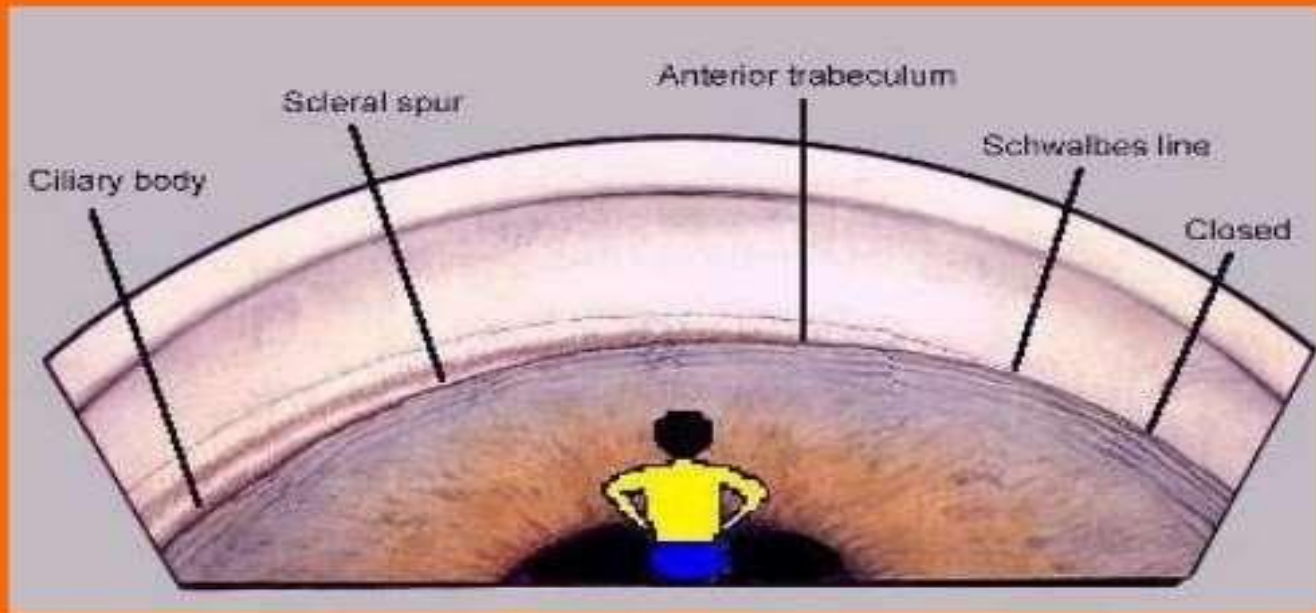


Primary Angle Closure Glaucoma (PACG)

Dr Gayatri Bhonsale
Associate Professor
Ophthalmology
MGMIHS
April 2020

Gonioscopy

Anatomy of angle



Introduction to PACG

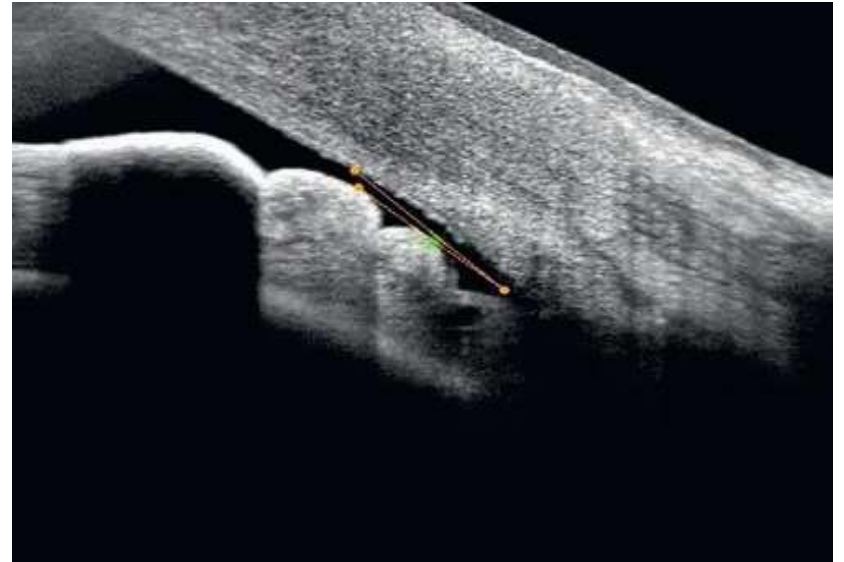
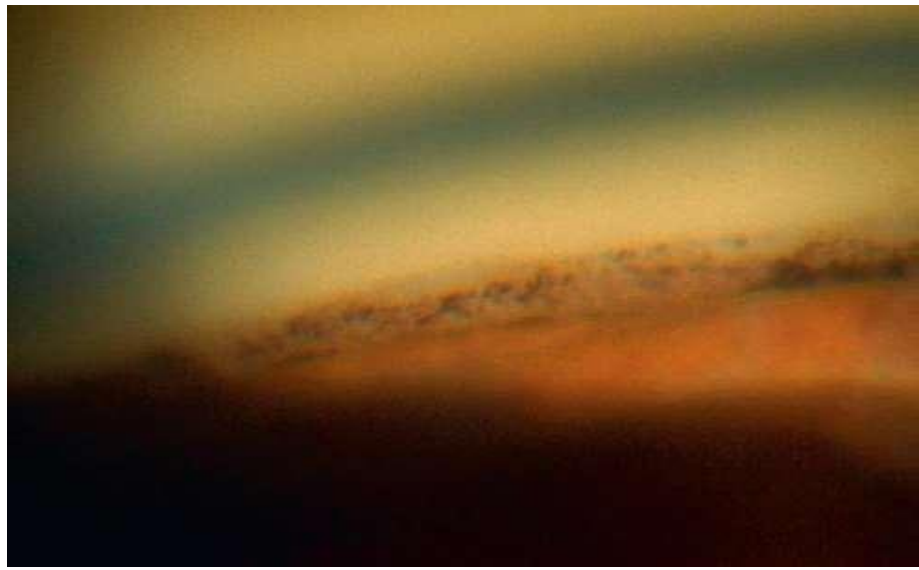
- The term 'angle closure' refers to occlusion of the trabecular meshwork by the peripheral iris (**iridotrabecular contact – ITC**), obstructing aqueous outflow.
 - Primary - when it occurs in an anatomically predisposed eye
 - Secondary - due to another ocular or systemic factor
- PACG forms half of all cases of glaucoma globally
- High prevalence in individuals of Far Eastern descent
- It is typically associated with greater rapidity of progression and visual morbidity than POAG

Classification

- Association of International Glaucoma Societies classify PACG in the following types.
 - Primary angle closure suspect (PACS)
 - Primary angle closure (PAC)
 - Primary angle-closure glaucoma (PACG)

Primary angle closure suspect (PACS)

- Gonioscopy shows posterior meshwork ITC in three or more quadrants but no PAS.
- Many patients with less ITC have evidence of intermittent angle closure and therefore a lower threshold for diagnosis such as two quadrants of ITC, may be justified.
- Normal IOP, optic disc and visual field.
- No peripheral anterior synechiae (PAS).
- The risk of PACG at 5 years may be around 30%.



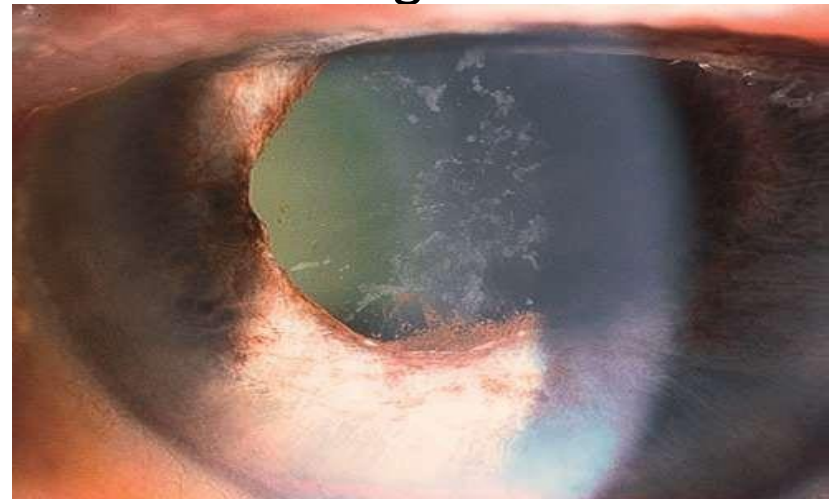
(A) On gonioscopy only a double Schwalbe line and part of the non-pigmented trabecular meshwork are visible (B) pigment smudging of the non-pigmented meshwork seen on indentation gonioscopy; © sparsely pigmented Schwalbe line (D) very narrow angle on dark-room anterior segment OCT

Primary angle closure (PAC)

- ITC in three or more quadrants, with glaucomatous optic neuropathy.
- Optic nerve damage from an episode of severe IOP elevation, such as acute angle closure, may not appear as typical glaucomatous cupping.

Primary angle-closure glaucoma (PACG)

- Gonioscopy shows three or more quadrants of ITC with raised IOP and/or PAS or excessive pigment smudging on the TM.
- Normal optic disc and field.
- Some authorities further classify PAC into non- ischaemic and ischaemic, the latter showing anterior segment evidence of prior substantial IOP elevation such as iris changes or glaukomflecken



Mechanism

Relative pupillary block

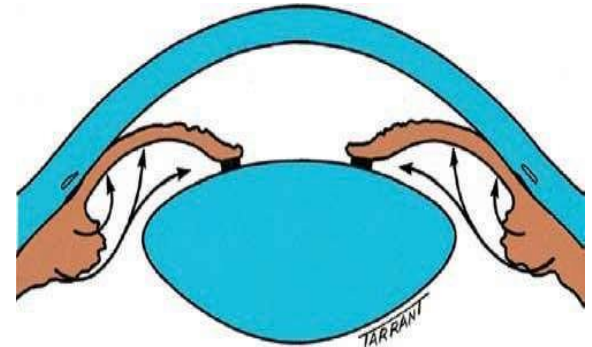
- Failure of physiological aqueous flow through the pupil



leads to a pressure differential between the anterior and posterior chambers



anterior bowing of the iris .

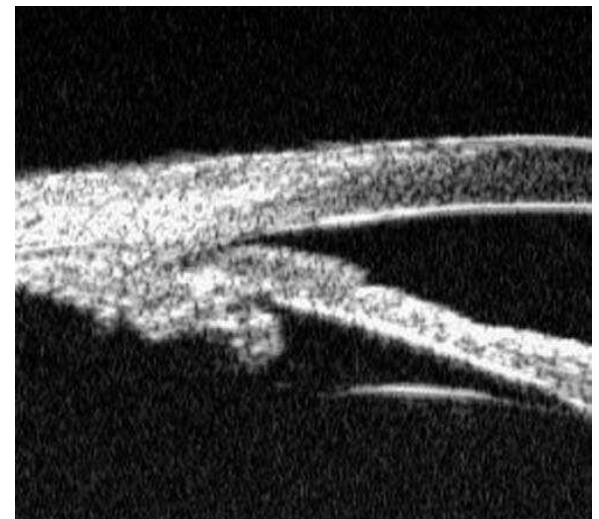


- The lens vault quantifies the portion of the lens located anterior to the anterior chamber angle

Non-pupillary block

- Far Eastern patients.
- Deeper anterior chamber (AC) than pure pupillary block.
- younger than those with pure pupillary block.
- Angle closure is not fully relieved by iridotomy.
- Plateau iris, and a thicker or more anteriorly positioned iris.

- Plateau iris configuration is characterized by a flat or only slightly convex central iris plane. A characteristic 'double hump' sign is seen on indentation gonioscopy.
- Plateau iris syndrome describes the persistence of gonioscopic angle closure despite a patent iridotomy in a patient with morphological plateau iris.



Reduced aqueous outflow in angle closure caused by the following mechanisms :

- Appositional obstruction by the iris.
- Degeneration or damage of the TM itself
- Permanent occlusion of the TM by PAS

Risk Factors

- **Age**

Average age of relative pupillary block is about 60 years

Non-pupillary block forms of primary angle closure tend to occur at a younger age.

- **Gender**

Females are more commonly affected than males.

- **Race**

Particularly prevalent in Far Eastern and Indian Asians; in the former non-pupillary block is relatively more significant.

- **Family history**

Genetic factors are important but poorly defined

-

- **Refraction**
- **Eyes with 'pure' pupillary block are typically hypermetropic.**
 - Although this is not as clear-cut with non-pupillary block, which can occur in myopic eyes.
 - Up to one in six patients with hypermetropia of one dioptre or more are primary angle closure suspects, so routine gonioscopy should be considered in all hypermetropes.
- **Axial length**
 - Short eyes tend to have a shallow AC eyes with nanophthalmos have a very short eye with a proportionally large lens and are at particular risk.

Diagnosis

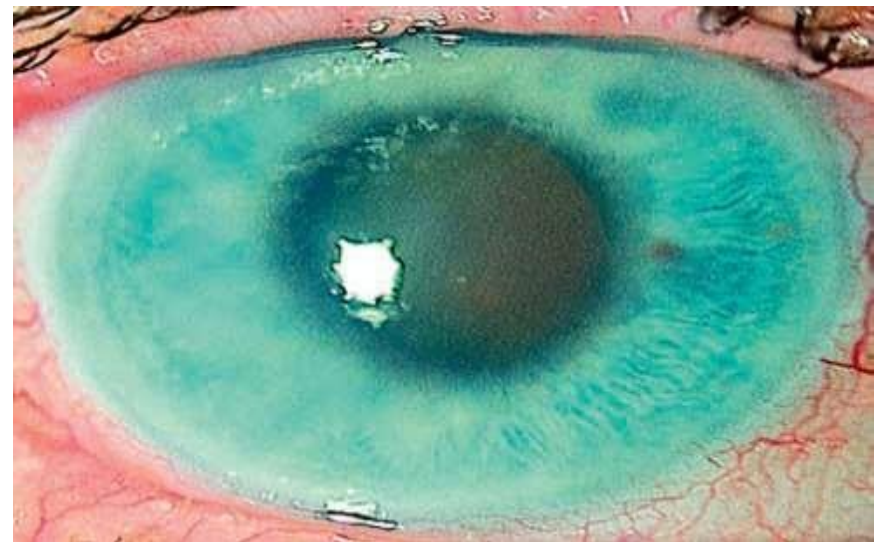
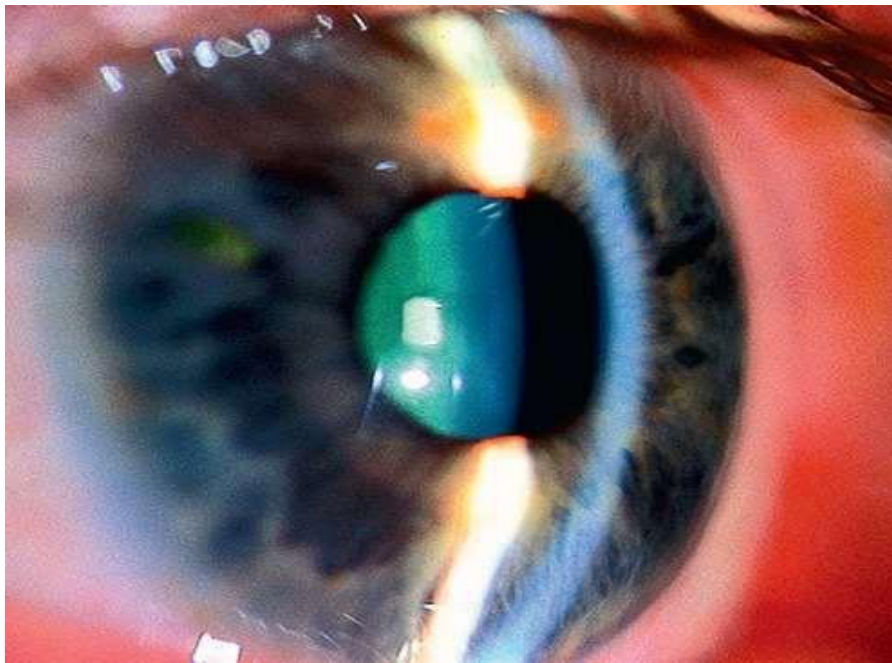
- **Symptoms:**

- Most patients are asymptomatic including a majority of those with intermittently or chronically Elevated IOP
- Blurred Vision (smoke filled Room)
- Coloured halos around light (Rainbow around light) due to corneal epithelial corneal oedema.
- Frontal, ocular /periocular pain and headache.
- Nausea, vomiting
- Precipitating factors include watching television in a darkened room.
- Pharmacological mydriasis, Acute emotional stress, semiprone position etc

Signs

Acute Primary Angle Closure

- VA is usually 6/60 to HM
- The IOP is usually very high (50–100 mmHg)
- Conjunctival hyperaemia with violaceous circumcorneal injection
- Corneal oedema
- Shallow AC with aqueous flare
- Unreactive mid-dilated vertically oval pupil
- Fellow eye typically shows an occludable angle, if not present, secondary causes should be considered



Chronic Presentation

- VA is normal unless damage is advanced
- AC is usually shallower in relative pupillary block than non-pupillary block.
- IOP elevation may be only intermittent
- ‘Creeping’ angle closure is characterized by a gradual band-like anterior advance of the apparent insertion of the iris.
- It starts in the deepest part of the angle and spreads circumferentially.
- Intermittent ITC may be associated with the formation of discrete PAS, individual lesions having a pyramidal (‘saw-tooth’) appearance.

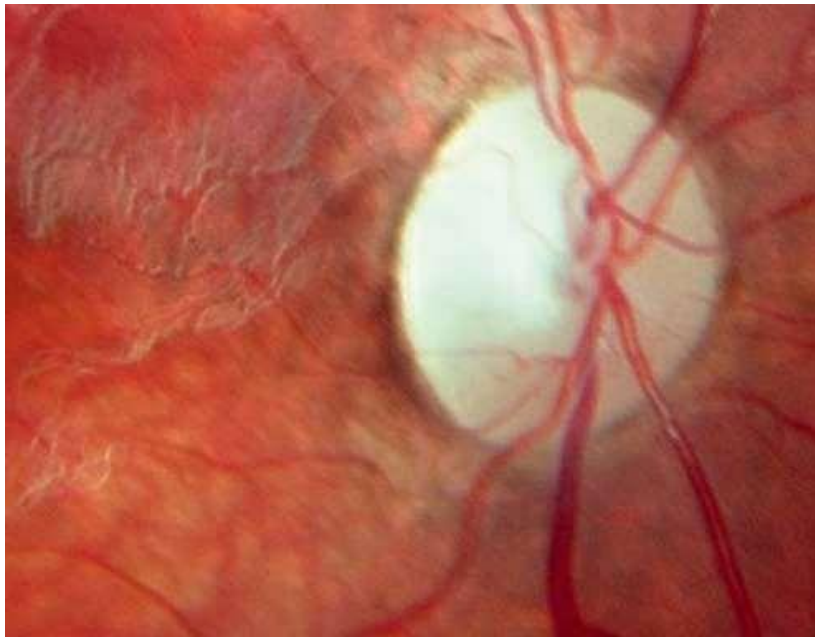
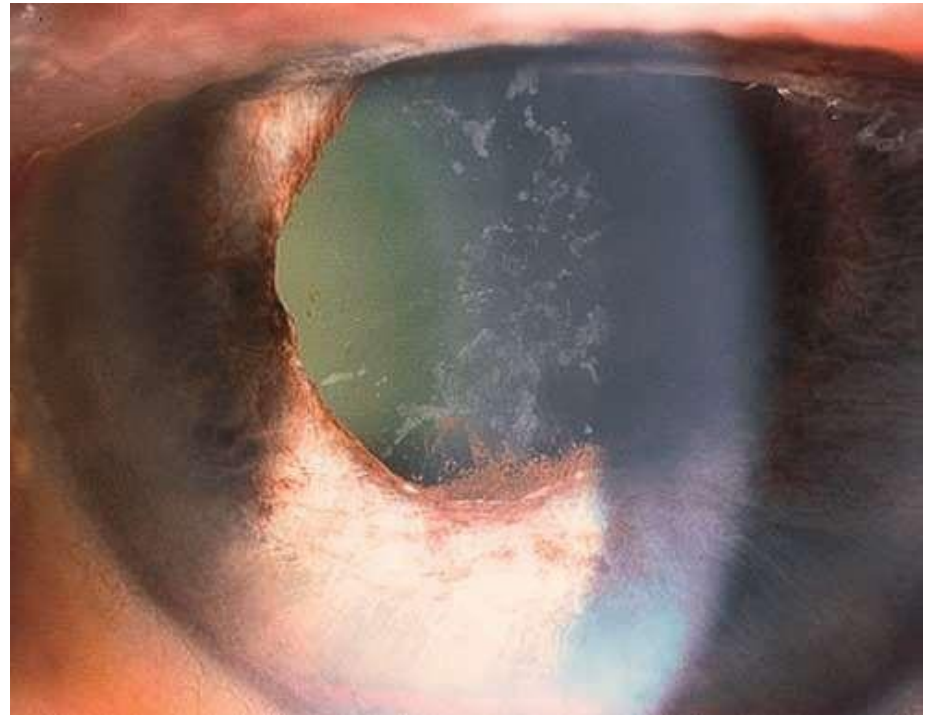
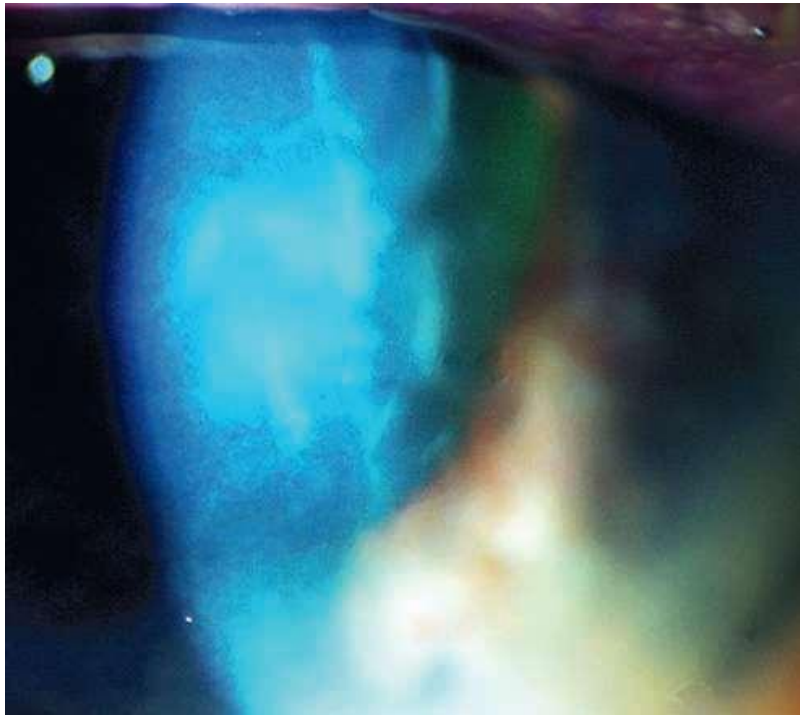
Resolved case

- **Early:**

- low IOP (ciliary body shutdown and effect of intensive treatment), folds in Descemet membrane if IOP has reduced rapidly
- optic nerve head congestion
- choroidal folds

- **Late:**

- Glaukomflecken (white foci of necrosis in the superficial lens) and other forms of cataract
- Iris Atrophy
- Irregular pupil due to iris sphincter/dilator damage and posterior synechiae.
- The optic nerve may be normal or exhibit varying signs of damage, including pallor and/or cupping .



Resolved acute primary angle closure. (A) Stromal corneal oedema and folds in Descemet membrane; (B) glaukomflecken, spiral-shaped atrophic iris, dilated pupil and posterior synechiae; (C) optic atrophy – combined pallor and cupping

Differential Diagnosis of PACG

- **Lens-induced angle closure** due to a swollen or subluxated lens.
- **Malignant glaucoma**, especially if recent intraocular surgery.
- **Other causes of secondary angle closure**, with or without pupillary block.
- **Neovascular glaucoma** may occasionally cause the sudden onset of pain and congestion.
- **Hypertensive uveitis**, e.g. iridocyclitis with trabeculitis (particularly herpetic including cytomegalovirus), glaucomatocyclitic crisis (Posner–Schlossman syndrome).
- **Scleritis** (rarely episcleritis) with or without angle closure.
- **Pigment dispersion**.

Investigation

- Provocative testing
 - Pharmacological mydriasis probably discriminates poorly.
 - It carries a small risk of precipitating APAC in susceptible patients without a patent iridotomy.
- Dark room/prone provocative test (DRPPT):
 - The patient sits in a dark room, face down for one hour without sleeping (sleep induces miosis).
 - The IOP is checked (immediately after the test, as IOP can normalize very rapidly), and an IOP rise of 8 mmHg or more is frequently taken as being of significanceAnterior chamber depth measurement (AS OCT)
- Biometry if lens extraction is considered.
- Posterior segment ultrasonography in atypical cases to exclude causes of secondary angle closure

TREATMENT

Initial treatment

- Supine position
- Acetazolamide 500 mg intravenously if IOP >50 mmHg, and orally if IOP is <50 mmHg.
- If treatment is intravenous an additional oral dose of acetazolamide 500 mg
- A single dose of each of apraclonidine 0.5% or 1%, timolol 0.5%, and prednisolone 1% or dexamethasone 0.1%
- Pilocarpine 2–4% one drop to the affected eye, repeated after half an hour; one drop of 1% into the fellow eye

Emergency treatment is required – preserve the sight!

Resistant cases

- Central corneal indentation
- Further pilocarpine 2–4%, timolol 0.5%, apraclonidine 1% and topical steroid.
- Mannitol 20% 1–2 g/kg intravenously over 1 hour
- Early laser iridotomy or iridoplasty
- Paracentesis can be performed
- Surgical options: peripheral iridectomy, lens extraction, goniosynechialysis, trabeculectomy and cyclodiode.

Subsequent medical treatment

- Pilocarpine 2% four times daily to the affected eye and 1% four times daily to the fellow eye.
- Topical steroid four times daily
- Any or all of the following should be continued as necessary according to response: timolol 0.5% twice daily, apraclonidine 1% three times daily and oral acetazolamide 250 mg four times daily.

SURGICAL TREATMENT

1. Peripheral laser iridotomy (LPI) (YAG Laser)

- To establish the communication between the posterior and anterior chambers by making an opening in the peripheral iris
- This will be successful only if less than 50% of the angle is closed by permanent peripheral anterior synechiae

2. Peripheral Iridectomy

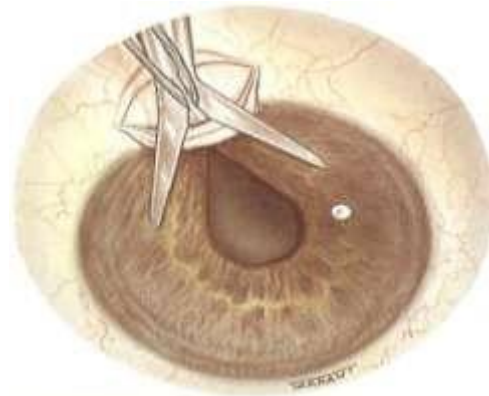


Figure 7.48 Peripheral iridectomy

SEQUELAE

1. **Peripheral anterior synechiae (PAS)** – the peripheral iris adheres to the posterior corneal surface in the trabecular area and blocks the outflow of aqueous
2. **Cataract**- swelling of the lens and cataract formation – this may push the iris even further anteriorly, this increases the pupillary block
3. **Atrophy of the retina and optic nerve** - glaucomatous cupping of the optic disc and retinal atrophy
4. **Absolute glaucoma** - eye is stony hard, sightless, painful.

Thank You