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 block²
• 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

Diagnostic Tests to Evaluate the Angle

- 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
Treatment Approach for PACS

Who will develop acute angle closure?
- Wilensky et al. 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. 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 180º 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 be withheld on eyes with more than 180º 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 ($2.8 \pm 2.2$ vs $2.1 \pm 2.0; P = .001$), 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 China\(^1\)
  - No difference in IOP, endothelial cell counts, or overall complication rates.
  - Ritch demonstrated improved angle architecture after iridoplasty\(^2\)
- 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
  - Reduced number or glaucoma medications
- 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 that 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.
EAGLE Results

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?

Thank You!
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