Tips on MIGS & Intraop Gonio

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Outline

Part I: Intraoperative Gonioscopy
- Principles
- Implementation
- Trouble-shooting

Part II: Tips on Individual MIGs
- MIGs defined
- Categorization
- Goniotomy – patient selection, technique, tips
- Trabeculotomy – patient selection, technique, tips
What is your level of training?

A. Resident
B. Fellow
C. Young surgeon (< 5 years of experience)
D. Experienced surgeon
E. Other
What is your experience with intraoperative gonioscopy?

A. I have never tried it or observed it live
B. I have observed it but have not tried it myself
C. I have tried a few cases but am still uncomfortable, learning, or having difficulty
D. I am proficient but could be better
E. I am skilled and could teach it
Part I: Intraoperative Gonioscopy
Total Internal Reflection

https://www.aao.org/disease-review/principles-of-gonioscopy
Direct Gonioscopy

https://www.aao.org/disease-review/principles-of-gonioscopy
Direct Gonioscopy

• Once reserved mostly for pediatric glaucoma
  • Exam under anesthesia
  • Goniotomy

• Impractical in clinic
  • Coupling agent
  • Portable slit lamp
  • Supine

• Resurgence with MIGs
So how do I get started with intraoperative gonioscopy?
Patient Selection

- Neck Mobility
- No Head Tremor
- Cooperative
- Angle Visible in Clinic
Surgeon Preparation

GONIOSCOPY IN CLINIC

KNOW YOUR LANDMARKS

GONIOSCOPY.ORG

INTRAOPERATIVE PRACTICE
Anesthesia

Topical with intracameral

Retrobulbar block
Wound Construction
Physician Know Thy...Gonio Lens

vilk.com

https://www.aao.org/disease-review/principles-of-gonioscopy
Wound Construction

- Point incision toward targeted angle
- Center main wound on targeted angle
- Avoid limbal vessels
- Smallest workable incision
- OK to make a new wound
Getting a View
Patient and Surgeon Positioning

1. Rotate the patient’s head **AWAY** from the surgeon.
   - Ask patient to look straight ahead

2. Rotate the microscope **TOWARD** the surgeon.
GOAL: Co-axial light entering parallel to iris, pointing into the angle, to achieve an *en face* view
Landmarks
Pigment

Blood
Small Space, Big Room for Error

- Anterior chamber depth (mean) = 3 mm
- Length of TM = 575 – 800 µm

Damageable structures
- Iris/CB → iridodialysis or cyclodialysis cleft
- Descemet membrane
- Posterior wall of Schlemm’s canal
- Lens
- Zonules
Normal eye AOD 500: ~329 µm
Narrow/closed eye AOD 500: < 210 µm
Trouble Shooting
Corneal Folds

IOP too low
- Add OVD
- Cohesive OVD – creates space but burps easily
- Dispersive OVD – more retentive
- Check wounds – dispersive OVD plug at wound to hold in cohesive

Gonio pressure too high
- Check positioning
- Lighten touch

Tension on wound
- Relax tension, reposition
Top Down View (Under-rotation)

Risks:
• Misjudgment of angle anatomy
• Descemet’s injury
• Difficulty with stent placement (requires en-face view)

Solution:
• Rotation head further away
• Rotate scope toward surgeon
• Have patient look away*
In a pinch: ask the patient to look AWAY from the surgeon
Blood, blood, blood...

- **Blood** (or other) on the lens
  - Front of the lens must be dry
- **Blood** on the cornea
  - Rinse, tamponade
  - More OVD
- **Blood** in the anterior chamber (AC)
Blood in the anterior chamber (AC)

Note: Blood = normal part of angle surgery

Fixes:
- Act with intention
- Add OVD – clears view, tamponades
- Move to a different area
- Wash out AC, replace OVD
Still blurry?

- Too zoomed out
- Surgeon accommodation
- Conjunctivochalasis
- Bubbles
- Corneal edema
Before or After?
<table>
<thead>
<tr>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cornea clear (+)</td>
<td>• Corneal edema (-)</td>
</tr>
<tr>
<td>• Less patient wiggle (+)</td>
<td>• Impatient patient (-)</td>
</tr>
<tr>
<td>• Physiologic globe (+)</td>
<td>• Increased globe compliance (-)</td>
</tr>
<tr>
<td>• Can hit lens (-)</td>
<td>• Lens out (+)</td>
</tr>
<tr>
<td>• Phacomorphic view (-)</td>
<td>• Wide open view (+)</td>
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</table>
Indirect Gonioscopy

https://www.aao.org/disease-review/principles-of-gonioscopy
Indirect Gonioscopy

Differences
- No need to rotate head
- Can view angle while working in primary
- Working with mirrors

Uses
- Xen
- Goniosynechiolysis
- Cleft repair
- View of superior, inferior, temporal angle
Part II: Tips on Individual MIGs
What is your current level of experience with MIGS?

A. No experience
B. A few cases
C. Proficient but could improve
D. Skilled and could teach
MIGS Defined
AGS-FDA Working Group

• Intended to lower IOP via an outflow mechanism
• Either ab-interno or ab-externo approach
• Very limited or no scleral dissection
  • Needle or device penetration/perforation of sclera allowed
  • Procedures involving significant scleral dissection excluded
• Minimal or no conjunctival manipulation
  • Limited peritomy or small incision allowed

Which MIGS have an IOP “safety net” due to episcleral venous pressure and are therefore unlikely to cause hypotony?

A. Trabecular bypass
B. Suprachoroidal shunts
C. Sub-conjunctival shunts
D. All of the above
E. None of the above
# Categorization

<table>
<thead>
<tr>
<th>Schlemm’s Canal</th>
<th>Suprachoroidal Space</th>
<th>Sub-Conjunctival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiologic</td>
<td>Non-physiologic</td>
<td>Non-physiologic</td>
</tr>
<tr>
<td>Efficacy limitations</td>
<td>Theoretically more efficacious</td>
<td>Theoretically more efficacious</td>
</tr>
<tr>
<td>Safety net due to ESVP</td>
<td>Possible risk of hypotony</td>
<td>Possible risk of hypotony and infection</td>
</tr>
<tr>
<td>Success dependent on viability of distal outflow</td>
<td>Disuse atrophy of physiologic system possible</td>
<td>Disuse atrophy of physiologic system possible</td>
</tr>
</tbody>
</table>
Examples

**Schlemm's Canal**
- Stenting
  - iStent
  - Hydrus
- Incisional
  - Goniotomy (Kahook)
  - Trabeculotomy (GATT)

**Suprachoroidal Space**
- Cypass
- iStent Supra
- Miniject

**Sub-Conjunctival**
- Xen
- InnFocus
Schlemm’s Canal Stents: Patient Selection

- Mild-mod glaucoma
- IOP target mid-high teens or more
  - Inject Study Group 2y (~17 mmHg)$^2$
  - HORIZON (~17 mmHg)$^3$
  - COMPARE (17-18 mmHg)$^4$
- Reduce medications
- Blood thinners OK

https://www.accessdata.fda.gov/cdrh_docs
Schlemm’s Canal Stents

TIPS

- En face angle view
- Target areas of pigment or heme reflux
- Be decisive, do not linger
- Angle of approach critical:
  - Both: 15 degrees in y-axis to engage TM
  - iStent (G1): 30 degrees in z-axis
  - Hydrus: 10-15 degrees in z-axis
- If noticing resistance:
  - Back wall of Schlemm’s canal
  - Stricture
  - Locked in wound
- Viscoelastic is a device
Goniotomy/Trabeculotomy: Patient Selection

- Mild-moderate glaucoma
- IOP target 13-15 mmHg range
  - PE+KDB (12-13 mmHg)
  - Stand alone KDB (~15 mmHg)
  - GATT (13-15 mmHg)
- Blood thinners
  - Absolute CI for GATT
  - Relative for limited goniotomy
- OK in controlled uveitis, PAS
- Great in steroid responders
- Caution in s/p vitrectomy

https://eyewiki.aao.org/Kahook_Dual_Blade%3A_Ab_Interno_Trabeculectomy
Goniotomy Basics

1. Temporal wound, nasal target
2. Direct gonio, ab-interno approach
3. Nasal incision of TM with blade/needle
4. Carve out TM (3 clock hours)
Goniotomy TIPS

- Instrument: bent 25-gauge needle
- Can use heel to lyse PAS
- Tip up at extremes of view
- Can bend needle at hub to increase degrees of goniotomy
- Err high in angle - sharp!
Trabeculotomy Basics

1. Temporal incision + ST/IT paracenteses
2. Direct gonio, ab-interno
3. High-temp cautery → 5-0 prolene bulb
4. Nasal goniotomy to start
5. Cannulate Schlemm’s canal 360
6. Rupture of Schlemm’s canal 360
Trabeculotomy TIPS

- Paracentesis pointing to work zone
- Small nasal goniotomy (25-g needle)
  - Crack open with OVD
- Orient rounded-tip 5-0 prolene suture to follow curve of canal
  - Make sure you have slack
Trabeculotomy

TIPS, cont.

• Pick up Prolene 2 mm behind bulb with very tip of microforceps
• Mind Descemet’s while threading
• If resistance, back up, try again
• If resistance persists, pull out and go the other way. Do not force it.
MIGS: Post-op TIPS

- In the OR – sit up!
- Leave some OVD if bleeding
- Steroid/antibiotic as usual
- Pilocarpine if early PAS, hyphema
- Cautious with post-op IOP drops
  - IOP too low – bleeding
  - IOP too high – risk to optic nerve
References:


Thank you!

- Lee Alward, MD – gonioscopy.org and gonioscopy inspiration
- Thomas Oetting, MD
- Manjool Shah, MD
- Shivani Kamat, MD
- Hunter Cherwek, MD