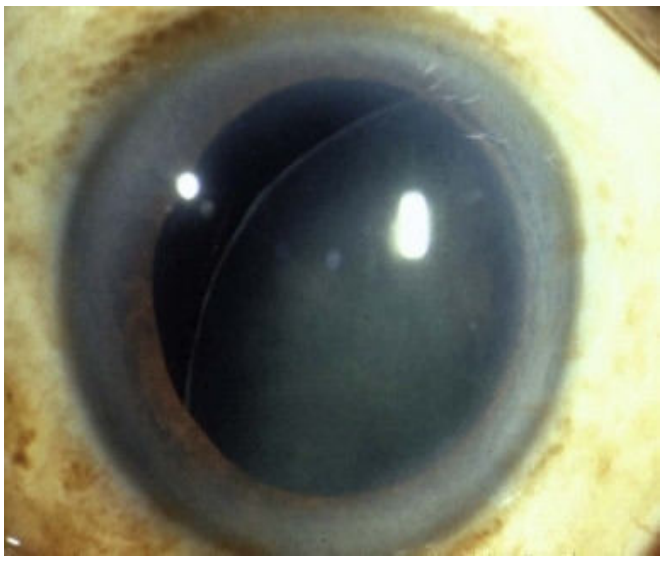
Secondary Glaucoma



Learning Objectives

- **At the end of this class the students shall be able to :**

- Define secondary glaucoma.
- Classify secondary glaucoma.
- Understand the aetiopathogenesis and clinical features of secondary glaucoma's.
- Understand the fundamentals of managing secondary glaucoma's.

Question

- A 12 year old boy is diagnosed as having an angle recession glaucoma. It is a type of

- primary open angle glaucoma
- secondary open angle glaucoma
- primary angle closure glaucoma
- secondary angle closure glaucoma

Definition

- Secondary Glaucoma

  A group of disorders in which rise in intraocular pressure(leading to glaucoma) is associated with some primary ocular or systemic disease.

Classification of secondary glaucoma's

- Based on mechanism of IOP rise

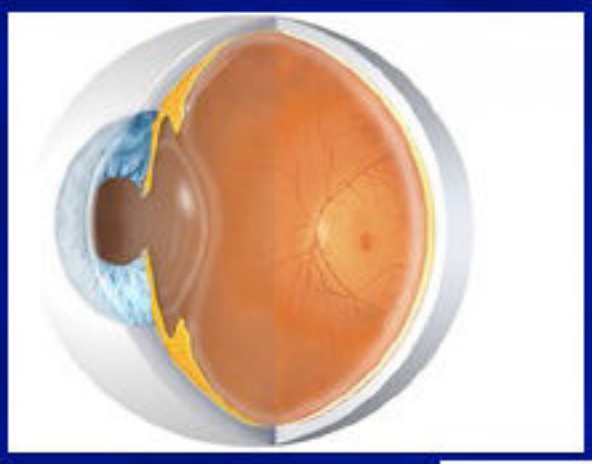
  Secondary open angle glaucoma

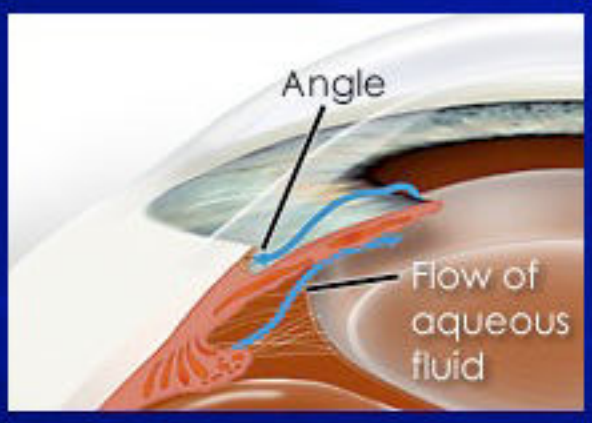
  Secondary angle closure glaucoma

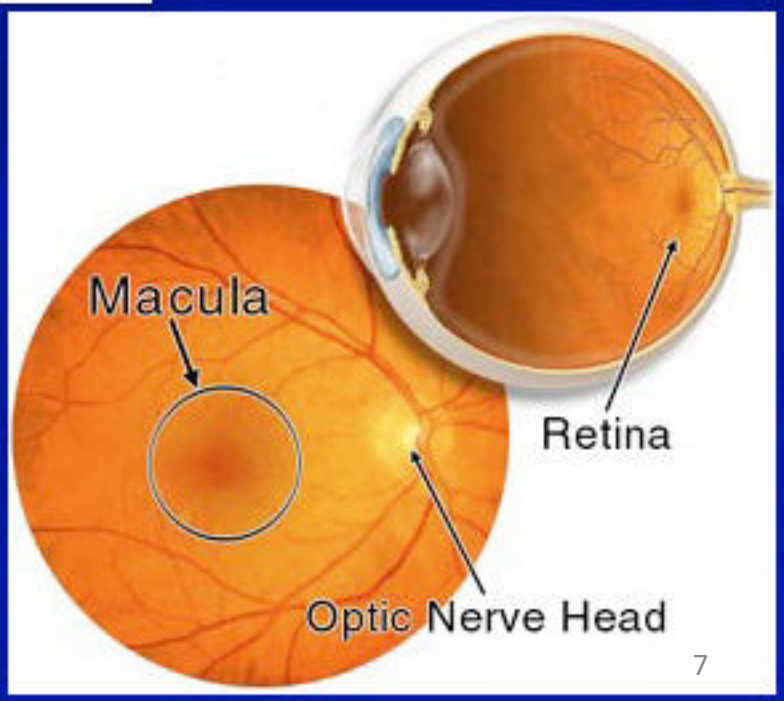
Classification of secondary glaucoma's

- Depending on causative primary disease
  - Phacogenic (Lens induced) glaucoma
  - Pigmentary glaucoma
  - Neovascular glaucoma
  - Inflammatory glaucoma (Uveitic)
  - Traumatic glaucoma
  - Steroid induced glaucoma
  - Pseudoexfoliative glaucoma
  - Glaucomas associated with intraocular tumours (Malignant melanoma, retinoblastoma)

"Location, Location, Location…"







The Approach

- Demographics
  - Age, Sex, Race
  - Unilateral vs. Bilateral
  - Statistics
- History
  - Risk factors, Symptoms
- Exam
- What can blind the patient?
  - Example: RD risk in PDS
- What can kill the patient?
  - Example: Secondary glaucoma and melanoma

Lens induced glaucoma

- Raised IOP secondary to a disorder of crystalline lens
- Secondary angle closure

Phacomorphic glaucoma

Phacotopic glaucoma

Secondary open angle

Phacolytic glaucoma

Lens particle glaucoma

Phacoanaphylactic glaucoma

Phacomorphic glaucoma

- **Causes** -
- Intumescent lens
- Anterior subluxation or dislocation of the lens and spherophakia (Phacotopic variant)
- **Pathogenesis** – Swollen lens pushes iris forwards, obliterating the angle
- **Presentation** – Acute congestive glaucoma

Phacomorphic glaucoma

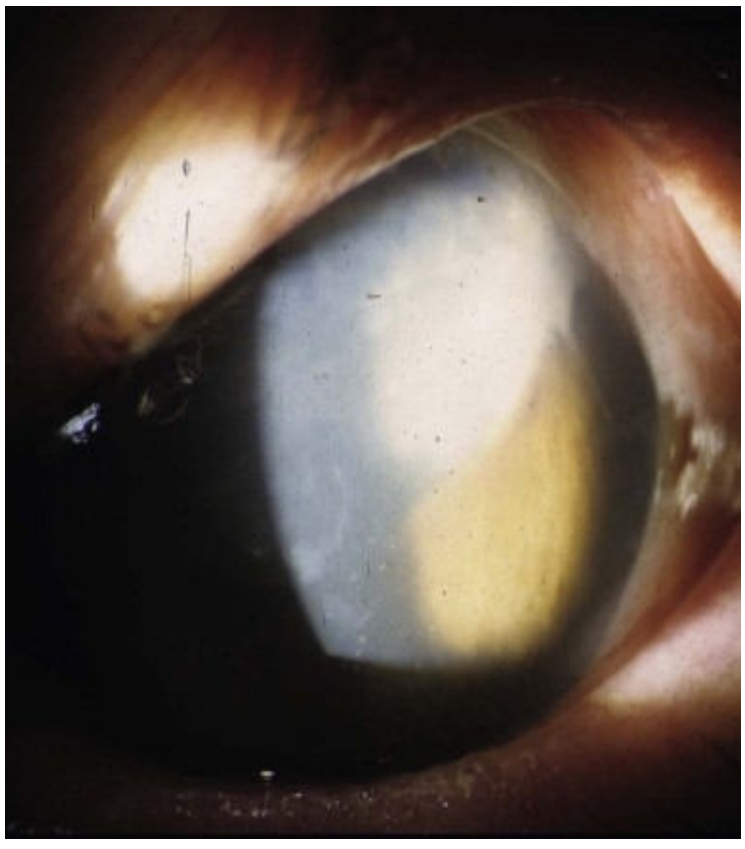
- **Treatment** –
- Medical treatment – Control of IOP by iv mannitol, systemic acetazolamide and topical beta blockers
- Surgical
  Cataract extraction with implantation of PCIOL

Phacolytic glaucoma

- Trabecular meshwork is clogged by lens proteins and macrophages which phagocytose the lens proteins and inflammatory debris
- **Treatment**
- Medical therapy to lower IOP followed by extraction of cataractous lens with PCIOL implantation.

Lens particle glaucoma

- Trabecular meshwork is blocked by lens particles floating in aqueous humour.
- **Management**
- Medical therapy to lower IOP and irrigation – aspiration of lens particles from anterior chamber



Phacoanaphylactic glaucoma

- Fulminating acute inflammatory reaction due to antigen – antibody reaction
- Granulomatous inflammation in involved eye
- Preceding disruption of lens capsule and leakage of proteins from capsule
- IOP is raised due to inflammatory reaction of uveal tissue excited by lens matter.

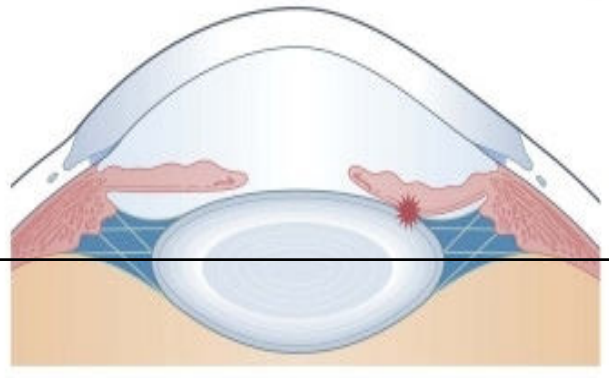
Phacoanaphylactic glaucoma

- Management includes medical therapy to lower IOP.
  Treatment of iridocyclitis with steroids and cycloplegics .
  Irrigation – aspiration of lens matter from anterior chamber (if required).

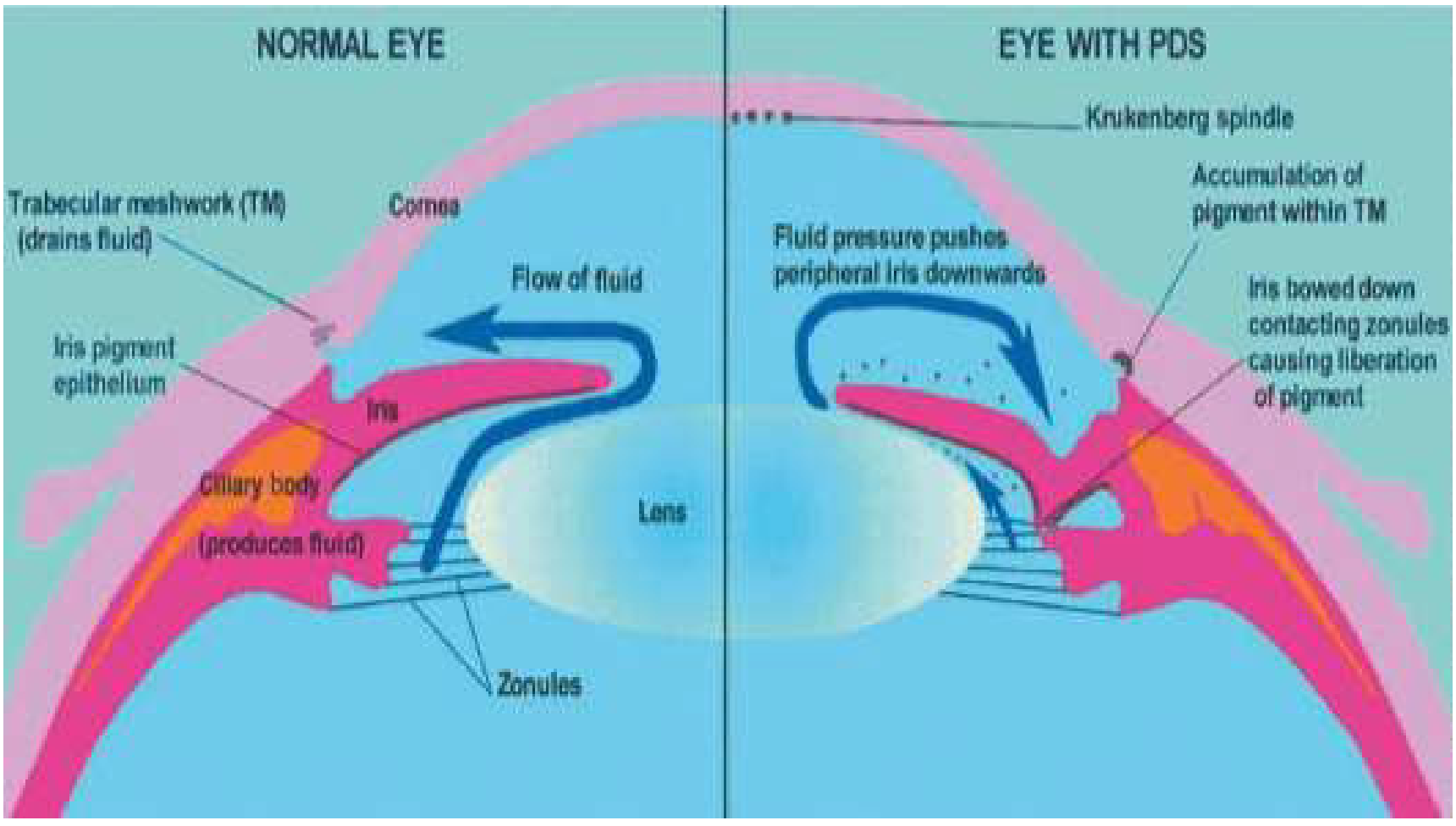
Pigmentary glaucoma

- Clogging up of trabecular meshwork by pigment particles in patients with Pigment Dispersion Syndrome(PDS)
- Pigment released by mechanical rubbing of posterior pigment layer of iris with zonular fibrils
- **Clinical features** –
- Young myopic males
- Features similar to POAG
- Deposition of pigment granules in anterior segment

Pigment deposition on lens zonules and equatorial region. The deposits are clearly visible in full mydriasis.

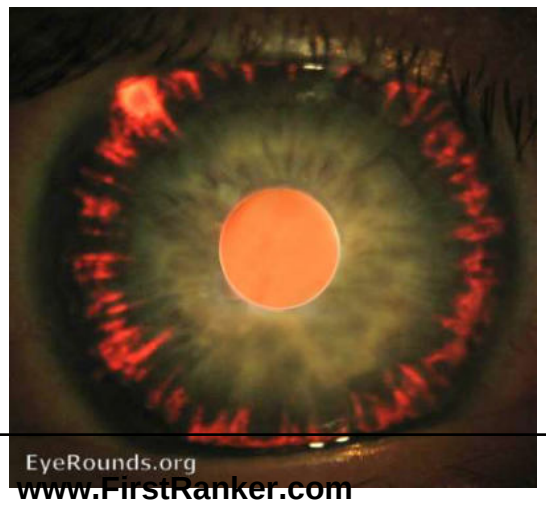


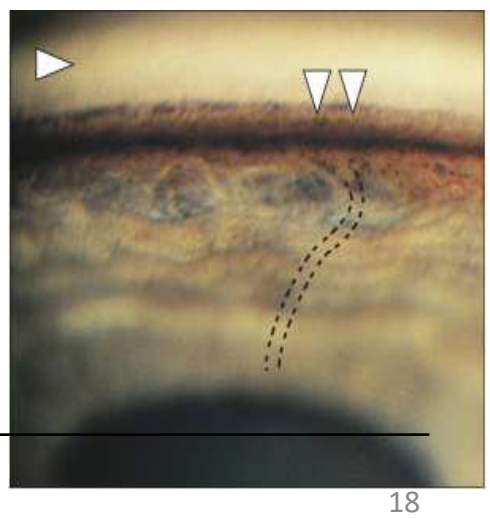
REVERSE PUPILLARY BLOCK IN PIGMENTARY GLAUCOMA



CLASSIC DIAGNOSTIC TRIAD

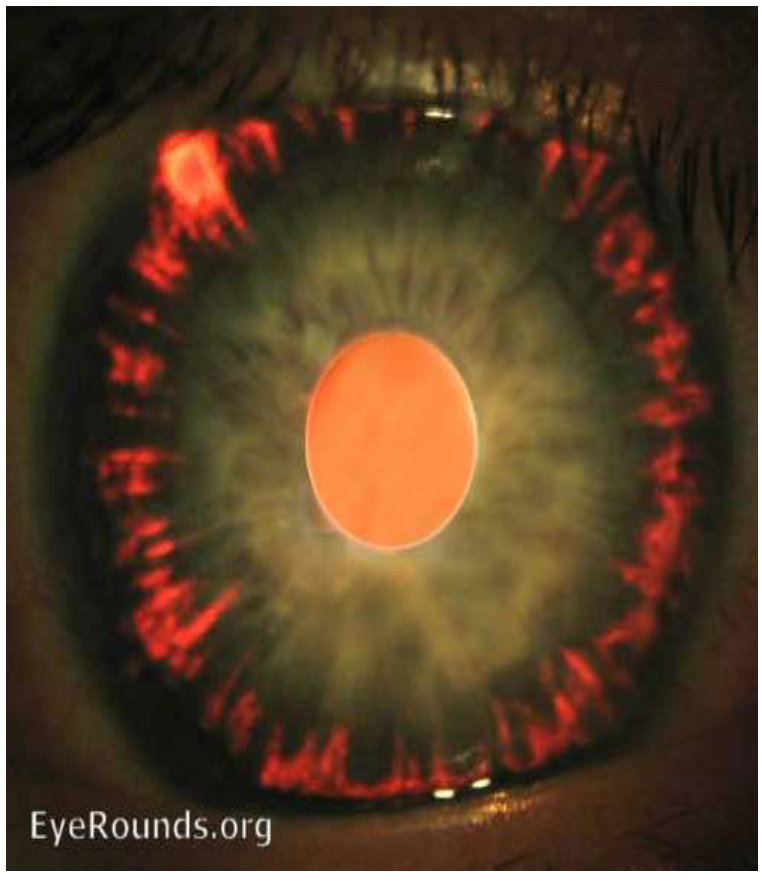
- Krukenberg spindle (Pigment deposition on the endothelium, in a vertical spindle-shaped distribution).
- Midperipheral iris transillumination defects
- Dense trabecular meshwork pigmentation





Pigmentary glaucoma

- Gonioscopy – pigment accumulation along the Schwalbe's line especially inferiorly (Sampaolesi's line)
- Iris transillumination – radial slit – like defects in the periphery
- Treatment is similar to that of POAG



Neovascular glaucoma

- Intractable glaucoma due to neovascularisation of iris and angle of anterior chamber.
- Due to retinal ischaemia

  Diabetic retinopathy

  CRVO

  Sickle cell retinopathy

  Eales' disease

  Chronic intraocular inflammation

PATHOGENESIS

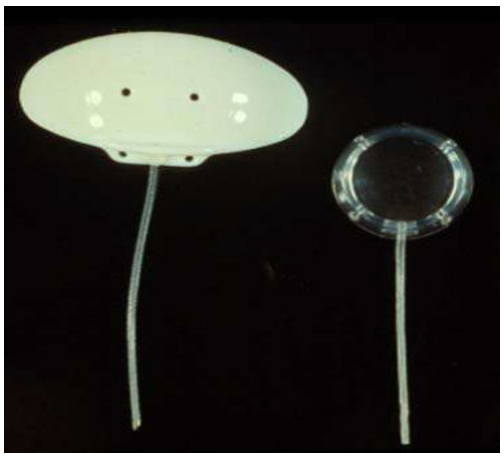
- CHRONIC RETINAL ISCHAEMIA
- ANGIOGENIC FACTORS RELEASED
- NEOVASCULARISATION ON IRIS AND ANGLE
- **NEOVASCULAR GLAUCOMA**

Stages of neovascular glaucoma

- Pre-glaucomatous stage
- Open angle glaucoma stage
- Secondary angle closure glaucoma

TREATMENT

- Panretinal photocoagulation
- Intra- vitreal Anti -VEGF
- Mydriatics and Corticosteroids
- Filtering surgeries
- Glaucoma drainage devices
- Cyclodestructive procedures



INFLAMMATORY GLAUCOMA

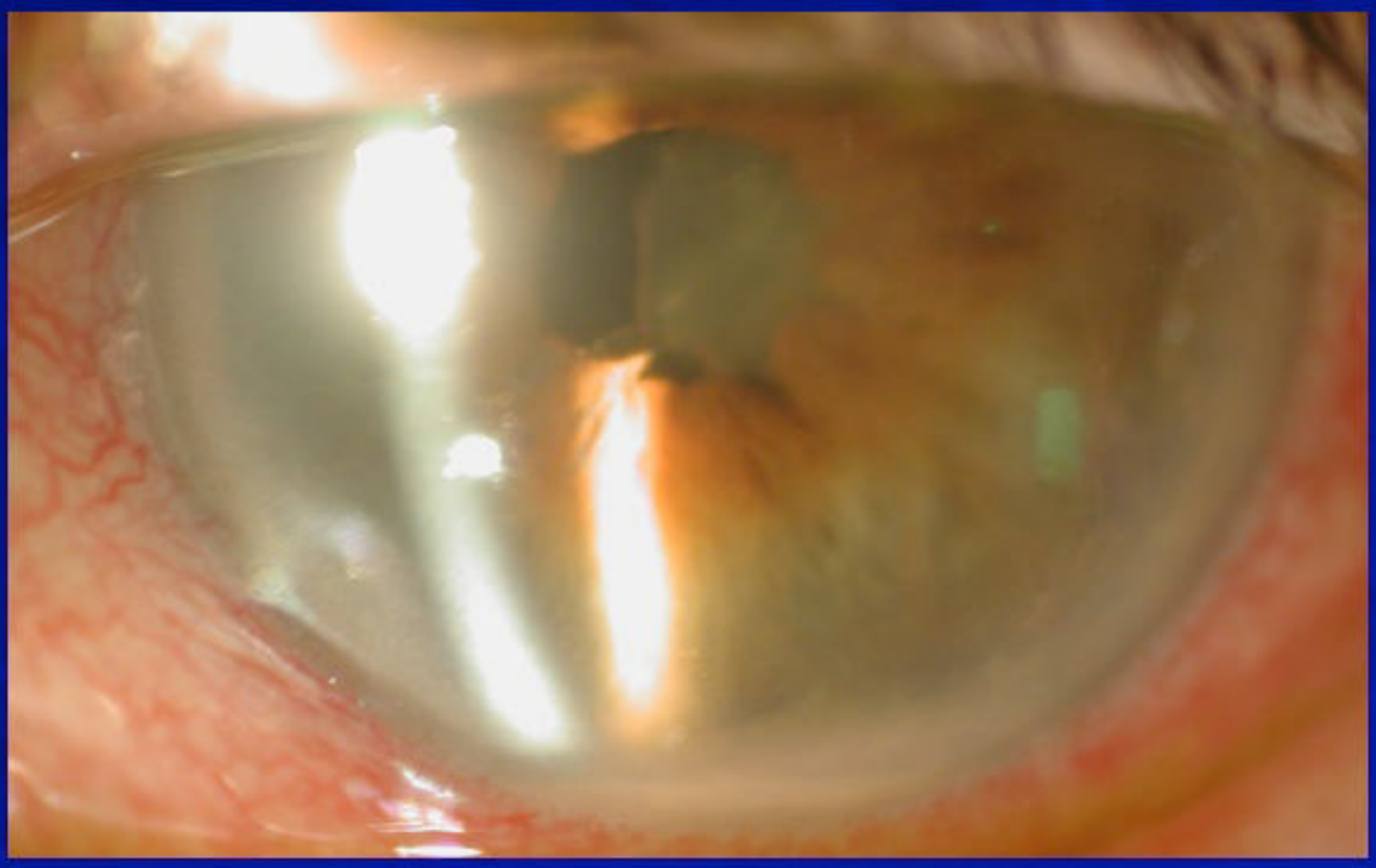
- **Non specific inflammatory glaucoma**

- Open angle
- Angle closure

- **Specific hypertensive uveitis syndromes**

- Fuchs' uveitis syndrome
- Glaucomatocyclitic crisis (Posner Schlossman syndrome)

Uveitic Glaucoma



Open angle inflammatory glaucoma

	Acute open – angle inflammatory glaucoma	Chronic open – angle inflammatory glaucoma
Mechanism of rise in IOP	Trabecular clogging , trabecular oedema and prostaglandin – induced rise in IOP	Chronic trabeculitis and trabecular scarring
Clinical features	Features of acute iridocyclitis associated with raised IOP with open-angle of anterior chamber	Raised IOP, open angle, no active inflammation but signs of previous episode of uveitis present
Management	Treatment of iridocyclitis Medical therapy to lower IOP by use of hyperosmotic agents, acetazolamide and beta – blockers eye drops	Medical therapy Trabeculectomy Cyclodestructive procedures

Angle closure inflammatory glaucoma

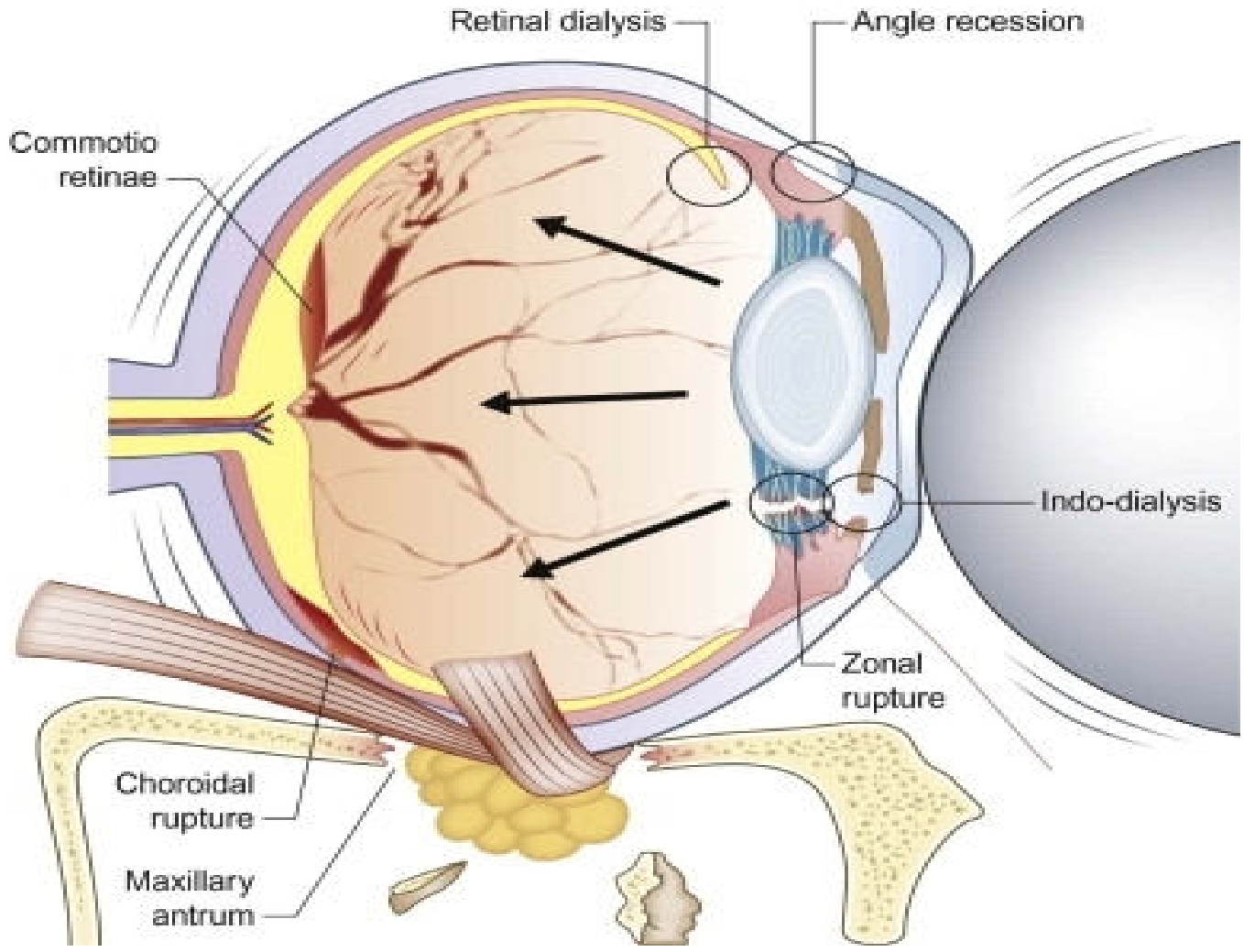
- **Mechanism of rise in IOP** –
- Secondary angle – closure with pupillary block
- Secondary angle – closure without pupillary block
- **Clinical features** – Raised IOP, seclusio papillae, shallow anterior chamber
- **Management** –
- Prophylaxis – Local steroids and atropine to prevent formation of synechiae
- Curative treatment – Medical therapy, surgical or laser iridotomy and filtration surgery

Specific hypertensive uveitis syndromes

- Glaucomatocyclitic crisis (Posner Schlossman syndrome)
- Recurrent attacks of unilateral, acute mild uveitis with secondary open angle glaucoma.
- Glaucoma is out of proportion to inflammation.
- Due to accompanying acute trabeculitis.

- Fuchs' uveitis syndrome
- Chronic low grade anterior uveitis.
- Occurs unilaterally in middle aged persons
- Heterochromia of iris
- No posterior synechia.
- Associated with cataract and secondary glaucoma

Blunt Trauma



Traumatic Glaucoma

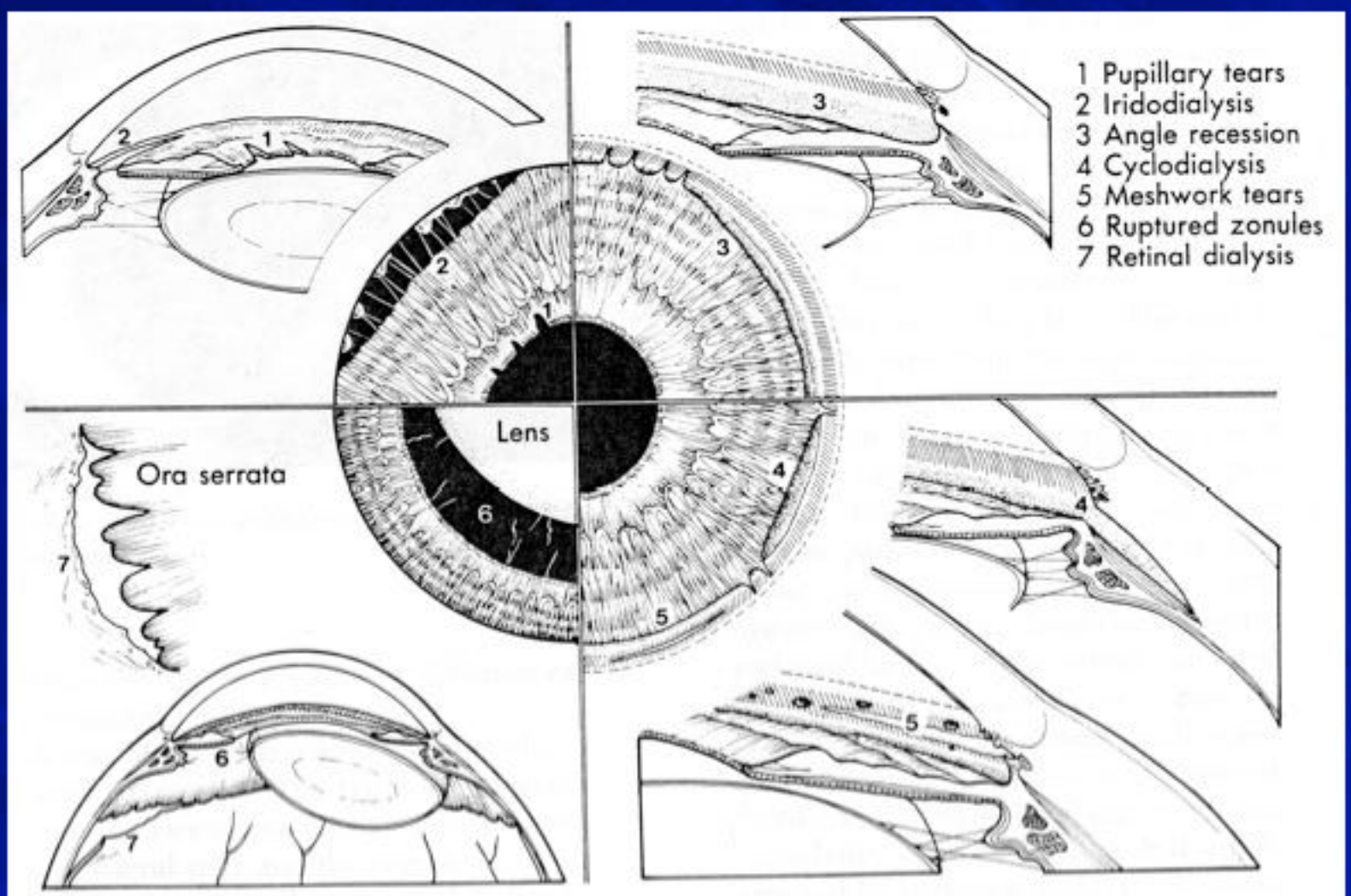
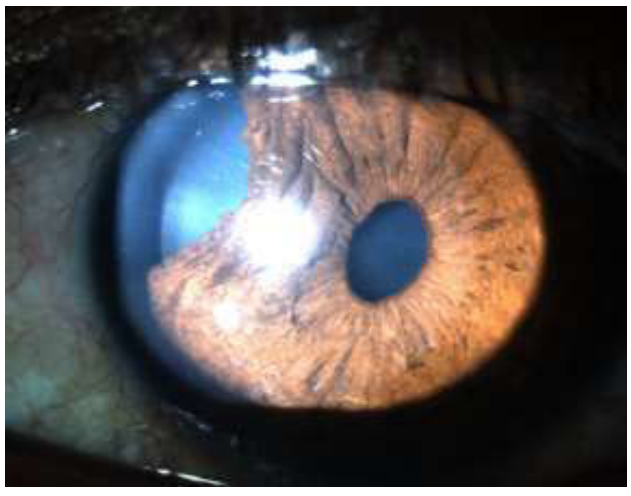
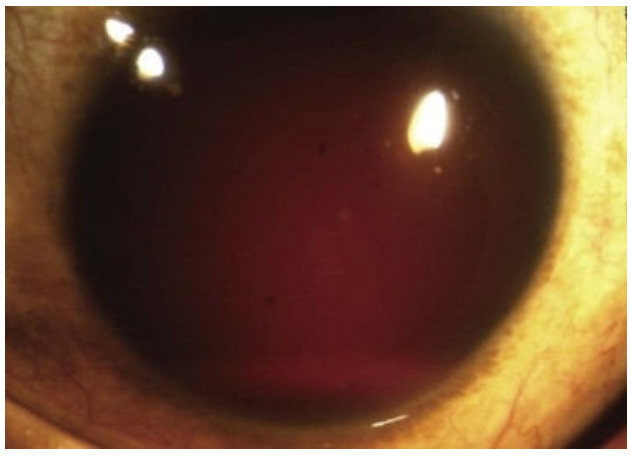


Fig. 10-2. The seven typical anterior tears that occur following blunt trauma to the eye.

Causes of glaucoma after trauma

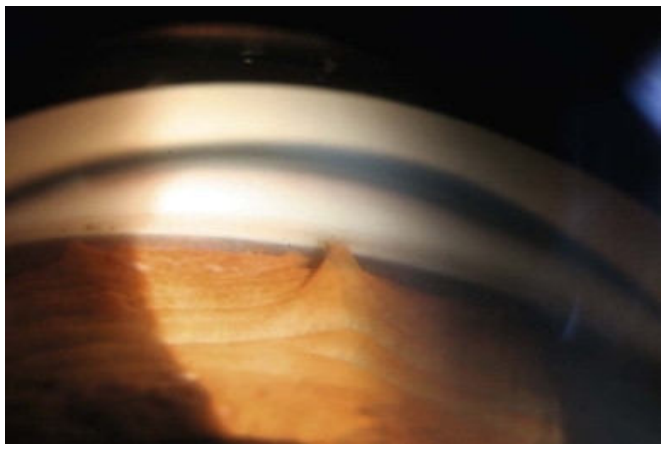
- Inflammatory glaucoma
- Glaucoma due to hyphema
- Lens induced glaucoma
- Angle recession glaucoma
- Epithelial or fibrous ingrowth
- Angle closure due to PAS



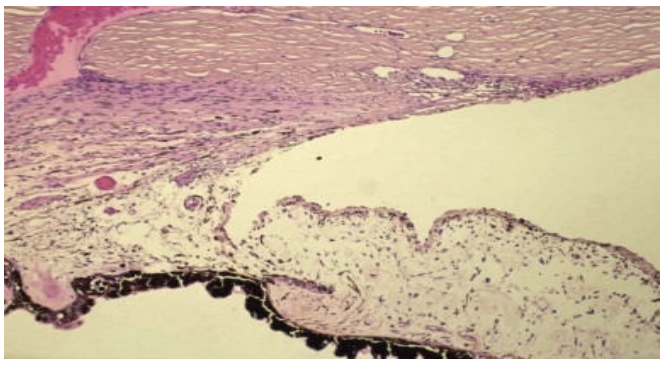


Angle recession glaucoma

- Rupture in ciliary body face
- Bimodal onset at 1 year and 10 year post trauma
- 270 degree recession- risk of glaucoma- 5%
- 360 degree recession- risk of glaucoma- 24%



Gonioscopic view of angle recession, demonstrated by a widened ciliary body band.



There is a disruption in the ciliary body between the external longitudinal muscle fibers and the internal oblique and circular muscle fibers.

Traumatic glaucoma

- **Management**
- Medical therapy with topical 0.5% timolol and oral acetazolamide
- Surgical intervention needs to be individualized according to nature and site of trauma

Steroid induced glaucoma

- Secondary open angle glaucoma following steroid therapy
- In the general population:
- High steroid responders – 5%
- Moderate steroid responders – 35%
- Non steroid responders – 60%

(IOP rise after six weeks of steroid therapy)

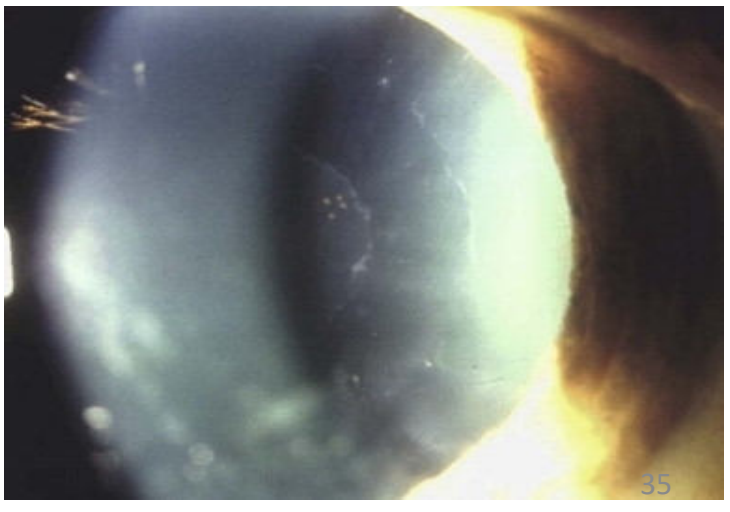
Precise mechanism of IOP rise not known

Prevented by judicious use of steroids and regular IOP monitoring

Treated by stopping steroids gradually and anti glaucoma medications

Pseudoexfoliative glaucoma

- Pseudo exfoliation syndrome(PES)/Glaucoma capsulare is associated with Secondary OAG in 50% of the cases.
- Deposition of an amorphous grey dandruff – like material on the pupillary border, posterior surface of iris and ciliary processes
- Trabecular blockage by exfoliative material
- Managed on the same lines as POAG



Causes of elevated IOP post cataract surgery

- Early phase
- Inflammation
- Haemorrhage
- Retained viscoelastic/lens matter

- Late phase
- Tight suture
- Excessive cautery
- Pupillary block(IOL/Vitreous)
- Aqueous misdirection
- Epithelial/Fibrous down growth

Glaucoma associated with iridocorneal endothelial syndromes

- Three clinical entities:
- Progressive iris atrophy
- Chandler's syndrome
- Cogan-Reese syndrome/Iris nevus syndrome

- Pathogenesis: Abnormal corneal endothelial cells proliferate to form a membrane in angle of AC. Contraction of membrane leads to secondary angle closure

- Treatment: Difficult and usually surgical

Other causes of secondary glaucoma

- Glaucoma in aphakia/pseudophakia
- Ciliary block glaucoma
- Glaucoma associated with intraocular haemorrhage
  - Red cell glaucoma
    - Haemolytic glaucoma
    - Ghost cell glaucoma
    - Hemosiderotic glaucoma

Goals of Therapy

- Keep the IOP below the target level at all times
- Stabilize the diurnal curve
- Identify and treat secondary causes

When Medications are Not Enough

1. Inadequate pressure control
   - Target pressure not attained
   - Diurnal variation not stabilized
2. Global patient assessment
   - Progression
   - Compliance
   - Medication intolerance
   - Cost
   - Geographic factors
   - Lifestyle
   - Drug interactions / concomitant systemic disease

Surgical / Laser Options

1. Laser Trabeculoplasty
2. Trabeculectomy
3. Glaucoma implants
4. Nonpenetrating surgery
   A. Viscocanalostomy
   B. Nonpenetrating deep sclerectomy (NPDS)
5. Wound modulation

Question

- A 50 year old lady with uncontrolled diabetes presented with painful red eye and decreased visual acuity in her right eye. On examination there was raised Intraocular Pressure and new blood vessels on the iris. The treatment includes all except**?**
- atropine
- beta blockers
- steroids
- pilocarpine

Question

- The laser procedure, most often used for treating neovascular glaucoma:

a) Goniophotocoagulation
b) Laser trabeculoplasty
c) Panretinal photocoagulation (PRP)
d) Laser iridoplasty

Question

- What is the most likely type of glaucoma in this patient ?

a) Phacolytic glaucoma
b) Phacoanaphylactic glaucoma
c) Phacotopic glaucoma
d) Lens particle glaucoma