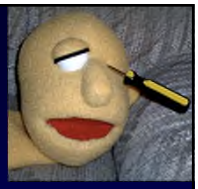


Pediatric Eye Trauma

Katharine C Long, MD

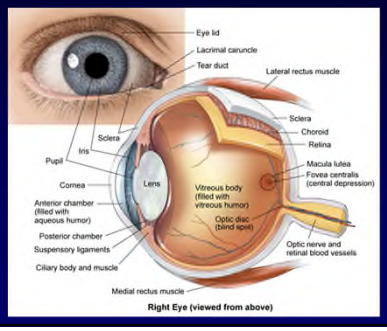
Goals & Objectives

- Review common pediatric eye injuries
- Discuss initial management/treatment
- Gain comfort with pediatric eye trauma

Overview

- 2 million annual ED visits eye complaints
- 50% related to eye trauma
- 3% require admission
- Minority require ophthalmology consult

Anatomy



History

- Patient's prior visual status
  - Acuity, surgeries, glasses/contacts
- Exact mechanism of injury
  - With what, how hard, indoors/outdoors

Physical Examination

- Anatomy & Function
- Visual acuity (ex Snelling Chart)
- Ophthalmoscope (fundus)
- Fluorescein
- Slit lamp (anterior chamber)
- Intraocular Pressure*

Differential Diagnosis

- Scleral hemorrhage
- Hyphema
- Traumatic Iritis
- Foreign body
- Orbitalfracture
- Corneal abrasion
- Retrobulbar hemorrhage
- Corneal infiltrate
- Open globe
- Vitreous hemorrhage

Immediate Interventions

- Concern for open globe?
  - Elevate HOP, Eye shield & NPO
  - Antibiobics, Antiemetics, Pain control
  - Ophthalmology consult
- Agitated or uncooperative patient?
  - Weigh interventions
  - Consider examination under conscious sedation vs operating room

When to Call Ophthalmology

- Suspicion for open globe
- Suspicion for intraorbital penetration
- Traumatic hyphema
- Conjunctival laceration > 1 cm
- Embedded foreign body

When to CT

- Orbital CT w/o contrast 1-2 mm axial cuts
- Indications
  - Concern for globe rupture
  - Concern for intraocular FB
  - Concern for orbital fracture
  - * Trauma pt undergoing CT

Cases

Case # 1

5 yo was playing outside with older brother

- Hit in right eye with bat
- Not reporting any current pain
- Mom noticed eye very red so brought to ED

Scleral Hemorrhage

- History
  - +/- blunt trauma, incr venous pressure
  - Painless
- Physical Exam
  - focal, flat red region
  - *Abrasions, foreign body, lacerations

Treatment & Outcome

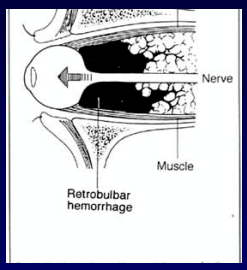
- NO eye patch needed
- Ophthalmology c/s
  - If traumatic mechanism esp w/ bullous elevation conjunctiva
  - Evaluate for retinal trauma & open globe
- Self limited 2-3 weeks

Complications

- 360 or Circumferential Scleral Hemorrhage
  - Can mask scleral laceration →treat like open globe
- Vitreous hemorrhage,
  - Risk of retinal detachment

Retrobulbar Hemorrhage

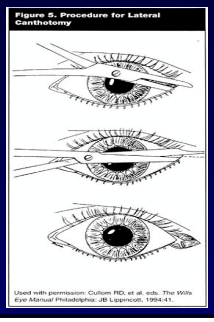
- Hemorrhage posterior arterial supply
- Develops within 24 hours s/p trauma
- Compression central retinal artery & optic nerve



Retrobulbar Hemorrhage

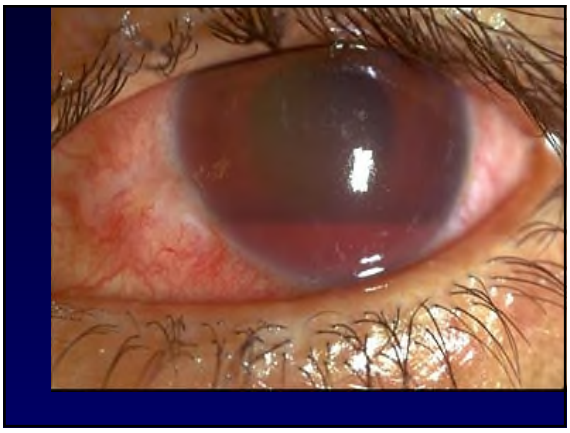
- Unable to detect light
- EOM reduced
- Tonometry OP 45

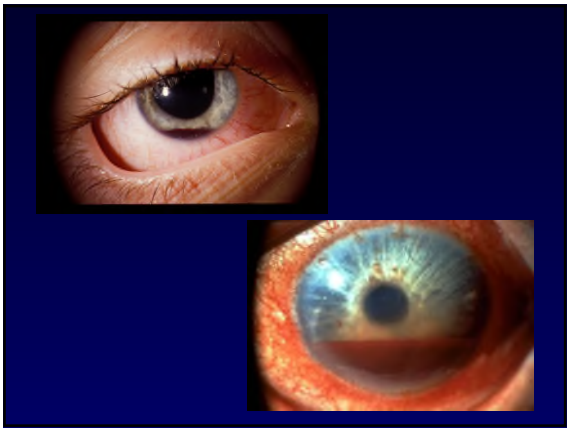
Lateral Canthotomy



Case # 2

13 yo male hit in eye with baseball
•Now c/o eye pain and nausea
•Decreased visual acuity out of eye
•EOM intact





Hyphema

- History
  - Blunt trauma, Vision loss, Pain, N/V
- Physical
  - Photophobia, Anisocoria, Elevated IOP
  - Grade I < 1/3 Grade II 1/3-1/2
  - Grade III > ½ Grade IV entire chamber
- ~ 70 % case in children ages 10-20 yo

Treatment

- Elevate head of bed 30 degrees
- Plastic eye patch
- Pain control & Anti-emetic
- Bed rest / Keep calm
- Ophthalmology consult
- Admission
  - Hb SS, > Grade I, Decreasing VA

Complications

- Often with more significant injury
  - Retinal tears/detachment, Corneal laceration
- Risk of re-bleed
  - 3-5 days later in 30% of patients
- Post-traumatic glaucoma

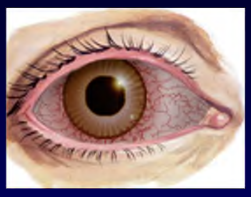
Outcomes

- Grade I resolve in 4-5 days
- Vision loss associated with
  - Large hyphemas: Grade III or IV
- Poor outcome: HbSS or Bleeding tendency
  - Increased risk re-bleed
  - Lower tolerance for incrased IOP

Case # 3

15 yo hit himself in eye with a tennis racket

- Eye appears red to family
- Tearing and light sensitivity
- Visual acuity intact



Traumatic Iritis

- History
  - Inflammation 24-72 hrs after trauma
  - Light sensitivity, tearing, injection
- Physical exam
  - Ciliary flush
  - Photophobia, Visual Acuity, IOP, cornea
  - *Associated hyphema

Treatment

- Ophthalmology consult
- Dilating drops: Cyclogyl 1 % TID
- Topical steroids
- Sunglasses

Complications

- Cataracts
- Scar tissue / irregular pupil
- Vision loss
  - Glaucoma
  - Band keratopathy (calcium deposition)
  - Cystoid macular edema (retinal cyst)

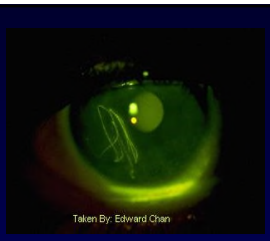
Outcome

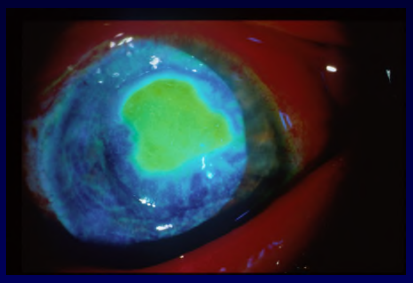
- Generally self limited if treated properly
- Traumatic iritis heals in 1-2 weeks

Case # 4

6 yo poked self in the eye w/ hairbrush

- Complaining of foreign body sensation
- + Tearing
- Family flushed out eye but not improved





Corneal Abrasion

- History
  - Pain, light sensitivty, FB sensation, contacts
- Physical exam
  - Visual acuity, Flip eyelids
  - Fluorescein staining

Treatment

- Topical Antibiotics
- Patch vs No Patch
  - No difference in outcome
  - Can be harmful with contact wearers
- Ophthalmology c/s
  - > 2 mm, Penetrates anterior chamber, Worsening pain/abrasion, Corneal infiltrate

Complications

- Infectious keratitis
  - Abrasion from contaminated tool
  - Contact wearers
- Contact wearers
  - At risk pseudomonas keratitis
  - Do NOT patch

Corneal Infiltrate

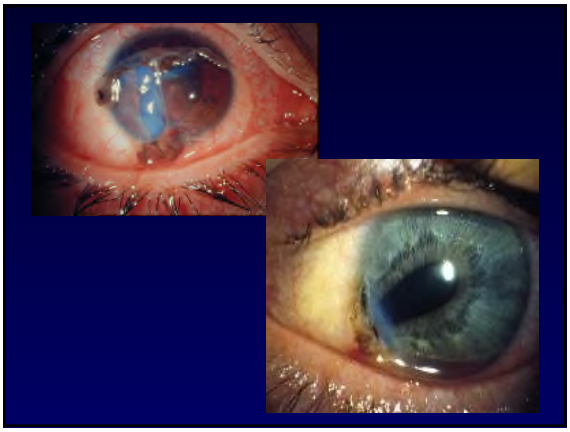
Outcome

- Typically heals within 2-3 days
  - < ¼ surface area w/in 24 hrs
- Follow up with Ophtho if not improved
- All contact wearers f/up 1-3 days

Case # 5

12 yo female hit in left eye with tree branch

- Immediate pain
- No visual acuity or color recognition
- EOM intact
- Pupil not responsive to light



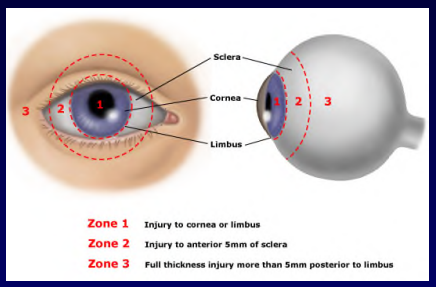
Penetrating Trauma

- History
  - Mechanism injury
  - Decreased VA, Pain
- Physical Exam
  - STOP examination if suspect

Physical Exam

- Markedly decrease visual acuity
- Relative afferent pupillary defect
- Eccentric or teardrop pupil
- Increased anterior chamber depth
- Extrusion vitreous
- Prolapse of the uvea
- Tenting of cornea or sclera

Zone of Injury



Treatment

- STOP examination & Make NPO
- Place plastic eye shield
- Antiemetics & Pain control
- * Tetanus & Antibiotics
- Keep patient CALM !
- Ophthalmology consult

Complications

- Bacterial Endophthalmitis
- Visual impairment/loss

Outcome

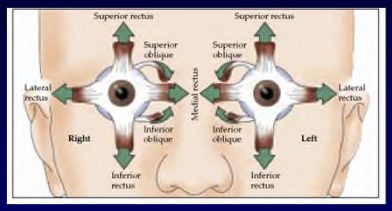
- Closure within 24 hours is ideal
- Worse outcome associated with:
  - No light perception initially
  - Blunt mechanism
  - Zone 3 wound
  - Metallic FB
  - Associated trauma

Case # 6

12 yo playing touch football at the park

- Collides with other player
- Direct elbow to the eye
- Now complaining of diplopia, decreased sensation below eye and pain

Innervation of Eye



Orbital Fracture

- History
  - Location pain, visual changes
  - Difficulty eye movements, sensation changes
- Physical exam
  - ecchymosis, diplopia, decreased sensation, orbital emphysema, step-offs

Fracture Types

- Orbital zygomatic
  - High impact lateral blow
  - Most common fx orbital rim
- Nasoethmoid
  - Also common
  - Involvement lacrimal duct system
  - Entrapment medial rectus muscle

Fracture Types

- Orbital floor aka Blowout fracture
  - Impact by small round object
  - Children increased risk entrapment IR nerve
- Orbital roof
  - Patients < 10 yo cranium : midface ratio
  - High association intracranial injury

Treatment

- Id & Treat life-threatening emergencies
- Computed Tomography of orbits
  - Sensitivity Xray orbits poor
- Fracture orbital floor = antibiotics
- Cold packs and elevate HOB at home
- Avoid sniffing and blowing nose

Ophthalmology Consult

- Emergent - Now
  - Globe injury
  - Severe vagal symptoms & nerve entrapment
- Urgent – 24 hrs
  - Muscle entrapment
  - Nasoethmoid with lacrimal envolvement
- All orbital fractures follow up within 1 wk

Complications

- Muscle entrapment
  - Ischemia, fibrosis, restriction eye movement
- Nerve entrapment
- Vision loss
  - Retinal detachment
  - Vascular compromise from hematoma

Outcome

- Fewer complications if OR early
- Even mild to moderate can cause vision loss
- Can have residual diplopia, restricted eye movements and parathesias

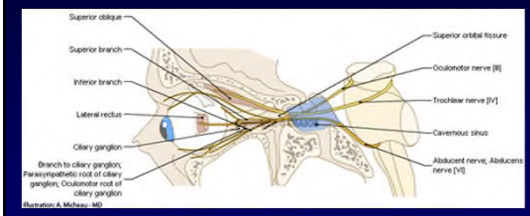
Case # 7

9 yo fell off bike not wearing a helmet
-Landed on rocky terrain
-Complaining of headache
-Large ecchymosis noted behind ear

Traumatic VI Nerve Palsy

- Rare to find isolated VI nerve palsy
- Basilar skull fracture
  - 23% associated with CN impairment
  - 50% resolve completely
- * Non-traumatic think neoplasm
- PE: binocular horizontal diplopia, esotropia

Abducens Nerve Pathway



Treatment

- Observation for several months
- Alternate patching
  - Relieves diplopia symptoms
  - Utilize care in patients < 9 years old
- Options
  - Stabismus surgery
  - Botulinum toxin injection

Outcomes

- Degree esotropia and abduction deficit makers of severity paresis or palsy
- Spontaneous resolution traumatic IV palsy
  - More common with unilateral
  - Less common with bilateral

Questions?