# LENS INDUCED GLAUCOMA

PRESENTER-P SHILPA RAVI

2ND YEAR PG

DEPT OF OPHTHALMOLOGY

# LENS INDUCED GLAUCOMA

- It is a form of secondary glaucoma where intraocular pressure is raised due to disorder in crystalline lens
- Most important cause of irreversible loss of vision, especially in the rural population
- More common in older age(>50yrs)
- More predominent in females
- Seen more in developing countries

# Lens-Induced Glaucoma

SUBTYPES:

1)Phacomorphic glaucoma

2)Phacolytic glaucoma

3)Lens particle glaucoma

4)Phacotopic glaucoma

5) phacoanaphylaxis glaucoma

# Lens induced secondary glaucoma

## *Open angle*

***a)Phacolytic Glaucoma***

Condition related to soluble lens proteins

***b)Lens Particle Glaucoma:***

- Condition related to lens particles

**c) Phacoanaphylactic Glaucoma**

- Antigen-lens protein and Antibody reaction

## Closed angle

***a)Phacomorphic Glaucoma:***

- Conditions related to the size of the lens

1)Intumescent cataract

2) Traumatic cataract

***b)Phacotopic Glaucoma:***

- Condition related to the site of the lens

1) Subluxated

2) Dislocated

# PHACOLYTIC GLAUCOMA

- Secondary open-angle glaucoma associated with a hypermature cataract

Phacolytic glaucoma

## *Mechanism:*

**Heavy Molecular Weight lens protein (**HMW) released- microscopic defects in the capsule of immature/hypermature lens

↓

Cause direct obstruction of outflow pathways

↓

**Macrophages** attempt to remove this material

↓

Macrophages laden with phagocytosed HMW lens material- cause blockage at the angle of the anterior chamber (major culprit )

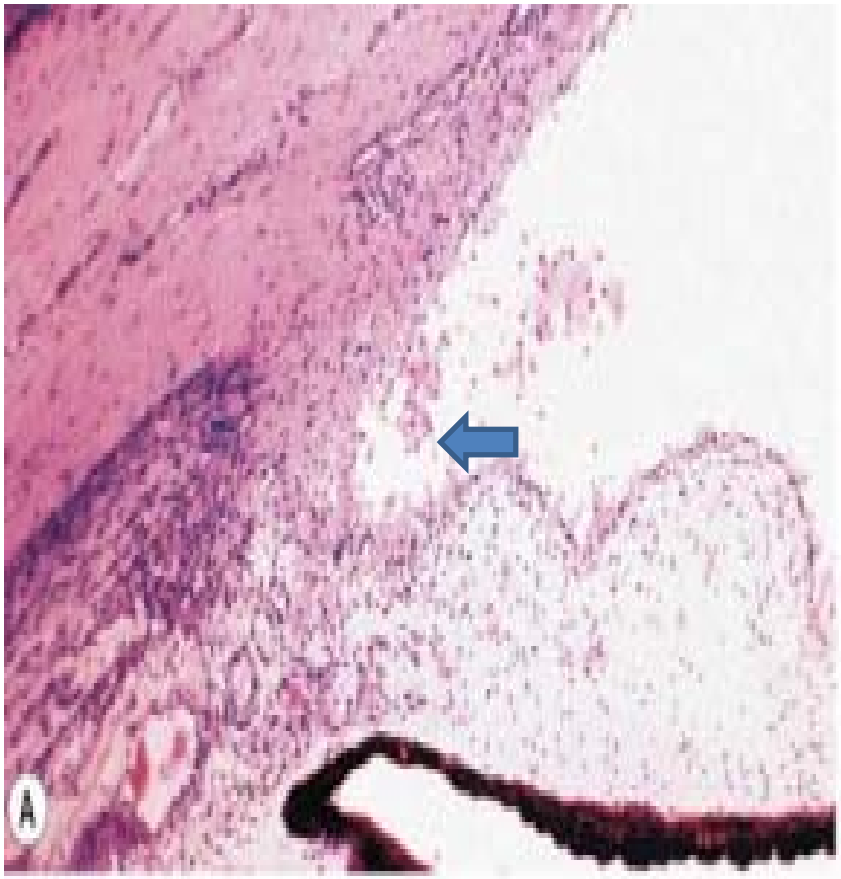
↓

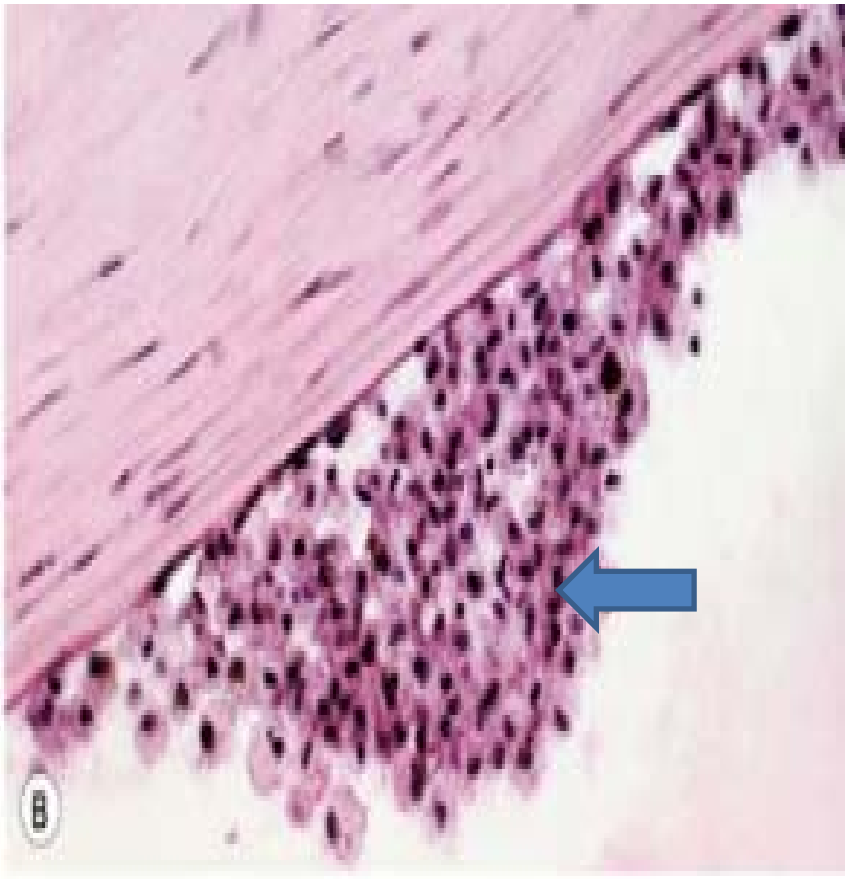
Increase in IOP

# Phacolytic glaucoma

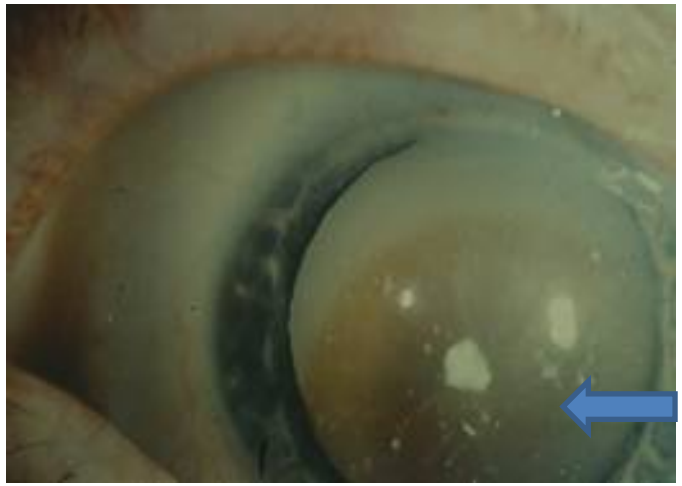
(A) Lens protein-containing macrophages in the angle

**(B)** lens protein-containing macrophages on the corneal endothelium



# Phacolytic glaucoma



## Clinical Picture:

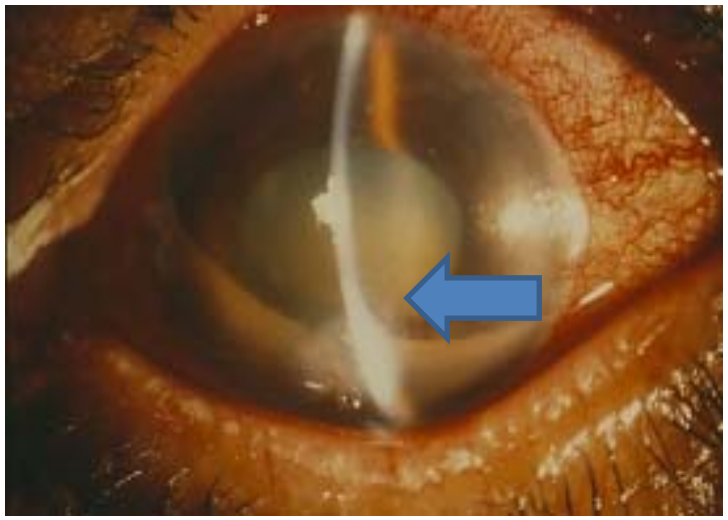
### Symptoms

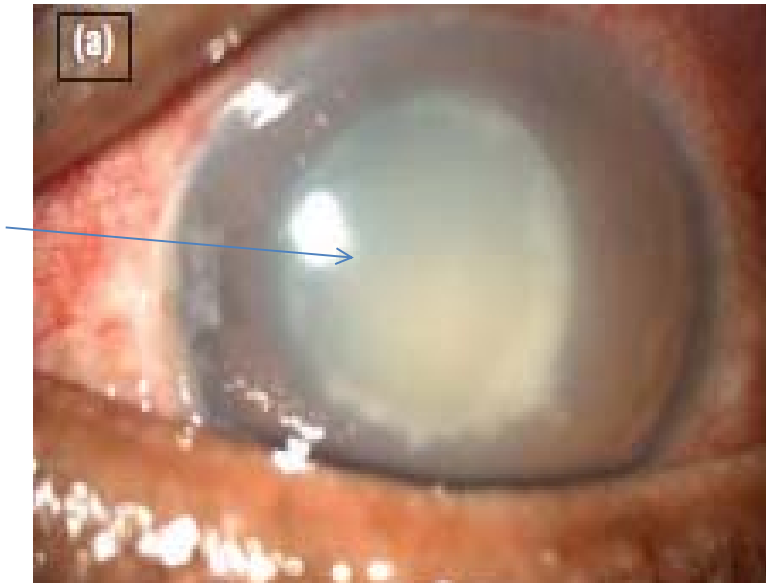
- Acute ocuar Pain
- History of slow vision loss for months or years prior to the acute onset of pain
- Inaccurate light perception due to the density of the cataract

# Phacolytic glaucoma

## Signs

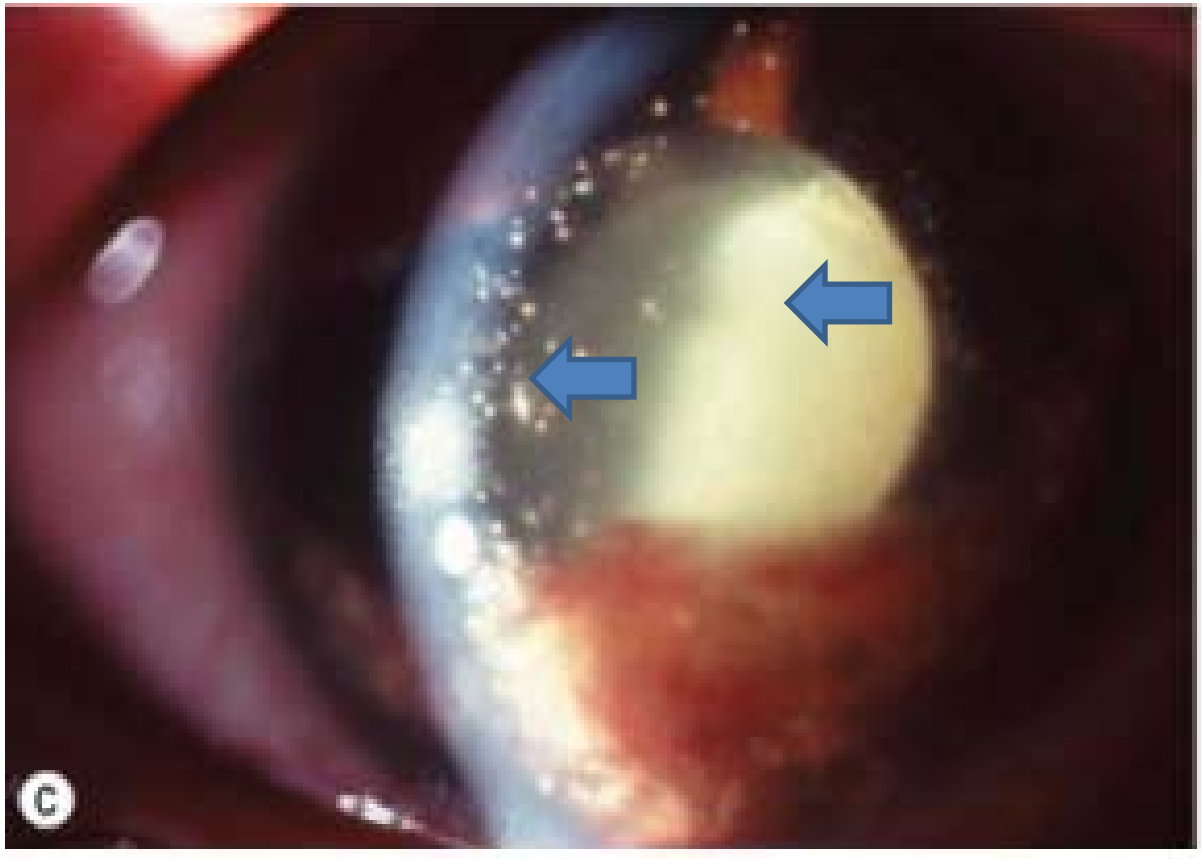
- Lid edema
- Conjunctival hyperemia
- Corneal edema
- Anterior chamber contains:
  - Flare
  - Aqueous cells
- Lens particles may precipitate on the
  - corneal endothelium
- Pupil sluggishly reacting
- Mature, hypermature /even morgagnian
  - cataract





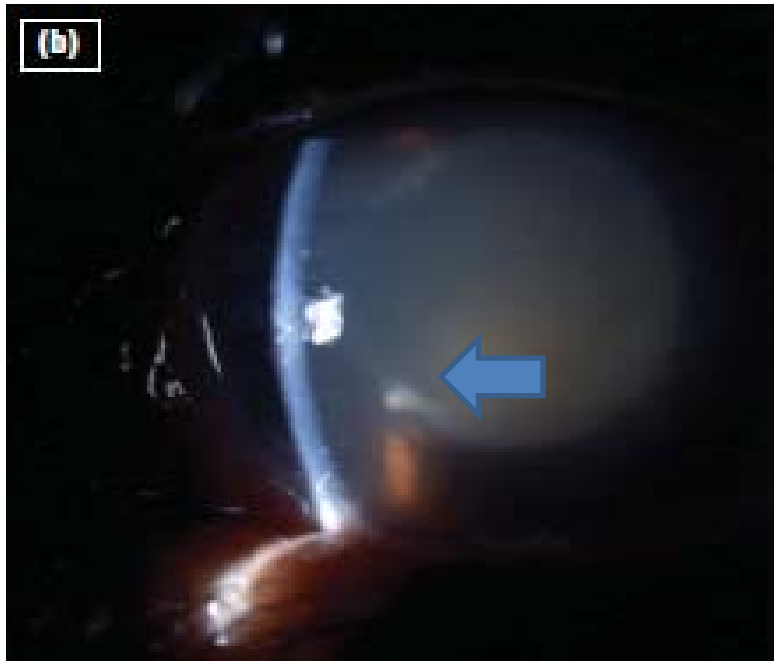
# Phacolytic glaucoma

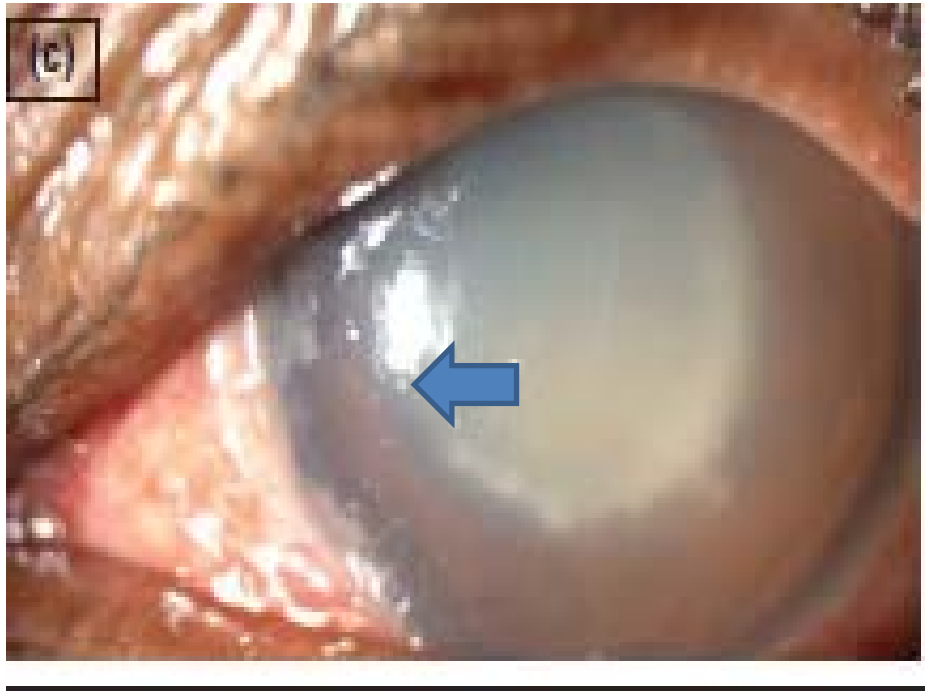
1. Hypermature cataract
2. Lens protein floating in the aqueous and endothelium



# Phacolytic glaucoma

Soft white patches on the Capsule-aggregates of macrophages trying to seal the site of leakage



# Phacolytic glaucoma

Differential Diagnosis:

- Acute Angle closure glaucoma
- Phacoanaphylactic glaucoma
- Lens particle glaucoma

# Phacolytic glaucoma

On Investigation :

- Tonometry - IOP is raised(30-50 mmHg)
- Gonioscopy reveals open angles

Phacolytic glaucoma Management:

- **Principles of management**

•Reduce IOP

•Remove the cause:cataract extraction

- Phacolytic glaucoma should be handled as an emergency

•**Initial treatment** - acute lowering of IOP

• Combination of topical and systemic IOP lowering agents

•Hyperosmotic agents –

i.v.**mannitol** 20% 1 to 2g/ kg in 30 to 40 mins

• Systemic Carbonic anhydrate inhibitors –

**Acetazolamide** 250-500mg bd

# Phacolytic glaucoma

- Topical beta-blockers-
  **Timolol maleate** 0.5% BD

Topical steroids –

- Eye drops prednisolone acetate 1%
  -reducing inflammation

- Cycloplegic drugs- eye drops homatropine 2% bd

# Phacolytic glaucoma

- **Definitive treatment**- Cataract extraction
- ***Combined surgery (***Trabeculectomy with cataract surgery)

**Indication**

- Duration of presentation is prolonged ( more than 72 hours)
- Intraocular pressure not by controlled with medical therapy for more than 07 days

# Phacomorphic Glaucoma [PMG]

- Acute secondary angle-closure glaucoma precipitated by an intumescent cataractous lens
- More common in smaller eyes (hyperopic)
- Predisposing factor- rapidly developing intumescent cataract and traumatic cataract
- More often seen as compared to other lens induced glaucomas.

# Phacomorphic glaucoma

**Precipitating factors**

- Intumescent cataractous lens

↓

antero-posterior thickness increased

↓

increased iridolenticular contact

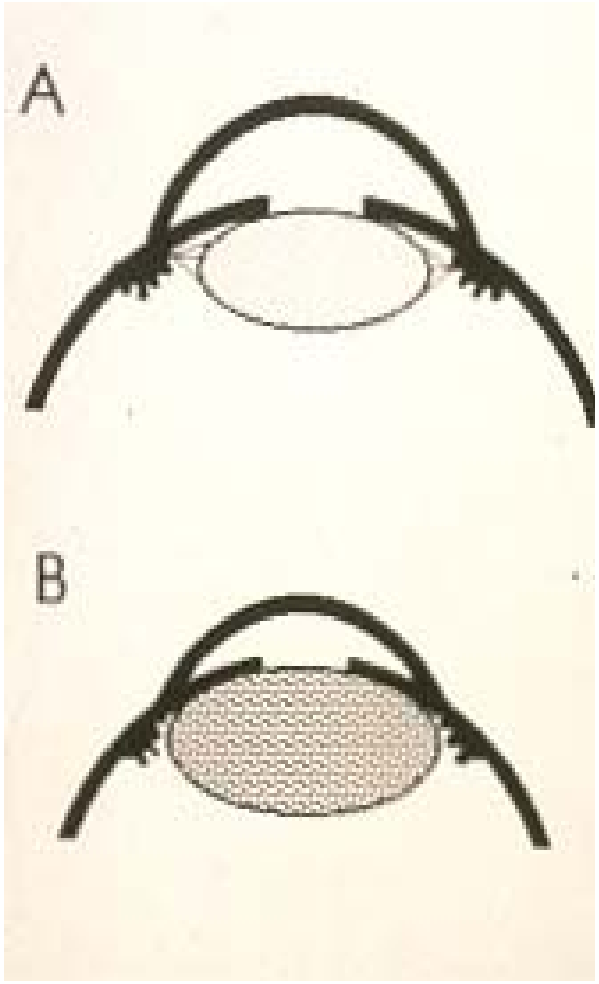
- Ageing lens- zonules gets weakened

↓

Allows lens to move anterior

↓

increased iridolenticular contact



Phacomorphic glaucoma

Mechanism:

Swollen lens → Pupillary block

↓ ↓

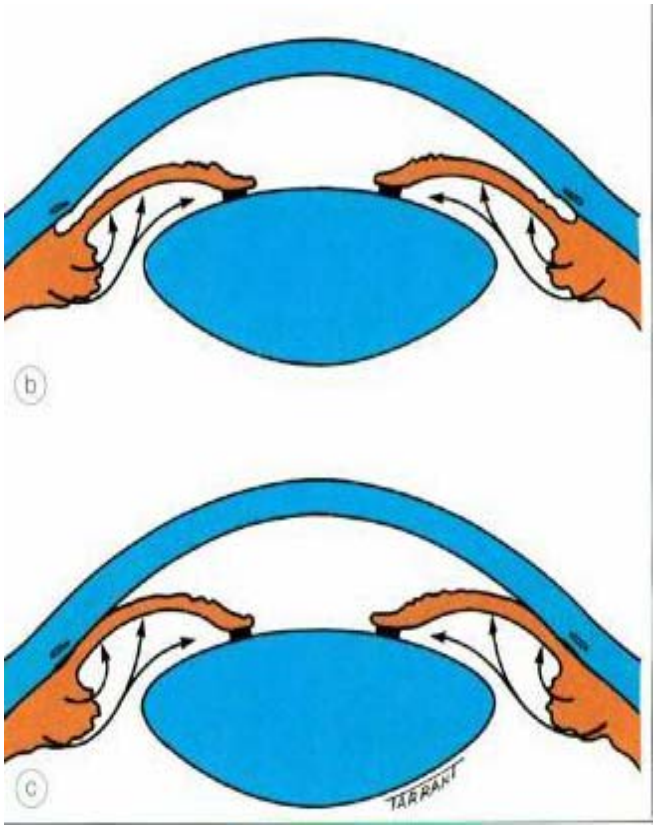
Angle closure ← Iris bombê

↓

Outflow obstruction

↓

Raised IOP

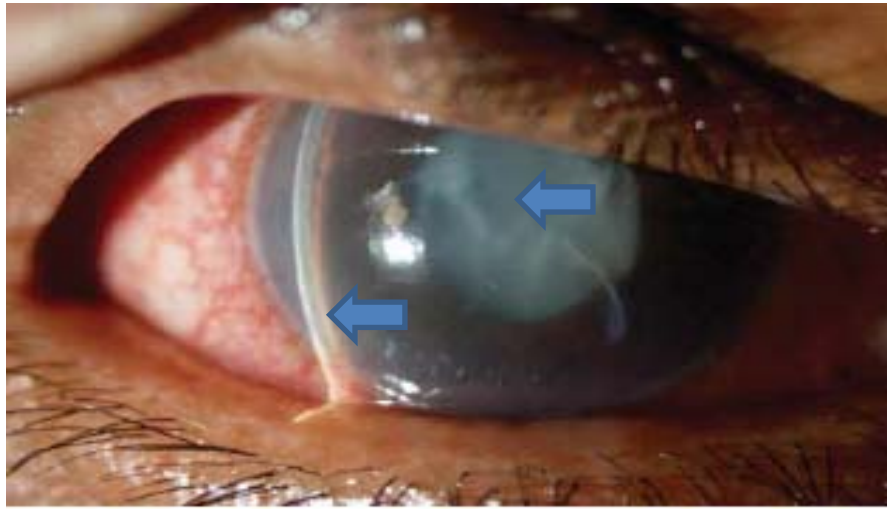


# Phacomorphic glaucoma

## SYMPTOMS

- Acute ocular pain
- Blurred vision
- Colored halos around light
- Decreased vision before the acute episode because of cataract.

# Phacomorphic glaucoma

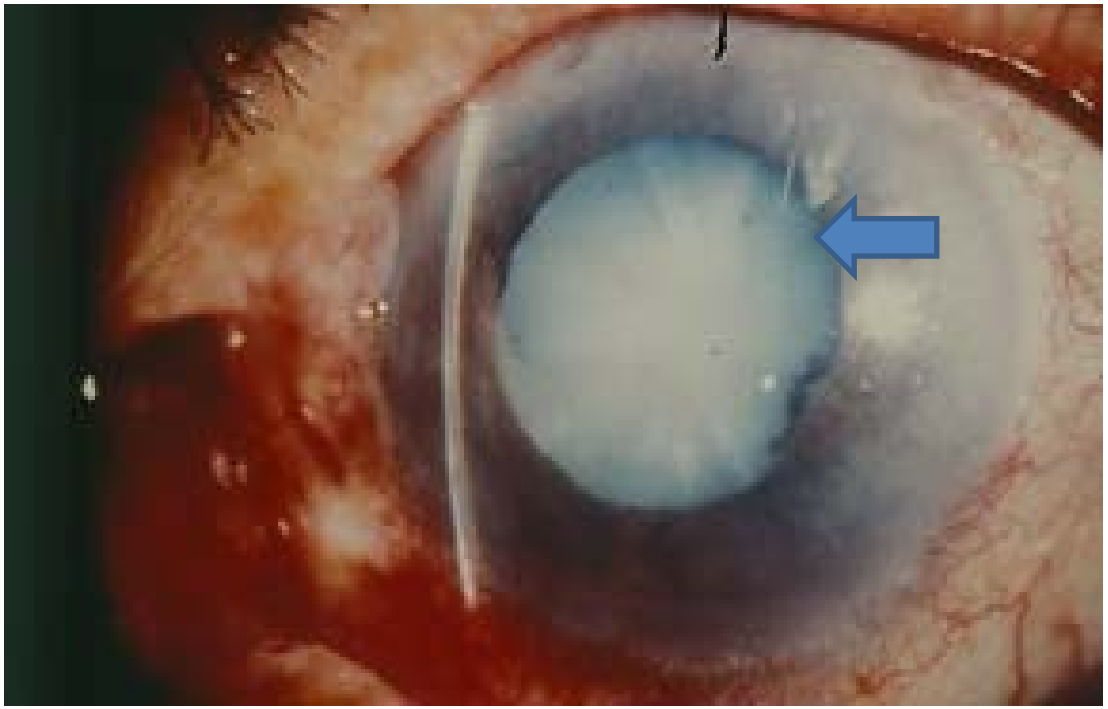


## SIGNS:

- Inaccurate light perception
- Reduced visual acuity
- Lid edema
- Chemosis
- Circumcorneal congestion
- Corneal edema
- Anterior chamber appears shallow both centrally and peripherally
- Presence of flare

# Phacomorphic glaucoma

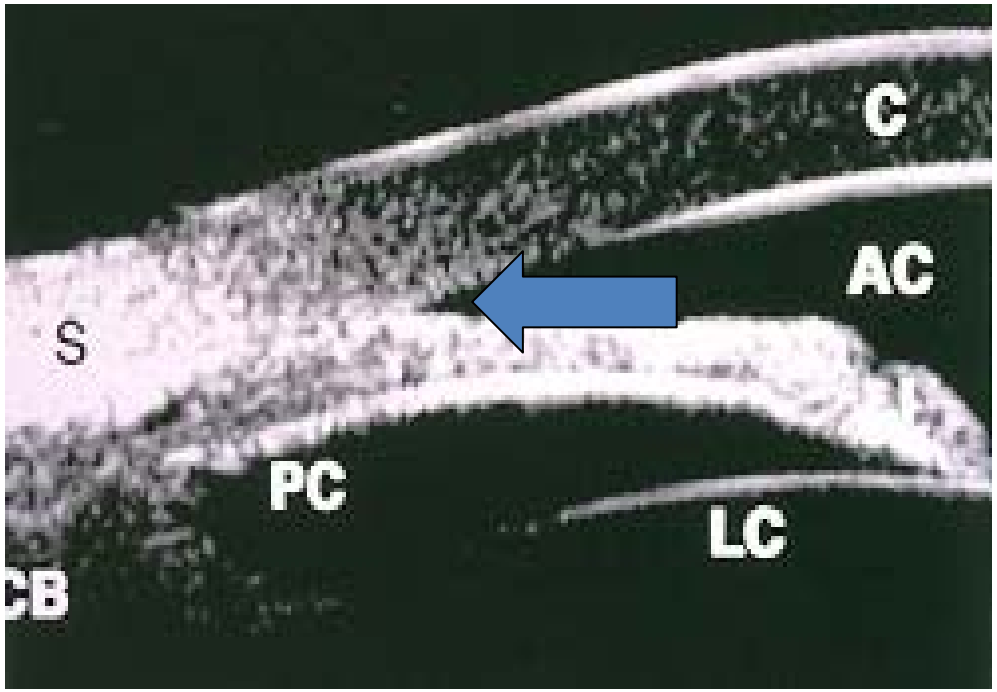
- Mid-dilated , sluggish, irregular pupil
- An intumescent cataractous lens



Phacomorphic glaucoma

**Investigation**

- On tonometry -Raised intraocular pressure(30-50 mmHg)
- On Gonioscopy –closed angles
- On ultrasonographic biomicroscopy-iris bombe and angle closure



Phacomorphic glaucoma

**Management:**

- **Principles of management**

- Reduce IOP
- Remove the cause:cataract extraction
- **Medical treatment to lower IOP** :
- Combination of topical and systemic IOP lowering agents
- Hyperosmotic agents –

  i.v.**mannitol** 20% 1 to 2g/ kg in 30 to 40 mins
- Systemic Carbonic anhydrate inhibitors –

  **Acetazolamide** 250-500mg bd
- Topical beta-blockers-

  **Timolol maleate** 0.5% bd

# Phacomorphic glaucoma

SURGICAL :

- **Definitive treatment**- Cataract extraction
- ***Combined surgery (***Trabeculectomy with cataract surgery)

**Indication**

- Duration of presentation is prolonged ( more than 72 hours)
- Intraocular pressure not by controlled with  medical therapy for more than 07  days

# Lens Particle Glaucoma

- Secondary open angle glaucoma due to presence of fragments of lens material in the anterior chamber

  Usually follows after:

- Cataract extraction
- Penetrating lens injury
- Nd: YAG laser capsulotomy

**Lens Particle Glaucoma**

The mechanism involves

Breach in the lens capsule

⬇

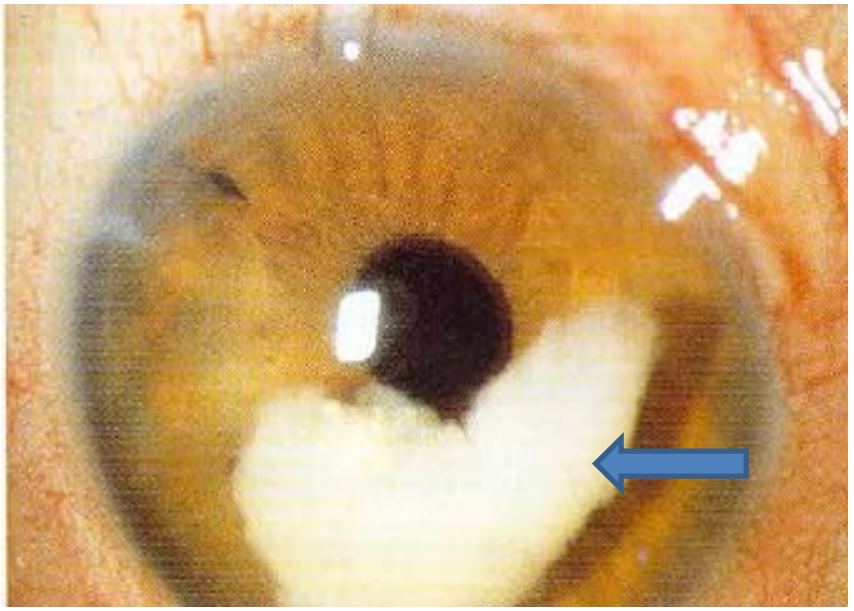
Dislocation of lens fragments

⬇

Obstruction of trabecular meshwork

⬇

Reduction of the outflow



- Patient often gives recent history of trauma or intraocular surgery, particularly cataract extraction
- Can also occur many years after cataract surgery

# Lens Particle Glaucoma
## *Clinical features*


- Present with monocular eye pain
- Redness
- Blurring of vision

Variable degree of inflammation:

- Corneal edema
- Keratic precipitates
- Hypopyon
- Often associated with posterior and anterior synechiae and inflammatory pupillary membranes

# **Lens Particle Glaucoma**
## Differential diagnosis

- Phacoanaphylaxis,
- Phacolytic glaucoma
- Uveitic conditions with associated open-angle glaucoma

# Lens Particle Glaucoma

## Management:

- **Principles of management**

- Reduce IOP
- Remove the cause-irrigation and aspiration of lens particles

- Medical Therapy:
  - Anti-glaucoma therapy
  - Topical steroid
- Surgical:
  - Anterior chamber wash-out: irrigation and aspiration of lens particles

# Lens Particle Glaucoma

- IOP can elevate after Nd: YAG laser Posterior Capsulotomy
- Acute “within hours”

Risk is greater in:

- Glaucoma patients
- Eyes without IOL
- More energy used

- Measure IOP 1h post laser capsulotomy
- Prophylactic anti-glaucoma therapy

# Lens Particle Glaucoma

## Management:

- Medical Therapy
  - Anti-glaucoma therapy (avoid miotics)
  - Hyperosmotic agents
  - Topical steroids
  - Cycloplegics

- Surgical
  - Anterior chamber wash-out

# Phacoanaphylaxis Glaucoma

- Fulminating acute inflammatory reaction

  ( Antigen-lens protein and Antibody reaction )

- Rare entity
- Inflammatory reaction directed against own lenticular antigens

## Phacoanaphylaxis Glaucoma

- Such cases are allergic in nature- the allergen being their own lens protein.
- Positive skin test - tested intradermally to lenticular protein
- Also called **Endophthalmitis phacoanaphylactica**
- Preceding disruption of the lens capsule similar to the lens particle glaucoma
- But there is usually a latent period of 24 hours to 14 days between the trauma and the onset of inflammation

# Phacoanaphylaxis Glaucoma

## ***Mechanism:***

- The patient is sensitized to his own lens antigens
- These proteins are kept in an immunologically privileged site within the lens capsule

## Phacoanaphylaxis Glaucoma

- After an eye surgery or other trauma to the lens capsule

lens antigens are exposed to the circulation

↓

Recognized - ‘foreign’ by immune system

↓

inflammatory response

Arthus-type immune complex reaction mediated by IgG and the complement system

↓

inflammation trabecular meshwork

↓

Obstruction to aqueous outflow

# Phacoanaphylaxis Glaucoma

## *Clinical Features*

- Lid edema
- Chemosis
- Conjuctival injection
- Corneal edema
- Mutton fat keratic precipitates
- Heavy anterior chamber reaction
- Posterior synechiae

## Phacoanaphylaxis Glaucoma

- Development of phacoanaphylaxis – nucleus is retained in the vitreous.
- ***Typical finding-***
- chronic
- Granulomatous-type inflammation -center of lens material in the primarily involved eye or in the fellow eye

# Phacoanaphylaxis Glaucoma
# Differential diagnosis

- Phacolytic glaucoma
- Lens particle glaucoma
- Chronic forms of uveitis

# Phacoanaphylaxis Glaucoma

## Treatment

Principle-

- Reduce IOP
- Treat the cause

➢ Initial measure –

**Control the inflammation-**

o Inflammation is intense(cells>+3)-

✓ Oral steroids(**prednisolone** 1mg/kg once daily)

o Inflammation is mild-

✓ Topical steriods(**prednisolone acetate 1% hourly )**

**Raised IOP if present**

- Requires antiglaucoma drugs
  - Cycloplegics

➢ Surgical- irrigation and aspiration of lens particles

## PHACOTOPIC GLAUCOMA

- Secondary angle closure glaucoma occur due to the site of the lens

1) Subluxated

2) Dislocated

## PHACOTOPIC GLAUCOMA

***Mechanism***

Dislocation/subluxation

cause pupillary block

result in angle-closure glaucoma

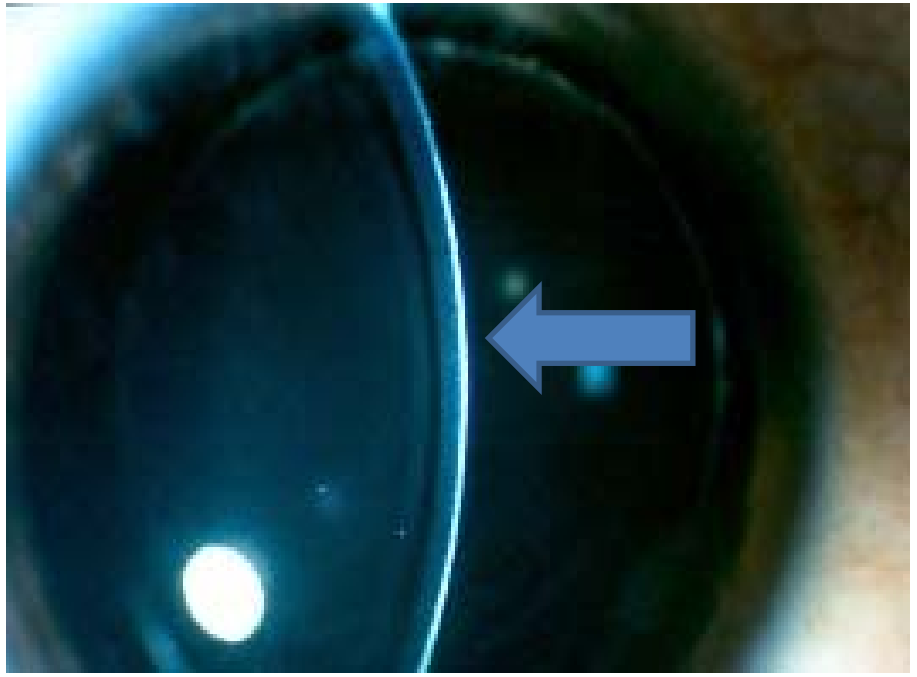
- Dislocated lens may directly encroach upon the angle

# PHACOTOPIC GLAUCOMA

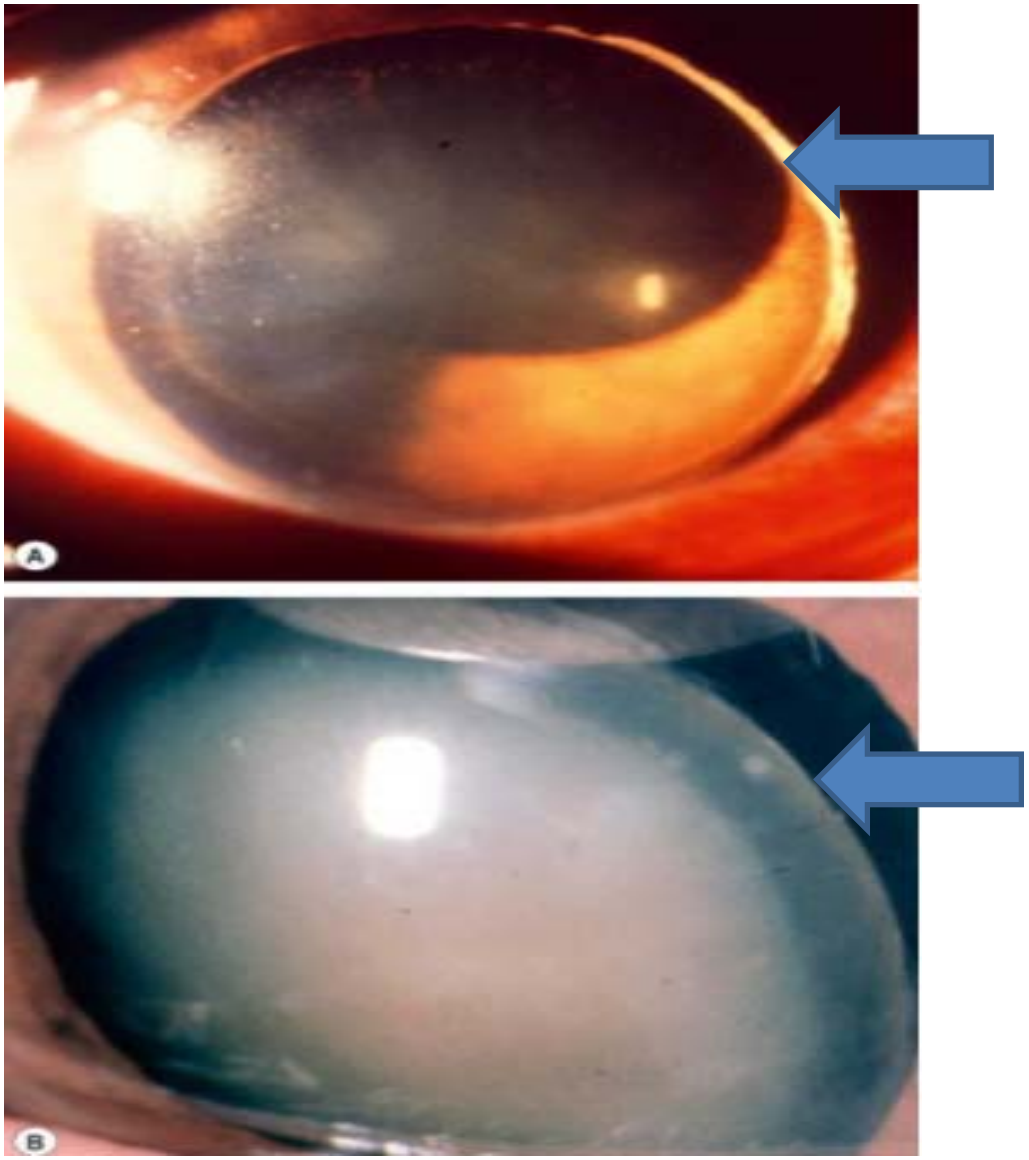
***Clinical features***

***symptoms***

- Redness
- Painful eye
- Decreased visual acuity



# PHACOTOPIC GLAUCOMA

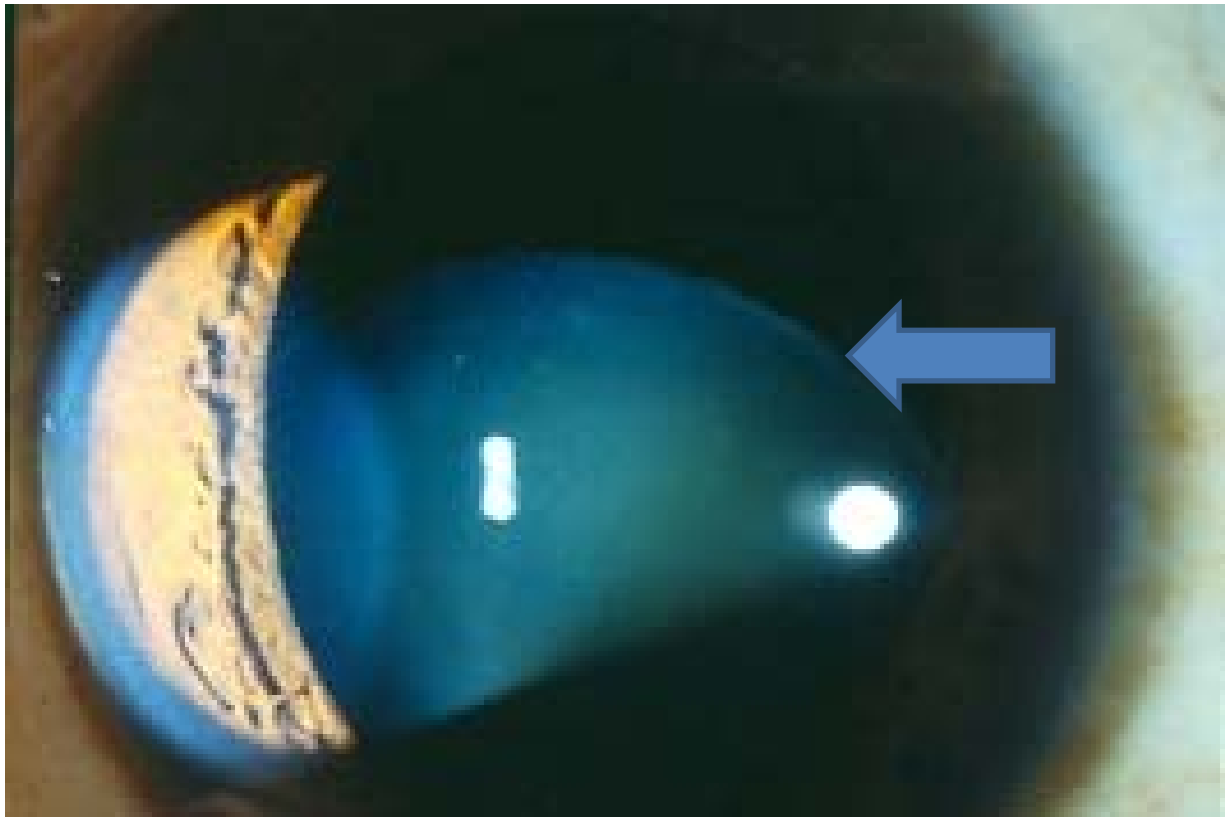


# PHACOTOPIC GLAUCOMA

**Signs**

- Shallowing of the anterior chamber either symmetrically or asymmetrically
- Iridodonesis
- Phacodonesis
- Subluxation/Dislocation
- Difference in the depth of the anterior chamber between the two eyes

# Inferior subluxation



# MANAGEMENT

## Therapeutic approach - degree of dislocation and the symptoms.

- If no pupillary block glaucoma -
- conservative nonintervention strategy

- Accompanied by pupillary block-
- laser peripheral iridectomy

# PHACOTOPIC GLAUCOMA

## *Management:*

- **Principle of management**

- Reduce IOP
- Remove the cause-cataract extraction
- **For acute attack-Initial treatment** - acute lowering of IOP
- Combination of topical and systemic IOP lowering agents
- Total anterior dislocation requires removal of the lens.

# summary

Main clinical presentations of LIG

- Triad of acute  eye pain, reduced vision and redness
- The common cause of LIG is phacomorphic glaucoma
- Late intervention cause poor visual outcome
- Public awareness and early detection is important for an early intervention of cataract
- Early cataract surgery aids in visual recovery and IOP control

Thank you