LENS INDUCED GLAUCOMA

Dr BHUVAN KALYAN P
Asst Professor
DEPT OF OPHTHALMOLOGY
LENS INDUCED GLAUCOMA

• Form of secondary glaucoma where lens plays a role either by size or position or by causing inflammation
• Most important cause of irreversible loss of vision, especially in the rural population
• More common in older age (>50yrs)
• More predominant 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) Phacoanaphylactic uveitis with secondary 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 uveitis with secondary 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 through microscopic defects in the capsule of immature/hypermature lens

Causes 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

Increase in IOP
Phacolytic glaucoma

Clinical Picture:

Symptoms

• Acute ocular 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 containing
  - Flare
  - Aqueous cells
- Lens particles may precipitate on the corneal endothelium
- Sluggishly reacting Pupil
- Mature/Hypermature /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 uveitis with secondary glaucoma
- Lens particle glaucoma
Phacolytic glaucoma

On Investigations:
• 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%
  - reduces 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 get weakened
  - Allows lens to move anteriorly
  - 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 lights
• 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

• Synechial Angle Closure in 3 quadrants or more on Gonipscopy

• Intraocular pressure not by controlled with medical therapy for more than 07 days
Trabeculectomy: creating a drainage pathway

Fluid reservoir
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

- IOP can elevate after Nd: YAG laser Posterior Capsulotomy
  - Acute if “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

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 steroids

- **Surgical:**
  - Anterior chamber wash-out: irrigation and aspiration of lens particles
Phacoanaphylactic Uveitis with Secondary Glaucoma

• Fulminating acute inflammatory reaction
  (Antigen-lens protein and Antibody reaction)

• Rare entity
• Inflammatory reaction directed against own lenticular antigens
• 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
Mechanism:

• The patient is sensitized to his own lens antigens

• These proteins are kept in an immunologically privileged site within the lens capsule
• 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
Phacoanaphylactic uveitis with secondary glaucoma

**Clinical Features**

- Lid edema
- Chemosis
- Conjuctival injection
- Corneal edema
- Mutton fat keratic precipitates
- Heavy anterior chamber reaction
- Posterior synechiae
• 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
Phacoanaphylactic uveitis with secondary glaucoma

Differential diagnosis

• Phacolytic glaucoma
• Lens particle glaucoma
• Chronic forms of uveitis
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 steroids (prednisolone acetate 1% hourly)
Raised IOP if present
• Requires antiglaucoma drugs
  o 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—LENS 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.
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