Corneal blood staining after traumatic hyphema- a case report

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Abstract
A 7 years old boy presented with the complaints of pain, redness, watering and loss of vision in RE following trauma with a wooden stick 5 days back. On examination, he had full chamber hyphema with blood staining of 2/3rd of cornea with raised IOP. Anterior chamber paracentesis was done after controlling the IOP. The patient developed lenticular changes and is on follow up.

Keywords: Traumatic, hyphema, intraocular pressure, anterior chamber, blood staining.

Introduction
Corneal blood staining has been described as a rare complication of contusion injury induced hyphema of relatively long duration with a raised intraocular pressure (IOP) and results from impregnation of the corneal stroma with hemoglobin and hemosiderin. A pressure >25 mm Hg for >5 days may cause corneal staining. It is infrequently seen after penetrating injuries, in which the tension is usually low. The reported incidence is 2–11% of traumatic hyphema cases and even higher for total hyphemas. Other corneal blood staining etiologies are hyphema induced by intraocular surgery or any other bleeding in the anterior chamber (AC). In case of hyphema, maximal medical and surgical efforts should be applied to prevent cornea staining, since this condition may end up with an irreversible corneal opacity, hence permanent blurring of vision. Irreversible corneal staining may require corneal transplantation. We herein report a case of traumatic hyphema resulting in corneal blood staining.

Case Report
A 7 years old boy presented with the complaints of pain, redness, watering and decreased vision in the right eye following trauma with a wooden stick 5 days back. On examination, the visual acuity was recorded as PL present and PR accurate in RE and 6/6 in LE. RE examination further revealed mild lid edema and conjunctival congestion on gross examination. On Slit lamp examination, there was ciliary congestion, corneal staining of lower 2/3rd of cornea with full chamber hyphema. The IOP was 50.6 mmHg by Schiotz tonometer in RE and 14.6 mmHg in LE. B-scan showed clear vitreous and intact retina. CT scan of orbit revealed no globe, bony orbit or optic nerve injury. The patient was kept on intravenous mannitol, oral acetazolamide, antibiotics and vitamin C along with topical b-blockers, antibiotic steroid eye drops and atropine ointment. The IOP in RE was reduced to 20.6 mmHg. So the patient was taken for anterior chamber paracentesis under GA after PAC fitness and negative RTPCR report for COVID 19. Clotted blood was aspirated out and AC was formed with BSS (balanced salt solution) and air. Next day, the anterior chamber had no hyphema and superior clear cornea was easily visualized with blood staining of lower 2/3rd of cornea (Figure 1 a and b).

Fig. 1 a : corneal blood staining (1st postoperative day)
The visual acuity improved to 6/12p (through superior clear cornea). The IOP became normal, so systemic anti-glaucoma drugs were discontinued and the patient was discharged on topical treatment as prescribed earlier with oral antibiotics, analgesics, vitamin C and prednisolone 20mg tablets after 2 days. At first follow up after 1 week, there was no fresh hyphema, IOP was 14mmHg with persistent corneal staining. The oral steroids were tapered over 1 week and topical medications were continued. At one month follow up, the VA decreased to 6/60 as the patient had developed lenticular changes (seen through superior cornea) and persistent corneal staining. The patient is under constant follow up.

**Discussion**

Hyphema is one of the most challenging clinical problems encountered by the ophthalmologists. Traumatic hyphema is encountered in children and adults. Hyphema is usually the result of blunt trauma that hits the exposed portion of the eye despite the protection of the bony orbital rim. Various missiles and objects have been incriminated, including balls, rocks, projectile toys, air guns pellets and the human fist.

Most hyphemas (71-94%) result from tears in the anterior face of the ciliary body, with disruption of the major arterial circle and its branches, recurrent choroidal arteries, or ciliary body veins, the remaining percentage arises from ruptured iris vessels, cyclodialysis, or iridodialysis. Predisposing factors for corneal blood staining include prolonged duration of hyphema, large or total hyphema, sustained increased IOP and dysfunction of the corneal endothelium. The reported case exhibited a total hyphema with markedly elevated IOP for 5 days prior to consultation.

The following pathogenesis of corneal blood staining has been postulated. Initially, endothelial degeneration occurs because of mechanical disruption, toxicity from erythrocytic debris and possibly porphyrin-induced phototoxicity. Subsequently, haemoglobin and breakdown products diffuse into the posterior stroma. Haemoglobin is phagocytosed by posterior keratocytes and degraded to haemosiderin, which is subsequently phagocytosed by anterior stromal keratocytes. Excess intracellular haemoglobin and haemosiderin causes kerocyte death. The cornea is repopulated with keratocytes as a result of ingrowth of fibrocytes from the limbus; corneal clearance therefore begins peripherally.

The natural history of corneal blood staining has been documented by slit-lamp microscopy. Initially, corneal oedema occurs as a result of endothelial dysfunction indicating that blood staining is imminent. The earliest sign is the presence of fine yellow granules in the posterior stroma. A straw yellow discoloration of the stroma subsequently develops, progressing to a reddish-brown discoloration over several days. Over time, the discoloration changes through various shades of greenish-black to grey. Corneal blood staining extending to Bowman's layer and the epithelium has been reported in severe cases, and a greyish discoid opacity deep in the stroma can simulate an anterior dislocation of the lens. Clearance of the blood staining begins peripherally and progresses centrally, and can take up to 3 years. Occasionally clearance is incomplete leading to permanent opacification. Therapeutic efforts should be made at the earliest to prevent corneal blood staining in cases of hyphemas presenting early. Corneal blood staining is most likely with a total hyphema and an IOP greater than 25 mmHg for longer than 6 days. Surgical evacuation of the hyphema is indicated at this stage, or at the first microscopic sign of blood staining. Thereafter, management options include awaiting spontaneous
clearance or penetrating keratoplasty. In this case, corneal staining was present at the first consultation only. Long time follow up will be done to determine the outcome in this case.

**Conclusion**

Corneal bloodstaining is undoubtedly a vision-threatening complication of total hyphema after ocular trauma. Timely control of IOP is important to prevent corneal blood staining and optic nerve damage. Furthermore, removing the whole hyphema as soon as possible may decrease the severity of corneal blood staining and shorten the course of clearing up spontaneously.

**References**


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