



Ocular Injuries in Sports

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Learning Objectives

1. Know the sport classification and risk of ocular injury
2. Discuss the most common mechanisms of ocular trauma in sports
3. Know the prevention and treatment of sports related ocular injuries
4. Be able to conduct an on site evaluation of ocular injuries (Workshop material)



Matt Mitrione 
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 **Follow**

en orbital floor. This and the shoulder happened after



Background

- 40,000+ sports related ocular injuries annually seen in the emergency department
 - 90% are considered preventable
 - 30% of eye injuries in those under 16 years of age are related to sports participation
 - 5-14 years old = baseball
 - 15-64 years old = basketball

Sport Classification

- Collision
 - football, rugby, hockey, lacrosse
- Contact
 - baseball, soccer, basketball, wrestling
- Noncontact
 - cross-country running, track, tennis, crew, swimming
- Other
 - bowling, golf, archery, field events

Sport Classification

- Misleading when used in the context of possible ocular injuries
 - Hockey has lower incidence due to the use of proper protective equipment
 - Golf and racquet sports are at higher risk for injury

Sport Classification – Eye Risk

- Low risk
 - no use of ball, puck, bat, stick, or racquet and no contact
 - track/field, swimming, gymnastics, and cycling
- High risk
 - baseball, hockey, football, basketball, lacrosse, racquet sports, tennis, fencing, golf, and water polo

Sport Classification – Eye Risk

- Very high risk
 - boxing, wrestling, and contact martial arts
 - Frequent high impact trauma to the eye and no eye protection typically worn

Functionally One-Eyed Athletes

- Considered monocular when best corrected vision in weakest eye is 20/40
 - Must wear eye protection which meets ASTM (American Society for Testing and Materials) racquet sports standards when participating in events
 - Under face mask in sports requiring such equipment
 - Recommend protective lens use at ALL times

Functionally One-Eyed Athletes

- Very high risk sports are contraindicated due to lack of proper protective equipment
- ASTM has multiple classifications for different sports
 - DO NOT confuse ASTM ratings with ANSI (American National Standards Institute) which do not write standards for sports eyewear, but do write standards for other protective eyewear

ASTM Standards

- Eye protectors must shift impact from the eyes and the face to the skull without causing intracranial injury
 - May be necessary to integrate into helmet
 - Hockey, football, baseball and lacrosse
 - Must be acceptable to the athlete, not change the appeal of the game, and not generate unacceptable liability



ASTM Standards

- Polycarbonate
 - Highly impact-resistant plastic
 - 2mm thickness in low risk sports
 - 3mm thickness in high risk sports
 - Withstand ball at 45mph-youth, 55-mid, 85-adult
 - Capable of absorbing ultraviolet light
 - Available in prescription and nonprescription lenses
 - Multiple standards for particular sports

Injury Mechanisms

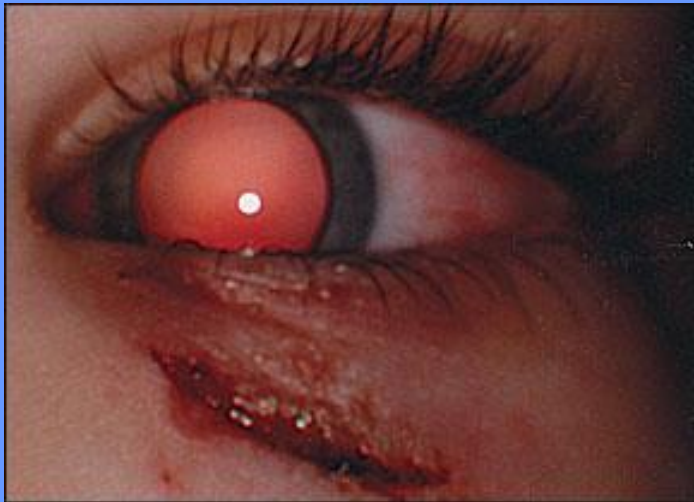


- Blunt trauma
 - Most common mechanism
 - Examples
 - Blowout fracture, contusions, iris injury, ruptured globe, traumatic iritis, subconjunctival hemorrhage, hyphema, retinal hemorrhage, commotio retinae, vitreous hemorrhage, choroidal rupture, retinal tears, and retinal detachment

Injury Mechanisms

- Blunt Trauma
 - Damage depends on size, hardness and velocity of the blunt object and the force imparted directly to the eye
 - Objects smaller than the orbital opening cause rapid AP compression and dilation of the middle globe, transferring force to the internal structures
 - Objects larger than the orbital opening exert force on the floor of the orbit or medial wall and cause fracture of the thin bones
 - Prevents rupture of the globe

Blunt Trauma



- Minor external trauma in the presence of severe ocular injury.

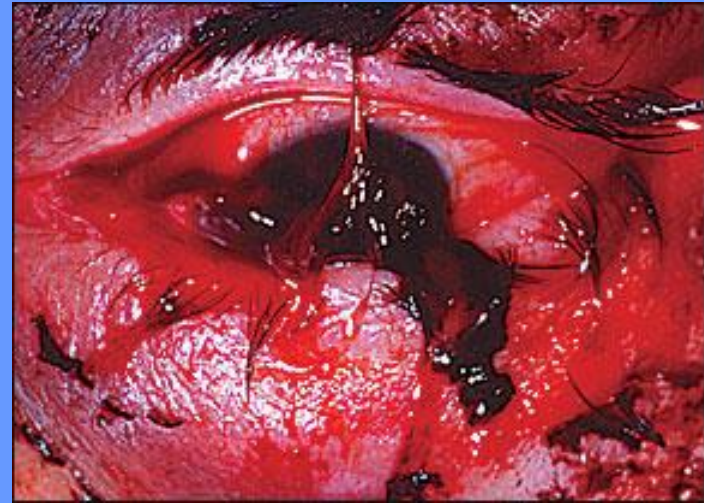


- The eye of the patient in the top view had no light perception and a large afferent pupillary defect from an avulsed optic nerve

Blunt Trauma

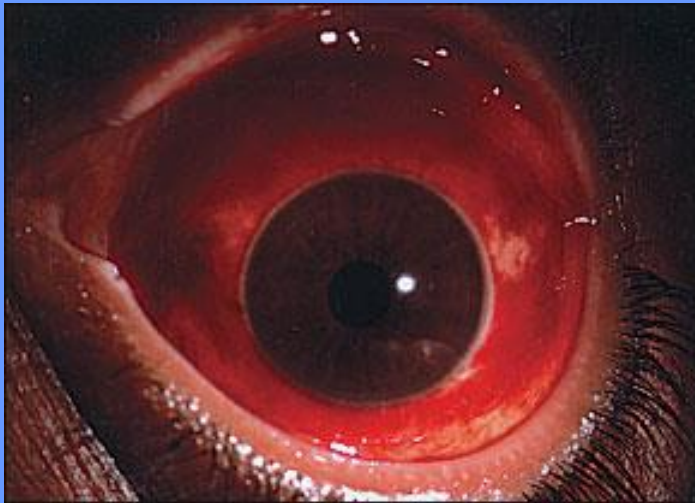


- Ruptured globe caused by golf ball



- The patient has transmarginal eyelid lacerations, a cornea-scleral laceration, and prolapsed uvea on the eyelid.

Blunt Trauma

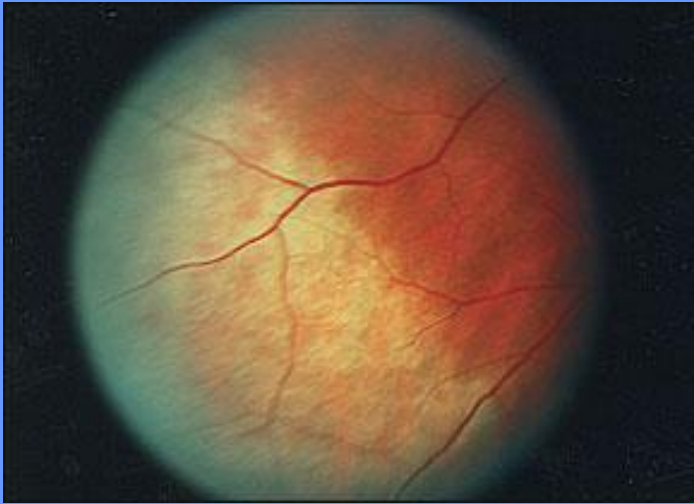


- Extensive subconjunctival hemorrhage can be a sign of occult globe rupture

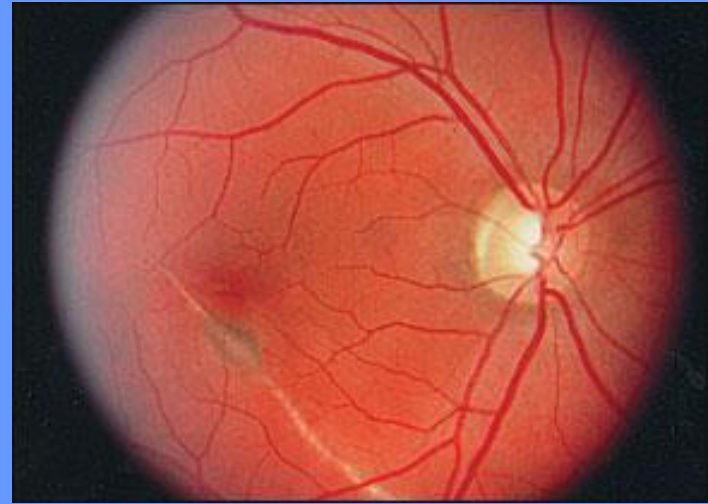


- Hyphema

Blunt Trauma



- Commotio retinae, seen as a whitish change in the retina after blunt trauma. This is believed to be caused by disorganization at the photoreceptor level

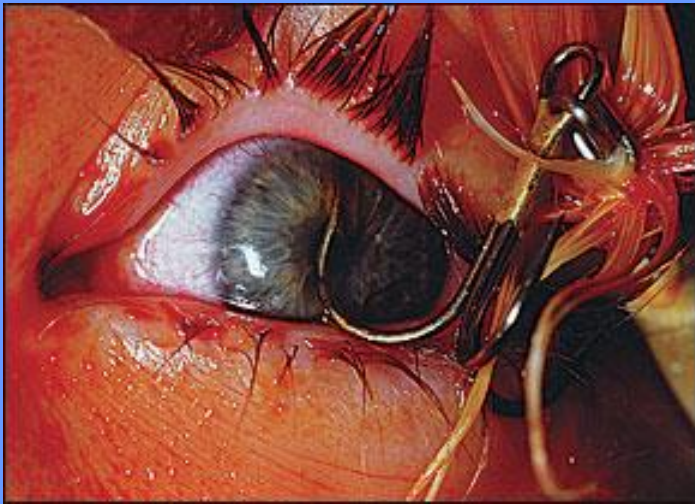


- Choroidal rupture resulting from blunt trauma. A late complication, choroidal neovascular membrane (*dark area surrounding the rupture*) can affect vision.

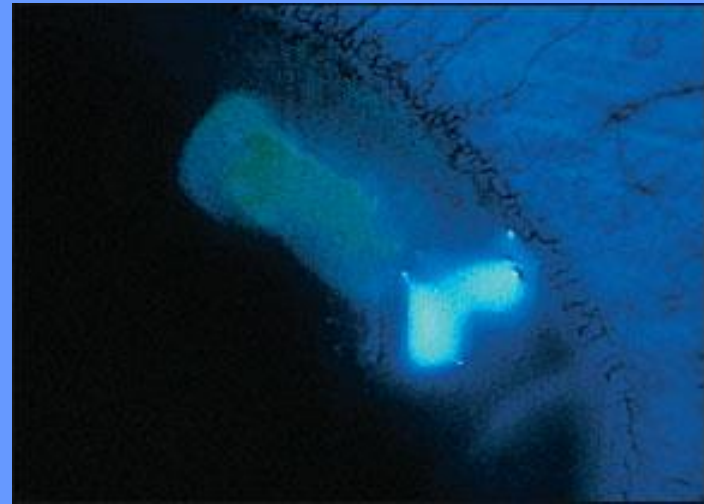
Penetrating Injuries

- Relatively uncommon
 - Can occur with large projectiles
 - Eye glass breakage from improper eyewear
 - Fishing hooks
 - Canalicular lacerations usually occur because of trauma from a fellow player's finger in the area of the medial canthus

Penetrating Injuries



- Fishing hook in the left eye. The hook was appropriately taped to the patient's forehead, a shield was placed, and immediate ophthalmologic referral was obtained

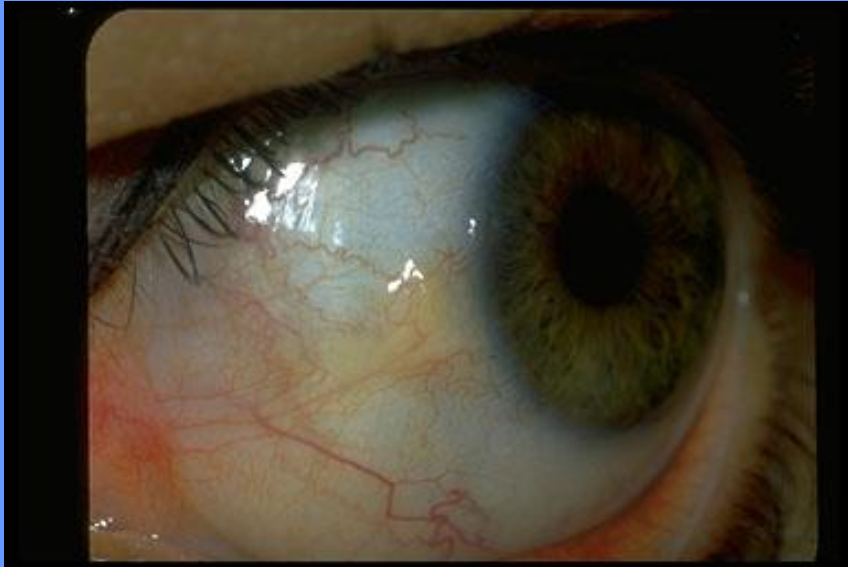


- Corneal abrasion with fluorescein stain

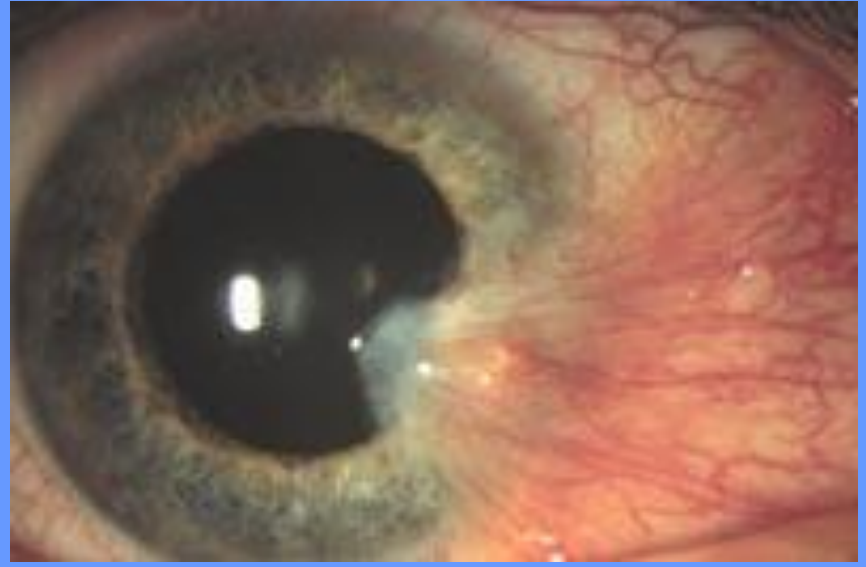
Radiation Injuries

- Result of exposure to ultraviolet light in snow skiing, water skiing, and other water sports
 - Pinguecula: They are yellow-white, amorphous, sub-epithelial deposits of abnormal collagen at the interpalpebral limbus, which may be calcified
 - Pterygium: raised, wedge-shaped growth of the conjunctiva. Grows over the central cornea and affects the vision.
 - As the pterygium develops, it may alter the shape of the cornea, causing astigmatism. If the pterygium invades the central cornea, it is removed surgically

Radiation Injuries



- Pinguecula



- Pterygium

Immediate Referral

- Sudden decrease in or loss of vision
- Loss of field of vision
- Pain on movement of the eye
- Photophobia
- Diplopia
- Proptosis of the eye
- Light flashes or floaters
- Irregularly shaped pupil
- Suspected globe perforation
- Foreign-body sensation/embedded foreign body
- Red and inflamed eye
- Hyphema (blood in anterior chamber)
- Halos around lights (corneal edema)
- Laceration of the lid margin or near medial canthus
- Subconjunctival hemorrhage
- Broken contact lens or shattered eyeglasses



Hands on workshop for
ocular evaluation and
injuries

Ocular Sports Examination

- During the workshop we will cover
 - Ocular preparticipation history
 - Standard aspects of the PPE examination
 - Special vision testing for athletes
 - What equipment can/should be in your bag
 - On field techniques and care

Preparticipation Examination

- Ocular history (simple)
 - Problems with eyes or vision?
 - Wear glasses or contacts?
 - Wear protective eyewear?
- Ocular history (more in depth)
 - Hyperopia/myopia, surgical aphakia (loss of lens), retinal detachment, eye surgery, and injury or infection
 - Family history of retinal detachment, retinal tears, and diabetic retinopathy

Preparticipation Examination



- Complete eye exam
 - Acuity
 - Visual fields
 - Motor control
 - External exam
 - Anisocoria (unequal pupils)
 - Funduscopic exam
 - *Testing for color blindness

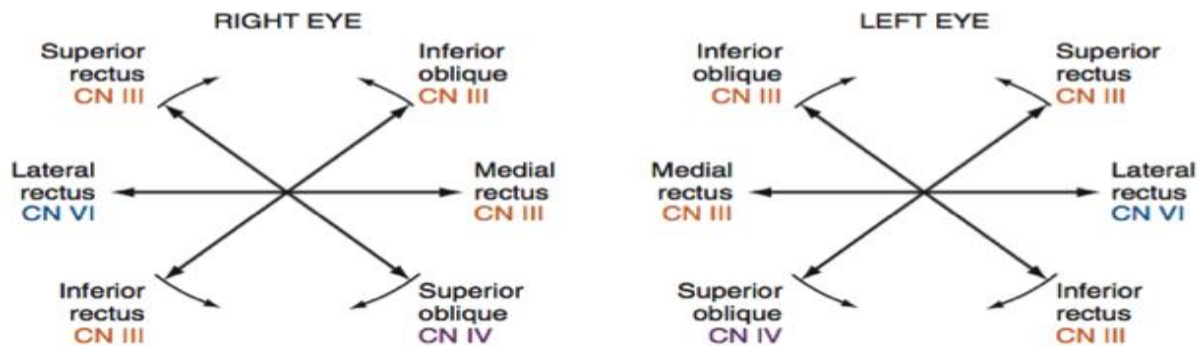
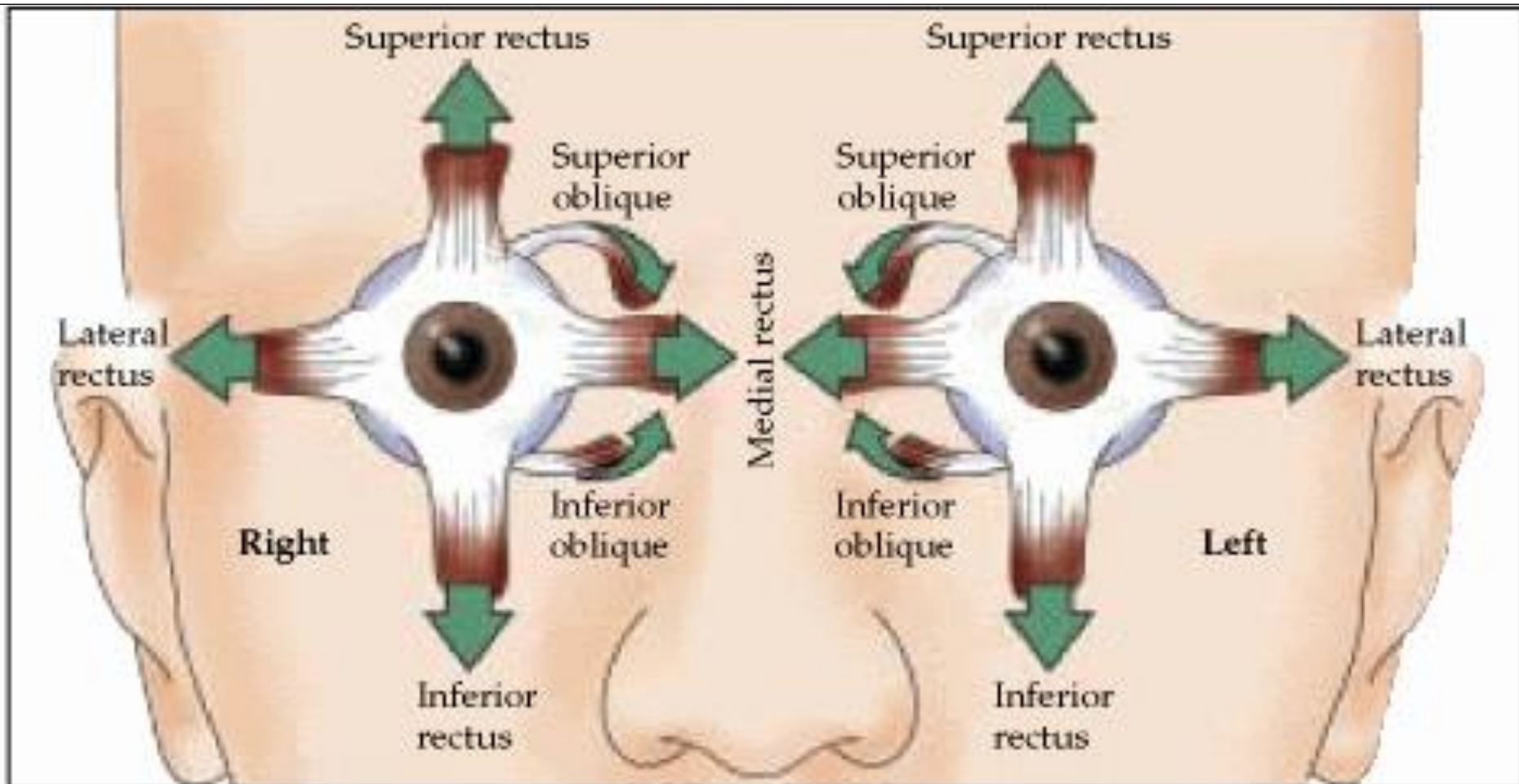


Figure 21-1. Cardinal movements of the eyes, with the oculomotor muscles that create them, and the nerves that supply those muscles. Small curved arrows denote intorsion or extorsion of the eye by the muscle indicated. CN, cranial nerve.



Ocular First Aid List for Team Physician Bag

Table 11.1 Eye injuries: first-aid kit for evaluation and treatment

Emergency telephone numbers

 Local hospital emergency room/team ophthalmologist

Near-reading card

Occluder

Penlight with cobalt blue filter

Wire lid speculum, adult and pediatric

Schiotz tonometer or tonopen (if possible)

Topical anesthetic (i.e., 0.5% proparacaine solution)

Dilating agents (i.e., 2.5% neosynephrine ophthalmic solution and 1% tropicamide ophthalmic solution)

Fluorescein strips

Cotton-tipped applicators (sterile)

Eye pads/eye shield (plastic or metal)

Tape

Sterile ocular irrigant (squeeze bottle)

Topical antibiotics (i.e., tobramycin ophthalmic solution)

Contact lens case and solutions

Sterile gauze sponges

Sterile hemostat and straight scissor

On Site Evaluation

- History
 - Mechanism of injury
 - Object
 - Force
 - Direction of impact
 - Best-corrected visual acuity pre-injury if known
 - Visual field
 - Defects suggest a retinal, optic nerve, or central nervous system injury

On Site Evaluation

- Pupil examination
 - Anisocoria, light reflex and consensual light reflex
 - Pupil irregularity is almost always pathologic
 - A deafferented pupil constricts consensually, but not to direct light, paradoxically enlarging when the light is quickly brought from the unaffected side (Marcus Gunn pupil).
 - An efferent lesion prevents direct and consensual constriction while the unaffected eye maintains both.

On Site Evaluation

- Penlight examination of the anterior chamber
 - Foreign bodies
 - Hyphema
 - Abrasions
 - Lacerations



On Site Evaluation

- Both eyes should have full motility in all positions of gaze.
 - Elevation of gaze may be limited by an orbital floor fracture.
 - Double vision in any gaze position suggests significant injury in one or both eyes

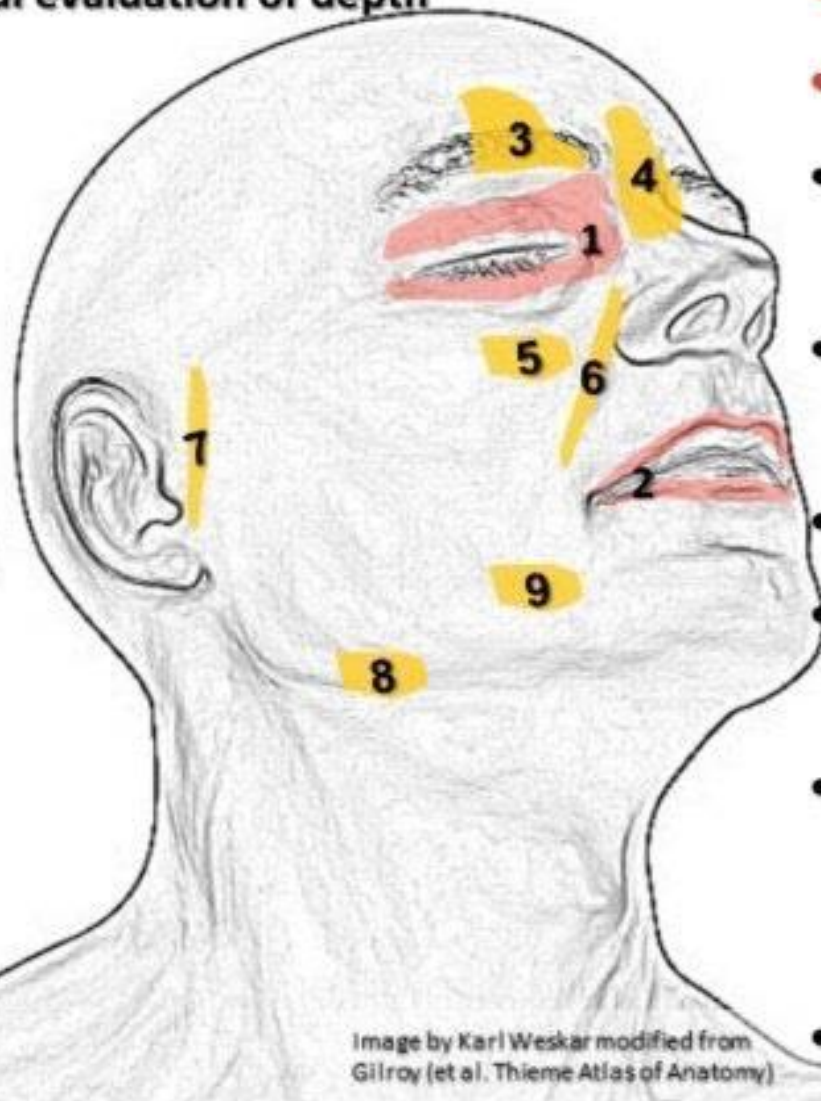
On Site Evaluation

- External examination
 - Periorbital ecchymosis, edema, proptosis, and bony step-off of the orbital rim.
 - Trismus, or pain when opening the mouth, often occurs with fractures of the lateral wall of the orbit.
 - Paresthesia in the CN V2 (infraorbital) distribution of the trigeminal nerve suggests a fracture of the orbital floor

Laceration Zones

Consider ending bout

Careful evaluation of depth



- **One – tarsal plate, lacrimal sac**
- **Two - vermilion border**
- **Three – supraorbital / supratrochlear nerves**
- **Four – nasal bridge, FRACTURE**
- **Five – infraorbital nerve**
- **Six – nasolabial fold with facial artery**
- **Seven — superficial temporal artery, facial nerve (at the zygomatic bone)**
- **Eight - facial artery at masseter**
- **Nine – mental nerve**

On Site Evaluation

- Funduscopic examination
 - Evaluate the red reflex
 - Even modest bleeding into the ocular media can alter or obscure
 - This may be the only sign of occult rupture of the globe
 - Any alteration of the red reflex requires immediate ophthalmologic referral

Treatment

- Corneal abrasion
 - fluorescent exam with cobalt blue light
 - antibiotic ointment
 - 24 hour ophthalmologic followup
- Superficial corneal foreign body
 - sterile irrigating solution or moistened sterile cotton swab
 - antibiotic ointment
 - 24 hour ophthalmologic followup

Treatment

- Concealed foreign object
 - suggested by vertical linear corneal abrasions
 - Evert upper eyelid
 - Sterile irrigating solution or moistened sterile cotton swab
 - Follow Corneal abrasion guidelines

Treatment

- Superficial eyelid laceration
 - Rule out globe injury
 - Reapproximate superficial lacerations not involving lid margins
 - Full thickness lacerations, especially involving the lid margin, warrant immediate referral
- Hyphema
 - Shield the eye and refer immediately

Treatment

- Burns

- Classic signs of UV burn are intense pain, photophobia, and delay in symptom onset
- Fine punctate staining with fluorescein is characteristic.
- Treat with systemic analgesics and topical antibiotic.
- Refer if epithelial defect is present

Treatment

- Blunt Trauma
 - Look for facial fractures and globe injuries
 - If no signs of orbital fracture or optic neuropathy are present, use rest, analgesics, and cold compresses to control further edema and discomfort

Return To Play


- In patients with significant ocular injury, a full examination and clearance by an ophthalmologist are required.
 - The injured eye should feel comfortable and have adequate return of vision.
 - Eye protectors must be worn.

Return To Play

- During the game, immediate return to play depends on the athlete's symptoms and the nature of the injury as determined by the team physician.
 - Athletes should never be allowed to use topical anesthetics to prolong play

References

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Thank you and
May the Force be with
you!