Alternative Surgeries for Angle Closure Glaucoma

South East Asia Glaucoma Interest Group
Other forms of surgery for ACG

- Goniosynechialysis
- Glaucoma drainage devices
- Cyclodestructive procedures
Goniosynechialysis (GSL)

- Surgical lysis of irido-trabecular adhesions to re-establish angle opening
- Restore aqueous outflow through normal physiological pathway
- Attractive concept
  - Avoids complications of filtration surgery
  - Preserves conjunctiva for future filtration surgery
- Ineffective if trabecular outflow damaged or abnormal
  - TM damaged from high IOPs, inflammation, prolonged obstruction
  - Obstruction of outflow further downstream from...
Goniosynechialysis for ACG

- PAS formation is the result of underlying mechanisms for angle closure
  - pupillary block, plateau iris or angle crowding
- GSL does not eliminate these mechanisms
  - re-closure and recurrence of PAS
- Need combine GSL with other treatment
  - Cataract extraction
  - Peripheral iridotomy
  - Peripheral iridoplasty
GSL for ACG

May be considered if:

- Extensive PAS present
- Short duration of angle closure
  - Trabecular function likely poor if little or prolonged PAS
- Mild or moderate optic neuropathy
  - Potential field wipe-out or fixation loss in advanced GON due to likelihood of post GSL IOP spikes
GSL for ACG

- No RCTs performed to compare its efficacy compared to other surgical alternatives for ACG
- Only small prospective and retrospective short term studies have been described demonstrating its efficacy in treating ACG in combination with other laser/surgical procedures

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# Clinical Studies of GSL for ACG

<table>
<thead>
<tr>
<th>Authors</th>
<th>ACG type</th>
<th>No. of patients</th>
<th>Mean FU Duration (months)</th>
<th>Extent of GSL/Combined Procedures</th>
<th>Success rate (IOP reduction to ≤ 21 mmHg)</th>
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</thead>
<tbody>
<tr>
<td>Singleton et al, 1990</td>
<td>Mostly 2° ACG post ocular sx (&lt; 6 months)</td>
<td>15</td>
<td>14 (1-37)</td>
<td>360° (various incl laser PI, gonioplasty, cyclodialysis, ant vit, cyclocryotherapy, cataract extraction)</td>
<td>93% (qualified) meds 2.6 to 1.1</td>
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<tr>
<td>Tanihara et al, 1992</td>
<td>PACG</td>
<td>70</td>
<td></td>
<td>PI ± lens extraction</td>
<td>87% (aphakic) 42% (phakic)</td>
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<tr>
<td>Teekhasaenee &amp; Ritch, 1999</td>
<td>CACG &lt; 6 months after AACG</td>
<td>52 eyes, 48 pts</td>
<td>20.8 (5-76)</td>
<td>360° + lens extraction &amp; PCIOl</td>
<td>90.4% w/o meds</td>
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<tr>
<td>Lai et al, 2000</td>
<td>CACG with 360° PAS</td>
<td>5</td>
<td>7.6 (6-12)</td>
<td>Inferior 180° followed by diode iridoplasty</td>
<td>80% (20% w/o meds)</td>
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<tr>
<td>Lai et al, 2001</td>
<td>CACG with 360° PAS</td>
<td>7</td>
<td>8.9 (2-16)</td>
<td>Phaco/PCIOl, Inferior 180° followed by diode iridoplasty</td>
<td>100% w/o meds, VA &gt; 2 lines in all eyes w/ meds 2.7 to 1.1</td>
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<tr>
<td>Harasymowycz et al, 2005</td>
<td>Acute &amp; subacute ACG unresponsive to meds, PI, iridoplasty ≤ 4 months</td>
<td>21</td>
<td>11.7 (2-36)</td>
<td>Phaco/IOL, 360° GSL</td>
<td>87% (27%)</td>
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</tbody>
</table>
GSL for Secondary ACG

- GSL has been found effective in 2° ACG
  - Post vitreoretinal surgery within 2-4 months of PAS Assalian et al. AJO 2000.
Compliations of GSL

- Post-op IOP spike
- Significant hemorrhage and hyphema
- Inflammation
- Iridodialysis, cyclodialysis
- Traumatic cataract
- Transient corneal decompensation
- Cystoid macular edema
Glaucoma drainage implants for ACG

- Limited clinical data
  - for ACG alone
  - comparing PACG with POAG or other glaucoma subtypes or
  - comparing between devices
- Generally used for refractory cases
- Overall success of 70-90% in various studies with subset of PACG
- Immediate term failure rate may be higher for PACG than POAG
  - 47% versus 19% in one study

Glaucoma drainage implants for ACG

- Lack of consensus if drainage implants should be used as initial surgery in uncontrolled glaucoma after meds & laser PI ± iridoplasty
- Limited success & high complication rate of GDI may be contributed by its use in the refractory stage
- Lens extraction/IOL often precedes or is combined with filtration/ tube surgery
  - Causative role of the lens in ACG
  - Angle widening achieved
Tube versus Trabeculectomy (multicenter RCT)

- 212 eyes, 17 centers
  - uncontrolled glaucoma + previous trab ± cataract op/IOL
- Randomized to Barveldt 350mm² implant vs trabeculectomy with mmc (0.4mg/ml X 4mins)
- 3-yr outcome
  - Similar IOP reduction and need for supplemental meds
  - Cumulative prob of failure: tube - 15%, trab - 30%
  - Post-op complications: tube - 39%, trab - 60%
    (mostly transient & self limited)
  - Complications needing re-op
  - & ≥ 2 Snellen lines loss of VA: tube - 22%, trab - 27%
Tube complications in ACG

- May be higher than in OAG
  - Shallow, flat AC
  - May have more corneal tube touch/ corneal decompensation
    - Existing/progressive PAS, already compromised corneal endothelium (prev AACG, Laser PI, past surgeries)
    - May require tube positioning behind iris/ post segment
  - Aqueous misdirection, malignant glaucoma requiring aggressive laser & surgical therapies

Cycloablative Techniques

- 1933 Weve - Non-penetrating diathermy
- 1936 Vogt - Penetrating diathermy
- 1950 Biette - Cyclocryotherapy
- 1960’s - Laser cyclophotocoagulation (LCP)
  (Ruby → Nd:YAG → Semiconductor diode)
  non-contact → contact transcleral (cTCP)
- Contact diode transscleral cyclophotocoagulation (TCP) now preferred method of cycloablation
  - Non-invasive
  - Easy to perform
  - Better tolerated than its predecessors
- Endoscopic CP (ECP): Converts an essentially blind procedure to a visually-directed one
Indications in ACG

1. When all else fails in refractory ACG... After multiple failed procedures
2. Treatment in eyes with little or no visual prognosis
3. As a temporizing adjunct to surgery
4. When surgery unsuitable or undesirable due to limited success rate &/or high risks of surgical complications

Effect unpredictable
Success limited
Multiple treatments required
Visual loss more common
Diode TCP in ACG

  - IOP lowering up to 2 years although repeat treatment required in some eyes
  - VA improved in 15%, unchanged in 46%, worse in 39% (mostly from cataract, GON progression)
- Reported efficacy in secondary ACG
  - Malignant glaucoma refractory to med/laser tx
  - Neovascular glaucoma
- Useful as supplemental tx after GDIs in refractory ACG. Semchyshyn et al, Ophthalmology 2002.
Diode TCP in ACG

- Established efficacy
- Non-invasive, easy to perform
- Short outpatient procedure, local anesthesia, inexpensive
- Portable equipment
- Can be performed in absence of ocular media clarity
- Does not compromise conjunctiva

Disadvantages
- Effect less predictable
- Need for repeat treatment
- Hypotony & phthisis may result with multiple/overtreatment
- Hyphema, vitreous haemorrhage, inflammation, macular edema, choroidal/retinal detachment associated with TCP may be vision limiting
Endoscopic cycloablation

Allows direct visualization of ciliary processes—'surer hit' ciliary epithelial side first

• Useful when
  • other intraocular procedures needed
  • Conventional TCP has failed
  • Scleromalacia with risks of perforation
  • Conj & scleral pigmentation eg naevus of Ota

• Intraocular procedure
  • Risks of endophthalmitis, posterior segment cxs in aphakic eyes
Summary

- For CACG with recent synechiae closure and uncontrolled IOP
  - GSL alone or in combination may be considered as an alternative surgical tx
  - May not be suitable in advanced GON and prolonged synechial closure
- Glaucoma drainage implants and cycloablation are at present reserved for CACG refractory to other surgical treatment
- Further long-term RCT for evaluating the role of these and other surgical alternatives are required