

Eye injuries

Dr Altin Hoxha MRCPGP



— **BELMATT** —
HEALTHCARE TRAINING

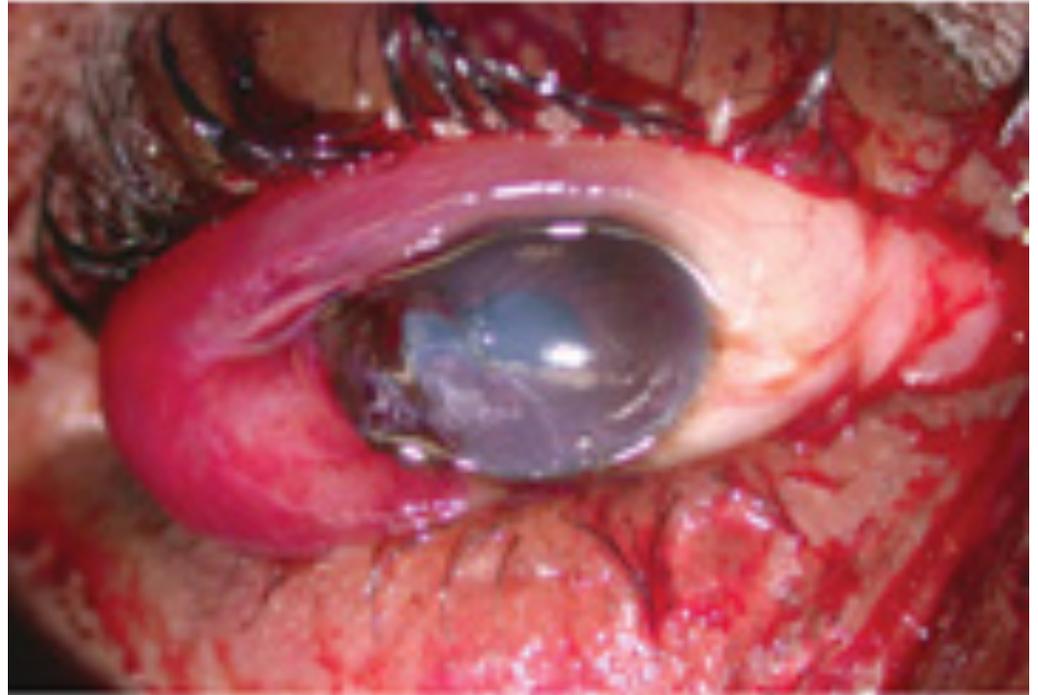
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Eye injuries

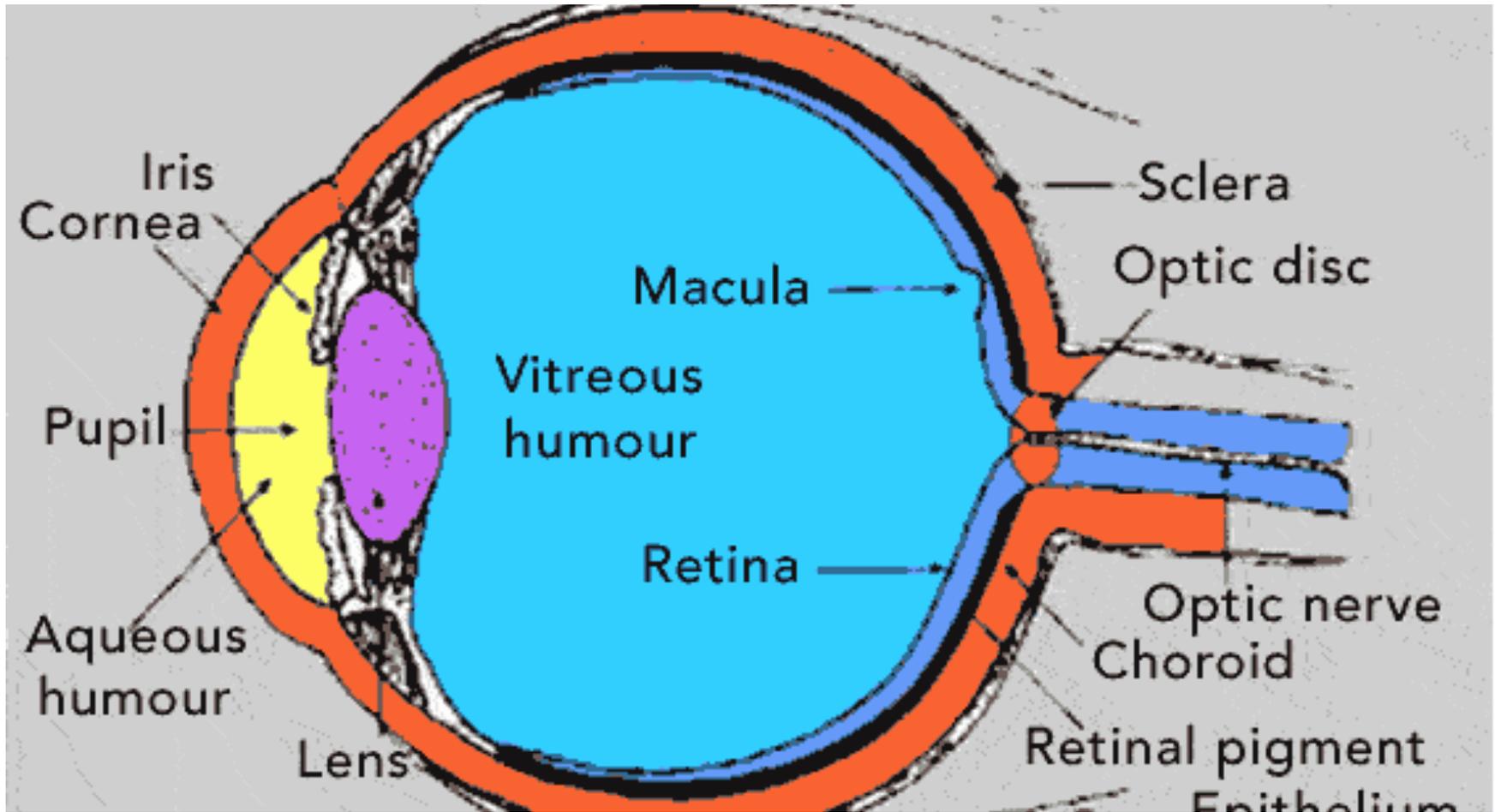


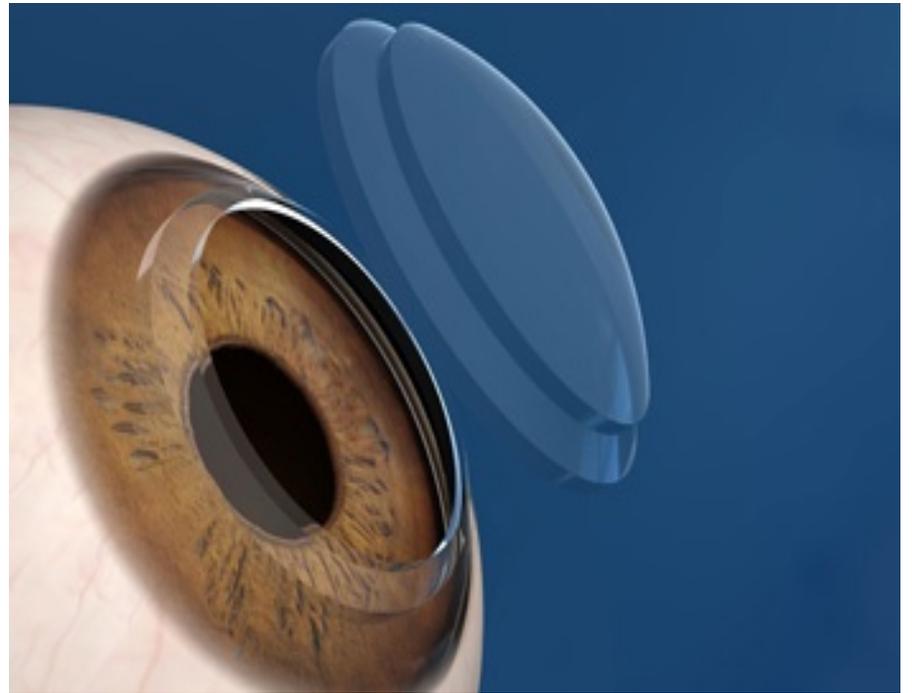
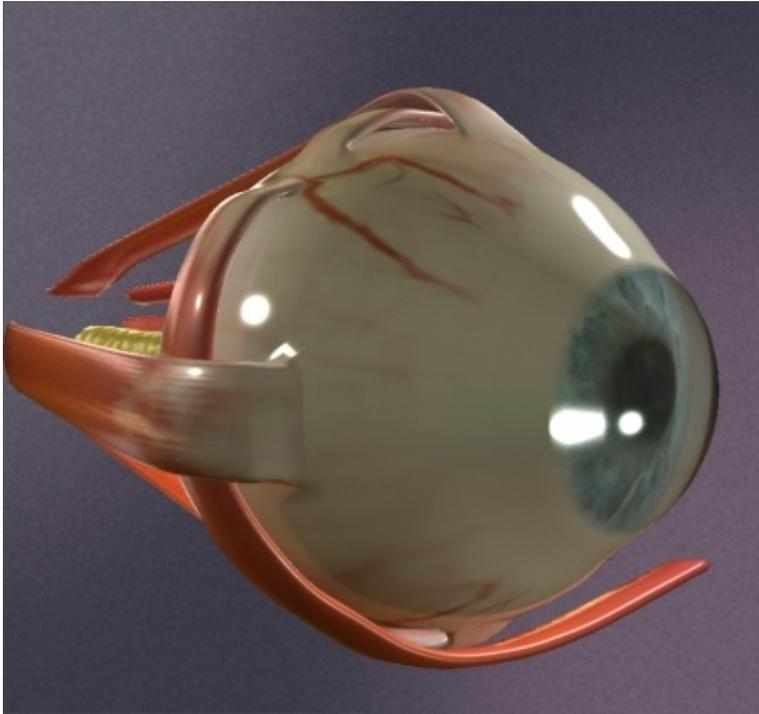
Eye injury

- 3% of all emergency department visits
- Rapid assessment and examination
- to **prevent further damage to the eye**
- loss of vision in one or both eyes has been classified as a **24% or 85%** whole-person impairment or disability, respectively

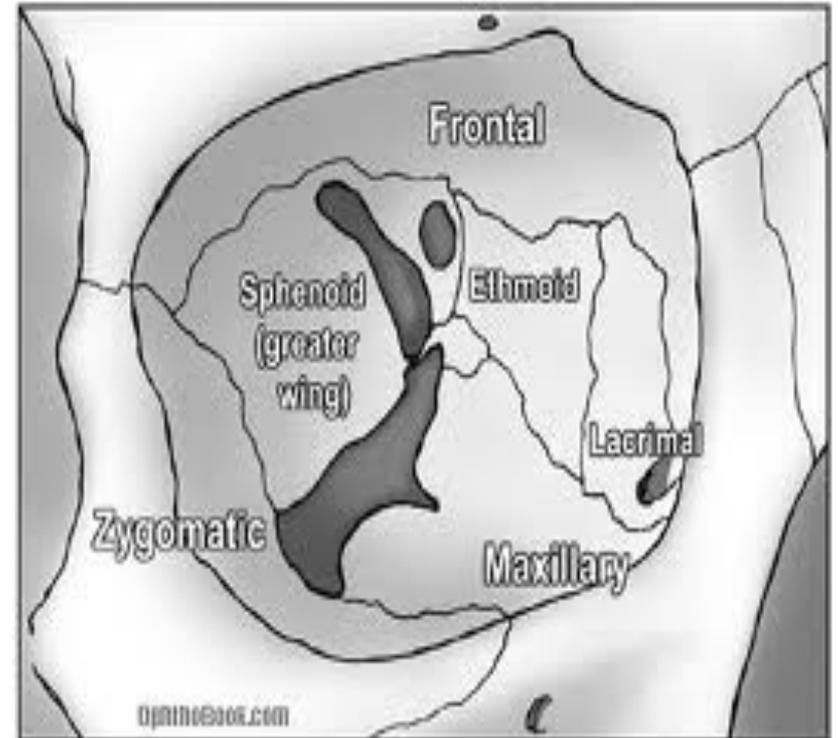
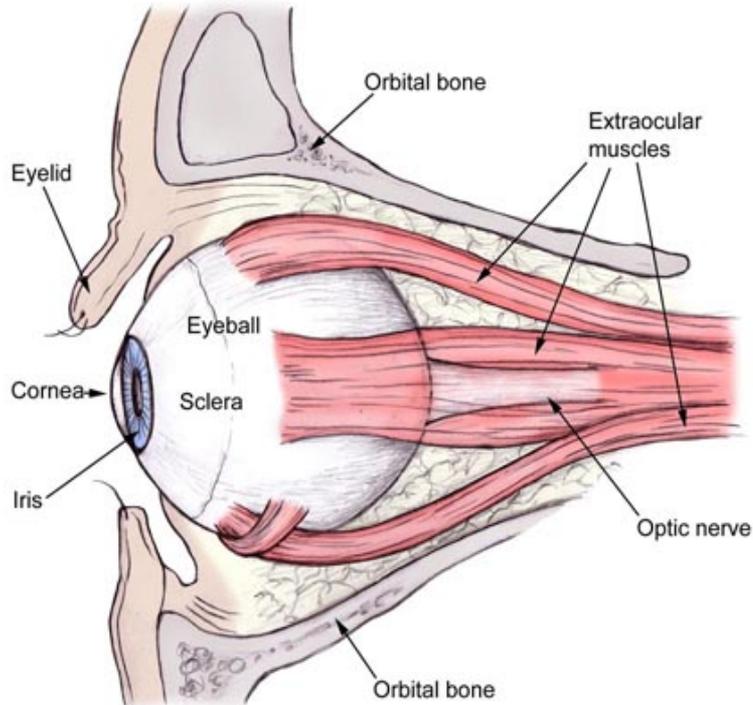


Eye anatomy





Orbit anatomy



SOAP

- Subjective- history
- Objective- examination
- Assessment- working diagnosis
- Plan- treat/refer

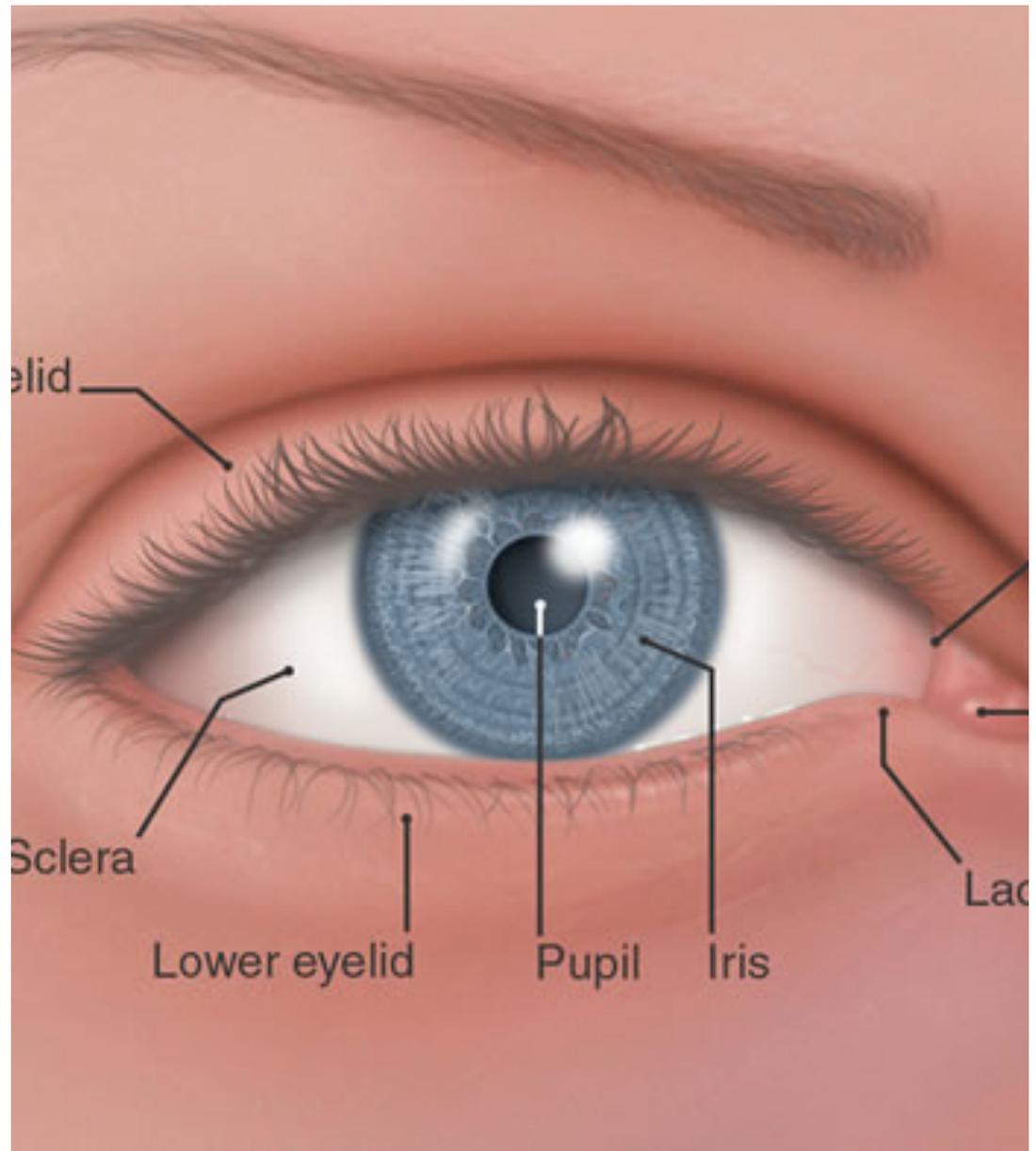
**To preserve as much of the patient's
vision as possible**

Taking History

- Incident: time , place, witness story, **mechanism of injury**, associated HI, other injuries
- Symptoms: affected **VA-COMPARED WITH THE PREVIOUS ONES**, floaters, flashes, field defects, diplopia, **pain- THE DURATION OF THE SYMPTOMS**, epistaxis
- POH/PMX: **PREVIOUS SURGERY** / current eye disease, systemic disease, tetanus status
- SH/FH/D_x/A_x

Objective- examination

- VA/PUPIL
- Orbit
- Soft tissue
- Globe
- Conjunctiva
- Cornea
- AC
- IRIS
- Slit lamp exam
- Imaging



Visual function: **VA- DOCUMENTED**

- "20/20 vision", 6/6 vision

numerator refers to the distance in feet/ meters between the subject and the chart,
denominator indicates the size of the letters

	Metric	Feet
A	6/60	20/200
D F	6/36	20/120
H Z P	6/24	20/80
T X U D	6/18	20/60
Z A D N H	6/12	20/40
P N T U H X	6/9	20/30
U A Z N F D T	6/6	20/20
N P H T A F X U	6/5	20/16

Check your eyes

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PUPIL EXAMINATION

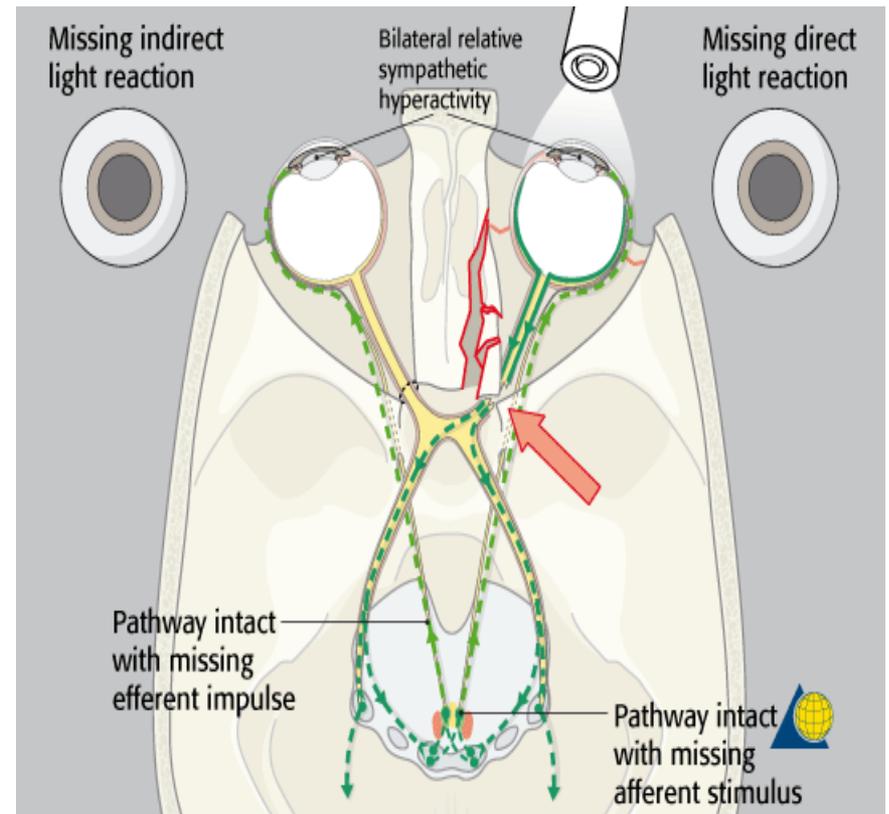
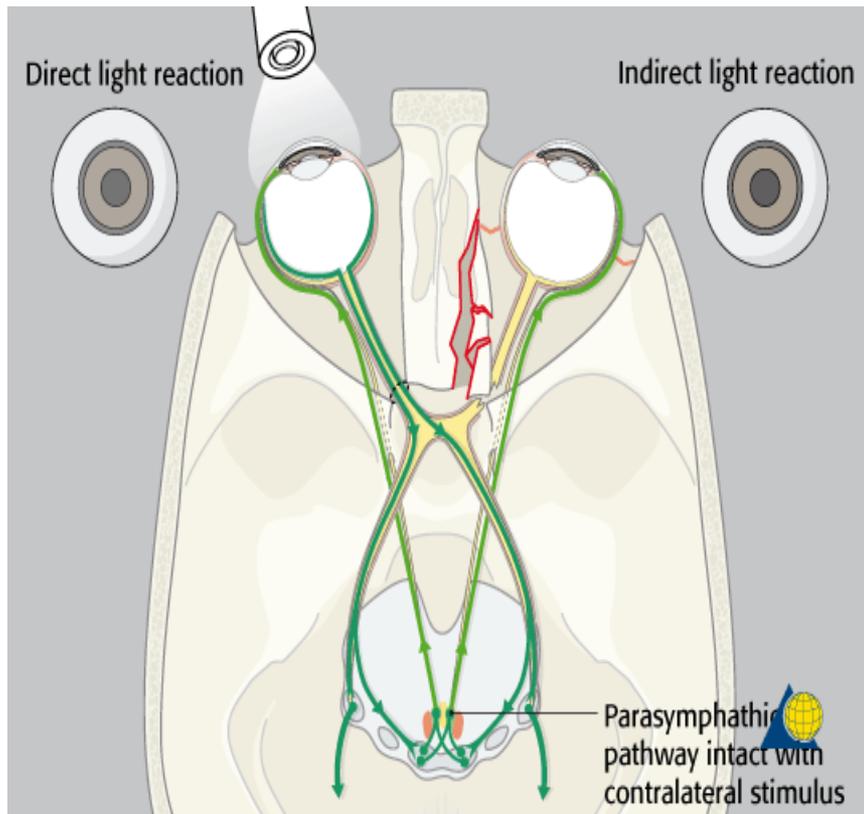
Note:

- size,
- shape,
- symmetry and
- reaction to light

•**RAPD** (**Relative Afferent Pupillary Defect**)- reliable way to implicate or rule out optic nerve disease



When an afferent pupillary defect is present, both pupils will dilate when the affected eye is exposed to the light source
assess consensual response using the “**swinging flashlight**” test

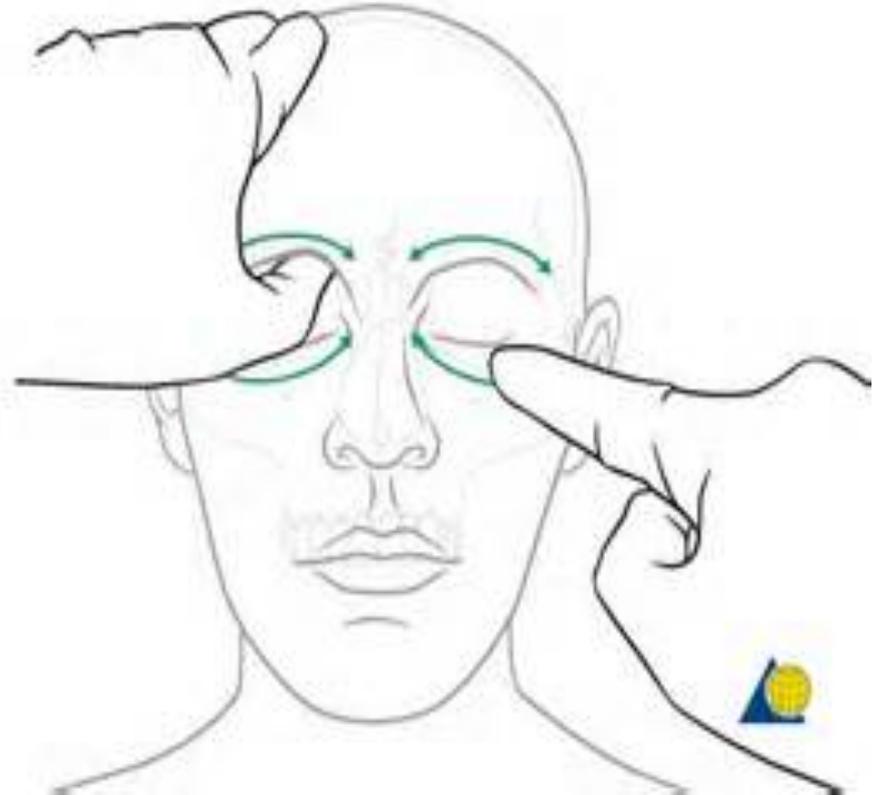


Examination of orbit

- continuity of orbital rim
(?step off's)

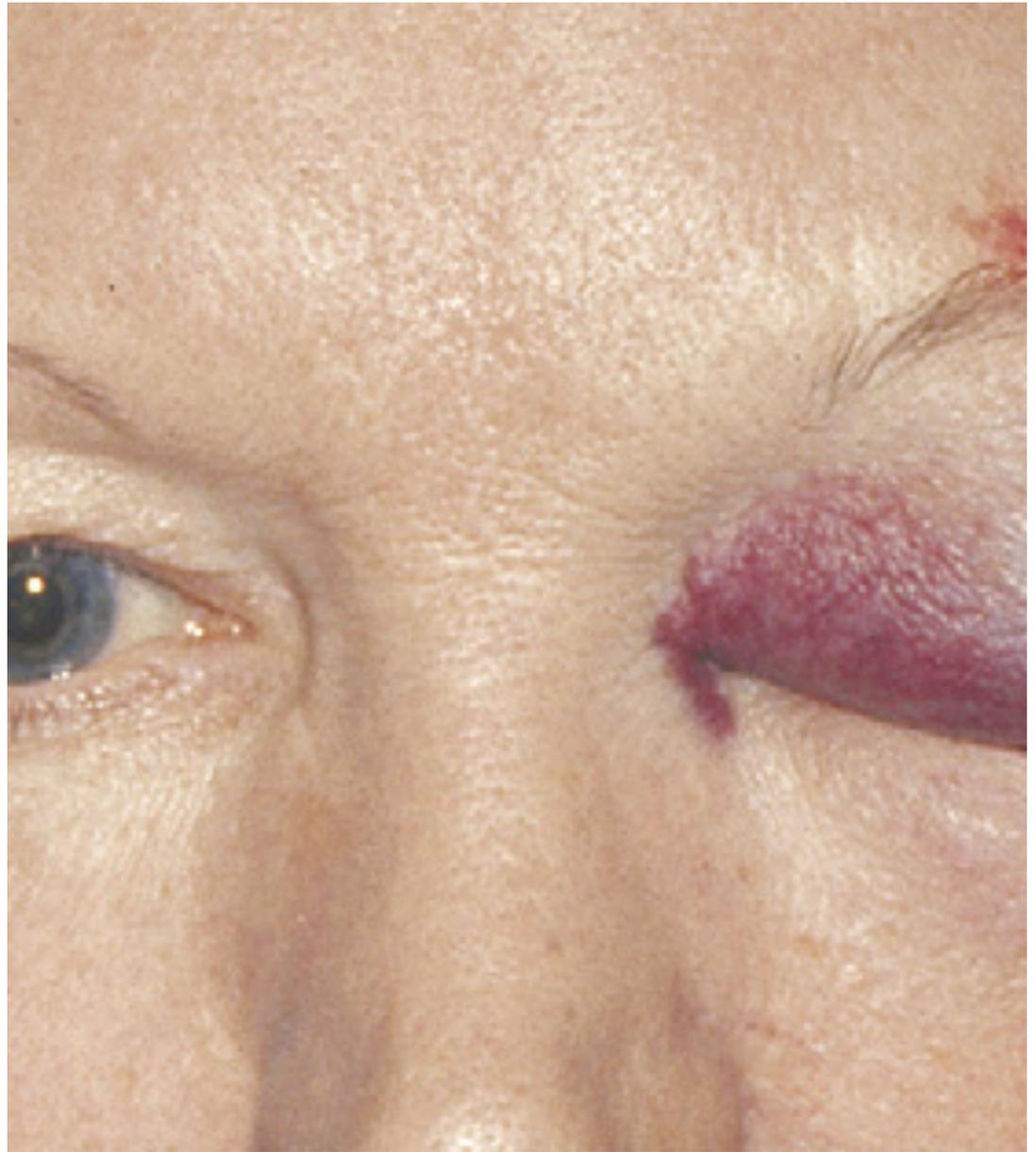
- **infraorbital sensation**

because infraorbital nerve passes through the orbital floor



Soft tissue examination

- periorbital bruising/oedema
- lid laceration
- surgical emphysema

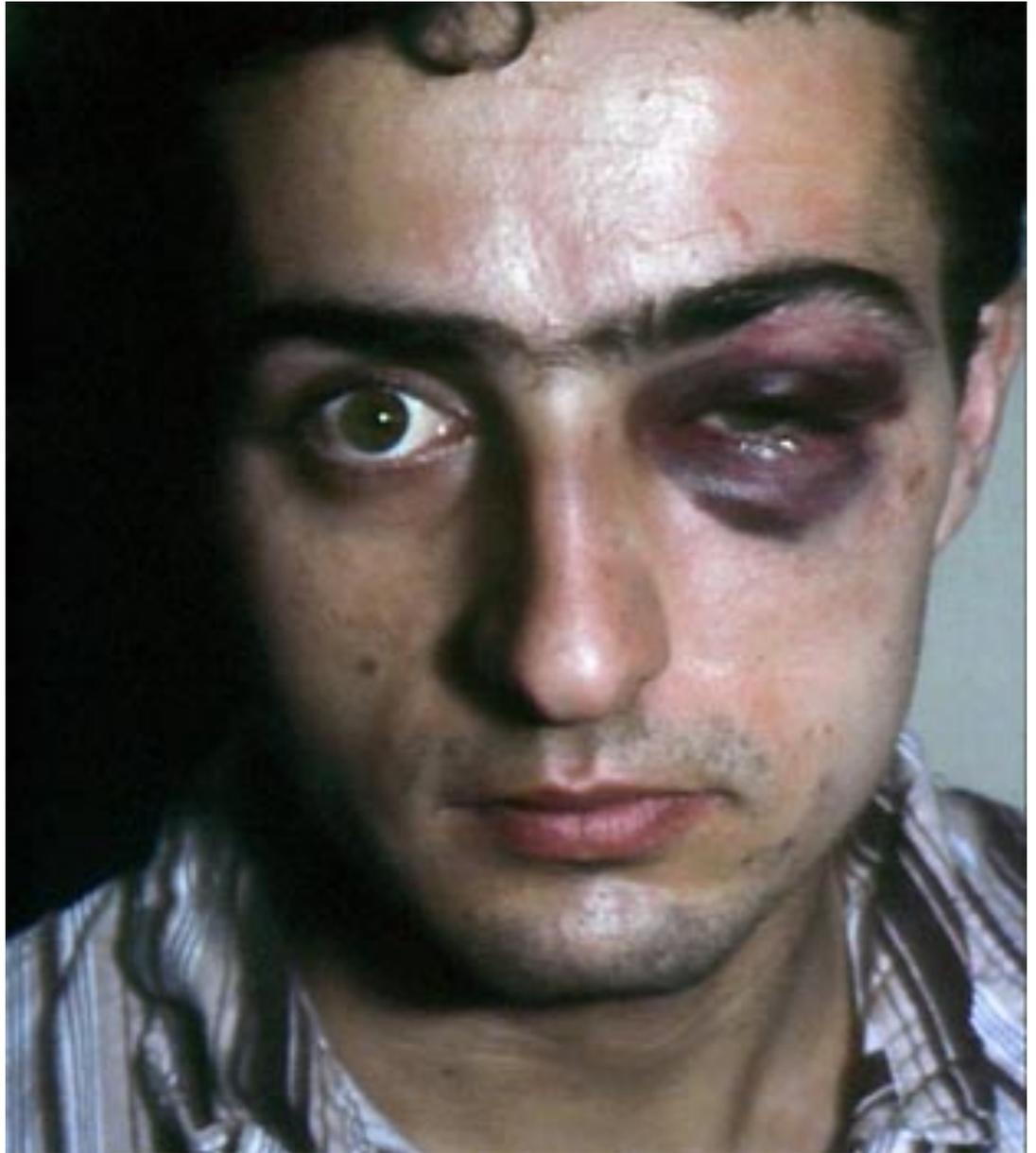


Surgical Emphysema

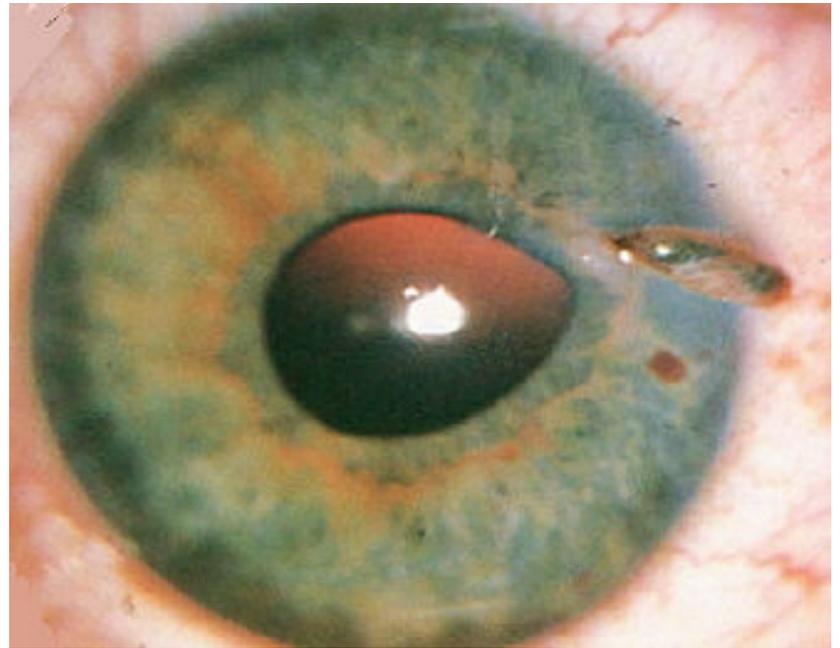
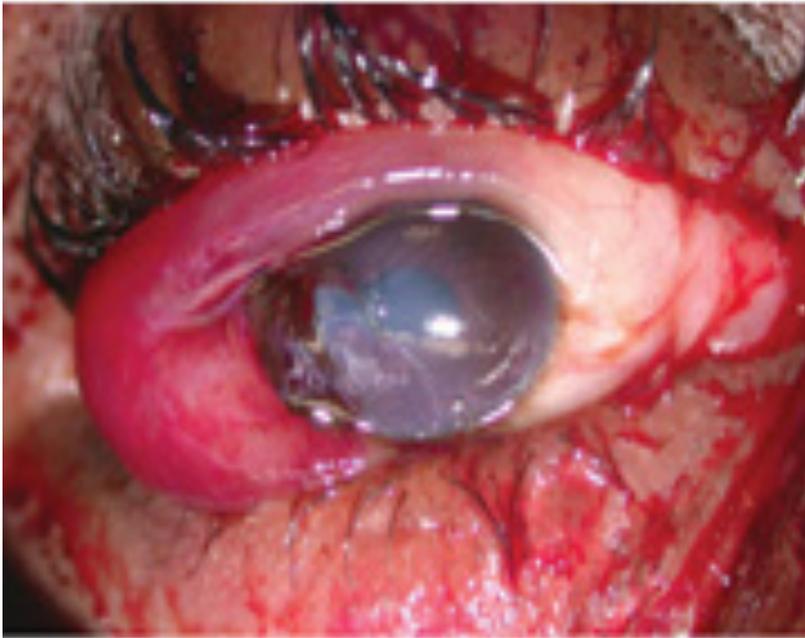


Globe examination

- Exclude rupture
- avoid placing pressure on the globe
- Check position, if sunk in called enophthalmos
- check ocular motility

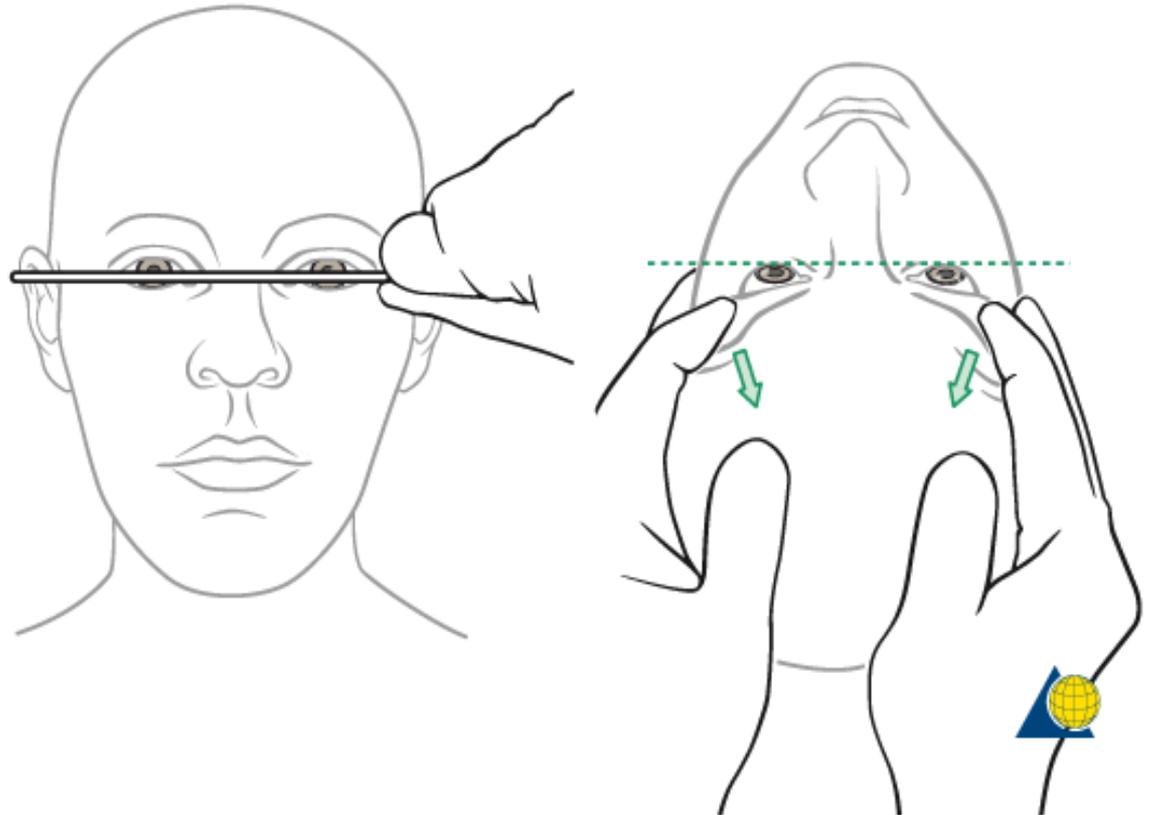


Globe rupture

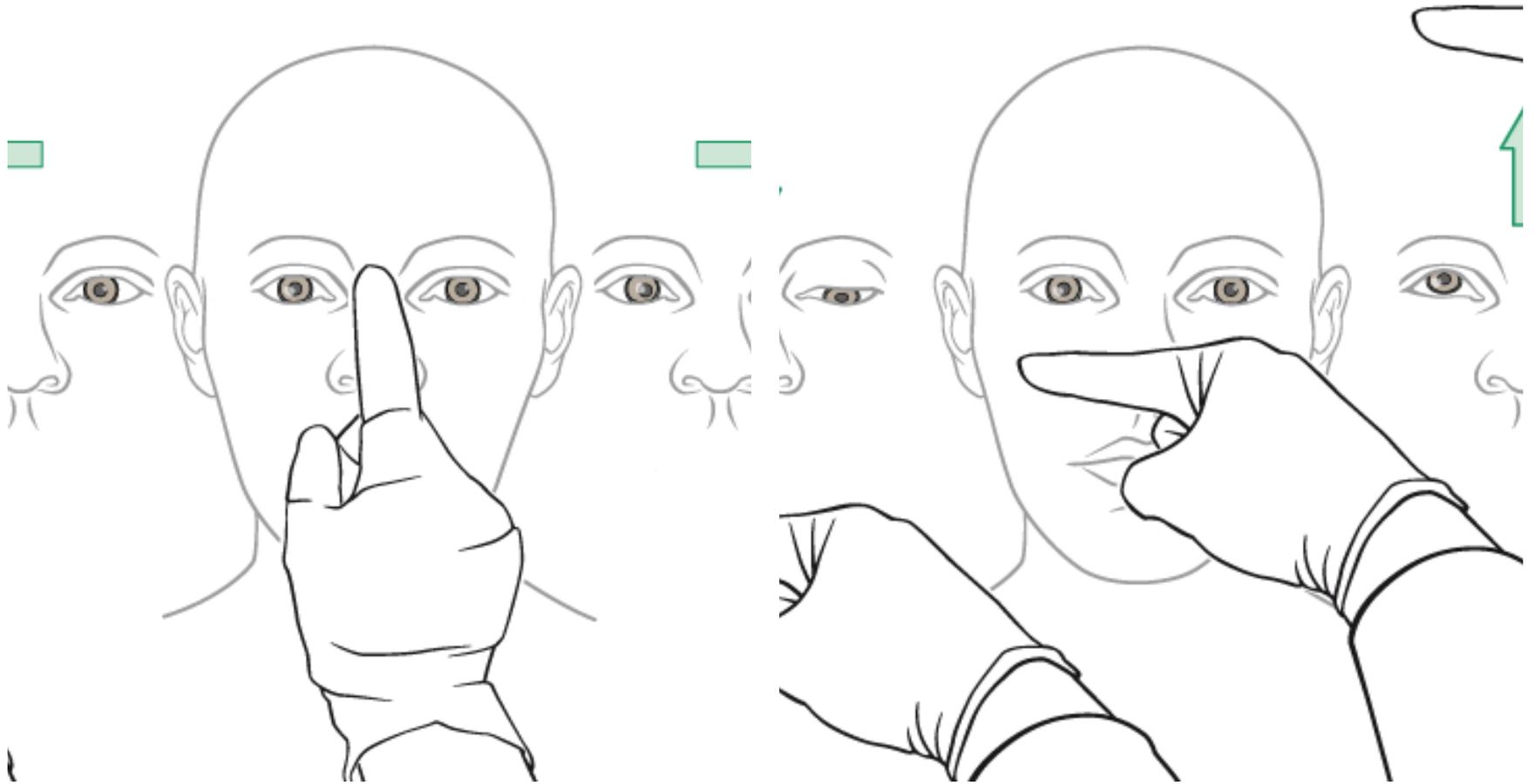


Globe position

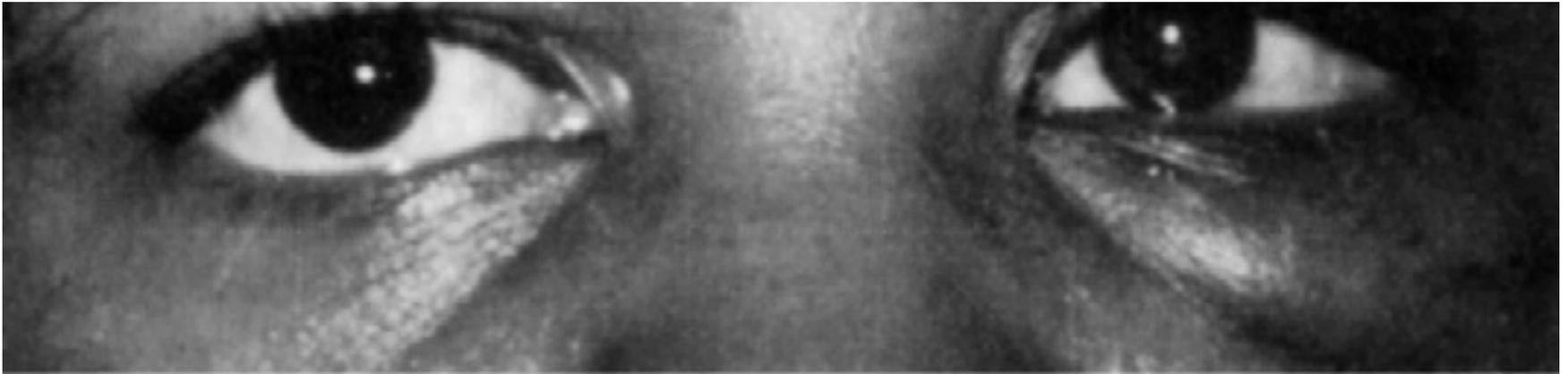
- using a straight instrument
- of light reflexes might be useful
- examination from above and below



Testing of ocular motility



Decreased extraocular movement.



Conjunctiva - Haemorrhage

- Most times harmless
- If massive could cause the edge of cornea to be exposed even perforate,
- If extends to the back could be a feature of retrobulbar Haemorrhage

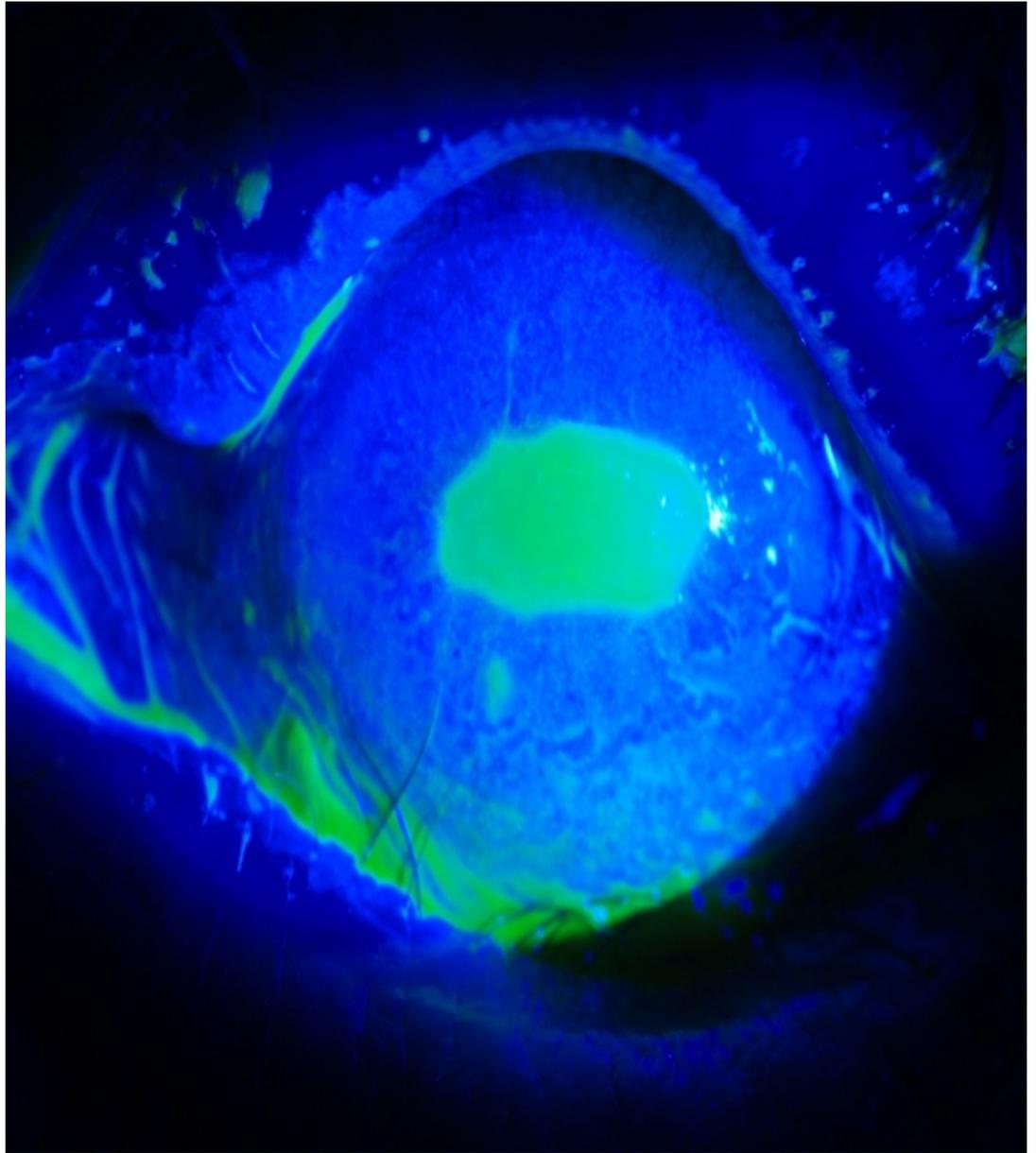


Cornea examination

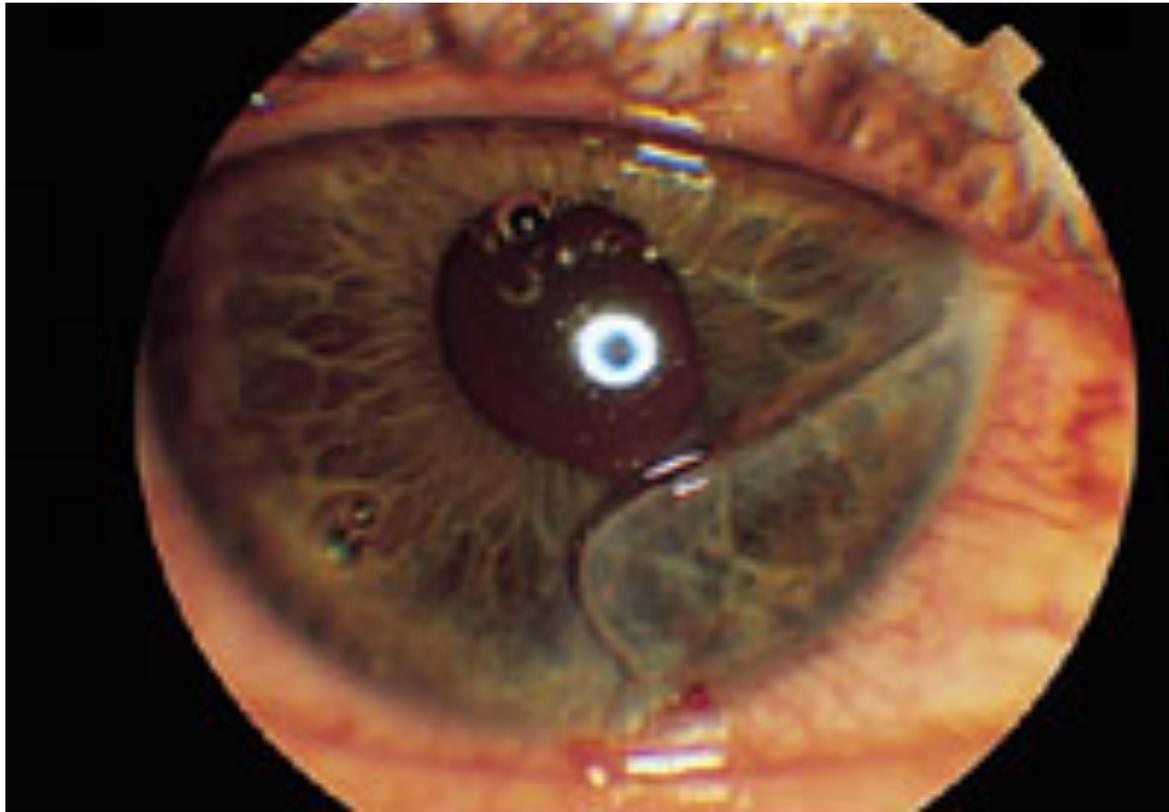
- fluorescein staining
- under cobalt blue light to look for abrasion

Injuries:

- Abrasion
- FB
- LACERATION



Corneal laceration



Anterior Chamber examination

- fluid level,
- Blood (hyphema)



Hyphaema- blood in AC

More in blunt trauma

The AC could be fully filled

Even a small hyphema can be a sign of major trauma

Sickle cell status

Avoid aspirin/ antiplatelets/
NSAIDS

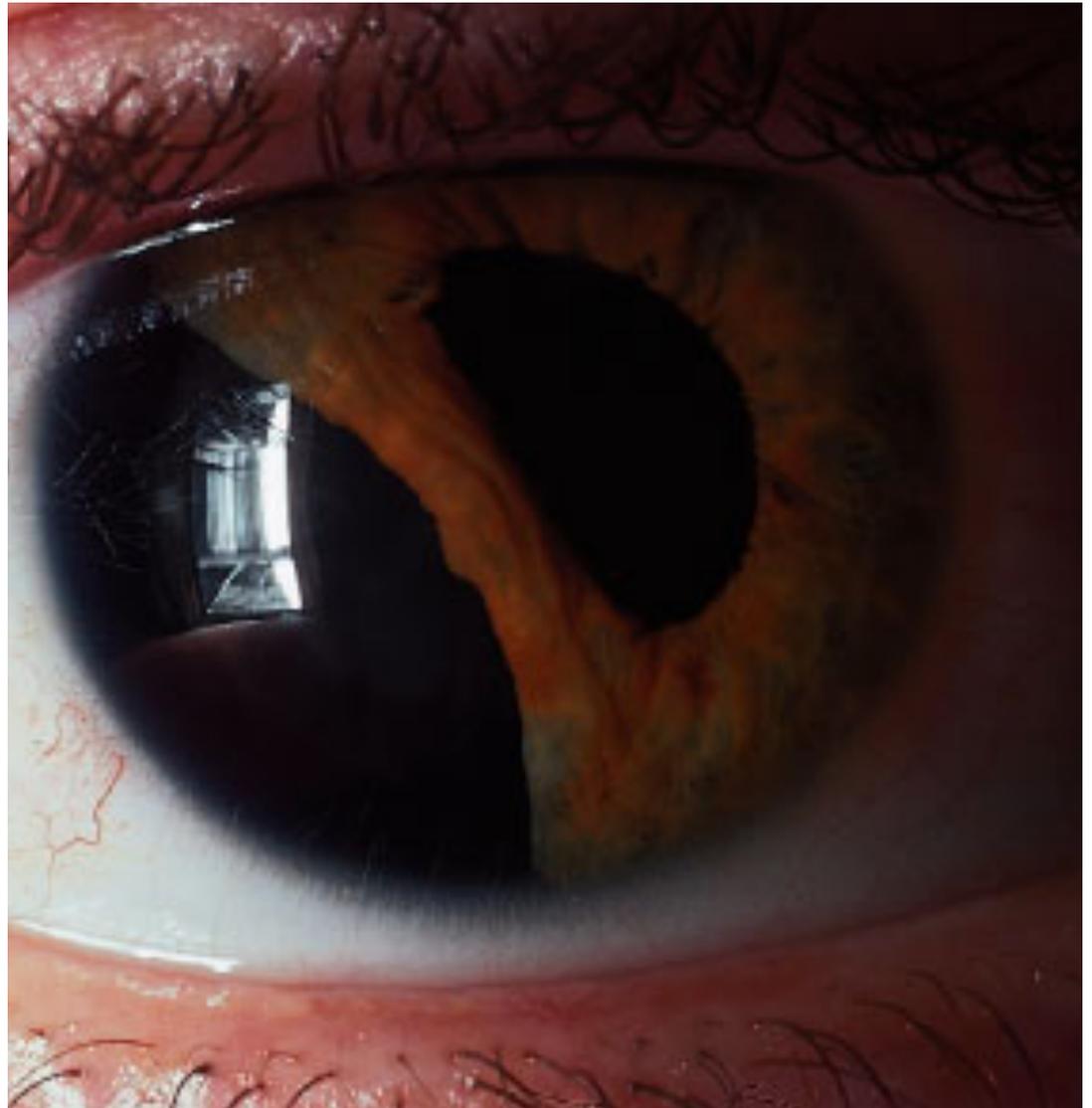
Complications:

- 1)Red cell glaucoma
- 2)Rebleed
- 3)Loss of vision



Iris examination

- FB
- tearing away of the iris from its attachment (Iridodialysis)
 - blunt or penetrating trauma



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Funny picture- look into my eyes



EYE INJURIES

- CHEMICAL
- Orbital fractures
- Lid lacerations
- Globe trauma:

BLUNT / PENETRATING

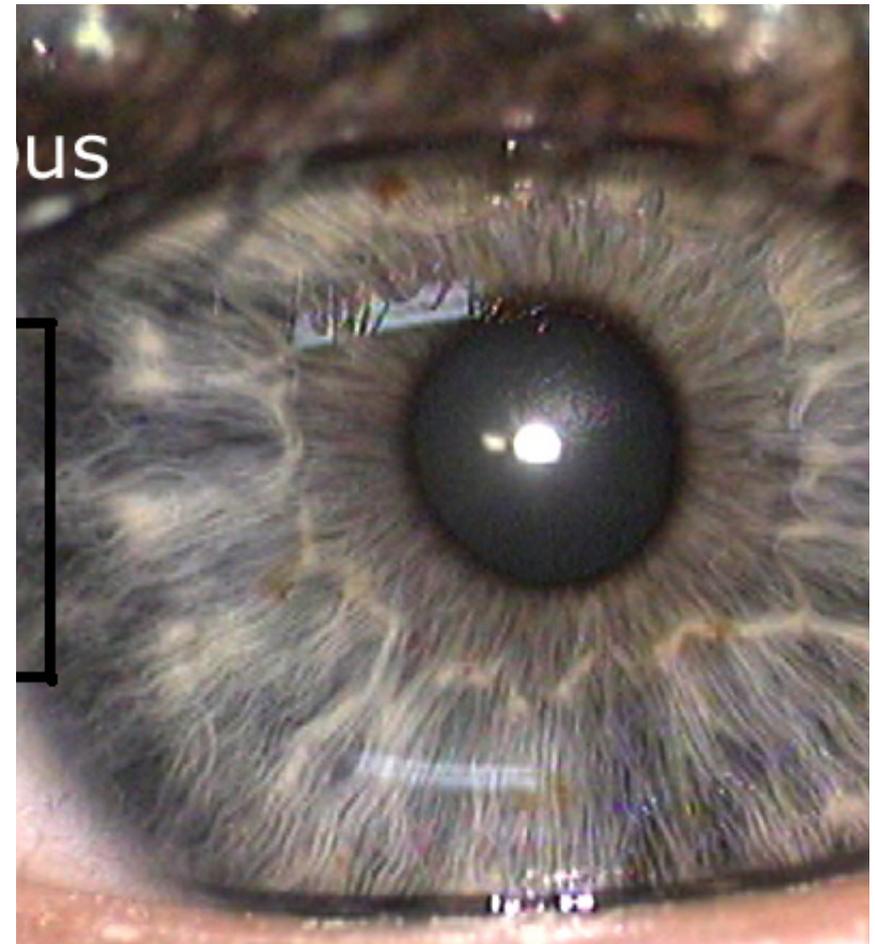
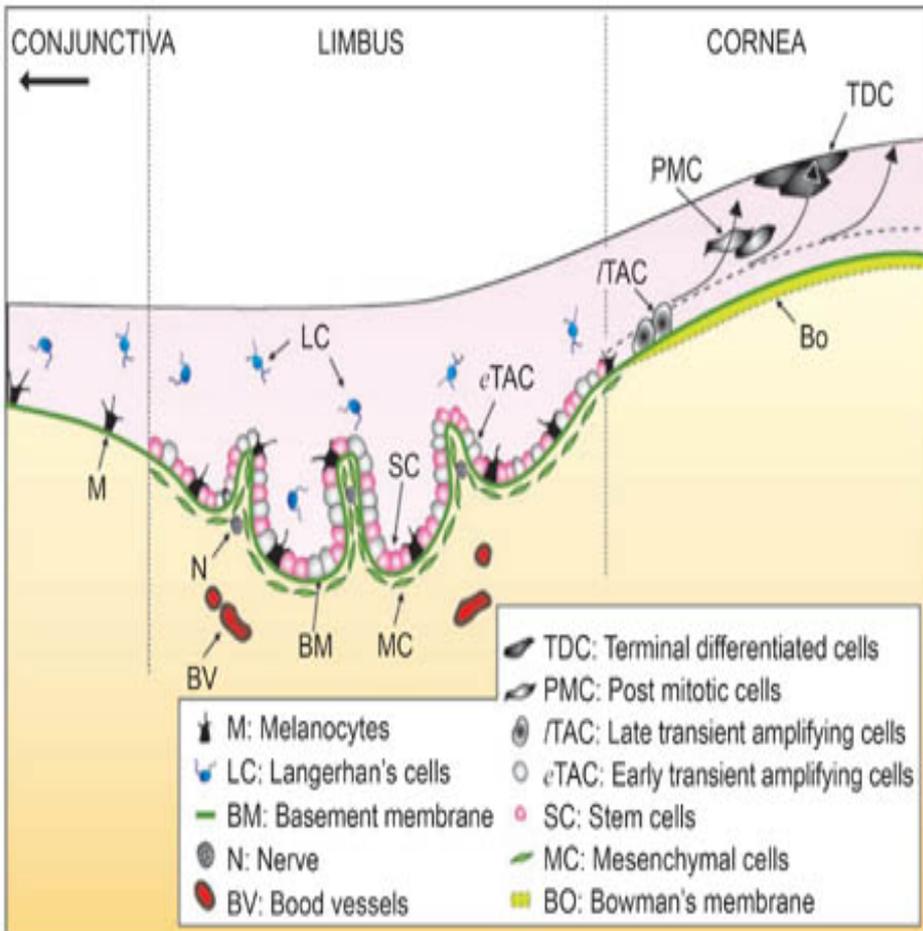
- Corneal injuries
- Hyphema

Chemical injury

- **Alkalis**(liquefactive necrosis- penetrates): Lime (cement, plaster)/ Drain (lye)/ oven cleaners/ Fertilisers/ cleaning products (ammonia)
 - **Acid**(coagulative necrosis that impedes own progress): battery (sulfuric) acid/ glass polish (hydrofluoric acid)/ vinegar/ nail polish remover (acetic acid).
 - **Irritants** (pepper spray)
- PROGNOSIS DEPENDS:
- surface area/duration of the affected cornea
 - Limbal involvement



The ocular surface is made up of two distinct types of epithelial cells, constituting the conjunctival and the corneal epithelia.



Symptoms

- Pain
- Redness
- Irritation
- Tearing
- Inability to keep the eye open
- Sensation of something in the eye
- Swelling of the eyelids
- Blurred vision

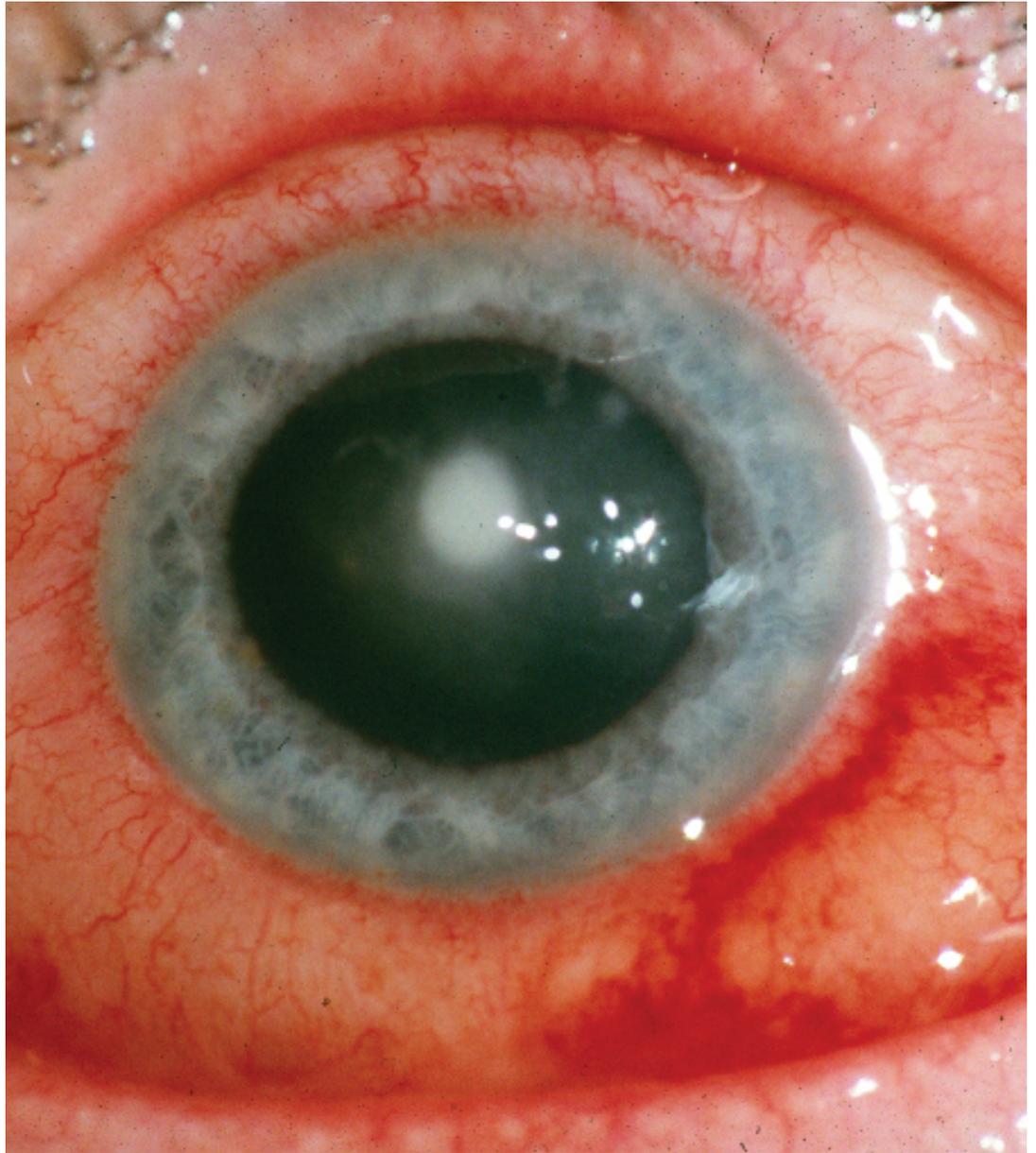
Signs of chemical burn

Conjunctiva:

injection/ blanching/ chemosis(oedema) /
haemorrhage/
epithelial defect

Cornea: punctate till complete loss / oedema

Picture: chemosis, sub-conjunctival haemorrhage,
and corneal haze



Treatment chemical injury

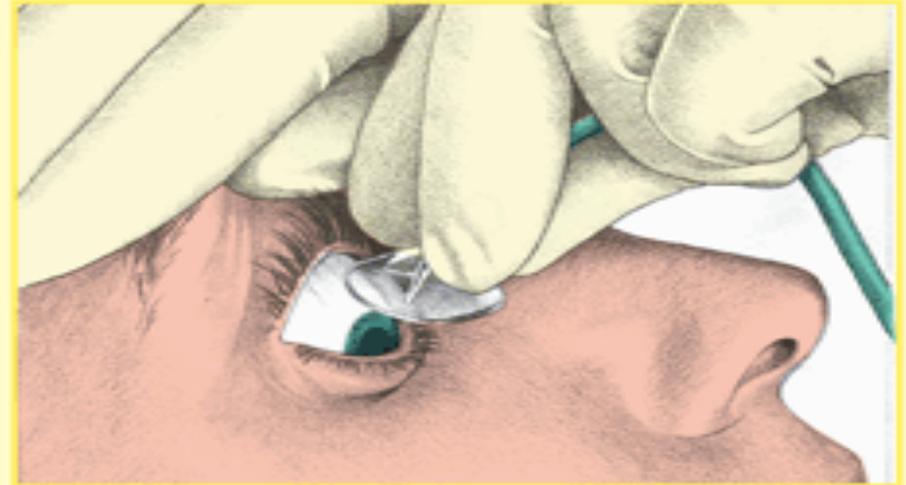
- Neutralisation of the pH by **irrigation** (To start before and during the transportation to the hospital)-Immediate copious irrigation that is available even before full Hx or detailed examination
- **Topical anaesthesia**- tetracaine
- **Evert eyelids** to remove the retained matter
- One litre for acid, two litres for alkali
- **Until pH=7 confirmed** by pH/ litmus test paper

EYE IRRIGATION FOR CHEMICAL BURNS

The patient's eye may be irrigated using either of these methods.

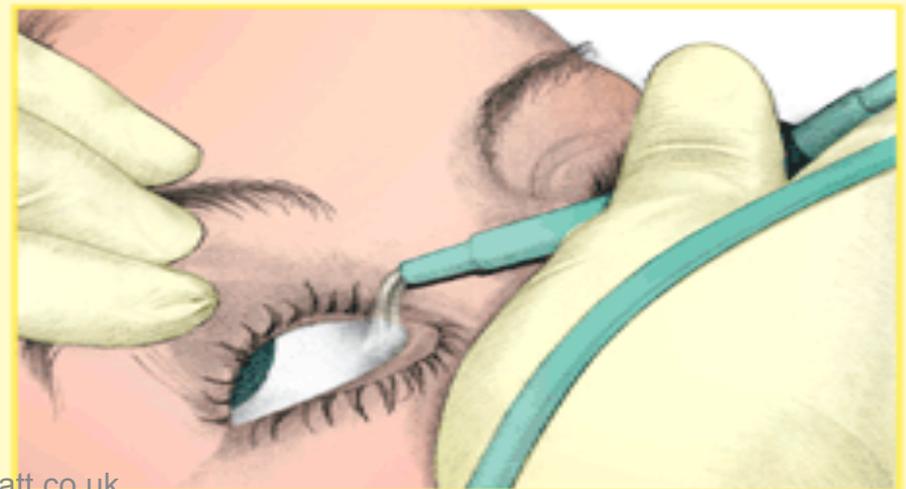
MORGAN LENS

Connected to irrigation tubing, a Morgan lens permits continuous lavage and also delivers medication to the eye. Use an adapter to connect the lens to the I.V. tubing and the solution container: Begin the irrigation at the prescribed flow rate. To insert the device, ask the patient to look down as you insert the lens under the upper eyelid. Then have her look up as you retract and release the lower eyelid over the lens.



I.V. TUBE

If a Morgan lens isn't available, set up an I.V. bag and tubing without a needle. Direct a constant, gentle stream at the inner canthus so that the solution flows across the cornea to the outer canthus. Flush the eye for at least 15 minutes.



After irrigation

- **Topical abx** (make sure not allergic to)
- Eye patch
- **Refer** to ophthalmology in severe cases

Orbital fractures



Facial Bones Project

Three lines for inspection

Line 1:

- Look for widening of the zygomatico-frontal suture
- **Fractures of the superior rim of the orbits**
- “Black-Eyebrow” sign due to orbital emphysema
- Opacification / air-fluid level in the frontal sinuses

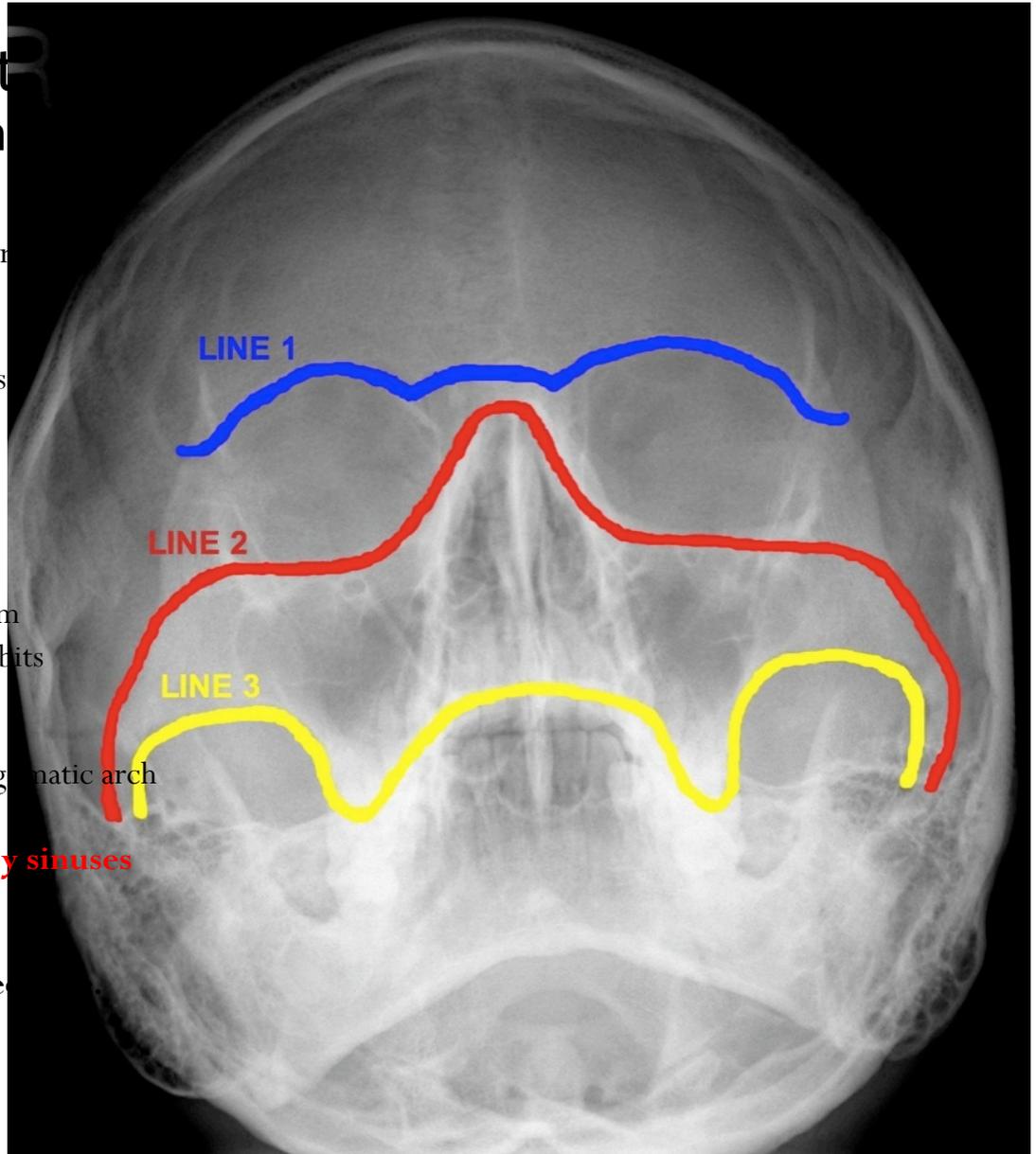
Line 2:

- Look for fractures of the superior aspect of the zygomatic arch
- **Fractures of the inferior rim of the orbits**
- Soft tissue shadow in the superior maxillary antrum
- Fractures of the nasoethmoid bones and medial orbits

Line 3:

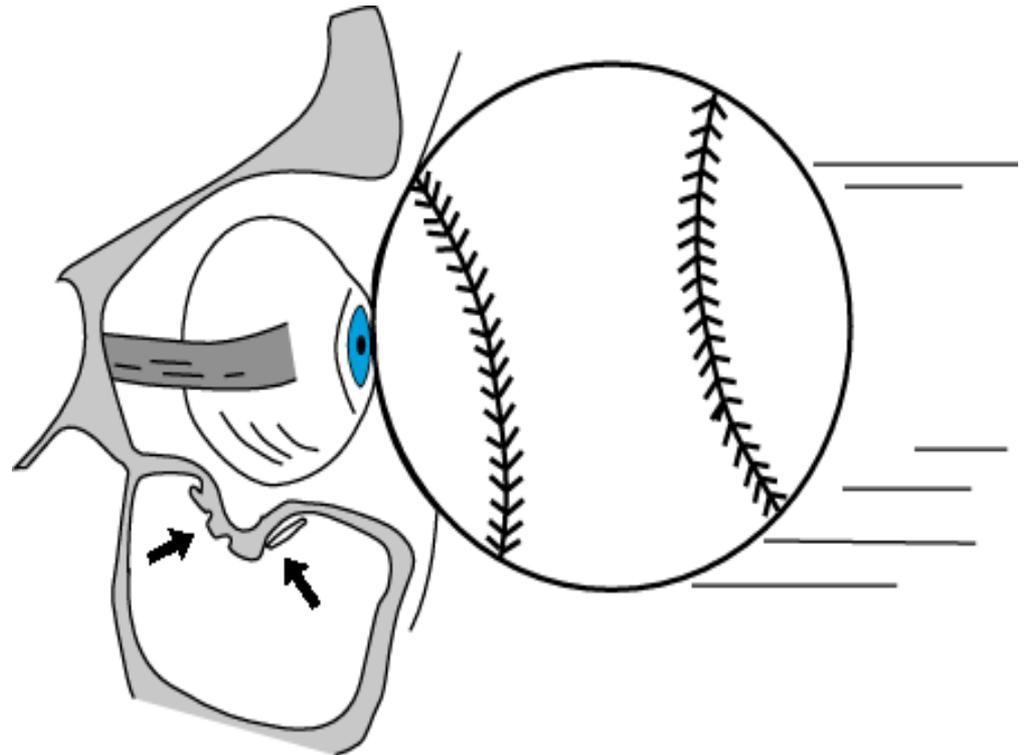
- Look for fractures of the inferior aspect of the zygomatic arch
- Fractures of the lateral maxillary antrum
- Opacification / **air-fluid level in the maxillary sinuses**
- Fractures of the alveolar ridge

Compare the injured side with the uninjured



Orbital floor (maxillary bone)

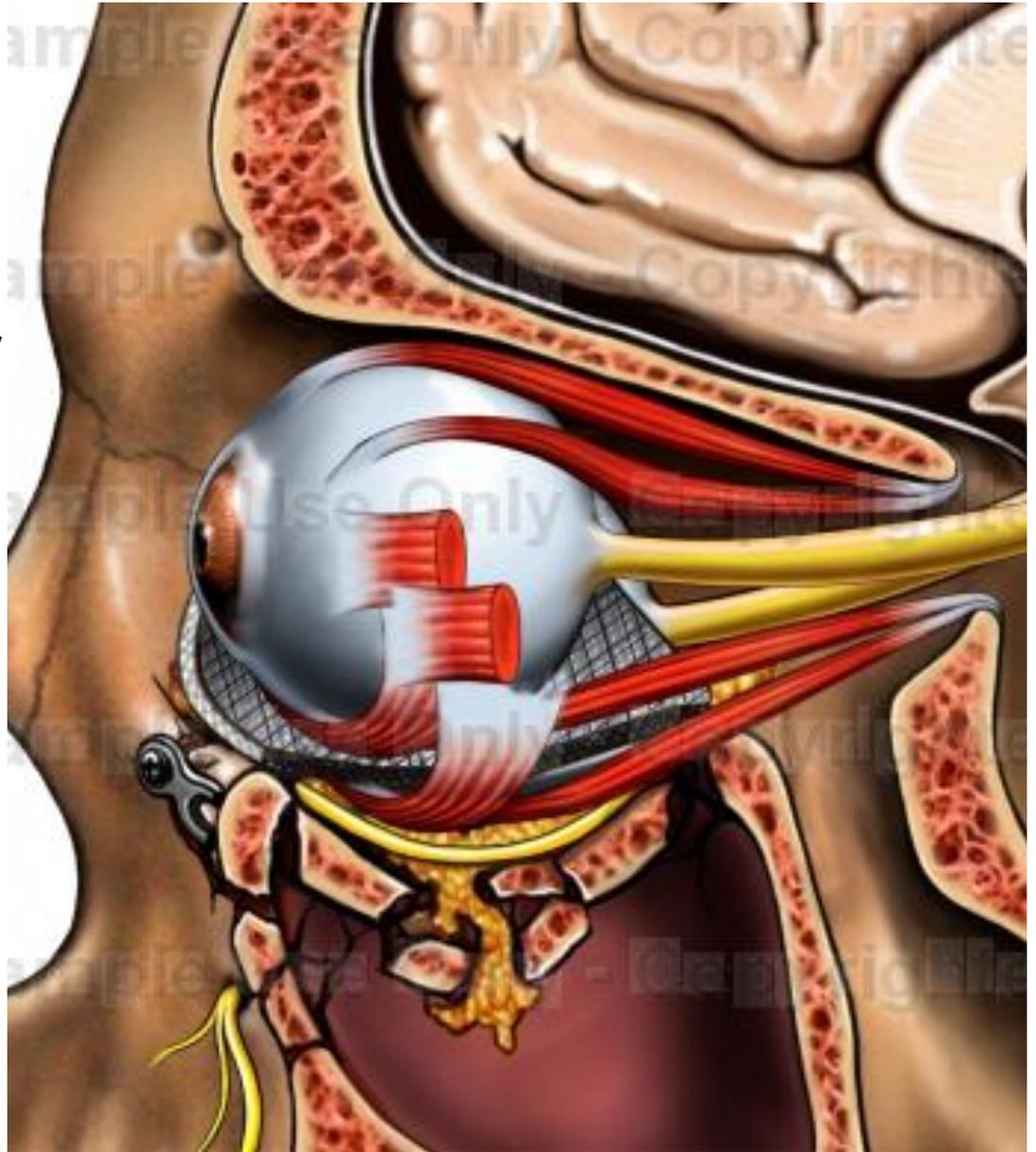
- The commonest
- Blow from a tennis ball/fist
- potentially life-threatening as well as disfiguring



Orbital floor (maxillary bone)

Injuries:

- Soft tissue: **periorbital bruising/oedema/lid laceration, surgical emphysema**
- **Vertical diplopia** due to tissue entrapment following prolapse through the bony defects/ soft tissue swelling tenting extraocular muscle insertion/ cranial nerve disruptions
- Enophthalmos
- Infraorbital anaesthesia



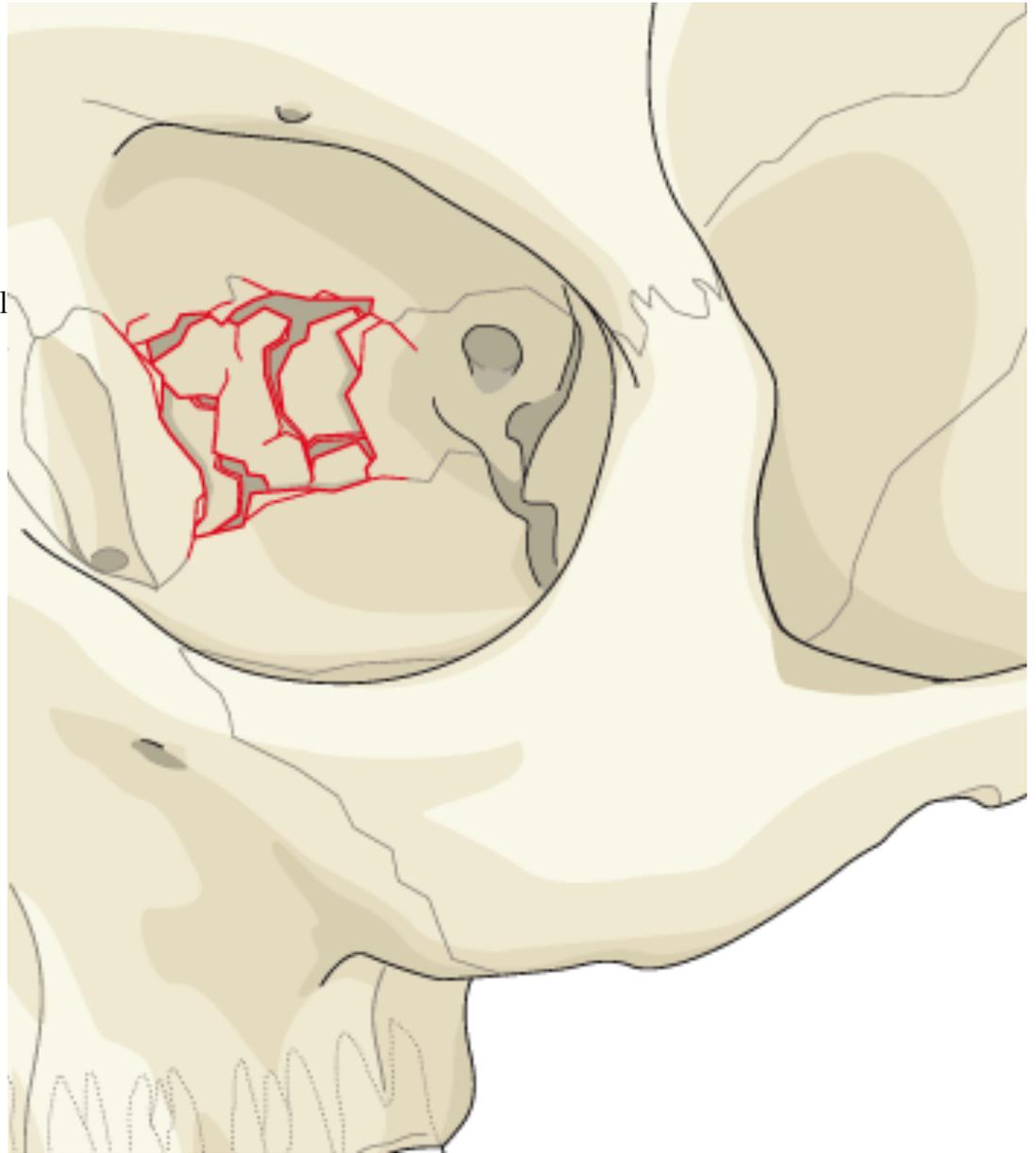
“teardrop” sign



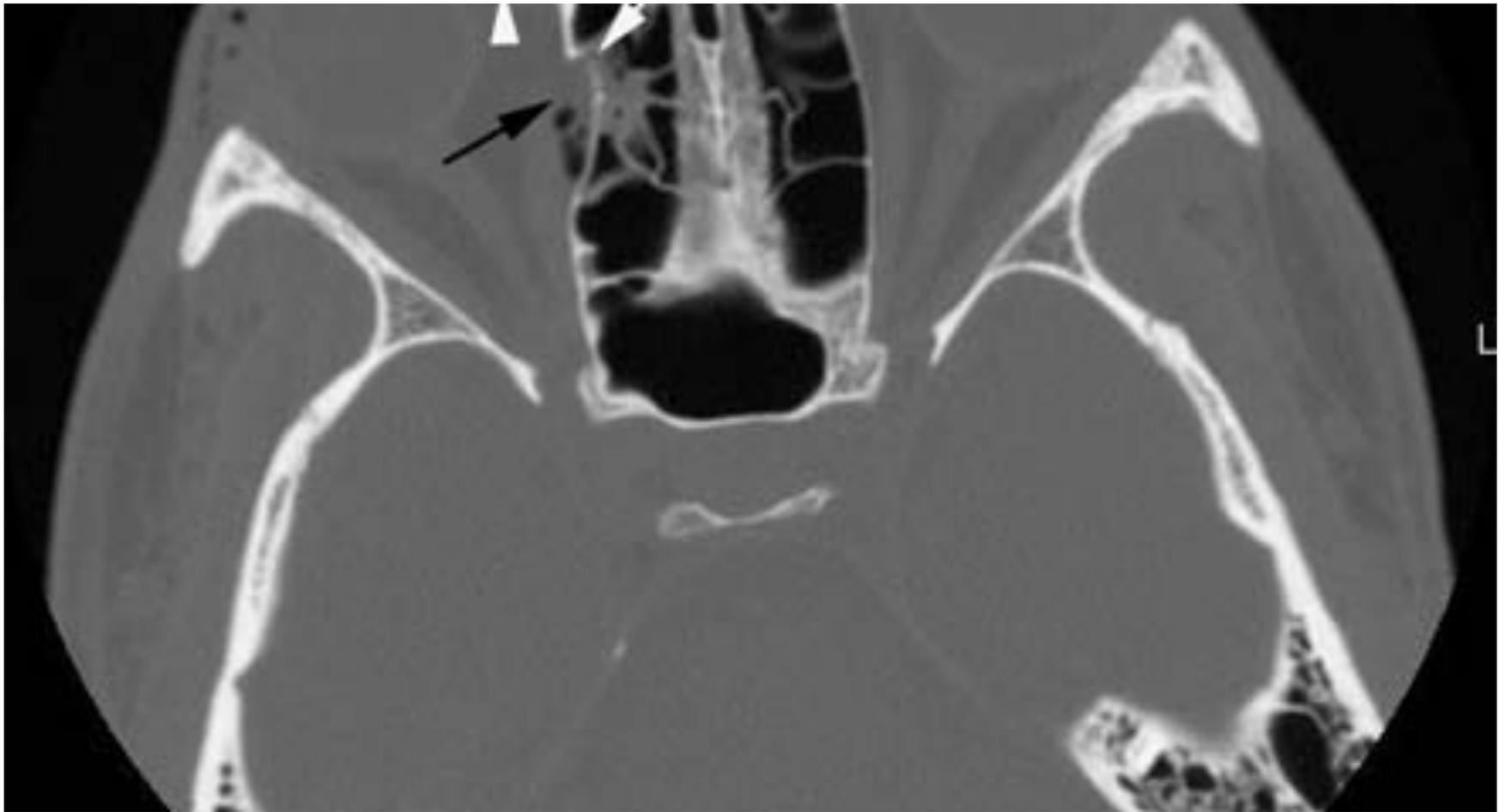
Medial wall (ethmoidal)

- Rare on their own but they may accompany orbital floor fracture
- Surgical emphysema may be prominent
- Horizontal diplopia due to mechanical restriction from the medial rectus entrapment

Lateral wall (zygomatic arch)- only seen in significant maxillofacial trauma

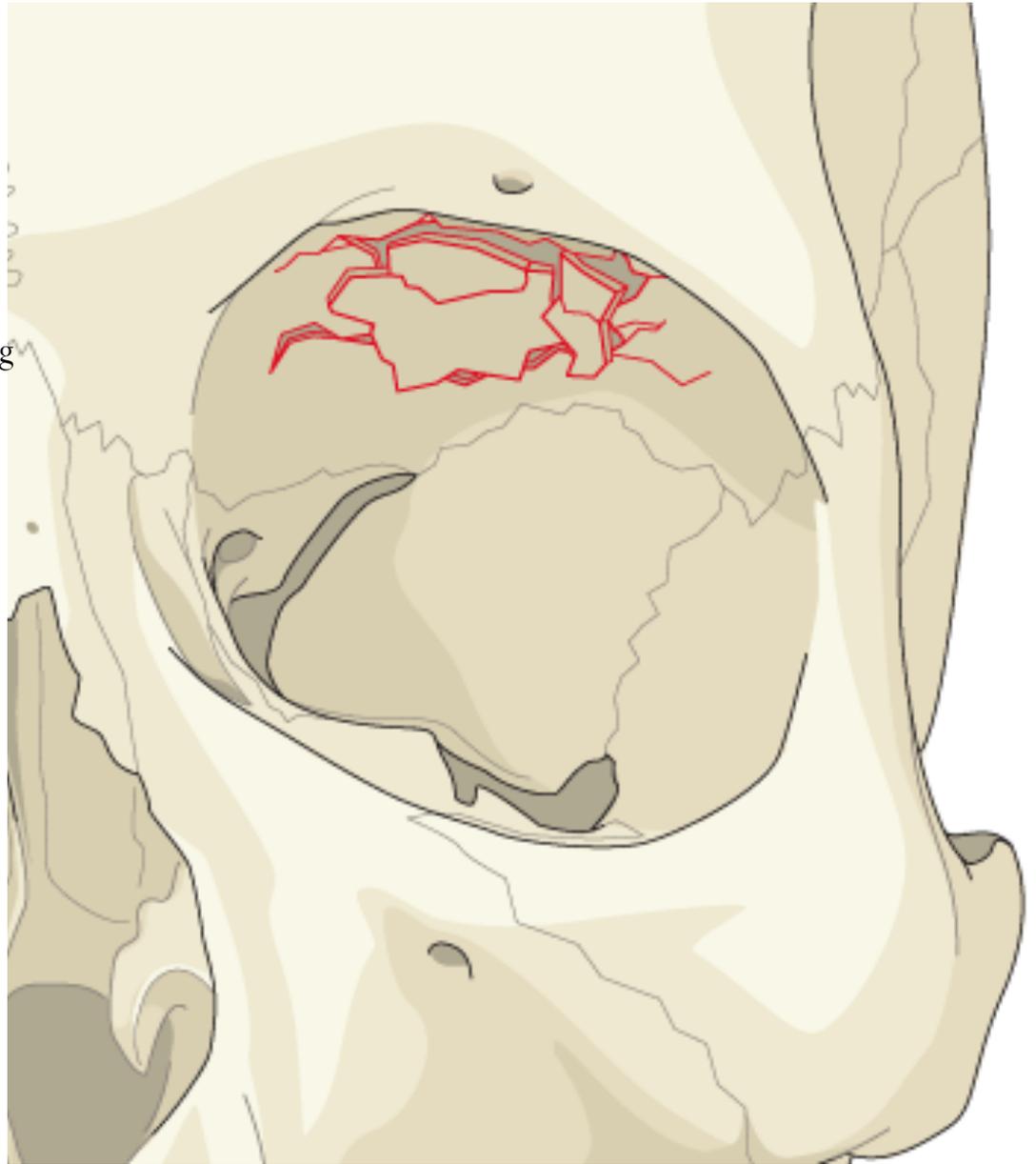


Axial CT shows fracture of the right medial orbital wall orbital (white arrow),
herniation of orbital fat through the fracture (black arrow), and orbital
emphysema (arrowheads).



Orbital roof (frontal)

- **Common in children** following blow trauma
- Soft tissue signs as per orbital floor # but bruising may spread across midline
- Superior subconjunctival haemorrhage with a distinct posterior limit
- carry risk of meningitis



Investigations

- **plain-film** radiographs of the orbits and sinuses may demonstrate the classic teardrop sign
- The diagnosis of orbital fractures is made most often using **CT scan**.
- **ultrasound** is a promising tool that can be used to identify orbital fractures.

Management

- Orbital fractures are **not considered an ophthalmologic emergency** unless there is visual impairment or globe injury.
- **Surgical repair** is indicated for patients who have persistent diplopia or cosmetic concerns
- and in general is not performed until swelling subsides 7 to 10 days following injury
- Patients should be cautioned to **avoid nose blowing**/ to sneeze with their mouths open
- **prophylactic antibiotics** (Augmentin)
- to return if they experience intense eye pain, changes in vision, proptosis, or a tense globe

Sneezing or forceful nose blowing may drive air from the nasopharynx into the orbital space, leading to a **compartment syndrome**



Lid lacerations

Hx: ?mechanism of injury,
?likelihood of associated injuries, ?infective
risk (e.g. Bites)

O/E: depth length, tissue viability

Canalicular involvement, Nasolacrimal drainage

**Be aware of associated injury of globe or
orbit**

Repaired in theatre

Picture: Inner lid surface disruption • Lid margin
disruption • Lacrimal duct involvement • Canaliculus
or canthal involvement • Ptosis • Tarsal plate
involvement



Funny face

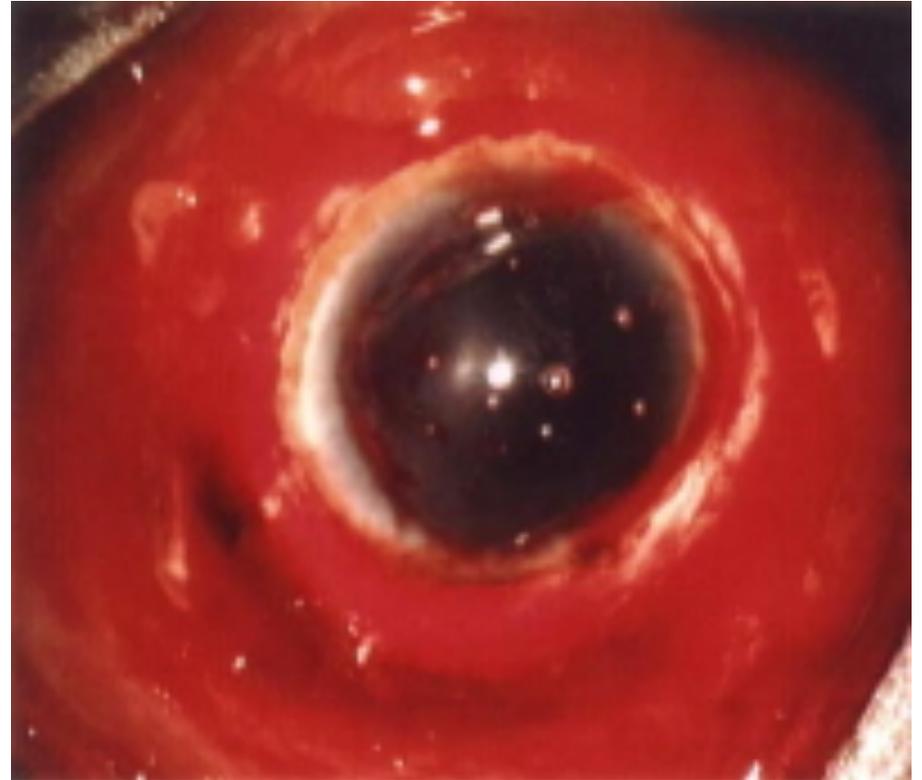


Ocular trauma

- Blunt 80%, penetrating 20%, with IOFB 1%
- Hx: -mechanism/ source (hammer on steel, machinery, explosive), ?FB,
 - associated injuries- ocular involvement occurs in around 10% of all non-fatal casualties
 - likely infective risk, tetanus status

Blunt trauma

- Anterior rupture; herniation of the uveal tissue, lens and vitreous/
- Severe conjunctiva/ hyphema
- Posterior rupture; deep AC and low IOP



Retrobulbar haemorrhage

- Haemorrhage into the retrobulbar space
- may result in acute visual loss

Symptoms:

Proptosis/limitation of extraocular movements, visual loss, RAPD, and increased IOP

Early recognition and decompression is key to preserving vision and warrants emergent ophthalmologic consultation

(Lateral canthotomy)



Penetrating trauma/ IOFB

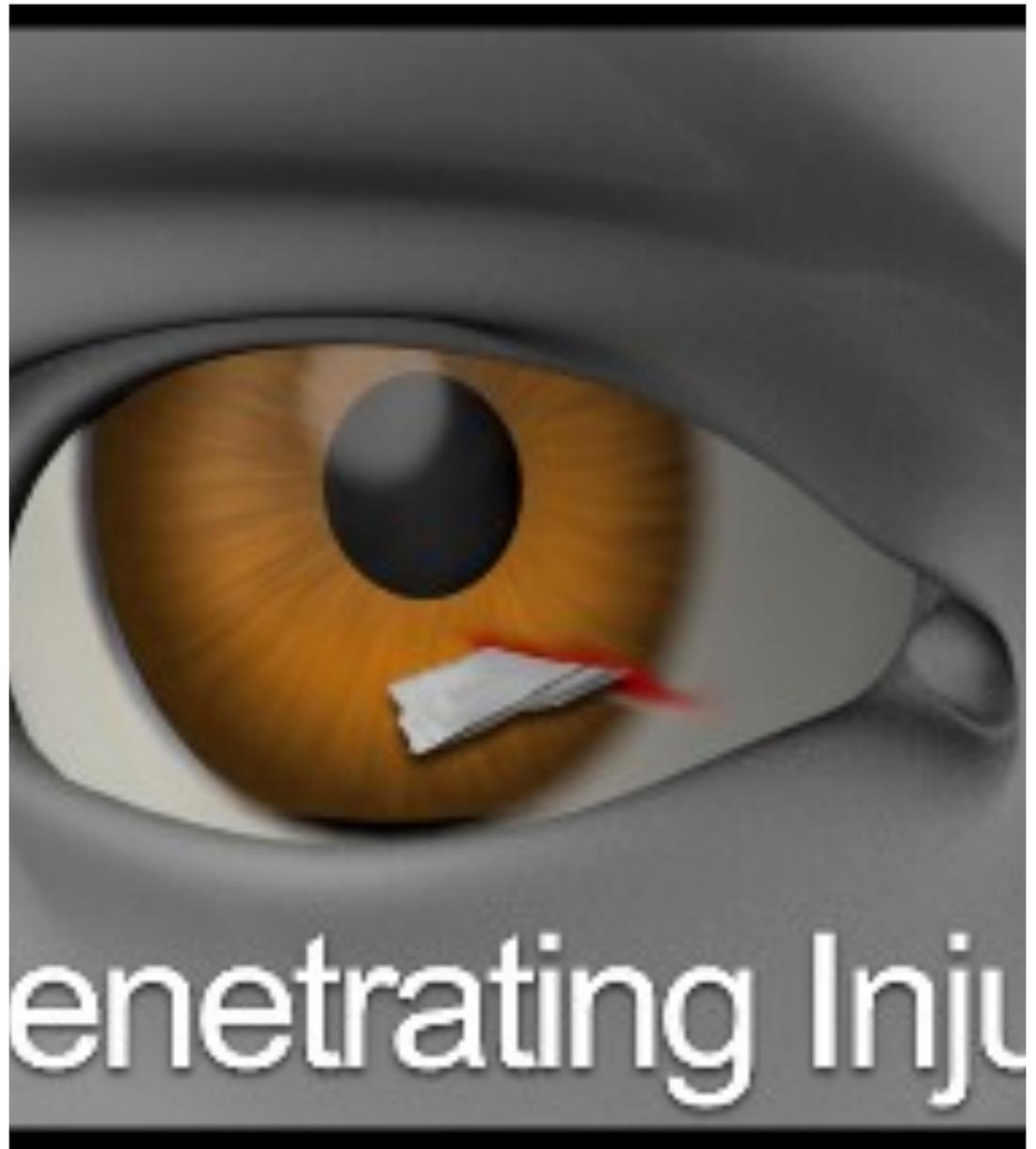
FB may leave a sealed wound

IOFB must be excluded in cases of penetration

Double / posterior perforation should be considered

Complications of IOFB:

- Infective (endophthalmitis)
- toxic (siderosis/chalcosis)



Cornea FB

- Photophobia/ pain/ injection/ blurred vision/
- Rust ring forms within 48hours
- Remove: explain the procedure
 - LA
 - REMOVE WITH
 - 26GAUGE NEEDLE
- Topical abx
- Warn the patient that it will be uncomfortable once the anaesthetic has worn off



Cornea FB

Most corneal FB are metallic

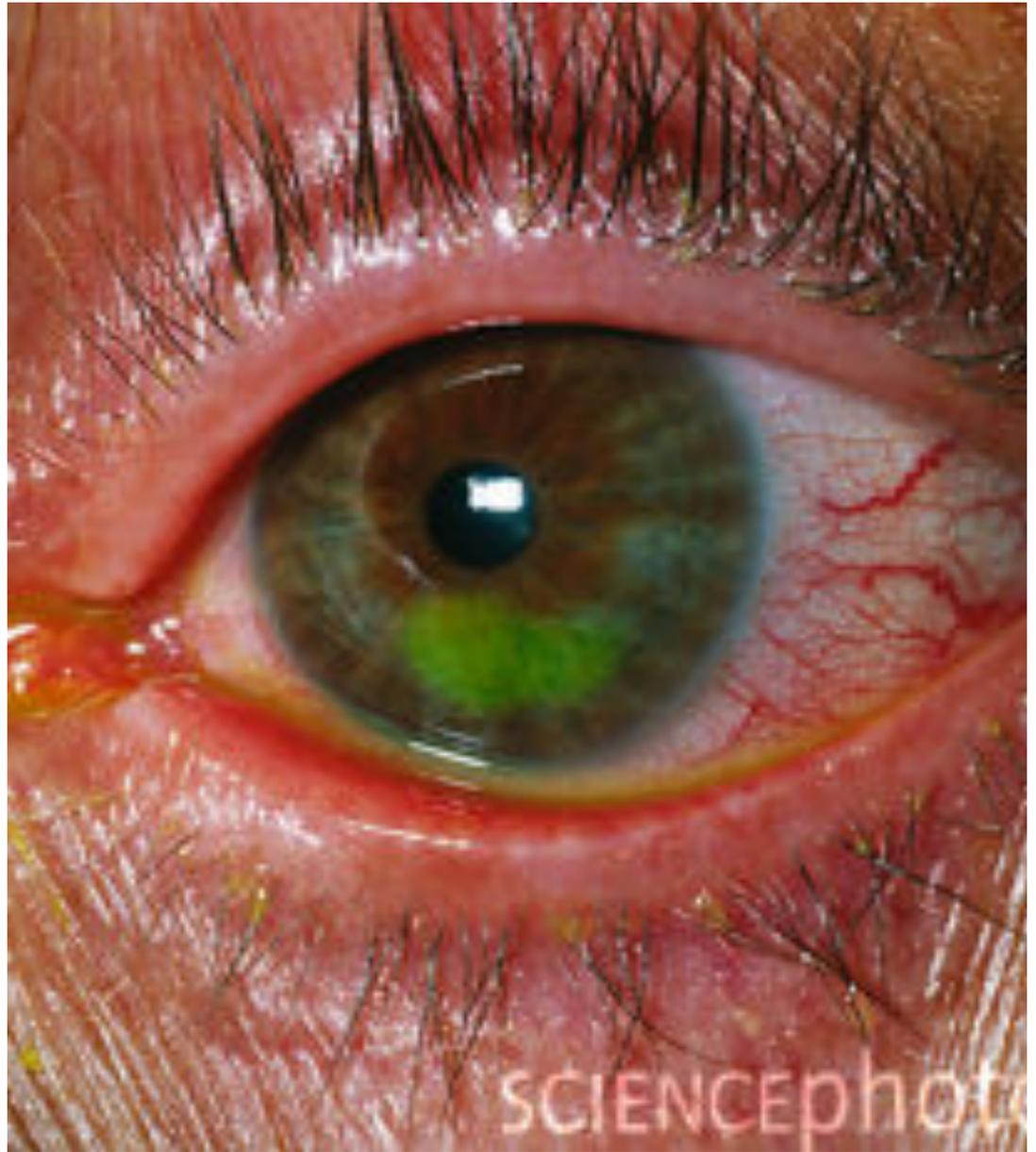
Microbial keratitis follows stone, ceramic,
organic FB

REMEMBER TO EXCLUDE A SECOND
INTRAOCULAR OR SUBTARSAL FB



Corneal abrasion

- Pain/ photophobia/ lacrimation/ increased risk of bacterial invasion
- Complication: keratitis/ recurrent erosions
- Topical abx



Red eye

Rule out : corneal ulcer, acute angle closure glaucoma, iritis, scleritis

- *History*

- ? Trauma (e.g., chemical, foreign body, etc.)? Contact lens wearer? (Possibility: corneal ulcer.)

- Pain? Severe photophobia? Both?

- Significant vision changes?

- History of prior ocular disease (e.g., scleritis, iritis)?

- *Signs*

- I. Abnormal pupil (fixed and small, fixed and dilated, etc.)

- II. Ocular tenderness (determine by touching the closed eyelids; pain could indicate iritis, scleritis or glaucoma)

- III. White corneal opacity or corneal haze (with or without fluorescein staining)

Remember

- **Vision**
- **Pupils**
- **Look at the eye**