Gonioscopy: Covering All the Angles
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London 2013

Why Perform Gonioscopy?
• Diagnosis
  • Glaucoma
  • Peripheral tumors
  • Cysts
  • Foreign bodies
  • Inflammatory conditions
• Drug treatment decisions

Kresge Eye Institute
• The most underutilized test by ophthalmology residents was gonioscopy
Poster, AAO, Las Vegas, November 2006
Any Alternatives?

1. Chamber depth with slit lamp
2. Fancy and much more expensive new instruments
   - Perhaps some day, when we can bill for it, instruments like the Visante OCT or Pentacam will be screening tests done on everyone
   - If suspicious, gonioscopy can then be performed
History of Gonioscopy

Gonioscopy Timeline

- 1899: Trantas performs 1st gonioscopic exam
- 1907: Trantas' 1st publication of gonioscopic observations
- 1910: Koeppe lens developed
- 1918: Trantas coins term "gonioscopy"
- 1919: Koeppe lens developed
- 1920: Troncoso self-illuminating gonioscope
- 1925: Troncoso self-illuminating gonioscope
- 1927: Thorburn is 1st to photograph angle
- 1930: 1st to photograph angle
- 1935: Goldmann mirrored contact lens
- 1940: Goldmann mirrored contact lens
- 1947: Troncoso's classic book on gonioscopy published
- 1950: Gonioprism invented
- 2003: Present day
Gonioscopy

Pioneers

- Alexio Trantas (1867-1961)
- Maximilian Saltzmann (1862-1954)
- Koeppe
- Manuel Uribe Troncoso (1868-1969)
- Thorburn
- Otto Barkan (1887-1958)
- Goldmann

Fundamentals of Gonioscopy

Anatomy of Aqueous Production/Drainage
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Total Internal Reflection

- Angle cannot be viewed with external light source alone because of total internal reflection
  - Curvature of cornea
  - Index of refraction for air is different than for optical tissue
- Contact lens needed to eliminate the air to cornea interface

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Anatomic Structures Visible Using Gonioscopy

- Schwalbe’s Line
- Trabecular meshwork
  - Pigmented
  - Non-pigmented
- Scleral spur
- Ciliary body band
- Peripheral iris
- Pupil border
- Blood vessels

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Gonioscopic Lenses
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Gonioscopic Lenses
Koeppe Lens (Direct Method)

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Gonioscopic Lenses:
Goldmann Lens (Indirect Method)

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Gonioscopic Lenses
Zeiss Lens (Indirect Method)
Gonioscopic Technique

Angle Classification Systems

- **Scheie**
  - Based on extent of angle structures visualized
  - Wide open (Grade I) to occluded (Grade 4) (reverse of current grading systems)

- **Shaffer**
  - Based on angular width of recess
  - Grade 0 (partly/totally closed) to grade 4 (30-45°)

- **Spaeth**
  - Based on angular approach to recess, configuration of peripheral iris, insertion of iris root
  - A (anterior to Schwalbe’s line) through E (extremely deep); grades A & B are always pathological
Recording Your Findings

- Grading system IV, III, II, I, slit, closed
- Grid drawing
- Label each quadrant numerically or with description of structures seen (i.e., CBB, or 2+ PTM)

Gonioscopy Guidelines

- Baseline gonioscopic exam for every
  - New glaucoma suspect
  - Already diagnosed glaucoma patient
  - Pt with family history of glaucoma
  - Pt with shallow chambers
  - Pt with history of transient pain, blurred vision
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- Repeat if neovascularization or sudden change in pressure
- Repeat yearly:
  - Post-iridotomy
  - If angle is narrow
- Repeat yearly:
  - Open angle (COAG) patients
  - Hyperopes older than 40 years

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Billing

- Code 92020
- Use a 92 or 99 code (E/M) exam code along with separate gonio charge
- Reimbursed in the $32 to $40 range

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Gonioscopy: Just Do It!

- Your insurance policy that you will never dilate a dangerous angle
- Gain confidence by doing it on one patient a day!
Case in Point

- 62 yo WM with history of "borderline IOP"
- Seen by OD for first time, noted "shallow chambers" and IOP 21/21
- Patient noted one episode of severe pain a year ago, and second episode 1 week prior to seeing OD

Our exam: IOP 22/22
- VA 20/25 with early SMD, cats
- VF normal
- Discs as shown

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Question:
- This patient most likely has:
  1. Low tension glaucoma
  2. Acute narrow angle glaucoma
  3. Sub-acute narrow angle attacks
  4. Chronic narrow angle glaucoma
  5. Unexplained eye pain

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Question:
- Given the clinical picture now, your most likely treatment of choice initially would be:
  1. Alpha agonist
  2. Prostaglandin
  3. Refer for laser PI's
  4. Refer for trabeculectomy

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Case 2 Gonioscopy reveals
Case 2

• Diagnosis: SubAcute Angle Closure
• Tipoff: pain, but most importantly the view of the angles with gonioscopy
• Treatment: bilateral PI's, IOP now 14 with open angles

Related Case:

• 65 WM
• Sent to Omni for PI's due to narrow angles
• +1.50 hyperope
• IOP 14
• No complaints
Pearl:
• Do gonioscopy!
• Saves the patient time and money and worry
• Increases your confidence AND the bottom line!

Pigment Dispersion Syndrome
• 20 to 45 yo; M>F
• Deep anterior chambers
• Mid-peripheral TI defects
• Krukenberg spindle
• 50% risk of associated glaucoma
Exfoliation Syndrome

- Prevalence increases with age
- Accounts for 20-25% of OAG worldwide
- Scandinavian descent
- Often presents unilaterally then becomes bilateral
- 20 to 60% risk of associated glaucoma
- Glaucoma tends to be refractory to medical therapy
Narrow (or Crowded) Angle

- Hyperopia or rarely myopia
- Family history of angle closure episodes
- Can progress with age as lens thickens
- Need for peripheral iridectomy (PI) sooner rather than later
- Can be done with Argon or YAG
Narrow (or Crowded) Angle

Narrow Angles

Chronic Angle Closure (Indentation Gonioscopy)
- Shallow anterior chamber
- Convex iris
- Progressive synechiae formation
- IOP rise is proportional to amount of angle obstruction (Goldmann equation)
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Chronic Angle Closure
(Indentation Gonioscopy)

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Angle Recession
- Typically post trauma and associated with >50% of traumatic hyphema
- Risk of glaucoma is proportional to the extent of angle involvement
- Bimodal distribution of glaucoma prevalence
- Tear between the circular and longitudinal muscles of the ciliary body
- Widened ciliary body band

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Angle Recession
Angle Recession (Traumatic)

Rubeosis
- Conditions causing retinal ischemia release angiogenic factors
- Fibrovascular membrane impairs trabecular outflow
- PAS eventually develop as the membrane contracts
- Treatment is usually surgical
Ciliary Body Cyst

Case in Point
- 8 yo WF in for routine exam
- VA 20/20
- Slit lamp exam reveals iris elevation temporally OD
23 WM

- Routine exam 1 year ago, “normal”
- Sees OD this visit, notes “bump on the iris nasally right eye”

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- Bump on nasal iris
- Gonio view obstructed
- Pupil very round and symmetrical with fellow eye
- IOP totally normal
Gonioscopy

- A valuable tool that we should be doing on many of our patients every day!