CASES OF NOTE

Column Editor: Elda G. Ramirez, PhD, RN, FNP-BC, FAANP

Patient With a Globe Rupture

Carmen T. Paniagua, EdD, RN, CPC, ANP, ACNP-BC;
Connie M. Gunter, BSN, MS;
Jonathan D. Casciano, MD;
Randy P. Maddox, MD

ABSTRACT
Eye injuries are a leading cause of monocular blindness within the United States. The management of patients who have sustained eye injuries can be challenging for advanced practice nurses (APNs) who work in emergency care settings. APNs are required to have a thorough understanding of eye injuries in order to promptly and accurately assess and manage eye emergencies. This article presents a case of a patient with an open eye globe rupture and discusses the assessment, diagnosis, and management for this patient. Key words: emergency eye trauma, eye globe rupture eye injury, globe rupture, traumatic globe rupture

IN the United States, nearly 2.4 million eye injuries occur each year (Centers for Disease Control and Prevention, National Center for Health Statistics, 2008). Approximately 95% of all eye injuries are reported to be minor, with the remaining 5% considered to have the potential of resulting in permanent vision loss and/or permanent anatomic change (Kuhn, Morris, Witherspoon, & Mann, 2006). Emergency departments (EDs) treat 0.3% of these injuries (McGwin and Owsley, 2005). Open eye globe injury is part of this small percentage of traumatic injury.

CASE REPORT
An 18-year-old Hispanic male presented the ED triage area. According to the patient, on the previous night he had consumed a large amount of alcohol. During this intoxicated state, he injured his right eye after running into a glass window. The patient then fell asleep and did not seek medical attention for approximately 18 hr.

An acute care nurse practitioner (ACNP) working in the nonurgent side of the ED came to assist with the interpretation in Spanish. The ACNP also performed the history and physical examination.
**Table 1.** History of present illness for patient with a right eye injury

<table>
<thead>
<tr>
<th>O</th>
<th>Onset: 18 hr ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Location: Right eye</td>
</tr>
<tr>
<td>D</td>
<td>Duration: Progressive pain; now</td>
</tr>
<tr>
<td></td>
<td>constant</td>
</tr>
<tr>
<td>C</td>
<td>Characteristics: Swollen, red,</td>
</tr>
<tr>
<td></td>
<td>irritated, right eye</td>
</tr>
<tr>
<td>A</td>
<td>Aggravating factors: Photophobia</td>
</tr>
<tr>
<td></td>
<td>and bending forward</td>
</tr>
<tr>
<td>R</td>
<td>Relieving factors: Unable to</td>
</tr>
<tr>
<td></td>
<td>obtain relief with closing the</td>
</tr>
<tr>
<td></td>
<td>eye</td>
</tr>
<tr>
<td>T</td>
<td>Treatment: Patient placed</td>
</tr>
<tr>
<td></td>
<td>sunglasses over eyes</td>
</tr>
</tbody>
</table>

*OLDCART mnemonic for history of present illness.

**Chief Complaint**

The patient stated, “I have an irritation in my right eye.”

**History of present illness.** The patient stated that the onset of the injury was 18 hr prior. The patient complained of progressive pain and then stated, “It’s constant now.” The patient also described a swollen, red, irritated right eye. He stated that his pain was aggravated by photophobia and bending forward; nothing relieved the pain. The patient put a pair of sunglasses over his eyes and came to the ED (Table 1).

**Medical history.** Noncontributory. Patient denied any past ocular conditions and denied ever wearing glasses or contact lens. Current medications: None. **Allergies:** No known allergies. **Immunization status:** Tetanus immunization was up-to-date.

**Surgical history/hospitalizations.** None.

**Family history.** Noncontributory.

**Social history.** The patient worked as a landscaper and he denied tobacco use. Positive for “occasional” alcohol consumption reported as 2–3 or 3–4 (as previously stated above) beers on weekends. He denied any recreational drug use, including intravenous drugs.

**Review of systems—Constitutional.** The patient denied any fever or chills or malaise.

**Skin:** No rash or itching reported. **Head/Eyes/Ears/Nares/Throat (HEENT):** No previous blurred vision, pain, or eye trauma. **Cardiovascular:** No chest pain or palpitations. **Pulmonary:** No cough or shortness of breath. **Gastrointestinal:** No vomiting or diarrhea. **Genitourinary:** No frequency with urination or discharge. **Musculoskeletal:** No pain in extremities or joints. **Neurologic:** No localizing weakness or trouble speaking. **Hematopoietic:** No easy bruising or prolonged bleeding. **Immunologic:** No frequent or recurrent infections. **Psychiatric:** No depression or anxiety.

**Physical examination—General.** The patient is a well-developed, well-nourished, conscious, and coherent individual in moderate distress. **Vital signs:** Oral temperature 98.2°F (36.7°C), pulse 72 beats per minute, respiratory rate 14 per minute, blood pressure 132/74 mmHg, and pulse oximetry was 98% on room air. **Skin:** Warm and dry. Normal texture and turgor. **HEENT:** Normocephalic, without evidence of trauma. **Eyes:** Gross external examination revealed a 1-cm laceration of the right upper eyelid and a 0.5-cm laceration of the right upper eyelid skin crease. In addition, conjunctival hemorrhage (2+) and scleral buckling with extrusion of ocular contents was noted (Fig 1). Visual acuity 20/200 right eye and 20/20 left eye without correction. Visual fields showed...
the six cardinal direction of gaze intact for both eyes. Extraocular movements were intact for both eyes. A teardrop-shaped pupil (i.e., pupil distortion suggestive of globe rupture with iris prolapsed) was noted in the right eye. The right eye was reactive to light; accommodation was compromised because of the teardrop-shaped pupil. The left eye was equal, round, and reactive to light and accommodation. Intraocular pressure reading was deferred because of visible prolapsed iris of the right eye. Relative afferent pupillary response was performed as a reliable way to rule out optic nerve disease. This response was normal for both eyes. 

**Ears:** Both ear canals were patent. Tympanic membranes were clear. 

**Nares:** Without rhinorrhea. 

**Mouth/throat:** Mucous membranes were moist, without erythema or exudate. 

**Neck:** Supple, without adenopathy or meningismus. Carotids equal. 

**Trachea:** Midline. No bruits or jugular venous distention. 

**Chest:** Normal AP diameter. Adequate expansion without retractions. No chest wall tenderness. Lungs are clear bilaterally with good tidal volume. 

**Abdomen:** Soft and nontender without masses, guarding or rebound tenderness. Bowel sounds active. No hepatosplenomegaly. 

**Back:** Without spinal or costovertebral angle tenderness. 


**Neurologic:** Alert and oriented to person, place, time, and event. Cranial nerves II-XII grossly intact. Reflexes symmetric. 

### IMAGING STUDIES 

Computerized tomography (CT) without contrast was performed to visualize the anatomy of the globe and orbit and to note any intraocular foreign body (i.e., glass). The CT results were reported as negative. Computerized tomography scanning is the most sensitive, readily available imaging study to detect occult rupture, associated optic nerve injury, and small foreign bodies. CT can also visualize the anatomy of the globe and orbit (Pokhrel & Loftus, 2007).

### Differential Diagnosis 

The differential diagnosis for this patient included corneal laceration, retinal detachment, and vitreous hemorrhage (Table 2). In addition, other problems such as subconjunctival hemorrhage and conjunctival laceration needed to be considered when considering all of the differential diagnoses.

### ASSESSMENT/DIAGNOSIS/ICD-9 CODE 

Right eye globe rupture/rupture eye with prolapse of intraocular tissue 871.1.

### ED COURSE 

A protective rigid shield was applied to cover the patient’s right eye, while an emergent consult was placed to the ophthalmologist. The ACNP conferred with the ED collaborative physician, who agreed with the examination and management of this patient. The ophthalmologist noted corneal edema and opacification with fluorescein under a portable slit lamp (Table 3). The left eye was also dilated, which demonstrated a normal

---

**Table 2. Differential diagnoses for a patient with a globe rupture**

<table>
<thead>
<tr>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival laceration</td>
</tr>
<tr>
<td>Corneal laceration</td>
</tr>
<tr>
<td>Retinal detachment</td>
</tr>
<tr>
<td>Subconjunctival hemorrhage</td>
</tr>
<tr>
<td>Vitreous hemorrhage</td>
</tr>
</tbody>
</table>
Table 3. Examination findings: Slit lam

| Lids/Lashes: 1-cm laceration of the right upper eyelid and 0.5-cm laceration of the right upper-eyelid skin crease |
| Conjunctiva/Sclera: Conjunctival hemorrhage (2+) and scleral buckling with extrusion of ocular contents |
| Cornea: Approximately (5 mm) corneal laceration originating at the temporal limbus and extending centrally; mild corneal edema and central epithelial defect |
| Anterior chamber: Shallow with visible iris prolapse through the wound |
| Iris (1): Teardrop-shaped pupil with the apex of the teardrop pointing to the area where the iris was prolapsed |
| Lens: Clear |

optic nerve and fundus. The use of dilute topical 0.5% proparacaine (Ophthane) is contraindicated in patients with globe rupture (Roberson, 2007). A prophylactic intravenous antibiotic was administered to prevent endophthalmitis, an inflammation of the intraocular cavities, which can potentially have devastating complications including blindness (Roberson, 2007).

OPERATIVE INTERVENTION
The patient was transported to the operating room to repair the globe rupture within an hour of arrival to the ED. The eye wound was closed with one 9-0 nylon suture at the limbus and five 10-0 interrupted nylon sutures were also placed. The patient’s eyelid lacerations were closed using 6-0 vicryl sutures tied in a mare’s tail. A bandage contact lens was placed on his right eye to reduce discomfort from corneal epithelial defects, to promote healing of corneal wounds and wound dehiscence after surgery.

POSTOPERATIVE CARE
The patient was discharged postoperatively to be following up the next day at the ophthalmology outpatient clinic. Discharge instructions included bed rest, wear sunglasses to prevent ocular injury, moxifloxacin (Vigamox) 0.05% ophthalmic solution, one drop every hour, to prevent bacterial conjunctivitis, prednisolone every 2 hr to decrease inflammation, brimonidine tartrate/timolol (Combigan) 0.2% ophthalmic solution, 1 drop twice a day, to decrease intraocular pressure, and atropine 1% ointment, 1% solution to be instilled in the conjunctival sac four times a day. The atropine ophthalmic is a combination of a cycloplegic agent, which paralyzes the ciliary muscle of the eye resulting in loss of accommodation, and a mydriatic agent that is used to dilate the pupil to better visualize the retina (Titcomb, 1999).

The following day at his postoperative examination, the patient’s right eye vision was 20/400 and his intraocular pressure was elevated to 42 mmHg. Eyelid sutures were intact without evidence of infection. There was 3+ injection of the sclera. Corneal edema was present with multiple Descemet’s folds and residual iris incarceration of the main wound. Descemet’s folds are present in any condition that causes inflammation of the cornea or the anterior chamber (Schuler, 2007).

Two days postoperatively, the examination revealed that the patient’s corneal laceration was resolving and there was no longer “leakage.” The patient’s vision was 20/80 (both eyes of the vitreous, the gel-like substance that helps the eye maintain its round shape) with an intraocular pressure of 13 mmHg (normal 10–20 mmHg).

The patient was also seen 6 days postoperatively. Fundus examination of the right eye was reported as 20/25 and intraocular pressure was 11 mmHg. The patient noted that his vision was much better and denied blurred or double vision or any other symptoms or complaints.

DISCUSSION
Healthcare outcomes depend on timely management. Prompt recognition and appropriate treatment of ocular trauma is essential. Careful eye examination and certain
ophthalmologic tests can assist nurse practitioners with a diagnosis to make decisions about appropriate treatment and referral for patients with ophthalmologic injuries.

When an eye injury/illness presents, the general eye examination should include a gross examination (Fig 2), slit-lamp examination, and fundoscopic examination. If eye pain is reported, topical anesthetic drops can be used unless they are contraindicated. The use of topical anesthetic drops is contraindication in a patient with a globe rupture.

The general eye examination includes visual acuity, visual fields, pupils, EOMs, APDR,
and other gross findings (e.g., change in pain with anesthetic agent contraindicated in this patient) and tonometry (when indicated). A tonometer measures the intraocular pressure by calculating the force required to depress the cornea, a given amount with a tonometer. Intraocular pressure between 10 and 20 mmHg is considered normal. When mechanical injuries of the globe occur, the tonometry is contraindicated.

If a corneal laceration or a postsurgical wound leak is suspected, a Seidel test is performed. The examiner can by place a fluorescein strip, moistened with topical anesthetic, directly to the area of the suspected rupture (Fig 3). The blue beam from the slit lamp will show a dark stream of fluid originating from the rupture site with a greenish yellow staining on either side. Table 3 lists the examination findings for this patient with a globe rupture after being examined under a slit lamp.

A fundoscopic examination will include inspection of the optic nerve, disc, macula, retina, and blood vessels. This examination is performed with the use of an ophthalmoscope. Visualization is easier with dilation of the pupils (instillation of mydriatic drops) but is not necessary. The drop effects may last for hours to days and should be documented carefully, especially in trauma patients (Pokhrel & Loftus, 2007). All these information should be reported on the documentation, dictations, and reports to the ophthalmologist.

The size, shape, light reflexes, and afferent pupillary defect (APD) or Marcus Gunn pupil should be examined. The APD is an abnormal reflex response to light that is a sign of nerve fiber damage due to optic neuritis. A pupil normally gets smaller when a light is shined either into that eye (direct response) or the other eye (indirect response). In an APD, there is a relative decrease in the direct response. This is most clearly demonstrated by the “swinging flashlight test” (Harrahil, 2006).

**SUMMARY**

This case report presented a medical emergency of an open globe eye injury treated
by an ACNP in the ED. The assessment, management, and evaluation of this eye emergency were discussed. Pertinent clinical documentation was presented to ensure proper referral and key components of evaluation and management code. Furthermore, this case report provides evidence-based research, which supports the need for an improved partnership and/or collaboration between physicians and ACNPs alike in order to achieve broader medical care benefits.

REFERENCES


