

Open Globe Injury

A 30-year-old male with no known past medical history presents to the emergency department with chief complaint of left eye pain after a large fish hook struck him in the left eye at 2000 the night prior. Prior to arrival, the patient was seen at a clinic and was given Rocephin 1g IM, Voltren 75 mg IM, and Gravol 50 mg IM. Currently, he complains of constant sharp left eye pain with associated blurry vision, headache, and nausea. He denies glasses or contact use and states he is only able to see shadows. Vitals on arrival: BP 160/92 mmHg, HR 69 bpm, RR 16 breaths/min, T 37.3C, O2 saturation 98% on room air.

On physical exam extraocular movements are intact without pain, no injury or trauma to the upper and lower eyelids bilaterally. Left eye is noted to have lateral subconjunctival hemorrhage with misshapen pupil and hyphema covering 1/3 - 1/2 of the anterior chamber. Which of the following tests is best to establish a diagnosis?

- A. Ultrasound of the left eye
- B. Fluorescein and wood's lamp examination
- C. X-ray of head/orbits
- D. CT orbit without contrast
- E. No imaging needed

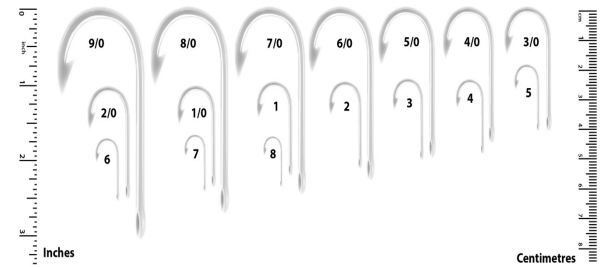


Figure 1. Fish hook sizes.
(<https://badangling.com/tackle-advice/a-guide-to-fishing-hook-sizes-and-types/>)

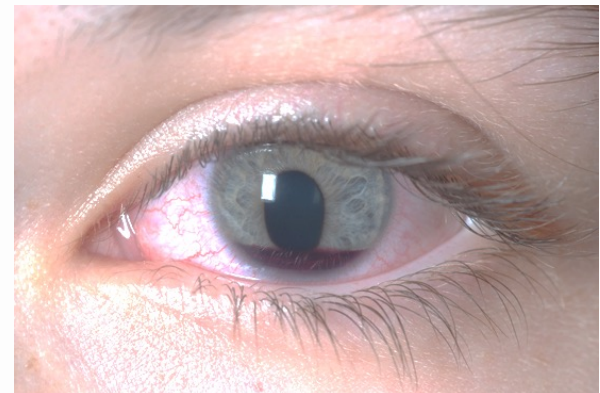


Figure 2. Open globe injury with traumatic hyphema.
(<https://www.jems.com/patient-care/traumatic-eye-injury-management-principi-0/>. Published 2013.)

Discussion

The correct answer is D, CT orbit without contrast.

Open globe ruptures occur after blunt trauma, while open globe laceration occurs with penetrating trauma. Open globe lacerations are further subclassified into penetrating and perforating. This patient obtained penetrating trauma to his left eye from a large fishhook striking him in the eye (reports the hook was never stuck in his eye). Injury to the eye globe can be further classified into anatomic zones, depending on the structures affected.

Obtaining a good history helps raise the suspicion of an open globe injury in the setting of trauma. Differential diagnoses include corneal laceration, vitreous hemorrhage, retinal detachment. If an open globe injury is suspected, certain diagnostics should be avoided, such as application of pressure to eyelids, tonometry, or addition of fluorescein drops, in order to prevent introduction of further infection or worsening of the injury. Along with open injury, increased intraocular pressure can lead to extrusion of internal ocular contents. CT imaging is superior to ultrasound in this case due to the absence of direct contact.

Physical findings that should raise concern for open globe injury include obvious gross deformity with eye volume loss, hyphema, irregular pupil, extrusion of intraocular contents (iris, ciliary body, lens through opening). Examination for external injuries such as orbital bony trauma or extraocular muscle entrapment, visual acuity, and afferent pupillary defect should be performed to assess for signs of nerve damage. Emergent ophthalmology consult should be obtained.

Anatomy of the Human Eye

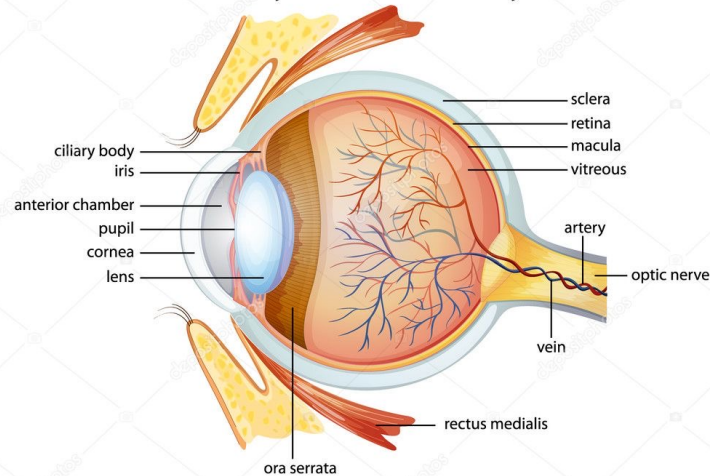


Figure 3. Anatomical horizontal section of the eye.

(<https://www.themedicaleyecenter.com/eye-conditions-manchester/eye-anatomy/>. Published 2022.)



Figure 4. Patient's CT results showing decompression injury of the left lobe which is collapsed.

Treatment

Immediate ophthalmology consult and empiric antibiotic treatment are essential in the setting of an open globe injury. Tetanus prophylaxis should be given. The patient should be kept in nothing by mouth (NPO) status in case the patient develops signs of infection and/or potential operative management of the injury.

Endophthalmitis is defined as inflammation and infection of intraocular fluid contents. Empiric antibiotic treatment for posttraumatic eye injuries should cover Gram-positive species such as coagulase-negative staphylococcus, streptococcal species, and staphylococcus species; bacillus species; and Gram-negative organisms. Options include vancomycin 15 mg/kg (1.5 g max) or ceftazidime 50 mg/kg (2 g max). If there is a penicillin allergy, ceftazidime can be substituted with a fluoroquinolone. In this case, the patient had received ceftriaxone 1g prior to arrival followed by levofloxacin 750 mg orally. Along with oral antibiotics the patient was given vancomycin and tobramycin ophthalmic drops until surgery. Additionally, the patient was given a rigid eye shield for the affected eye and antiemetics to help his associated symptoms.

Take Home Points

- **Mechanism of injury and physical exam findings should raise concern for open globe injury.**
- **Precautions should be taken to prevent worsening injury or introducing infection.**
- **CT imaging is the preferred modality for diagnostic imaging.**
- **Empiric antibiotics (vancomycin versus ceftazidime versus fluoroquinolone) should not be delayed to avoid development of endophthalmitis.**
- **Ophthalmology consult should be obtained as soon as possible with goal of repair within 24 hours.**



About the Author

Samantha is a 4th year medical student at Arkansas College of Osteopathic Medicine (ARCOM). She is originally from Stamford, CT and grew up in Jakarta, Indonesia, until she was 12. She plans on pursuing Emergency Medicine after graduation. In her free time she enjoys outdoor activities, cooking/baking, arts & crafts such as painting and ceramics, and hanging out with her large family and friends!

References

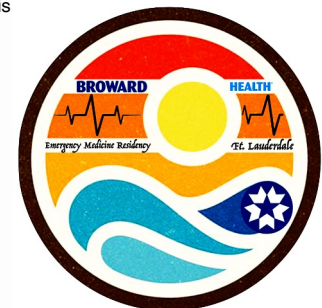
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