1 Fundamentals of Gonioscopy Workshop
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   Optometry’s Meeting 2014

2 The Most Valuable Glaucoma Tool

3 Glaucoma Diagnosis
   - Gonioscopy
   - Central corneal thickness
   - Visual fields
   - Fundus photography
   - Scanning lasers
   - Serial tonometry

4 Gonioscopy 92020
   - CPT Definition: Gonioscopy (separate procedure)
   - Bilateral
   - Requires documentation
   - Medicare Allowable: $27.94

5 Managing Glaucoma Patients
   - Monitor IOP reduction: 1-2 week, 1 month
   - Check IOP every 3-4 months
   - Repeat VF every 6-12 months
   - Disc photos every 1-2 years
   - Gonioscopy every year
   - Optic nerve analysis every 6-12 months
   - Document everything

6 Glaucoma: Treatment
   - Goal of treatment
     - Halt further visual loss
     - Halt further optic nerve damage
   - How We Treat
     - Reduction of IOP slows progression of glaucoma
   - Treatment options
     - Medications
     - Laser therapy
     - Surgical intervention
7  **Why Gonioscopy?**
- Identification of abnormal angle structures
- Estimation of the width of the chamber angle
- Visualization of the angle during surgical procedures

8  **Indications for Gonioscopy**
- Narrow angles
  - Consider prior to dilation
    - “Occludable” angle?
  - van Herick

9  **Indications for Gonioscopy**
- Glaucoma and glaucoma suspects
  - Are the angles open or closed?
  - Open angle
    - Pigment dispersion
    - Pseudoexfoliation
  - Assess angle structures

10 **Indications for Gonioscopy**
- Iris evaluation
  - Iris lesions
  - Presence of synechiae
- Angle closure
- Angle recession
- Synechiae
- Neovascularization
- Neoplasms
- Trauma

11 **Gonioscopy Contraindications**
- Suspected ocular trauma
- Hyphemas
- Corneal epithelial compromise
- Corneal/conjunctival infections

12 **Gonio Lenses**
- Direct vs. Indirect
- Suction vs. Non-suction
- How many mirrors are needed?
- What the difference?

13 **Types of Gonioscopy**
• Direct
  • Provides a direct view of the angle
  • Used with the patient in supine position
  • Used in surgical procedures
  • Direct view of angle
  • Inconvenient

• Indirect – Most common
  • Provides mirror-image view of the opposite angle
  • Performed at the slit lamp
  • Do not require viscous coupling agents
  • Indentation gonioscopy
  • Easy to open / close angle

14 Techniques of Gonioscopy
• Any pertinent slit lamp findings
• Estimation of angle
• Topical anesthetic
• Tonometry

15 Techniques of Gonioscopy
• Clean and prepare gonio lens
• Align patient at slit lamp
• Magnification from x10 to x25
• Lighting considerations
  • Bright to identify landmarks
  • Lower beam length – 2 to 3 mm
• Put the patient at ease

16 Techniques of the Three-Mirror
• Fill concave face of Goldmann lens with methylcellulose coupling fluid
• Watch for air bubbles
  • Store bottle upside down
  • Squeeze air out of bottle
  • Remove top of bottle
• Have patient look up
• Apply inferior edge of lens onto inferior sclera
• Lens in one hand, slit lamp in the other
• Remove with gentle pressure to globe next to lens

17 Techniques of the Four-Mirror
• Can be used without drops due to tear film coupling
• Hold square to the eye
• Corners of the four-mirror can irritate the eye
• Apply lens just until air disappears

18 Remember the View
• Angle that is viewed is 180° away from mirror used
• NOT inverted and reversed
• Illumination helps to evaluate contour
  • Diffuse
  • Focal with broad beam
  • Focal with narrow beam
• Find the corneal wedge
  • Illuminates the interface between the cornea and the face of the opaque sclera
  • Locates the anterior border of the TM

19  Common Errors
• Bubble in view
• Wrong angle position
• Pushing too hard

20  Cleaning the Lens
• Alcohol sponge
• 1:10 household bleach
  • Left for 5 minutes, rinsed, dried
  • Rinse, rinse, rinse

21  What Do We Really Need to Know?
• Anything we need to know about the iris?
• What is the deepest structure seen?
• Any trabecular meshwork pigmentation?
• What are the angle characteristics?

22  Clinical Anatomy
• Identify most posterior structures
  • Iris
  • Ciliary body
  • Scleral spur
  • Trabecular meshwork (anterior and posterior)
  • Schwalbe’s line

23  Clinical Anatomy

24  Clinical Anatomy

25  Clinical Findings
• Angle recession
• Angle vessels
• Appositional closure
• Blood in Schlemm’s Canal
• Iris processes
• Neovascularization
• Posterior embryotoxin
• Sampaolesi’s Line
• Synechiae
26 **Iris Processes**
- Iris tissue extends across CB into scleral spur or TM
- Roughly 1/3 of normal eyes

27 **Sampaolesi’s Line**
- Heavily pigmented Schwalbe’s Line
- More prominent inferiorly
- May be associated with pigment dispersion syndrome

28 **Posterior Embryotoxin**
- Prominent, anteriorly displaced Schwalbe’s Line
- 15% normal eyes
- May be associated with Axenfield-Rieger’s anomaly

29 **Blood in Schlemm’s Canal**
- Reflux caused by increased pressure in episcleral or conjunctival veins

30 **Angle Vessels**
- Physiologic vs neovascular
- Physiologic are more common in blue eyes
  - Run circumferentially
  - Radial branches

31 **Angle Recession**
- Important late complication of ocular trauma
- IOPs may remain normal for years to decades before becoming severely elevated
- Patient education to the importance of future care
- Fellow eye increased risk of POAG

32 **Alternative Imaging Modalities**
- Conclusion: No other imaging method provides sufficient information about angle anatomy to be a substitute for gonioscopy.

33 **Gonioscopic Grading Systems**
- Recording for communication and future reference
- Most common
  - Scheie
  - Shaffer
  - Spaeth

34 **Grading System: Scheie**
- Roman numerals to describe the degree of angle closure
- Pigmentation
  - 0 = No pigmentation
  - IV = Heavy pigmentation

35 **Grading System: Shaffer**
- Most commonly used
- Describes the degree to which the angle is open

37 **Grading System: Spaeth**
- Grade all three major features of angle anatomy
- Level of iris insertion
  - “A” for iris insertion anterior to Schwalbe’s Line
  - “D” for insertion into ciliary body face
- Width of the angle
  - Estimated angle between a line tangential to the TM and a line tangential to the surface of the iris about 1/3 away from the periphery
- Configuration of the iris
  - Describes curvature of the peripheral iris
- Permits inclusion of indentation gonioscopy
  - (C)D30S

38 **Grading System: Spaeth**

39 **Grading System: Van Herick**
- A narrow slit beam is placed perpendicular to the most peripheral part of the cornea
- Angle about 60° from the beam of light
- Augments gonioscopic findings

40 **Developmental Abnormalities of the Angle**
- Aniridia
- Axenfeld-Rieger Syndrome
- Coloboma
- Posterior embryotoxin
- Primary infantile glaucoma

41 **Closed Angle Abnormalities**
- Primary angle closure
  - Pupillary block
  - Plateau iris
  - Aqueous misdirection
- Secondary angle closure
  - Pupillary block
  - Synechiae
    - Neovascularization
    - Iridocorneal-endothelial syndromes
    - Posterior Polymorphous Dystrophy
    - Trauma
    - Inflammation
  - Posterior pressure
  - Swelling of Ciliary Body and Choroid
  - Iridochisis

42 **Indentation Gonioscopy**
- Differentiates between angle closure due to synechiae and appositional closure
• Direct pressure onto cornea causes aqueous to be pushed into angle to allow view of TM
• Synechiae will not open or slightly open
• At high IOP, indentation is difficult and minimally effective

43 **Open Angle Abnormalities**
• Primary open angle glaucoma
• Pigmentary glaucoma
• Pigment dispersion syndrome
• Pseudoexfoliation
• Inflammation
• Foreign bodies
• Traumatic glaucoma
  • Angle recession
  • Iridodialysis
  • Cyclodialysis
• Post-surgery

44 **Anterior Segment Imaging: Ultrasound Biomicroscopy**
• Uses frequencies above 20 MHz
• High resolution images of the anterior segment and the ideal tool for imaging structures located behind the iris
• Provides a high level of penetration through opaque and pigmented tissues in comparison with optical technology

45 **UBM and Glaucoma**
• Measure the anterior chamber angle
• Assess the configuration of the peripheral iris
• Evaluate the trabecular meshwork

46 **Anterior Segment Imaging: Optical Coherence Tomography**
• Generates in vivo, cross-sectional scans of the tissue to assist in analyzing the cornea, anterior chamber angle, iris and lens
• Utilizes near-infrared light waves to measure distances of anatomical structures. A series of axial scans (A-scans) are combined to form two-dimensional images of the ocular structures in a process similar to ultrasound biomicroscopy; however, light (as opposed to sound waves) is used in OCT.

47 **Anterior Segment Imaging: Optical Coherence Tomography**
• Evaluating narrow angles
• Patient education
• Iris evaluation
• Pachymetry

48 **Let’s Compare**
• AS - OCT
2. Non-contact
   • More user-friendly
   • Indicated for imaging the conjunctiva, sclera, cornea, and iris, screening the angle, and visualizing subconjunctival, corneal, and anterior chamber implants
   • Coupling mode is air instead of fluid

3. UBM
   • More Invasive and not for infected eyes, ruptured globes or post-surgery
   • Indicated for imaging the conjunctiva, sclera, iris, lens, and ciliary body, for tumor measurements, for light-and-dark tests in glaucoma, and for viewing subconjunctival, anterior chamber, posterior chamber, and pars plana implants.
   • Penetration depth is 6X greater than AS-OCT

49. Surgical Considerations
   • Argon Laser Trabeculoplasty
   • Selective Laser Trabeculoplasty
   • Laser Iridoplasty / Iridotomy
   • Minimally invasive glaucoma surgery

50. Selective Laser Trabeculoplasty
   • Non-thermal treatment which uses short pulses of relatively low energy to target and irradiate only the melanin-rich cells in the TM

51. Advantages of SLT vs ALT
   • SLT has the potential for repeat procedures
   • SLT lacks thermal damage/scarring to the TM
   • SLT has less post-operative pain and inflammation

52. Laser Peripheral Iridotomy (LPI)
   • Indications
     • Narrow angles
     • Acute, angle closure glaucoma
     • Chronic, angle closure glaucoma
     • YAG laser to create opening from posterior to anterior chamber
     • Superior location
     • Procedure / Drop Protocol
     • Re-evaluate in one week
     • Treat fellow eye

53. iStent

55. Trabectome

56. Pearls
   • Practice makes perfect
   • Practice on normals and not so normals
   • Narrow beams helps define contour
Open Angle Abnormalities

Grading System: Shaffer

Gonioscopic

Posterior Sampaolesi's

Clinical Anatomy

Common Errors

Techniques of the Three

Gonio

Indications for

Glaucoma: Treatment

Gonioscopy

The Most Valuable Glaucoma Tool

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Hands-on Workshop

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