

No financial disclosures

Managing Anterior Segment Trauma

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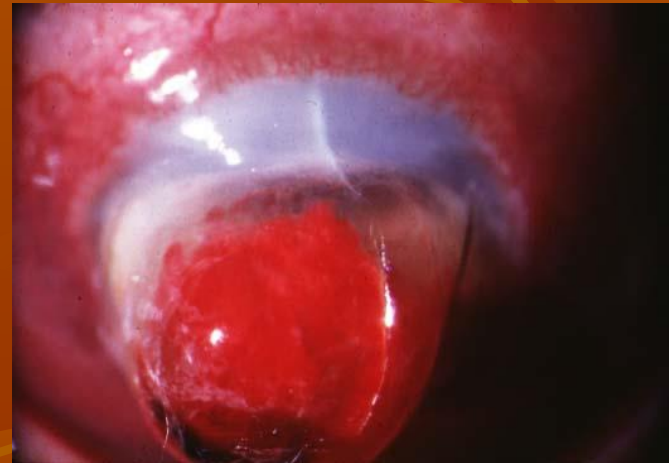
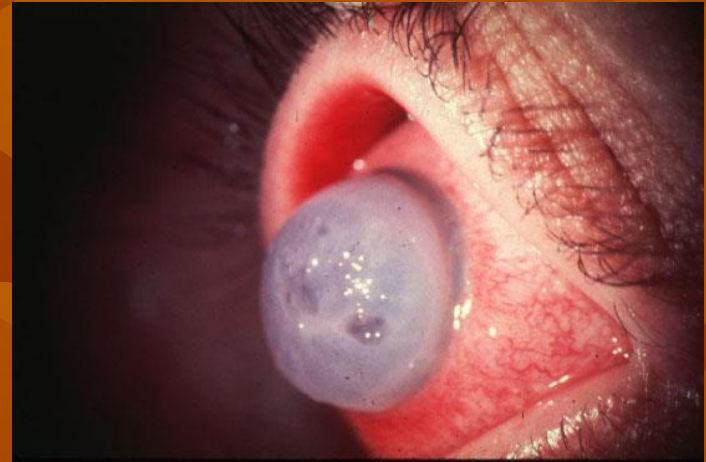
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Prevalence (all trauma)

- 800,000 work place ocular injuries per year (over 2000 per day)
- 80% men
- 90% preventable with safety eyewear



Sources of work place trauma

- Top 5.....
- 1) scrap, waste , debris: 34%
- 2) chemicals: 18%
- 3) person, plants, animals: 9%
- 4) parts: 6%
- 5) welding torches: 6%

Non-workplace trauma

- 3000 ocular fireworks injures per year- mandatory reporting in some states (IN!)
- Over 42,000 sports and recreational injuries per year
- Over 70% preventable with protection
- 70% younger than 25
- Don't forget domestic abuse

Emergencies (minutes matter!)

- Chemical burn



Urgencies

- Corneal / conjunctival abrasions
- Foreign bodies
- Hyphema / angle recession
- Lacerations of cornea , conjunctiva , sclera , and lids
- Ruptured globe
- Orbital rim and blowout fractures

Other anterior segment trauma

- Subconjunctival hemes
- Ecchymosis
- Traumatic iritis
- Traumatic cataract

Trauma history

- What, when and where?
- Any self treatment?
- Any changes since the event?
- Any medical allergies?
- When was last tetanus shot?

Chemical burns

- Begin treatment immediately!
- Flush on site and on the way to the doctor with saline or water. ER may be best option then follow-up eye care
- Begin Tx in office before taking VA's or performing detailed examination. Rinse with saline in short intervals until Ph is neutral as measured with litmus paper 5-10 minutes after flush
- Get history of chemical involved (MSDS)

Chemical burns

- Acids do damage immediately while bases (lime, lye, ammonia) continue to cause escalating harm , especially if not removed promptly and completely
- Varying degrees of corneal and conjunctival epithelial loss from mild PEK to complete loss
- With total loss of corneal epithelium staining is NOT prominent

Common bases (alkali)

- Ammonia
- Fertilizers with ammonia
- Drain cleaners (contain lye)
- Cement, plaster, mortar (lime)
- Potash
- Fireworks
- Airbag rupture

Common acids

- Battery acid
- Bleach
- Glass polish
- Vinegar
- Chromic acid
- Nitric acid
- Hydrochloric acid

Chemical burns

- Conjunctival injection and chemosis
- Necrotic tissue
- Burns to eyelid skin
- Mild to severe anterior chamber reaction
- Often elevated IOP
- Perilimbal blanching indicates severe ischemia and is a bad sign

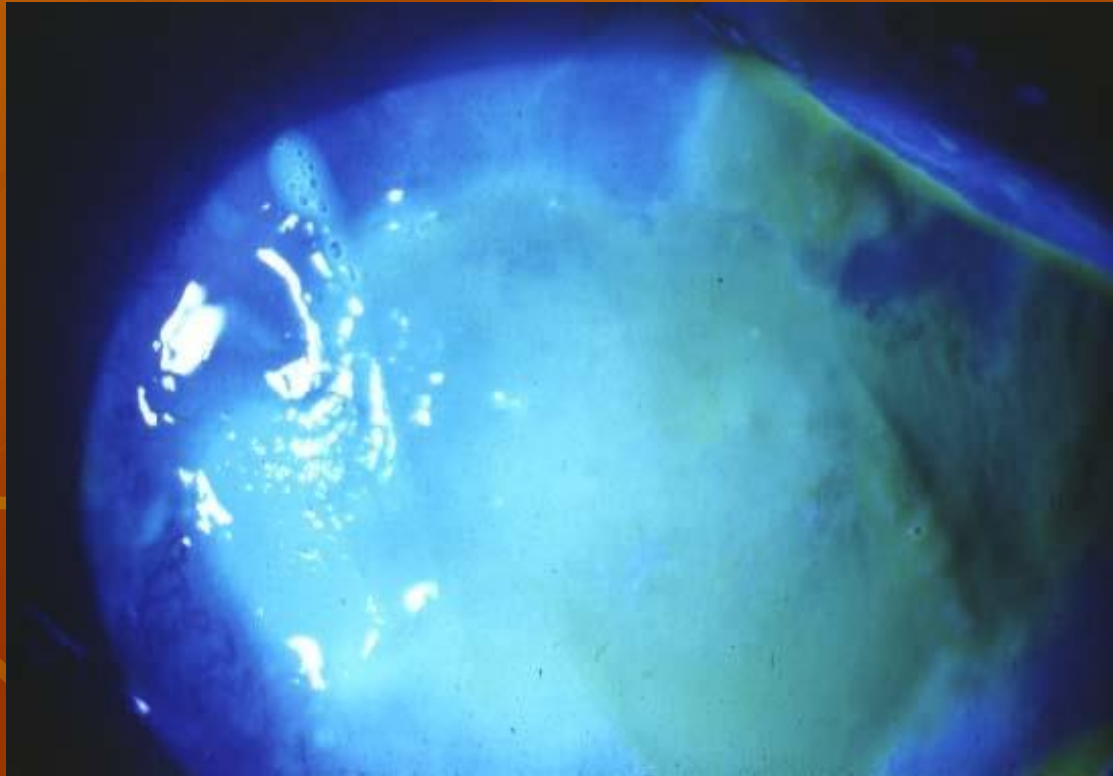
Chemical burns

- Late sequelae include symblepharon , cicatricial scarring , corneal opacification and glaucoma
- Rinse until neutral Ph then remove necrotic tissue. Swab fornices with a cotton tip applicator or a glass rod to remove all residual particles
- Cycloplege aggressively

Chemical burn treatment

- Utilize a bandage contact lens. Healing is often very slow and it usually takes several days to fully assess the extent of permanent damage
- Oral pain meds and IOP control as needed
- Antibiotic coverage
- Utilize steroids and lubricants heavily and follow closely
- Topical (10% sodium ascorbate) or oral vitamin C (500-2000mg) to decrease scarring
- Often utilize amniotic membrane

Chemical burn



Chemical burn



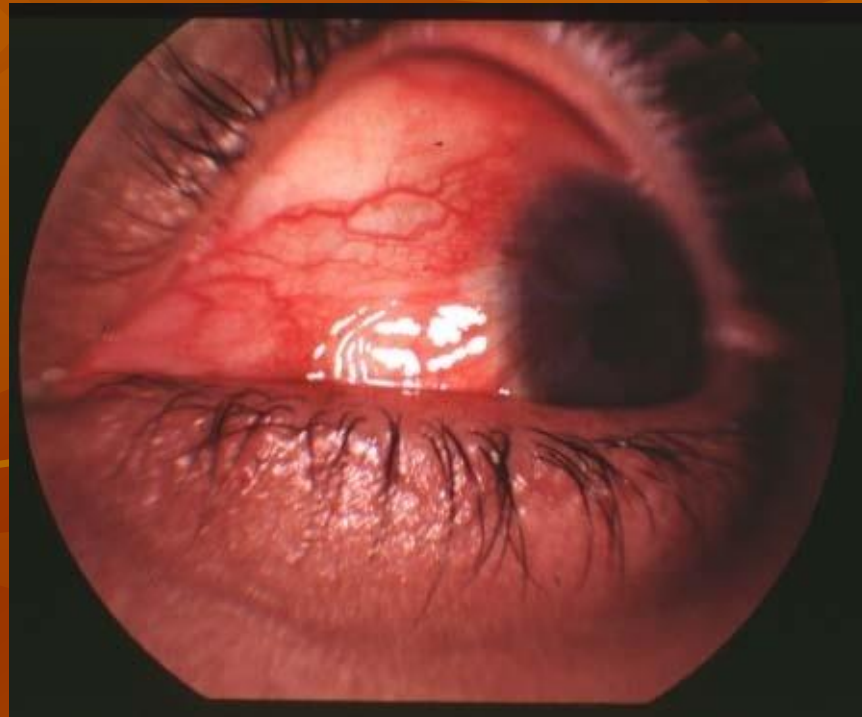
S/P Chemical burn



S/P chemical burn



Mild symblepheron



Corneal abrasions

- Traumatic scrape leads to loss of epithelium
- Area stains with fluorescein
- Photophobia , FB sensation , tearing
- Mild anterior chamber reaction

Corneal abrasion management

- Cycloplege aggressively
- Two strategies for treatment
- 1) Fit bandage contact lens (billable CPT code) and utilize antibiotic drops , NSAID and frequent rewetting drops
- 2) Use drops only with antibiotic , NSAID, and frequent lubricants

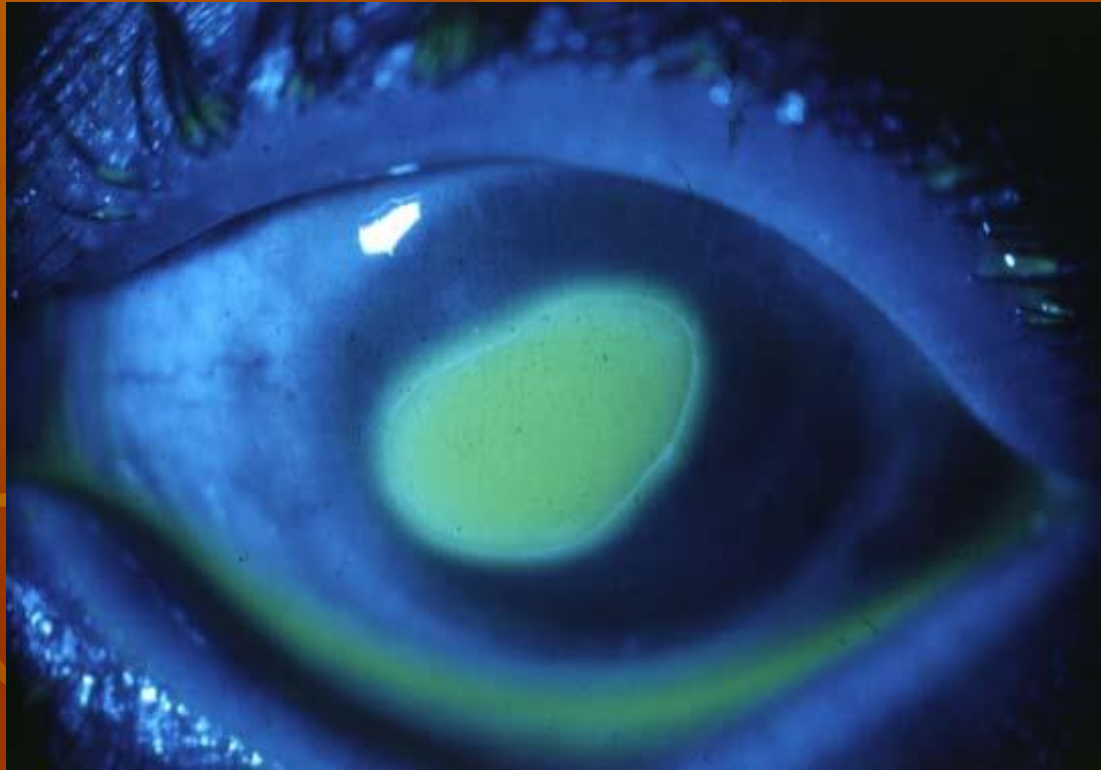
Corneal abrasion tips

- Limit NSAID usage to BID secondary to retardation of epithelial healing
- Can use steroids after a few days to help with comfort and speed resolution of corneal edema, but usually not necessary
- Sometimes still need to pressure patch small children
- Amniotic membranes can be useful in severe cases

Corneal abrasion tips

- Watch for late fungal infections when a tree branch or vegetative matter is involved
- RCE's.....consider prophylactic NaCl (Akorn generic on Amazon.com).
- Symptoms and management for conjunctival abrasions are similar to corneal pharmaceutical management

Corneal abrasion



Superficial foreign bodies

- Foreign material embedded in the cornea , bulbar conjunctiva , or palpebral conjunctiva
- Vertical tracking on the cornea indicates an upper palpebral FB
- Metal FB's will result in rust if not removed within the first several hours

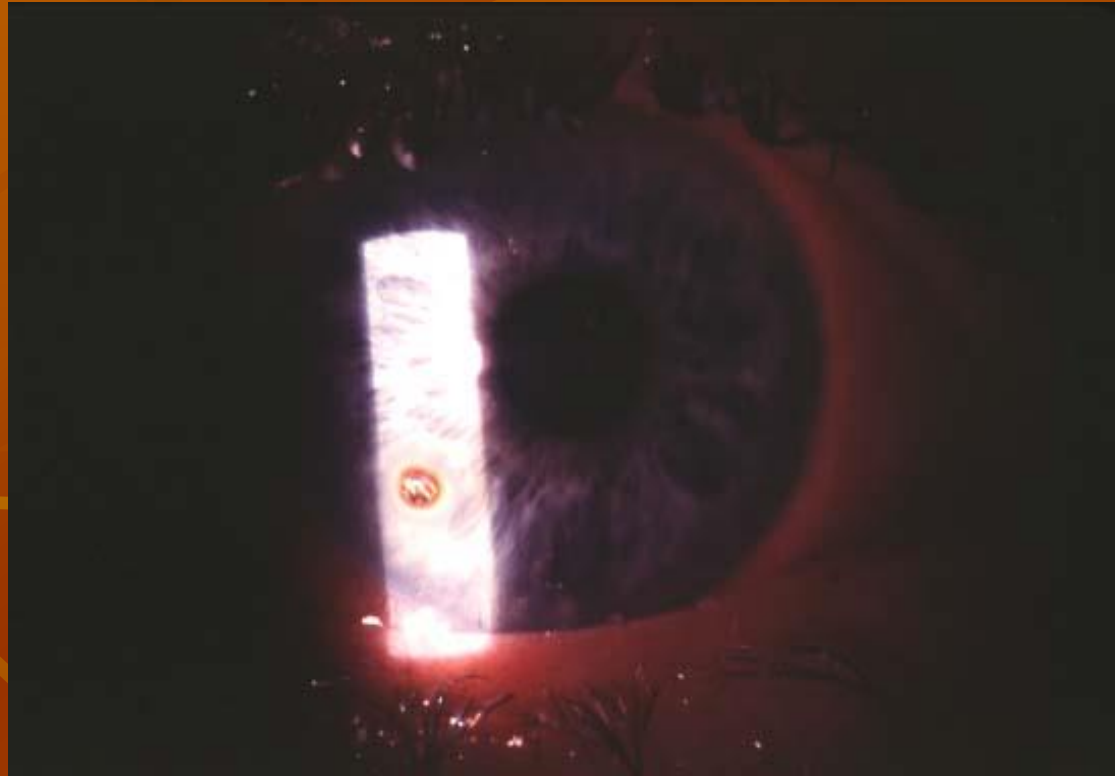
Foreign body symptoms

- FB sensation , tearing , pain
- Photophobia , decreased VA
- Conjunctival injection , anterior chamber reaction
- Corneal infiltrate if longstanding

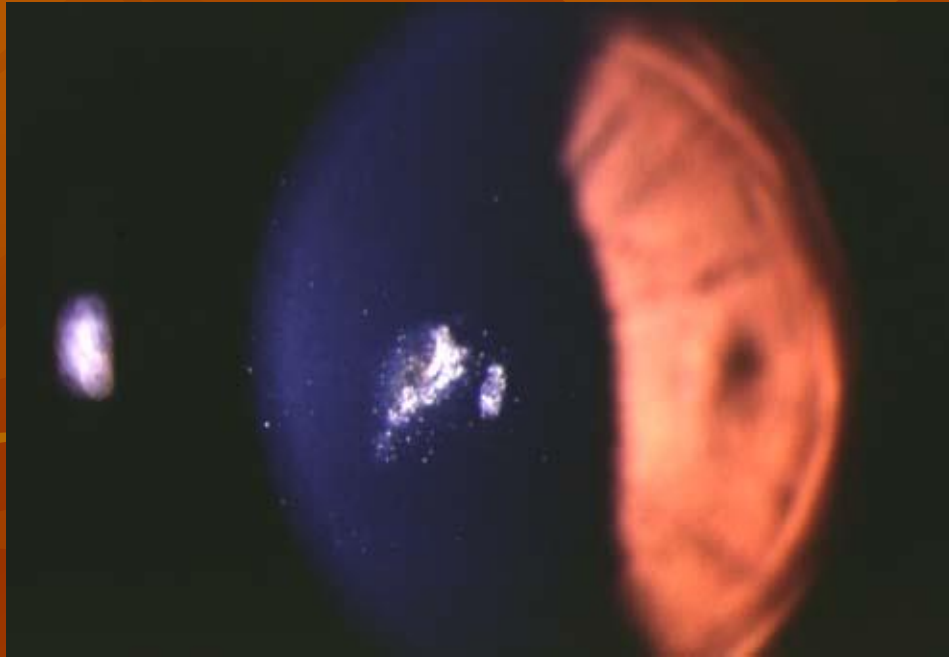
Foreign body treatment

- Anesthetize and remove with 30-gauge needle, spud, or Q-tip : informed consent
- Alger's brush as needed for rust removal
- Cycloplege , antibiotic drops, frequent lubricants for 2-3 days. Oral pain meds as needed. Educate regarding safety glasses
- Return if not feeling normal in 2 days

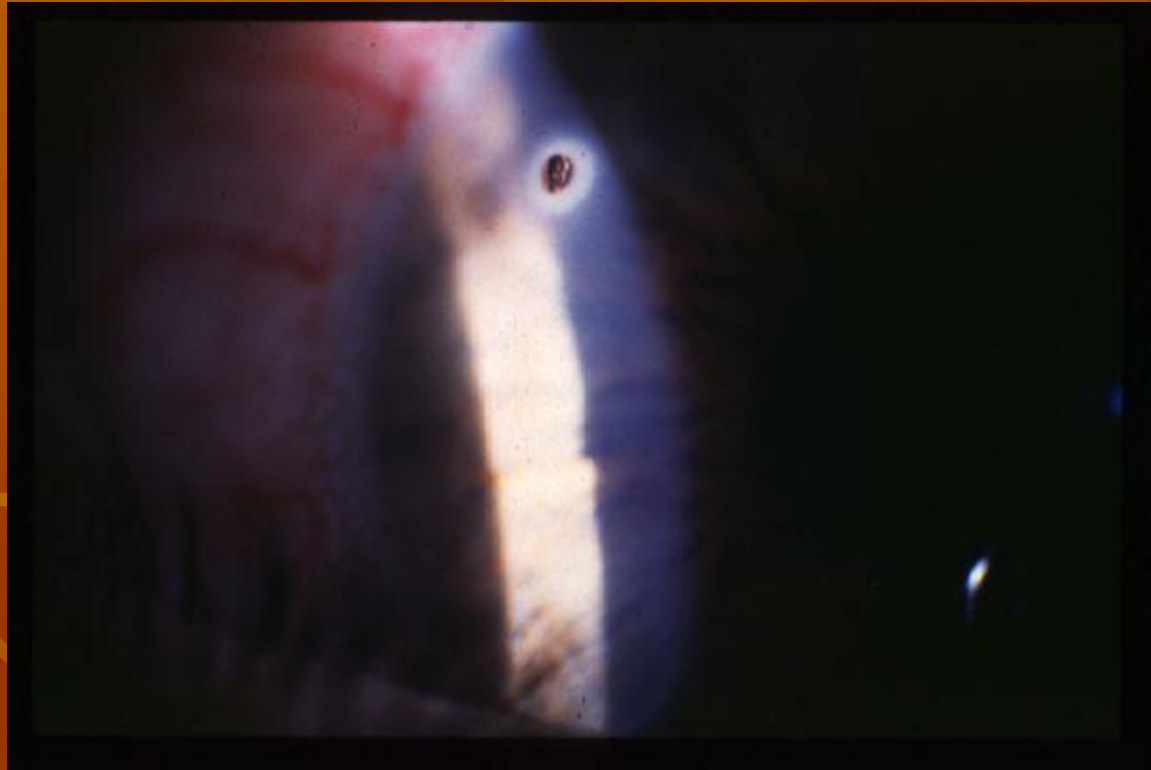
Foreign body



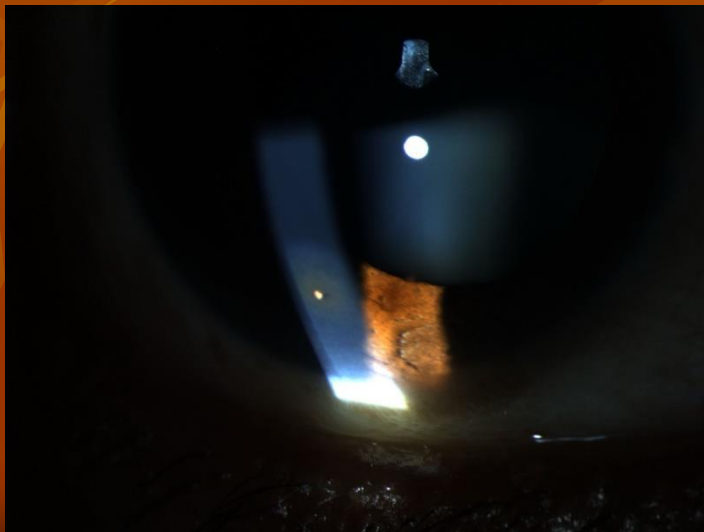
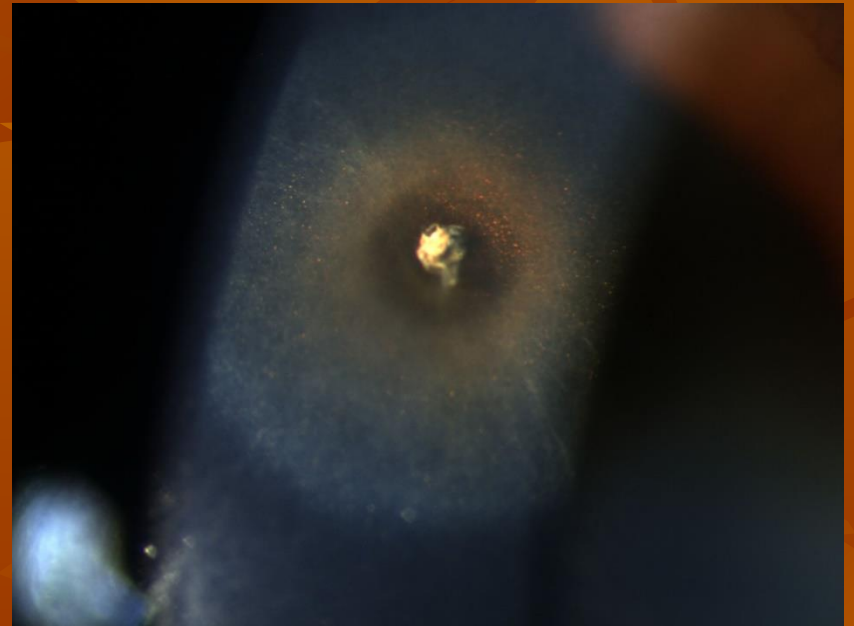
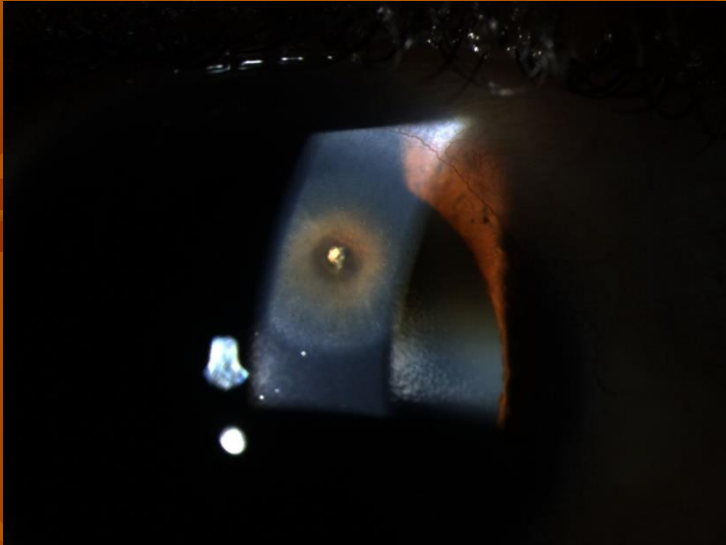
Foreign body



Metal foreign body



Gunshot wound shrapnel



Palpebral foreign body



Pine tree needles!



Intraocular foreign body (IOFB)

- High speed projectiles can easily penetrate the globe (grinding , hammering)
- Wide range of symptoms from severe to nearly asymptomatic. Usually less painful than superficial FB's
- Can see penetrating track through the cornea , iris , and lens. Difficult to see scleral penetration due to overlying hemorrhage
- $\frac{3}{4}$ of IOFB from hammering steel or brick

IOFB management

- Dilate all FB patients who were grinding or hammering after closely checking the iris
- Check for Seidel's sign and perform Seidel's test.....low IOP is a red flag!
- Perform B-scan and CT scan if needed. No MRI with metal FB's!
- Surgical removal if FB causing significant inflammation or interfering with vision

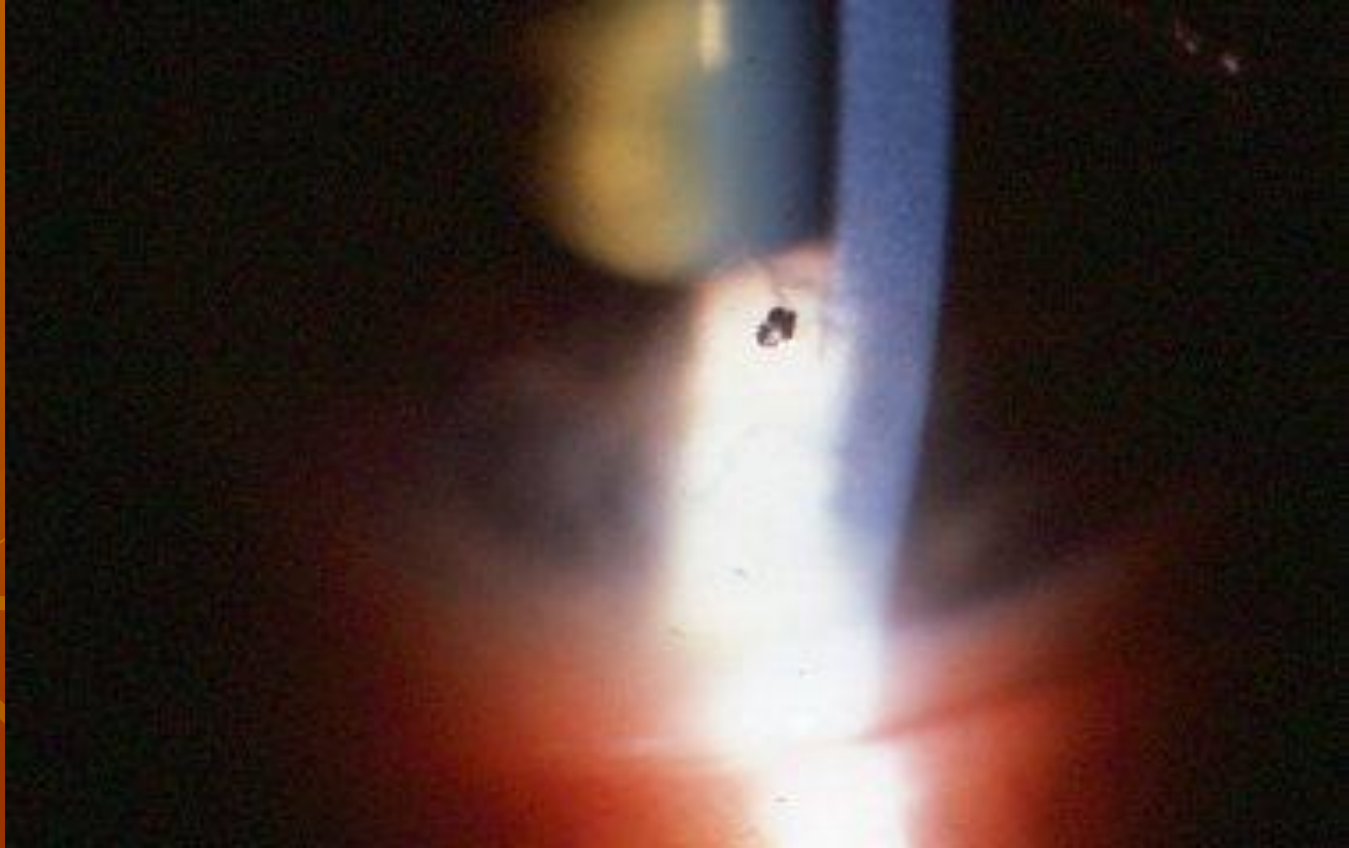
IOFB management

- Oral antibiotics if no immediate surgical removal
- Severe response : wood , iron , steel , copper
- Mild response : aluminum , zinc
- Inert : glass , lead , stone , carbon
- BB's are 90% lead and 10% iron

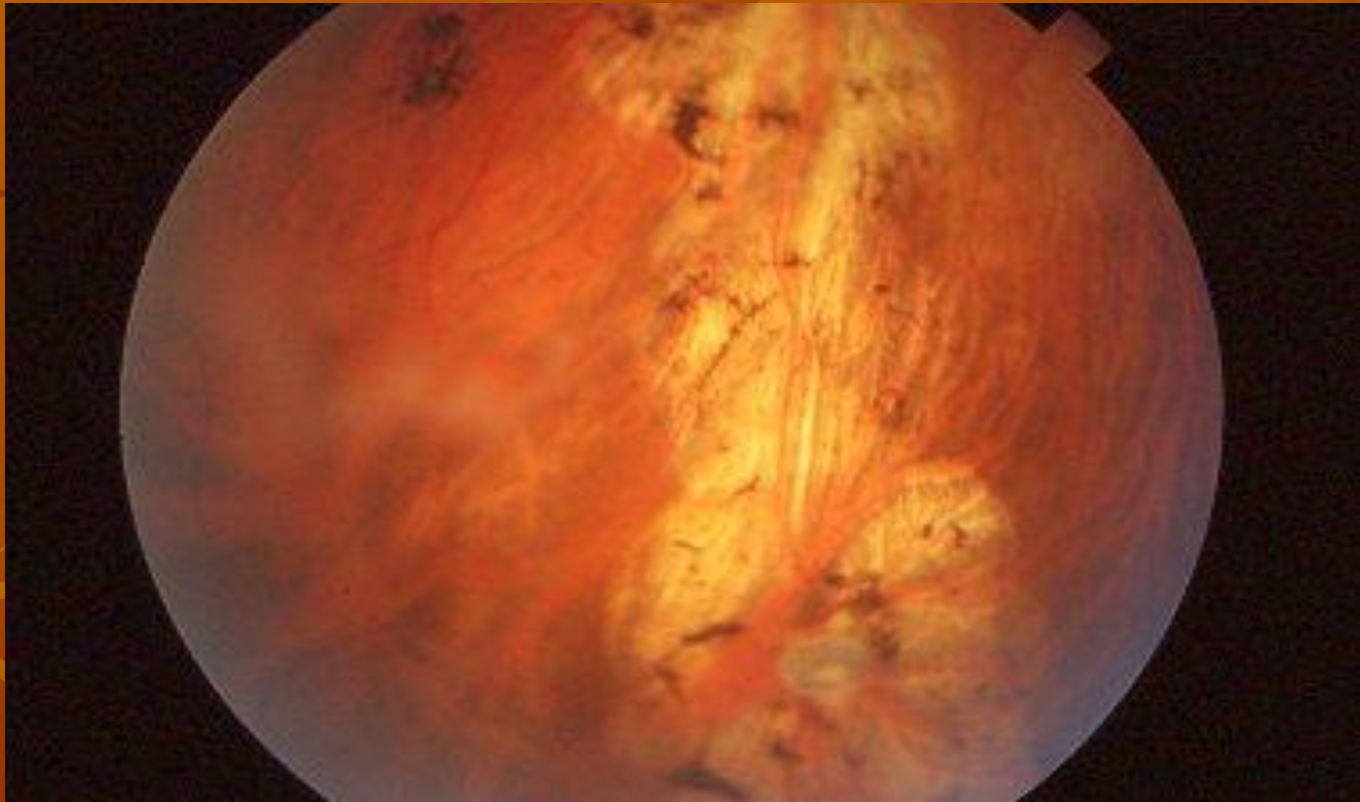
Seidel's sign



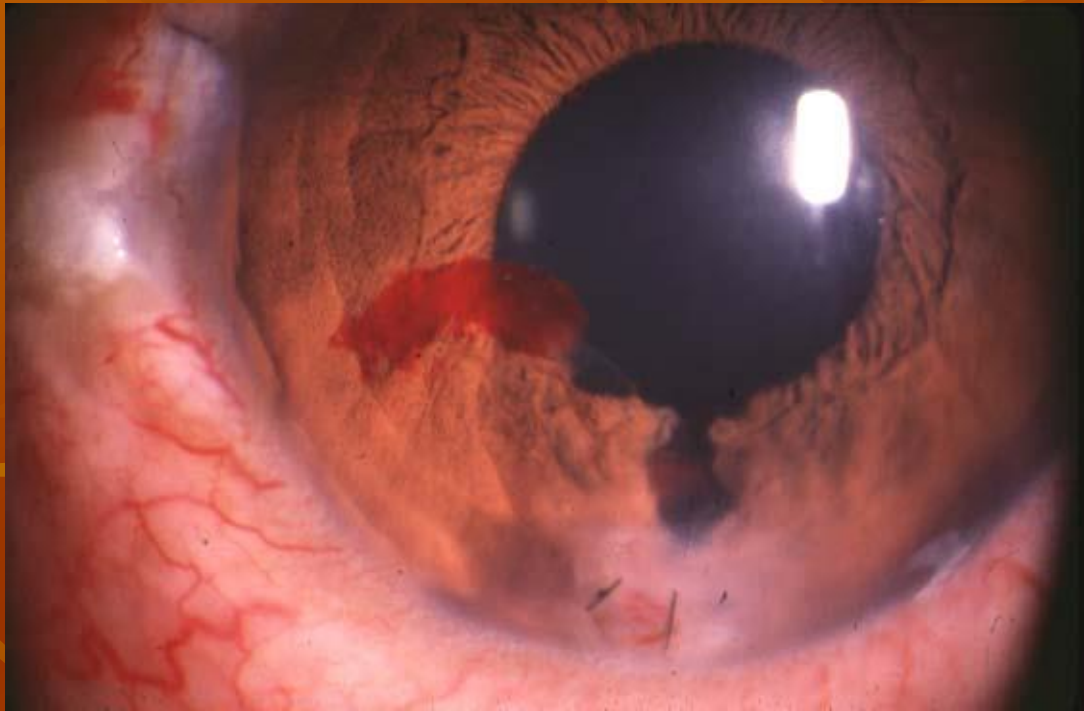
Iris foreign body



Retinal foreign body



Penetrating foreign body track



Conjunctival laceration

- Laceration of conjunctival tissue not involving the underlying sclera
- Pain , tearing , FB sensation
- Cycloplege if needed. Antibiotic drops, lubricants prn , NSAID's prn until healed.

Partial thickness corneal laceration

- Laceration not penetrating Descemet's membrane. Utilize Seidel's sign / test
- Same symptoms as conjunctival laceration
- Cycloplege
- Treatment options the same as for corneal abrasions

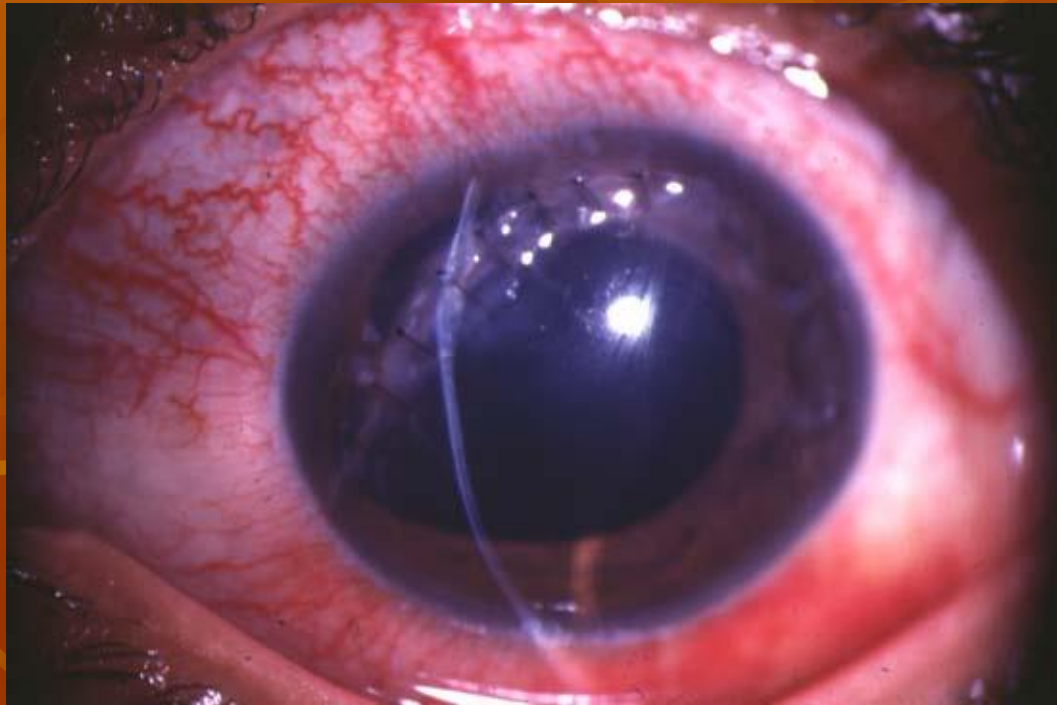
Full thickness corneal/scleral laceration

- Laceration with complete penetration of the globe
- Symptoms essentially the same as for partial thickness except extra tearing
- Positive Seidel's sign or test , low IOP
- Fox shield , NPO. Oral antibiotics and tetanus shot when indicated
- Refer for surgical repair (suturing)
- Very small wounds may not need suturing

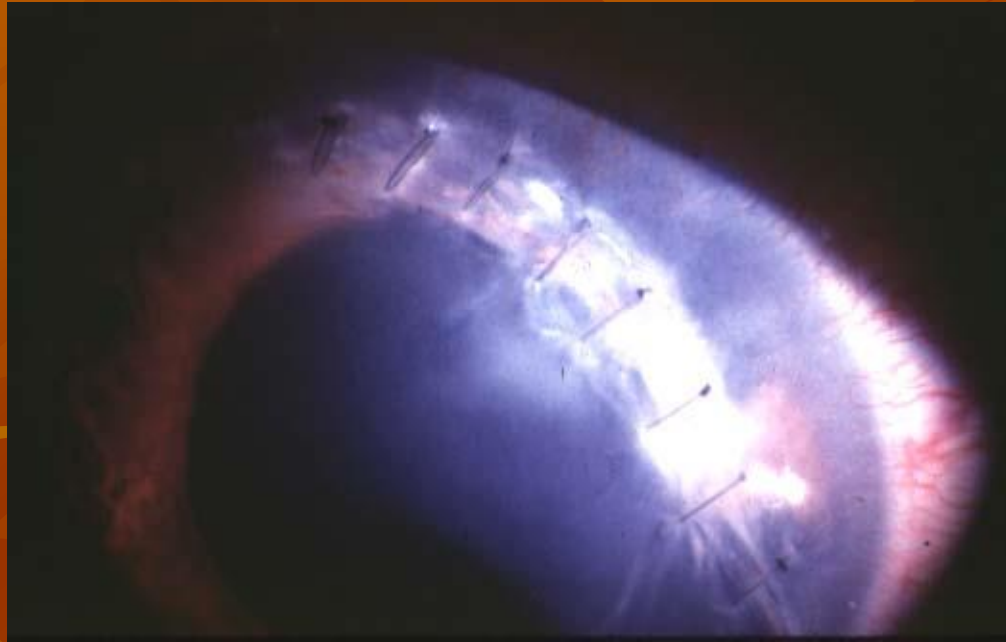
Laceration



Sutured laceration



Sutured laceration



Lid laceration

- Deep cut in eyelid tissue
- Pain but normal VA
- Obtain history of the accident and tetanus history
- Complete ocular exam
- Refer for suturing. Cases at very high risk for infection should be treated with antibiotics and dressings before suturing

Lid laceration



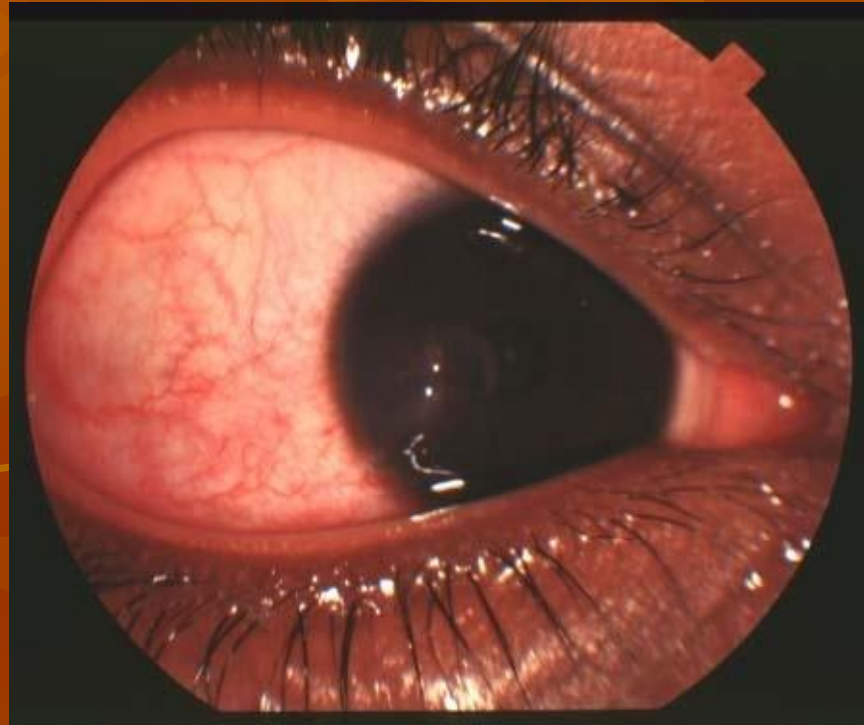
Lid laceration



Ruptured globe with prolapse

- Scleral or corneal rupture with prolapse of uveal tissue through the wound
- Uvea appears blue - black
- IOP may be low or normal
- Oral antibiotics , tetanus , fox shield and NPO.
Refer for surgical repair

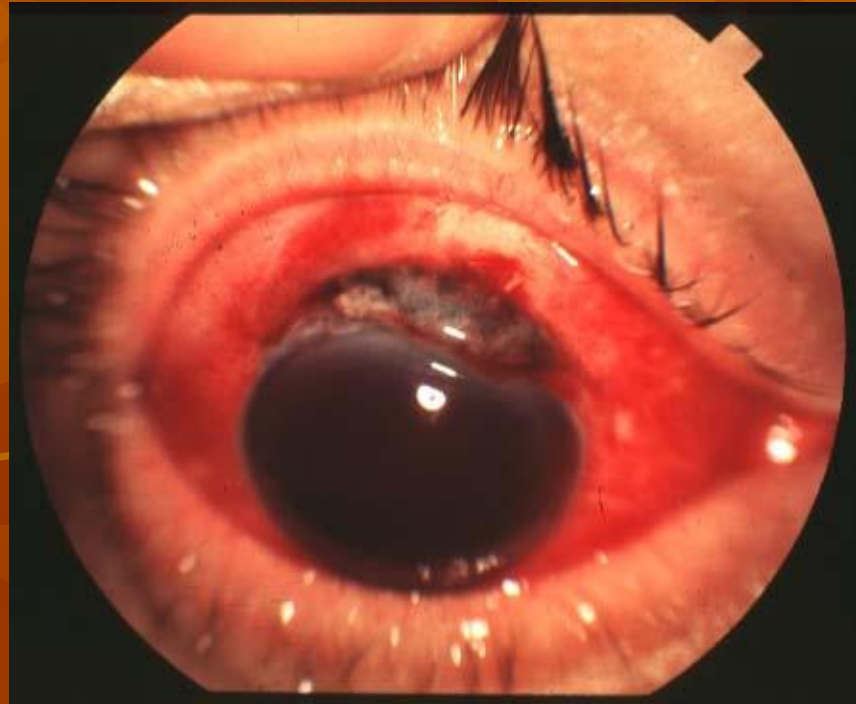
Iris prolapse



Iris prolapse



Ruptured globe with ciliary body prolapse



Hyphema / microhyphema

- Blunt trauma leads to hemorrhaging from iris or limbal vessels resulting in blood in the anterior chamber
- Microhyphema = dispersed , suspended RBC's while hyphema = layered or clotted RBC's
- Complete filling of anterior chamber with blood is referred to as eight ball hyphema

Hyphema

- Decreased VA , increased IOP , pain
- Often associated with angle recession or iridodialysis
- Synechiae , corneal blood staining are late sequelae
- Often other ocular trauma as well
- Incidence about 20 / 100,000 / year in US

Hyphema management

- Examine as completely as possible
- B-scan if necessary
- Management depends upon the extent of the hyphema and the reliability of the patient
- Microhyphema and mild hyphema patients who are reliable can be treated with cycloplegics and steroids

Hyphema management

- IOP lowering agents if needed: avoid prostaglandins and miotics
- Restricted activity , bed rest with head elevated 30 degrees
- Analgesics but no aspirin or ibuprofen, acetaminophen OK
- Follow daily watching for re-bleeds which spontaneously occur in about 25% of cases
- Restrict heavy activity for 1-2 weeks after clear

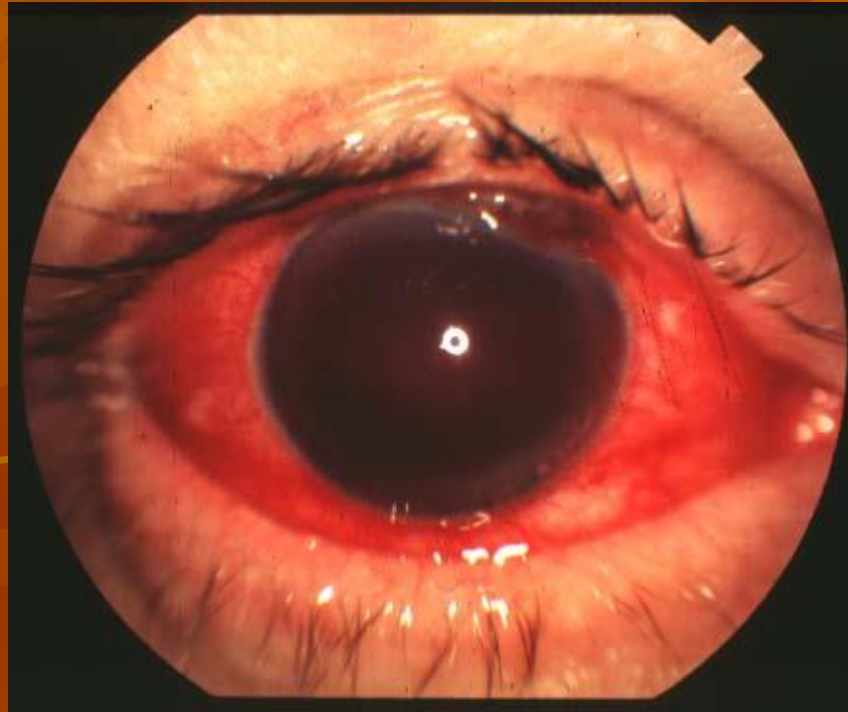
Severe hyphema management

- Cycloplegia and bed rest full time with head elevation
- Eye shield and analgesics, examine daily
- No gonioscopy for two weeks

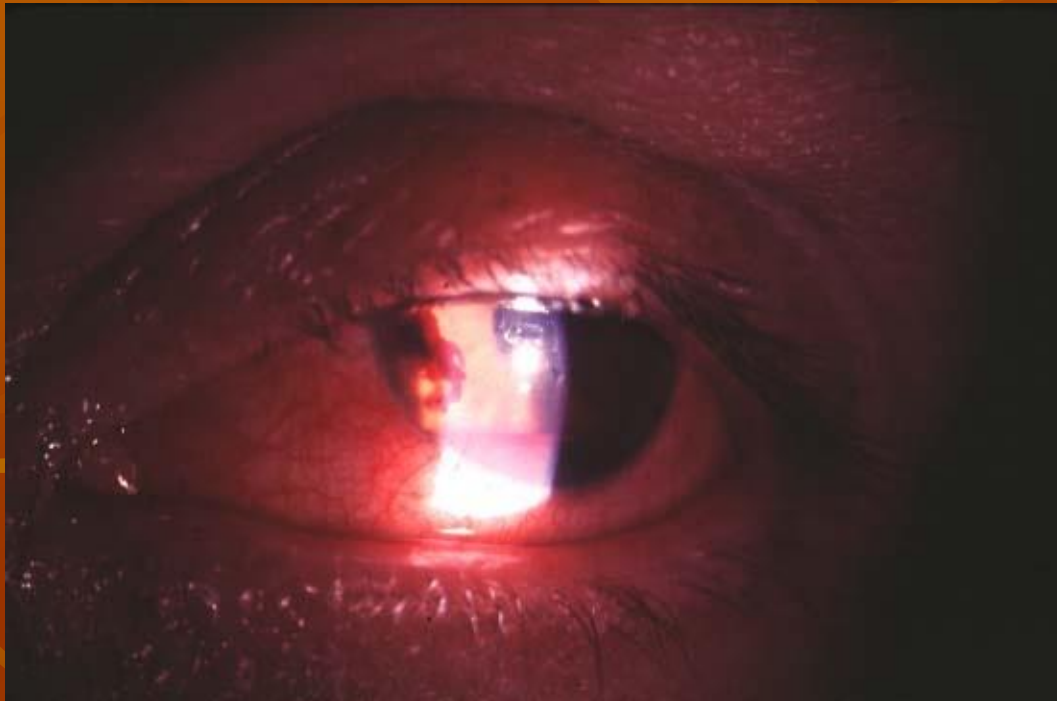
Hyphema



Eight ball hyphema and globe rupture



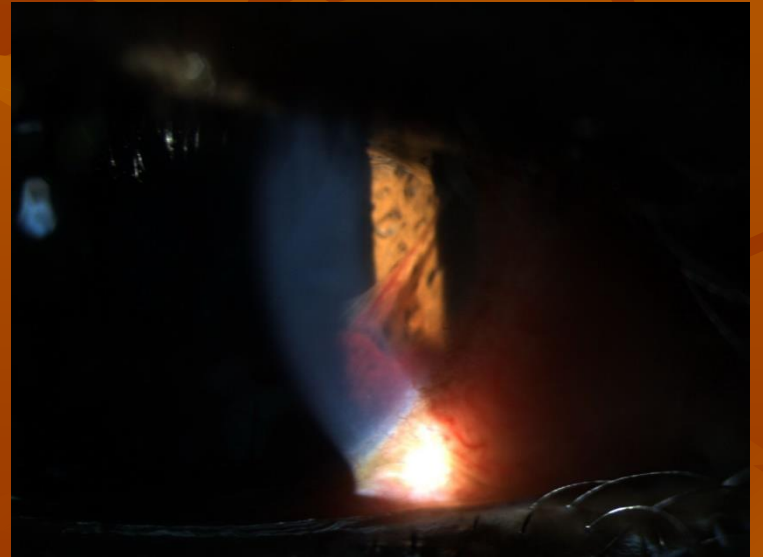
Hyphema



Hyphema



Hyphema



Hyphema



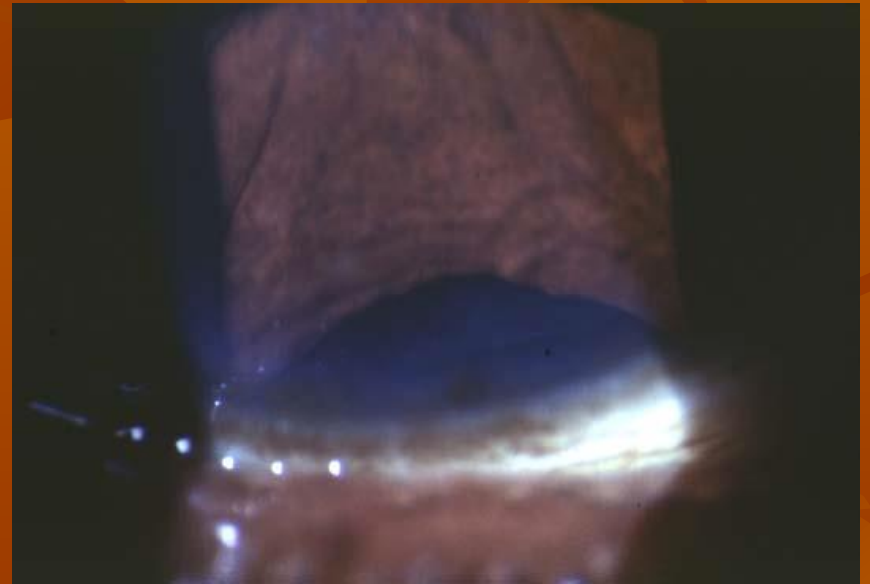
Hyphema in Sickle Cell

- Unique! Question sickle cell history in African Americans with hyphema
- Aqueous Humor causes sickling
- Applies to all genotypic variants and trait carriers (SS, SC, SThal, AC, SA)
- Mild elevation in IOP results in severe optic atrophy and risk of CRAO. Can lose vision
- 24 –for -24 rule (IOP can not exceed 24 for more than 24 hours) No Diamox (Neptazane OK)

Angle recession

- Blunt trauma leads to recession of the angle structures away from the iris root
- Gonioscopy reveals a wide ciliary body in the affected area
- May cause increased IOP and secondary glaucoma years after the incident so patient education and follow up are key
- Iridodialysis : complete tear of iris root

Iridodialysis



Orbital rim fracture

- Caused by object larger than the orbit
- Pain , swelling , edema
- Palpate the orbital rim checking for bone fragments , pain , crepitice
- X-ray series then surgical repair when indicated
- Oral antibiotics

Orbital blowout fractures

- Blunt trauma to the globe or inferior orbital rim causes fracture of the medial wall or floor of the orbit
- Pain , nausea , vertical diplopia more prominent on up gaze. Restricted motility
- Lid edema with blowing of nose, possible enophthalmos
- Hypesthesia in distribution of the infraorbital nerve

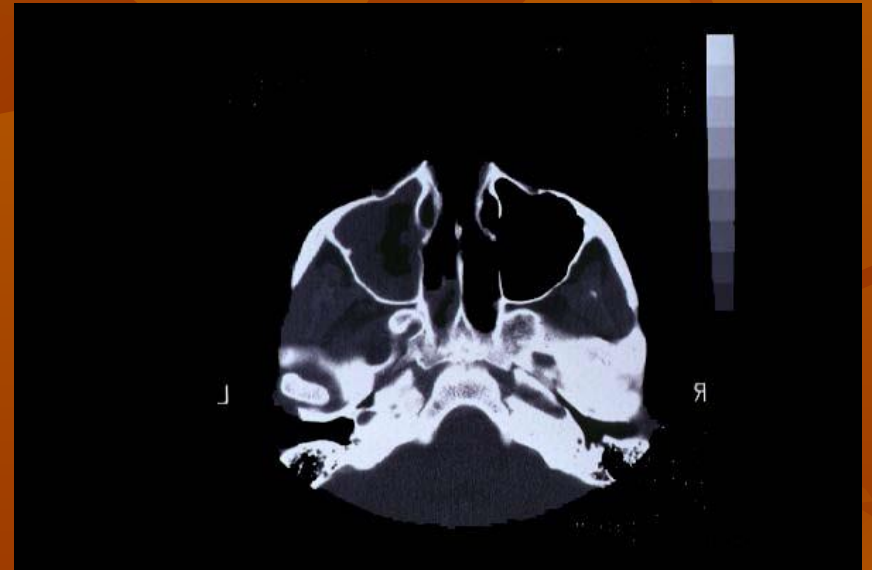
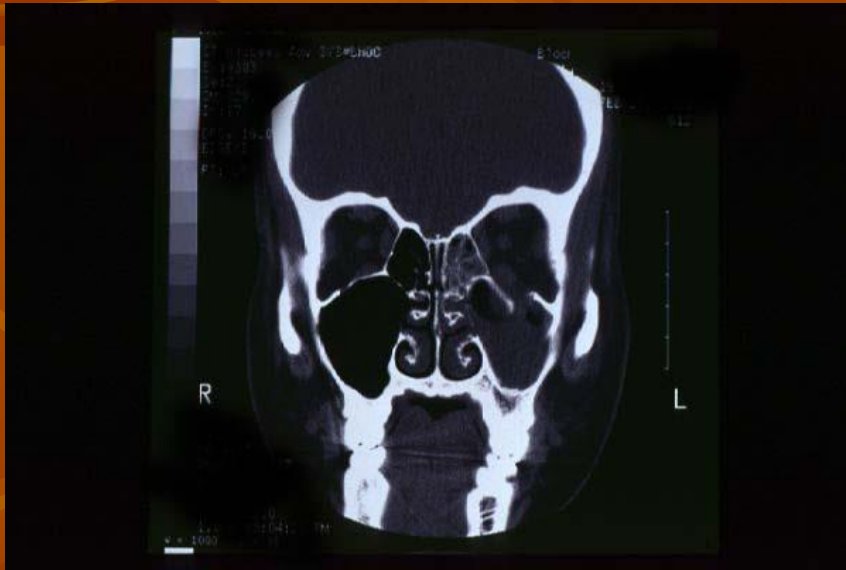
Blowout fracture management

- Complete ocular exam if possible. Palpate orbital rim checking for pain and crepitance and check EOM's
- Can get pain , edema , and restricted motility without a blowout fracture simply from swelling
- Follow for 7-10 days with oral antibiotics and nasal decongestants. Use ice packs for the first 48 hours and do not blow nose

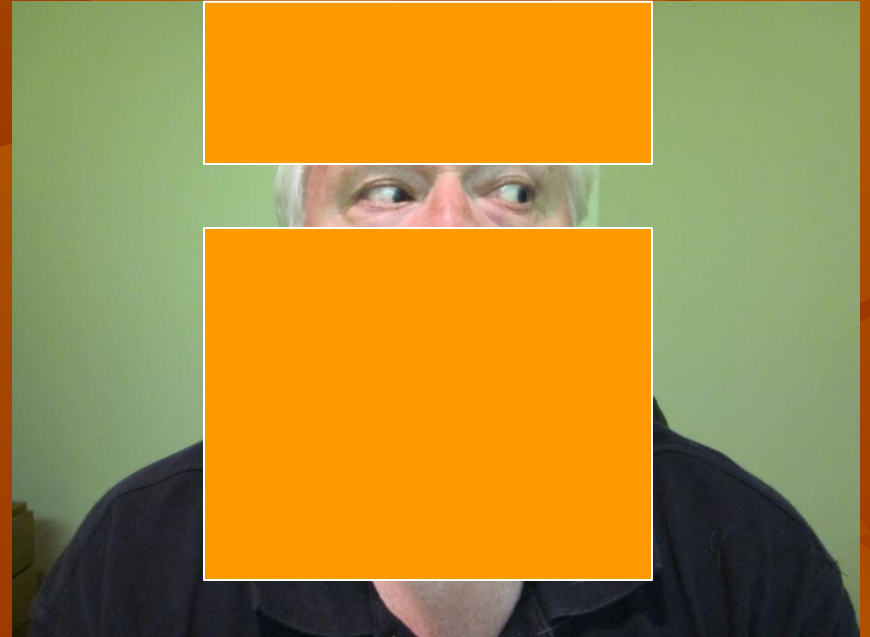
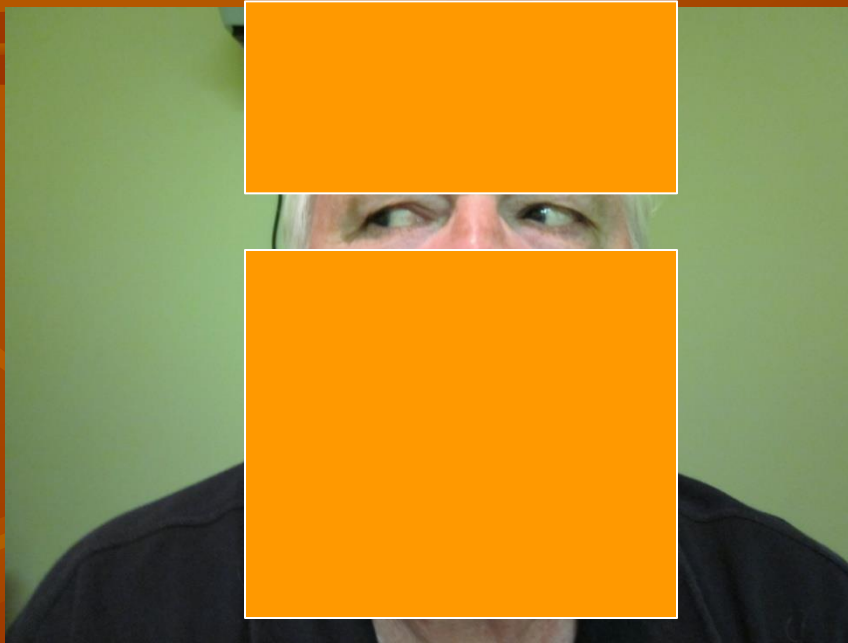
Blowout fracture management

- If significant problems persist beyond 7-10 days and diplopia remains, then order CT scan of the orbit (axial and coronal) and refer to an oculoplastics specialist for surgery when indicated

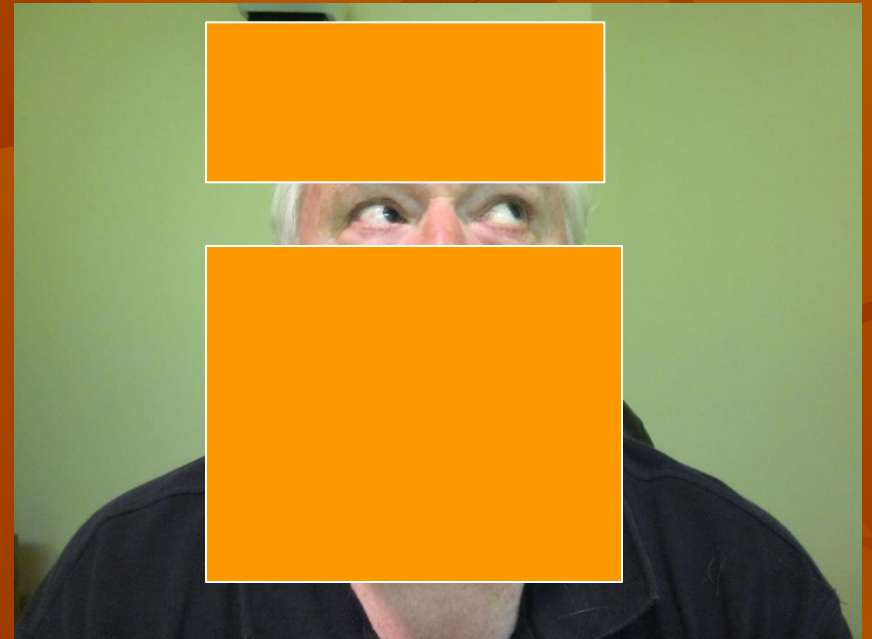
Orbital blow out fractures



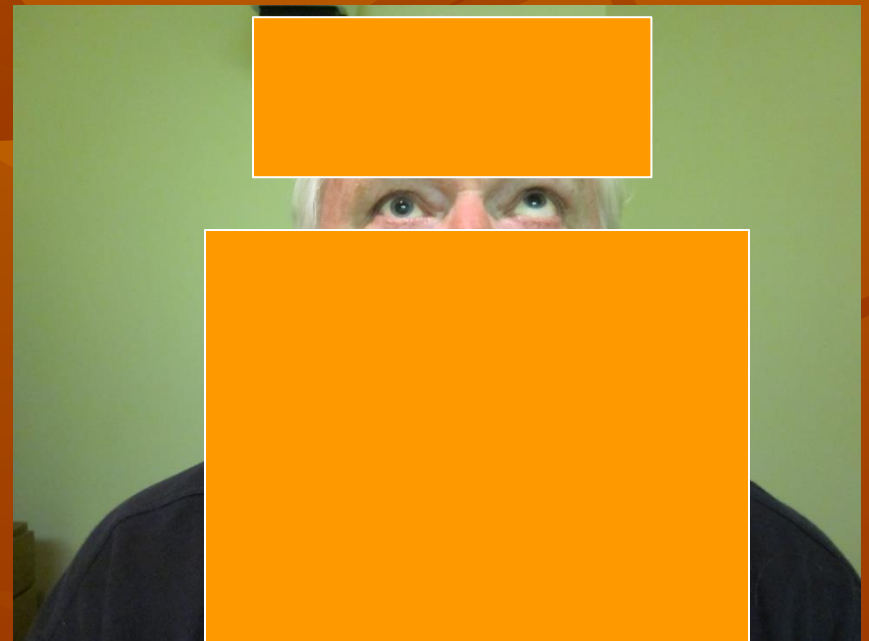
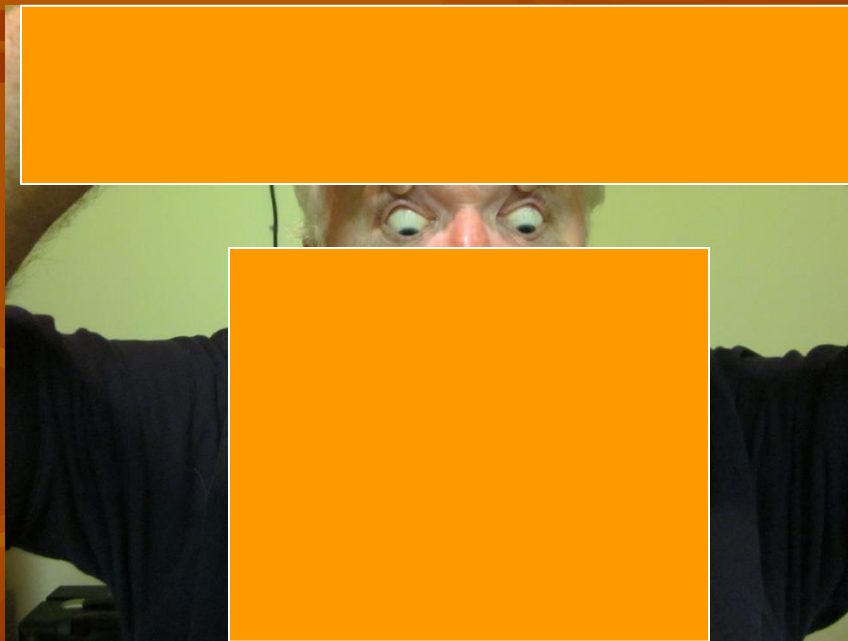
EOM sequence



EOM sequence



EOM sequence



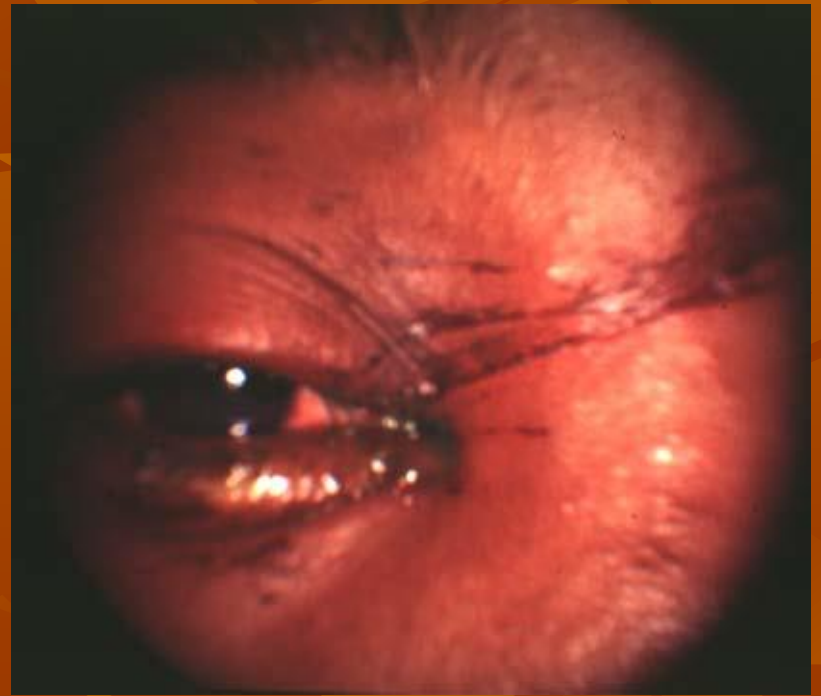
Echymosis (black eye)

- Blunt trauma causes cutaneous echymosis and edema
- Blood may spread to the bridge of the nose and the cheeks
- Full ocular exam
- Cold packs prn

Echymosis



Echymosis



Subconjunctival heme

- Trauma causes conjunctival or episcleral vessel to rupture
- Can also occur spontaneously with valsalva or HTN
- No pain or vision loss but appearance scares the patient
- Patient reassurance is key. AT as needed

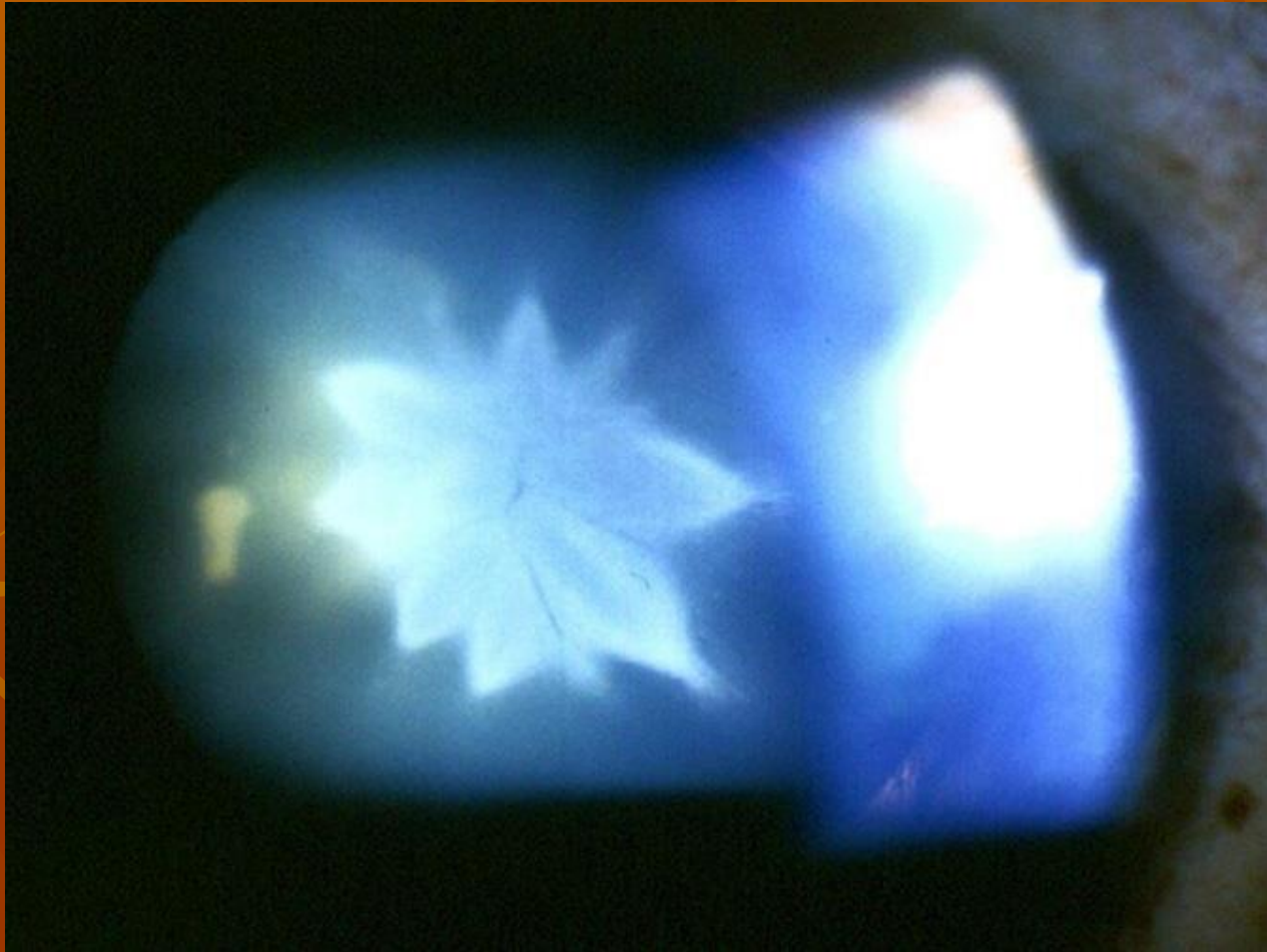
Traumatic iritis

- Blunt trauma leads to iris inflammation
- Signs and symptoms of standard iritis but usually cells without much flare
- Manage with cycloplegics and steroids. Resolution is typically rapid
- May get traumatic pupillary dilation

Traumatic cataract

- Trauma causes changes within the lens structure leading to hydrolysis and cataract formation. Can also get rupture of the zonules and luxation of the entire lens
- Rupture of the lens capsule leads to phacolytic uveitis
- Surgical removal , may require anterior chamber IOL

Traumatic cataract



Traumatic lens rupture

