Management of Primary angle closure suspect: LPI?

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Pathogenesis:
- Pupillary block and anterior lens movement
- Most common cause
- Normal pressure gradient between AC and PC: ~0.23 mmHg (Heys et al. 2001).
- Lens movement: phacomorphic glaucoma, Loose zonules in PXE

Primary angle closure (PAC)

Table 1. Classification of angle-closure disorders.

<table>
<thead>
<tr>
<th></th>
<th>≥180° of ITC</th>
<th>Elevated IOP or Presence of PAS</th>
<th>Glaucomatous optic neuropathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Angle-closure Suspect (PACS)</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary Angle-closure (PAC)</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Primary Angle-closure Glaucoma (PACG)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

ITC, iridotrabecular contact; IOP, intraocular pressure; PAS, peripheral anterior synechiae.

Pathogenesis
- Angle crowding
- Plateau iris configuration/syndrome
Risk factors

- **Age:**
  - Prevalence of PACG: 0.02% for 40–49 years old
  - Prevalence: 0.95% for those > 70 years old (Day et al. 2012)

- **Gender:**
  - Women is approximately 3 times higher than in men
    (Foster et al. 1996, 2000; Quigley & Broman 2006)

- **Ethnicity: Asian**

- **Refractive error: hyperopia is common**

- **Family history and Genetic predisposition**

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**Diagnosis - Gonioscopy**

- **most important diagnostic method**

**Table 2. Van Herick grading scale.**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Limbal depth relative to corneal thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>≥ corneal thickness</td>
</tr>
<tr>
<td>3</td>
<td>½–⅔ corneal thickness</td>
</tr>
<tr>
<td>2</td>
<td>¼ corneal thickness</td>
</tr>
<tr>
<td>1</td>
<td>≤¼ corneal thickness</td>
</tr>
</tbody>
</table>

**Shaffer grading of angle width**

- Grade I: 15–45°
  - Ciliary body angle visible
  - Iris border visible
  - Angle is open and stable
  - High risk of angle closure

- Grade II: 10–15°
  - Ciliary body angle visible
  - Iris border visible
  - Angle is open and stable
  - Medium risk of angle closure

- Grade III: 5–10°
  - Ciliary body angle visible
  - Iris border visible
  - Angle is narrow and possibly closed
  - High risk of angle closure

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**Diagnosis - OCT**

- Anterior segment OCT: Visante
- Swept-source OCT:
  - Reproducible, quantifiable information on angle structure across 360 deg
  - Possible to differentiate appositional from PACS by varying lighting conditions

**Diagnosis - UBM**

- Has better view beyond iris: plateau iris
  - Ciliary body cysts
  - Ciliary effusions
  - Ciliary body tumors
Goal of laser peripheral iridotomy (LPI)

- To reduce the risk of acute attacks
- To reduce the risk of PAC/PACG
- To lower intraocular pressure (IOP)

Natural history (PACS)

- Untreated eye:
  - PACS to PAC varies from 13 to 35%
    - Among 129 mostly European-derived subjects, with 6 years followed up (mean = 2.7 years), 13% were converted to PAC, 6% developed acute attack. (Wilensky JT, 1997)
    - In an India population, 22% (11/48) were converted to PAC in 5 years (Thomas 2003)
    - In Eskimos, 35% (7/20) were converted to PAC in 10 years

- Treated eye:
  - In an India population: 0% (0/27) progressed from PACS to PAC or PACG over an average 4-year follow-up (Pandav et al. 2007)
  - In Vietnamese: 22% (53/239) progressed to PAC over 10 years (Peng et al. 2011)

ZAP trial

- Zhongshan Angle Closure Prevention Trial
  - Aims to clarify the value of LPI as a preventative measure in PACS.
  - Compares LPI versus no treatment across 870 patients with PACS
  - Follow up: 3 years for signs of increased IOP, formation of synechiae, and instances of acute angle closure
Longitudinal Changes of Angle Configuration in Primary Angle-Closure Suspects:

The Zhongshan Angle-Closure Prevention Trial

- Angle width of treated eyes increased markedly after LPI, remained stable for 6 months, and then decreased significantly by 18 months after LPI. Untreated eyes experienced a more consistent and rapid decrease in angle width over the same time period.

- The annual rate of change in angle width was equivalent to 1.2°/year (95% confidence interval [CI], 0.8–1.6) in treated eyes and 1.6°/year (95% CI, 1.3–2.0) in untreated eyes (P<0.001).

Complications of LPI

- Spaeth et al reported visual symptoms after LPI in 9% of eyes with completely covered LPI, in 26% with partially covered LPI, and 17.5% with fully exposed LPIs.

- Hyphema, inflammation, endothelial cells injury, cataract

Visual Symptoms and Retinal Straylight after Laser Peripheral Iridotomy

The Zhongshan Angle-Closure Prevention Trial

- Neither visual acuity nor straylight score differed between the treated and untreated eyes among all treated persons, nor among those with LPI partially or totally uncovered.

- Prevalence of subjective glare did not differ significantly between participants with totally covered LPI (6.61%), partially covered LPI (11.6%), or totally uncovered LPI (9.43%).

- LPI is safe regarding measures of straylight and visual symptoms.

- It provides strong evidence that LPI for narrow angles would be unlikely to result in important medium-term visual disability (18 months follow-up).
Special population

- Medication is required that may provoke pupillary block
- The patient has symptoms suggestive of intermittent angle closure
- The patient’s health status or occupation/avocation makes it difficult to access immediate ophthalmic care
- The patient is poorly compliant with follow-up
- The contralateral eye of the eye with acute attack
- The patients with positive provocative tests

Cataract extraction

- Important treatment for patients with PACS and cataract
- The role of clear lens extraction is not clear for patients with PACS

Treatment for early PAC

Effectiveness of early lens extraction for the treatment of primary angle-closure glaucoma (EAGLE): a randomised controlled trial

- clear-lens extraction showed greater efficacy and was more cost-effective than laser peripheral iridotomy, and should be considered as an option for first-line treatment.

Thank you
Treatment for late PAC and PACG

- cataract extraction +/- glaucoma surgery

Treatment for late PAC and PACG

- Early PAC: cataract extraction treating PACG. Results have been promising, with most studies demonstrating that extraction has been beneficial in lowering IOP and reducing reliance on glaucoma medication postoperatively
- Decrease degree of PAS
- Tarongoy et al. 2009; Liu et al. 2011; Shams & Foster 2012
- One comparison of phaco-emulsification and trabeculectomy demonstrated comparable long-term IOP control between the methods; trabeculectomy had an increased rate of postoperative complications (Liu et al. 2011). Another showed improved IOP in the trabeculectomy group but noted that 60% of trabeculectomy patients subsequently required cataract extraction (Tarongoy et al. 2009; Tham et al. 2013).
- The Shams and Foster study observed that IOP reduction after lens extraction was comparable in patients with and without prior LPI (2012). Studies of acute angle closure have also compared the benefit of cataract extraction versus LPI as a primary treatment; they found that patients who underwent

Cataract Removal

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Primary angle closure glaucoma

- PACG is estimated to affect ~26% of the glaucoma population
- PACG is responsible for ~50% the cases of glaucoma-related blindness in the world (Quigley 1996; Quigley & Broman 2006).
Cataract Removal

- The above results have favoured cases of advanced disease and have often been conducted in eyes with clinically significant cataracts. It is unclear whether or not early phacoemulsification and IOL implantation will be beneficial for patients with mild cases of PACG. Limited research exists on the subject of clear lens extraction in PACG treatment, but an ongoing study by the Effectiveness in Angle-closure Glaucoma of Lens Extraction (EAGLE) study group is currently investigating this question (Azuara-Blanco et al. 2011). In recent years, lens extraction has become a promising surgical intervention for reducing IOP and decreasing the degree of PAS in the eye, with 65% of cases showing improvement post-LPI.

- Across studies, disease progression post-LPI is greater in eyes with a higher degree of PAS, iridotrabecular contact in more than one quadrant and more significantly elevated IOP pre-procedure. Accordingly, these are the eyes most likely to need subsequent treatment (He et al. 2007; Pandav et al. 2007; Peng et al. 2011; Rao et al. 2013a,b).

ECP

- Endoscopic cyclophotocoagulation (ECP) is another promising technique, which uses a fibre-optic cable to deliver laser energy to the ciliary processes using a video monitor. This procedure may be beneficial for patients with PACG or plateau iris, either in combination with cataract surgery or as a separate procedure. Unlike the other ciliodestructive procedures, ECP may change the plateau configuration and open the angle.