

Intraoperative Gonioscopy: A Key to Angle Surgery

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Course Outline

- Historical perspective and importance of office based gonioscopy (**Dr. Alward**)
- 10 Essentials Steps of Perioperative Gonioscopy (**Dr. Shareef**)
- Tips/Pearls of Gonioscopy in MIGS procedures (**Drs. Ahmed/Vold**)
- Non-gonioscopic Methods of Angle Viewing (**Dr. Crandall**)
- Panel Discussion/Q&A (**Time allows**)


10 Essential Steps of Perioperative Gonioscopy

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No financial conflicts of interest

Angle Surgery limited to goniotomy

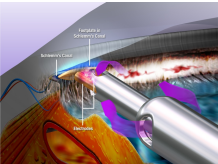
1936 – Goniotomy



70 years



2006 – FDA Approves Trabectome



Mandal A, Chakrabarti D. Evolution of Surgery for Congenital Glaucoma. Bengal Ophth J. 2012;10-19

What's the Big Deal?

MIGS PROCEDURES

- Canaloplasty
- Trabectome
- iStent/iStent inject
- Hydrus
- Xen/InnFocus
- CyPass/iStent Supra
- Goniotomy/GATT
- KDB/ABiC/Visco 360
- In Development ...

RATE LIMITING STEP

**ANGLE
VISUALIZATION WITH
INTRAOPERATIVE
GONIOSCOPY**

Why Learn Gonioscopy?

PROCEDURE	PERFORMED	FDA APPROVAL/TRIALS
Trabectome (NeoMedix)	>5,435*	June 2006
iStent (Glaukos)	>100,000	June 2012
CyPass (Transcend/Alcon)	>1000	COMPASS trial completed March 2015
Hydrus (Ivantis)	2000	Investigational in U.S.

GONIOSCOPIC ASSISTED ANGLE SURGERIES (2015)

Rate-limiting step to angle surgery: angle visualization with surgical gonioscopy

*Sameh Mosaed – The First Decade of Global Trabectome Outcomes. European Ophthalmic Review 2014

Phaco vs. MIGS

	CATARACT	MIGS
ELBOWS	Aligned with flanks	Increased work distance between oculars & surgical field with elbow extension
HANDS	Bimanual intraocular	Simultaneous extra/intra ocular
CORNEA	Minimal impact with incisions	Maximal stimulation with goniolens docking
RED REFLEX	Present	Absent
IRIS PLANE VIEWING	Posterior – full view	Anterior; viewing confined to AC depth; 0.7 mm TM space in angle

Essential Perioperative Steps For Successful Angle Surgery

	STEPS	DESCRIPTOR
PRE-OP	1	Office Based Gonioscopy
	2	Angle Anatomy
	3	Anesthesia
INTRA-OP EXTRA-OCULAR	4	Head/Microscope Rotation
	5	Goniolens Selection
	6	Hand Positioning
	7	Corneal Incision
	8	Soft Shell Technique
	9	Goniolens Docking and Manipulation
POST-OP	10	Gonioscopy/Goniophotography

Step 1: Office Based Gonioscopy

PRE-OP



Intra-op gonioscopy is **NOT** a **substitute** for slit lamp based gonioscopy

Step 1: Office Based Gonioscopy

PRE-OP

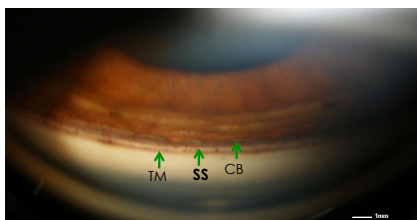
- Why? For surgical planning
- www.gonioscopy.org [Dr. Alward]
- 1. Gonioscopy documented < 50% charts reviewed of patients undergoing ocular medical therapy¹
- 2. Medicare Claims Data: 50% open angle glaucoma patients undergoing surgery had a claim for pre-op gonioscopy²

Reflects **under utilization** of office based gonioscopy

1. Quigley HA, Friedman DS, Hahn SR. Ophthalmology. 2007;111:1599-1606.
2. Coleman AL, Yu F, Evans SJ. Use of gonioscopy in Medicare beneficiaries before glaucoma surgery. J Glaucoma 2006;15: 386-93.

Step 2: Angle Anatomy

PRE-OP

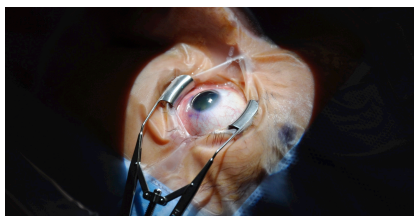


Scleral Spur: surgical landmark separates TM anteriorly from CB posteriorly

TM: Canal based surgery
CB: Suprachoroid based surgery

Step 3: Anesthesia

PRE-OP

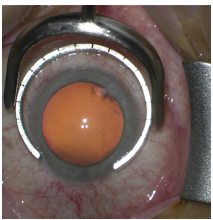


Topical – involuntary movements (Saccade)
Peri-/Retrobulbar – Akinesia

Novice Surgeons: **Block**
Build surgical confidence
Avoid intraocular complications

INTRA-OP

Step 4: Corneal Incision



- **Fixation Ring:**
 - (1) Familiarity in **holding handle** of surgical goniolens. Use it in **all** cataract cases
 - (2) **Globe control**
 - (3) **Nasal rotation** provides **access** to peripheral cornea

INTRA-OP

Step 4: Corneal Incision

Eccentricity



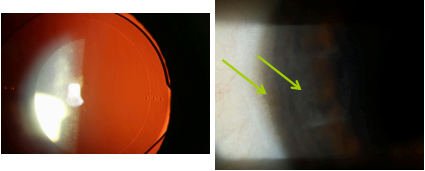
With assistance of a fixation ring, rotate globe nasally and create incision just inside the limbus

Avoid nicking limbal conjunctival vessels – Blood will get between goniolens and cornea **obscuring view of angle**

INTRA-OP

Step 4: Corneal Incision

Eccentricity

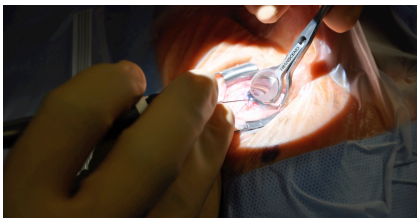


Femtosecond Laser – Keratome incision **offset** from limbus

Potential for **interference** of surgical instruments with the overlying goniolens. Consider making incision **manually** and limiting the laser to capsulorhexis and fragmentation.

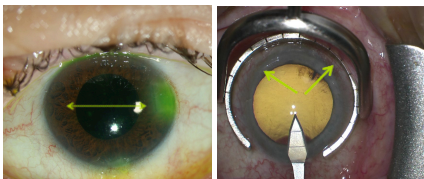
INTRA-OP

Step 4: Corneal Incision
Eccentricity



INTRA-OP

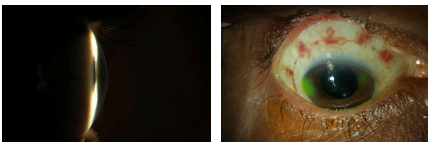
Step 4: Corneal Incision
Location



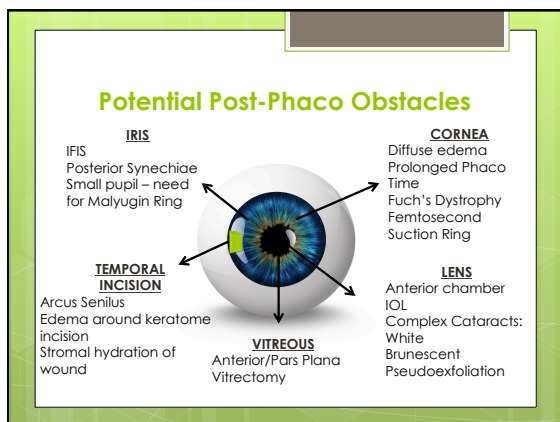
Create incision along 3 – 9 o'clock plane
Gives **equidistant access** supero and inferonasal angle
Serves as an **anchor and pivot point** for surgical instruments during intra-op surgical manipulation

INTRA-OP

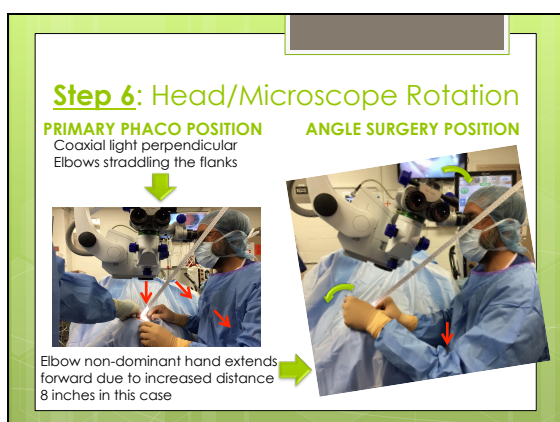
Step 4: Corneal Incision
Angle Surgery Timing: Pre or Post Phaco?



Pre-Phaco:
Pristine corneal clarity with unobstructed view of angle anatomy
Maintenance of ocular integrity
Small Keratome incision

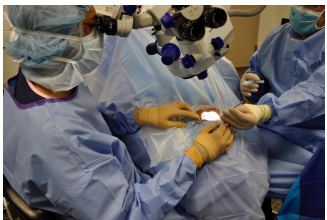






INTRA-OP

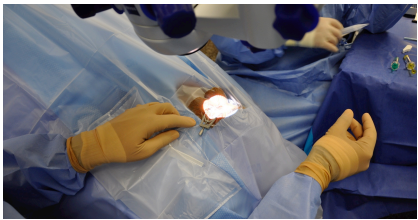
Step 6: Head/Microscope Rotation



Rotate Head **AWAY** Microscope **TOWARDS** surgeon **30 degrees**.
Note the **INCREASED** working distance between the oculars and surgical field

INTRA-OP

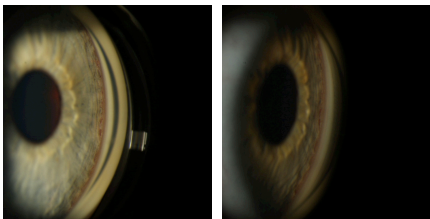
Step 6: Head/Microscope Rotation



Endpoint: Align coaxial light **along iris plane** – **NOT** corneal plane (oblique). Allows **direct** access of surgical instruments to target tissue in the **SAME** plane. Adjust **illumination** (no red reflex) & **magnification**

INTRA-OP



Step 6: Head/Microscope Rotation



Corneal Plane: Oblique approach to angle structures
Iris Plane: Direct approach to angle structures in the same plane
Fine Tuning: Instruct patient to **look nasally** to bring angle into view

INTRA-OP

Step 7: Goniolens Selection

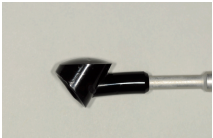


Modification of Swan Jacob (SJ) Lens. Lens **contiguous** with handle. Vary in **degree of corneal contact, field of view, magnification and handle length (See Hand-out: Table 2)**

Shareef S, Alward W, Crandall A, et al. Intraoperative gonioscopy: a key to successful angle surgery. Exp Rev Ophthalmol. 2014;9(6):515-527.

INTRA-OP

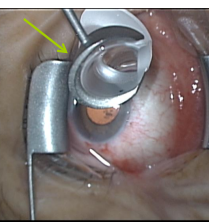
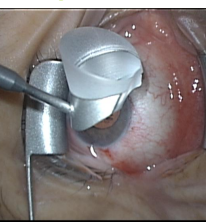
Step 7: Goniolens Selection



SJ lens modification with a plastic ridge to counter eye movement

INTRA-OP

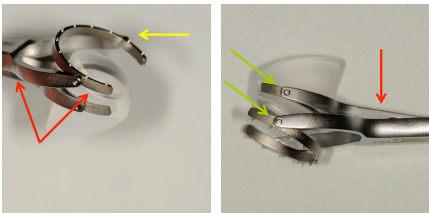
Step 7: Goniolens Selection



Hill Lens with **flange** (protruding metal rim) at base to counter eye movements for globe stabilization. Comes in right and left sided handles to be held by the non dominant hand

INTRA-OP


Step 7: Goniolens Selection



Vold Goniolens:
Handle **contiguous** with a cleat (Fixation) ring and **NOT** lens itself
Lens **originates** and is **suspended** by a **separate pendulum handle**
Multiple pivot points allow for **surgical adaptability**

INTRA-OP


Step 8: Hand Positioning



Side of Palm:
Weight Bearing anchor
Pivot point to help 'gently' dock the goniolens onto the corneal surface (Pencil analogy)

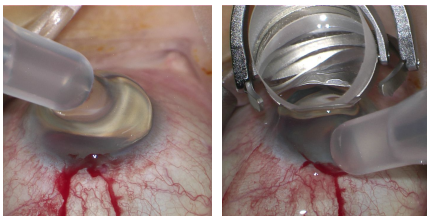
INTRA-OP

Step 8: Hand Positioning



Side of Palm:
Weight Bearing anchor
Pivot point to help 'gently' dock the goniolens onto the corneal surface (Pencil analogy)

INTRA-OP

Step 9: Docking of Goniolens

Options: Topical anesthetic drops; viscoelastic; lidocaine gel
 2% Lidocaine Gel: (1) **Topical analgesic**; (2) **coupling medium**
Decrease sensation of tissue manipulation during surgery

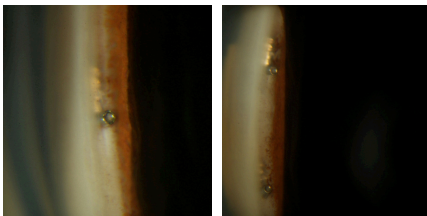
INTRA-OP

Step 9: Docking of Goniolens

◦ **Trabecular Meshwork Identification:**

1. Pigmented TM Band
2. Trypan Blue
3. Blood Reflux into Schlemm's Canal with relative hypotony in AC or by applying pressure of gonioprism in limbal area causing backflow

POST-OP

Step 10: Goniophotography

Documentation purposes
 Fosters a trusting doctor-patient relationship (**show and tell**)
Self assessment of surgical technique
Pre-op Counseling of potential surgical candidates

Getting Started – Summary Points

- **Office based gonioscopy** at slit lamp
- In **Minor O.R.**, practice gonioscopy
- Cataract Surgery:
 1. **During surgery:**
 - (i) Hold **fixation ring** to stabilize globe
 - (ii) Rotate globe to create keratome incision
 1. **After routine surgery:**
 - (i) rotate head and microscope
 - (ii) place goniolens to view angle structures

Recommend References

- www.gonioscopy.org
- www.anglesurgery.org
- **Basis for this course:**
 - ✓ Shareef, S., Alward W, Crandall A, Vold S., Ahmed I. "Intra-operative Gonioscopy – A Key to Successful Angle Surgery". *Exp Rev Ophthalmol* 2014; 9(6):515-527

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