Eye Trauma: Incidence

- 1.3 million eye injuries per year in the United States.
- 40,000 of these injuries result in visual loss.
The History: Vision

- Are one or both eyes affected?
- Vision at time of examination?
- Vision prior to trauma?

The History: Symptoms

- Symptoms besides decreased vision?
- Duration of symptoms?
- Any surgery prior to trauma?

Complete Eye Examination

- Vision
- External Exam
- Pupils
- Motility Exam
- Anterior Segment (globe)
- Ophthalmoscopy
- Intra-ocular pressure (IOP)
- Visual Fields
Key Elements of All Exams

- Vision
- Pupils
- Look at the Eye

Chemical Burns

- A true ocular emergency
- Alkali burns more serious than acid

- **Common Alkali-based chemicals**
  - Lime (cement, plaster, whitewash)
  - Drain cleaners
  - Lye
  - Metal polishes
  - Ammonia
  - Oven cleaners

- **Common Acid-based chemicals**
  - Swimming pool acid (muriatic acid)
  - Battery (sulfuric) acid

Chemical Burns (Alkali)
Chemical Burns: Irrigation

- Irrigation should begin before and during transportation of the patient to the hospital.
- Immediate copious irrigation essential!
- One liter acid, two liters base
- Saline or water

Chemical Burns: Initial ED Management

- Topical anesthesia
  - Proparicane
  - Tetracaine
- Copious irrigation
  - Sterile saline or water
- Check for foreign bodies
Chemical Burns: ED Treatment After Irrigation

- Topical Cycloplegic
  - Homatropine
  - Cyclopentolate
- Topical Antibiotic
  - Double check for allergies!
  - Sulfacetamide topical ointment
  - Bacitracin topical ointment
- Patch affected eye
- Prompt referral to an Ophthalmologist

Ruptured Globe

- ALL EYES ARE RUPTURED UNTIL PROVEN OTHERWISE
- A blunt object impacts the orbit, causing globe compression.
  - This raises intraocular pressure resulting in sclera tears.
- Ruptures usually occur where the sclera is thinnest.
  - Insertions of the extraocular muscles.
  - Limbus.
  - Around the optic nerve.

Ruptured Globe

- Sharp or high velocity objects may penetrate directly.
- Small foreign bodies may penetrate and remain within the globe.
  - Consider rupture during all evaluations for:
    - Blunt and penetrating orbital trauma
    - Cases involving high-speed projectiles.
LOOK FOR: Peaked pupil, hyphema, subconjunctival hemorrhage, loss of red reflex, APD

Protective Eye Patching Techniques

Hyphema

• Post-injury accumulation of blood in the anterior chamber.
• Even a small hyphema can be a sign of major intraocular trauma with associated damage to vascular and other intraocular tissues.
• Secondary to rapid, marked elevation in IOP with sudden distortion of intraocular structures.
• Complications include:
  – Secondary hemorrhage
  – Secondary onset of glaucoma
  – Loss of vision
Hyphema

- Rule out rupture-full exam
- Use atropine
- Consider AMICAR
  - To prevent rebleed
- Watch for glaucoma
- NO ASPIRIN
  - Or MOTRIN

Orbital Trauma: Isolated Blow Out Fracture

- Orbital floor fractures can occur as isolated injuries or in combination with other significant facial bone injuries.
Blow Out Fracture

CT images of Orbital Floor Fractures

Inferior Rectus Muscle Entrapment on Left
Eye Lid Lacerations

Maintain high index of suspicion for occult globe injury.

Rule out rupture

Site: canaliculus, lid margin, elsewhere

Marginal Lid Laceration

Watch for canaliculus

Eye Lid Laceration
Eye Lid Laceration

First, rule out ruptured globe

Superficial Lid Laceration

- Insure tetanus prophylaxis
- Watch for ruptured globe
- Remove superficial foreign bodies
- Consider risk/presence of intra-ocular foreign bodies

Corneal Abrasions

- the most common eye injury
- Occurs due to disruption in the integrity of the corneal epithelium.
- Corneal surface scraped away as a result of external forces.
- Can be small or large
- Usually heal without serious complication.
- Deep corneal involvement may result in scar formation.
- Abrasions are common and frequently missed.
Corenal Abrasion Symptoms

- Foreign Body Sensation
- Pain
- Tearing
- Photophobia

Fluroscien Staining
Corneal Abrasion: Treatment

• Topical Cycloplegic
• Topical Antibiotic
• Pressure patch affected eye
  • Warn patients about loss of depth perception.
  • Patients should not drive while patched.
Conjunctivitis

• The most common cause of a non-traumatic “red eye”
• Inflammation of the surface membrane overlying the anterior sclera (bulbar conjunctiva) and tarsal surface of the eyelids (palpebral conjunctiva)
• Signs:
  – Vascular Dilation
  – Exudate: Lids crusted together
    • Discharge may cause the eyelids to mat together
    • Morning discharge suggests bacterial infection.
  – Chemosis (conjunctival edema)
  – Eyelid Edema
  – Eye Discomfort

Conjunctivitis

• Bacterial
• Viral
• Allergic

Bacterial Conjunctivitis

Copious, mucopurulent discharge
**Viral Conjunctivitis**

- Watery discharge, pre-auricular adenopathy, follicles

**Allergic Conjunctivitis**

- Itching and tearing

**Acute Glaucoma: History**

- May present with sudden onset of blurred vision and eye pain.
- Nausea and vomiting often present
- Patient may see halos around lights secondary to corneal edema.
- Pain described as “Dull ache in or around one eye”
- Pain is typically deep and boring.
- Systemic symptoms may mimic:
  - Cardiovascular or intraabdominal disease
  - May be misdiagnosed as migraine headache
- Rest may relieve symptoms.
Acute Glaucoma: Physical Findings

- Decreased visual acuity.
- Conjunctival injection present, most prominent at the limbus.
- Cornea appears hazy from edema.
- Ischemia to the iris produces a fixed midposition pupil.
- IOP over 40 mmHg

Acute Glaucoma: Treatment

- Immediate treatment is necessary to prevent ocular damage
- Risk of vascular occlusion
- Strategies to lower IOP:
  - Block aqueous production
  - Reduce vitreous volume
  - Facilitate aqueous outflow
Pre-Septal Cellulitis

- Symptoms
  - Pain
  - Decreased vision
  - Impaired Ocular Motility
  - Proptosis

Pre-Septal/Orbital Cellulitis: Management

- X-rays/CT scan if history of trauma or sinus disease
  - Warm compresses
  - Systemic Antibiotics
- Requires immediate specialty consultation
  - May require surgical intervention
Contact Lens Injury

• Prolonged wear of hard contact lenses may produce a corneal abrasion.
• Treat as any other corneal abrasion/injury.

Removal of Hard Contact Lens

Ocular Emergencies and Trauma

• Future lectures:
• Sudden Loss of Vision
• Red Eye
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