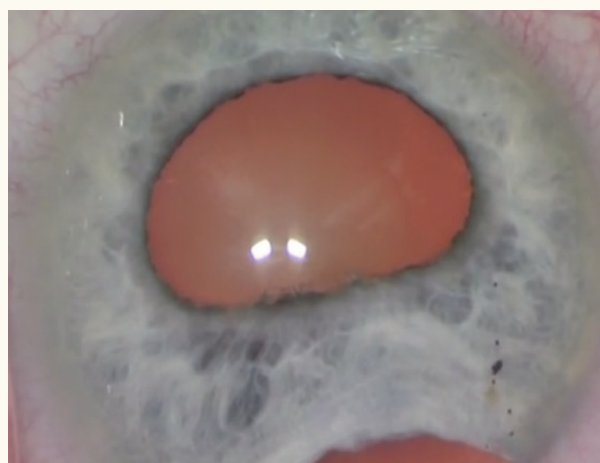


Figure 1. Iridodialysis demonstrating a peripheral iris defect in the area of iris root disinsertion.



Figure 2. A large cyclodialysis cleft on gonioscopy.

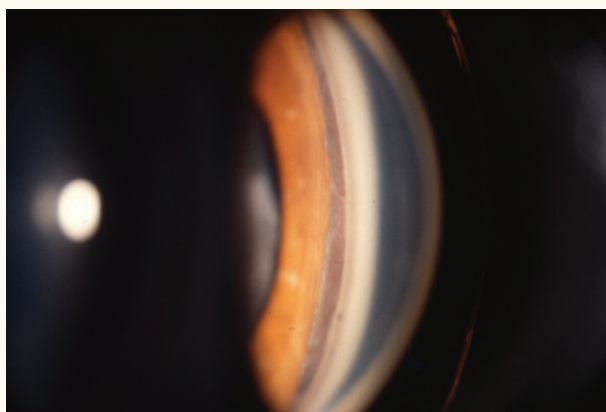


Figure 3. A widened ciliary body band on gonioscopy demonstrating angle recession.

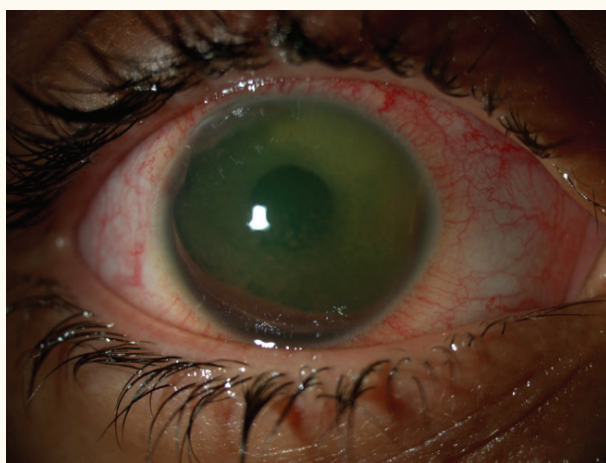


Figure 4. A layered hyphema with corneal blood staining at the slit lamp.

dislocated, there can be secondary angle closure resulting in elevated IOP (Figure 1).

Cyclodialysis is disinsertion of the ciliary body from the scleral spur. Patients typically present with low or normal IOP, but hypotony is possible. There may be accompanying iridodialysis or hyphema (Figure 2).

Angle recession is a radial tear of the ciliary muscle that separates the longitudinal and circular fibers. It is seen on gonioscopy as a widening of the ciliary body band (Figure 3).

Studies have demonstrated that more than 60% of eyes with trauma have some degree of angle trauma.⁵ The presence of a hyphema dramatically increases the likelihood that angle recession is present.⁶ In one study, 7% of eyes with angle recession involving greater than 180° eventually developed glaucoma.⁷

Treatment

IOP control is the cornerstone of management. In cases of hypotony, raising the IOP should be considered, either via medical treatment with steroids or surgically, with closure of any overfiltering clefts. If the cleft does not close on its own, surgical closure can be considered with an argon laser or intraoperatively.

When the IOP is elevated, prostaglandin analogues are a good choice for managing angle-recession glaucoma, because these drugs augment uveoscleral outflow instead of using the damaged trabecular meshwork.⁸ Angle-recession glaucoma frequently requires incisional glaucoma surgery.⁹ Given that angle recession and traumatic glaucoma are risk factors for trabeculectomy failure, the placement of a glaucoma drainage device may be a more appropriate choice.¹⁰ The Molteno (Katena Products), Ahmed Glaucoma Valve (New World Medical), and Baerveldt implants (Johnson & Johnson Vision) have all shown efficacy at lowering the IOP in angle-recession patients.¹¹

HYPHEMA

Overview

Hyphema is a frequent presenting sign after ocular trauma.¹² Initially, there may only be a microscopic hyphema, characterized by red blood cells floating in the aqueous. In later stages, these cells can settle into a layered hyphema (Figure 4). In many cases, with conservative management, the blood clears without intervention in a few days, but bleeding may recur, especially in the first few weeks after injury.¹³

The incidence of developing glaucoma after traumatic hyphema relates to the size of the hemorrhage. In one study, glaucoma developed in 13.5% of eyes when the hyphema involved less than half of the anterior chamber and 52% of eyes with a total hyphema.¹⁴

Treatment

Conservative management of traumatic hyphema includes reducing the risk of a rebleed by minimizing the patient's ambulation, avoiding anticoagulants, using an eye shield to prevent recurrent trauma, and administering aqueous

suppressants for elevated IOP. Topical corticosteroids can treat associated inflammation. Cycloplegics can be considered to reduce ciliary spasm, photophobia, and the formation of posterior synechiae.

The management of elevated IOP in the presence of a hyphema starts with aqueous suppression. Oral carbonic anhydrase inhibitors or intravenous hyperosmotic agents are options if the IOP is refractory to topical medication. In patients with preexisting glaucomatous damage, the target IOP may be lower to prevent further damage.¹⁵ Additionally, in sickle cell disease, the optic nerve is vulnerable to damage when the IOP is mildly to moderately elevated. In these patients, a pressure above 24 mm Hg for 1 day is an indication for surgical intervention.¹⁶ It is important to remember to avoid using carbonic anhydrase inhibitors in these patients, because they can develop acidosis, which encourages red blood cell sickling.

If the IOP does not respond to conservative management, surgical intervention becomes necessary. The ophthalmologist can perform an anterior chamber washout with manual irrigation and aspiration. This alone, without additional filtering procedures, can effectively lower the IOP.¹⁷ ■

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