

Ocular Emergencies and Trauma

Stuart Fourman, MD
Director, Glaucoma Center
Department of Ophthalmology
Stony Brook University

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

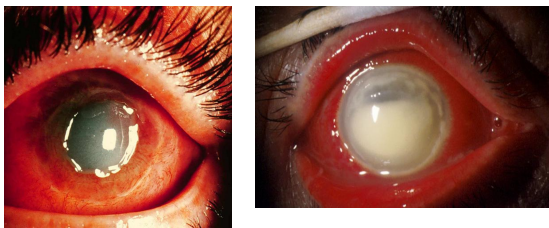
Key Elements of All Exams

- 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

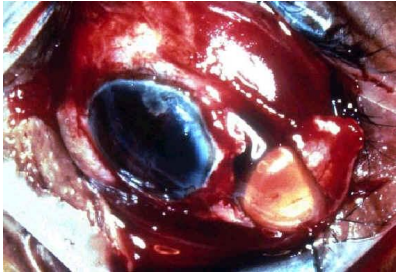
Ruptured Globe

- 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.

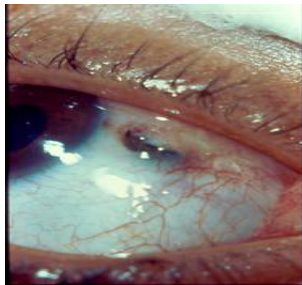
Ruptured Globe

- 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.

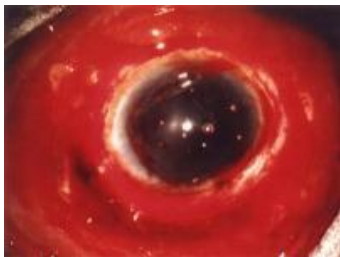
Globe Rupture



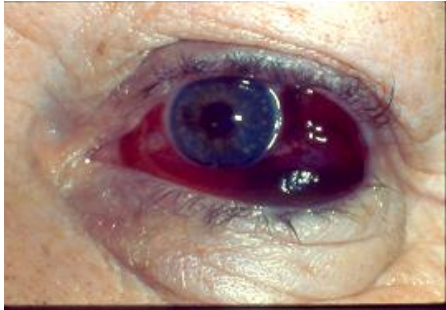
Globe Injury: Scleral Defect



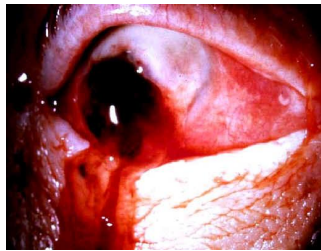
Globe Rupture



Globe Rupture



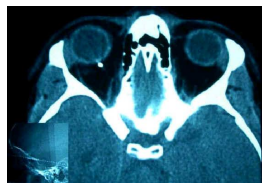
Globe Rupture



Penetrating Globe Injury



Knife Wound



Penetrating Projectile



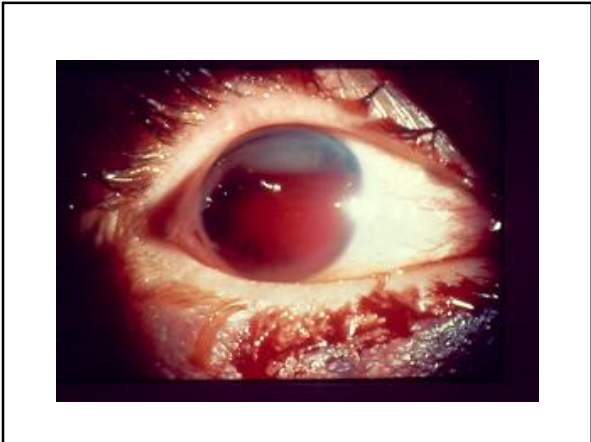
LOOK FOR: Peaked pupil, hyphema, subconjunctival hemorrhage, loss of red reflex, APD

Protective Eye Patching Techniques



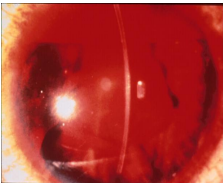
Hyphema

- 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

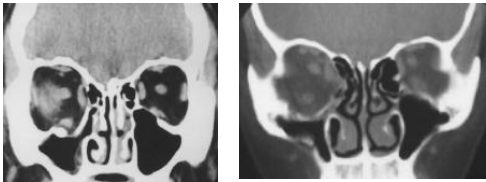
- Orbital floor fractures can occur as isolated injuries or in combination with other significant facial bone injuries.



Blow Out Fracture

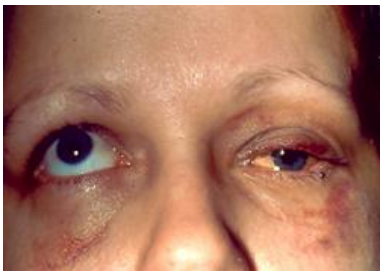


Blow Out Fracture



CT images of Orbital Floor Fractures

Blow Out Fracture



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



Eye Lid Laceration



Watch for canaliculus

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

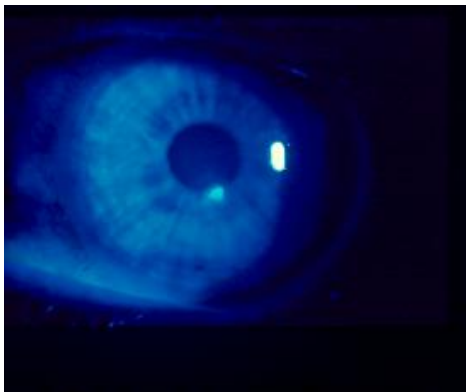
- the most common eye injury
- Occurs due to disruption in the integrity of the corneal epithelium.
- Corneal surface scraped away as a result of external forces.
- Can be small or large
- Usually heal without serious complication.
- Deep corneal involvement may result in scar formation.
- Abrasions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

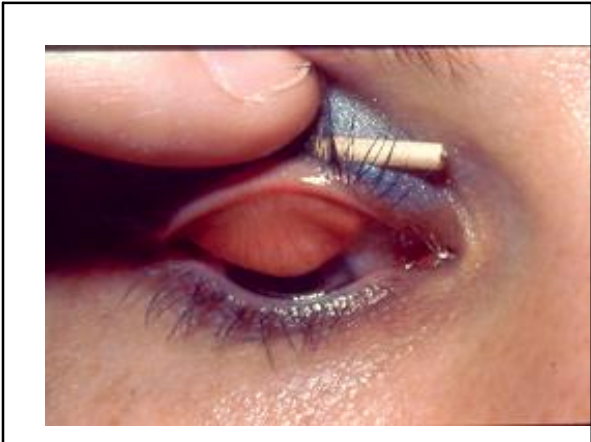
Corneal Abrasion Symptoms

- Foreign Body Sensation
- Pain
- Tearing
- Photophobia

Fluorescein 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

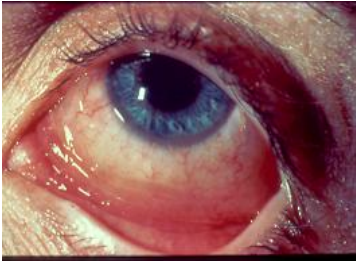
- Bacterial
- Viral
- Allergic

Bacterial Conjunctivitis



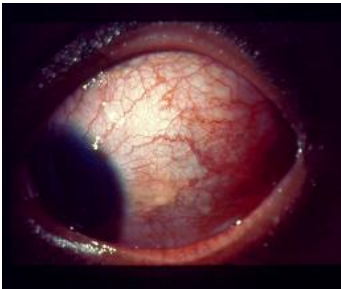
Copious, mucopurulent discharge

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

Ocular Emergencies and Trauma

- Burns
- Ruptured Globe
- Hyphema
- Blow-out Fracture
- Eye laceration
- Corneal Abrasion
- Acute Conjunctivitis
- Acute Glaucoma
- Preseptal/orbital cellulitis
- Contact Lens Overwear
