Orbital and Ocular Trauma

“Ouch ….. That’s Gotta Hurt”

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• Differentiate “Emergency” vs. “Urgency”
• Proper Triage necessary
• Understand the “10 A Club”

PapillaedemA  Central Retinal Artery Occlusion
Giant Cell Arteritis  PerforAted Globe
Aneurysm  Acute Angle Closure Glaucoma
Pituitary Apoplexy  Acid / Alkaline Chemical Burn
Carotid Artery Dissection  HyphemA

Epidemiology of Trauma

• There are approximately 2.5 million ocular and orbital injuries in the US per year
• Greater probability for young males to be affected.

Pathophysiology

• There are four main mechanisms that cause ocular trauma: coup, contrecoup, equatorial expansion, and global repositioning
• Compression, Decompression, Overshoot, Oscillation

Classification

• Closed Globe (Burn, Contusion, Laceration)
• Open Globe (Rupture, Laceration – penetrating, perforated) Signs of open globe include: penetrating lid injury, bullous subconjunctival hemorrhage, shallow anterior chamber (AC), blood in the AC (hyphema), peaked pupil, iris disinsertion (iridodialysis),
lens dislocation, and vitreous hemorrhage. If globe is obviously open, do not check pressure, motility or dilate the traumatized eye.

**Conditions**

**Refractive:**

- **Traumatic myopia** – Transient myopia (~ 1 to 10 Diopters) Ciliary body edema causes relaxation of the lens zonules. Ciliochoroidal effusion can cause an anterior shift of the lens–iris diaphragm, which also causes the eye to acquire more plus optical power. Tends to resolve.

**Adnexa:**

- **Ecchymosis** – Cold x 3 days followed by Hot x 11 days
- **Eyelid lacerations** (Superficial vs. Deep)

**Anterior Segment:**

- **Corneal abrasions / laceration**
- **Chemical burns** - irrigation as needed until pH is 7.0-7.5 For chemical burns, injury grade is based on exam before irrigation has begun
- **Subconjunctival hemorrhage** – does not usually require treatment. Discontinue Aspirin or NSAID. Will resolve in 1-2 weeks
- **Conjunctival abrasions / laceration** – Antibiotic ung / Pressure Patch – if laceration larger than 1.5 mm consider suturing
- **Hyphema**
- **Traumatic iritis**
- **Angle Recession** - Traumatic glaucoma is the result of trabecular meshwork injury from the original trauma and the rapid scarring that results. In medically uncontrolled post-traumatic angle recession glaucoma, trabeculectomy with antimetabolite therapy is the most effective surgical procedure. However, late bleb infection is a significant risk.
- **Iridodialysis**
- **Vossius' ring**
- **Traumatic cataract**
- **Lens subluxation**
- **Lens dislocation**
- **Intraocular foreign body**

**Vitreo-Retinal:**

- **Pre-retinal hemorrhage** – PVD / Retinal Tear / RD
• **Posterior vitreous detachment**

• **Choroidal rupture**
  - Crescent-shaped lesion of the posterior pole
  - Concentric with the disc margin
  - Located opposite the site of impact (contrecoup injury)
  - Tears of the choroid, Bruch’s membrane, and RPE
  - Subretinal heme is often present initially
  - VA may be affected if rupture or hemorrhage involves the fovea
  - Choroidal neovascularization (CNVM) may occur at any time

• **Traumatic Macular Hole**
  - VA correlates with hole size: 20/25-20/200
  - Positive Watzke-Allen sign
  - 25%-30% bilateral
  - PVD protective
  - PPV with or w/out adjuvant agents
  - Goal: reduce tension and reattach neurosensory detachment

• **Traumatic retinal detachment**
  - Traumatic RD usually occurs in males during the third decade of life
  - Non-traumatic RDs occur during the sixth & seventh decade of life
  - 10-20% of adult patients with a rhegmatogenous RD report a history of blunt ocular trauma
  - The majority of RD in children result from ocular trauma
  - All patients with a history of ocular trauma should undergo BIO (binocular indirect ophthalmoscopy) with scleral depression

  • **Retinal Tears / Giant Retinal Tears > 90 degrees**
  • **Traumatic Retinal Dialysis** – tear @ ora serrata – slow progression to RD

• **Commotio Retinae**
  - Blunt trauma injury: “shock waves” to retina
  - Central: Berlin’s edema
  - Retina may appear normal for hours after trauma
  - Variable reduction of vision
  - Confluent white to opaque area of retina
  - R/O choroidal rupture & RPE damage

**Optic Nerve:**

• **Traumatic optic neuropathy**
  - Not well understood
Shearing, contrecoup-type injury
- Direct “shock-wave” trauma to nerve fibers
- Intrasheath hemorrhage
- Vision loss
- Hemorrhage w/in nerve sheath: CT/B-scan
- APD
- May resolve spontaneously
- IV methylprednisolone: 250mg q 6h x 12 doses
- Surgery: decompression of Optic Nerve or Optic Canal
- Oral antibiotics

Prognosis: usually irreversible vision loss

- **Optic nerve avulsion**

**Orbit:**

- **Intraorbital foreign body**
- **Globe rupture**
- **Retrobulbar hemorrhage**
- **Arteriovenous fistulas (High Flow vs. Low Flow)** - Traumatic injuries to the head and neck that result in arteriovenous fistulae. Clinical signs and symptoms that characterized a hazardous carotid cavernous fistula included increased intracranial pressure, rapidly progressive proptosis, diminished visual acuity, hemorrhage, and transient ischemic attacks.
- **Orbital fractures**
  - A medial wall or ethmoidal fracture
  - Blow-out fracture
  - Trapdoor fracture
  - Tripod fracture
  - Orbital roof fracture
  - Apex or optic canal fracture

**Other:**

- **Purtscher’s retinopathy**
  - Traumatic thoracic compression
  - Similar to Valsalva
  - Increased A/V pressure secondary to intracranial heme & / or centrifugal forces
  - Hemorrhagic retinopathy similar to Valsalva
  - Increased exudation
  - “Fluffy cloud” edema
- Valsalva

- Straining-type injury
- Increased intra-abdominal pressure: sudden increase
- Subarachnoid & subdural hemorrhage: sudden bleed
- Variable visual acuity
- Variable Headache
- Subconjunctival hemorrhage
- Skin petechia in head & neck region
- Traumatic asphyxia
- Variable retinal edema
- Variable exudation
- Valsalva Hemorrhagic Retinopathy
- Retinal & pre-retinal hemorrhage, if extensive may lead to fibrosis, scarring, & Traction RD
- Occasional “break through” vitreous hemorrhage

- Child Abuse – Shaken baby syndrome
- Terson's Syndrome – 3rd Nerve palsy, subarachnoid heme, blood in retina / vitreous

- Carotid Artery Dissection - patients with seemingly minor trauma can develop dissection of the internal carotid artery. Sports injuries (including direct impact of high-velocity ball or other direct impact to the neck), overhead painting, coughing, or sneezing. Unilateral oculosympathetic palsy, or a partial Horner syndrome, may develop, and these patients will experience miosis, visual disturbance, and mild ptosis that may not be detected clinically.

Systemic Medications:

Oral Antibiotics:
Four main Classes:
- Penicillins – Dicloxacillin, Augmentin (Amoxicillin)
- Cephalosporins - Keflex
- Macrolides – Erythromycin, Clarithromycin, Azithromycin
- Fluoroquinolones – Ciprofloxacin, Levofloxacin, Ofloxacin

Oral Analgesics:
There are three main categories of analgesics:
- Over the Counter – Aspirin, Ibuprofen
  (Ibuprofen at 400 mg QID = to Tylenol 3)
- Non-narcotic prescription – Celebrex, Vioxx, Bextra
- Narcotic prescription

Narcotic Prescription
- Opioid analgesic
- Are chemical compounds that have morphine-like actions
• “Narcotic” – refers to chemical agents that induce sleep or stupor
• Drug of first choice for dense, acute pain
• Must have a DEA# to prescribe
  • Unlike the NSAID’s the opioids do not have a “ceiling” effect
  • May use with severe chemical trauma, scleritis, blunt trauma

Mild to Moderate Pain
• **Tylenol 3**
  Tylenol (300 mg) + Codeine

Moderate to Severe Pain
• **Lortab**
  Tylenol (500 mg) + Hydrocodone
• **Vicodin**
  Tylenol (500 mg) + Hydrocodone

Severe Pain
• **Percocet**
  Tylenol + Oxycodone
  • One to two tablets PO every 4-6 hours as needed for pain
  • Prescribe all of these analgesics for no more than three days !!!!!

**Ultram** – Tramadol HCL (Non-Narcotic)
• Equal in effectiveness as Tylenol 3
• Weak opioid receptor binding
• Can be taken without regards to meals
• Minimal side effects (constipation, dizziness and nausea)
• One 50 mg tablet QID or PRN – not to exceed 400 mg / day