NCLE Basic Exam Review

Domain V: Diagnostic Fitting of RGP Lenses and Soft Lenses

Developed by the National Federation of Opticianry Schools

Professor Robert J. Russo has no financial interests to disclose

NCLE Basic Exam Review
Domain V: Diagnostic Fitting (11 questions)

a. RGP Fitting and Evaluation

Rigid Gas Permeable Materials:

- PMMA, CAB, Silicone/Acrylate, Silicone, FSA-Fluorocarbon Silicon Acrylate
- PMMA – 1947 – 1971
- Complications of PMMA-Corneal Edema, Overwear Syndrome, Corneal Anesthesia
- Why Gas Permeable? Reduce Corneal Edema, Corneal Warpage, Polymegethsim
- Advantages:
    - Crisper Vision
    - More Durable than Soft Lenses
    - Aftercare of lenses is easier
    - No need to change lenses every year, lenses can be cleaned and polished
    - Patients are more loyal
    - Stabilizes Myopia in teenagers and reduces “Myopic Creep”

Fitting GP Lenses

- Considerations should involve: DK Value, Wetting angle, and Specific Gravity, Tint Availability
- Many GP lenses today come with UV absorbers.
- **Procedure**:
    - Health History
    - Refraction
    - Pre-fitting examination with Slit Lamp
    - Keratometry
    - Lens Options (Spherical Lenses, Toric Lenses) (Rigid or Soft?)
- **Methods**: Empirical & Trial Lens Fitting
- **Interpalpebral Fitting:**
    - Use of Fitting Rules
    - Fit “On K” or “Steeper than “K”
    - Diameters 8.5 – 9.2
    - Edges should be well tapered to minimize edge sensation with the upper lid

Fittings Procedure:

- **Interpalpebral Lens:**
- Transpose Rx in minus cylinder
- Compensate for Vertex Distance >+/- 4.00
- Select a trial lens consistent with a fitting philosophy
- Usually On “K” or Steeper than “K”
- Ex:
- Given the following information: K’s 45.00/44.00 @ 90
- Rx -3.00 +1.00 x 180
- -2.00 – 1.00 x 90
- 44.00, -2.00 starting base curve and power if lens if fit on “K”
- Fitting an intrapalebral lens a base curve “on K” or steeper than “K” should be chosen

- **Superior Lid Alignment/Upper Lid Attachment:**
- Transpose Rx in minus cylinder
- Compensate for Vertex Distance >+/- 4.00
- Select a trial lens consistent with a fitting philosophy

- **Diameter Lens Selection**
    - Lens Diameter is determined by:
    - Lid Position
    - Pupil Diameter
    - Palpebral Fissure Size
    - Corneal Astigmatism (The greater the astigmatism, the smaller the diameter, the flatter the cornea, the larger the diameter)

SAM – FAP

- **Steeper Add Minus**
    - 05 mm = .25 D in Tear Lens Power
    - 7.80, -2.00 $\rightarrow$ 7.75 = .05 mm steeper $\rightarrow$ Power needed at cornea = -2.25 D

- **FAP – Flatter Add Plus**
    - .05 mm - .25 D in Tear Lens Power
    - 7.80, -2.00 $\rightarrow$ = .05 mm flatter $\rightarrow$ Power needed at cornea = -1.75D

  Example 1: If a patient is fit with the following lens, 44.50, -4.50 and the base curve is changed to 45.00, what is the new base curve and power?
  44.50, -4.50 SAM .50 = -.50
  New Rx = 45.00, -5.00

Example 2: If a patient is fit with a 7.65 mm base curve and the Rx is +4.00. What prescription would be needed if we change the base curve to 7.55?
7.65, +4.00 D
SAM
7.55, .10 mm = .50
Answer 7.55, +3.50

Base Curve radius is based on Diameter and Corneal Astigmatism (Nomogram)

Corneal Astigmatism	9.0 Diameter	9.2 Diameter	9.5 Diameter
0.00 to 1.00D	On K	0.25 D flatter than K	0.50 D flatter than K
1.12 to 2.00 D	0.25 flatter than K	On K	0.25 D flatter than K

Example # 1 -2.00 –1.00 x 180

"K"42.00@180/43.00@90
If you fit a 9.5 – base curve selection is .50 D flatter than "K" Upper Lid Attachment is achieved
Recommendation: 41.50, -1.50, 9.5

Given the following information: K's 42.00 @ 180 / 43.00 @ 90
Rx -2.00 - .75 x 180
Which of the following set of lens specifications would most simulate a lid attachment RGP fitting:

	B.C.	Rx	Dia.
a.	43.00	-2.50	9.5
b.	41.50	-1.50	9.5
c.	42.50	-2.50	8.5
d.	43.00	-3.00	8.2

Which of the following set of specifications would most simulate an interpalpebral RGP fitting?

	B.C.	Rx	Dia.
a.	44.50	-2.50	8.5
b.	43.50	-3.50	8.5
c.	43.50	-1.50	9.5
d.	44.50	-2.50	9.5

Fluorescein Pattern Evaluation:

- Fitting Procedure for GP Lenses involves an additional step over Soft Lens Fitting
- Pre-fitting and Evaluation
- Diagnostic Trial Fitting (Establish Fit first)
- Over-Refraction
- Fluorescein Evaluation
- Write up Lens order
- Slit Lamp

Fluorescein Evaluation

- Wratten filter with RGP lenses with UV inhibitor

InterpalpebralFit

- Ideal
- Flat
- Steep

Upper Lid Attachment

- Ideal
- Flat
- Steep

Correction of a Low Riding Lens (Minus Lens)

- Interpalpebral Fit (Lens may be too flat)
- -Steepen base curve

- Upper Lid Attachment (Lens may be too steep)
- -Flatten base curve or increase lens diameter or combination of both

Correction of a High Riding Lens (Minus Lens)

- Interpalpebral Fit (Lens may be too flat) Note: This is if edge of lens is slightly under upper lid
- -Steepen base curve or increase lens diameter

- Upper Lid Attachment (Lens may be too flat)
- -Steepen base curve or increase lens diameter or combination of both
- - Thin out edge design (CN Bevel or Hyperflange design)

Lens Flexure:

- New GP lenses are thinner
- If vision fluctuates, either:
- Flatten base curve first or
- Increase CT by .02 - .04
- Depending on corneal toricity sometimes new GP lens materials will bend on the eye after blinking

Edge Design

a. **Hyperflange/ CN Bevel**
    - If a high minus lens is riding too high or the edge of the lens is too thick, but the base curve relationship is adequate

b. **Myoflange**
    - If a high plus is riding too low, a minus carrier lenticular can be designed to pull the lens under the upper lid and center the lens after the blink

Basic Fluroescein Staining

Stippling:

- Minute air bubbles get trapped under lens
- Mucous debris under lens
- Check Fit
- Clean and Polish lens and review cleaning

Punctate Staining:

- Air bubbles getting trapped under lens
- Dirty lens
- Check fit of lens
- Review cleaning procedures

Abrasion:

- Fit of lens that is too flat
- Foreign body gets trapped under lens
- Eye Patch overnigh

3&9 O'clock Staining / Peripheral Staining:

- Improper blinking
- A low riding RGP lens
- Stress the importance of blinking, Blinking exercises, Eye lubricant
- Flatten base curve or increase lens diameter

Dimple Veil:

- Not a stain but excessive air bubbles trapped under a lens
- Usually a lens that is too steep or too flat at the edge periphery

Arc Stain:

- Crescent shaped stain from improper insertion, rough edge of contact lens or improper recentering of contact lens

WTR Fluorescein Pattern

Foreign Body Stain – Sometimes referred to as "Chicken Tracks"

Crazing

Soft Lens Indications:

- Cosmetics
- Better Vision especially at the periphery
- Prosthetic use
- Bandage or Therapeutic use

Advantages:

- Lenses are more comfortable than conventional rigid lenses
- Easily Adaptable
- Flexible Wearing Schedule
- Less debris gets under the contact lens
- Safer lens for athletics/will not dislodge as easily compared to rigid lenses

Disadvantages:

- Vision not as sharp as rigid lenses
- Is more fragile than rigid lenses
- GPC and infections are more common with soft lenses compared to rigid lenses

Types of Hydrogel Modalities:

- *Daily Wear (Conventional Wear)* – is worn during waking hours. 12-13 hours. Replace every 12 months
- *Extended Wear* – may be worn during sleep usually up to 7 days. FDA regulations state 14 days and new silicone hydrogel lenses are approved for 30 days
- *Flexible Wear* – can be worn as both a daily wear and extended wear lens
- *Disposables* – These lenses can be slept with and used as a Daily wear lens
- *Disposable "Dailies"* – are discarded after one day of use every day. Usually comes in 90 and 30 day supplies packs
- Planned Placement – involves scheduled replacement of lenses from every month or three months as determined by eye care professional
- *Bandage or Therapeutic Lens* – to promote corneal healing

Soft Lens Tints

- Visibility Tint – either blue or green
- Cosmetic Tint – used to enhance eye color
- Opaque Tint – changes eye color
- Prosthetic Tint – to enhance appearance of damaged or disfigured eye.

Parameters that must be considered when fitting Soft Lenses are:

Base Curve
Power
Diameter
Water Content
Availability

Fitting Techniques:

- Soft lenses are fitted flatter than the flattest "K" reading
- A normal fitting soft lens should have a "3 Point Touch"
- Keratometry should be used as a starting point in the fitting process
- Spherical soft lenses do not neutralize corneal astigmatism, therefore the amount of refractive astigmatism should be limited to .75 – 1.00 D.
- With borderline astigmats, sometimes a thick or stiffer soft lens might mask some corneal astigmatism

Good Centration and Corneal Coverage:

- The soft lens should be large enough to cover the entire cornea
- The soft lens should be reasonably well centered
- Establish a 3 Point Touch
- Initial Selection should be determined by measuring the HVID and Palpebral fissure
- Rule of Thumb – add 2 mm to the HVID as a starting point

Movement:

- Factors to Consider: Base Curve, Water Content, Diameter,Thickness, Eyelid Forces
- Thin soft lenses move less that soft lenses that are thicker
- Thin soft lenses usually have a lower water content
- Thicker soft lenses usually have a higher water content
- Contact Lens Practitioners should be aware of the lens materials that they are fitting

Movement Characteristics and Evaluation:

- Primary Gaze – lens should move .5mm – 1mm with the blink
- Upward Gaze – lens should drop .5 mm – 1mm
- Ideal Movement – 1mm – 2 mm
- Evaluation – Slit Lamp
- Push Up Test
- When a patient blinks, the vision should be clear and crisp before and after the blink
- Variable vision may indicate a problem with the fit, improper power of the contact lens or residual astigmatism
- During the initial fitting, variable vision is to be expected until the contact lens settles in
- If the vision does not improve with Over-refraction, an astigmatic clock should be used to evaluate the presence of residual astigmatism

Stable Vision

- When a patient blinks, the vision should be clear and crisp before and after the blink
- Variable vision may indicate a problem with the fit, improper power of the contact lens or residual astigmatism
- During the initial fitting, variable vision is to be expected until the contact lens settles in

- If the vision does not improve with Over-refraction, an astigmatic clock should be used to evaluate the presence of residual astigmatism

Diagnostic Lens Selection

1. Transpose the spectacle Rx in minus cylinder form
   -3.75 + .50 x 90
   -3.25 - .50 x 180
   -3.25 is your starting power

2. Depending on refractive astigmatism, and the type of lens chosen, the Spherical Equivalent maybe used
Spherical Equivalent = ½ the cylinder power added to the sphere
-3.25 - .50 x 180 (1/2 of .50 = .25 added to the –3.25 = -3.50

Fitting:

- Keratometer readings and Corneal Diameter (HVID) help determine the starting base curve for a soft lens
- Lens Selection: Transpose/ ½ the cylinder power added to the sphere
- Guidelines
- Rule of Thumb: 45.00 > fit 8.6, 45.00 or < fit 8.9 or 8.6
- Use Flattest "K" as your reference point
- 42.00 or < - Choose an 8.90
- 42.00 – 45.00 – Choose an 8.90
- 45.00 – 46.00 – Choose an 8.60
- 46.00 or > - Choose an 8.30

Characteristics of a Flat or Loose Fit:

- Variable Vision
- Awareness
- Excessive Movement
- Edge Standoff
- Lens may fall out
- Vision is clear before the blink and blurry after the blink
- Keratometer reflex blurs after the blink
- Lens displacement
- Some Lenses that are **Loose or Flat**, may ride high
- This is usually seen in a minus lens and not in a plus lens because of the edge thickness

- **Correction**- Switch to a larger Diameter or Steeper base curve or combination of both. In clinical practice, you will probably only change the base curve.

Steep or Tight Fit:

- Lens is initially comfortable but becomes more uncomfortable as the day goes on
- Keratometer Reflex blurs before the blink
- Vision improves after blinking

Correction:

- Switch to a smaller or flatter base curve or a combination of both

Good Luck on the NCLE

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