GONIOSCOPIC EXAMINATION
Gonioscopy

I. Purpose of gonioscopy
II. Principle of gonioscopy
III. Method of gonioscopy
IV. Angle structures
V. Grading of angle width
VI. Developmental abnormalities
VII. Key points
Purpose of gonioscopy

• Why do I need to perform gonioscopy?
  – Fundamental part of comprehensive exam
  – Most important factor in correct diagnosis
    • Omission of gonioscopy is a common cause of misdiagnosis
  – Done initially for all glaucoma patients and suspects
  – Repeated periodically for patients with angle-closure glaucoma
Purpose of gonioscopy

• What can I achieve with gonioscopy?
  – Visualisation of the anterior chamber angle
    • Angle topography: scenery, landscape, geography
  – View of the peripheral iris
  – Differentiation between angle-closure, occludable and secondary glaucomas
Purpose of gonioscopy

• What should I look for in gonioscopy?
  – Recognise angle landmarks and consider:
    • level of iris insertion
    • shape and profile of peripheral iris
    • estimated width of the angle approach
    • degree of trabecular pigmentation
    • areas of iridotrabecular apposition
      or synechiae

Other ways to evaluate the anterior chamber angle

- Scheimpflüg photography
- Ultrasound biomicroscopy
- Anterior segment optical coherence tomography
Principle of gonioscopy

- Total internal reflection
  - Fibre optic cable

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Principle of gonioscopy

• Overcoming total internal reflection

Method of gonioscopy

• Direct gonioscopy
• Indirect gonioscopy
  – Without indentation
  – With indentation

Without indentation

With indentation: synechiae present

Jain S
Direct gonioscopy

• Koepppe lens
Direct gonioscopy

- Advantages
  - Straight-on view
  - Angle of visualisation variable
  - More panoramic
  - Angle recession: comparison

Direct gonioscopy

- Disadvantages
  - Inconvenient
  - Special equipment needed
Indirect gonioscopy

- Goldmann three-mirror lens
Indirect gonioscopy

- Slit lamp technique

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Indirect gonioscopy

- Slit lamp technique
  - Goldmann three-mirror lens
Indirect gonioscopy

- Posner four-mirror lens

Courtesy of Ocular Instruments
Indirect gonioscopy

- Sussman four-mirror lens

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Courtesy of Ocular Instruments
Indirect gonioscopy

- Slit lamp technique
  - Four-mirror lens
Indirect gonioscopy

• Slit lamp technique
  – Insertion of lens

Courtesy of Max Forbes
Slit lamp technique

• General guidelines
  - Do an external examination first
  - Perform tonometry before gonioscopy
  - Use anaesthesia
  - Pay attention to patient comfort
  - Pay attention to alignment

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Slit lamp technique

• General guidelines
  – Use a magnification of 10–25x
  – Use a fairly short and narrow beam (2–3 mm)
  – Use a dark room
    • Pupillary constriction makes a narrow angle appear more open

Nolan W
Effect of illumination on the angle configuration

Click on screen to play video

Chew PTK, Aquino MC
Indirect gonioscopy

• Advantages
  – Preferred by most
  – Quick, convenient
  – No special equipment needed
  – Slit lamp
    • Variable magnification and illumination
  – Can create corneal wedge
  – Allows differentiation of appositional and synechial angle closure
Indirect gonioscopy

• Disadvantages
  – Mirror image can be confusing
  – Inadvertent pressure on the cornea:
    • exaggerates the degree of angle narrowing in the Goldmann lens
    • opens the angle in four-mirror lenses

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The corneal wedge

The corneal wedge

Post-inflammationary

Pale angles

Recognising angle structures

• When the iris covers the trabecular meshwork (TM), it is very easy to mistake:
  – the non-pigmented TM for the scleral spur
  – a pigmented Schwalbe’s line for the TM

• Indentation gonioscopy is particularly useful in these cases
Normal angle structures

Non-pigmented trabecular meshwork
Schwalbe’s line
Pigmented trabecular meshwork
Scleral spur
Ciliary body band
Angle structures: iris

- Myopes – concave
- Hyperopes – convex
- Abnormal convexity (pupillary block)
- Abnormal concavity (pigment dispersion syndrome)
- Crypts (Fuchs’)
- Abnormal last roll (plateau iris)

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Angle structures: ciliary body band

- Iris inserts into concave face
- Wide in:
  - angle recession (scan circumference)
  - cyclodialysis (cleft)
Angle structures: scleral spur

- Posterior border of TM
- Attachment of ciliary body
- Insertion of longitudinal muscles of ciliary body
- May be obscured by:
  - iris processes
  - iris bombé
  - peripheral anterior synechiae
  - pigments
Angle structures: trabecular meshwork

- More pigmented with age
- Flow is through posterior TM
- Pigment is intracellular
- More pigment inferiorly
- ID by Schwalbe’s line
- ID by blood in Schlemm’s canal

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Angle structures:
Schwalbe’s line

- Termination of Descemet’s membrane
- Pigmented – Sampaolesi’s line
- Landmark for identification of TM in narrow angles
Angle structures: Schwalbe’s line

Schwalbe’s line

Trabecular meshwork

Jain S
The view: indirect gonioscopy without indentation

- Pigmented Schwalbe’s line (Sampaolesi’s)
- 1+ pigmented anterior trabecular meshwork
- 4+ pigmented anterior trabecular meshwork
- Scleral spur
- Wide ciliary body band
- Flat iris inserted at ciliary body band
Angle blood vessels

- Normal vessels
  - Radial orientation
  - Thick
  - Non-branching
  - Do not cross the scleral spur

- Neovascularisation
  - Fine
  - Arborising
  - Crosses scleral spur
Differentiating between iris processes and synechiae

- **Iris processes**
  - Fine
  - Extend into scleral spur
  - Follow concavity of recess
  - Underlying structures seen
  - Iris moves with indentation
  - Broken with angle recession

- **Synechiae**
  - Broad
  - Extend beyond scleral spur
  - Bridge concavity of recess
  - Obscure structures
  - Resist movement
  - Intact

Ritch R

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Indentation gonioscopy

- Useful when iris surface is convex
  - Done when recognition of angle structures is difficult
- Performed in all glaucoma cases
  - Differentiates appositional versus synechial closure in pupillary block
  - Measures extent of angle closure
  - Identifies plateau iris configuration
  - Identifies pseudoplateau configuration
  - Identifies lens-induced angle closure
Recognition of sites of blockage in angle closure

Pupil block

Plateau iris

Chew PTK, Aquino MC

Chew PTK, Aquino MC
Indentation gonioscopy

Photos courtesy of Nolan W
‘Over-the-hill’ gonioscopy

Courtesy of Ravi Thomas
Appositional closure

Synechial closure

Chew PTK, Aquino MC

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Open angle
Indentation gonioscopy: synechial closure

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Plateau iris configuration

Chew PTK, Aquino MC
Indentation gonioscopy: plateau iris configuration

Curvature of iris along anteriorly placed ciliary processes

Dipping of the iris at lens equator

Curvature of iris along lens surface

S-curve configuration of iris

Jain S
Indentation gonioscopy: ciliary body (pseudoplateau iris)
Indentation gonioscopy:
lens-induced angle closure

Lim A

Chew PTK, Aquino MC
Gonioscopy flow diagram

**Scleral spur visible?**

- Yes
  - Grade: Record findings
  - Open angle

- No
  - Do indentation gonioscopy
  - Any synechiae?

  - Yes
    - Grade: Record findings
    - Primary angle closure (synechiae)

  - No
    - IOP raised?

      - Yes
        - Grade: Record findings
        - Primary angle closure (apposition)

      - No
        - Grade: Record findings
        - Primary angle closure suspect

## Grading of angle width: Spaeth classification

### Insertion of iris root

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>A: Anterior to Schwalbe’s line</th>
<th>B: Behind Schwalbe’s line</th>
<th>C: On the scleral spur</th>
<th>D: Behind the scleral spur</th>
<th>E: On the ciliary band</th>
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<td>1</td>
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<td>© EGS 2003</td>
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### Angular width of angle recess

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Slit</th>
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<tbody>
<tr>
<td>2</td>
<td></td>
<td>10°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Narrow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wide</td>
</tr>
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# The Spaeth classification

| Configuration of the peripheral iris | 3 s: steep, anteriorly convex  
| r: regular  
| q: queer, anteriorly concave |  
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|  
| Trabecular meshwork pigment | 0: none  
| 4+: maximal |  

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### Grading of angle width: Shaffer and modified Shaffer system

<table>
<thead>
<tr>
<th>Grade 0</th>
<th>Grade I</th>
<th>Grade II</th>
<th>Grade III</th>
<th>Grade IV</th>
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</thead>
<tbody>
<tr>
<td>Closed</td>
<td>10(^\circ)</td>
<td>20(^\circ)</td>
<td>30(^\circ)</td>
<td>40(^\circ)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modified Shaffer</th>
<th>Schwalbe’s line not visible</th>
<th>Schwalbe’s line visible</th>
<th>Anterior TM visible</th>
<th>Scleral spur visible</th>
<th>Ciliary band visible</th>
</tr>
</thead>
</table>

- **Red** = higher risk
- **Yellow** = medium risk
- **White** = lower risk

Developmental abnormalities

• Congenital glaucoma

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Developmental abnormalities

• Posterior embryotoxon

Developmental abnormalities

• Axenfeld’s anomaly
Key points

• Gonioscopy
  – Fundamental part of ophthalmic evaluation
    • Confirmation of normal angle structures
    • Determination of narrowness or closure of anterior chamber angle
    • Grading of angle width
    • Pathological findings
  – Needs to be performed routinely