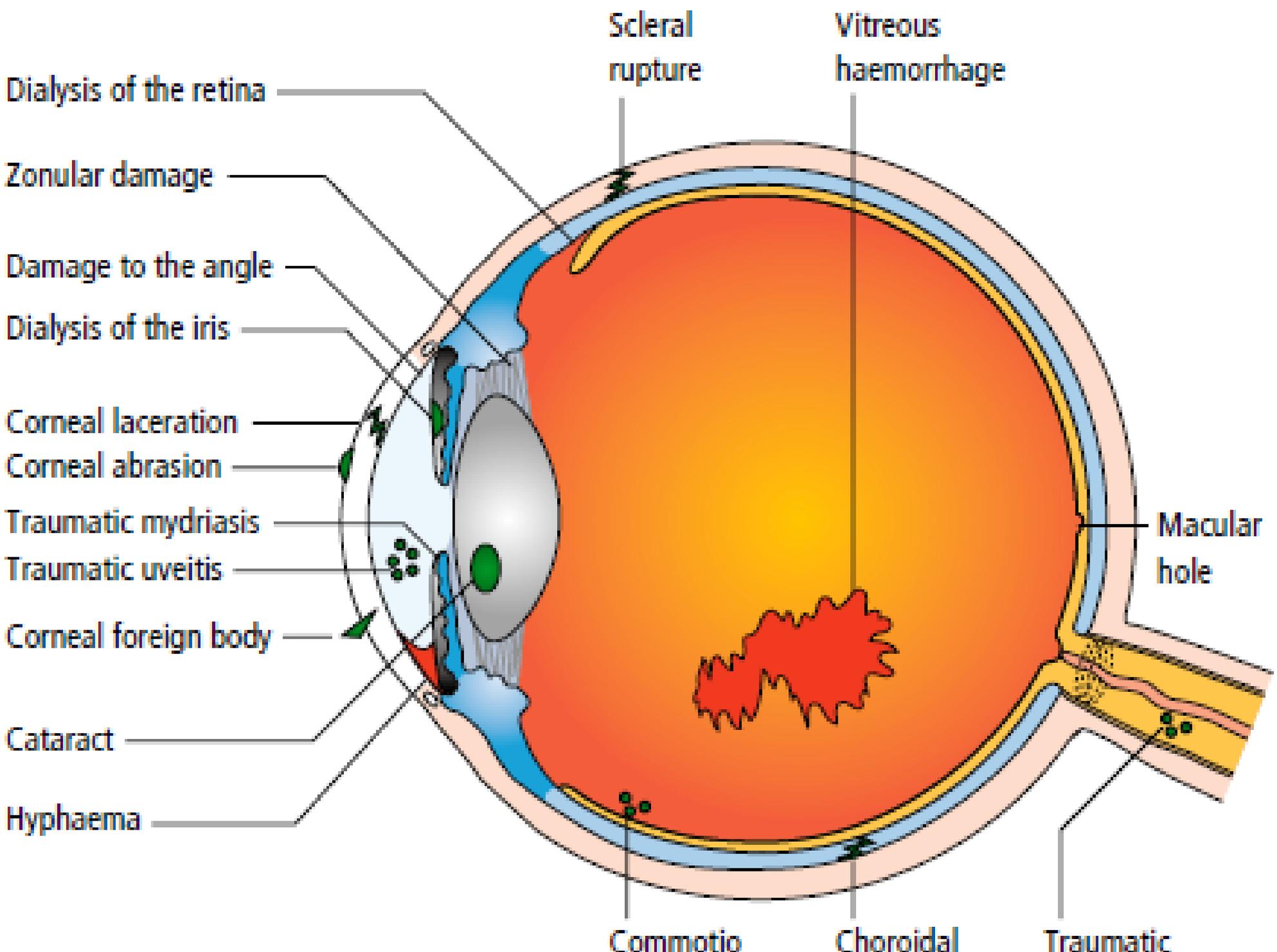


# Eye Trauma

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Dialysis of the retina

Zonular damage

Damage to the angle

Dialysis of the iris

Corneal laceration

Corneal abrasion

Traumatic mydriasis

Traumatic uveitis

Corneal foreign body

Cataract

Hyphaema

Scleral rupture

Vitreous haemorrhage

Macular hole

Comotio

Choroidal

Traumatic

# Evaluation of ocular trauma

## History :

- Age, occupation
- Brief history of accident: Time and location of injury.
- Specific symptoms
- Past ocular history.
- Past medical history, medications, allergies.
- **Pain, lacrimation and blurring of vision** are common features of trauma, but mild symptoms may distinguish a potentially blinding intraocular foreign body.

## Examination :

- Visual acuity
- External examination
- Pupil examination
- Extra ocular muscle motility
- Anterior segment
- Posterior segment
- Intraocular pressure.

- ***Visual acuity in both eyes not only the injured.***
- Where a penetrating injury is suspected and pressure to the globe must be avoided, it may only be possible to measure vision approximately in the injured eye; the patient may be able to detect light shone through the closed lid and even the direction of the source.

- ***External examination:***

1- Gross observation to detect:

- any asymmetry
- abnormal facial or periorbital features.

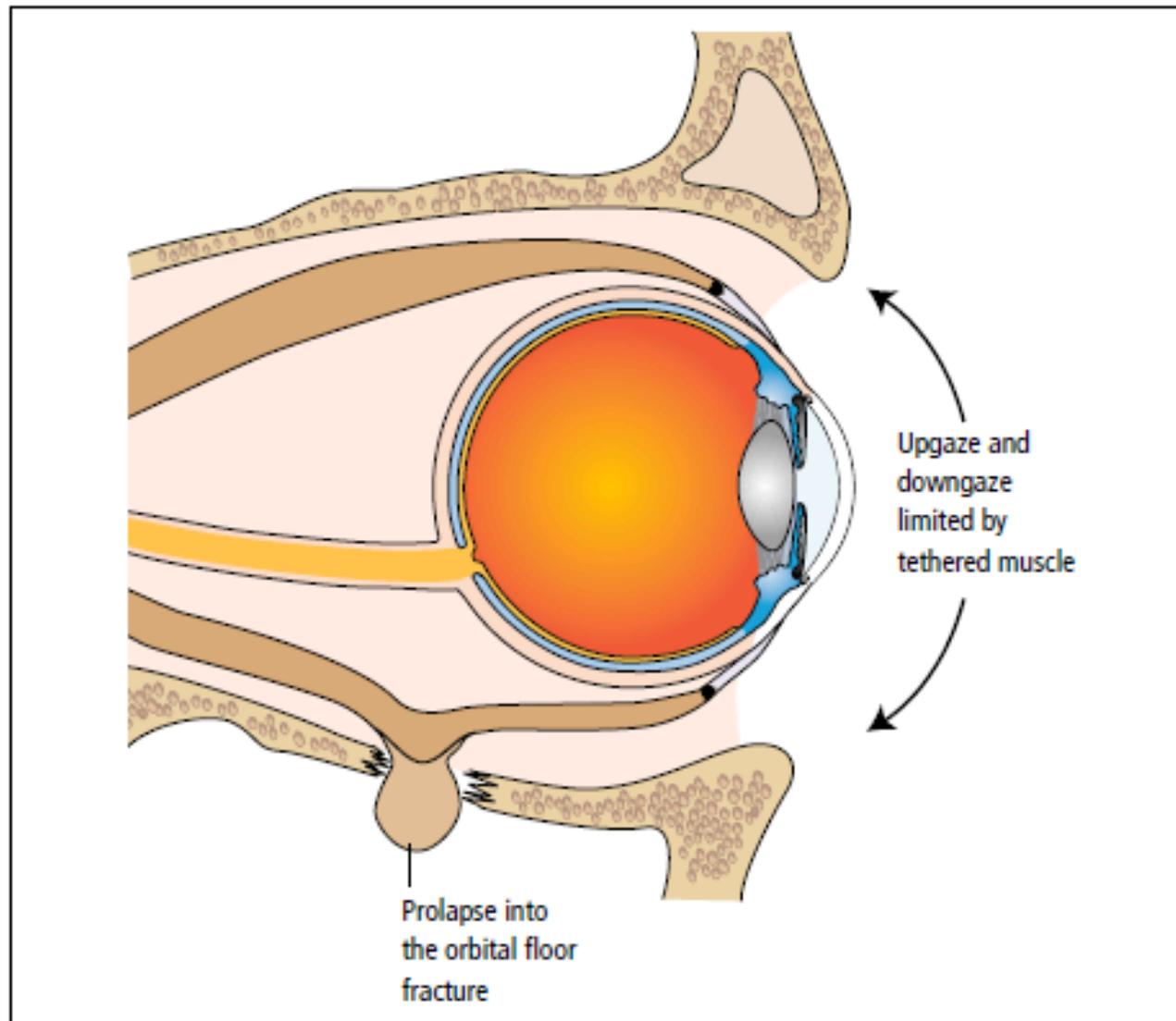
2- Palpation of the bony orbit, avoid pressure on eye if nature of injury not known or if ruptured globe is suspected.

3- Retract upper and lower eyelids with care if foreign body is suspected.

avoid this procedure if ruptured globe is suspected.

# Orbital injury

- Damage to the orbit itself (***blow - out orbital fracture***) is suspected if the following signs are present:
  - • **Emphysema** derived from a fractured sinus.
  - • **A patch of paraesthesia** below the orbital rim suggesting infraorbital nerve damage. The infraorbital nerve is commonly injured in orbital blow – out injury involving the floor of the orbit.
  - • **Limitation of eye movements**, particularly on upgaze and downgaze, due to trapping of the inferior rectus muscle by connective tissue septa caught in the fracture site in the inferior orbital floor, the wall most commonly fractured.
  - • Subsequently the eye may become recessed into the orbit (***enophthalmos*** ).
  - • If the lid margin is cut at the medial canthus it is important to determine if either of the lacrimal canaliculi is severed. This will cause epiphora if untreated.



**Figure 16.2** A blow-out fracture.

# 1- The conjunctiva and sclera

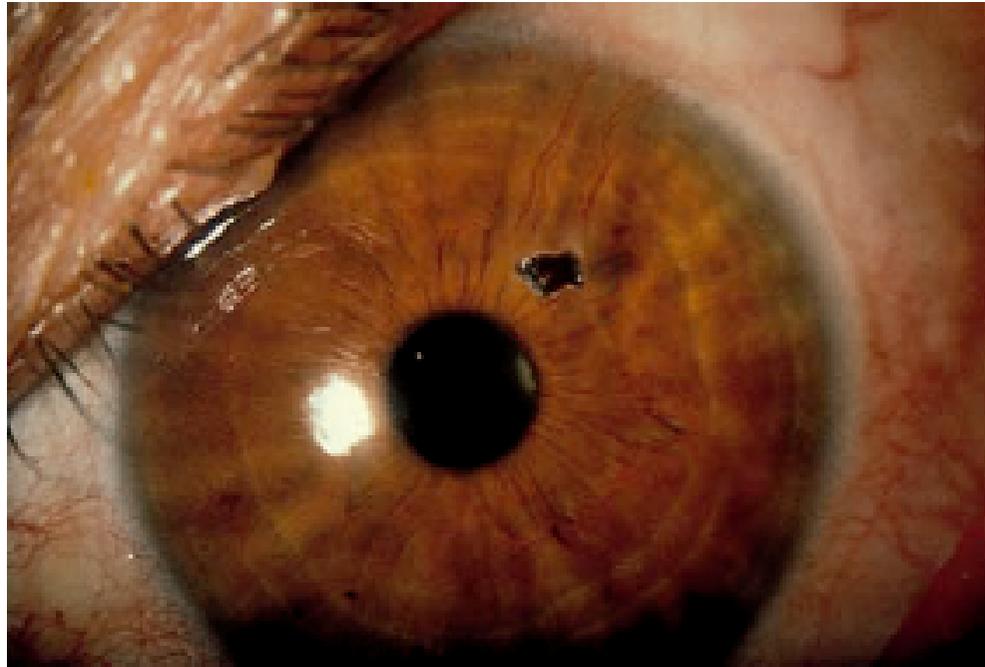
- These must be examined for the presence of any lacerations.
- If the history is appropriate a **subconjunctival haemorrhage** should be considered to be the **possible site of a scleral perforation** .
- The **fundus** should be examined with full mydriasis to exclude a retained **intraocular foreign body**.
- Retained, iron - containing foreign bodies may have an insidious and particularly devastating effect on the eye ( ***siderosis oculi*** ).
- A ***tiny, high - velocity metal fragment***, penetrating the ocular coats and retained in the peripheral vitreous cavity can, with time, lead to a progressive, pigmentary degeneration of the retina. **A discolouration of the iris ( *heterochromia* ) , *a fixed mydriasis* and *cataract*** can be a late clues to the diagnosis.



Subconjunctival hemorrhage .

# 2- The Cornea

- This is examined for loss of the epithelial layer (abrasion), for lacerations and for foreign bodies .
- The instillation of **fluorescein** will identify the extent of an **abrasion** and use of **concentrated fluorescein**, will identify a **leak of aqueous through a penetrating wound** .
- Electromagnetic radiation may injure the conjunctiva and the cornea.
- Unprotected exposure to **ultraviolet radiation from an arc lamp** (*arc eye*) or sunlamp, or reflected from snow, is the commonest cause of this severely painful condition. Typically, severe ocular pain onsets acutely, 6 hours after exposure to the radiation, and **the cornea shows diffuse epithelial oedema and punctate erosions**. These resolve within 24 – 48 hours.



**Figure 16.5** A corneal foreign body. (With permission from Sue Ford, Western Eye Hospital.)

## Treatment

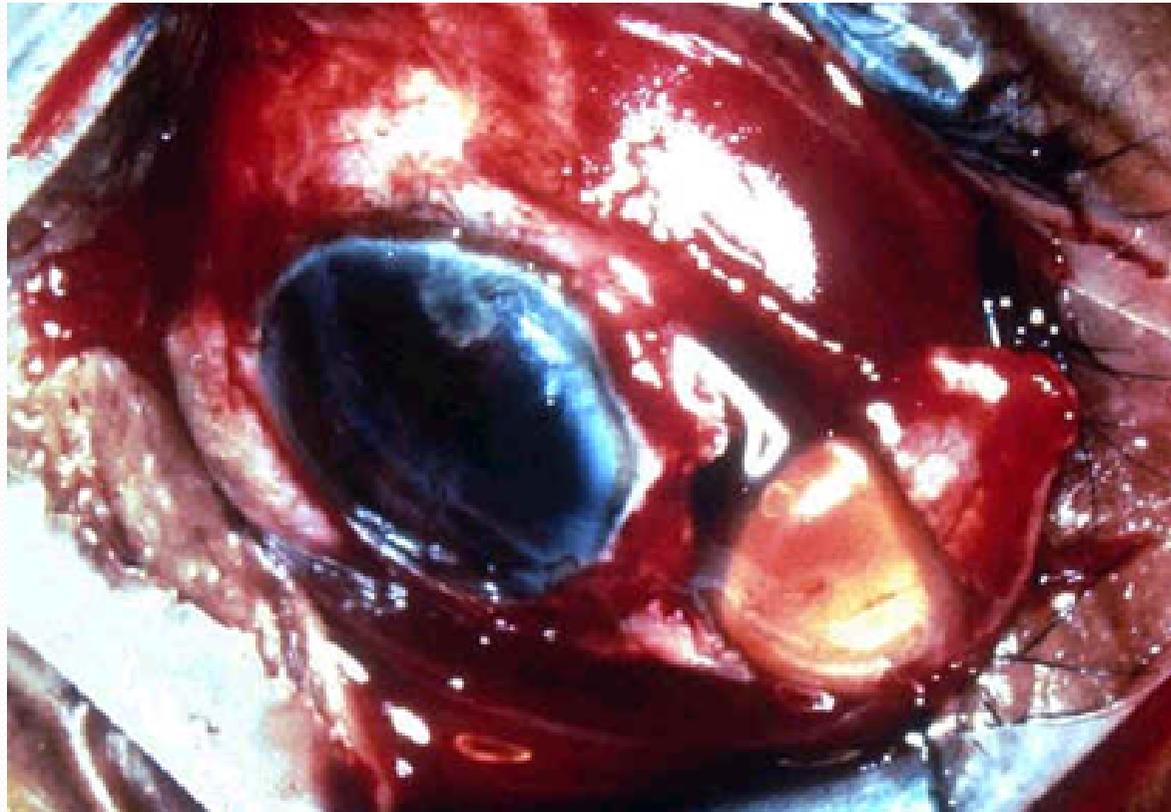
- **Corneal abrasions** = antibiotic ointment, with or without an eye pad , cyclopentolate 1% can help to relieve the pain caused by spasm of the ciliary muscle.
- UV injury to the cornea responds quickly to topical steroids.
- Corneal foreign bodies should be removed with a needle under topical anaesthesia.

- **Corneal laceration .**

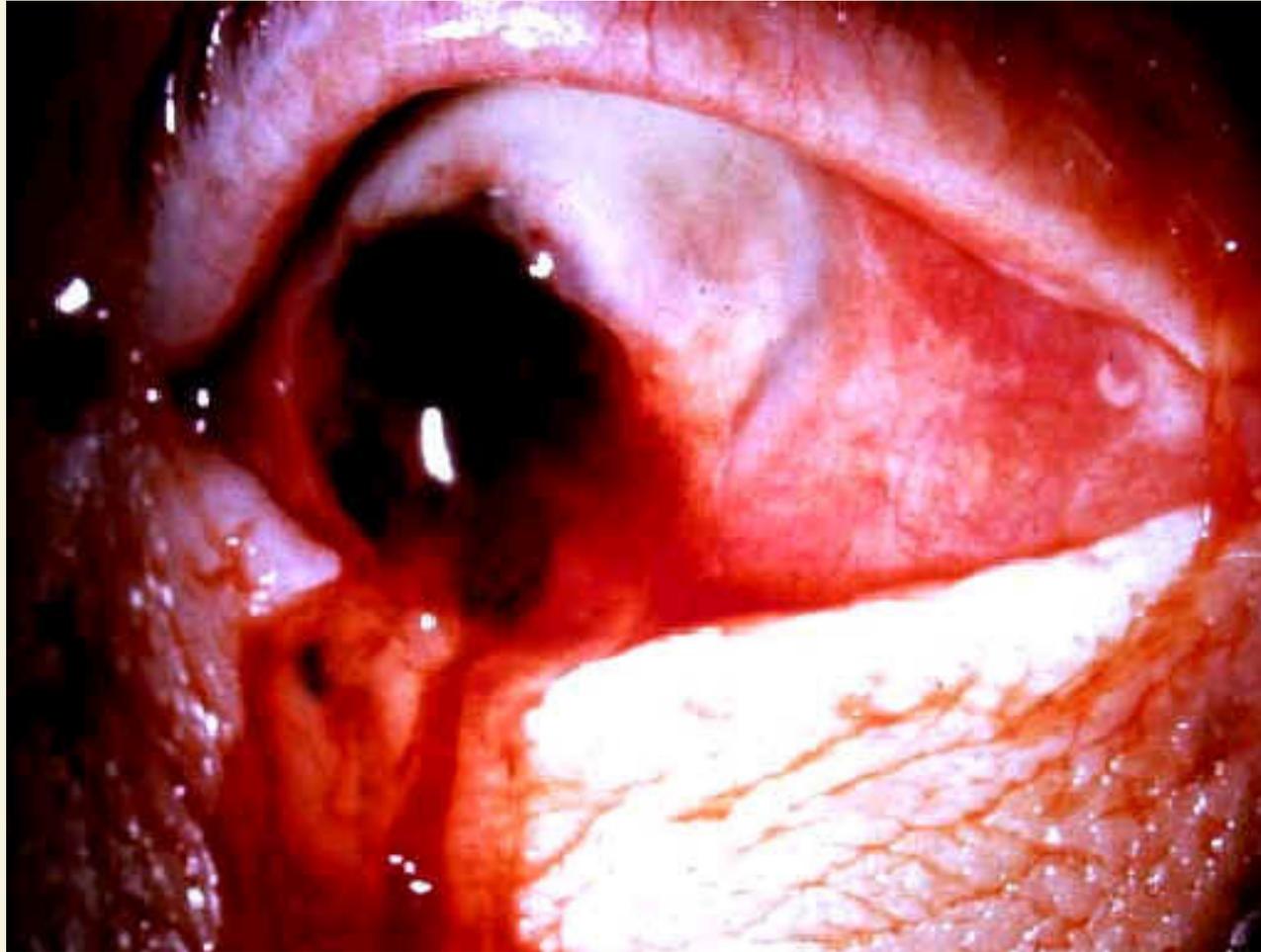
There is interruption of the cornea. The anterior chamber usually is shadow. Iris may be incarcerated into the wound.

- **Corneal-scleral laceration .**

wound extended into sclera, and may extend posteriorly



Severe trauma that resulted in a scleral rupture with delivery of the lens



- Corneal laceration and traumatic cataract from a thrown beer bottle

- When suspect an open globe, one shall protect the eye from further injury by covering the eye with a shield or any device that can protect the eye
- Do not instill any medication to the eye.
- Define the type of injury.

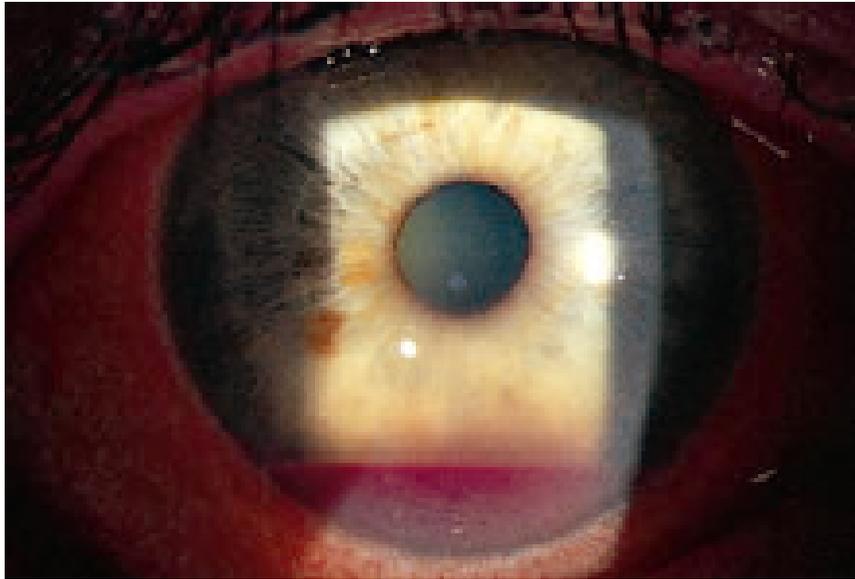
## 3- Anterior chamber

- **Blunt trauma** may cause haemorrhage into the anterior chamber, where it collects with a fluid level, visible **as a hyphaema**. *This is caused by rupture of the root of the iris blood vessels, or the iris may be torn away from its insertion into the ciliary body ( **iris dialysis** ) to produce a D - shaped pupil.*
- *Hyphaema may also be seen with a penetrating eye injury and the shape of the pupil may be distorted if the peripheral iris has plugged a penetrating corneal wound .*
- The pupil may also show a fixed dilatation as a result of blunt trauma( **traumatic mydriasis** ).

# Iridodialysis

localized separation or tearing away of the iris from its attachment to the ciliary body.





(a)



(b)

**Figure 16.6** (a) A hyphaema; (b) penetrating eye injury (note the eyelashes in the anterior chamber and the distorted iris).

## How to treat “Hyphaema”?

- This usually settles with **rest**, but a rebleed may occur in the first 5 – 6 days after injury.
- **Steroid eye drops** are given for a short time, together with **dilation of the pupil**. Steroids reduce the risk of rebleeds.

The commonest complication is **a raised ocular pressure**, particularly if there is a secondary bleed, which tends to be more severe than the first. It is for this reason that rest is important.

# 4- The Lens

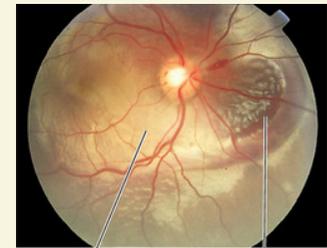
- Dislocation of the lens following blunt trauma may be suggested by a fluttering of the iris diaphragm on eye movement ( **iridodonesis** ).
- *Lens clarity should be* assessed with the slit lamp and against the red reflex after pupil dilatation.
- Cataracts develop abruptly with direct penetrating trauma .
- Blunt trauma also causes a posterior subcapsular cataract within hours of injury , which may be transient.



Cataract following penetrating trauma

# 5- The Fundus

- The fundus should be inspected with a direct ophthalmoscope after full mydriasis. If no systemic neurological complications accompany the injury and ocular penetration is not suspected, the pupil can be dilated.
- Areas of retinal haemorrhage may be seen and typical patches of white, retinal oedema ( ***commotio retinae*** ).
- A *retinal dialysis* (a separation of the peripheral retina from its junction with the pars plana of the ciliary body) and a macular hole may also result from blunt trauma.
- The choroid may also become torn, causing a subretinal haemorrhage which later leads to subretinal scarring.



Commotio retinae    Subretinal hemorrhage

- Peripheral retinal changes can only be excluded with indirect ophthalmoscopy or slit - lamp microscopy.
- If there is no red reflex and no fundus details are visible, this suggests a **vitreous haemorrhage**.
- The optic disc may be pale from a traumatic optic neuropathy caused by avulsion of the blood vessels supplying the optic nerve. Although this is uncommon, it leads to a profound loss of vision and no treatment is available.
- **Treatment :**
  - In **commotio retinae** *the affected zone of retina opacifies and obscures the underlying choroidal detail. It usually resolves, but requires careful observation.*
    - A **vitreous haemorrhage** *may absorb over several weeks, or may require removal by vitrectomy.*

# 6- corneal & scleral penetrating trauma

Penetrating – in and out

## Complications of penetrating trauma



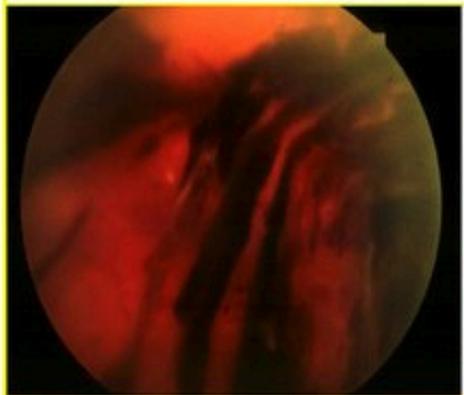
Flat anterior chamber



Uveal prolapse



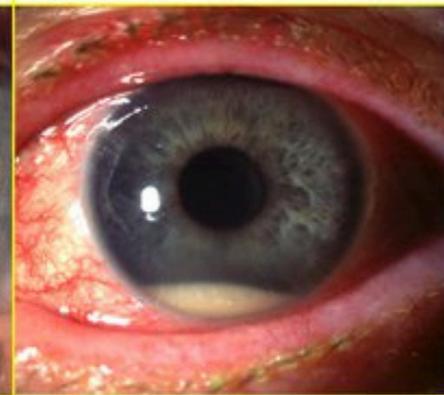
Damage to lens and iris



Vitreous haemorrhage



Tractional retinal detachment



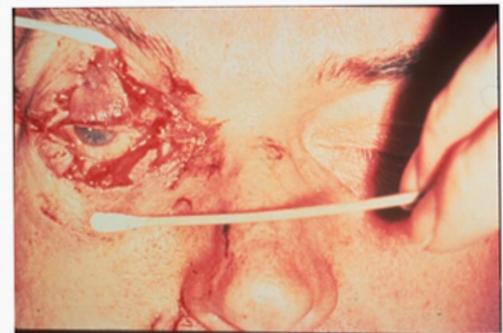
Endophthalmitis

## Treatment:

- Once identified, no further examination of the globe should be performed but a **shield** should be gently placed over the eye and the patient referred for urgent ophthalmic treatment.
- These serious injuries, often with grave implications for sight, require careful microsurgical suturing to restore the integrity of the globe.
- Once the eye has settled from this primary repair additional operations are
  - often required later, to:
    - • remove a foreign body;
    - • remove a cataract;
    - • replace a corneal opacity with a corneal graft;
    - • repair a detached retina or remove the vitreous gel to prevent detachment.

# 7- Laceration of the skin and lid.

- Check if the eyelid margin is involved.
- The naso- lacrimal drainage system may be involved if injury involves nasal portion of the eyelid.
- Need to look for associated occult eye or orbital trauma.
- The multiple layers of the lid must be apposed correctly to avoid poor lid function, which could result in corneal injury or scarring.



Full thickness lid laceration from a dog bite

- **Treatment:**

- These require careful apposition and suturing, particularly if the lid margin is involved, to retain the lid contour.

- If one of the lacrimal canaliculi is damaged ,an attempt can be made to repair it, but if repair is unsuccessful, usually the remaining tear duct is capable of draining all the tears.

- If both canaliculi are involved, an attempt at repair should always be made.

# 8- Chemical injury

Common **household agents** that can damage the eyes:

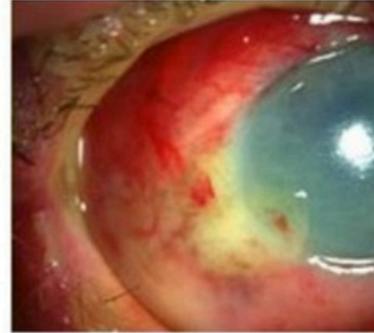
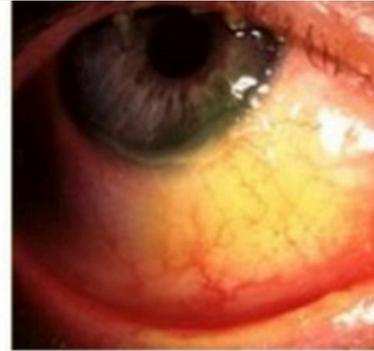
- Ammonia
- Disinfectants
- Oven Cleaners
- Drain Cleaners
- Bleach
- Detergents
- Makeup and Perfumes

- **Symptoms:**
- Burning ,Tearing, Redness and blurred Vision
- **Damage to the Eye from Chemical Injury Can Include:**
  1. Swelling of the cornea and conjunctiva
  2. Burns (either acid or alkali burns)
  3. Infection .
  4. Scar tissue altering vision .
  5. Increased intraocular pressure. (glaucoma)
  6. Dry eye syndrome .



## Grading of the chemical injuries

Grade	Prognosis	Limbal ischemia	Cornial involvement
I	Good	None	Epithelial damage
II	Good	Less than 1/3	Corneal haze, Iris details are visible
III	Intermediate	1/3 to 1/2	Total epithelial loss stromal haze Iris details obscured
VI	Poor	over 1/2	Total epithelial loss Cornea is opaque iris and pupil are obscured



- **Treatment :**

- 1- Acid**

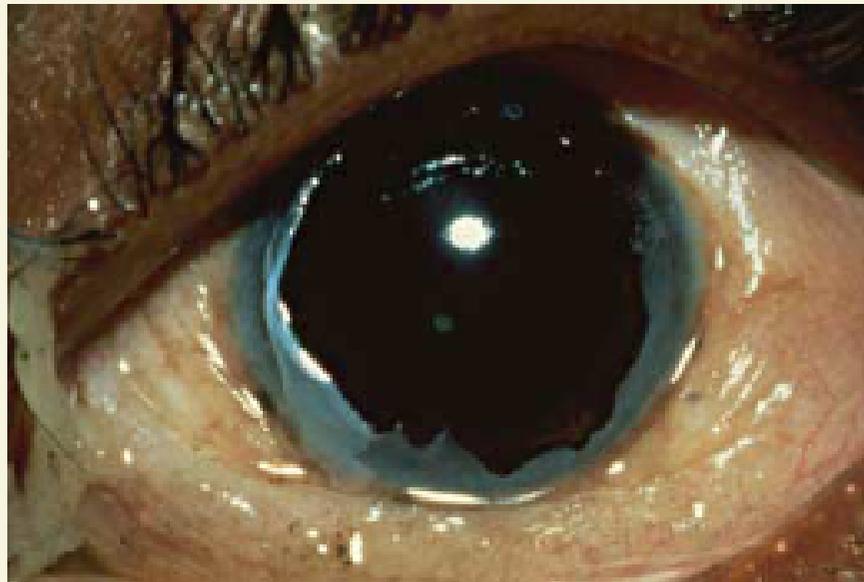
- 1- Start continuous **irrigation with normal saline** until pH of tears neutralized

- 2- **Cycloplegia** ( Atropine 1% qid or scopolamine 0.25% bid or homatropine 5% bid )

- 3- Patch with **ophthalmic ointment** ( bacitracin, erythromycin)

## 2- Alkali

- Stat continuous irrigation for many minutes to hours until pH of tears neutralized
- Pain relief may be administered by dropping anesthetic directly into the eye (for both)



Thank  
you