Preventing, Identifying and Treating Sports-Related Ocular Trauma
Lecture objectives

➢ Discuss sport-related eye injury demographics
➢ Become familiar with the most common types of sports-related eye injuries
➢ Discuss triage & treatment of injuries
Overview:
➢ Prevalence
➢ Demographics
➢ Legal Considerations

Injury Prevention:
➢ Protective Eyewear
➢ Functionally Monocular Athletes

Identification and Management:
➢ Eyelid/brow laceration
➢ Periorbital Ecchymosis ("Black Eye")
➢ Blow-out Fracture
➢ Subconjunctival Hemorrhage
➢ Corneal Abrasion
➢ Corneal Foreign Body
➢ Traumatic Iritis
➢ Hyphema
➢ Dislocated lens
➢ Traumatic Retinal Detachment

Resources/Equipment:
➢ Ocular Emergency Kit
➢ Triage Card
➢ Online Resources
Overview

Agenda:

➢ Prevalence
➢ Demographics
➢ Legal Considerations
Overview

Agenda:

➢ Prevalence
➢ Demographics
➢ Legal Considerations
Eye Injury Prevalence (all trauma)

- 2.5 million cases per year in U.S.
- 40-45K cases of permanent visual impairment
- Accounts for 20% of unilateral blindness; 7% of bilateral
- 70% male, inc. prevalence-younger athletes
- **Sports-related ocular trauma=600,000+ per year**
Sports Eye Injury Demographics

➢ Coalition to Prevent Sports Eye Injuries (sportseyeinjuries.com)
  • More than 600,000 eye injuries related to sports and recreation occur each year\(^3\)
  • 42,000 of these injuries are of a severity that requires Emergency Room attention\(^4\)
  • Sports participants using "street wear" are at a far more severe risk of eye injury than participants using no eye protection at all\(^5\)

3. Tri-Service Vision Conservation and Readiness Program, Eyes (Ears) and Workers Compensation.
5. National Eye Institute
Sports Eye Injury Demographics

Incidence (Prevent Blindness America 1993)

- #1: Basketball (20.8%)
- #2: Baseball (14.9%)
- #3: Swimming & Pool Sports (8.4%)
- #4: Racquet and Court Sports (7.8%)
Injuries in Sports by Age

5-to 14-year-olds
Basketball  16.5%
Baseball    15.5%
Swimming & pool sports  12.5%

15-to 24-year-olds
Basketball  34.0%
Baseball    7.2%
Racquetball & Ct. sports  8.1%

25-to 64 year-olds
Basketball  19.6%
Swimming & pool sports  14.9%
Racquetball & Ct. sports  6.7%

Total injuries of all ages  39,297
Medico-Legal Considerations

➢ Duty to Inform
  • History should determine if “street eyewear” is worn for sports
  • Obligated to warn in U.S.

➢ Document Recommendations
  • Mandatory protection for “one-eyed” athletes
  • Mandatory protection for post-trauma/surgery
  • Consider for high refractive errors (myopia)
  • Replace protectors when yellowed
Eye Injuries Associated w/ Sports

Prevent Blindness America

➢ The use of protective eyewear could effectively reduce the frequency and severity of sport-related eye injuries by 90%.

➢ Should comply with the appropriate ASTM standard
Injury Prevention

Agenda:

➢ Protective Eyewear
➢ Functionally Monocular Athletes
Protective Eyewear for Sports


- ASTM F803 standards
  - Basketball, baseball fielders, racquet sports, field hockey and women’s lacrosse; soccer (pending)
- ASTM F910: baseball batters and base runners
- ASTM F513: Ice hockey
- ASTM F1776: Paintball
- ASTM F659: Skiing goggles/shields
Functionally Monocular Athletes

- Criteria: <20/40 (6/12) best corrected
- Risk of blindness increased by >15x
- Risk is averted with protective eyewear use
- Discourage participation in sports with a risk for serious eye injury in which an effective method of eye protection does not exist
  - Examples: boxing, wrestling, martial arts
Identification and Management:

**Agenda:**
- Eyelid/brow laceration
- Periorbital Ecchymosis ("Black Eye")
- Blow-out Fracture
- Subconjunctival Hemorrhage
- Corneal Abrasion
- Corneal Foreign Body
- Traumatic Iritis
- Hyphema
- Dislocated lens
- Traumatic Retinal Detachment
Injury Identification & Management

- Discussion re: symptoms, signs and management (triage)
- Most injuries should be handled by eye care professional
- Determine the context of the injury from the player or eyewitness, if possible
Eyelid/brow laceration

- Laceration of the area surrounding the eye
- Superficial
  - Apply pressure to stop bleeding
  - Cleanse wound
  - Apply sterile dressing
- Deeper lacerations
  - May notice:
    - Fat herniation
    - Muscles
Deeper lacerations
  • Apply pressure
  • See eye care professional

Depending on depth, you may be able to handle on the field or need a referral
Periorbital Ecchymosis (“Black Eye”)  

- Blood accumulation – usually greater along lower lid  
- Occasionally forms a firm mass – hematoma  
- Need to be careful as there may be a lot of damage to eye
Be sure to rule out:

- Lid swollen shut
- Blood inside eye
- Cornea is white or hazy
- Irregular, fixed, dilated, or constricted pupil
- Visual problem (stars, floaters, distortion)
- Eye pain
Periorbital Ecchymosis ("Black Eye")

- If the athlete has none of the previous findings, you can:
  - Apply cold compress for first 24-48 hrs.
  - Hot packs for days 3-5

- If there is no improvement, you should refer as there may be larger issues
Have athlete follow pen/light/finger up and down along midline and along shoulders
  • During this time, make sure the eyes are equal in movement

Athlete may notice
  • Pain
  • Double vision
 Blow-out Fracture

➢ A break in the floor of the orbit
  • Can also be in the nasal wall
➢ Inferior rectus muscle gets trapped in the fracture
  • Limits ability to move eye
➢ Eye may look sunken
➢ May have significant muscle entrapment if athlete has:
  • Intense pain
  • Nausea / vomiting
  • Inability to look up at all
Imaging will be performed to look at the bone structure.

May need surgery.
Subconjunctival Hemorrhage

- Blood trapped between the conjunctiva and the sclera
  - Remember a slide cover on a microscope?
- Isolated, it is not a big issue
- Best evaluated by
  - Having athlete look in all directions of gaze
Subconjunctival Hemorrhage

- Can be caused by:
  - Rubbing eye, sneeze, lifting heavy objects, vomiting, trauma, etc.

- Recommend cold compress to decrease risk for extra bleeding

- Comprehensive eye evaluation to assess for other potential side effects

- If it is ONLY a ‘subconj’
  - It will move down to the lower portion of the eye (gravity)
  - The more blood, the longer it takes to resolve
Corneal Abrasion

➢ One of the most common sport-related eye injuries

➢ Normal signs
  • Pain
  • Tearing
  • Redness
  • Vision could be reduced
Corneal Abrasion

➢ If a minor abrasion - athlete should probably not play until signs subside
  • Consider instilling artificial tears and/or lavage
  • If pain subsides, may be okay to play

➢ May want to refer urgently due to pain, size, concern, etc.

➢ Assess impact on vision

➢ Assess size & depth of abrasion (poss. scaring)

➢ Can cause inflammation
Corneal Foreign Body

➢ A foreign material on the clear part of the eye, on the conjunctiva, or under the lid
➢ Another very common eye injury
➢ Normal signs
  • Pain
  • Tearing
  • Redness
  • Vision could be reduced
Corneal Foreign Body

- Assess vision
- Try not to rub
- Locate foreign body
  - Sometimes the particle will get stuck under the upper lid
  - Assess sodium fluorescein and look for foreign body tracking
If the object is visible
- Lift object gently with tissue or cotton moistened with sterile eye solution
- Consider lavaging with eye wash
- If that removes the particle, then instill artificial tears for comfort
- If particle is embedded, may require advanced removal technique (spud, Alger brush, etc.)

If object is not visible
- Grasp upper lashes, pull lid forward and down
- Allows tears to wash out foreign body
Traumatic Iritis

➢ If one is hit in the eye, this may start an inflammatory cascade inside the eye
  • Analogous to swelling of an ankle after twisting

➢ The problem...
  • Cannot see with naked eye – needs to be assessed with microscope
Traumatic Iritis

➢ Due to the impact on the eye and surrounding tissues, the iris (colored part) is injured
  • It then releases inflammatory bi-products
  • Can become swollen and sticky
    • Leads to a distorted pupil

➢ Athlete may notice:
  • Pain
  • Sensitivity to light
  • Pressure
Anyone who takes a significant hit (blunt trauma), should be assessed for iritis by an eye care provider

Another reason why it is important to refer someone who you suspect may only have a “black eye”
Hyphema

- Blood in the anterior chamber due to iris bleed
- Caused by sig. trauma
- Graded by amount of blood in anterior chamber
- May have other issues
- Athlete should restrict activity to aid recovery
- May need surgery to remove blood

http://www.varga.org/hyphema.jpg
Dislocated lens

- Lens is dislocated from its supporting fibers
- Due to a significant blow to the eye
- Vision will be significantly affected
- May also notice some flashes of light
- Recommend photos
  - Red reflex has changed
- Will probably need surgery
Due to significant trauma - the retina separates from the supporting structures

Athlete will commonly notice:

- Flashes of light that don’t go away
- Black spots in vision
- Distortion or loss of vision

May require immediate surgery
Resources & Equipment

**Agenda:**
- Ocular Emergency Kit
- Triage Card
- Online Resources
Ocular Emergency Kit for the Athletic Trainer

- Bottle sterile eye wash solution
- Bottle contact lens disinfecting solution
- Contact lens cases
- Lubricating/rewetting drops
- Anesthetic
- Sterile cotton swabs
- Fluorescein strips
- Pen light
- Informational sports-related ocular emergency triage card
Triage Card from AOA

Sports-Related Ocular Emergencies: What to Do

This material is informational in nature and does not constitute medical advice. Consultation and referral to a qualified eye care professional must be undertaken in all cases.

**Superficial Injury to Eyelid**
Gently apply direct pressure to stop bleeding. Cleanse wound and apply sterile dressing taped in place or by bandage encircling head.

**Burns**
In the event of a chemical burn, do not attempt to neutralize acids or alkalies. Do not use an eye cup. Do not bandage the eye. When irrigating, make sure the chemical does not wash into the other eye as well. If sterile eye solution is not available, use water.

- **UV Burn** (Most commonly occurs in water/snow sports)
  - Yes: Lift object gently with tissue or cotton moistened with sterile eye solution. If solution not available, use water.
  - No: Irrigate 30 mins. with sterile eye solution, lids forced open. See eye care professional immediately.

- **Is the chemical a strong base (alkali)?**
  - Example: Drain cleaner, LIME (cement, plaster)
  - Yes: Lift object gently with tissue or cotton moistened with sterile eye solution. If solution not available, use water.
  - No: Irrigate at least 15 mins. with sterile eye solution, lids forced open. See eye care professional immediately.

- **Is the chemical a strong acid?**
  - Example: battery acid
  - Yes: Lift object gently with tissue or cotton moistened with sterile eye solution. If solution not available, use water.
  - No: Irrigate at least 15 mins. with sterile eye solution, lids forced open. See eye care professional immediately.

Prevent Injuries Before They Happen

Almost all sports-related eye injuries can be prevented, according to Prevent Blindness America. The American Optometric Association encourages the use of protective eyewear that meet the standards set by the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI).

Athletes should be educated by their team physician or optometrist about proper eye and facial protection and should be encouraged to use protective devices.

Sports-Related Ocular Emergencies: What to Do

**Foreign Object in Eye/Eye Pain**

- **Pull down the lower lid. Is the object visible (and it is not embedded)?**
  - Yes: Lift object gently with tissue or cotton moistened with sterile eye solution. If solution not available, use water.
  - No: Object cannot be seen (no embedded object is visible)
    - Yes: Gently grasp lashes of upper lid and pull lid forward and down. Allow tears to wash out the foreign body.
    - No: Are any of the following true?
      - Can object be seen and does it remain after following the steps above?
      - Could object have penetrated the globe of the eye or surrounding tissue (if so, do not attempt to remove object)?
      - Can blood be seen in the eye?
      - Does it feel as though the object might be trapped behind the upper lid?
      - Is there any problem with vision?

- **Blunt Trauma**
Patient should have a dilated fundus exam performed by an eye care professional within 96 hours of the event as serious internal eye injuries may have occurred.

- **Are any of the following true?**
  - Is lid swollen shut?
  - Is there blood inside the eye?
  - Is cornea (front of the eye) white/hazy?
  - Is pupil irregularly shaped, fixed, dilated, or constricted?
  - Problem with vision (e.g., patient seeing stars, floaters, distortion)?

- **Is there eye pain?**
  - Yes: See Eye Care Professional Now
  - No: Apply cold compress for first 24 hours. If no improvement, see eye care professional within 24-36 hrs. of traumatic event.
Online Resources

➢ American Optometric Association
   • aoa.org/SPV

➢ Coalition to prevent sports eye injuries
   • sportseyeinjuries.com

➢ Joint statement on eye injuries
   • sportseyeinjuries.com/docs/Protective_eyewear.pdf

➢ Bluminator
   • slitlamp.com/ProdutList.htm
How many sports-related eye injuries occur in the U.S.?
What percentage lead to permanent visual impairment?
What are the most effective ways to protect the eye?
What sports should monocular athletes avoid?
What are the most common eye injuries?
Which common eye injuries are doctors of optometry equipped and trained to handle?
Which eye injuries require immediate referral?