

Ouch That's Gotta Hurt Understanding Ocular Trauma

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Financial Disclosure

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Course Goal

To provide useful clinical information in the diagnosis and treatment of ocular trauma disorders.

Differentiate “Emergency” vs. “Urgency”

Proper Triage necessary

Understand the “ 10 A Club ”

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

Causes of Blunt Trauma

- Wide variety of causes
- Young adults: sports injuries most common
- Automobile airbag deployment can cause severe blunt ocular trauma
- Accidents in and around home: elastic straps, champagne corks, keys, garden tools, furniture, sticks, stones, fireworks, paintballs, etc.
- Home - most common > workplace > assault

Pattern of Injury

- Bimodal distribution of injury with the young and the elderly most affected - young men in their teens and 20's bear the burden of eye injury
- Men 3 - 5 times as frequently than women = vision threatening eye injuries
- Ocular trauma is a significant cause of visual loss, especially in lower socioeconomic strata and countries
- Ocular trauma is a recurrent disease

- In the United States alone ~ 2,500,000 eye injuries per year
- United States Eye Injury Registry (USEIR) was est. in 1988
- Goal is collect and document information on serious eye injuries.
 - Data from USEIR shows the following:
 - Mean age of 29 years old
 - Median age of 26 years old
 - 57 % of patients usually < 30 years old
 - 80 % are males

Trauma History: Interrogate and Investigate !!!!

History is the the Key !!! 80% of the diagnosis

Important questions to ask to help determine the etiology

History taking is the most clinically sophisticated procedure in medicine

Alvin R. Feinstein

Examination

Common sense must be emphasized !!!!

- Visual Acuity – Snellen, CF, HM, LP, NLP
- Pupils – RAPD
- Brightness Testing and Color Vision
- Visual Fields
- Extraocular motility
- Intraocular pressure
- External and Internal examination

Eye Injury

Closed Globe

- Contusion
- Concussion
- Superficial foreign body
- Laceration (partial thickness)



Open Globe

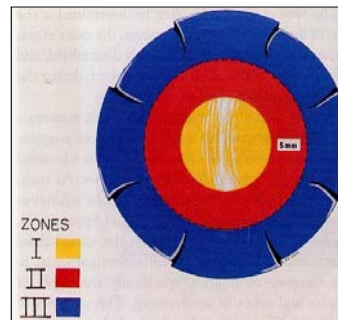
- Penetrating
- Perforating
- Ruptured globe
- Intraocular foreign body



Eye Injury



Open-globe injury - zone of injury



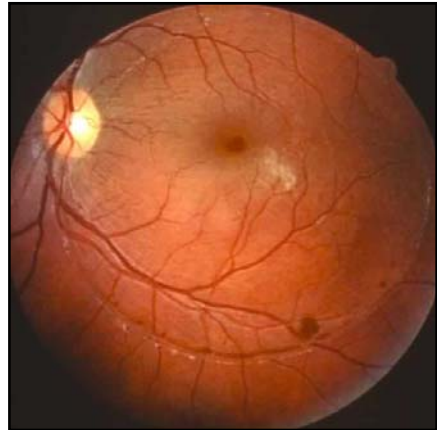
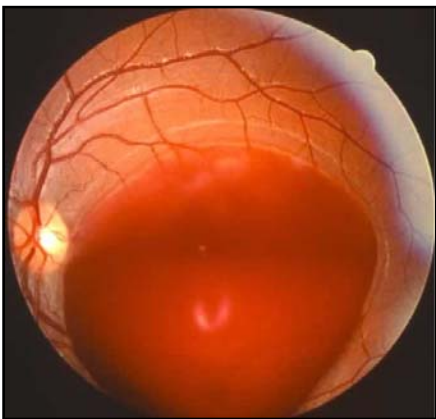
- Zone I: opening of globe is limited to cornea or corneoscleral limbus
- Zone II: those that involve the anterior 5mm of the sclera (not more posterior than the pars plana)
- Zone III: those that extend the full thickness into the sclera more than 5mm posterior to the limbus

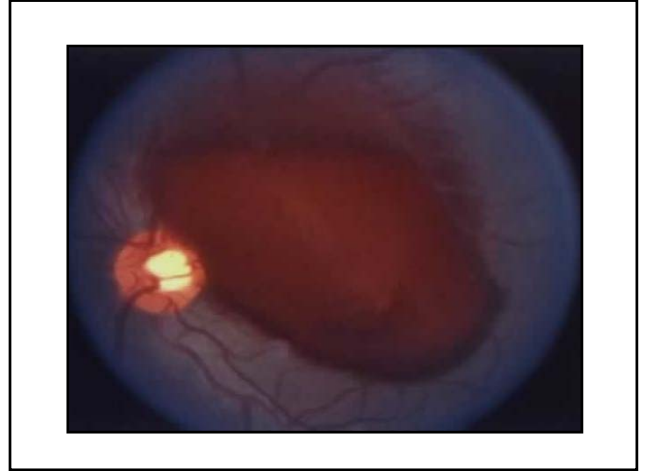
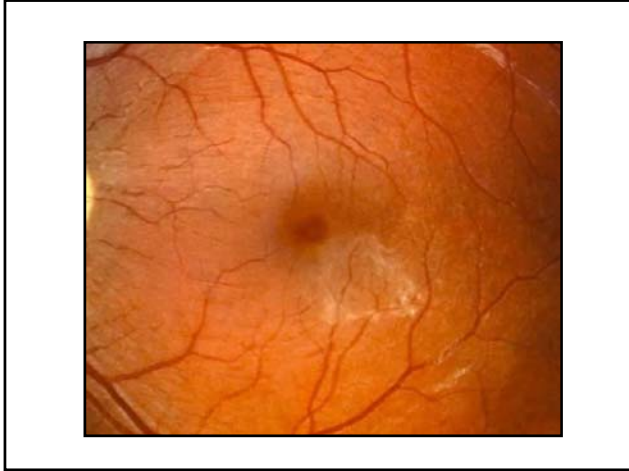
Polycarbonate

- Late 1970's
- Children and safety eyewear
- Superior impact resistance
- Thinner / lighter than plastic
- Inherent UV protection
- Decreased optical clarity
- Increase chromatic aberration

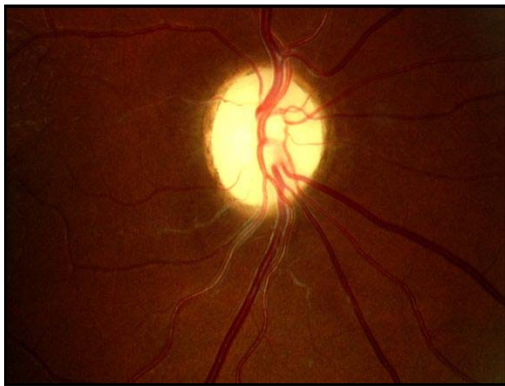
Trivex

- 2001 by PPG
- Passed FDA - impact resistance
- Lightest lens material available
- Inherent UV protection
- Optically superior
- Ideal for drill mounting
- Slightly thicker than polycarb
- Slightly more expensive





Optic Atrophy





Purtschers Retinopathy



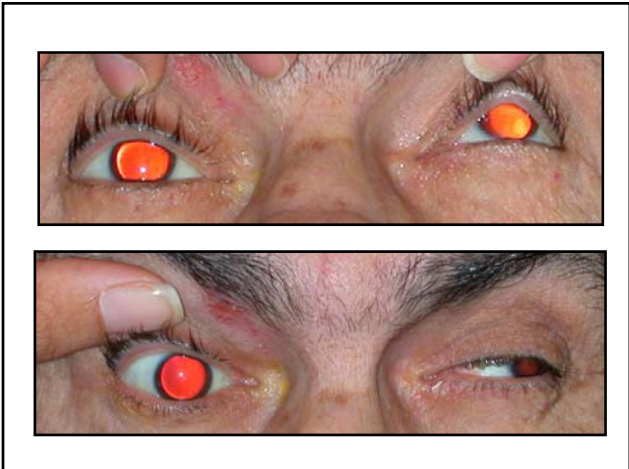


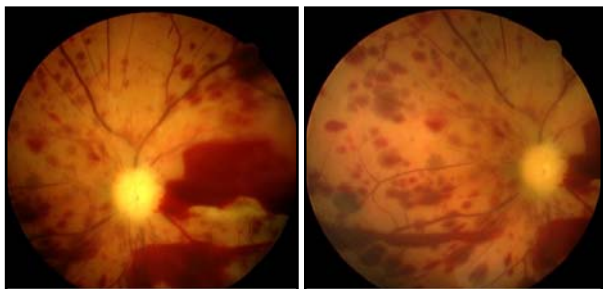
Cranial Nerve Palsies

- Cranial Nerve 3, 4 and 6
- Compression
- Contusion - inflammation, edema and hemorrhage of the muscle
- Laceration

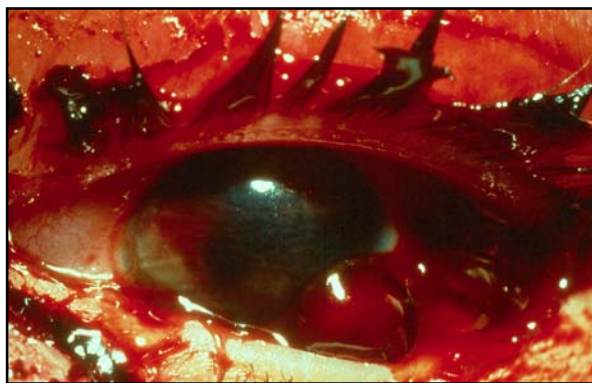


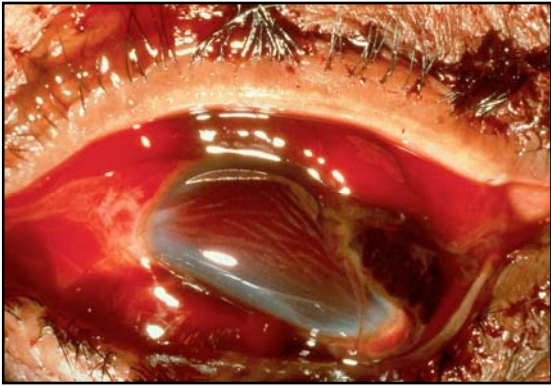
The most common cause of motility restriction after orbital trauma is orbital soft tissue swelling. Orbital compartment syndrome = true emergency





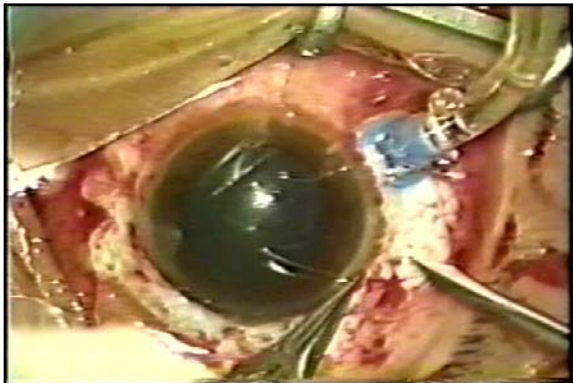
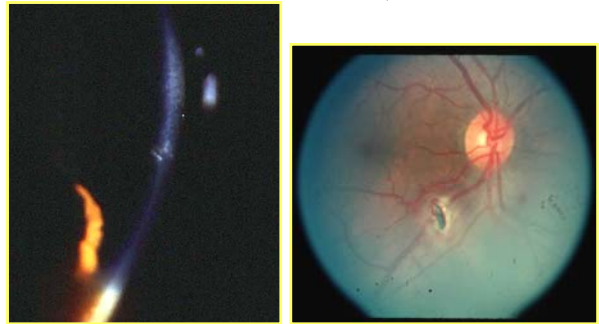
Terson's Syndrome from a Subarachnoid Hemorrhage





Open globe = patient kept *nil per os* (NPO), pain meds given, contact MD !

Intraocular Foreign Bodies – iron and copper are toxic. Aluminum metal alloys, plastics are non-toxic



The incidence of endophthalmitis following penetrating injuries is between 5% to 14%.

The USEIR incidence is 2.6% and more common in males.

The incidence is more common in rural settings (30%) or Involves an IOFB (15%)

Infections with more than one organism are common (48%)

Bacillus and staph are most prevalent.





Types of Pain

<h3 style="text-align: center;">Nociceptive</h3> <ul style="list-style-type: none"> • Expected result from tissue injury • Normal neural transmission • Localized, resolves 	<h3 style="text-align: center;">Neuropathic</h3> <ul style="list-style-type: none"> • Primary lesion in the CNS • Chronic
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The World Health Organization Pain Ladder

Mild Pain	Oral NSAID , Non Opioid Analgesic
Moderate	Oral Opioid – oral
Severe	Parenteral Opioids (Morphine)
Intractable	Invasive therapy

There are three main categories of analgesics:

- Over the Counter
- Non-narcotic prescription
- Narcotic prescription

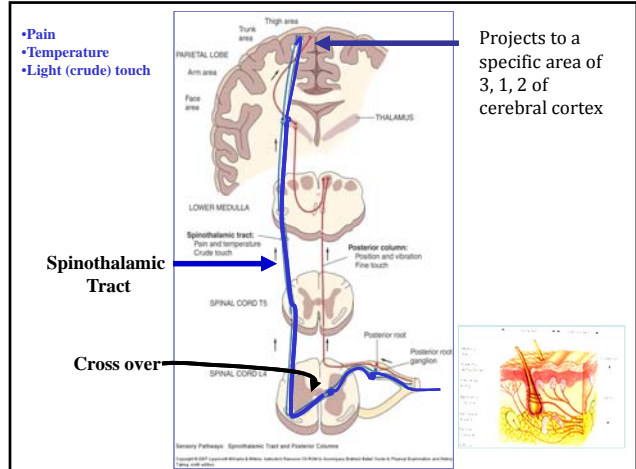
Over the Counter:

NSAIDS	↗	Aspirin	<ul style="list-style-type: none"> • Anti - inflammatory • Analgesic • Anti - pyretic • Increase bleeding time
	↘	Ibuprofen	

Acetaminophen (Tylenol) only analgesic and anti-pyretic *

Narcotic Prescription

- Must have DEA # to prescribe
 - Opioid analgesic
 - Are chemical compounds that have morphine-like actions
 - “Narcotic” – chemical agents that induce sleep / stupor
 - Drug of first choice for severe, acute pain
-
- Work by affecting both the duration and emotional component
 - There are 4 classes of opioid receptors in the body
 - Mu, Kappa, Delta, Sigma opioid receptors
-
- 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 !!!

What about Codeine ????

Must be metabolized to morphine to have analgesic effect

Other metabolites cause nausea and dysphoria

10% of population can not metabolize, so no analgesic effect

2% are ultra rapid metabolizers – prone to morphine intoxication at normal doses

Common Opioid Side Effects

- Nausea and vomiting
- Constipation
- Itchiness
- Respiratory depression
- Mental confusion
- Hypersensitivity reactions

Narcotic agents can cause:

- Blurred vision
- Drowsiness
- Dizziness
- Take Narcotic agents with food to avoid GI upset
- Alcohol should be avoided with patients taking narcotic agents

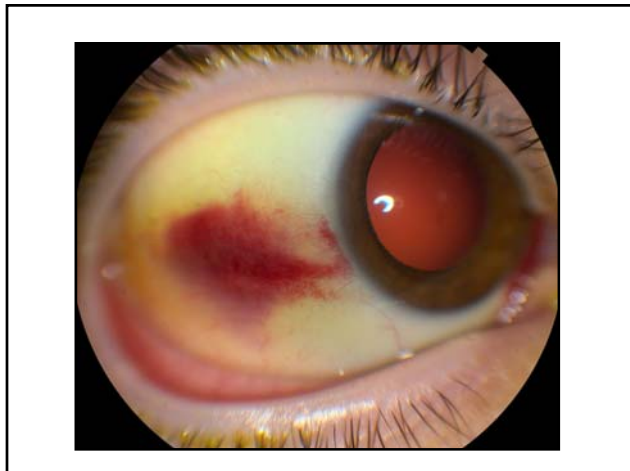
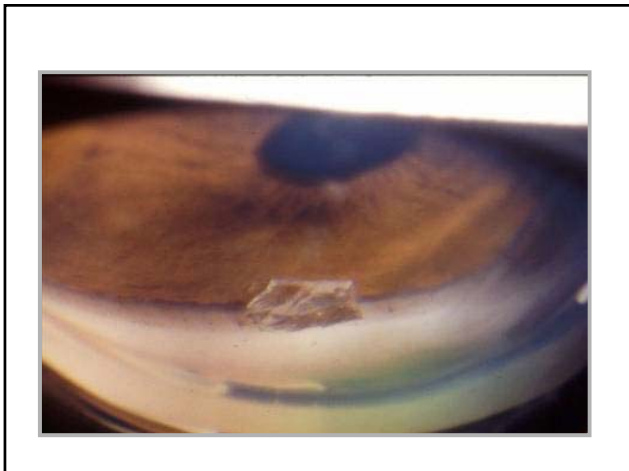
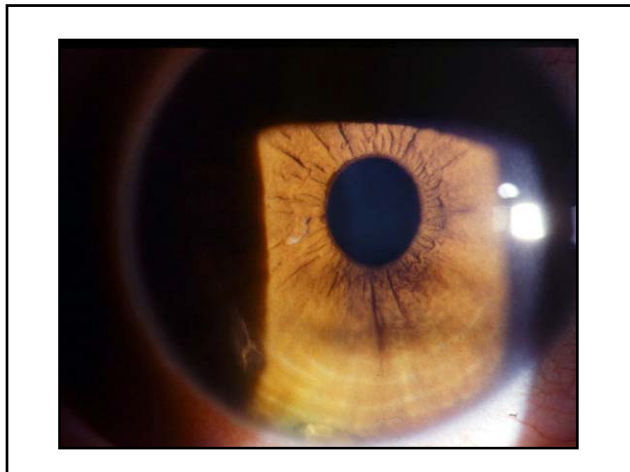
Contraindications of Narcotic agents:

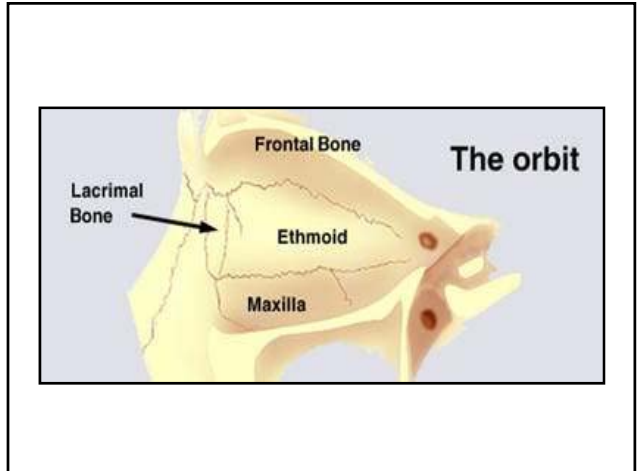
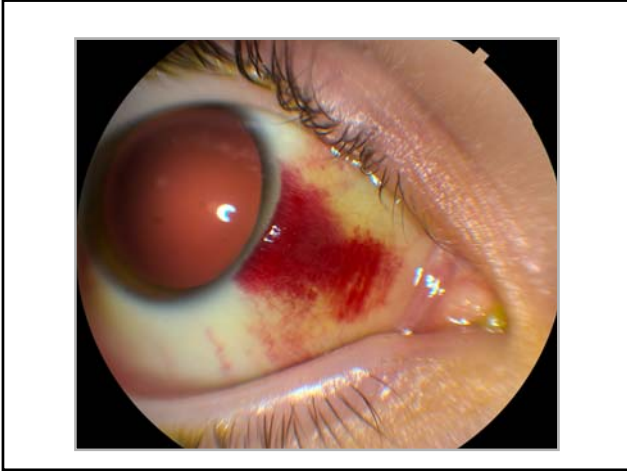
- Prior addiction
- Renal dysfunction
- Liver dysfunction
- Use of CNS agents - Tricyclic antidepressants
- Lung problems - COPD

Ultram – Tramadol HCL (Non-narcotic)

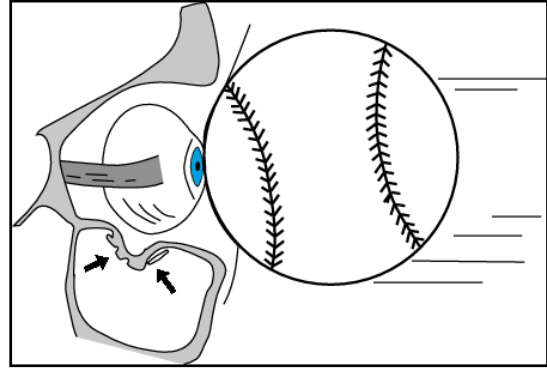
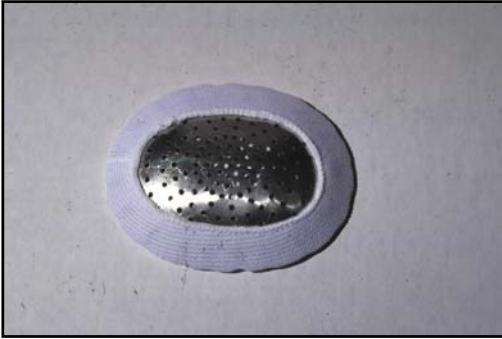
- Equal in effectiveness as Tylenol 3
- Weak opioid receptor binding
- Can be taken without regards to meals
- Minimal side effects (constipation, dizziness and nausea)
- One 50 mg tablet QID or PRN – not to exceed 400 mg / day







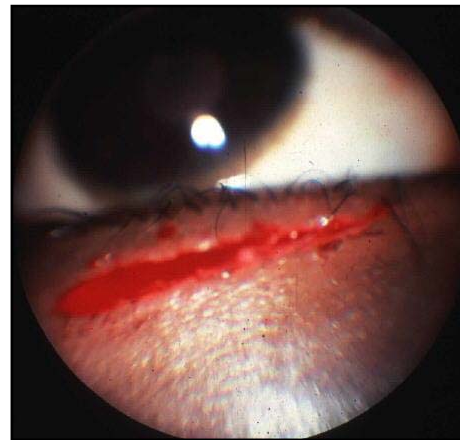
Fox Shield

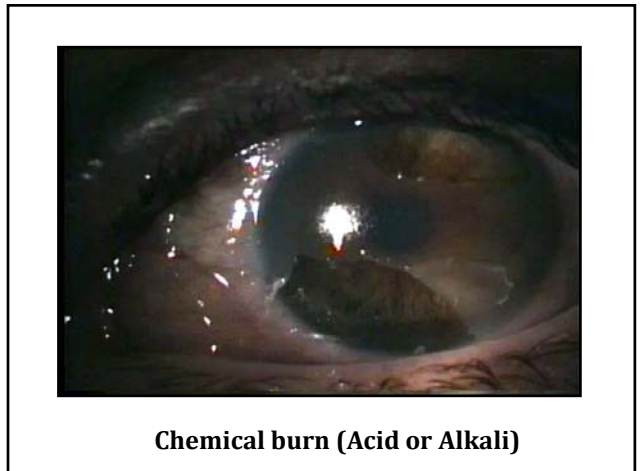
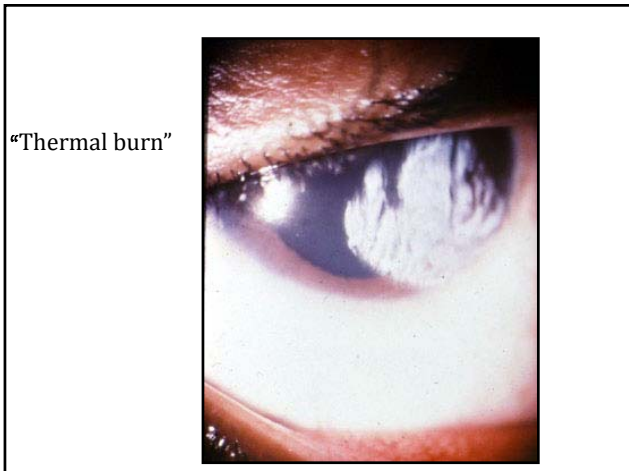


Remember Compression, Decompression, Overshoot, Oscillation

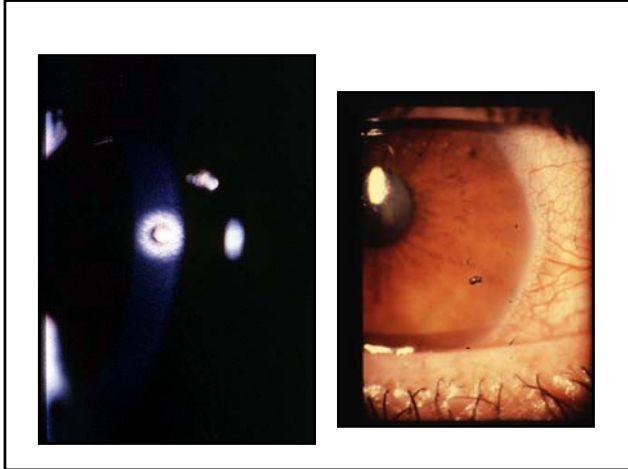
Computed Tomography (CT)

- Has replaced plain radiography
- Preferred imaging modality for ocular and periocular trauma
- Axial (1.0-2.0 mm sections) – provide best views of the globe
- Coronal (2.0 – 4.0 mm sections) – Superior and Inferior rectus muscles
- Used for foreign bodies, hemorrhage and fractures
- Intravenous contrast is rarely necessary in acute ocular or periocular trauma
- CT is faster than MRI, less expensive, less motion artifact
- Readily available at most medical facilities





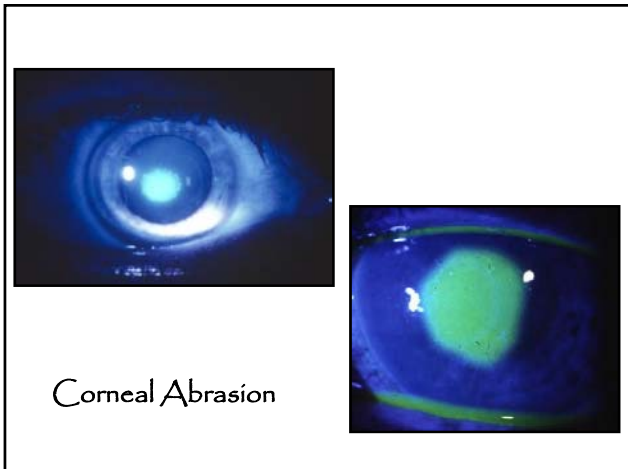
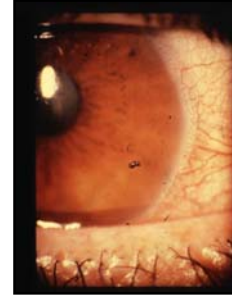
Chemical burn (Acid or Alkali)



Corneal Foreign Bodies

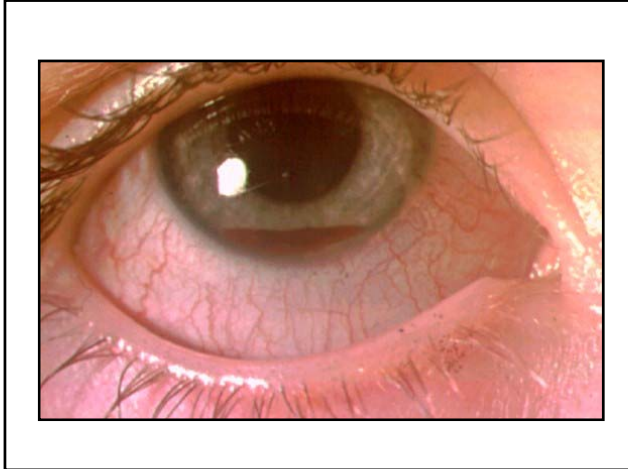
Non-metal particles causing corneal injury:

- Glass
- Plastic
- Insect parts
- Plant debris
- Wood splinters
- Paint chips
- Cinders




- Topical antibiotics for 5-7 days (drops or ointment)
- Small lacerations (<10 mm) will heal quickly without suturing
- Larger lacerations (>10 mm) and horizontally oriented lacerations should be sutured






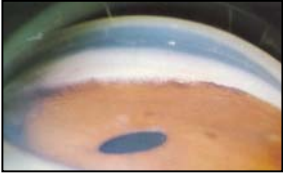
Complications of Hyphema

- Early complications attributable to the hyphema itself include:
 - Elevated intraocular pressure
 - Corneal blood staining
- Topical prednisolone acetate 1%
- Cycloplegia
- Eye shield
- Bed rest – 45 degree angle
- Daily follow-up


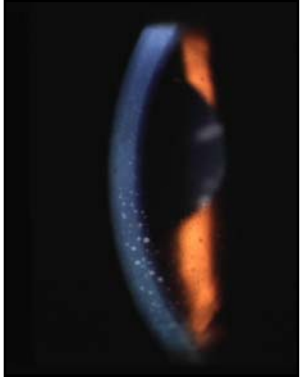


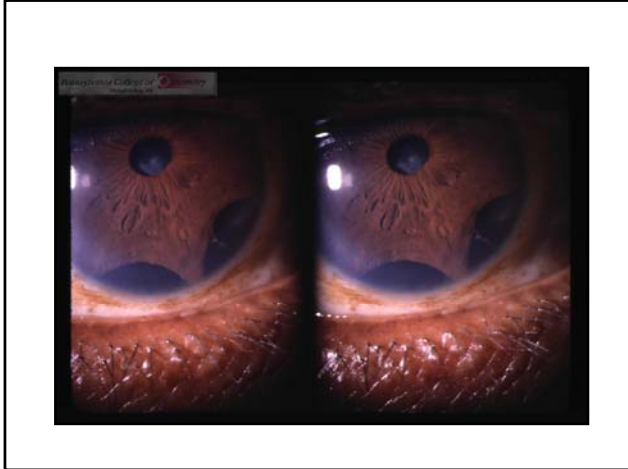
Complications of hyphema

- Anterior synechiae may form due to the organization of the clot in the AC.
- Optic atrophy can be caused by uncontrolled IOP

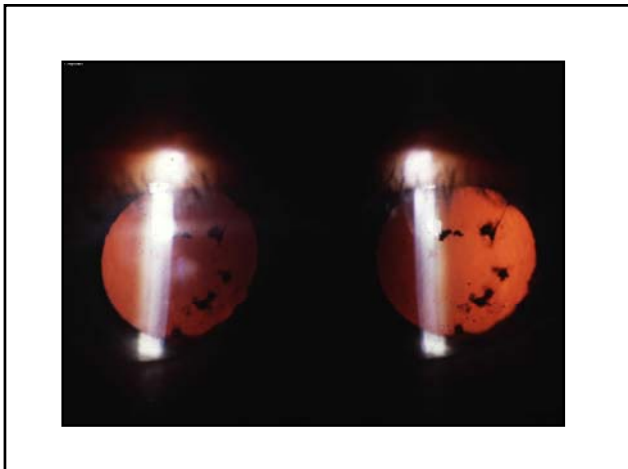
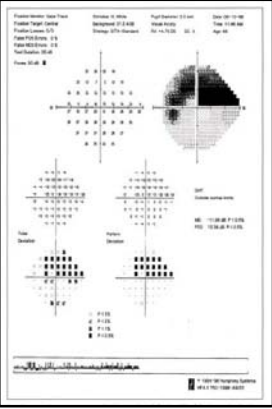



Traumatic Iritis




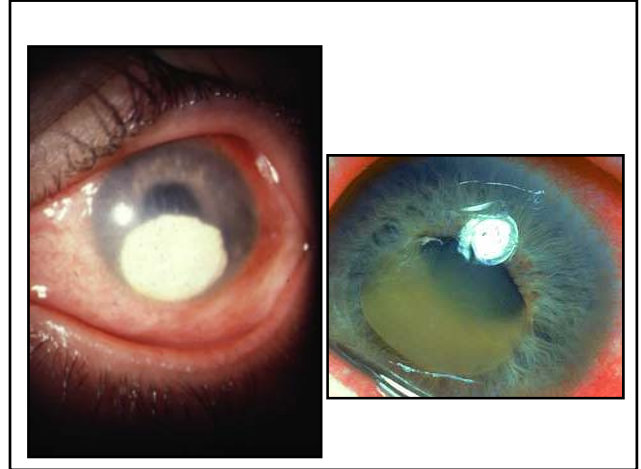
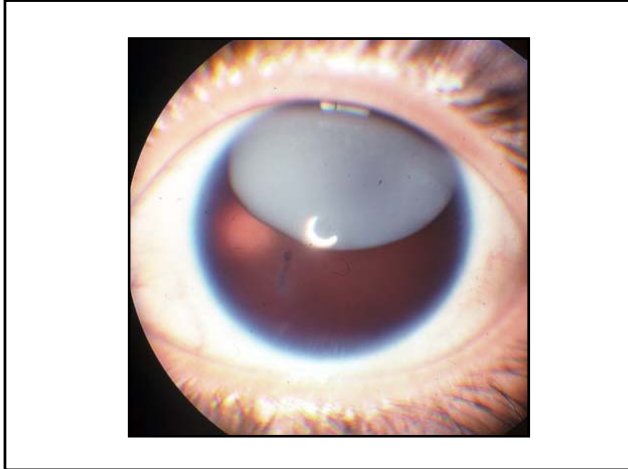


History of Eye Trauma
29 years ago - hyphema
IOP (OD) 15 (OS) 38



Traumatic
Cataract
(Days to Years)





Phacolytic glaucoma

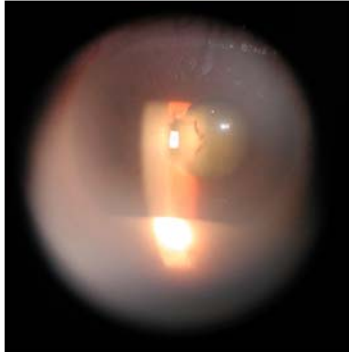
- Open angle
- Delayed onset
- Intact capsule

Lens particle glaucoma

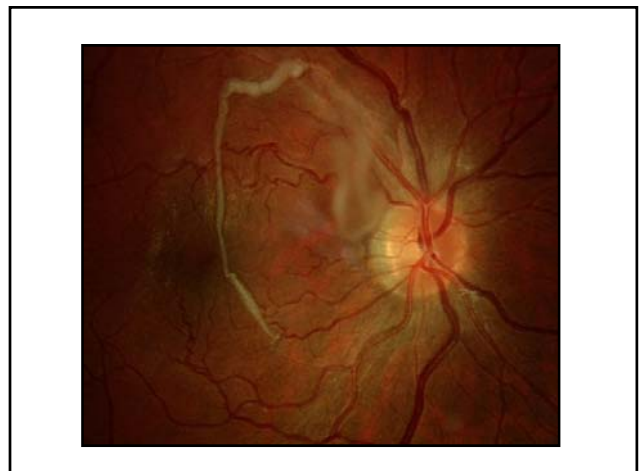
- Open angle
- Rapid onset
- Violated capsule

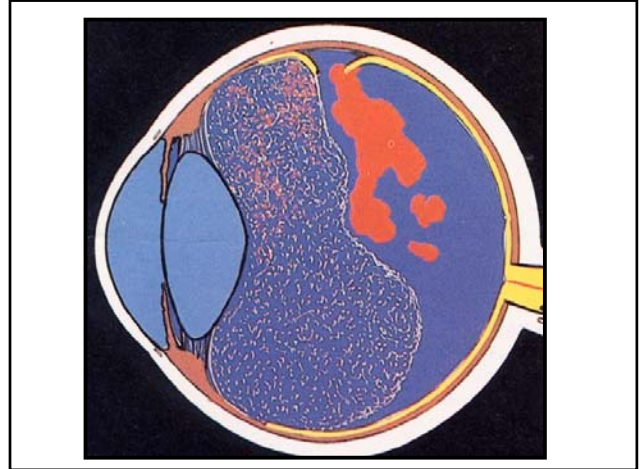
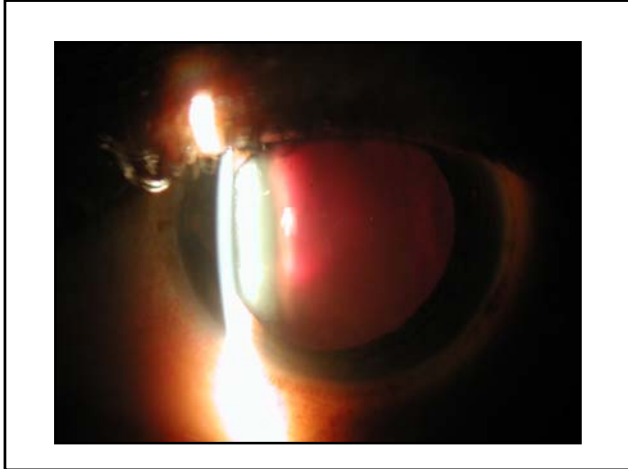
Phacomorphic glaucoma

- Closed angle
- Delayed onset
- Violated or intact capsule



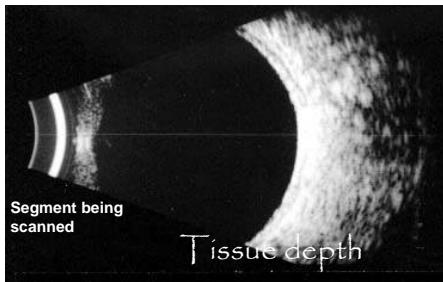
Lens induced glaucoma (days to years)





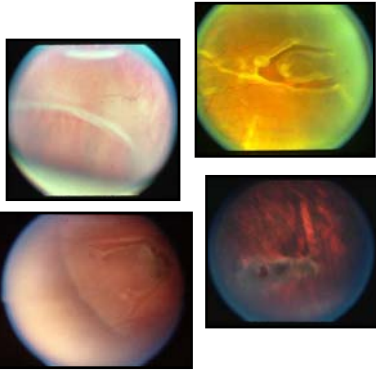
B-scan Mode

B-scan of normal eye

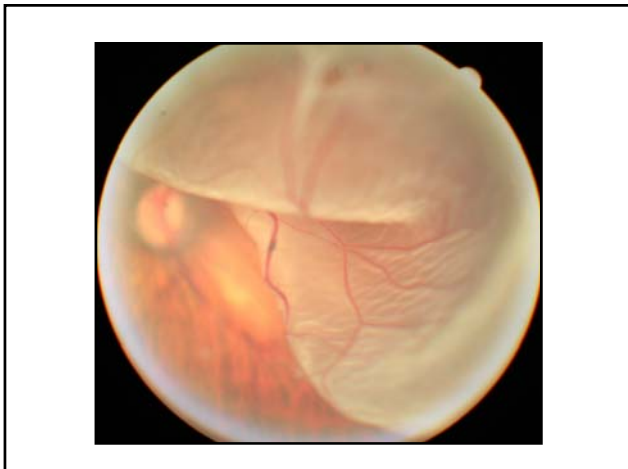
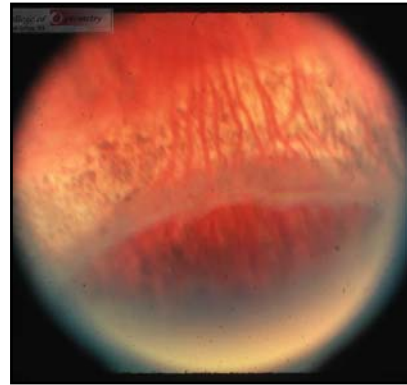


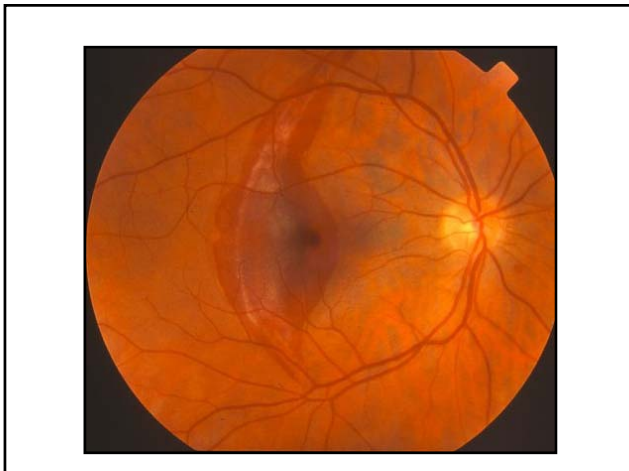
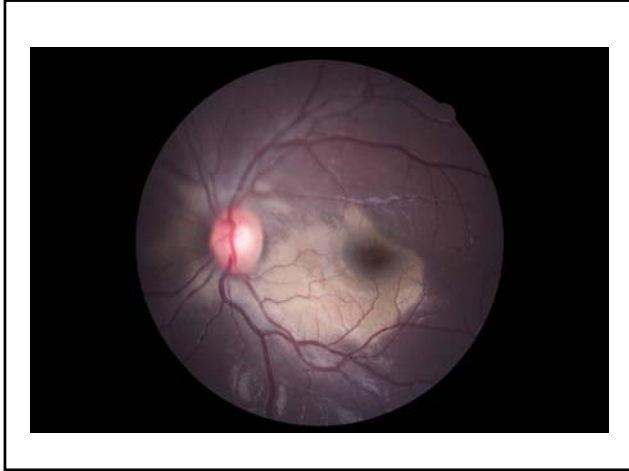
Traumatic Retinal Breaks

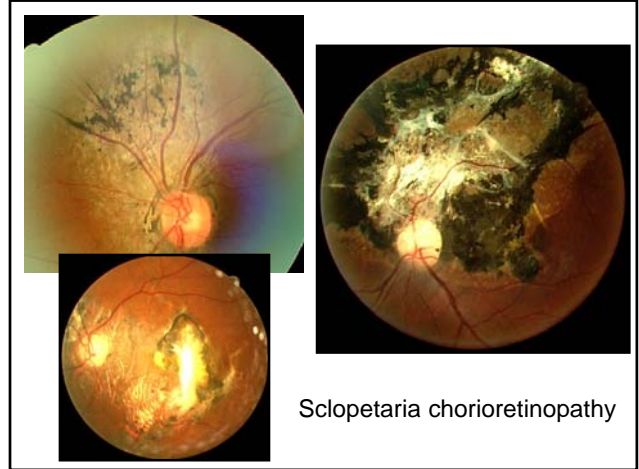
- 1. Retinal dialysis - 53%
- 2. Giant retinal tears - 16%
- 3. Retinal flap tears with adherent vitreous - 11%
- 4. Tears with lattice degeneration - 8%



Retinal Dialysis







Sclopetaria chorioretinopathy

Optic Nerve Trauma - Epidemiology

- Usually associated with significant trauma
- Often there is a multisystem trauma or brain injury present
 - Sometimes defined as a subpopulation of head trauma cases
 - Traumatic optic neuropathy occurs in approximately 3% of head trauma case
- Associated loss of consciousness in 40-72% of cases

The International Optic Nerve Trauma Study

- Conclusion:
- No clear benefit was found for either corticosteroid therapy or optic canal decompression surgery.
- The number of patients studied was sufficient to rule out major effects in the treatment groups, although clinically relevant effects in specific subgroups could have been missed. These results and the existing literature provide sufficient evidence to conclude that **neither corticosteroids nor optic canal surgery should be considered the standard of care for patients with traumatic optic neuropathy.** It is therefore clinically reasonable to decide to treat or not treat on an individual patient basis.

Prevention of Eye Injuries

- Optometrists, opticians, and ophthalmologists have the primary responsibility of educating the public
- Encourage patients to avoid hazardous situations and protect their eyes properly
- Become involved in activities designed to inform the public (mass media, public appearances, etc.)

Understanding Ocular Trauma

The End!



Any Questions ????
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