Financial Disclosures

- I have received honoraria from:
  - Essilor/DOsP
  - TDOA
  - UPICO
  - DCOS
  - NETOS
  - TCOS

- Assistant Visiting Professor—University of Houston, College of Optometry

- Opinions from this lecture are my own and are not necessarily views of the University

Indications

- Ill-fitting corneal GPs
- Inadequate patient comfort with corneal GPs
- Ocular disease
  - Steven-Johnson
  - Graft-versus-host Disease
  - Keratoconus/PMD
  - Post-refractive surgery
  - Dry eyes
  - Traumatic corneas
  - High astigmatism

Sclerals on the Market

- Jupiter ***
- Genesis ***
- Insight ***
- Zen Lens
- Soclears
- Custom Stables
- Digiform
- EyeprintPRO

- And so many more.

Classification

<table>
<thead>
<tr>
<th>Terminology</th>
<th>Alternative Names</th>
<th>Diameter</th>
<th>Heating</th>
<th>Tear Reservoir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal</td>
<td></td>
<td>12.5 to 15.0 mm</td>
<td>All lens bearing on the cornea</td>
<td>Limited tear reservoir capacity</td>
</tr>
<tr>
<td>Semi-scleral</td>
<td></td>
<td>15.0 to 16.0 mm</td>
<td>Lenses share bearing on the cornea and the sclera</td>
<td>Limited tear reservoir capacity</td>
</tr>
<tr>
<td>Full-scleral</td>
<td></td>
<td>16.0 to 22.0 mm</td>
<td>All lens bearing</td>
<td>Limited tear reservoir capacity</td>
</tr>
</tbody>
</table>


https://www.reviewofoptometry.com/ce/todays-scleral-lens
Zones Labels What it actually is

Corneal Chamber
- Base Curve Optical zone curve
- PC1 Secondary curve
- PC2 Limbal curve

Haptic / Scleral
- PC3 Scleral or landing curve
- PC4 Edge curve

Scleral Design

Scleral vs. Corneal GP
- Base on sagittal height:
  - Larger OAD: more sagittal height
  - Smaller OAD: less sagittal height
- Difference in language:
  - Scleral: clearance, vault, impingement, etc, etc...
  - GP: flat, steep, too high, too low, etc, etc...
- Does SAM/FAP still apply?
  - Yes... but there’s still a tear layer to work with
  - Any BC change requires SAM/FAP

Diameter Selection
- Measure HVID
  - Select the appropriate diameter to clear the corneal chamber
  - 1a. ≤ 5.040 ≤ 3rd corneal watershed
  - 1b. ≤ 5.040 ≤ 1st corneal watershed
  - This allows for adequate interlimbal clearance
- Determine your goals
  - Refraction:
    - Start smaller
    - Proceed by 0.5△
  - Pathology:
    - Start larger
    - Start around 6.0
- Patient Comfort
  - More landing zone there is, the more weight distribution there is, therefore better patient comfort

Essilor Sclerals

Configuration Changes of Second Curve / PC1
- Standard 1D flatter than center BC
- Reverse Geometry 4D steeper than center BC
- Advance Keratoconic 4D flatter than center BC

Getting Started
- Training?
- Fitting Set?
- Topography?
- OCT?
- Anterior segment camera?
**ProLOOK**

- A simplified fitting system.
- Fit set: 16.6 OAD
  - 3 trials with symmetric PCs
  - 2 trials with tonic PCs
- Selection will be based on your disease or corneal size.
- Most eyes will fit the “D” Trial which is a 16.6.
- Limited modifications.
- Advance modifications require a switch to the eJupiter design.

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**eJupiter Fitting Method**

- Lens Selection:
  - Base curve diameter:
    - 78.0 / 82.0 / 85.0
  - Profiling
- Improperly evaluate for insertion bubble / tear film:
  - Sodium Chloride Solution 0.9%
  - Not made tear and present
- Allow lens to settle for 20 minutes.
- Fitting evaluation:
  - Alignment / lensing zone
  - Corneal limbal clearance
  - Vault clearance: 16.0 - 20.0
- Vault too low
  - Excessive edge lift / bubbles
  - Excessive movement
- Vault too high
  - Excessive vault
  - Central bubble
  - Excessive limbal clearance
  - Minimal limbal clearance
  - Good limbal clearance

---

**Fit & Design**

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**Fitting Method:**

**CENTRAL ZONE EVALUATION**

- Vault too low
  - Excessive edge lift / bubbles
  - Excessive movement
- Vault too high
  - Excessive vault
  - Central bubble
  - Excessive limbal clearance
  - Minimal limbal clearance
  - Good limbal clearance

---

**Fitting Method:**

**LIMBAL ZONE EVALUATION**

---

**Fitting Method:**

**Landing Zones**

- Steep/tight landing zone → blanching of vessels
- Aligned landing zone
- Flat landing zone → shadowing of edge or edge bubbles

**Compression vs. Impingement**

- **Compression:**
  - Problem with landing zone
  - Can lead to blanching
  - Rebound hyperemia after lens removal
  - To fix:
    - Address landing curve and/or lens curve

- **Impingement:**
  - Problem with edge radius against conjunctiva
  - May show blanching
  - Show accurate staining initially
  - May lead to conjunctival hypertrophy
  - To fix:
    - Address edge curve and/or landing curve

**Fitting Method:**

- Obtain your over-refraction. Aim for SOR.
- If astigmatism is present, check for flexure.
- Checking for flexure: anterior surface should be spherical so obtain K's over the lens.
  - If cylinder similar: consider this ational cylinder
  - If cylinder > 0.75D: consider this flexure
- If internal cyl is present, consider front surface toric (FST).

**Understanding Toricity**

- **Front Surface Toricity (FST):**
  - Optical purposes
  - Toricity added to the front surface to correct vision
  - Requires stabilization

- **Back Surface Toricity (BST):**
  - Lens alignment
  - Toricity added to landing curve and edge radii
  - For asymmetric sclerals
  - Latest design added to 8-10 meridians, usually flat meridian for Eastor
  - Need to address asymmetric sclerals first before adding on FST
  - Same scleral lens can have both FST and BST,
    - Important to finalize BST before incorporating FST.
    - If both FST and BST, markings will be present for indicate FST. If markings are ≤ 360 degrees, then it is in the right position.

**Fitting Method:**

- Evaluate landing zone meridians independently
  - Nasal/temporal
  - Superior/inferior

- Can inform lab of need for toric PCs
  - Usually start at a difference of 1 mm
  - Indicate flat vs. steep toric PCs
  - Ex.:
    - One meridian: L2 = 22.5, R2 = 33.25
    - Other meridian: L3 = 15.75, R3 = 35.25
Parameter Modifications:

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Identify Characteristics</th>
<th>Modify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too much clearance</td>
<td>• Excessive central vault pooling</td>
<td>• Flatten BC</td>
</tr>
<tr>
<td></td>
<td>• May develop steep bubble</td>
<td>• Smaller OAD</td>
</tr>
<tr>
<td>No clearance</td>
<td>• Poor fluorescence</td>
<td>• Steepen BC</td>
</tr>
<tr>
<td></td>
<td>• Low to no tears on apical section</td>
<td>• Larger OAD</td>
</tr>
<tr>
<td>Low clearance mid peripheral</td>
<td>• Low to touch midperipheral</td>
<td>• Add reverse curve</td>
</tr>
<tr>
<td></td>
<td>• Bulb eye pattern</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Usually on oblate corneas</td>
<td></td>
</tr>
<tr>
<td>Excessive limbal clearance</td>
<td>• Conjunctival prolapse over limbus</td>
<td>• Decrease OZ</td>
</tr>
<tr>
<td></td>
<td>• Excessive pooling over limbus</td>
<td>• Flatten limbal curve (but adjust prior curve)</td>
</tr>
<tr>
<td></td>
<td>• May have bubble</td>
<td></td>
</tr>
</tbody>
</table>

Parameter Modification Changes: things to remember
- Remember: Going larger gives more sagittal height
- When changing parameters, sagittal height/vaulting WILL change.
- Assuming the standard widths from fitting set:

<table>
<thead>
<tr>
<th>When you change / steepen the...</th>
<th>By this amount...</th>
<th>Vault will increase by....</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAD/OZ</td>
<td>0.2 mm</td>
<td>~ 40 microns</td>
</tr>
<tr>
<td>Base Curve</td>
<td>1 diopeter</td>
<td>80 – 100 microns</td>
</tr>
<tr>
<td>Reverse Curve</td>
<td>1 diopeter</td>
<td>40 – 50 microns</td>
</tr>
<tr>
<td>Limbal Curve</td>
<td>0.1 mm</td>
<td>30 microns</td>
</tr>
<tr>
<td>Landing Curve</td>
<td>0.50 mm</td>
<td>20 microns</td>
</tr>
</tbody>
</table>

Vault Affects Power
- SAM/FAP:
  - Works well if small sagittal height changes (less than 100 microns)
  - Utilized for BC changes
- What about limbal, landing or edge radius changes? Or diameter change? Or large sagittal height changes in general?
  - Will affect sagittal height
  - Every 100 microns of vault change, adjust for 1/4 diopeter.
  - Increase by 50 microns, add 1/4 diopeter.
  - Decrease by 100 microns, add -1/4 diopeter.

Fitting Application

Let’s do this!

Case 1
Case 1: Initial Exam

- **OD:**
  - Mid-K = 47.18 D
- **OS:**
  - Mid-K = 47.45 D

Case 1: Topography

Case 1: Fitting

- **Assessment:**
  - Mild Keratoconus OD, OS.
- **Plan:**
  - Counseled pt. on specialty lens options.
  - RITE for specialty lens fitting.

Case 1: Fitting

- **Fitting sets:**
  - Jupiter 45.6, 16.6, 18.2
  - Prolook 16.6
- **Determine diameter:**
  - Usually start with 16.6
  - Beginner fitter → Prolook Design

Case 1: BC Selection

- **Method 1:** Base on K’s
  - Since OAD = 16.6:
    - BC = Mid-K
  - Case 1:
    - OD: Mid-K = 47.18 → 46 D trial
    - OS: Mid-K = 47.45 → 48 D trial

- **Method 2:** Base on Ds / Severity
  - Select base on condition and severity
  - Case 1:
    - Lens selection:
      - Mid-keratometry OD, OS → 16 D
      - lem = 48 D
Case 1: Fitting

**Curve OD: Prolook 46D**
- **Evaluation**: OCT shows very mild compression of LZ 360.
- **Modification**: Flatten LZR by 0.5 mm

**Limbal Curve**: Limbal clearance except superonasal None

**Corneal Curve**: Central clearance 339 microns

**Curve OS: Prolook 48D**
- **Evaluation**: OCT shows very mild compression of LZ 360.
- **Modification**: Flatten LZR by 0.5 mm

**Limbal Curve**: Limbal clearance except superonasal None

**Corneal Curve**: Central clearance 475 microns

---

**How Modifications Changes Sagittal Height: OD**

<table>
<thead>
<tr>
<th>Modification for OD</th>
<th>Additional Sag Height</th>
<th>Cumulative Sag Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Sag of 339 microns</td>
<td>Flatten LZR by 0.50</td>
<td>319 microns</td>
</tr>
</tbody>
</table>

**How Modifications Changes Sagittal Height: OS**

<table>
<thead>
<tr>
<th>Modification for OD</th>
<th>Additional Sag Height</th>
<th>Cumulative Sag Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Sag of 475 microns</td>
<td>Flatten BC by 1.5</td>
<td>325 microns</td>
</tr>
<tr>
<td></td>
<td>Flatten LZR by 0.50</td>
<td>305 microns</td>
</tr>
</tbody>
</table>
Case 1: Consultation / Order

- Email consultation:
  - indicate trial:
    - OD: Proclear 4.8 D (-4.50) x 16.6
    - OS: Proclear 4.8 D (-6.50) x 16.6
  - Evaluation
  - Oversecretion
  - Plan:
    - OD: Flaxem 2.4 N by 5 mm, ADD CR
    - OS: Flaxem 2.4 C by 5 D, ADD CR

- Sent photos and OCTs if available and necessary

Case 1: CL Dispense

- CC: Presents for CL Dispense

- Lenses ordered:
  - OD: Proclear 4.0 D (-4.50) x 16.6 20/20
  - OS: Proclear 4.0 D (-6.50) x 16.6 20/20

- Overrefraction:
  - OD: -0.35 20/20
  - OS: -0.35 20/20

Case 1: CL Dispense

- Assessment:
  - Mild keratoconus OU:
    - Adequate fit with scleral lenses

- Plan:
  - RTC 2 weeks in the afternoon with CL FU.
    - Potential changes: Consider flattening s to 1.5 D OD, OS.

Case 2

- Proclear 4.0 D (-4.50) x 16.6
- Proclear 4.0 D (-6.50) x 16.6
- Align 1.75 X 10
- Diffuse central clearance
- Diffuse central clearance around 600 microns
- Mild interlamellar decentration
- Wearable decentration
Case 2

• 26 AF
• CC: Interested in specialty lenses for vision improvement
• MRx:
  - OD: +32.60 x 50 = 20/20
  - OS: +30.00 x 180 = 20/20
• K-reading:
  - OD: 46.68 / 45.06 @ 173
  - OS: 46.68 / 44.16 @ 104

Case 2: Topography

Case 2: Scleral Selection

• Fitting Goal: Refractive purposes → Go smaller
• Genesis Scleral from Metro-Optics:
  - Available in 15, 16 OAD and 18.2 OAD fitting sets
  - Comprised of a central spherical zone and aspheric peripheries
  - Back surface toricity available
  - Front surface toricity available
• Fitting Guide:
  • BC selection = Steep K + 1

vs Mid-K + 1?

Case 2: Mid-K + 1 Method

Case 2: Steep-K + 1 (sort of)
Curve | OD | Evaluation | Modification
--- | --- | --- | ---
Landing Zone | | Align | None
Limbal Curve | | Diffuse +360 | None
Corneal Curve | | Diffuse central clearance (25-50 microns) with low clearance mid-peripheral superonasal | Add +4D rev-curve.
1. Adjust by flattening +2D centrally
2. Flatten by another +1D
3. Apply SAM of +1D

How Modifications Changes Sagittal Height: OD

<table>
<thead>
<tr>
<th>Modification for OD</th>
<th>Additional Sag Height</th>
<th>Cumulative Sag Height</th>
</tr>
</thead>
</table>
| Starting Sag of 350 microns | 4D of Rev-Curve/PC1 | + 200 microns | = 550 microns
| Flatten BC by 2D | - 200 microns | = 350 microns
| Flatten BC by 1D | - 100 microns | = 250 microns

Curve | OS TRIAL 1 | Evaluation | Modification
--- | --- | --- | ---
Landing Zone | | Aligned landing zone | None
Limbal Curve | | Low limbal clearance nasal/temporal | None. For now adjust central curves.
Corneal Curve | | Very low central clearance (25-50 microns) especially superonasal | Add +4D rev-curve.
1. Flatten by -2D centrally
2. Flatten by another -1D
3. Apply SAM of -1D

How Modifications Changes Sagittal Height: OS

<table>
<thead>
<tr>
<th>Modification for OS</th>
<th>Additional Sag Height</th>
<th>Cumulative Sag Height</th>
</tr>
</thead>
</table>
| Starting Sag of 25 microns | 4D of Rev-Curve/PC1 | + 200 microns | = 225 microns
| Flatten BC by 3D | - 200 microns | = 26 microns
| Steepen BC by 3D | + 200 microns | = 250 microns

Case 2: Consultation / Order

- **Email consultation:**
  - Indicate titlks:
    - OD: General, weak near, large
    - OS: Generl, myopic
  - Evaluation
  - **Checklist:
    - PMD:
      - OD: Add +1 D rev-curve. Adjust by flattening +2D centrally
      - OS: Same OD as above
    - Review:
      - OD: Add +1 D rev-curve. Adjust by flattening +2D centrally
      - OS: Same OD as above
  - **Sent photos and DCTs if available and necessary

Case 3

- **35 yr old AF**
  - **CC:** interested in contact lenses; previous corneal GP
  - **MR:
    - OD: +0.75 +0.5 x 90 = +20/30
    - OS: +0.50 +0.5 x 00 = +20/30
  - **K-reading:
    - OD: 44.94/41.98 @ 00
    - OS: 44.79/44.87 @ 00
Case 3: Scleral Selection

- Fitting goal: Refractive → Smaller OAD

- Jupiter Standard 15.6
  - BC Selection = Mid-K + 3

- BC Selection = Mid-K + 2
  - Mid-K = 43.46 + 1 = 44.46
  - Mid-K = 43.21 + 2 = 45.21

- Trial selection:
  - OD Jupiter Standard 45 D/2.50/15.6
  - OS Jupiter Standard 44 D/4.00/15.6

Sclerals for Astigmatism

- Great option for patients with astigmatism
- Like spherical corneal GPs, scleral GPs can mask the amount of cylinder
- Unlike spherical corneal GPs, sclerals are more stable on the eye which is ideal for a toric design.
- If residual astigmatism is present, you can consider a front surface toric.

How Modifications Changes Sagittal Height: OD

<table>
<thead>
<tr>
<th>Modification for OD</th>
<th>Additional Sag Height</th>
<th>Cumulative Sag Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec OZ by 0.40 mm</td>
<td>- 80 microns</td>
<td>= 70 microns</td>
</tr>
<tr>
<td>Steepen by 1 D to compensate</td>
<td>+ 100 microns</td>
<td>= 170 microns</td>
</tr>
<tr>
<td>Add 4 D reverse curve</td>
<td>+ 200 microns</td>
<td>= 370 microns</td>
</tr>
<tr>
<td>Flatten by 2 D to compensate</td>
<td>- 200 microns</td>
<td>= 170 microns</td>
</tr>
<tr>
<td>Steepen BC by 0.5 D.</td>
<td>+ 50 microns</td>
<td>= 220 microns</td>
</tr>
</tbody>
</table>
Case 3: Consultation / Order

- Email consultation:
  - Indicate trial:
    - OD: Barraquer Standard 4.0 D, +5.00 / 090
    - OS: Ciba Standard 4.0 D, +5.00 / 090
  - Evaluation
    - Overrefraction
    - Plan:
      - OD:
        1. Decrease OAD by 0.4 mm. Steepen OD to compensate.
        2. Add 4 D reverse curve and flatten OD to compensate.
      - OS:
        1. Dec OAD by 0.4 mm and steepen OD to compensate.
        2. Add 4 D reverse curve and flatten OD to compensate.
        3. Steepen OD by 1.5D.
  - Sent photos and OCTs if available and necessary.

Case 4

- CC: blur at distance and near

- MR:
  - OD: +0.25 +0.25 x 004
  - DS: +0.25 +0.35 x 165

- K-reading:
  - OD: 44.75 / 47.75 @ 102
  - OS: 44.75 / 47.35 @ 083
**Case 4: Scleral Selection**

- Refractive goal \(\rightarrow\) Smaller
- Jupiter Standard \(35.6\) Fitting Set
- \(\text{BC Selection} = \text{Mid}K + 1\)
  - \(\text{Mid}K = 44.75\)
  - \(\text{Mid}K = 44.00\)
- \(\text{Trial selection:}\)
  - OD Jupiter Standard \(46.00 / 35.6\)
  - OS Jupiter Standard \(45.00 / 35.6\)

**Case 4: Fit Evaluation**

- OD JUPITER \(46.00 / 35.6\)
  - Impingement temporal \(\rightarrow\) nasal, aligned superior/inferior
  - Minimal limbal clearance superiorly
  - 300 microns of central clearance but displaced inferior
- OS JUPITER \(45.00 / 35.6\)
  - Impingement nasal
  - Minimal limbal clearance superiorly
  - 300 microns of central clearance but displaced inferior

<table>
<thead>
<tr>
<th>Curve</th>
<th>OCT/REAL</th>
<th>Evaluation</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landing Zone</td>
<td>Impingement temporal (\rightarrow) nasal, aligned superior/inferior</td>
<td>Add 0.75 mm flat toric PC</td>
<td></td>
</tr>
<tr>
<td>Limbal Curve</td>
<td>Minimal limbal clearance superiorly</td>
<td>Steepen limbal curve by 0.20 mm. Compensate by flattening BC 0.5 D</td>
<td></td>
</tr>
<tr>
<td>Corneal Curve</td>
<td>300 microns of central clearance but displaced inferior</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

**How Modifications Changes Sagittal Height: OD**

- Modification for OD
- Additional Sag Height
- Cumulative Sag Height

<table>
<thead>
<tr>
<th>Starting Sag of 300 microns</th>
<th>Add 1 mm flat toric PCs</th>
<th>+ 0 microns</th>
<th>= 300 microns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steepen limbal curve by 0.2 microns</td>
<td>+ 60 microns</td>
<td>= 360 microns</td>
<td></td>
</tr>
<tr>
<td>Flatten by 0.5 D to compensate.</td>
<td>- 50 microns</td>
<td>= 310 microns</td>
<td></td>
</tr>
</tbody>
</table>

**How Modifications Changes Sagittal Height: OS**

- Modification for OD
- Additional Sag Height
- Cumulative Sag Height

<table>
<thead>
<tr>
<th>Starting Sag of 250 microns</th>
<th>Add 0.75 mm flat toric PCs</th>
<th>+ 0 microns</th>
<th>= 250 microns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steepen limbal curve by 0.2 mm</td>
<td>+ 60 microns</td>
<td>= 310 microns</td>
<td></td>
</tr>
<tr>
<td>Flatten BC by 0.5 D</td>
<td>- 50 microns</td>
<td>= 260 microns</td>
<td></td>
</tr>
</tbody>
</table>
Case 4: Over-refraction

- SCOR /VA
  - OD: $+1.25 \times +1.25 \times 0.75$
  - OS: $+1.25 \times +1.25 \times 0.75$

- Masking of cylinder
  - OD: $60$ of corneal cyl
  - OS: $45.0$ of corneal cyl

- Residual cylinder or flexure?

Flexure “bending”

- More common in:
  - High DK materials
  - Thin center thicknesses
  - Steep BCR
  - Large optical zone

- Flexure determinations: Over-K's
  - Spherical front surface should produce spherical Ks.
  - If over-K cyl = OR cyl assume flexure.
  - If little to no over-cyl assume residual astigmatism.

Case 4: Residual Astigmatism or Flexure?

- SCOR /VA
  - OD: $+1.25 \times +1.25 \times 0.75$
  - OS: $+1.25 \times +1.25 \times 0.75$

- Masking of cylinder
  - OD: $60$ of corneal cyl $\rightarrow$ almost equal to manifest cyl
  - OS: $45.0$ of corneal cyl $\rightarrow$ almost equal to manifest cyl

- Over-Ks:
  - OD: $45.12/40.08 \times 0.75$ (diff of about $1.5^\circ$) $\rightarrow$ FLEXURE
  - OS: $41.12/40.08 \times 0.75$ (diff of about $1.5^\circ$) $\rightarrow$ FLEXURE

Flexure in Sclerals

- Flexure can cause some complications:
  - Tightening of the lenses causing discomfort
    - Particularly in cases where corneal
    - Reduced accuracy
  - Tends to be less of a problem in sclerals versus corneal
    - Due to sclerals being naturally thicker

- How to fix it:
  - Increase CT
  - Consult with the labs.

Case 4: Consultation

- Indicate trials:
  - OD: Jupiter Standard $45^\circ / 40.00 / 35.6$
  - OS: Jupiter Standard $45^\circ / 40.00 / 35.6$

- Evaluation: Indicate flexure
- Over-refraction: spherical equivalent only

- Plan:
  - OD:
    - Add a mm flat two PC
    - Choose lens that falls into 30mm
    - Compensate by flattening BC a 0.50
    - Address flexure
  - OS:
    - Add a 25 mm flat two PC
    - Choose lens that falls into 30mm
    - Compensate by flattening BC a 0.50
    - Address flexure

Case 4: Residual Astigmatism or Flexure?

- SCOR /VA
  - OD: $+1.25 \times +1.25 \times 0.75$
  - OS: $+1.25 \times +1.25 \times 0.75$

- Masking of cylinder
  - OD: $60$ of corneal cyl $\rightarrow$ almost equal to manifest cyl
  - OS: $45.0$ of corneal cyl $\rightarrow$ almost equal to manifest cyl

- Over-Ks:
  - OD: $45.12/40.08 \times 0.75$ (diff of about $1.5^\circ$) $\rightarrow$ FLEXURE
  - OS: $41.12/40.08 \times 0.75$ (diff of about $1.5^\circ$) $\rightarrow$ FLEXURE

What if the Over-Ks were spherical?
Front Surface Toric

- Markings are translucent dots
  - Usually on the flat meridians
- Check to make sure that the fit and landing zones are appropriate
  - This can affect where the lens (and marking) will land.
- If adequate fit, assess markings:
  - Acts like a soft contact lens in terms of rotation.
  - LARS

Scleral Dispense

- Prior to patient visit:
  - Clean lenses
  - Soak in Boston conditioning solution to allow for greater wettability
  - Verification
  - Power
  - Align eye in left eye
- Establish scleral wearers?
  - If marginal fit with established scleral lenses, ask patient to discontinue wear that day for a fresh dispense
- Depending on your EMR:
  - Document reference # of order on your examination
  - Otherwise can document all parameters

Insertion

- Methods of insertion:
  - DMV inserter
  - Pinger
  - Slinger
- Solution: most neutral solution
  - Undercare solution
- Instructions:
  - Have the patient look straight ahead.
  - Gently lift the upper eyelid with your index finger until the patient's eye is parallel to the floor.
  - Grasp the lens from the fundus using a sterile index finger and thumb, and slowly bring the lens to the center of the cornea.
  - Lower the lens gently into the patient's eye.

Removal

- Due to strong capillary forces of scleral to the ocular surface, best to remove from the edges then centrally
- Instructions:
  - Have the patient look straight ahead.
  - Gently use the lower lid to massage the edge of the lens. This will help break the suction of the lens.
  - Aim the DMV towards the edge of the lens.
  - Pull outward and up.
Problem Causes Solution

Air Bubbles Due to insertion (infrequent bubble) or inadequate fit (common bubble).
• If due to insertion, remove and fill solution to rim of the scleral.
• If due to inadequate fit, look at location of bubble and address fit. Will likely need to flatten BC.

Bulbar Redness Can be due to hypoxia, toxicity, or pressure on the limbus or cornea.
• Make sure it is not due to external factor.
• Change material to high dK.
• Change solution and fluid to non-preserved agent.
• Address fit. Perhaps there is too much compression so consider reducing vault.

Sectorial Conjunctival Blanching Can be due to differences in scleral toricity or external condition such as pterygium or pinguecula.
• Consider toric landing zones.
• Consider notch.

Circumferential Blanching Due to inadequate landing zone.
• If sclera inside edge of lens is blanched, consider increasing landing zone width and/or flattening curve.
• May need to address limbal curve if steepness starts there.

Care System

• Disinfecting agent:
  - Peroxide-base solution
  - i.e. Clearsilk
  - Boston Advance
  - Unique PH
  - Boston Simplis

• Cleaning:
  - Daily cleaning:
    - Alcohol-based tends to work well for lipid deposition
    - 2% chlorhexidine in PFG
    - Abrasive cleaner works well for protein build-up
    - Ca. Biotec cleaner
    - Can alternate the lens

Scleral Follow-Up

• Best to do after a few hours of wear
  • Afternoon vs. morning follow-ups
  • Lenses settle by about 300 microns by the end of the day!

• Prior to seeing OD:
  • Add fluorescein on the eye (without scleral removal?)
  • Tear exchange within 30 minutes
  • Can obtain AR / open up OCTs if necessary

• Examination:
  • VA check
  • DR if necessary
  • Evaluate - Modify or finalize.

Consultation

• Capsule
• Tech
• Fit
• Advisor
• Note
• Consultation time

Today’s Sclerales

• Scleral topography
  • @3DMap
  • Gen map as well as soft contact lenses
  • 3D printed: Silicone is custom and can be worn by patients

• Impression molding: EyePrint Pro
  • Impression obtained in office and sent to lab to be created
  • Option for patients with highly irregular sclera

• Quadrant specific peripheries: several brands
  • @3Form Dermo

• Multifocal options: several companies

• Tangible Science Hydra-PEG™

Tangible Science Hydra-PEG™

• Hydra-PEG:
  - PEG = Polyethylene glycol
  - Preservative free
  - Biocompatible

• Lens coating:
  • Improves wearability
  • Improves water retention on the surface of the lens
  • Decreases the amount of deposits
  • Decreases the chance of mid-lens fogging

• A true coating meaning care system is important.
  • Avoid abrasive cleansers

• Offered by many labs now, offered on Contamac materials

Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Causes</th>
<th>Solution</th>
</tr>
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Problem Causes Solution

Corneal staining
• If localized staining, consider mechanical interaction of lens and the corneal hinge or hingeless design.
• If diffuse staining, consider toxicity or hypoxia.
• Readdress proper insertion/removal. Consider different technique or assistance.
• Change solution/wetting/disinfecting agent or higher dK material.

GPC Can be due to more eyelid interaction with the sclera.
• Use of intensive cleaning agents.
• Decrease risk of toxicity and antigens.

Scleral suction problems with flexure or compression of landing zone.
• Thicken junctions.
• Consider flatter landing zone.

Mid-day fog
• May be due to inadequate tear pump, low Dk/t or interaction with conjunctival tissue.
• Ocular surface disease.
• Address any impingement issues.
• Avoid excessive or minimal corneal vault; aim for tear layer similar to thickness of scleral.

Debris in tear film
• Underlying ocular surface disease.
• Consider solution that is neutral.
• Switch to inhalation if not already on it.
• Address ocular surface disease.
• Consider flatter landing curves for better tear fluid pump.

Resources

• Scleral Lens Education Society
  • http://www.sclerallens.org
  • IRS Video
• “A Guide to Scleral Lens Fitting”
  • http://commons.pacificu.edu/mono/4/
  • Download a booklet for reference
  • Colorphotos
• Contact Lens Spectrum
• Global Specialty Lens Symposium
• Annual Meeting in Vegas

References