Understanding Angle Closure

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Case

- 56 year old Caucasian Male
- Primary Eye Exam
- BCVA:
  - 20/25 OD with +1.25 DS
  - 20/25 OS with +1.75 DS
- Slit Lamp Exam:
  - 2+ deep angles
  - 2+NS

Gonioscopy

- Can I dilate?
- Are the Angles Occludable?
- Should I refer?

Outline

- Define and Classify Angle Closure
  - Primary Angle Closure Suspect (PACS)
  - Primary Angle Closure (PAC)
  - Primary Angle Closure Glaucoma (PACG)
- Diagnostic Testing
- Treatment options
- Plateau Iris

- Angle closure accounts for 10% of all glaucoma in US¹.
- More prevalent worldwide
- 5.3 million people will be blinded by angle closure by 2020²
- 90% of all angle closure in US will be due to pupillary block³
  - 10% non-pupillary block angle closure
- Increase in angle closure GLC due to aging population, increased optometric screening, and increased awareness of narrow angle among clinicians³

Categories of Angle Closure

- Primary Angle Closure Suspect (PACS)
  - More than 2 quadrants of TM is not visible with static gonioscopy (<180° of visible TM on gonioscopy)
  - No PAS and Normal IOP
- Primary Angle Closure (PAC)
  - More than 2 quadrants of TM is not visible with static gonioscopy (<180° of TM visible)
  - PAS &/or increased IOP &/or acute angle closure attack
  - No glaucomatous optic atrophy
- Primary Angle Closure Glaucoma (PACG)
  - PAC with glaucomatous optic neuropathy

What is an Occludable Angle?

- An angle is considered “occludable” if at least 180° of the trabecular meshwork cannot be visualized with gonioscopy.
- If the TM is not visible, need to perform compression gonioscopy to determine if it is appositionally closed or closed from synechia.

Diagnostic Tests to Evaluate the Angle

- 4 mirror gonioscopy vs 3 mirror gonioscopy
  - Need to perform dynamic gonioscopy through compression
    - 3 mirror very difficult to perform compression/indent
      - Some would argue that it cannot be done
  - What type of irido-trabecular contact?
    - Apposition vs synechial contact
      - +PAS in primary angle closure
      - - PAS in Primary angle closure suspect
  - Gonioscopy is subjective
  - Angle depth can change depending on amount of light

Anterior Segment OCT

- Provides static image of the angle
- Depending on the model, can provide several data parameters
  - Angle opening distance
  - Trabecular iris space area
  - Trabecular iris circumference volume
- Poor to differentiate the type of iridocorneal contact
  - apposition vs synechial
    - treat or not to treat

Normal Anterior Chamber Angle

Anterior Segment OCT
Spectralis Angle Images

Treatment Approach for PACS

- Who will develop acute angle closure?
  - Wilensky et al\(^1\) enrolled 129 asymptomatic, occludable pts with anterior chamber depth <2mm.
    - After 5 year, 6.2% developed acute angle closure
    - 13.2% developed appositional closure or PAS
- Who will progress from PACS to PAC?
  - Thomas et al\(^2\) followed 50 PACS patients.
    - After 5 years, 22% progressed to PAC.


Treatment for PACS

- LPI vs observation
  - Consider LPI if increased risk:
    - Family history of angle closure, over 60 years old, female gender and hyperopia
    - If the angle is occludable
      - Less than 180\(^\circ\) of TM with gonioscopy
    - If past symptoms of acute angle closure
  - Observation should include serial gonioscopy
  - Always PRIOR to any dilated exams
- Cataract extraction
  - Option for PACS who have a visually significant cataract

Treatment of PAC and PACG

- If elevated IOP
  - medical management of elevated IOP first.
- LPI Goals
  - Relieve any pupillary block by equalizing pressure in anterior and posterior chambers.
  - Protect against progressive TM dysfunction and obstruction
- LPI should not be performed on eyes with more than 180\(^\circ\) of PAS.
  - IOP spikes are risk due to not enough functioning TM to accommodate possible inflammation created by LPI
LPI Location: Temporal vs Superior

- New-onset linear dysphotopsia was reported in 18 (10.7%) eyes with superior LPI versus 4 (2.4%) eyes with temporal LPI (P = .002).
- Eleven eyes (6.5%) with superior LPI reported linear dysphotopsia despite complete eyelid coverage of the iridotomy.
- There was more pain experienced by the temporal LPI (2.8 ± 2.2 vs 2.1 ± 2.0; P = .001), despite no difference in laser energy or number of shots.

Endoscopic Cyclophotocoagulation (ECP)

- IOP lowering due to ciliary body destruction
  - Reduced aqueous production
- Laser energy directed to the posterior portion of the ciliary process to cause shrinkage and concurrent retraction of the process and iris root posteriorly.
- Avoided if significant PAS due to the inflammation created
- May be more beneficial for plateau iris

Iridoplasty

- Iridoplasty after LPI is controversial
  - One clinical study in China¹
    - One group received iridoplasty and other did not.
    - No difference in IOP, endothelial cell counts, or overall complication rates.
  - Ritch demonstrated improved angle architecture after iridoplasty²
    - Help break an acute attack
    - Relieve appositional closure secondary to plateau iris or lens related angle closure

Cataract Extraction of PAC and PACG

- Many studies to date with visually significant cataracts
  - Cataract extraction deepens the anatomical angle
  - Prevents pupillary block
  - Reduces IOP
- Comparison of phaco alone vs combined phaco/trabeculectomy in both medically controlled and medically uncontrolled eyes
  - Phaco alone reduced IOP in both groups
  - IOP reduced by 8mmHg in the uncontrolled grp
  - Effect lasted more than 2 years

Effectiveness in Angle-closure Glaucoma of Lens Extraction (EAGLE) Study Group

- Multicenter randomized trial
- Newly diagnosed PACG or PAC with IOP >30 mmHg at diagnosis with no visually significant cataract
- Outcomes:
  - Quality of life and vision measures
  - IOP
  - Stability of disease
  - Safety of interventions
  - Cost per quality adjusted life year
  - 3 years of follow-up.

Plateau Iris

- Plateau iris results from large or anteriorly positioned ciliary processes holding forward the peripheral iris and maintaining its apposition to the trabecular meshwork.
- Female, in their 30-50s, hyperopic, and often have a family history of angle-closure glaucoma.


- Plateau iris syndrome usually is recognized in the postoperative period when the angle remains persistently narrow in an eye after iridotomy.
- Patients may present with angle closure, either spontaneously or after pupillary dilation.
- More commonly, the diagnosis of plateau iris configuration is made on routine examination.

- Can I dilate?
  - Properly classify PAGS, PAC, PACG
  - Synechial closure vs appositional closure
- Are the Angles Occludable?
  - Less than 180° of visible TM with gonioscopy
- Should I refer?