Intraoperative Gonioscopy: A Key to Angle Surgery

Senior Instructor: Shakeel R Shareef MD
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Intraoperative Gonioscopy: A Key to Angle Surgery
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Why Learn Gonioscopy?

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th># PERFORMED</th>
<th>FDA APPROVAL/TRIALS</th>
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<tbody>
<tr>
<td>Trabecome (NeoMedix)</td>
<td>&gt;5,435</td>
<td>June 2006</td>
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<tr>
<td>IStent (Glaukos)</td>
<td>&gt;100,000</td>
<td>June 2012</td>
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<tr>
<td>CyPass (Transcend)</td>
<td>&gt;1000</td>
<td>COMPASS trial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>completed March 2015</td>
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<tr>
<td>Hydrus (Ivantis)</td>
<td>2000</td>
<td>Investigational in U.S.</td>
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GONIOSCOPIC ASSISTED ANGLE SURGERIES
Rate-limiting step to angle surgery: angle visualization with surgical gonioscopy

Phaco vs. MIGS

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<thead>
<tr>
<th></th>
<th>PHACO</th>
<th>MIGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing</td>
<td>Full corneal access</td>
<td>Limited AC depth; increased work distance</td>
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<tr>
<td>Intraocular Surgery</td>
<td>Posterior to dilated iris sphincter</td>
<td>Anterior to iris plane; risk to corneal/tissue in narrow space</td>
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<tr>
<td>Corneal Stimulation</td>
<td>Limited to keratome/side-port incisions</td>
<td>Stimulation sub-epithelial nerve endings entire surface</td>
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<tr>
<td>Instrument Handling</td>
<td>Bimanual intraocular</td>
<td>Simultaneous extra and intra-ocular manipulation; one handed surgery</td>
</tr>
</tbody>
</table>
Essential Perioperative Steps For Successful Angle Surgery

<table>
<thead>
<tr>
<th>STEPS</th>
<th>DESCRIPTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-OP</td>
<td>1 Office Based Gonioscopy</td>
</tr>
<tr>
<td></td>
<td>2 Angle Anatomy</td>
</tr>
<tr>
<td></td>
<td>3 Anesthesia</td>
</tr>
<tr>
<td></td>
<td>4 Head/Microscope Rotation</td>
</tr>
<tr>
<td></td>
<td>5 Goniolens Selection</td>
</tr>
<tr>
<td></td>
<td>6 Hand Positioning</td>
</tr>
<tr>
<td></td>
<td>7 Corneal Incision</td>
</tr>
<tr>
<td></td>
<td>8 Soft Shell Technique</td>
</tr>
<tr>
<td></td>
<td>9 Goniolens Docking and Manipulation</td>
</tr>
<tr>
<td></td>
<td>10 Gonioscopy/Goniphotography</td>
</tr>
</tbody>
</table>

Step 1: Office Based Gonioscopy

- **Why?** For surgical planning
- [www.gonioscopy.org](http://www.gonioscopy.org) [Dr. Alward]
- 1. Gonioscopy documented < 50% charts reviewed of patients undergoing ocular medical therapy¹
- 2. Medicare Claims Data: 50% open angle glaucoma patients undergoing surgery had a claim for Pre-Op gonioscopy.²


Step 2: Angle Anatomy

- Scleral Spur – Surgical Landmark that separates:
  - Anteriorly: Canal Based surgery via the Trabecular Meshwork
  - Posteriorly: Suprachoroidal based surgery via the ciliary body face

PRE-OP
Step 3: Anesthesia
- Topical? Involuntary eye movements
- Peri- or Retrobulbar block? Akinesia
- For novice surgeons, not unreasonable to begin with a block. Why?
  1. Builds surgical confidence
  2. Avoids potential intra-ocular complications

PRE-OP

Step 4: Head/Microscope Rotation
- Temporal approach to reach nasal angle
- Rotate head 30-40 degrees away nasally
- Rotate microscope temporally same amount
- End-point: Align coaxial light along iris plane
- Increase magnification of angle
- Increase light intensity to view structures

INTRA-OP

Step 4: Head/Microscope Rotation
- Increased working distance between oculars and surgical field
- Phaco: Full access to entire cornea
- Angle surgery: viewing space confined to AC depth [2-3 mm centrally; TM space: 0.77 mm]
INCREASED WORKING DISTANCE: 8 INCHES

PRIMARY PHACO POSITION  ANGLE SURGERY POSITION

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Step 5: Goniolens Selection
- All are a modification of Swan-Jacob Lens
- Vary in degree of corneal contact, field of view, magnification and handle length
- Handle contiguous with goniolens
- Exception: Volk Transcend Volk Goniolens:
  1. Free floating lens originates from separate handle
  2. Fixation ring for globe stability
  3. Rotation in x and z axis

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Step 6: Hand Positioning
- Hold lens with non-dominant hand
- Place and rest palm on forehead or cheek based upon laterality
- Arch fingers over the nasal bridge
- Phaco: bimanual intraocular surgery
- Angle: extra/intra-ocular simultaneous manipulation – one handed surgery

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**Step 7: Corneal Incision**

**Wound Construction:**

- **Eccentricity**
  1. Femtosecond laser incision offset a few millimeters inward from limbus. Potential for friction between overlying goniolens and instrument access via keratome incision.
  2. Consider making incision manually.

- **Location**
  1. Along 3 – 9 o’clock axis
  2. Use fixation ring to rotate globe nasally and initiate incision just within limbus
  3. Serves as a pivot point/anchor during surgical manipulation of angle structures
  4. Provides equidistant surgical access to supero and inferonasal angle structures

**Step 8: Soft Shell Technique**

- Angle surgery: Takes place anterior to iris plane
- Phaco: Occurs posterior to dilated pupil
- Viscodispersive OVD – protects and coats endothelium from any damage
- A 2nd deeper layer of a viscohesive OVD creates and maintains space in a confined trabecular space
- Helps protect intraocular structures during surgical manipulation
**Step 9: Docking of Goniolens**

- **Corneal Considerations:**
  1. Phaco: Keratome/Side-port incisions with minimal surface manipulation
  2. Angle Surgery: Cornea highly innervated structure in human body:
     - Sub-epithelial nerve endings
     - Limbal Plexus
     - With docking, entire corneal/limbal surface stimulated by goniolens

- **Tetracaine drops**
- **Viscoelastic**
- **Lidocaine Jelly:**
  1. Topical analgesic/patient comfort
  2. Coupling medium between cornea/lens
  3. Decreased sensation tissue manipulation

**Step 10: Post-Operative Goniophotography**

- Self assessment for surgeon of proper anatomic placement of micro-stents
- Builds confidence and trust with patients
- Documentation purposes
- Pre-op counseling of potential surgical candidates
Trouble Shooting
- Fluid/Gel on goniolens surface
- Air bubbles
  1. lens/cornea interface
  2. in AC or angle obscuring view
- Heme

A.C.T.: Patient Safety/Surgical confidence
- A = Anesthesia
  1. i.v. sedation + topical lidocaine jelly in pre-op holding area
  2. Intra-Op: Intracameral NP lidocaine + lidocaine jelly coupling medium with cornea
- C = Control – under topical, involuntary eye movement can lead to intra-ocular complications; iridodialysis, bleed; importance of globe fixation
- T = Timing of angle surgery in combined procedures. Potential benefits in performing it pre-phacoemulsification

Non-gonioscopic angle viewing
- Angle Imaging: AS-OCT; UBM
- Intra-Op OCT
- Endoscopy
- Goniometry
- Ret-Cam
Getting Started
- Office based gonioscopy at slit lamp
- In Minor O.R., practice gonioscopy
- Cataract Surgery:
  1. Hold fixation ring to rotate globe during creation of keratome incision
  2. After routine surgery:
     (i) rotate head and microscope
     (ii) place goniolens to view angle structures

Gonioscopic Techniques
- Identification of Schlemm’s Canal:
  1. Provocative gonioscopy
  2. Dropping IOP in AC below episcleral venous pressure
- Use of pupil constriction for supra-choroid based surgery to identify ciliary body band

Angle Surgeries and Gonioscopic Techniques
Instructor Videos
Panel Discussion
Q&A

Recommend References
- www.gonioscopy.org
- www.anglesurgery.org
- Basis for this course:
  - Shareef, S: Optimizing Angle Surgery ACT. Glaucoma Today May/June 2015
  - AAO 2015 Video on Demand: Optimization of angle surgery with the A.C.T. [Anesthesia, Control, Timing]

Contact info/Feedback
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