

Management of Ocular trauma

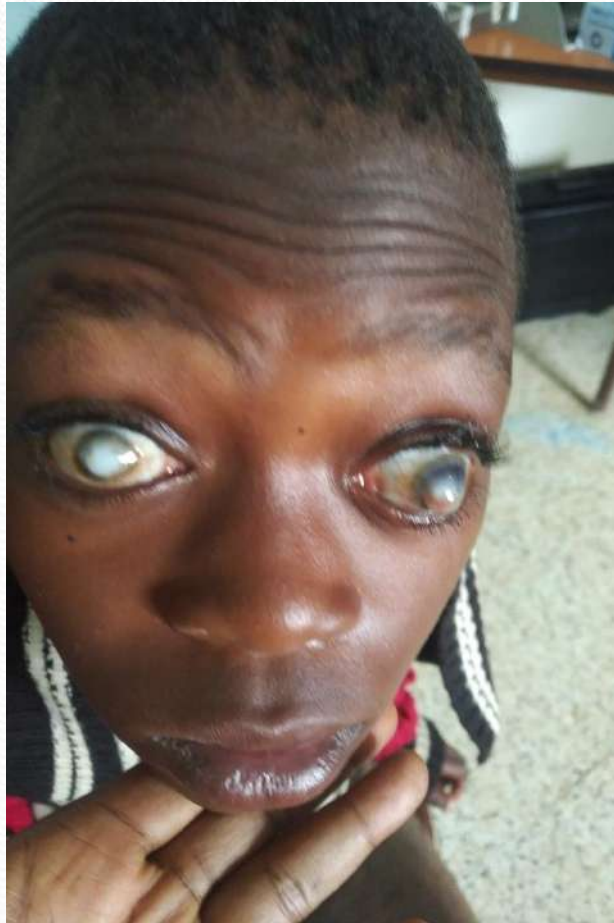
Alex nyemazi, MD

january 2020

Case #1



Case #2



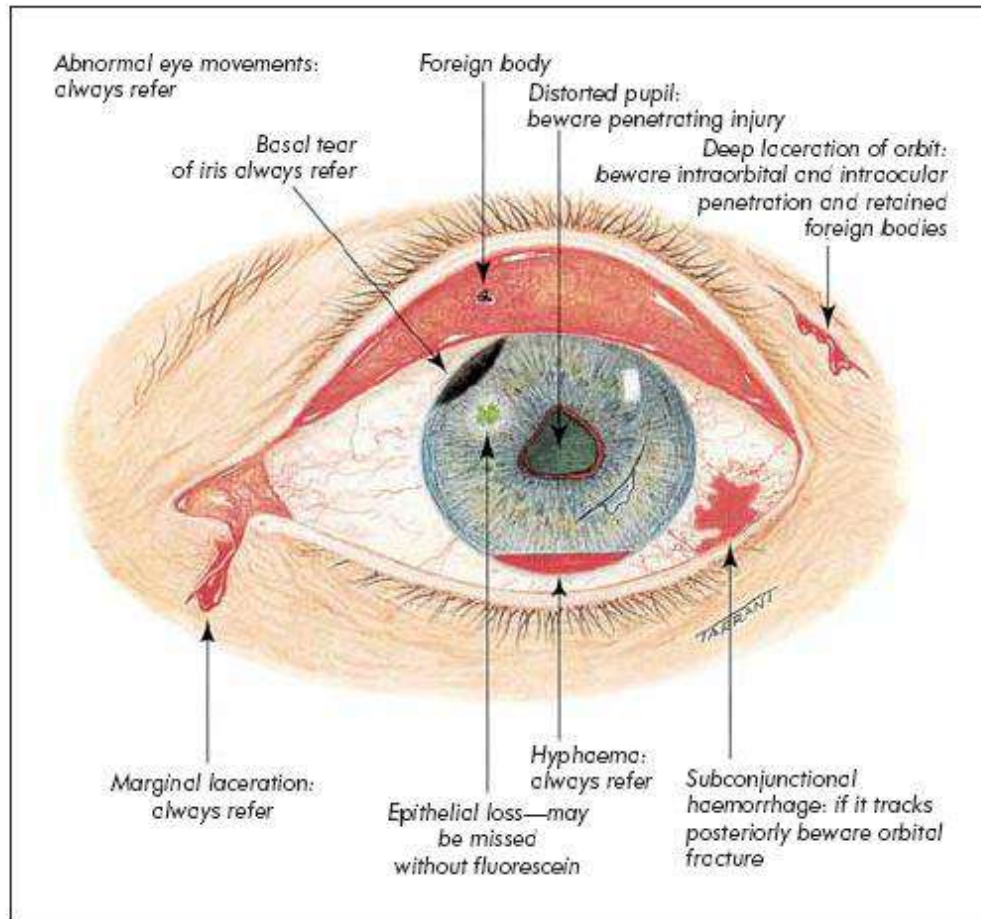
Case #3



Case #4



Ocular Trauma



The injured eye

Learning Objectives

- To take a good history in a case of ocular trauma
- To understand the effects of trauma on the eye
- To understand the management of eye trauma
- To understand basic terms related to eye trauma

Introduction

Although the eye is well protected by the orbit, it may yet be subject to injuries.

forms of injury include:

- Foreign bodies
- Blunt trauma
- Penetrating trauma
- Chemical and radiation injuries

risk factors

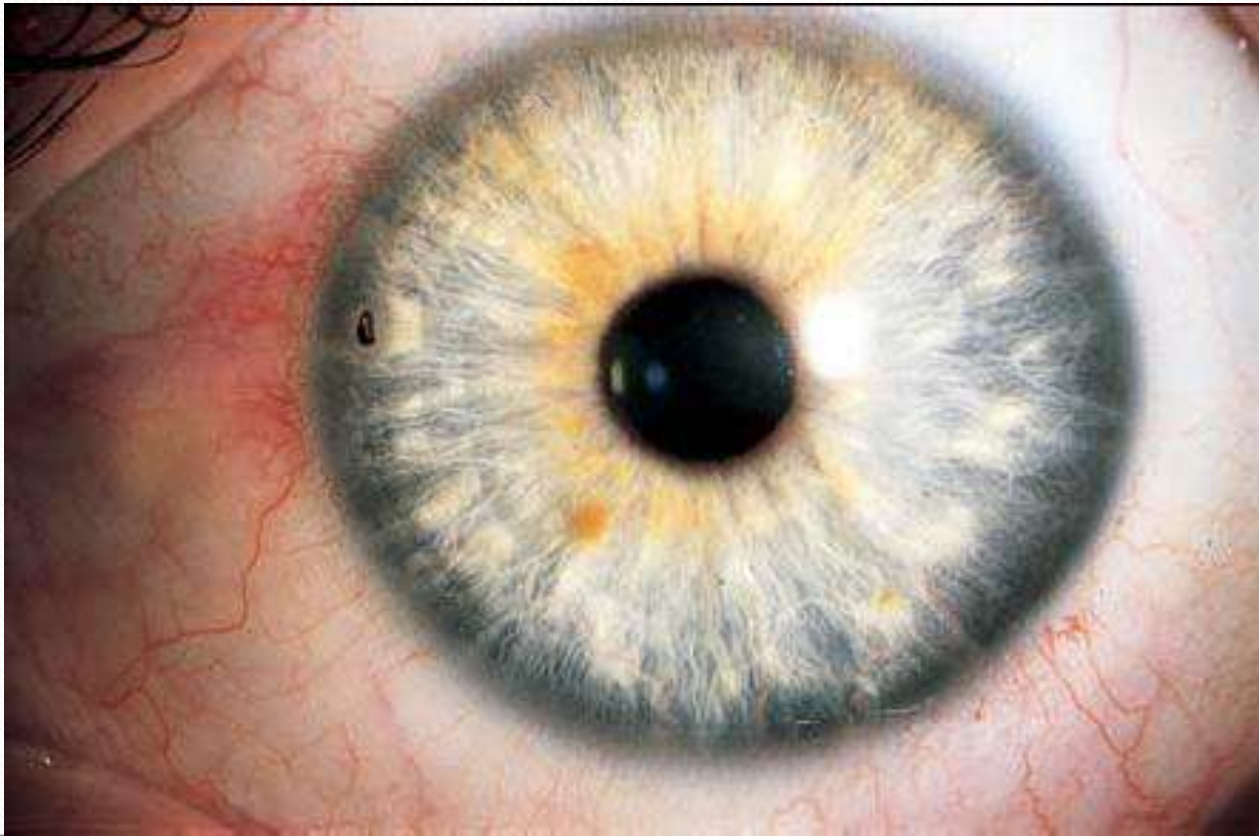
- Gender : 75%-80% of them are in males
- Age: more in children and young age group
- Occupation : construction, industry
- Sports : boxing , racket sports
- Motor vehicle accidents

Effects of eye injury :

- **Closed globe injury or Non-penetrating trauma:** The eye **globe is intact**, but the seven rings of the eye have been classically described as affected by blunt trauma.
- **Penetrating trauma:** The **globe integrity is disrupted** by a full-thickness entry wound and may be associated with prolapse of the internal contents of the eye.

Foreign bodies

Corneal foreign body is foreign material on or in the cornea, usually metal, glass, or organic material.



Effects of eye injury (cont.)

- **Blowout fracture of the orbit** is caused by blunt trauma, classically described for fist or ball injury, leading to fracture of the floor or medial wall of the orbit due to sudden increased pressure on the orbital contents.
- **Perforating trauma:** The globe integrity is disrupted in two places due to an entrance and exit wound (through and through injury). This is a quite severe type of eye injury.

Corneal foreign bodies:

Symptoms

Foreign body sensation,
Tearing, History of
trauma ,photophobia ,
pain , red eye

Signs

Corneal foreign body
with or without rust ring,
edema of the lids,
conjunctiva, and cornea,
foreign body can cause
infection and/or tissue
necrosis.



OP5. Foreign Body

Presence of rust ring on cornea after removal of
metallic foreign body.

Corneal foreign bodies cont.

Workup

1. History
2. Document visual acuity. One or two drops of topical anesthetic may be necessary to control pain.
3. Slit-lamp Examination: If there is no evidence of perforation, evert the eyelids and inspect for foreign bodies.
4. Dilate the eye and examine the vitreous and retina
5. Consider a B-scan US, CT of the orbit.

Corneal foreign bodies cont.

Treatment

1. Apply topical anesthetic, remove the foreign body with a spud or forceps at a slit lamp. If multiple superficial foreign bodies, its easier to remove with irrigation.
2. Remove the rust ring. This may require an ophthalmic drill.
3. Measure the size of the resultant corneal epithelial defect.
4. Treat as for corneal abrasion.

Blunt trauma

blunt impact may damage the structures at the front of the eye (the eyelid, conjunctiva, sclera, cornea, iris, and lens) and those at the back of the eye (retina and optic nerve).

If a small objects (such as a squash ball, shuttlecocks, knuckles, etc.) hits the area the eye itself may take most of the impact.

If a large object (such as a football, or by fist) hits the eye most of the impact is usually taken by the orbital margin.

Such an impact may also result in damage to the orbit (blow-out fracture).



Penetrating trauma

when a foreign body passes through the ocular coat
this will cause damage in the ocular structures.

.in some cases the foreign body may also be **retained
in the eye.**

.Penetrating injury of the eye
represents a major threat to
vision.

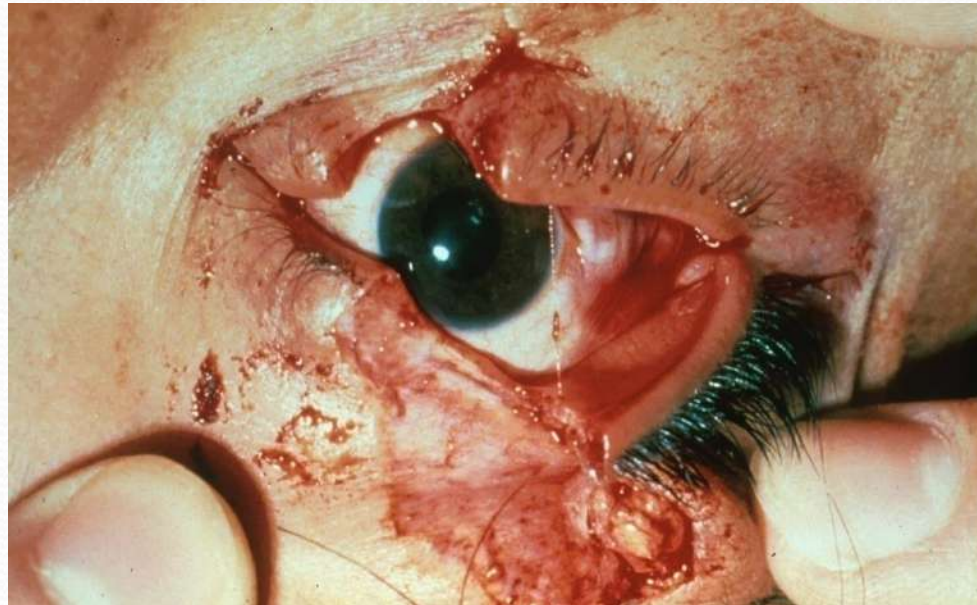


Andrew Doan, MD, PhD
U of Iowa 2004

Lid lacerations:

Eyelid Lacerations: Cuts to the eyelid caused by trauma

Superficial Lacerations can be usually treated in the emergency room under local anesthesia



Subconjunctival hemorrhage:

Is bleeding underneath the conjunctiva. The conjunctiva contains many small, fragile blood vessels that are easily ruptured or broken. When this happens, blood leaks into the space between the conjunctiva and sclera.

Symptoms

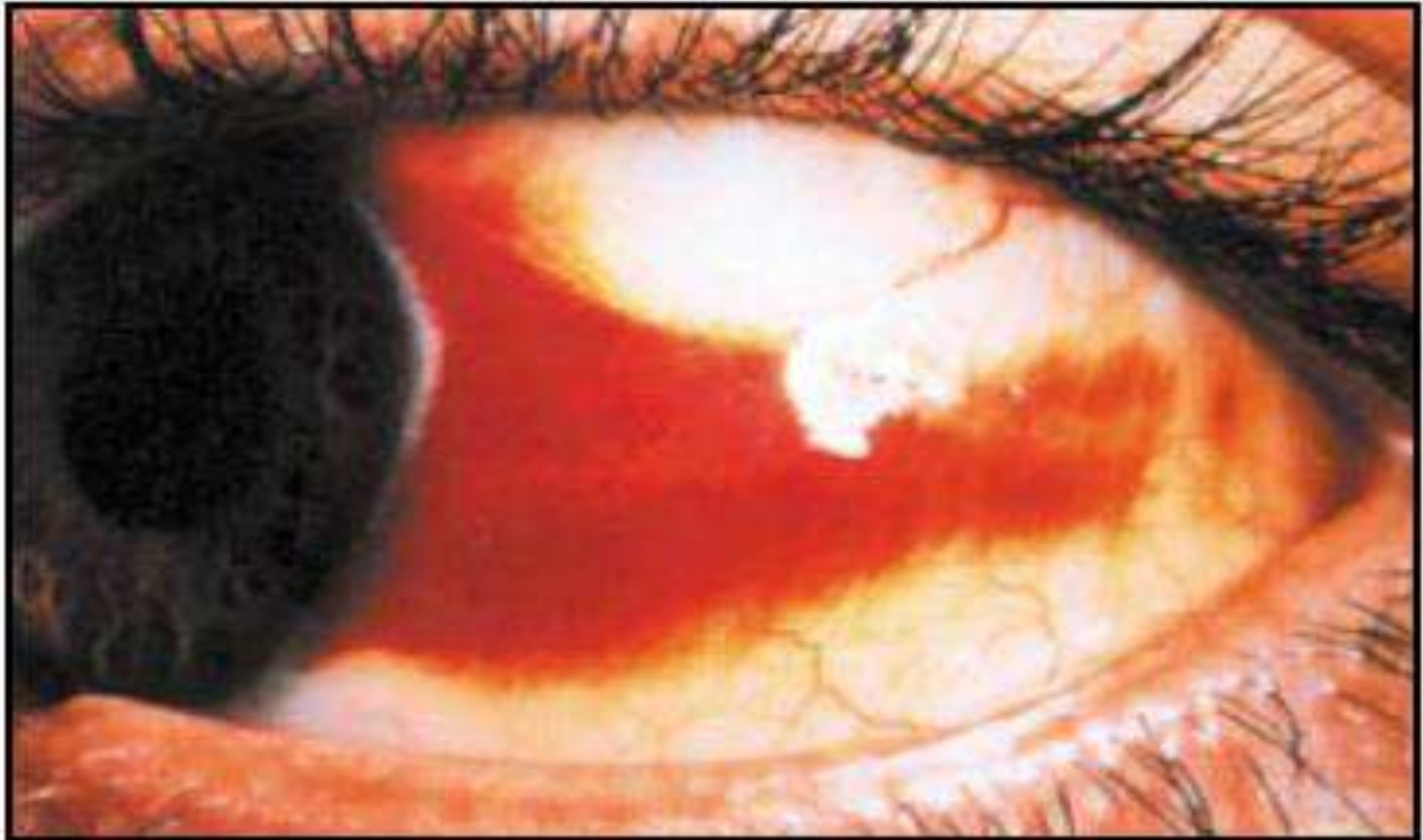
Red eye, may have mild irritation, usually asymptomatic

Signs

Blood underneath the conjunctiva, often in a sector of the eye. The entire view of the sclera may be obstructed by blood.

Causes

Valsalva (e.g., coughing or straining), Trauma, HTN, Bleeding disorder, Hemorrhage due to orbital mass (rare), Idiopathic



OP12. Subconjunctival Hemorrhage

Subconjunctival hemorrhage as evidenced by a bright red colour.

Subconjunctival hemorrhage cont.

Workup

-History: Bleeding or clotting problems? Medications (e.g., aspirin, warfarin)? Eye rubbing, trauma, heavy lifting, Valsalva? Recurrent Subconjunctival Hemorrhage? Acute or Chronic cough (COPD)?

-Check Vital signs

-History of recurrence or bleeding problem; order Bleeding time, PT, PTT, CBC.

-Positive Orbital signs: CT scan with and without contrast

Subconjunctival hemorrhage cont.

-Ocular Examination: Rule out a conjunctival lesions, Check IOP, and Check extraocular motility.

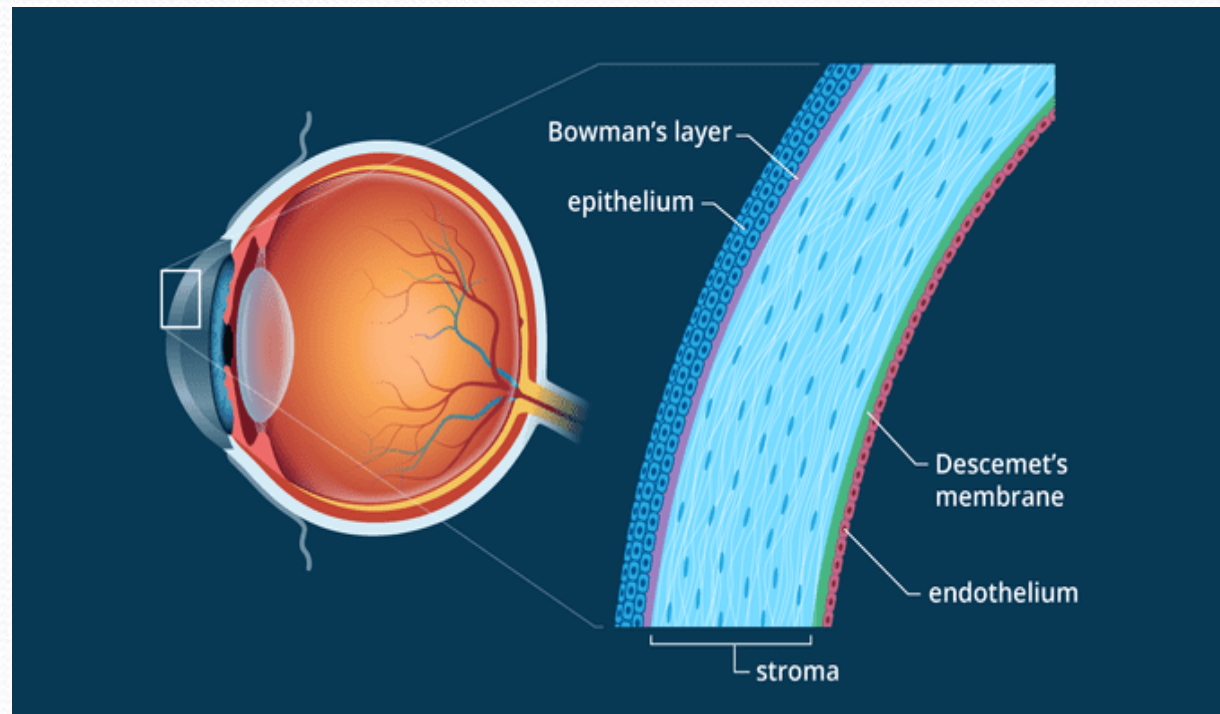
In traumatic cases you should rule out: Ruptured Globe (Abnormal deep ant. Chamber, Significant SCH, Hyphema, Vitreous hemorrhage, or prolapse of uveal tissue) .

Retrobulbar Hemorrhage (Exophthalmus, Increased IOP, and chemosis)

Orbital Fracture (Limited extraocular eye motility, eno- or exo-phthalmus, preiorbital crepitus, paraesthesia.

The cornea

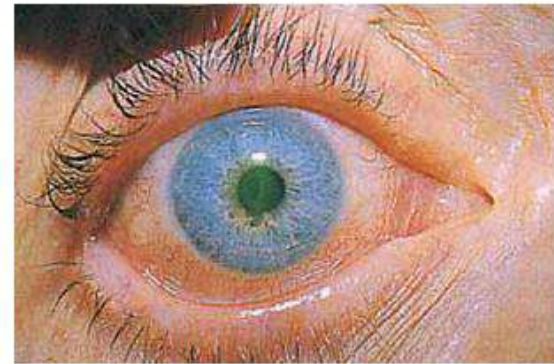
The **cornea** is the transparent front part of the eye that covers the iris, pupil, and anterior chamber



Corneal abrasion:

is a medical condition involving the loss of the surface epithelial layer of the eye's cornea.

It's the most common eye injury and perhaps one of the most neglected, it occurs because of a disruption of the integrity of corneal epithelium



Corneal abrasion stained with fluorescein and illuminated with white light



Corneal abrasion stained with fluorescein and illuminated with blue light

Corneal abrasion cont.

- They usually heal without serious consequences, although deep abrasion can result in scar formation in the stroma.

Corneal abrasion cont.

- Most patients present with the following:

Photophobia

Watering

Foreign body sensation

Gritty feeling

Pain

Corneal edema

Corneal abrasions cont.

Treatment:

- **Antibiotics**

Ointment
(Erythromycin,
Ciprofloxacin) Drops
(Polytrim, Fluoroquinolone)

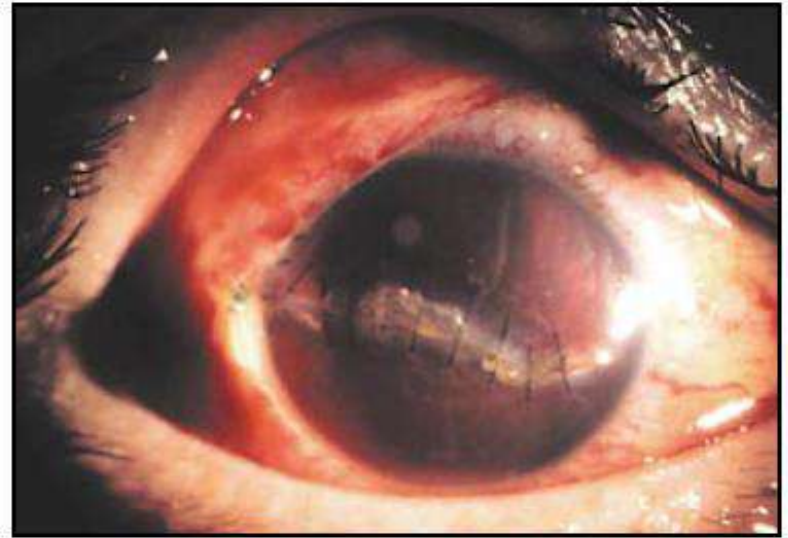
- **Cycloplegic agent**
(Cyclopentolate) for
discomfort from traumatic
iritis which may develop
24-72 hours. **AVOID**
STEROIDS.

- **Patching** for comfort,
and avoiding scratching of
the eye during sleep.
- **Topical NSAIDS**
drops (Ketorolac) for
pain control. **AVOID** in
post-op patients
- **Debriding** loose or
hanging epithelium
- No contact lens wear

Corneal lacerations:

A corneal laceration is a partial- or full-thickness injury to the cornea.

A full-thickness injury penetrates completely through the cornea, causing a ruptured globe



OP2. Corneal Laceration

Corneal laceration

Partial thickness:

Signs

The Ant. Chamber isn't entered, therefore, the cornea isn't perforated

Workup

1. Complete ocular examination
2. Seidel test. If positive then it's a full-thickness laceration.

Seidel test: is used to assess the presence of anterior chamber leakage in the cornea.

Corneal lacerations cont.

Treatment

1. Cycloplegic (Scopolamine) and an antibiotic eyedrop
2. If moderate to deep corneal laceration is accompanied by wound gape, it is often best to suture.
3. Tetanus toxoid for dirty wounds

Follow up

Reevaluate daily until the epithelium heals.

Corneal lacerations cont.

Full thickness:

We should exclude Ruptured Globe and Penetrating Ocular injury, A full-thickness injury will allow aqueous humor to escape the anterior chamber, which can result in a flat-appearing cornea, air bubbles under the cornea, or an asymmetric pupil secondary to the iris protruding through the corneal defect.

Small, self-sealing, or slow leaking lacerations may be bandaged with soft contact lenses, antibiotics drops.

Alternatively, a pressure patch and twice-daily antibiotics may be used. **AVOID steroids.**

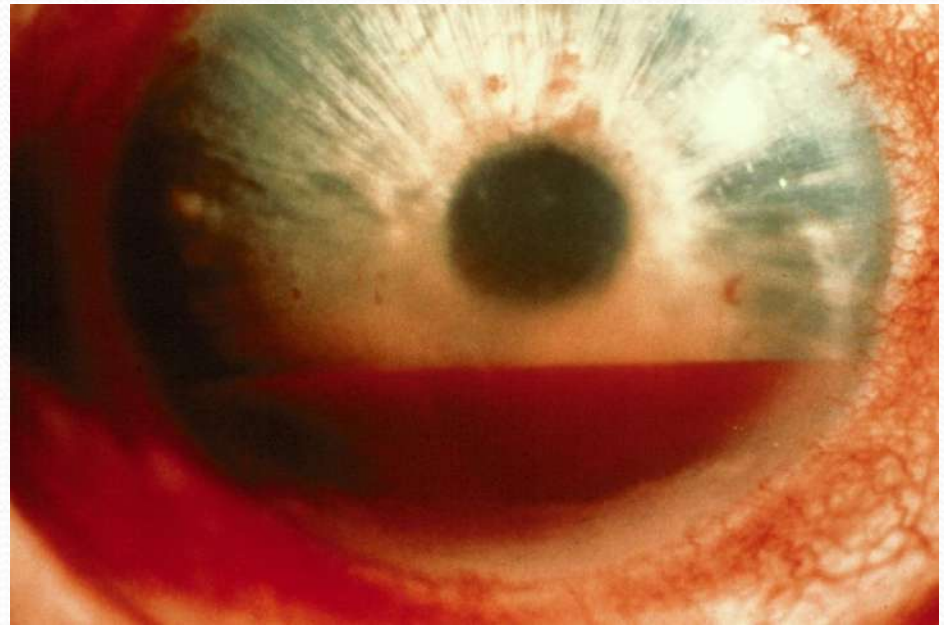
Hyphema:

Symptoms

Pain, Blurred vision, History of blunt trauma

Signs

Blood in the Anterior Chamber. Gross layering or clot or both, usually visible without a slit lamp. A total (100%) hyphema may be black or red; when black its called “8-ball” or “black ball” hyphema.



Hyphema cont.

Workup

1. History: Mechanism of injury,
2. Complete Ocular Examination
3. CT scan of the orbit
4. Screen for sickle cell disease or trait

Factors with poor outcome:


1. Poor visual acuity (worse than 20/200)
2. Sickle cell disease/trait with increased IOP
3. Medically uncontrollable IOP
4. Large initial hyphema
5. Recent Aspirin, NSAIDs use
6. Delayed presentation

Hyphema cont.

Treatment

For all patients

1. Complete bed rest or hospitalization
2. Place a shield over the injured eye
- . Elevation of the head
 3. Atropine
 4. Mild analgesics
 5. Topical steroids drops

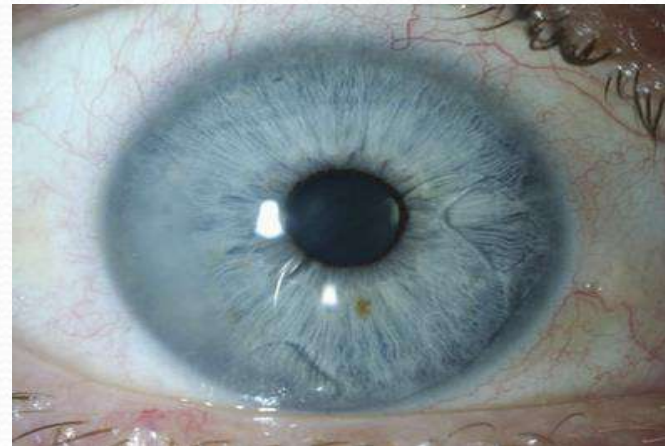
- 
- complications:1.hemosiderosis
 - 2.hetrochromia
 - 3.blood acumulation may also cause elevation of the intraocular pressure

of the lens: Subluxation /dislocation

Definition:

Subluxation: Partial disruption of the zonular fibers; the lens is decentered but remains partially in the pupillary aperture

Dislocation: Complete disruption of the zonular fibers; the lens is displaced out of the pupillary aperture.



Subluxation/dislocation of the lens cont.

Symptoms

Decreased vision, double vision that persists when covering one eye (monocular diplopia)

Sign

Decentered or displaced lens,. Marked astigmatism, Cataract, Angle-closure glaucoma as a result of pupillary block, acquired high myopia, vitreous in the ant. Chamber, asymmetry of the ant. Chamber depth

Other Causes

Marfan Syndrome
Homocystinuria

Subluxation/dislocation of the lens cont.

Treatment

1. Subluxation:

Asymptomatic; Observe

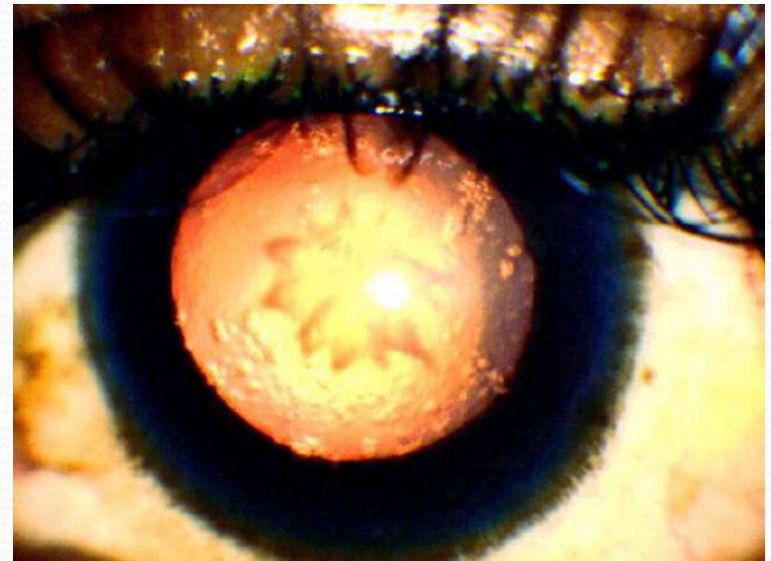
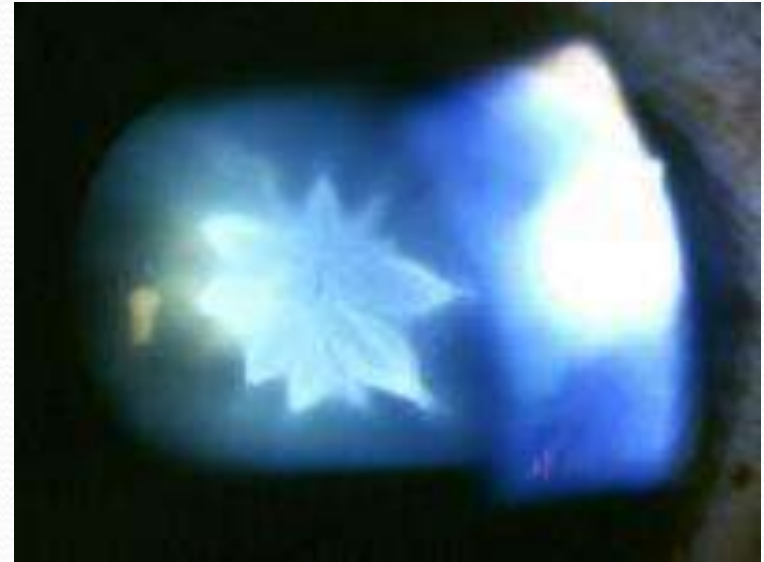
High uncorrectable astigmatism; Surgical removal
of the lens

Symptomatic cataract: Surgical removal,

Traumatic cataract

Traumatic cataracts occur secondary to blunt or penetrating ocular trauma. Infrared energy, and ionizing radiation are other rare causes of traumatic cataracts.

Cataracts caused by blunt trauma classically form stellate- or rosette-shaped. penetrating trauma with disruption of lens capsule forms cortical changes



Traumatic cataract cont.

History

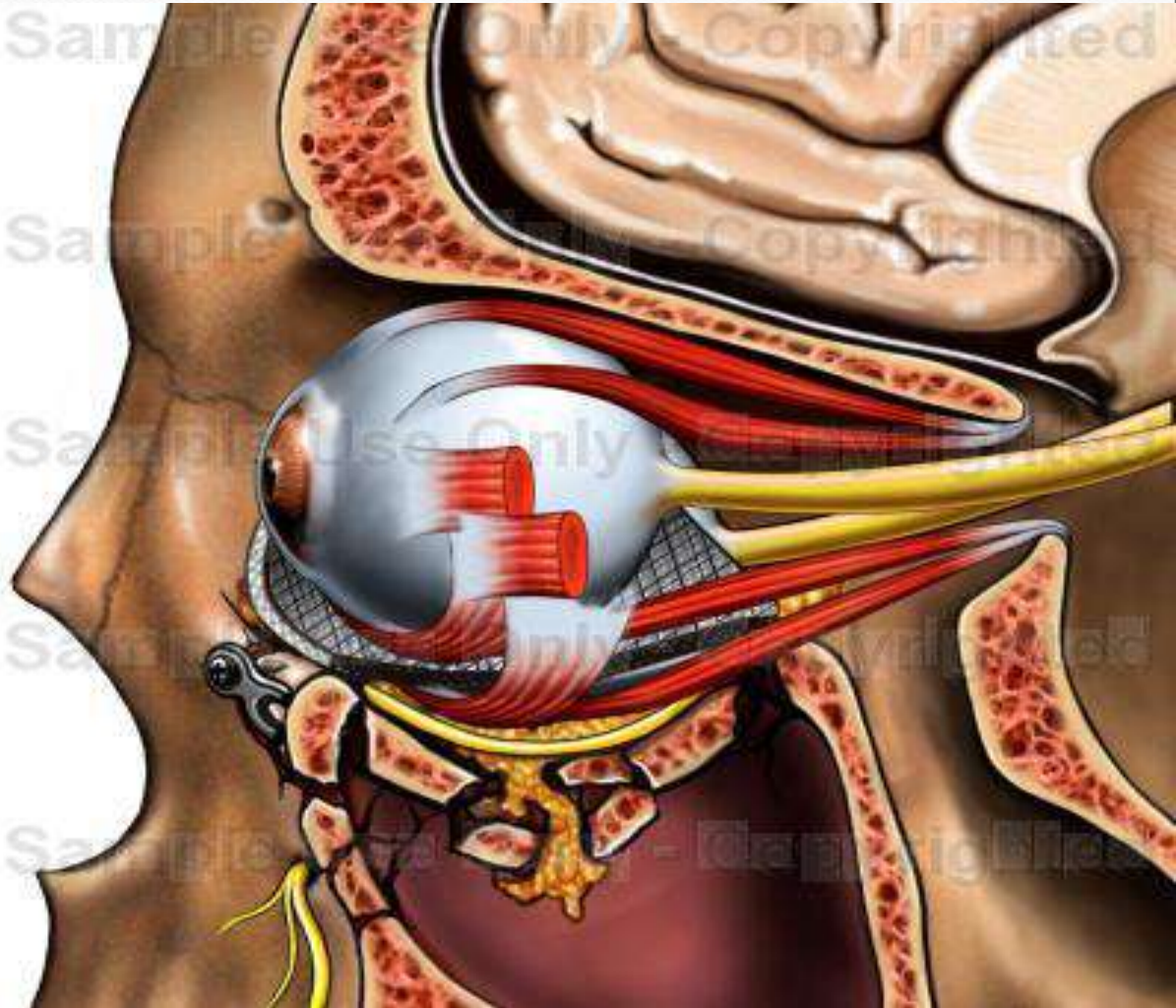
Mechanism of injury -
Sharp versus blunt

Past ocular history -
Previous eye surgery,
glaucoma, retinal
detachment, diabetic eye
disease

Planning surgical
approach is of most
importance in cases of
traumatic cataract.

Blowout fracture

A **blowout fracture** is a fracture of the walls or floor of the orbit. Intraorbital material may be pushed out into one of the paranasal sinuses. This is most commonly caused by blunt trauma of the head



: Blowout fracture

- Symptoms:

 - Pain (especially on attempted vertical eye movement)

 - Local tenderness

 - Binocular double vision

 - Eyelid swelling

 - And creptius after nasal blowing

- Sign:

- Emphysema (air under the skin with crackles when pressed) derived from the fractured sinus.

- Parasthesia below the orbital rim suggesting infraorbital nerve damage

- Limitation of eye movement , particularly on upgaze and downgaze , due to tethering of the inferior rectus muscle .

Blowout fracture cont.

-Treatment (most adult orbital fractures can initially be followed conservatively)

*Broad spectrum oral antibiotic (may be use but not mandatory)

*Instruct the patient not to blow his nose

*Apply ice packs to the orbit for the first 24 to 48 hours

The aim of treatment is prevention of permanent diplopia and cosmetically unacceptable enophthalmos.

The factors that determine the risk of late complications are

- Fracture size

- Herniation of orbital content into the maxillary sinus

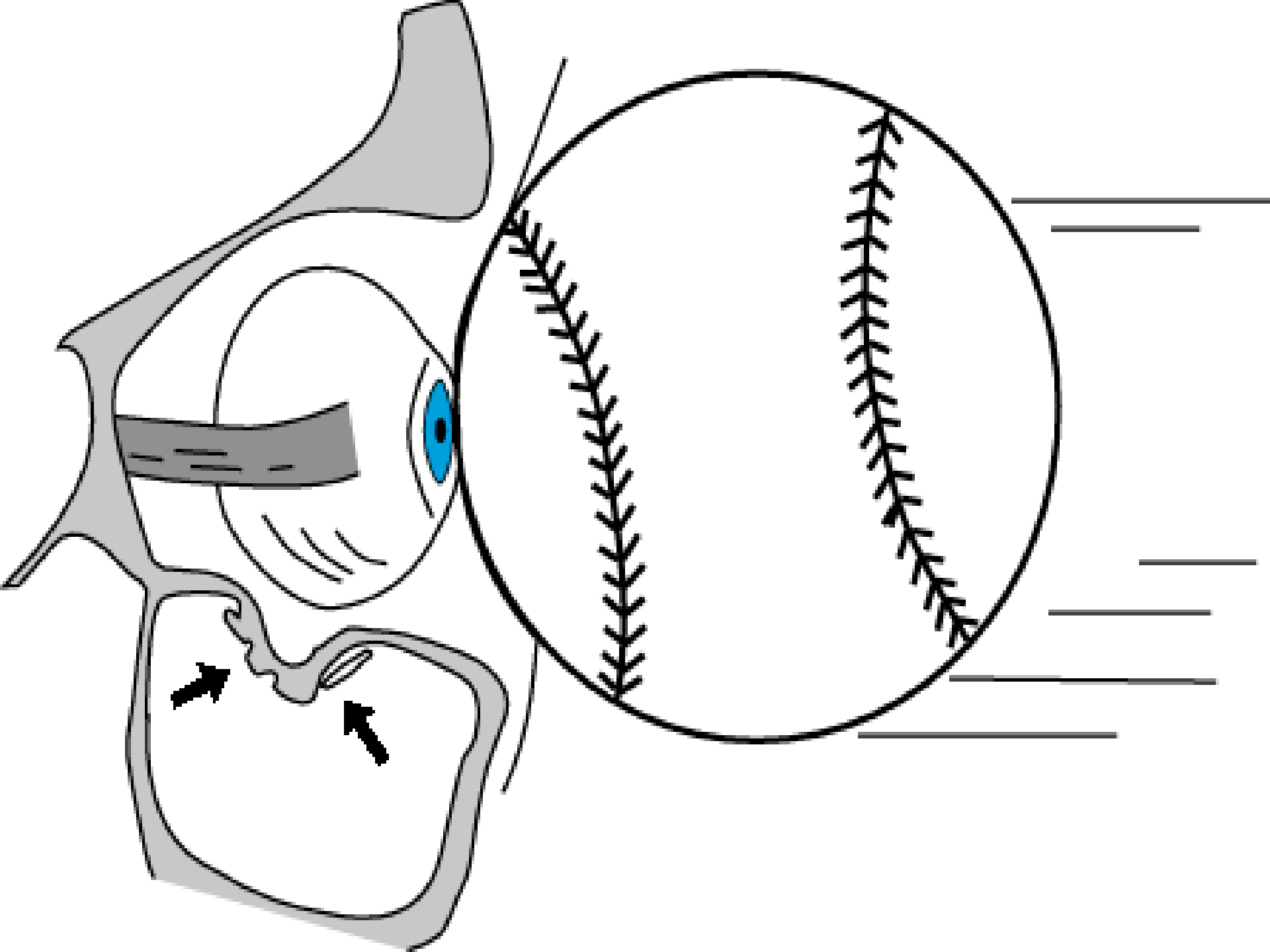
- Muscle entrapment

*Surgical repair

- Immediate repair (usually within 24hr.)

- Repair in 1 to 2 weeks

*Neurosurgical consultation is recommended



**Restriction on
upgaze due to
trapping of the
inferior rectus
muscle by
connective tissue
septa caught in the
fractured site.**

The inferior
orbital floor is
the most
commonly
fractured site.



Commotio retinae:

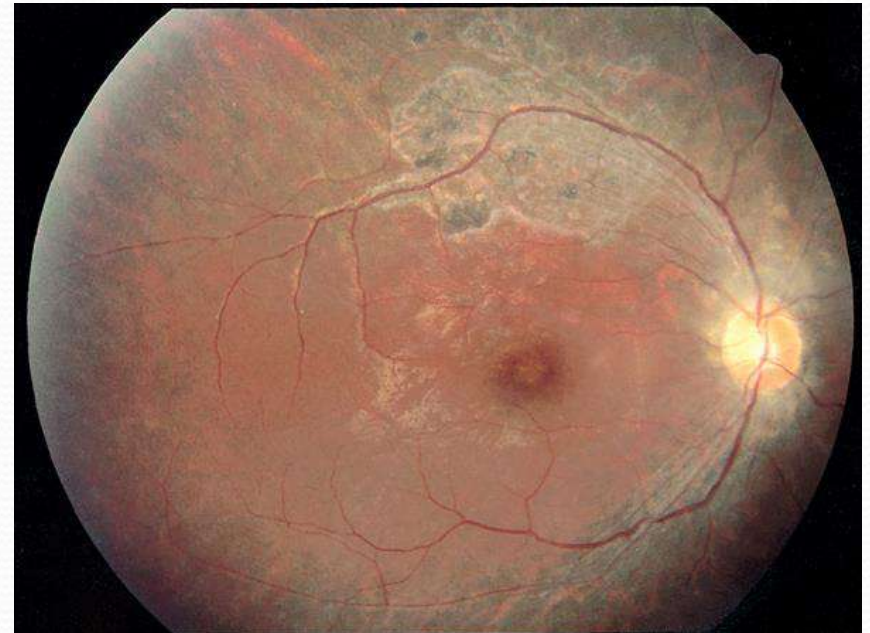
Concussion of the retina that may produce a milky edema in the posterior pole that clears up after a few days.

Symptoms

Decreased vision or asymptomatic, history of recent ocular trauma

Signs

Confluent area of retinal whitening



Commotio retinae cont.

Workup

Complete ophthalmic examination, including dilated fundus examination. Scleral depression is performed except when a hyphema, or iritis is present

Treatment

No treatment is required because this condition usually clears without therapy

Follow up

Dilated fundus examination is repeated in 1-2 weeks.

Traumatic retinal detachment:

Retinal detachment refers to separation of the inner layers of the retina from the underlying retinal pigment epithelium (RPE, choroid).



Chemical burn (injury)

ALKALIS INJURIES

- The chief danger comes from alkali-containing compounds found in household cleaning fluids, fertilizers and pesticides.
- Alkali chemicals are lipophilic and penetrate cell membranes through **saponification** of membrane lipids
- They erode and opacify the cornea

ACIDIC INJURIES

These burns are generally less destructive than their alkali

- Hydrochloric acid (used to clean swimming pools, LABORATORIES) and sulfuric acid (found in car batteries) are some of the more common acids encountered in emergency settings. are somewhat less dangerous.
- Acids tend to denature, **coagulate**, and precipitate corneal proteins on contact, creating a barrier that prevents deeper penetration of the acid.

Chemical burn (injury) cont.

Treatment should be instituted immediately, even before testing vision.

Emergency treatment:

1-copious irrigation of the eyes, preferably with saline or ringer lactate.

Don't use acidic solutions to neutralize alkalis or vice versa.

Pull down the lower eyelid and evert the upper eyelid to irrigate the fornices

2-irrigation should be continued until neutral PH is reached.

The volume of irrigation fluid required to reach neutral PH varies with the chemical and the duration of the chemical exposure

Chemical burn (injury) cont.

For mild to moderate burns (during and after irrigation):

- cycloplegic
- topical antibiotic
- oral pain medication
- if increase IOP use drugs to reduce it (acetazolamide, methazolamide add b blocker if additional IOP control is required)
- frequent use of preservative free artificial tear

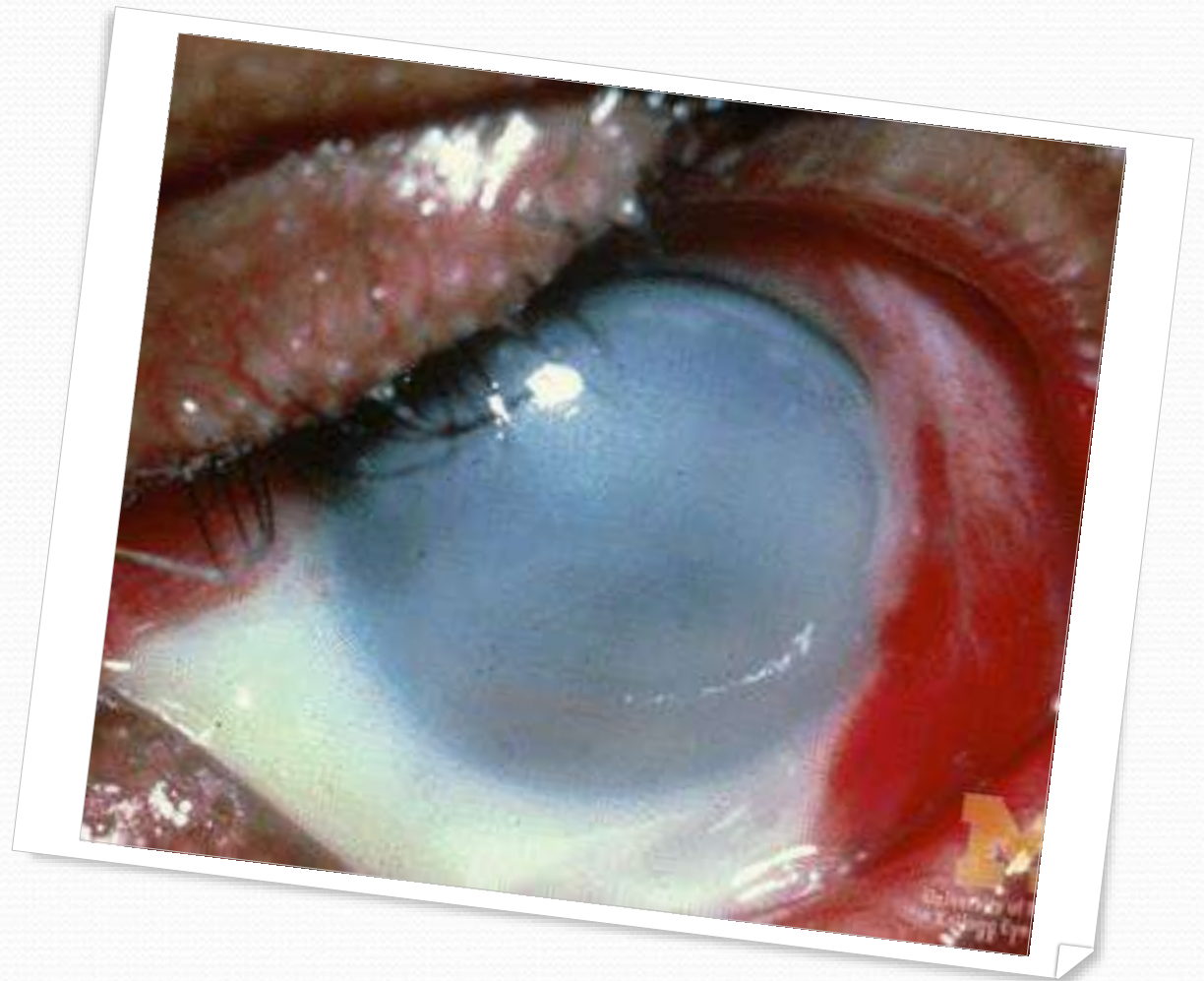
Chemical burn (injury) cont.

For severe burns (Treatment after irrigation):

- Admission to the hospital Lysis of conjunctival adhesion
- Debride necrotic tissue
- Topical antibiotic
- Topical steroid
- Consider a pressure patch
- Antiglaucoma medication if the IOP is increased or cant be determined
- Frequent use of preservative free artificial tear
- Other consideration:
 - Therapeutic contact lenses, collagen, amniotic membrane transplant
 - IV ascorbate and citrate for alkali burns
 - If any melting of the cornea occurs, collagenase inhibitors may be used
 - If the melting progresses an emergency patch graft or corneal transplat may be necessary.

**Chemical burn
(injury)**

A hazy cornea
following an
alkali burn





DANKE