Introduction to Keratometry (Zoraida Fiol-Silva, MD)

**Keratometry**

*Measurement of the central anterior corneal curvature.*

Is considered to be one of the basic measurements of the eye. As such, should be performed in all patients as part of a full initial evaluation.

- Consists of a target imaged by the cornea and a telescope to observe this image.
- Measurement of the target image reveals the corneal curvature (diopters and/or mm).

**Keratometer**

*(Ophthalmometer)*

Multiple uses in ophthalmology

- Contact Lenses
- Early cataracts
- Suspected glaucoma
- Aphakia
- Nystagmus
- Amblyopia

**Diagnostic Value**

*(Keratometry)*

- Low astigmatism
- High astigmatism
- Irregular astigmatism
- Oblique astigmatism
- Keratoconus

**Cornea**

Is an integral part of refraction and vision.

Any variations in the surface, shape and/or radius of curvature will definitely affect the visual outcome.

- Average total power of the human eye is 58 D (diopters).
- Cornea alone has power of 44 D.
- Therefore, the cornea represents an integral part of vision and refraction.
Majority of patients
Low or high
Lenticular, corneal or combined --- identification only possible with the use of keratometry
Amount & axis best identified using lenticular, corneal or combined keratometry.

**Introduction to Keratometry (Zoraida Fiol-Silva, MD)**

- **Keratometry**
  - Regular Astigmatism
    - Condition in which corneal curvature varies in any one meridian. Multiple variations typically seen.
    - Easily identified using keratometric mires
    - Often missed when using automated keratometer.
  - Oblique Astigmatism
    - When the two principal meridians do not lie in the vertical and horizontal meridians
    - Troublesome – difficult to correct
    - Keratometry can be very helpful
    - Objects may appear tilted if misdiagnosed/mistreated

- **Types of Astigmatism**
  - In order to better understand the value of keratometry, we should know and understand the different types of astigmatism:
    - Regular
    - Irregular
    - Oblique
    - Asymmetrical

- **Early Cataracts**
  - Comparison of serial retinoscopic findings and keratometric measurements may reveal progressive development of (irregular) lenticular astigmatism – spherical cornea.

- **Keratometry**
  - Asymmetrical Astigmatism
    - Occurs when the major and minor axis are at right angles of each other.
    - Easily diagnosed using keratometry while it could be a diagnostic dilemma on retinoscopic findings

- **Amblyopia & Nystagmus**
  - Objective measurement with keratometry more accurate and dependable when other objective and subjective findings are not reliable.

- **Aphakia**
  - Refraction is easier and often more accurate with the use of keratometry – particularly in patients with significant corneal astigmatism.

- **Keratometers**
  - Types
    - Bausch & Lomb Keratometer
    - Haag-Streit Ophthalmometer
    - Automated keratometers (autokeratometers)
Introduction to Keratometry (Zoraida Fiol-Silva, MD)

**Contact Lenses**

**Keratometry**

- Consists of a target imaged by the cornea and a telescope to observe the image.
- Measurement of target image reveals the corneal curvature in diopters or millimeters of radius – astigmatism.

**Haag Streit Ophthalmometer**

- Uses essentially the same principle as the B&L keratometer but utilizing forms and colors – more contrast and definition.
- Comfortable design – may be used with one hand only if necessary.

**Bausch & Lomb Keratometer**

- B & L Keratometer

**B & L Keratometer**

**B & L Keratometer**
B & L Keratometer

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Bausch & Lomb Keratometer
- Adjust the eyepiece
- Position the patient
- Level the keratometer to the patient’s eye.
- Patient fixation

Keratometric Mires
Adjusting the eyepiece

Bausch & Lomb Keratometer
Taking the readings:
- Focus
- Locate axis
- Measure “horizontal” meridian
- Measure “vertical” meridian
- Determine amount of astigmatism and read axis on scale.

Keratometric Mires
Focusing

Axis alignment

Keratometric Mires

Patient fixation

Adjust the eyepiece

Measure “horizontal” meridian

Measure “vertical” meridian

Focus

Determine amount of astigmatism and read axis on scale.
When measuring corneal astigmatism...

If refractive astigmatism is to be corrected in the "minus cylinder form", use as the axis the mark representing the drum having the lower dioptric power reading – vice versa for "plus cylinder form".

Haag-Streit Ophthalmometer

- Locking screw for horizontal movement
- Control lever – horizontal & vertical adjustment
- Marks to indicate commencing position
- Lighting plate
- Pilot light
- Face
- On-off switch
- Rail covers
- Head rest
- Height adjustment control for chin rest
- Chin rest
- Octalder
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- Adjust the eyepiece
- Position the patient
- Patient fixation
- Instrument alignment

- Simultaneous view of mires and lines
- Red and green images (inner ones used)
- Align images
- Read radius in millimeters (left side/arc)
- Read corneal refraction in diopters (right)
- Read axis (Tabo scale)
- Measure astigmatism

- Eye level mark
- Lamp housing & mires
- Connection
- Housing for illuminated fixation mark
- Counterweight
- Alignment device
- Tabo scale
- Index ring
- Eyepiece
- Locking screw for ophthalmometer head
- Fixation rod for breath protection shield
- Handle for moving the mires & rotating the arc
- Arc radius scale – left & diopter scale – right
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