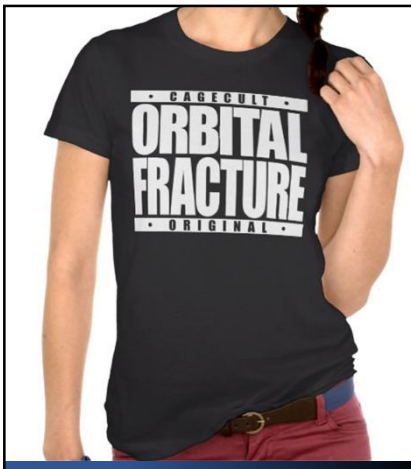
Eye injuries

BELMATT
HEALTHCARE TRAINING

Session Aims and Objectives

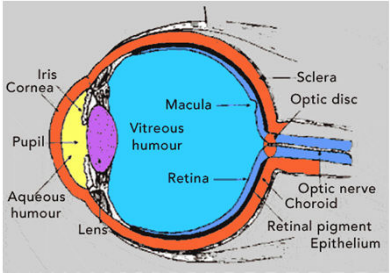
- Aims: This session aims to provide practical tips around assessing and managing eye injuries in primary care settings
- Objectives
- By the end of the session, the learner will:
- Develop an understanding of eye anatomy
- Recognise red flags and eye emergencies
- Develop assessment skills
- Understand the importance of when to refer or treat.

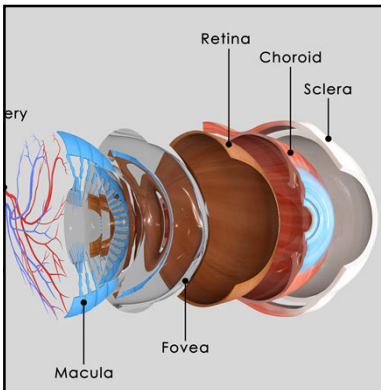


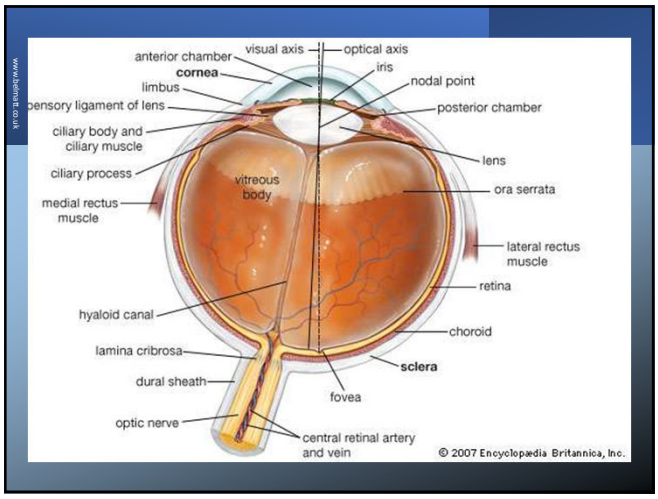
Eye injuries

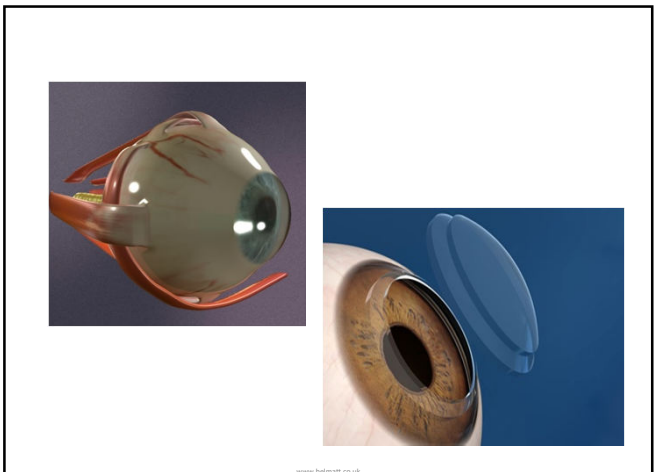
- 3% of all emergency department visits
- Rapid assessment and examination
- to **prevent further damage to the eye**
- loss of vision in one or both eyes has been classified as a 24% or 85% whole-person impairment or disability, respectively

Eye anatomy

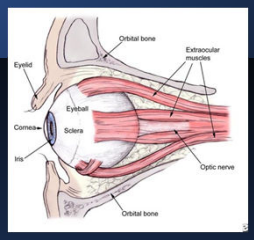








Orbit anatomy



Outline

- Assessment of Trauma
- Types of injury
  - Peri-ocular
  - Anterior segment
  - Posterior segment
- Chemical injury

Epidemiology

- 40% of monocular blindness is related to trauma
  - The leading cause of monocular blindness
- 70-80% injured are male
- Age range is 0-100 yrs but most are young
  - average age 30yr
- Incidence of penetrating eye injuries: 3.6/100000
- Incidence of Eye injuries requiring hospitalisation: 15.2 /100000

Sources of Injury

- Blunt objects - 30-40%
  - rocks, fists, branches, champagne corks
- Motor Vehicle Injuries - 9%
- Play or sports - 1/3
  - golf/squash balls, shoulder/elbow, bats/racquets, horse
- Falls - 4%
- Sharp objects - 18%
- Globe involvement in 22% of cases

Assessment

1. Rule out life threatening injuries
2. Rule out globe threatening injuries
3. Examine both eyes
4. Image
5. Plan for treatment

History

- Mechanism of trauma
  - blunt/penetrating/mixed
  - forces involved
- Previous injuries
- Past ocular history
- Past medical history

Assessment

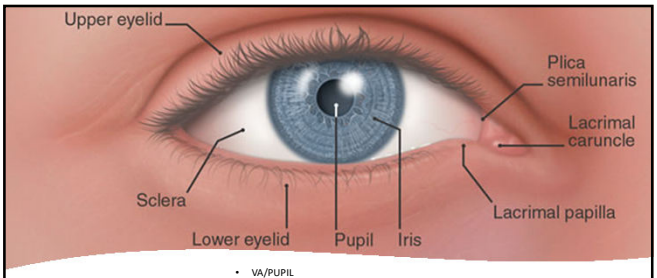
- History
  - Detailed as possible
  - Time and nature of injury
    - Missile, blunt, ? FB remaining, chemical etc
  - Past ocular history
    - Previous VA and lid function
    - remember trauma is a recurrent pathology
  - Med Hx
    - ?tetanus, ? Anticoagulation

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/Dx/Ax

Examination

- Pt review
  - are there life threatening injuries which need to be treated first?
    - ?brain injury
- Facial Exam
  - lacerations/bruising, numbness, weakness
- Ocular exam
  - VA, lids and lacrimal system, orbital rim/orbital bones, ocular motility, globe, optic nerve



Objective-examination

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

https://www.youtube.com/watch?v=E2XzBaOOX8g

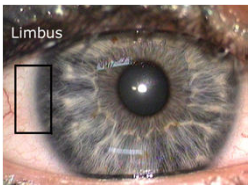
Visual function: VA-DOCUMENTED

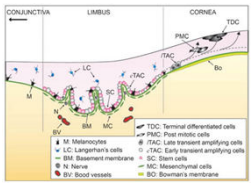
- **"20/20 vision", 6/6 vision**

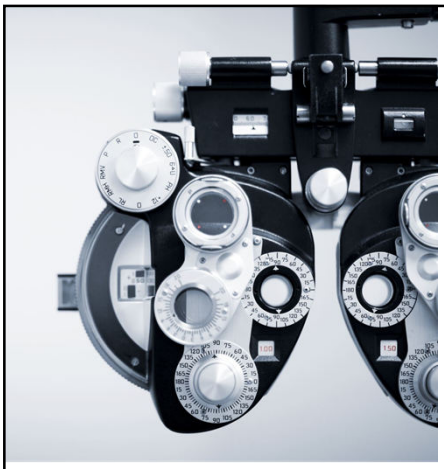
numerator refers to the distance in feet/ meters between the subject and the chart,

denominator indicates the size of the letters

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

PUPIL EXAMINATION

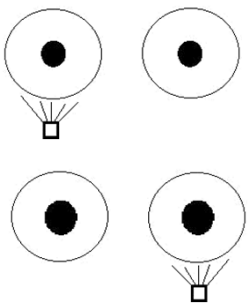
- Note:
- size,
- shape,
- symmetry and
- reaction to light
- **RAPD (Relative Afferent Pupillary Defect)**- reliable way to implicate or rule out optic nerve disease

---

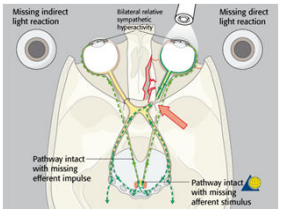
RAPD

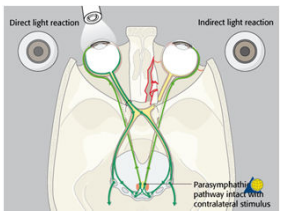
- RAPD
- Relative afferent pupillary defect

https://www.youtube.com/watch?v=zjiG7GmG67g

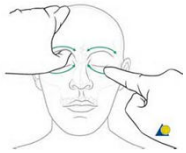


When an afferent pupillary defect is present, both pupils will dilate when the affected eye is exposed to the light source assess consensual response using the **"swinging flashlight" test**

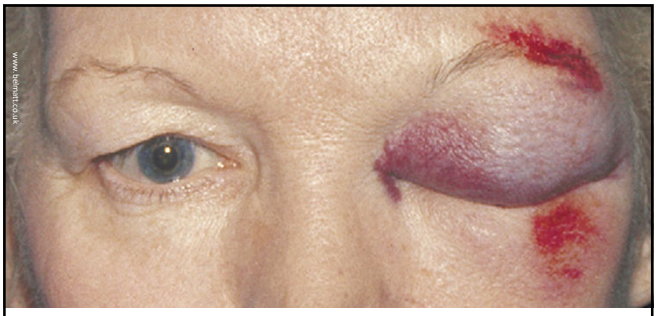




Examination of orbit



- continuity of orbital rim (?step off's)
- infraorbital sensation because infraorbital nerve passes through the orbital floor



Soft tissue examination

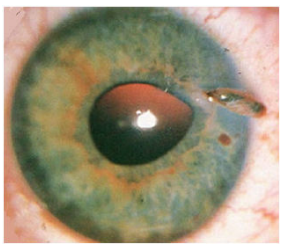
- periorbital bruising/oedema
- lid laceration
- surgical emphysema

Lids and orbits

Globe examination

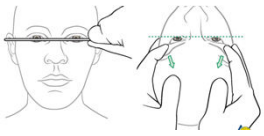
- Exclude rupture
- avoid placing pressure on the globe
- Check position, if sunk in called enophthalmos
- check ocular motility

Globe rupture

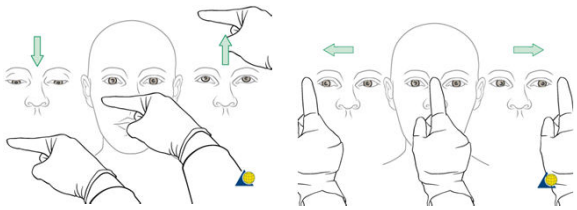


Globe position

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



Testing of ocular motility



Anterior Segment Trauma

Assessment

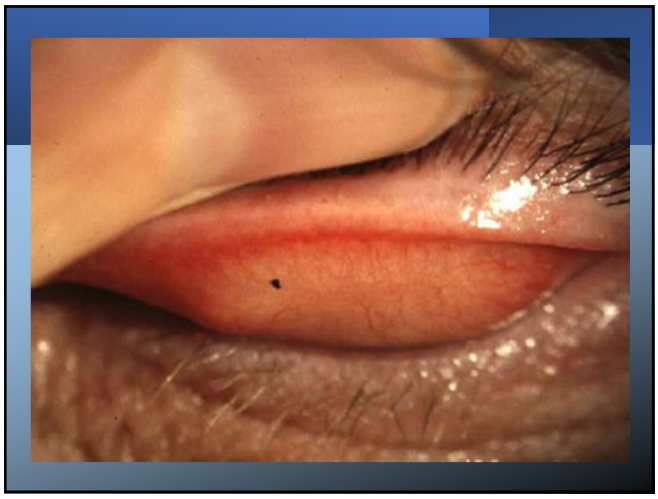
- History
  - Forces involved
  - Blunt, FB?, Penetrating
  - Chemical
    - Acid?
    - Alkali?
    - Contact allergy?

Common Causes

Abrasion	Foreign body	Penetrating Injury	Blunt
• Minor trauma - lash, finger • Recurrent Epithelial Erosion Syndrome • Plant	• Grinding	• Hammering metal on metal • Explosion • Dirty / clean	• Fist • Ball • Bungy cord

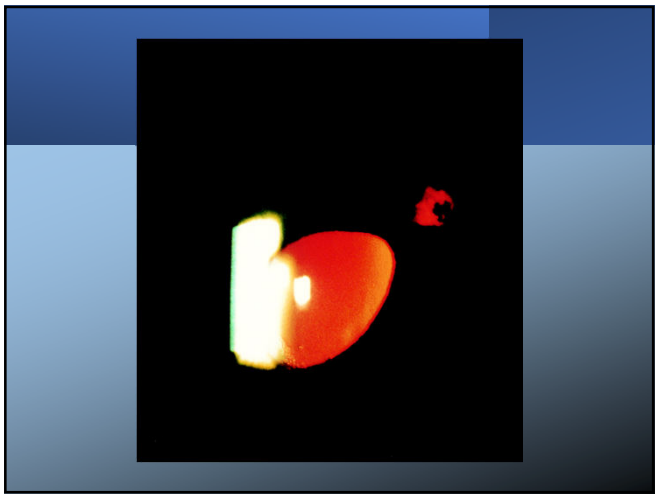
Examination

Visual Acuity	Skin/lids	Evert lids	Conjunctiva
	• Evidence of severity of injury	• ? Subtarsal FB • Look for fine scratches on upper cornea	• Laceration • Look carefully for scleral injury beneath • Sub conj hemorrhage



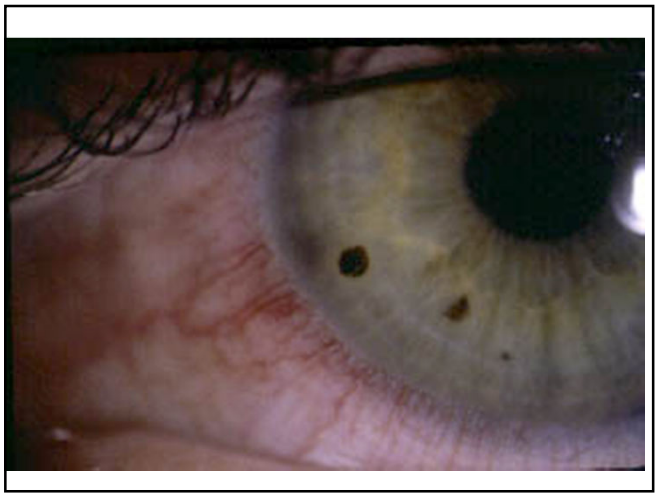
Examination…

- Cornea
  - Fluorescein stain - abrasion/wound
  - Leak
  - Infiltrate
  - FB
- Anterior chamber
  - Cells
  - Hyphaema
  - Hypopyon



Examination….

Iris	Lens	IOP
• Transillumination defects • Peaked pupil • Dilated pupil • Check for RAPD	• Red reflex • Stability	• +/- angle



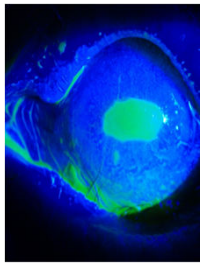
Corneal foreign body

- Grinding most common cause
- Usually do not need surgery
- Treatment
  - Removal of foreign body with needle and/or burr
  - Children may require GA

Cornea examination

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

- Injuries:
- Abrasion
- FB
- LACERATION



Corneal Abrasion and use of Fluorescine

- https://www.youtube.com/watch?v=Ls45AVffbtE

Corneal Abrasion

- Common
- Usually resolves quickly 2-3 days
- Very painful initially
- Treatment
  - Exclude other injuries
  - Chloramphenicol ointment
  - Patch not recommended
  - +/- pain relief / sleeping tablets

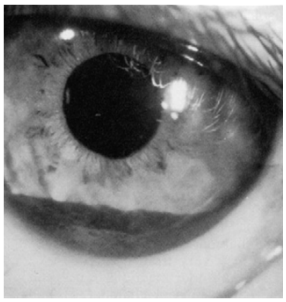
- Most times harmless
- If massive could cause the edge of cornea to be exposed even perforate,
- If extends to the back could be a feature of retrobulbar Haemorrhage

Anterior Chamber examination

- fluid level,
- Blood (hyphema)

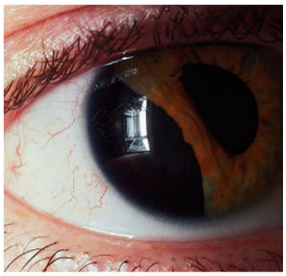
Hyphaema- blood in AC

- 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



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

Signs of chemical burn

- **Conjuctiva**:
- injection/ blanching/ chemosis(oedema) / haemorrhage/
- epithelial defect
- **Cornea**: punctate till complete loss / oedema
- Picture: chemosis, sub-conjunctival haemorrhage, and corneal haze

Treatment chemical injury

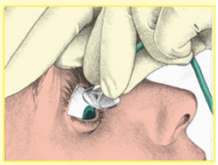
- Neutralisation of the pH by **irrigation**(To start before and during the transportation to the hospital)-Immediate copious irrigation that is available even before full Hx or detailed examination
- Topical anaesthesia- tetracaine
- Evert eyelids to remove the retained matter
- One litre for acid, 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.

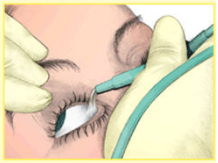
Morgan lens

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.



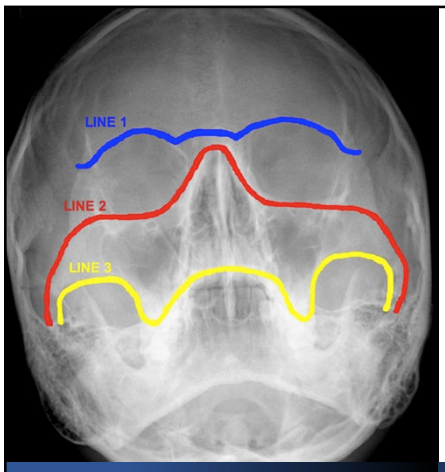
I.V. tube

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



Facial Bones Projections

Three lines for inspecting the OM (Occipito-mental) views

- **Line 1:**
- Look for widening of the zygomatico-frontal sutures
- **Fractures of the superior rim of the orbits**
- "Black-Eyebrow" sign due to orbital emphysema
- Opacification / air-fluid level in the frontal sinuses

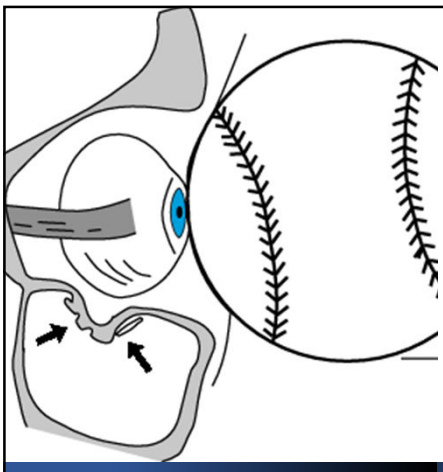
Line 2:

- 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:

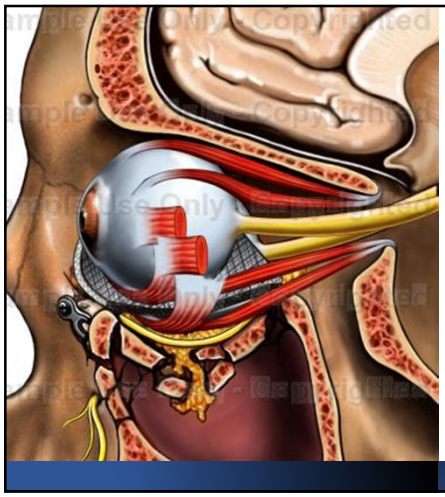
- Look for fractures of the inferior aspect of the zygomatic arch
- Fractures of the lateral maxillary antrum
- Opacification / **air-fluid level in the maxillary sinuses**
- Fractures of the alveolar ridge

- **Compare the injured side with the uninjured side.**



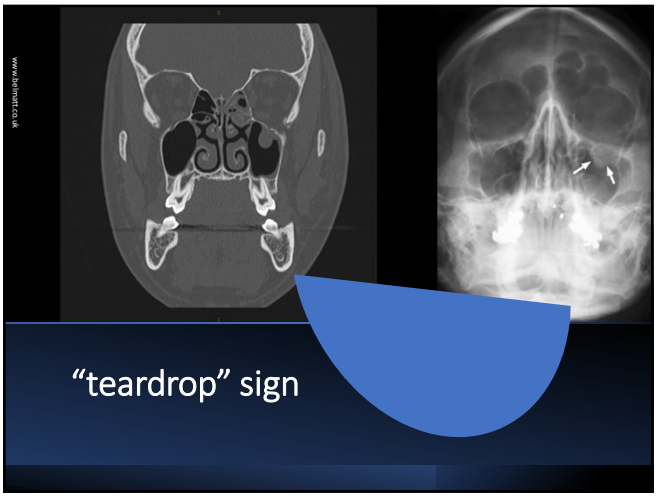
Orbital floor (maxillary bone)

- 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



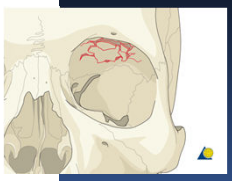
Medial wall (ethmoidal)

- •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**

Orbital roof (frontal)

- •Common in children following blow trauma
- Soft tissue signs as per orbital floor # but bruising may spread across midline
- Superior subconjuctival 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

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 vitrous/
- 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)

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

- *History*

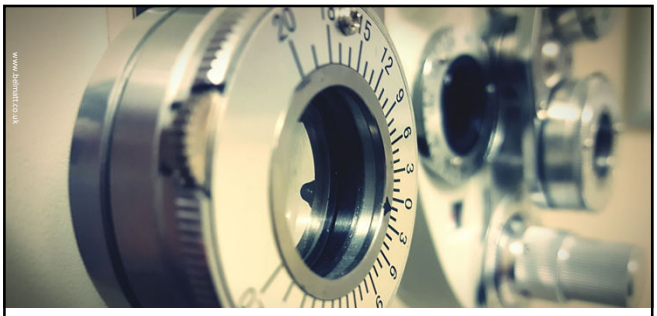
- ? Trauma (e.g., chemical, foreign body, etc.)? Contact lens wearer? (Possibility: corneal ulcer.)
- Pain? Severe photophobia? Both?
- Significant vision changes?
- History of prior ocular disease (e.g., scleritis, iritis)?

- *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**

Thank you for listening!

www.belmatt.co

- Contact: 0207 692 8709
- Email: info@belmatt.co.uk
- Website: www.belmatt.co.uk