“It’s All Fun and Games …”
Ocular Trauma During Childhood Sports

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Goals

• Be able to identify key exam points for ocular trauma
• Be able to recognize signs for an ocular emergency
• Provide even better support for our patients
# Sports-related Injuries

<table>
<thead>
<tr>
<th><strong>100,000+ patients affected by sports-related injuries</strong></th>
</tr>
</thead>
</table>

| **40,000** of these patients account for eye injuries | **13,500** can result in **PERMANENT BLINDNESS** | **90%** of these sports-related injuries can be **PREVENTABLE** |

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# Serious Pediatric Eye Injuries

- **70%** require major surgery
- **30%** require 2 or more surgeries
- **25%** result in monocular blindness
- **25%** result in severe visual impairment in one eye
What Activities Lead to Eye Injuries?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball</td>
<td>26%</td>
</tr>
<tr>
<td>Other</td>
<td>21%</td>
</tr>
<tr>
<td>Fishing</td>
<td>12%</td>
</tr>
<tr>
<td>Darts</td>
<td>11%</td>
</tr>
<tr>
<td>Hunting</td>
<td>9%</td>
</tr>
<tr>
<td>Tennis</td>
<td>8%</td>
</tr>
<tr>
<td>Bicycling</td>
<td>7%</td>
</tr>
<tr>
<td>Football</td>
<td>6%</td>
</tr>
</tbody>
</table>

Most common types are either

- Penetrating injuries
- Blunt injuries
- Radiation injuries

Air rifle, BB gun, Paintball, etc.
Relative Risk to the Eyes by Sport

<table>
<thead>
<tr>
<th>High Risk</th>
<th>Moderate Risk</th>
<th>Low Risk</th>
<th>Eye Safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small, Fast Projectile</td>
<td>Intentional Injury</td>
<td>Tennis</td>
<td>Swimming</td>
</tr>
<tr>
<td>Air rifle</td>
<td>Boxing</td>
<td>Badminton</td>
<td>Diving</td>
</tr>
<tr>
<td>BB gun</td>
<td>Full-contact</td>
<td>Soccer</td>
<td>Skiing (Snow &amp; Water)</td>
</tr>
<tr>
<td>Paintball</td>
<td>Martial Arts</td>
<td>Volleyball</td>
<td>Non-contact Martial Arts</td>
</tr>
<tr>
<td>Hard Projectiles, “Sticks,” Close Contact</td>
<td></td>
<td>Water Polo</td>
<td>Wrestling</td>
</tr>
<tr>
<td>Basketball</td>
<td></td>
<td>Football</td>
<td>Bicycling</td>
</tr>
<tr>
<td>Baseball/Softball</td>
<td></td>
<td>Fishing</td>
<td></td>
</tr>
<tr>
<td>Cricket</td>
<td></td>
<td>Golf</td>
<td></td>
</tr>
<tr>
<td>Lacrosse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hockey (field &amp; ice)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fencing</td>
<td></td>
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Eye Injuries from Trauma

Males are affected 9x more often than females

- Trauma is a leading cause of visual impairment; usually unilateral
- A unilaterally blind child is more likely to become blind in second eye compared to bilaterally sighted child
Pediatric Eye Injuries

90% of BB injuries
67% of fireworks injuries
46% of sports-related injuries
20% of MVA-related injuries

Types of Eye Injuries

**Periocular**

- Lacerations
  - Lid
  - Canalicular
- Orbital soft tissues
- Orbital fractures

**Ocular: Non-penetrating, Mild**

- Subconjunctival Hemorrhage
- Corneal Abrasions
- Traumatic iritis
### Types of Eye Injuries

#### Ocular—non penetrating but vision threatening

- Corneal foreign body
- Hyphema
- Cataract, lens dislocation
- Retinal damage
- Traumatic optic neuropathy
- Retrobulbar Hemorrhage

#### Ocular—penetrating, perforating

- Open globes
- Intraocular foreign bodies

#### Ocular trauma from systemic injury

- Purtscher’s retinopathy
- Valsalva retinopathy
- Terson’s syndrome
Get a Good History of the Child’s Eyes

**Past Eye History**
- Prior surgeries
- Ocular medications
- Ocular diagnoses
- Use of glasses or contact lenses

**Preexisting Visual Impairment**
- Amblyopia (lazy eye)
- Other causes of visual impairment

**Event History**
- Onset of complaint and associated symptoms
- Time, place, activity and circumstances of injury
- Treatment rendered prior to arrival
Perform Eye Exam – Front to Back

- Lids
- Conjunctiva and Sclera
- Cornea
- Anterior Chamber
- Iris
- Lens
- Vitreous
- Retina and Optic Nerve
Key Features of Eye Exam

• Vision (near, one eye at a time)
• External inspection
• Alignment / motility
• Pupil reactions to light
• Penlight or slit lamp exam
• Red reflex test (Bruckner test)

The Eye Exam

Visual Acuity (VA)
• Monocular assessment at near or distance
• Check with glasses
• Nonverbal patients
  – Fixation
  – Occlude either eye

Lids/Adnexa
• Lacrimal system

Orbit
• Symmetry, proptosis, enophthalmos
• Orbital “step-offs”
The Eye Exam

Alignment, Motility
- Cranial nerves III, IV, and VI
- Doll’s head if necessary

Pupil Exam
- Size, shape
- Response to direct and consensual light
- Afferent Pupillary Defect?

Fluorescein Staining

Shows
- Damage to the corneal epithelial cells
- Leaking wound
Other Studies to Consider

• Imaging—CT scan preferred
  – Globe contour, lens position can be assessed
  – For intraocular foreign body (IOFB)

• Ultrasound
  – For globe, orbit

Urgent Need for Eye Consult

Surgical

• Open globes
• Intraocular foreign bodies

Nonsurgical

• Severe chemical burns (but start irrigation at once!)
  – Hyphema, if total (“8-ball”) or painful
Eye Consult Timeline

**Less Urgent**
- Corneal foreign bodies – no penetration
- Hyphema – partial, non-painful
- Anterior segment trauma
- Lens, iris
- Traumatic optic neuropathy
- Retinal trauma
- Most corneal abrasions

**Non Urgent**
- Subconjunctival hemorrhage
- Clean, small corneal abrasions

What to Look for with Eyelid Lacerations

Always evaluate for possible globe injury.
Always, Always, Always
Eyelid Lacerations

- Usually due to dog bites, trauma (i.e. finger poke)
- Determine if full vs. partial thickness
- Determine if involving the lid margin or canaliculus
- Evaluate for other ocular injury
- Broad spectrum antibiotic coverage (If animal or human bite cover with Augmentin or Clindamycin)
- +/- Tetanus Prophylaxis

Canalicular Lacerations
Orbital Fractures

Signs
• Periorbital ecchymosis
• Motility deficits
• Orbital rim “step-offs”

Treatment
• Broad spectrum antibiotics
• Avoid nose blowing
• Outpatient follow up for motility
• Surgery prn

Orbital Fractures

Be careful of a white quiet eye in an orbital fracture!

• Trap-door orbital floor fracture
• Other signs of entrapment
  – Oculocardiac reflex: Patient’s will have nausea and have bradycardia when asked to look up
  – Increased IOP when looking in the restricted gaze.
• Other emergencies: roof fractures
Subconjunctival Hemorrhage = Blood in Conjunctiva

- Overlies the sclera
- 2/2 rupture of conjunctival vessels
- What was mechanism of trauma?
- Often secondary to Valsalva, sneezing, delivery
- Self limited, no Rx

Corneal Abrasions = Corneal Epithelial Defect

- Etiology
  - Direct trauma
  - Contact lens
  - Foreign body
  - Spontaneous
- Photophobia
- Pain
Corneal Abrasions

- **Proparacaine** to anesthetize the corneal epithelium (10 min.)

  NOT for treatment!

- **Fluorescein**: stains the defect

- Rule-out foreign body
  or corneal penetration;
  evert upper and lower lid

- **Treatment**: Antibiotic ophthalmic ointment

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Corneal Abrasions, Lid FB
## Corneal Foreign Bodies

- **History:** trauma, windy day, sudden onset foreign body sensation/pain
- Playground, power or lawn tools
- Rule out open globe, IOFB

### Treatment

- Remove at **slit-lamp**
- May leave residual scar
Traumatic Iritis = Inflammation of the Iris Following Trauma

- Pupil can be sluggish, dilated, irregular
- Photophobia
- Eye injected (ciliary flush, limbal flush)
- Slit lamp exam: cells in the anterior chamber
- R/O other ocular injuries

Hyphema = Blood in Anterior Chamber

- Due to rupture of iris vessels
- Evaluate for other eye injuries
- Risks: re-bleed, glaucoma
Hyphema – Treatment

- Ophthalmology consult
- Thorough eye exam
- Sickle prep - prn
- Topical prednisolone 1%
- Topical atropine 1%
- Shield, rest, head of bed up x 5d
- +/- Admission

Posterior Segment Trauma

- Choroidal rupture
- Commotio retinae
- Retinitis sclopeteria
Open Globe – Initial Rx

STAY CALM

• Place shield over eye
• Elevate head
• Avoid Valsava, pressure on globe, bending, lifting
• Check tetanus status
• Broad spectrum systemic antibiotics
• Imaging, R/O FB

NO TOPICAL MEDS

Open Globes

• Eye-shield placement:
  If you don’t have one – use a styrofoam cup
• DO NOT use gauze
Take Home Points

- Eye protection for childhood sports is important
- A pre-participation sports physical can be helpful in identifying patients who may be at increased risk
- Glasses and sunglasses are not enough protection. Safety Sports eyewear that conforms to the American Society for Testing and Materials Standard for selected sports is recommended

Resource: Vision Council’s Eye Safety At-a-Glance

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<th>Protection Needed</th>
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<tr>
<td>BADMINTON</td>
<td>Sports goggles</td>
<td>LACROSSE (MALE)</td>
<td>Helmet and full face protection</td>
</tr>
<tr>
<td>BASEBALL</td>
<td>Batting: Face guard attached to helmet</td>
<td>LACROSSE (FEMALE)</td>
<td>Minimum: Sports goggles</td>
</tr>
<tr>
<td>BASKETBALL</td>
<td>Fielding: Sports goggles</td>
<td>Max: Helmet and full face protection</td>
<td></td>
</tr>
<tr>
<td>CYCLING</td>
<td>Sports goggles</td>
<td>RACQUETBALL</td>
<td>Sports goggles</td>
</tr>
<tr>
<td>FENCING</td>
<td>Cycling eyewear</td>
<td>SOCCER</td>
<td>Sports goggles</td>
</tr>
<tr>
<td>FIELD HOCKEY</td>
<td>Full face cage</td>
<td>SQUASH</td>
<td>Sports goggles</td>
</tr>
<tr>
<td>HANDBALL</td>
<td>Face shield attached to helmet</td>
<td>SWIMMING</td>
<td>Swim goggles recommended</td>
</tr>
<tr>
<td>ICE HOCKEY</td>
<td>Sports goggles</td>
<td>TENNIS (DOUBLES)</td>
<td>Sports goggles</td>
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<tr>
<td></td>
<td>Helmet with full face protection</td>
<td>TENNIS (SINGLES)</td>
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