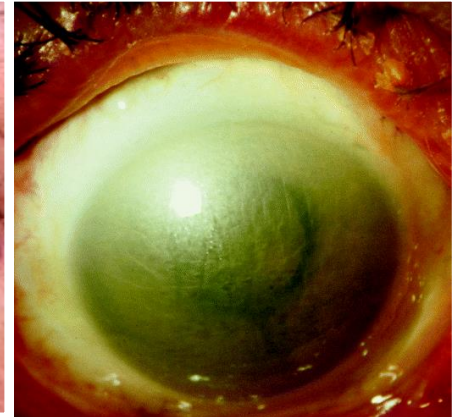
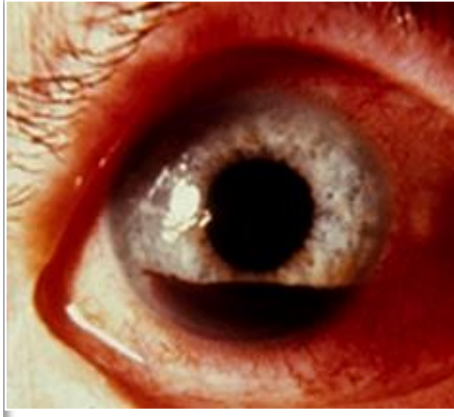
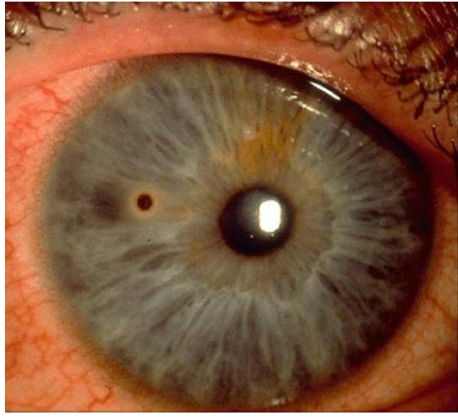




Ocular Emergencies

Dr. N. Abidi

A patient may present in casualty with complaints of

- sudden and painless/painful loss of vision
- Some chemical has entered the eye
- Patient sustained injury due to RTA, fall, etc.

CMO in Ophthalmology Fears

- “The patient is going to lose their vision”
- “Will I miss something major and not recognize it”
- “I don’t know where to start with EYE patients”
- “I have no idea what I am looking at...but I am glad it’s not my eye”
- “I can’t get a good view or image”
- “Will I cause damage to the eye if I do a physical exam”
- “Do I need to send a call to an ophthalmologist?”

Acute Eye Conditions

```
graph TD; A[Acute Eye Conditions] --> B[Emergency<br/>Immediately]; A --> C[Very Urgent<br/>Within a few hours]; A --> D[Urgent<br/>Within one day]; B --> B1[Central Artery Occlusion]; B --> B2[Chemical Burns]; C --> C1[Perforation<br/>Ruptured]; C --> C2[Acute glaucoma]; C --> C3[Central Vein Occlusion]; D --> D1[Orbital cellulitis<br/>Orbital injury]; D --> D2[Corneal ulcer<br/>Corneal abrasion<br/>Corneal FB]; D --> D3[Hyphema<br/>Intraocular FB]; D --> D4[Retinal detachment<br/>Macular edema];
```

Emergency
Immediately

**Central Artery
Occlusion**

Chemical Burns

Very Urgent
Within a few hours

**Perforation
Ruptured**

Acute glaucoma

**Central Vein
Occlusion**

Urgent
Within one day

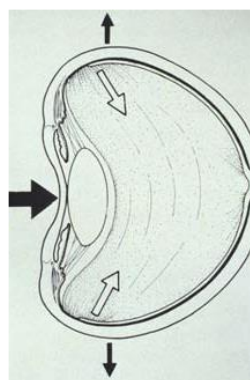
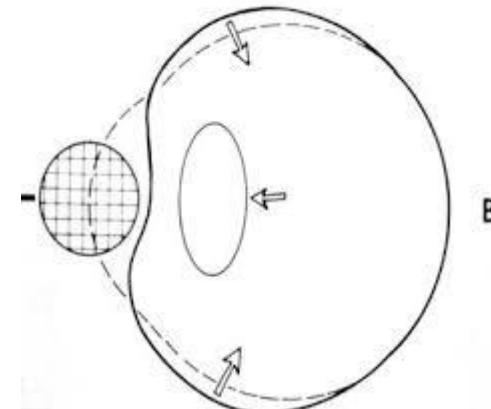
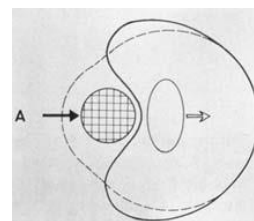
**Orbital cellulitis
Orbital injury**

**Corneal ulcer
Corneal abrasion
Corneal FB**

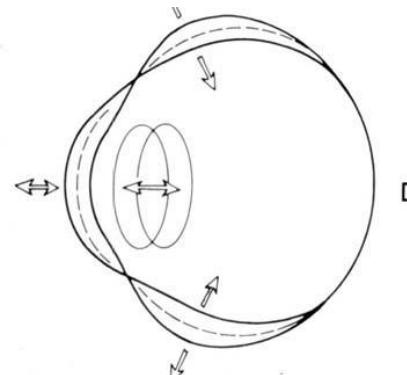
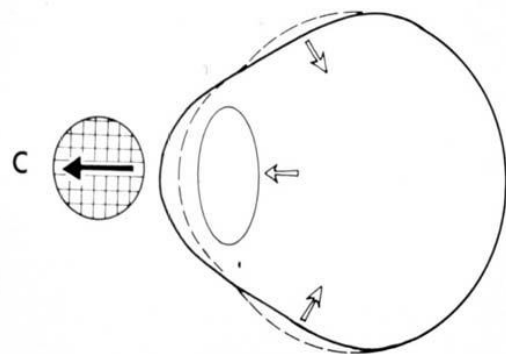
**Hyphema
Intraocular FB**

**Retinal detachment
Macular edema**

BLUNT MECHANISM: • ↓ A-P DIAMETER
• ↑ EQUATORIAL DIAMETER



↑ INTRAORBITAL PRESSURE • EYE
REACTION – DECREASES IN ANTERIOR
- POSTERIOR DIAMETER – INCREASES
IN LATERAL DIAMETER • PRESSURE
TRANSMITTED TO ORBITAL BONES
AND CREATES SHOCK WAVE



Points to note in history

Time of onset

Changes in vision (lost, blurred, or decreased vision; diplopia, sudden or gradual)

Events preceding the current state

Recent history of ocular disease or surgery

Ask for any Systemic Diseases?

Current medications or recent changes to medications

Visual acuity before the current event

Other symptoms (pain, nausea, vomiting)

Eye Exam

Visual acuity - Snellen's eye chart, counting fingers, light perception

CN II – VII - Pupils, visual fields, EOMs, facial droop

Inspection/palpation of eye and surrounding structures - Asymmetry, proptosis, enophthalmos, orbital rim

Lids/ducts

Slit lamp – Anterior segment



Eye Exam

Funduscopy – Posterior segment

Contraindications to dilation – significant head trauma, suspected rupture, history of glaucoma

Intraocular pressure - Goldman Applanation

Tonometry, Tonopen



Anterior Segment

Perform at slit lamp

If not available, use ophthalmoscope

Inspect

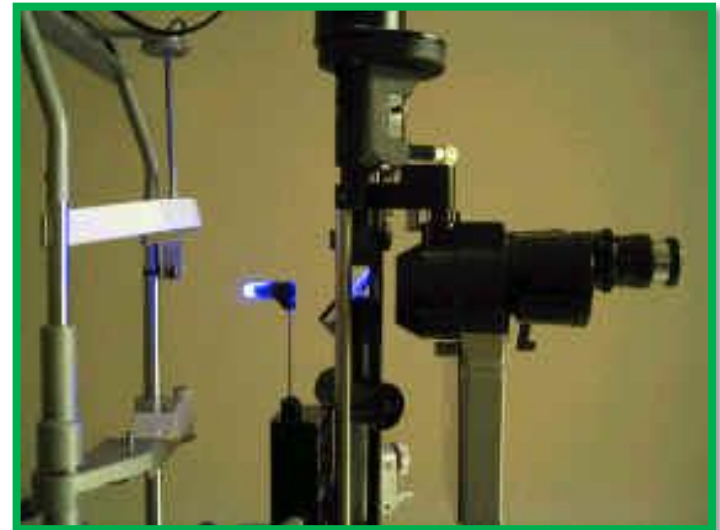
Conjunctiva

Cornea

Anterior chamber

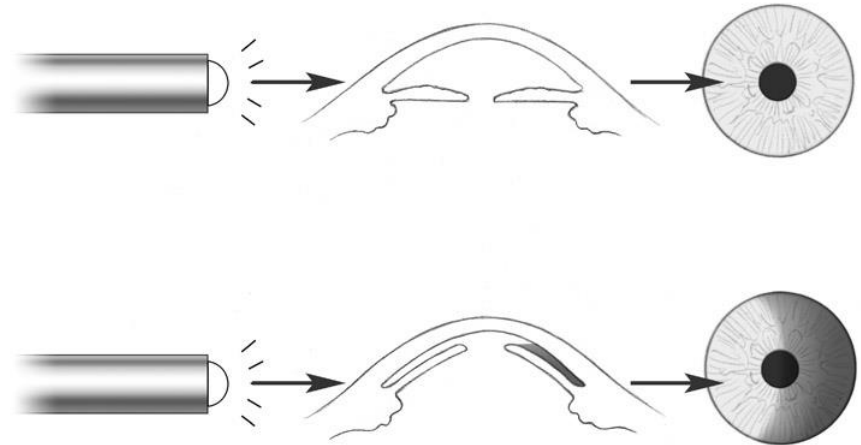
Iris

Lens



Estimating Anterior Chamber Depth

- Shine the torch from the temporal side of the head across the front of the eye parallel to the plane of the iris
- Look at the nasal aspect of the iris. If two thirds or more of the nasal iris is in a shadow, the chamber is probably shallow and the angle is narrow



The Swinging Flashlight Test

Measures both the direct and consensual response of pupil to light.

Step 1: Shine light in right eye. This will cause **BOTH** right and left pupils to constrict via **CN III** through Edinger-Westphal nucleus.

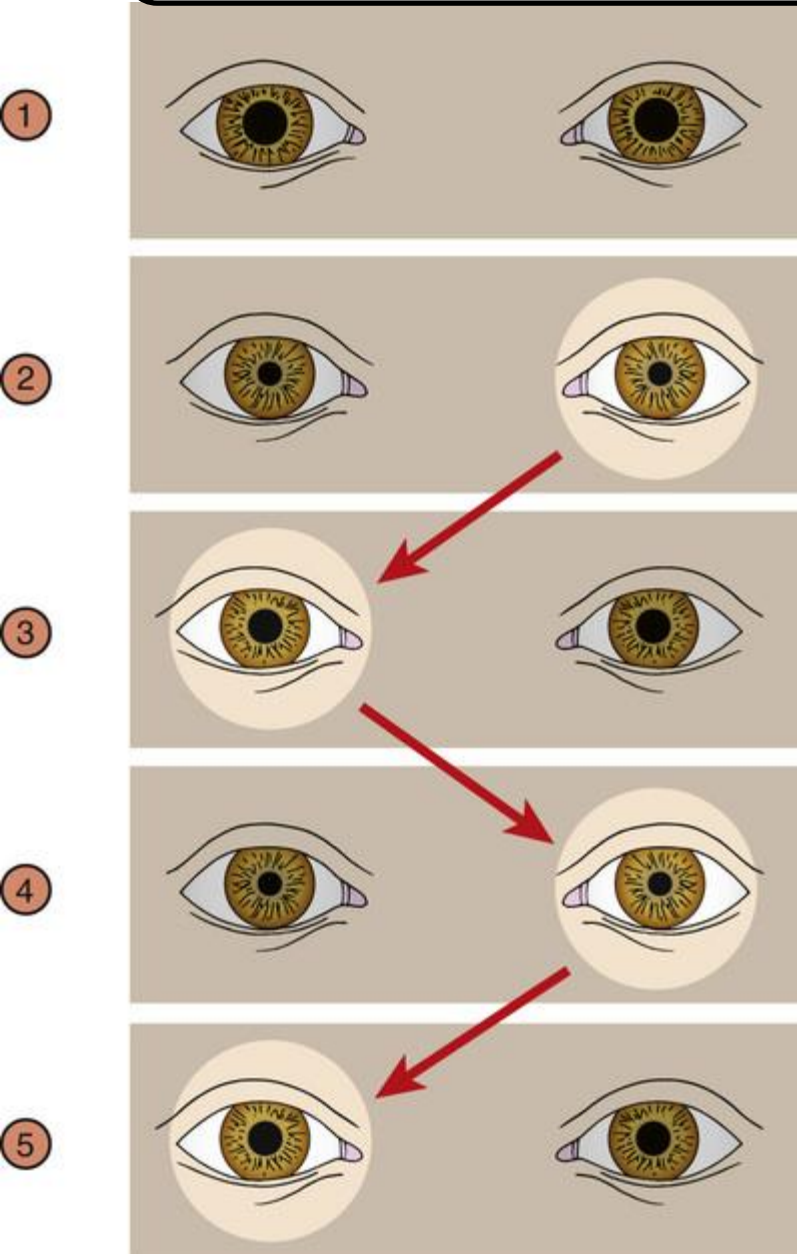
The Swinging Flashlight Test

Step 2: Then swing pen light to left eye and check to make sure the left eye **CONSTRICTS**.

If it constricts, this means that the LEFT Optic Nerve is intact and is causing a direct pupillary reflex.

If it dilates, then this is a sign that the LEFT retina or optic nerve is damaged and is called an **Afferent pupillary defect. (APD)**

The figure depicts a patient with an abnormal right optic nerve. Under normal room light illumination



The pupils are symmetrical.

During the swinging flashlight test, the pupils constrict when the normal eye is illuminated (rows 2 and 4)

But dilate when the abnormal eye is illuminated (rows 3 and 5)

The pupil that dilates during the swinging flashlight test has the “relative afferent pupillary defect” and is labeled the Marcus Gunn pupil.

Posterior Segment

Examine

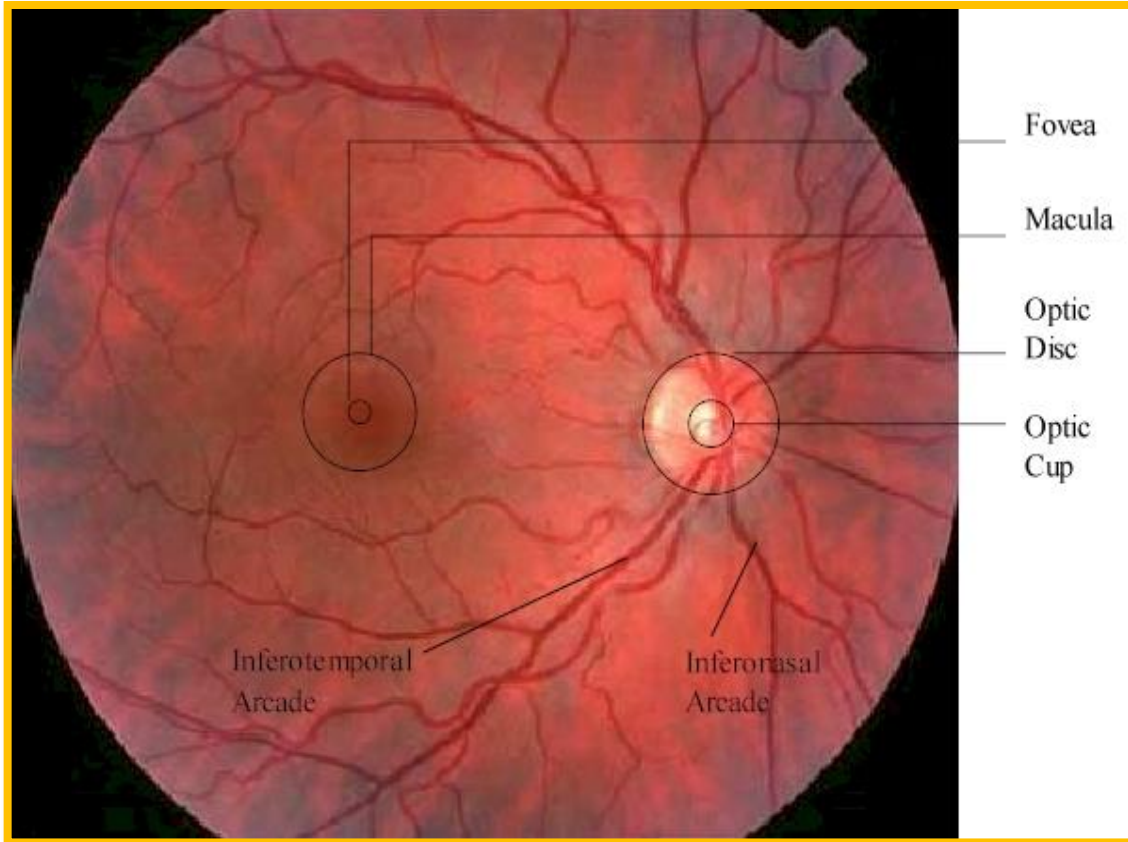
Vitreous

Optic disc

Margins, color,
cup,

Retinal vessels

Macula



Case 1

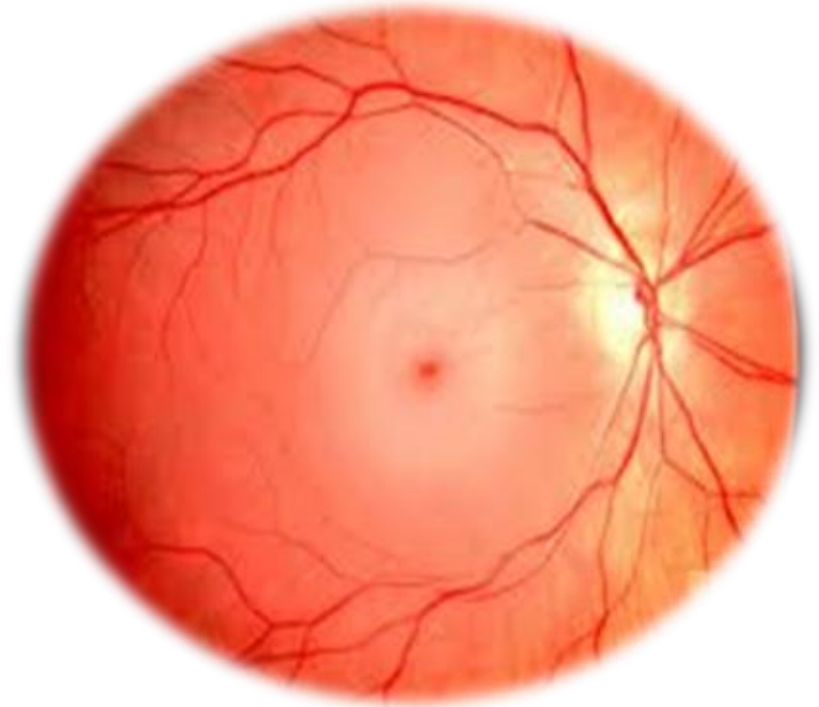
- 67 year old female presents in casualty with complaints of sudden painless loss vision in her right eye
- Vision loss is persistent
- She gives H/O Cardiovascular disease and Hypertension



What is the Diagnosis?

What is the Diagnosis?

1. Central Retinal Artery Occlusion
2. Central Retinal Vein Occlusion
3. Retinal Detachment
4. Open Globe
5. Temporal Arteritis



Central retinal artery occlusion, CRAO

Etiology

Common causes:

- Embolism is the most common cause of CRAO,
 - The major source of this being carotid artery disease, usually due to atherosclerotic plaques.
 - Carotid stenosis and the heart are other important sources of emboli
- It is equally probable that an occlusive thrombus at the level immediately posterior to the lamina cribrosa also causes CRAO

Risk Factors

The risk factors and demographics of retinal artery occlusion are similar to ischemic stroke and include several modifiable risk factors:

- Older age
- Male gender
- Smoking
- Hypertension
- Obesity
- Diabetes
- Hyperlipidaemia
- Cardiovascular disease
- Coagulopathy

Symptoms



☐ Sudden painless vision

☐ Unilateral

☐ Persistent

Signs



☐ A relative afferent pupillary defect (RAPD)

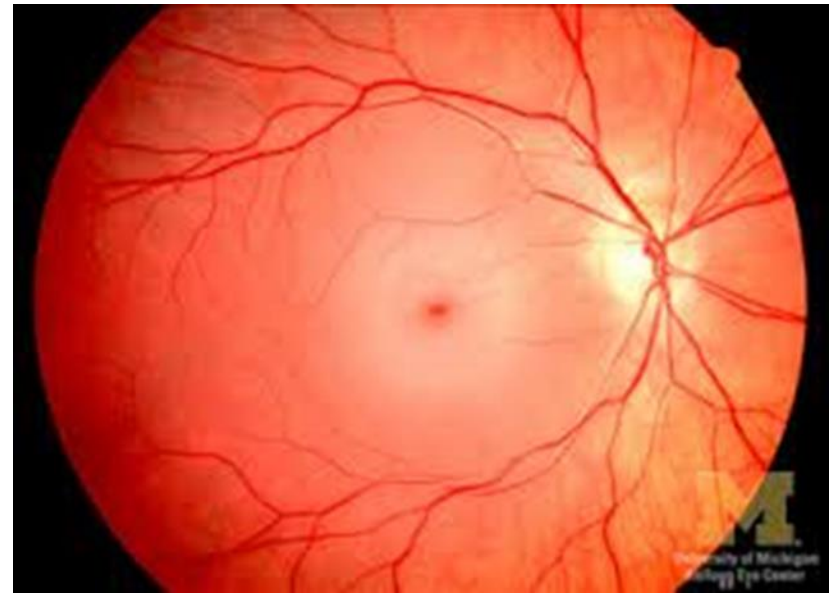
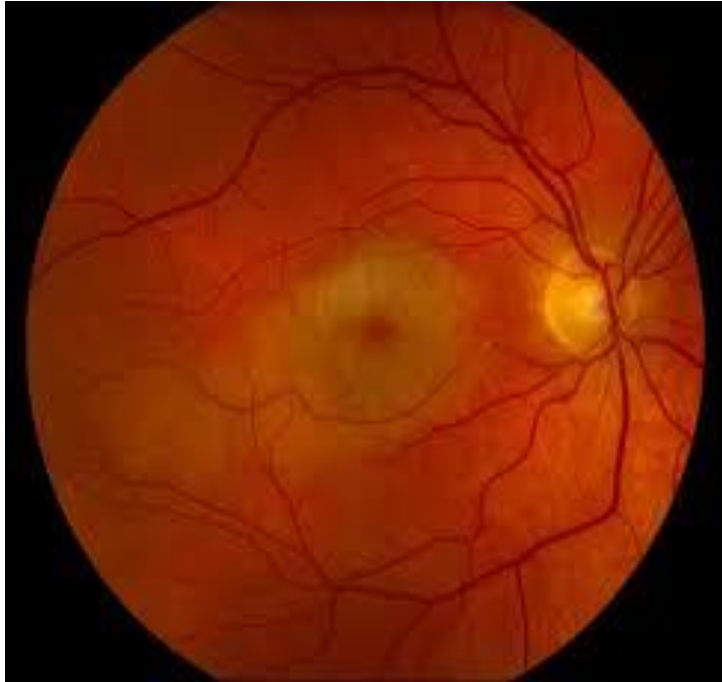
☐ Retinal opacity in the posterior pole (58%),

☐ Cherry Red Spot 90%

☐ Arterial attenuation 32% cattle tracking 19%

☐ Optic disk oedema & pallor





Treatment

- The management of CRAO should be divided into:
 - *Acute*: Attempt to restore ocular perfusion to the CRA.
 - *Subacute*: Preventing secondary neovascular complications to the eye.
 - *Long term*: Preventing other vascular ischaemic events to the eye or other end organ.

Treatment

Use of sublingual isosorbide dinitrate

Systemic pentoxifylline

Inhalation of a carbogen, hyperbaric oxygen

To increase blood oxygen content and dilate retinal arteries

Ocular massage to attempt to dislodge emboli

Intravenous acetazolamide and mannitol

Anterior chamber paracentesis

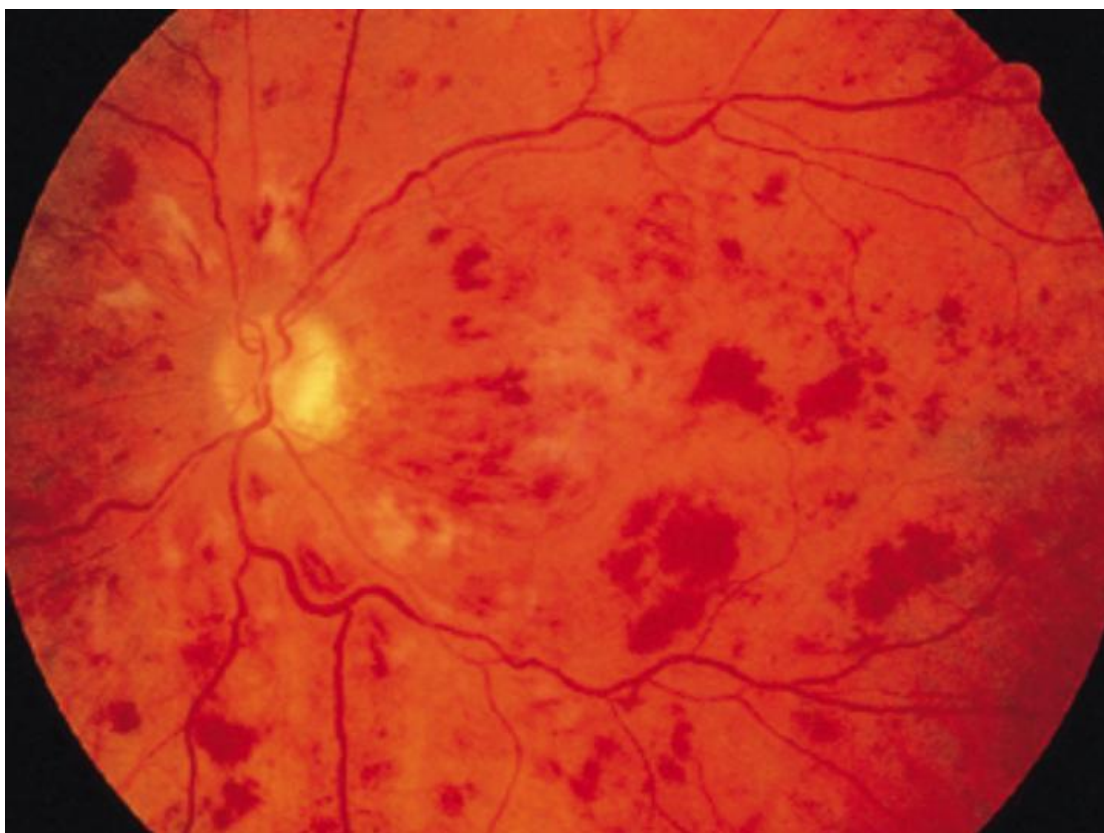
To increase retinal artery perfusion pressure by reducing intraocular pressure

Systemic Work up

- Investigate the patient for systemic cardiac disease:
 - Carotid Doppler
 - Echocardiography
 - ESR & C-reactive protein
 - Prothrombin time
 - Serum Homocysteine levels (in young patients especially)
- Management of systemic disease is always after the initial emergency treatment
- Look for ocular complications-may develop neovascular glaucoma

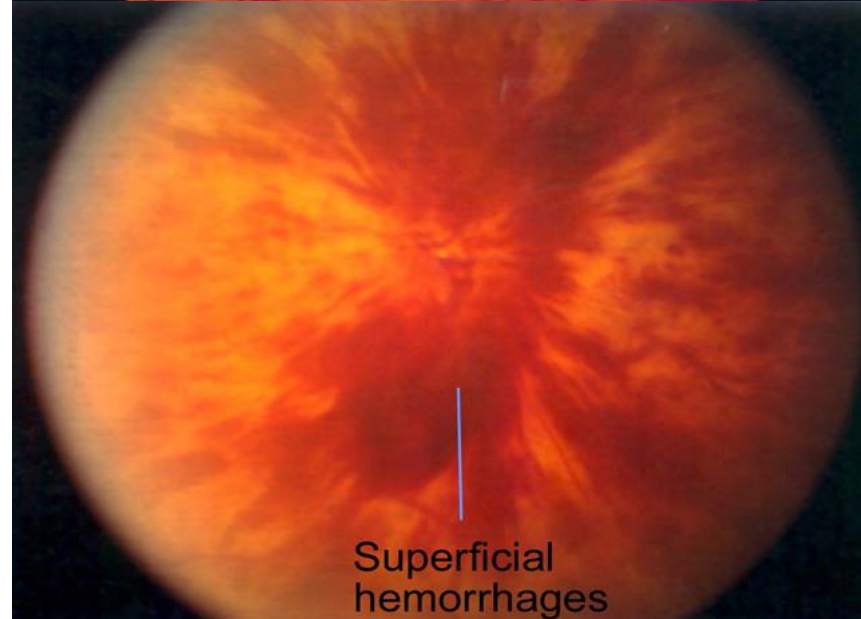
Case 2

- 69 year old M with HTN and DM complains of painless, monocular rapid loss of vision



What is the Diagnosis?

1. Central Retinal Artery Occlusion
- ➔ 2. Central Retinal Vein Occlusion
3. Vitreous Hemorrhage
4. Retinal Detachment
5. Episcleritis



Central Retinal Vein Occlusion CRVO

Start Treatment within 30 min

Symptoms

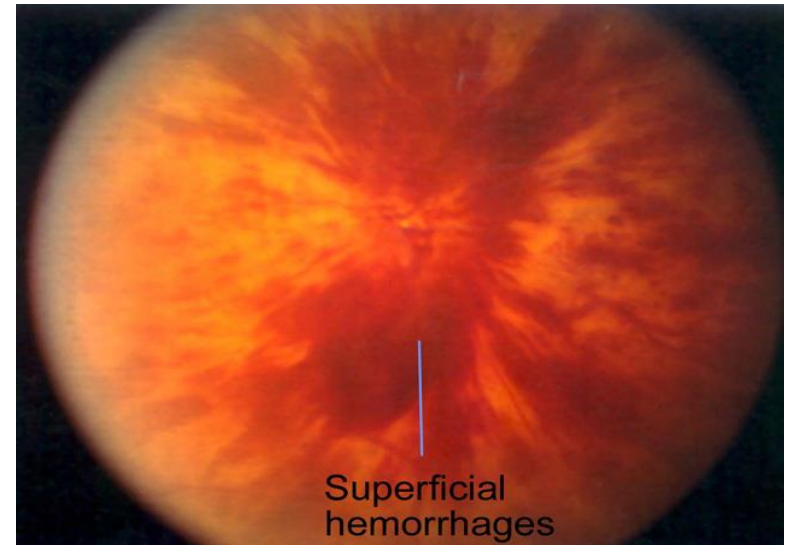
Sudden and painless loss of vision.

Predisposing factors

Increasing age.

Hypertension.

Diabetes.



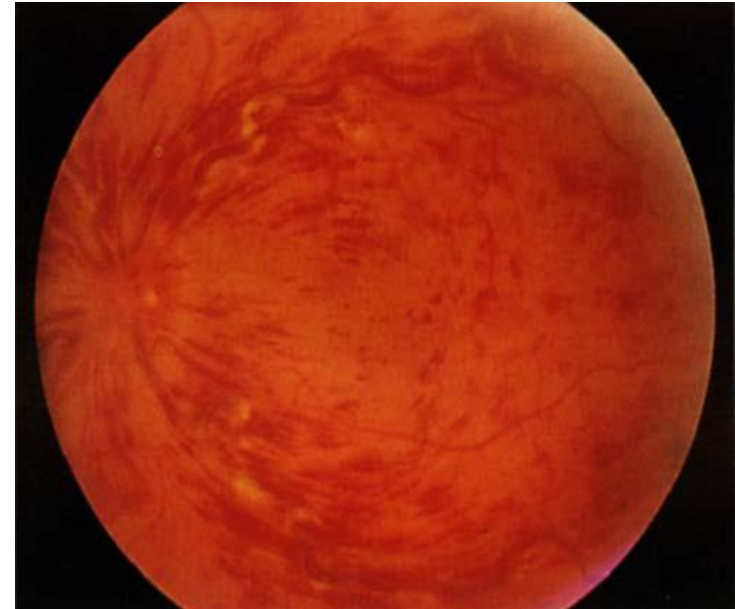
Central Retinal Vein Occlusion CRVO

Signs

Visual acuity and presence of a Relative Afferent Pupillary Defect (RAPD) are variable depending on the severity and duration since the onset of the condition.

Abnormal red reflex.

Fundus examination shows large areas of hemorrhage.



Central Retinal Vein Occlusion

Investigation and Management

Screen for diabetes and hypertension

Urgent referral to ophthalmologist

Laboratory testing should be directed toward identifying systemic vascular problems

Complete blood cell (CBC) count

Glucose tolerance test

Lipid profile

Serum protein electrophoresis

Chemistry profile

Hematologic tests

Syphilis serology

A List of Advocated Treatments:

Aspirin (Acetyl Salicylic Acid)

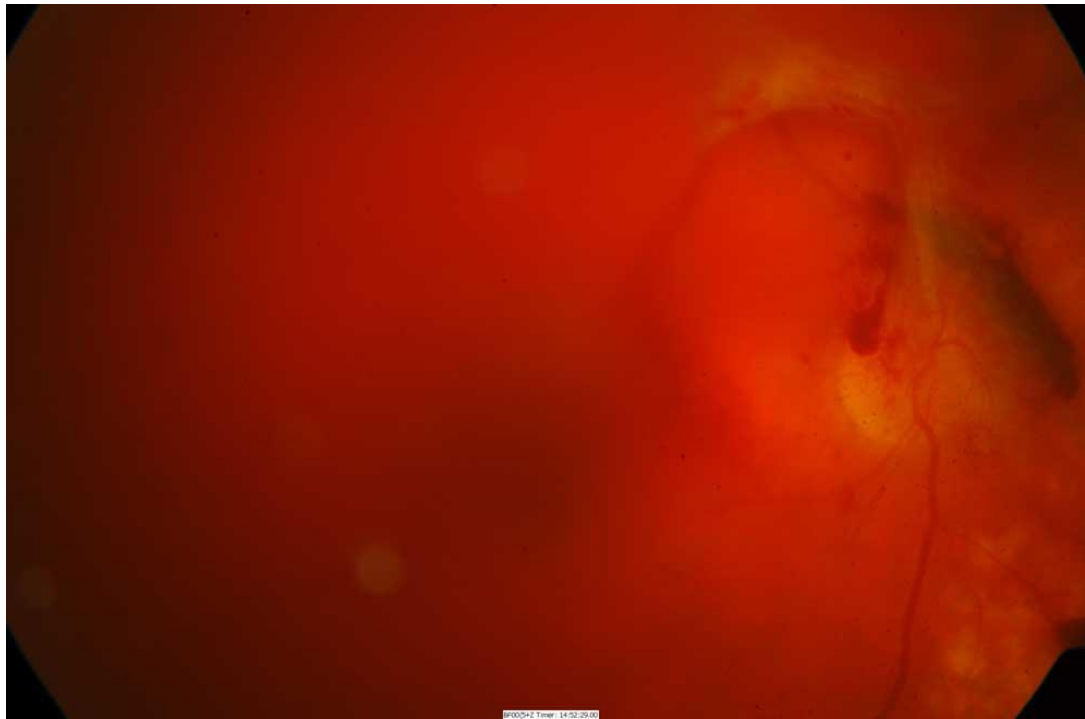
Anti-VEGF Injections (intravitreal)

Intravitreal Dexamethasone/Triamcinolone

Laser Photocoagulation

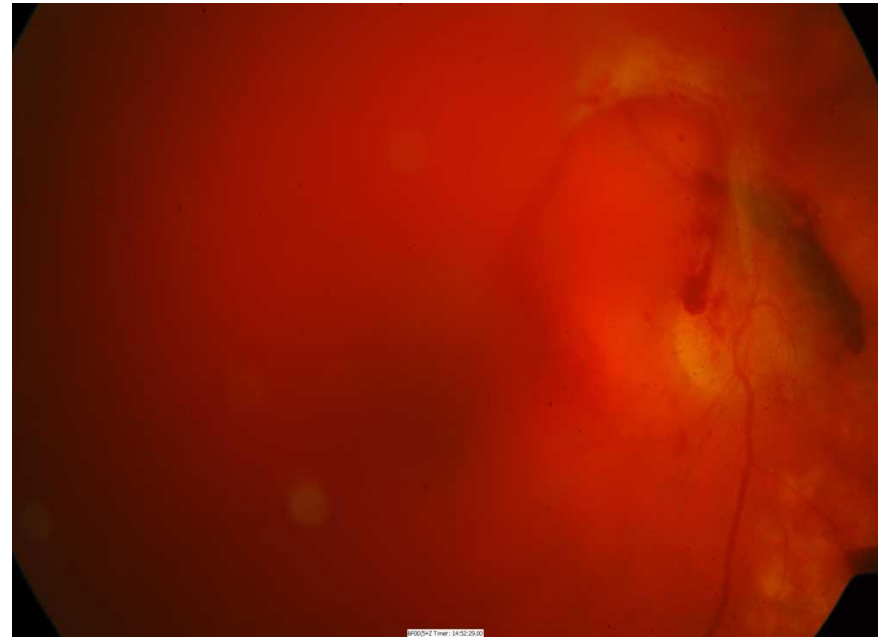
Case 3

- 67 M with HTN and DM complains of painless, monocular rapid loss of vision
- Lifting boxes when it occurred



What is the Diagnosis?

1. Central Retinal Vein Occlusion
2. Central Retinal Artery Occlusion
3. Glaucoma
-  4. Vitreous Hemorrhage
5. I can't see anything with my ophthalmoscope.
This is my normal view



Vitreous Hemorrhage

- Patient Complaints: New multiple floaters, smoke, haze, looking into a fog, cobweb
- Variable loss of fundal detail on exam
- Most common in patients with HTN, DM, CAD, PVD



Vitreous Hemorrhage



Vitreous Hemorrhage Treatment

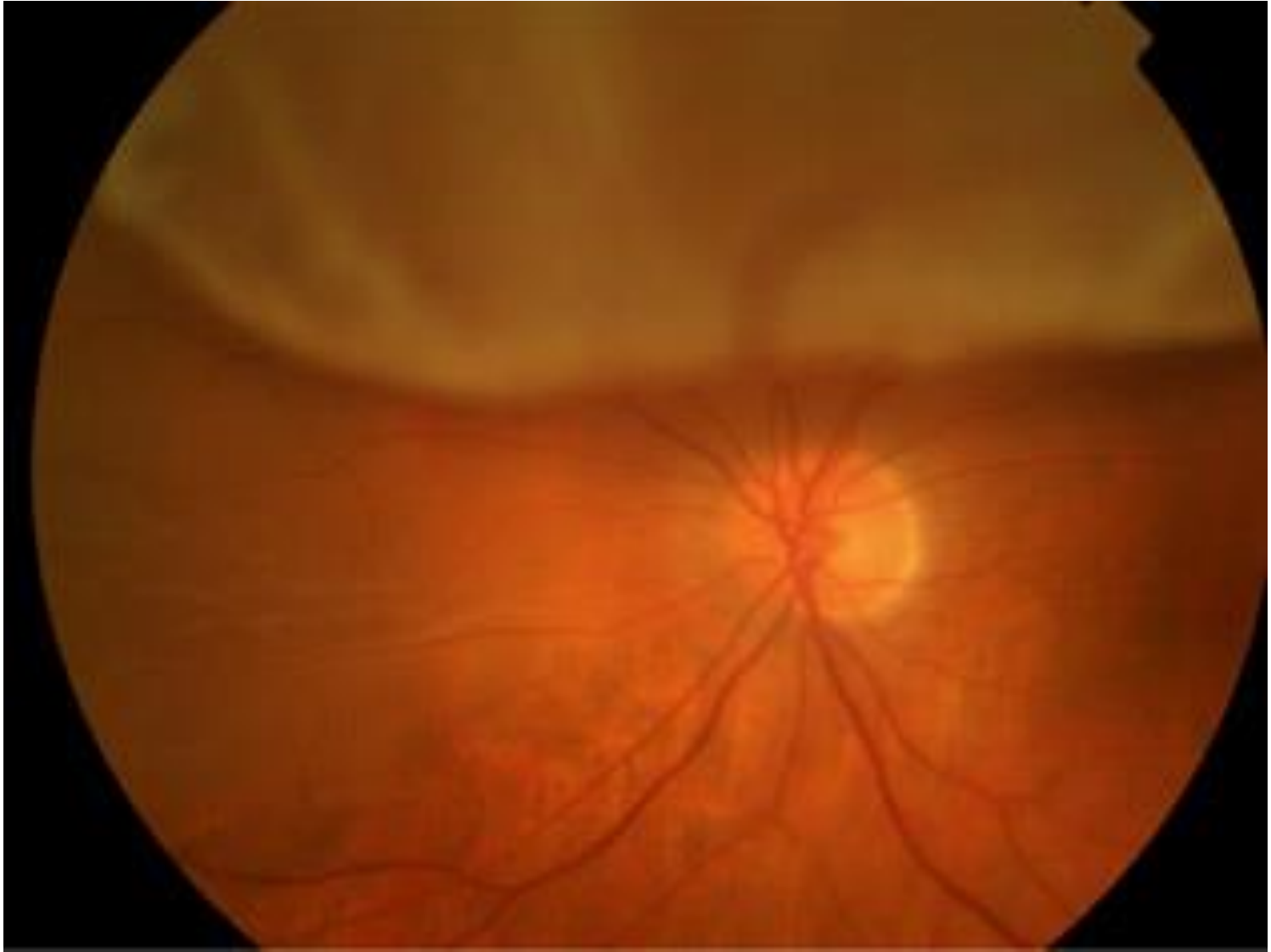
- Emergency consultation is required if hemorrhage has resulted from trauma or abuse or if an acute retinal tear or detachment is suspected.
- Discharge instructions: limit physical activity and sleeping in an upright position
- Anticoagulants and other anti-platelet agents may need to be stopped (weigh risks and benefits)
- Ophthalmic consultation is mandatory in vitreous hemorrhage (1-2 days) Why? Complications?
- 1) Corneal Staining 2) Glaucoma

Case 4

- 67 M was watching TV and noticed a dramatic increase in the number of floaters in his left eye and felt like a “curtain” was being pulled down over his vision.
- No Trauma, No other complaints
- Severe Myopia = Thick Glasses

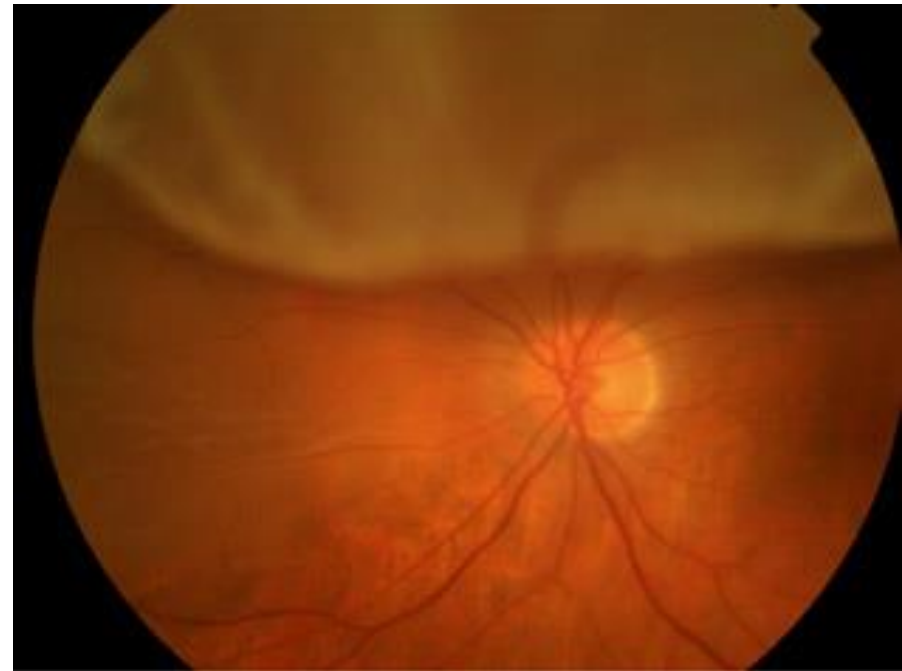


“Parachute” or “Curtain”



What is the Diagnosis?

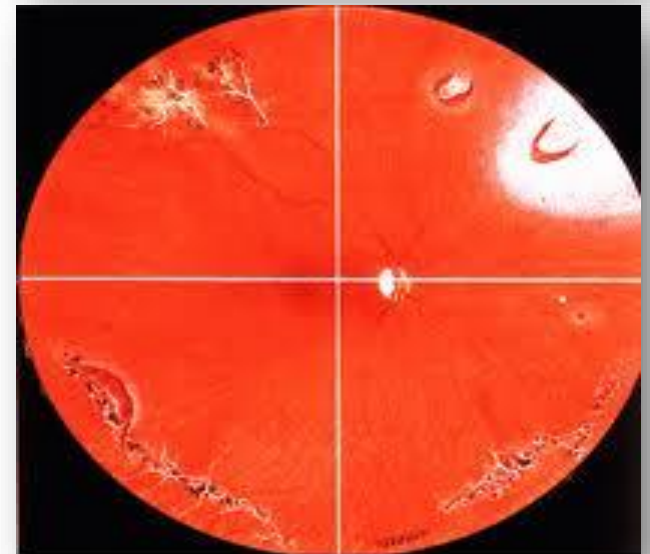
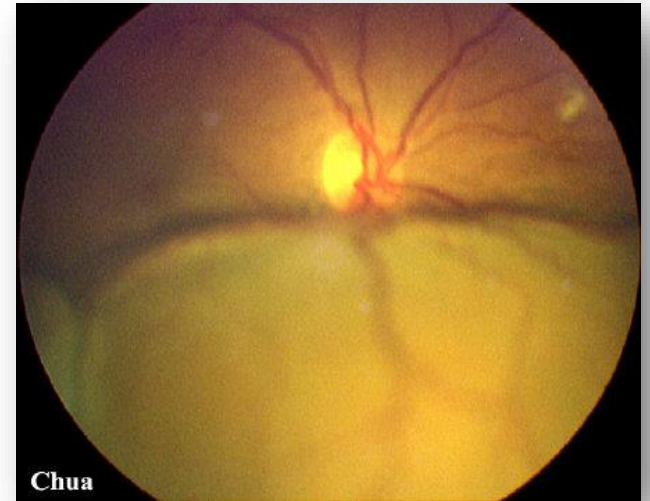
1. Central Retinal Artery Occlusion
2. Central Retinal Vein Occlusion
-  3. Retinal Detachment
4. Open Globe
5. Temporal Arteritis



Retinal Detachment

- Pathophysiology: the retina peels off from its underlying layer of support tissue.
- Initial detachment may be localized and small
- Without rapid treatment, the entire retina may detach leading to vision loss and blindness
- Symptoms: flashes of light and an increase in floaters, cobwebs, curtain pulled down over eye
- Very difficult for the non-ophthalmologist to diagnose smaller retinal detachments

Retinal detachment



Retinal detachment

Diagnosis

If direct ophthalmoscopy is inconclusive, refer to ophthalmologist for dilated fundus exam with indirect ophthalmoscope.

Treatment

Surgery to re-attach the retina

Surgical options include laser photocoagulation therapy, and scleral buckle with intraocular gas bubble to keep retina in place while it heals

KEY MANAGEMENT POINT- know “classic” presentation so you can refer to an ophthalmologist quickly.

Perforation of Globe

Penetrating trauma leads to corneal or scleral disruption and extravasation of intraocular contents.

Can lead to:

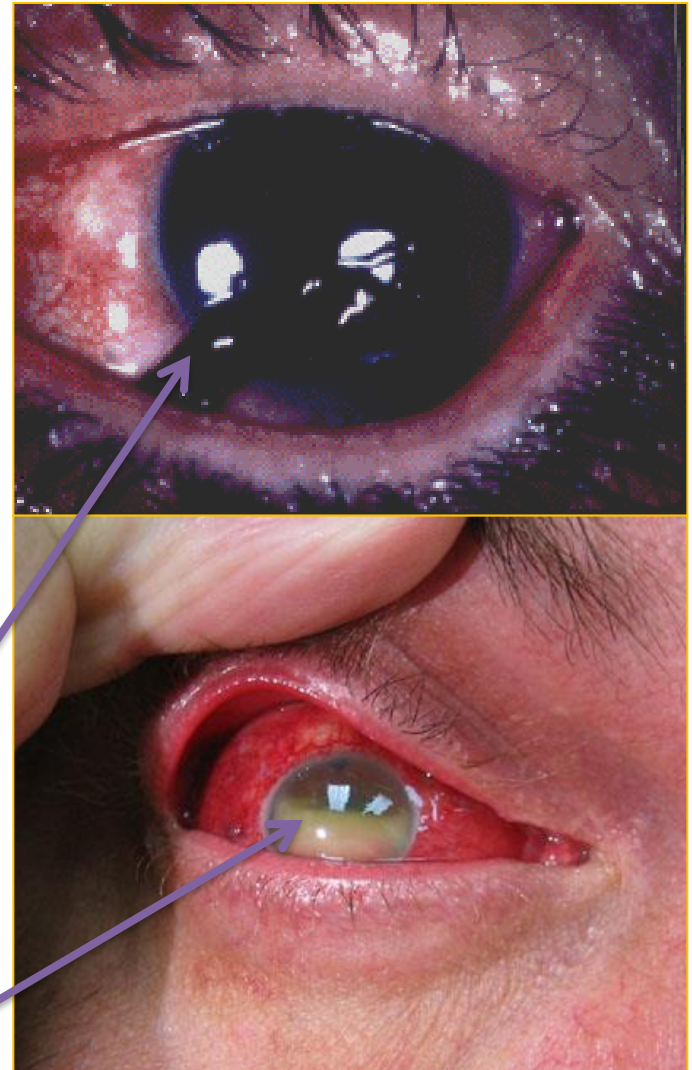
- Irreversible visual loss

- Endophthalmitis –inflammation of the intraocular cavities

Corneal tear with Iris prolapse

Call the Ophthalmologist

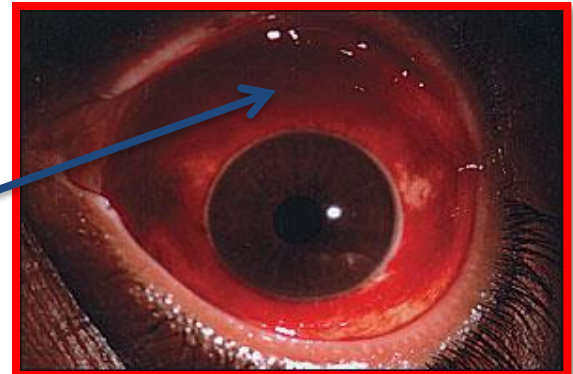
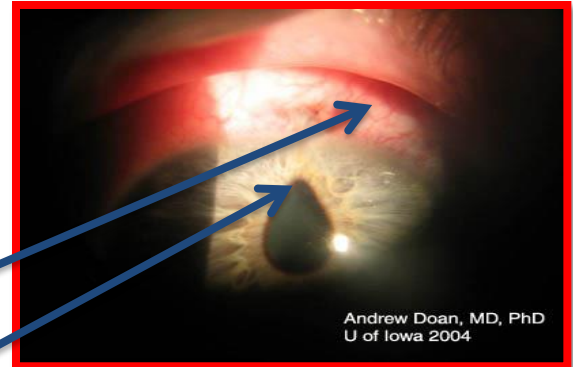
Endophthalmitis



Perforation of Globe

➤ Signs and symptoms:

- pain, decreased vision
- hyphema
- loss of anterior chamber depth
- “tear-drop” pupil which points toward laceration
- severe subconjunctival hemorrhage completely encircling the cornea.
- Diagnosis: positive Seidel’s test, clinical exam.



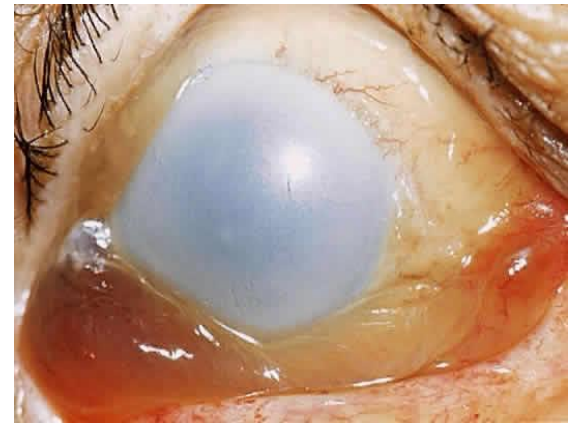
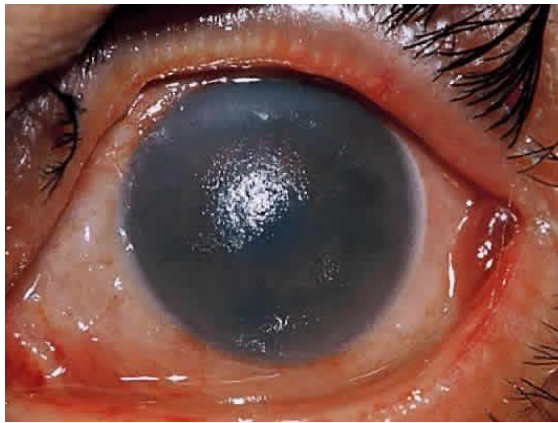
Scleral laceration

“tear-drop”
pupil

Subconjunctival
Hemorrhage

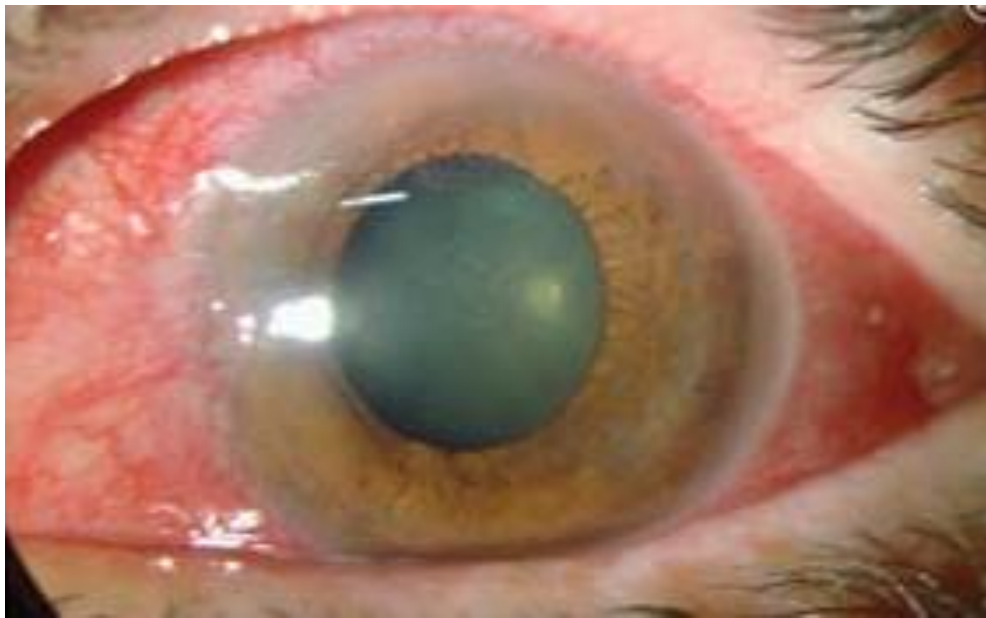
Case 5

- Young male industry employee presents with H/O some chemical splashing in one eye
- Has severe pain and decreased vision
- Probably has acid or alkali burn
- CMO should immediately irrigate the conjunctival sac with ringer lactate solution to neutralize the pH
- **Call the Ophthalmologist**



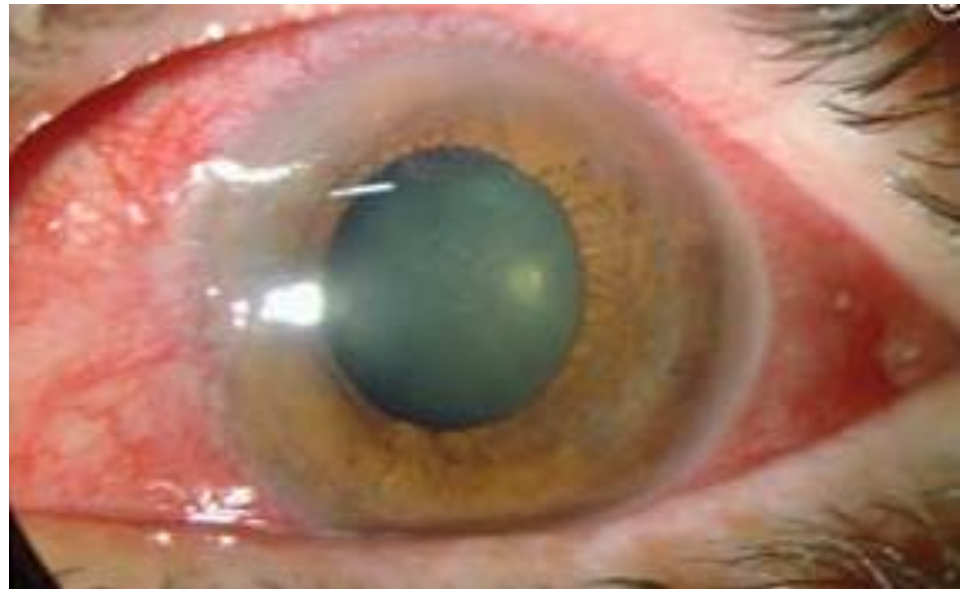
Case 6

- 67 F woke up with severe eye pain, tearing, nausea, vomiting, headache, and vague abdominal pain.
- She is also seeing “Halos” around objects and has blurry vision in the affected eye



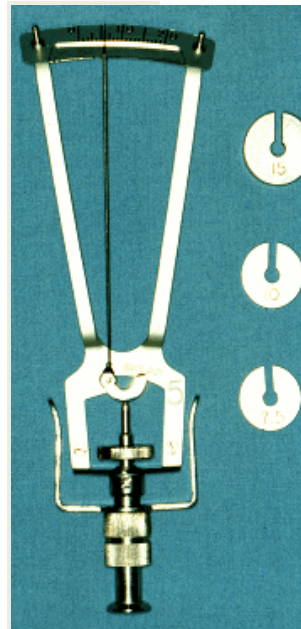
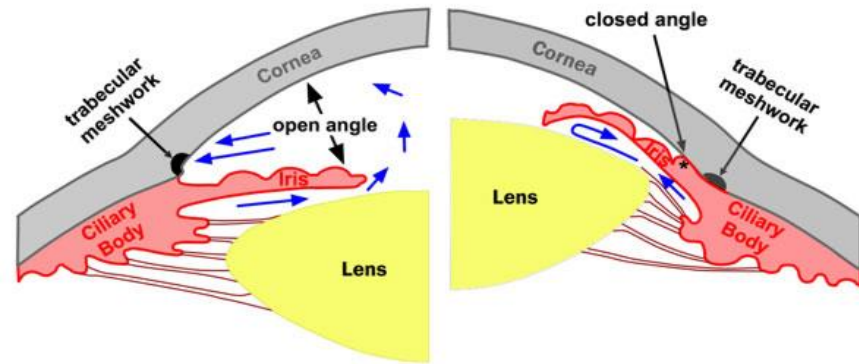
What is the Diagnosis?

1. Iritis
2. Acute Angle Closure Glaucoma
3. Corneal Ulcer
4. Hyphema
5. Conjunctivitis
6. Cataract



Acute Angle Closure Glaucoma (AACG) - Diagnosis

- History: Acute onset, higher risk in hypermetropes
- Symptoms:
 - Pain
 - Halos (around lights)
 - Visual loss (usually peripheral)
 - Nausea/vomiting
 - Headache



Schiotz Tonometer



Acute Angle Closure Glaucoma Treatment

Medical Treatment

- Reduce production of aqueous humor
 - Topical β -blocker (Timolol 0.5%)
 - Carbonic Anhydrase Inhibitor (Acetazolamide)
 - Systemic osmotic agent (Mannitol 1-2 g/Kg IV over 45 min)
- Or increase outflow
 - Topical alpha-1 adrenergic agonist (phenylephrine)
 - Miotics (Pilocarpine 2%) with caution
- **Definitive Treatment**
 - Ophthalmic referral: Laser peripheral iridectomy

Gonococcal Conjunctivitis

N. gonorrhoeae is a gram-negative diplococcus.

Can penetrate intact epithelial cells, and once inside the cell, they divide rapidly



Gonococcal Conjunctivitis

- Treat as an emergency
- Development of a hyperacute conjunctivitis
 - marked lid oedema
 - Chemosis
 - Conjunctival membranes may be present.
 - corneal ulceration may occur and can rapidly progress to perforation.
- All this can happen within 24 to 48 hours after birth.
- Septicaemia and meningitis are possible systemic involvements.
- Scrapings of the palpebral conjunctiva for cultures and Gram stain should be sent--- gram-negative diplococci

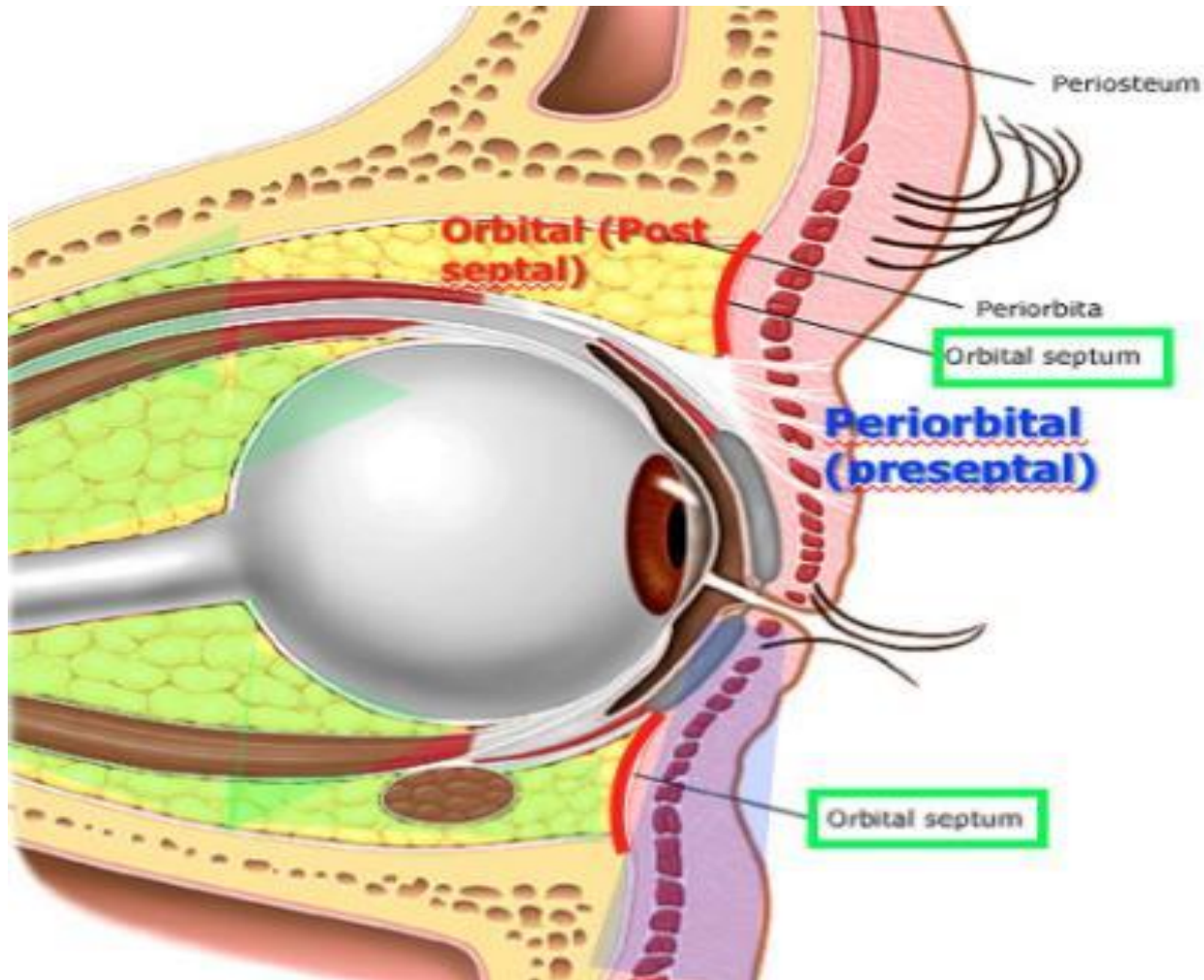
Gonococcal Conjunctivitis



Gonococcal Conjunctivitis

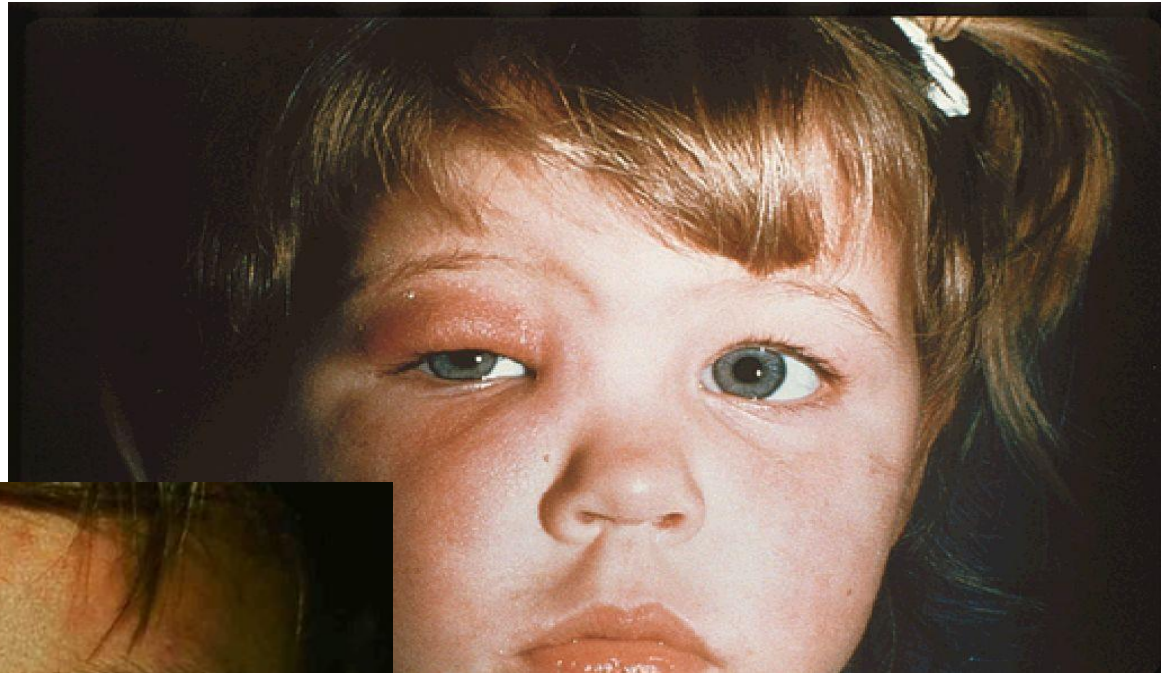
- Topical therapy for a neonate
- Includes aqueous penicillin (10,000 to 20,000 U/ml one drop every hour for 6 to 12 H
- Followed by one drop every 2 to 3 H until resolution).
- **Saline irrigation** of the conjunctival cul-de-sac prior to antibiotic instillation may be helpful.
- Systemic therapy: Start 3rd and 4th generation cephalosporin IM or IV
- Paediatric consultation is advised.

Anatomy of Orbital Septum



Orbital Cellulitis

**Periorbital Cellulitis
(Preseptal Cellulitis)**



Preorbital (preseptal) cellulitis:

- More common than orbital cellulitis.
- Begins *anteriorly* → spread to eyelids.
- Etiology:
 - Conjunctivitis
 - Chalazion, hordeolum
 - Allergic reaction
 - Local infection/trauma e.g. insect bites, puncture wounds (cat bites e.g.)
 - Dacryocystitis

Preorbital (preseptal) cellulitis

Clinically: There is no evidence of

- a. fever
- b. no leukocytosis
- c. symptoms are localized to the lids and conjunctiva.
- d. no pain on eye movement and vision is not impaired.
- e. there is no evidence of sinusitis on plain film or CT.



Pre orbital cellulitis due to chalazion



Preorbital cellulitis secondary to dacrocystitis

Preorbital (preseptal) cellulitis:

Treatment:

- a. Broad spectrum antibiotics for 10 to 14 days
- b. Investigate for comorbidities
- c. Treat causes
- d. If younger than 5 years admit in hospital

Orbital Cellulitis



Symptoms

Fever, generally high

Painful swelling of upper and lower eyelids

Shiny, red or purple eyelid

Eye pain, especially with movement

Decreased vision

Bulging eyes

General malaise

Painful or difficult eye movements

Orbital Cellulitis

Orbital Cellulitis (Postseptal Cellulitis)

Warm, indurated, erythematous eyelids only

Fever, toxicity, proptosis, painful ocular motility, limited ocular excursion

Diagnosis:

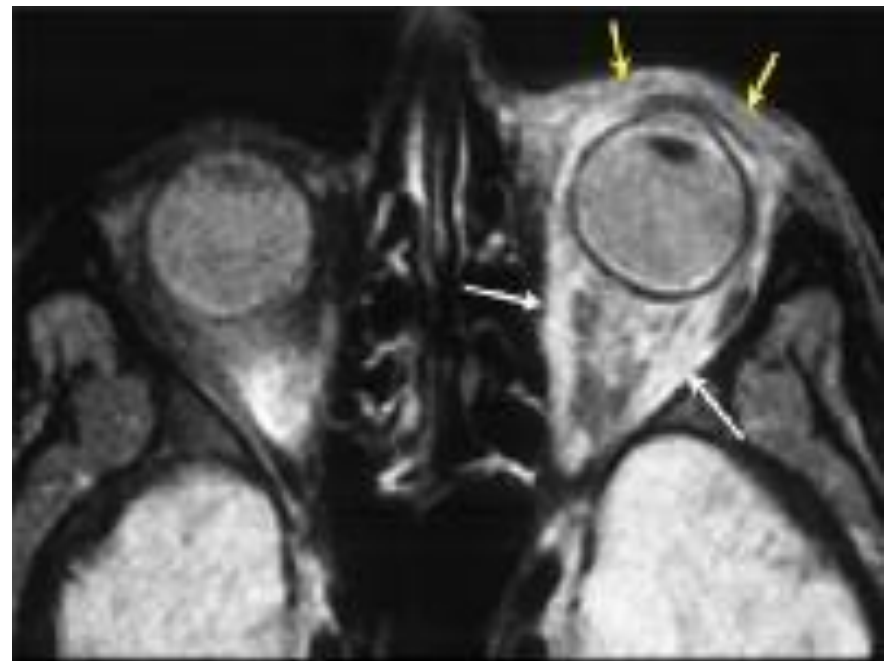
emergent orbital and sinus thin-slice CT w/o contrast, if *negative*:

CT with contrast - may reveal subperiosteal abscess

Treatment:

Ophthalmic consultation

Hospital admission for IV Cefuroxime



Difference between Preseptal and Orbital Cellulitis

	Preseptal	Orbital
Inflammation	Anterior to septum	Beyond septum
Fever	Mild	++
Lid edema	+	+++
EOM limitation	No	Yes
Proptosis	No	Yes
Hospitalization	Only children	Yes

Orbital Cellulitis

- **Investigations:** commonly include:
- [CBC](#) (complete blood count)
- [Blood culture](#)
- Other tests may include: [X-ray of the sinuses](#) and surrounding area
- [CT scan or MRI of the sinuses and orbit](#)
- Culture of eye and nose drainage
- [Throat culture](#)

Orbital Cellulitis

Treatment

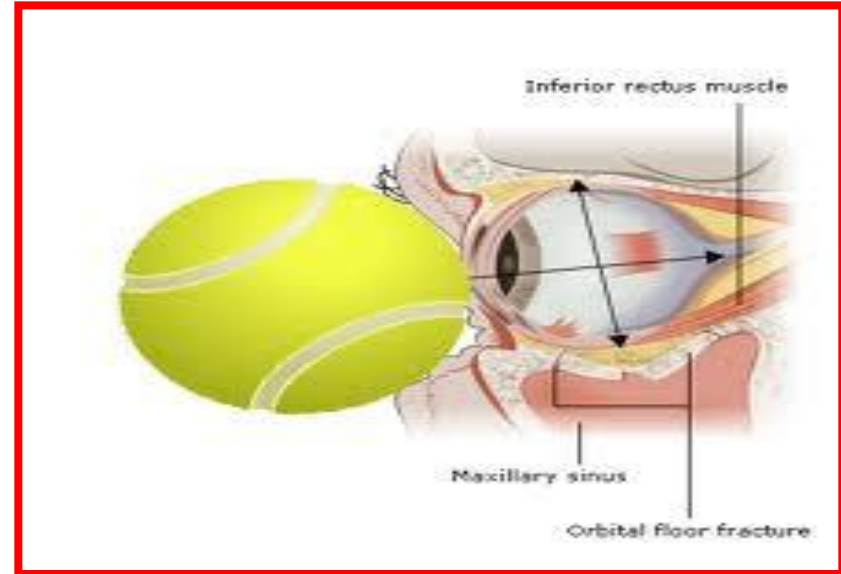
- a. The patient usually needs to stay in the hospital. Treatment includes I V antibiotics.
- b. Surgery may be needed to drain the abscess.
- c. An orbital cellulitis infection can get worse very quickly. The patient must be carefully checked every few hours.
- d. Vision loss due to high orbital pressure:
 - i. lateral cantholysis
 - ii. rarely in very severe case
 - iii. orbital decompression

Complications

- Cavernous sinus thrombosis
- Hearing loss
- Septicemia or blood infection
- Meningitis
- Optic nerve damage and loss of vision

Orbital Blowout Fracture

- Signs & Symptoms:
 - Enophthalmos
 - Diplopia, Epistaxis
 - Impairment of eye movement due to EOM entrapment
 - Crepitus/tenderness over orbital rim or maxilla
 - orbital hemorrhage or nerve damage
 - Orbital emphysema
 - Infraorbital n. anesthesia
- CT should include axial and coronal cuts



Orbital Blowout Fracture

Treatment : (most adult orbital fractures can initially be followed conservatively if no enophthalmos)

Broad spectrum oral antibiotic (may be used 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.

Orbital Blowout Fracture

The factors that determine the risk of late complications are

- Fracture size

- Herniation of orbital content into the maxillary sinus

- Muscle entrapment

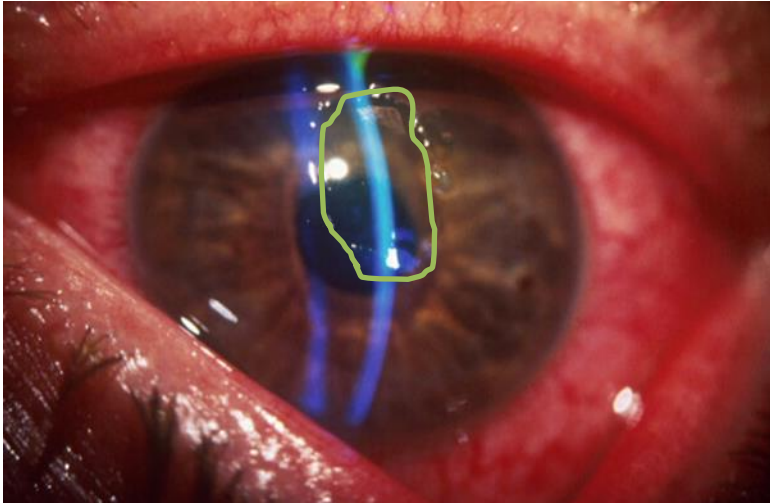
Surgical repair

- Immediate repair (usually within 24hr.)

- Repair in 1 to 2 weeks

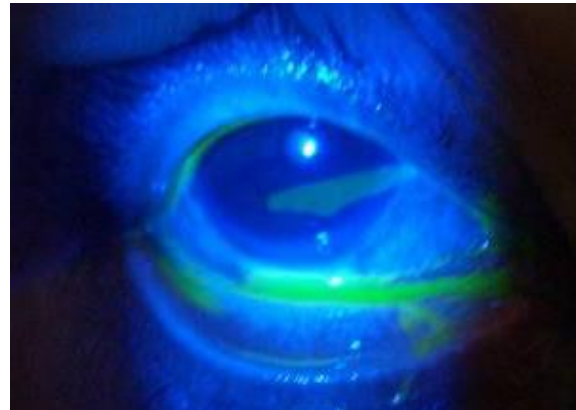
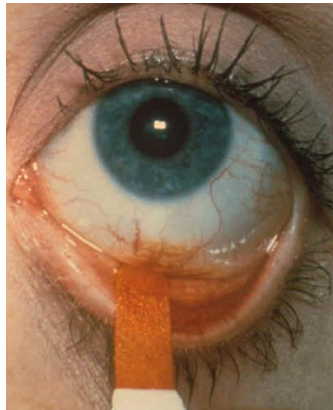
Neurosurgical consultation is recommended

Corneal Abrasion



**Pain, photophobia,
FB sensation, tearing
Conjunctival injection
Swollen eyelid**

Epithelial staining defect with fluorescein



Corneal Ulcer



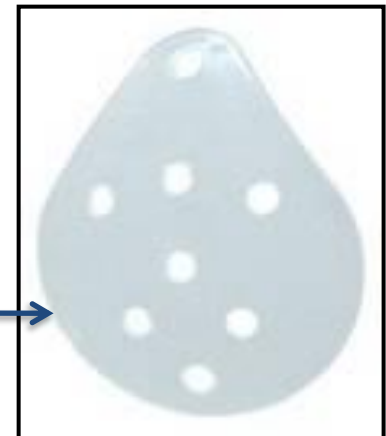
Corneal Ulcer



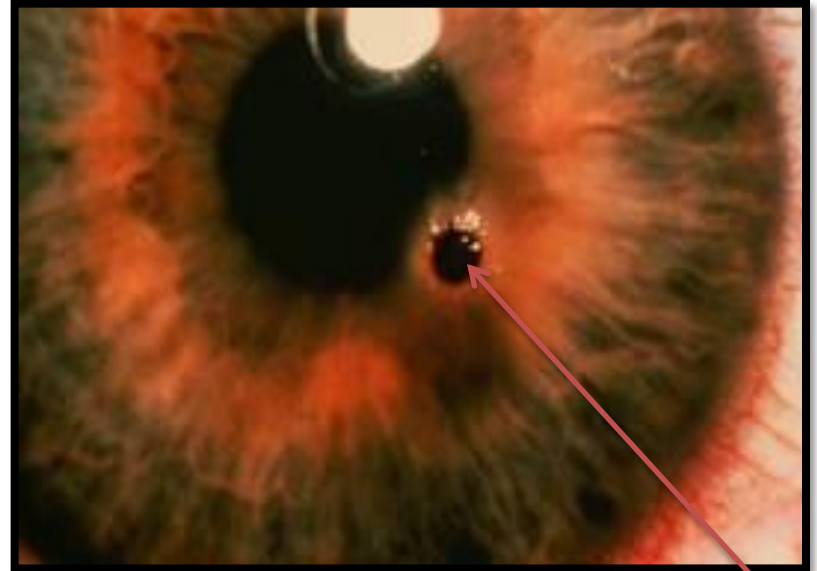
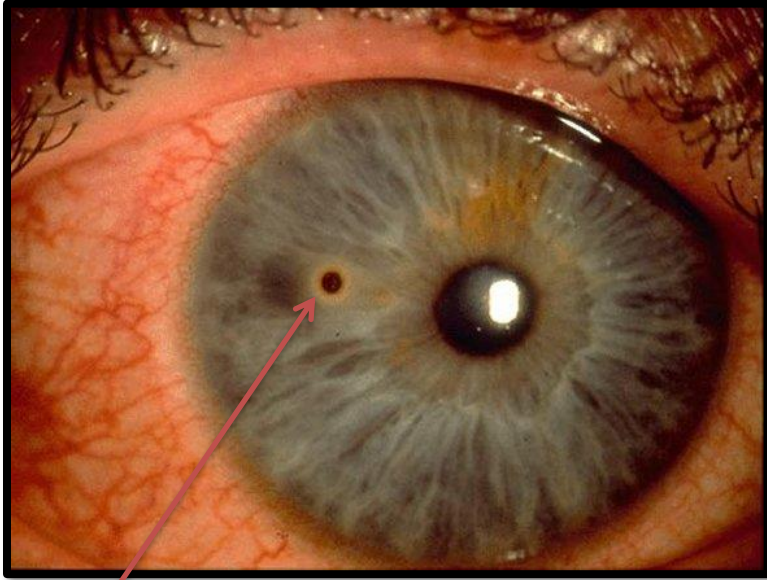
Hypopyon

- No patching
- Topical antibiotics
- Mydriatic-Cycloplegic Eye Drops
- Ophthalmologist referral

**Cartella
shield**



Corneal Foreign Body

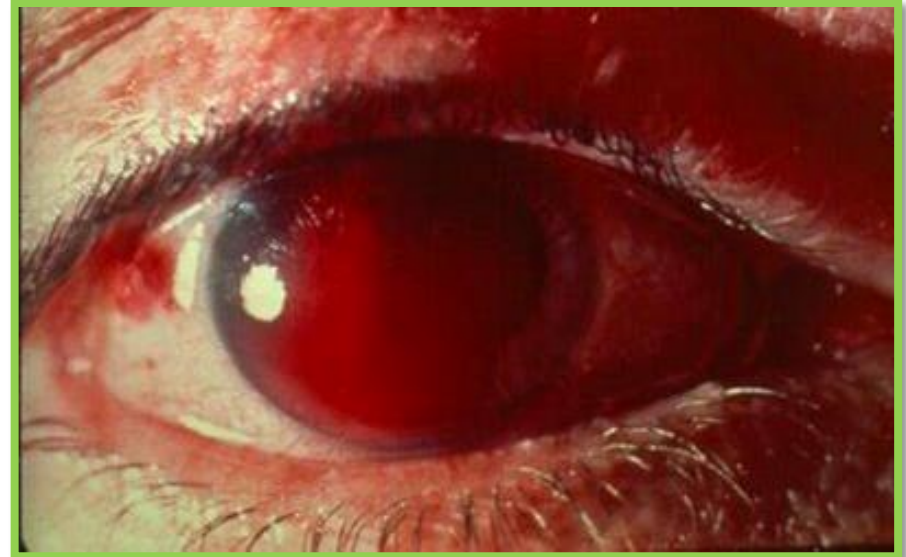
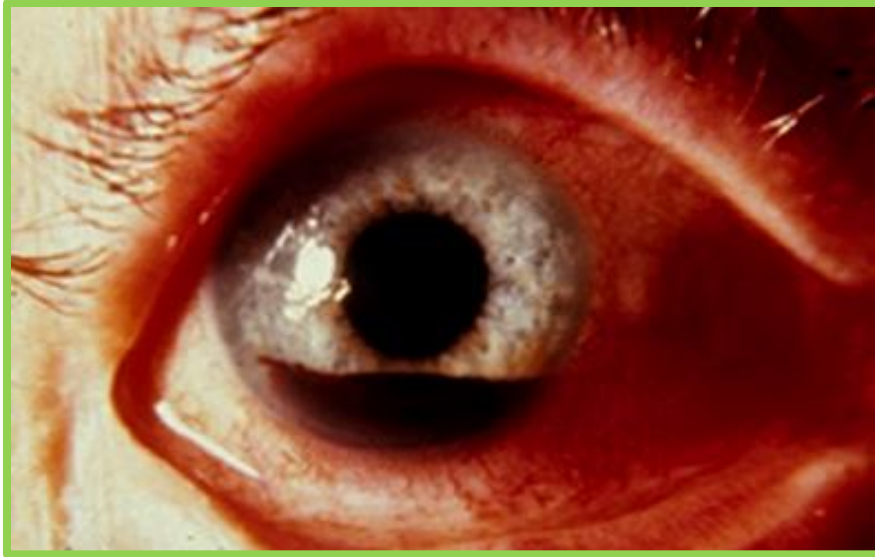


- Remove the FB under the best magnification
- Evert the eyelid to rule out additional FB
- Treat resulting corneal abrasion
- Referral to ophthalmologist, next day

Conjunctival Foreign Body



Traumatic Hyphema



- **Disruption of blood vessels in the iris or ciliary body**
- **Blood in anterior chamber**

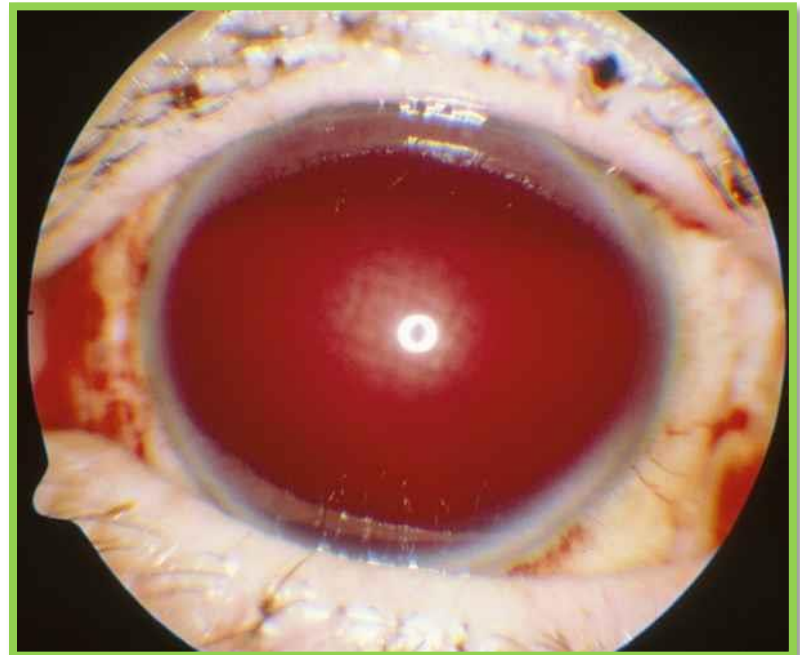
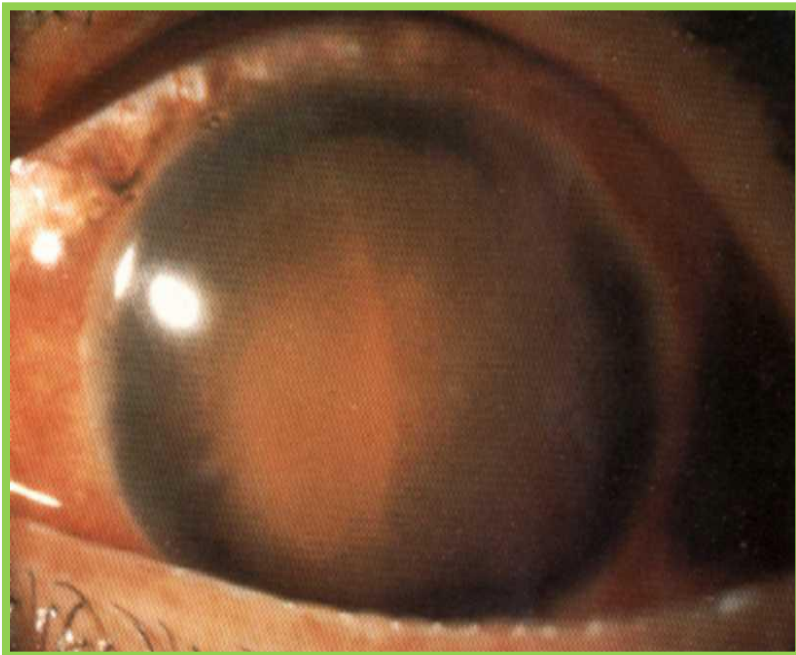
Traumatic Hyphema : Classification

Grade	Size of Hyphema
0	circulating red blood cells only
I	Less than $\frac{1}{3}$
II	$\frac{1}{3}$ to $\frac{1}{2}$
III	$\frac{1}{2}$ to less than total
IV	Total

Traumatic Hyphema : Management

Rebleeding can occur 3 to 5 days later in 30%

Uncontrolled glaucoma or blood stained cornea requires urgent treatment to control IOP. Paracentesis may be needed



Traumatic Hyphema : Management

Elevate the patient's head

Bed rest

1% atropine one drop 3-4 times daily

1% prednisolone acetate one drop 3-4 times daily

If the globe is intact, measure IOP

Reduce IOP

Ophthalmology consult

Inflammation of the uveal tract

Symptoms of **ANTERIOR UVEITIS**

blurred vision

Photophobia

Pain

Redness

Signs

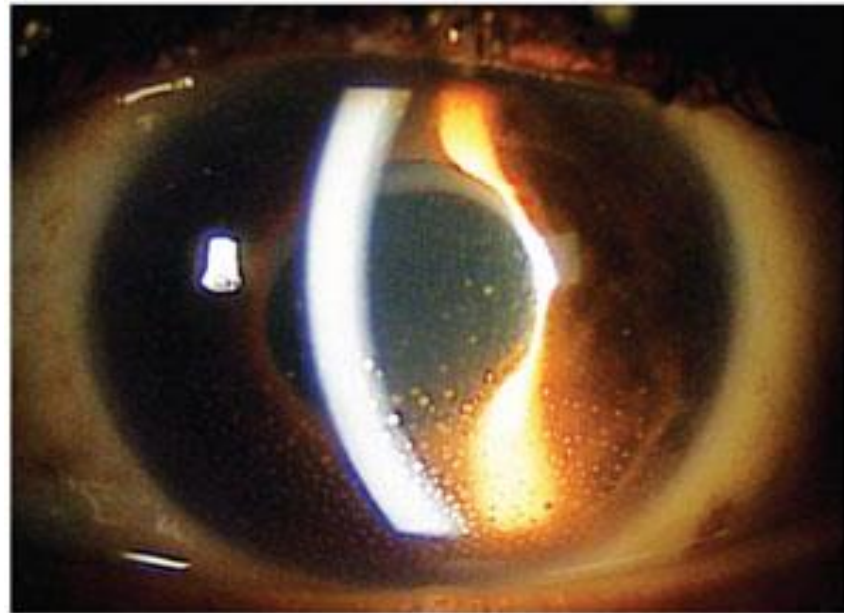
Injection

Flare

Keratic precipitates

Posterior synechiae

Iris nodules



Examination

Cornea

Keratic Precipitates

Fine pigmented or mutton fat

AC

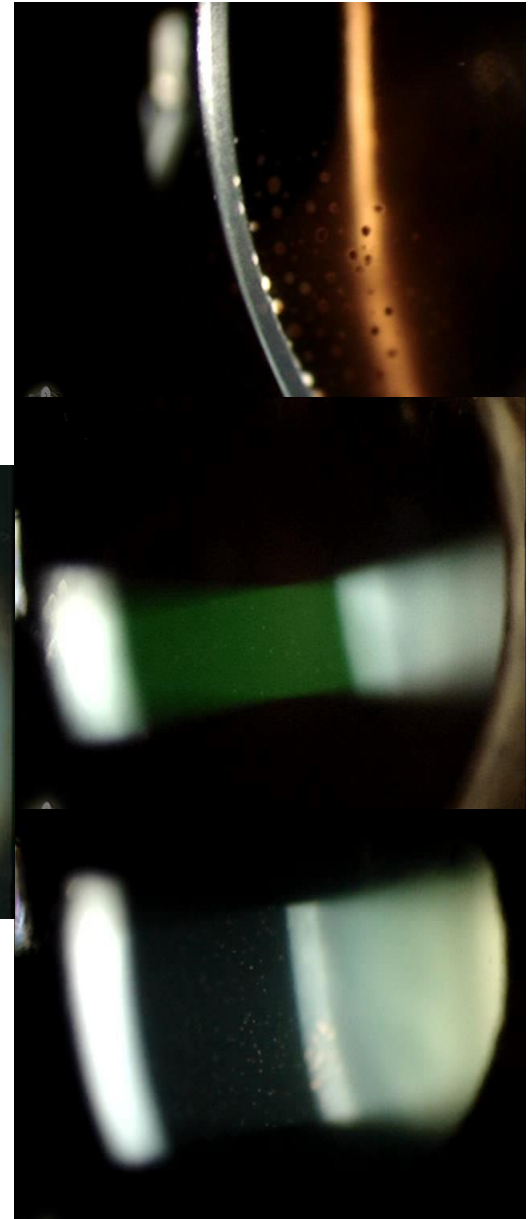
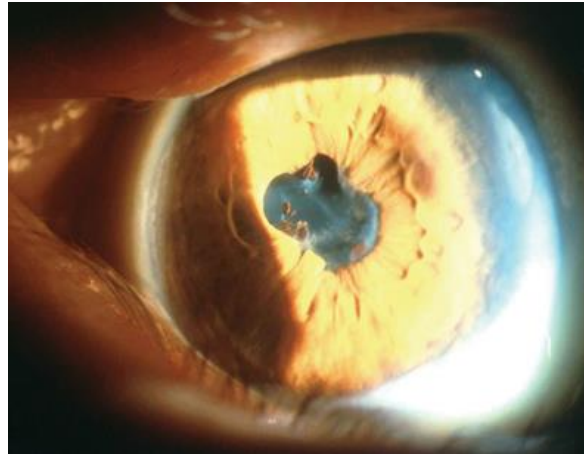
Flare, Cells

Pupil

Miosis

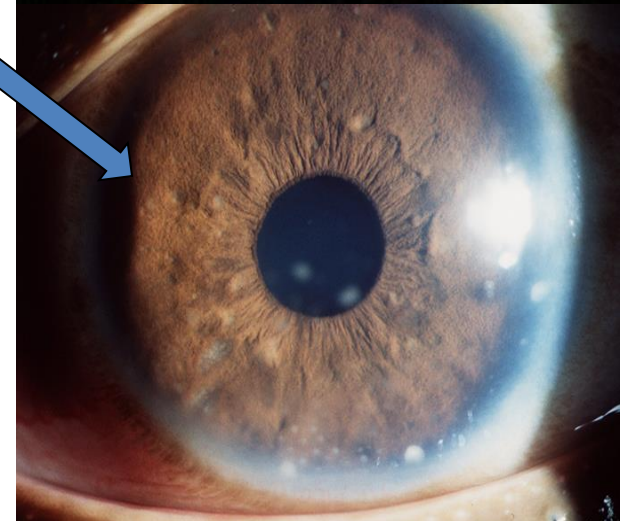
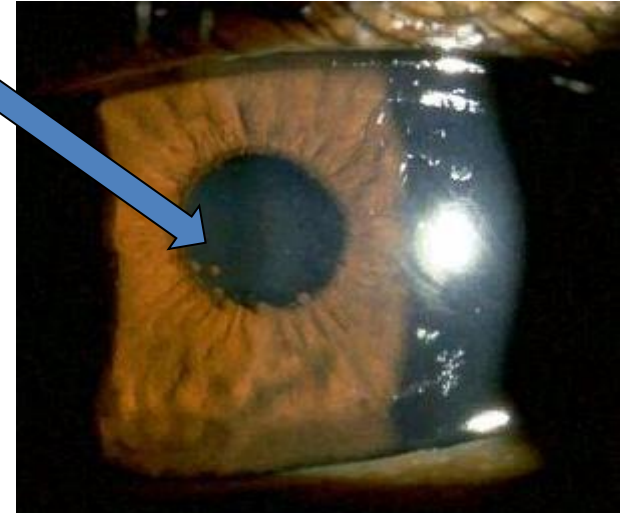
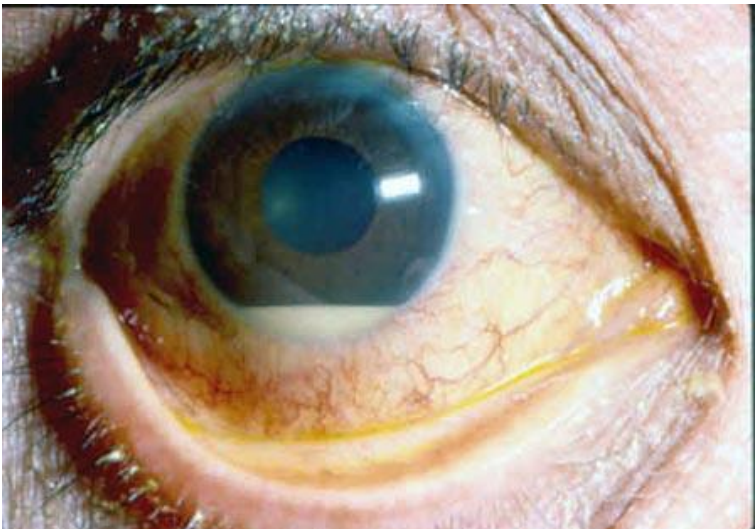
Posterior synechiae

Festooned pupil



Examination

- Iris: Nodules Koeppes, Bossaca
- Hypopyon



Examination

Seclusio Pupillae

The rim of the pupil is stuck to the lens

Occlusio Pupillae

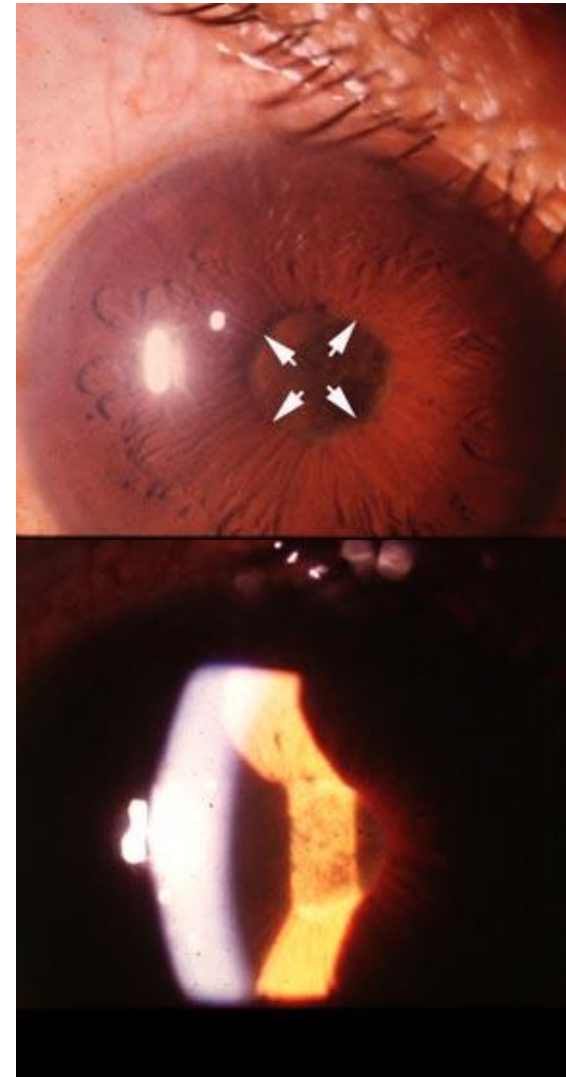
The pupil is occluded by exudates

Iris bombe

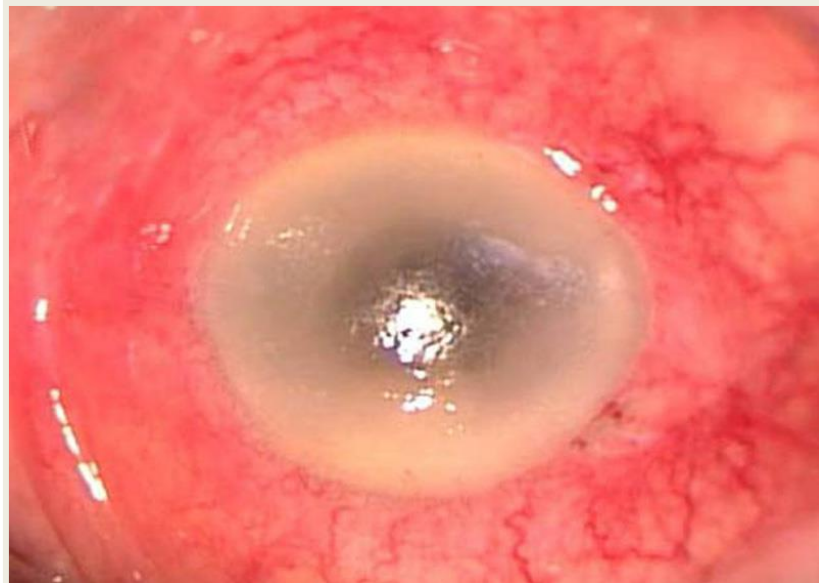
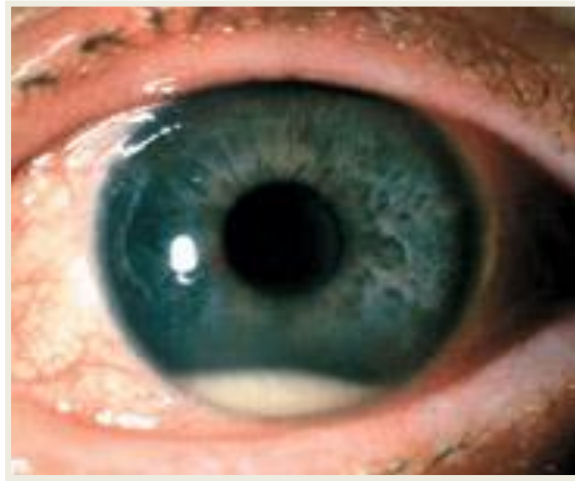
Funnel Shaped Ant chamber

Total Posterior Synechiae

The iris is attached along its whole length to the lens = deep AC



Endophthalmitis



Post Operative Endophthalmitis

- Acute-onset endophthalmitis - signs and symptoms:
 - Marked intraocular inflammation
 - Hypopyon
 - Reduced vision (marked)
 - Pain (75%)
 - Call the Ophthalmologists

