Overview

- Clinical Indications
- Advantages and Challenges
- Terminology
- Anterior eye anatomy
- Basic Design Features
- Instrumentation
- Fitting basics – lens selection, fitting, evaluation, follow-up
- Case presentations highlighting: Tips and Troubleshooting

Clinical Indications

- Vision Improvement
  - Correcting the irregular cornea
    - Corneal Ectasia
      - Primary – Keratoconus, Keratoglobus, Pellucid marginal degeneration (INTACS, CXL)
      - Secondary – post-refractive surgery, corneal trauma
    - Corneal Transplant
    - Corneal Degenerations
    - Normal Cornea
      - Presbyopia, moderate to high corneal astigmatism

- Ocular Surface Protection
  - Dry Eye
  - Incomplete lid closure

- Cosmetic/Sports
  - Hand-painted scleral lenses
  - Ptosis
  - Water sports

Advantages of Scleral GPs vs Corneal GP

- Centration
  - Fitting a “regular” part of the eye
- Lens Retention
  - Minimal chance of inferior standoff
- Comfort
  - Reduced lid interaction; no corneal interaction
- Vision
  - Masking severe corneal irregularity

Challenges associated with scleral lenses

- Handling
  - Difficult I and R (initially)
  - Apprehensive patients
- Fitting
  - Subtle fit indications
  - Increased chair time
- Physiology
  - Dk/L – Oxygen must diffuse over great distance
  - Long-term effects of scleral lens wear are unknown
Terminology

- Classification
  - Corneo-scleral: 12.9mm to 13.5mm
  - Semi-Scleral: 13.6mm to 14.9mm
  - Mini-Scleral: 15.0mm to 18.00mm
  - Full-Scleral: 18.1mm to 24+

Anatomy and Shape of the Anterior Ocular Surface

- Maximum scleral lens size for normal eye: 24mm
- Scleral Shape Study

Anatomy and Shape of the Anterior Ocular Surface

- Clinical Consequences
  - Temporal-Inferior decentration of scleral lenses
    - Inferior decentration
      - Weight/gravity
      - Eyelid pressure
    - Temporal
      - Flatter nasal elevation
  - Conjunctival Prolapse

Basic Design Features

- Spherical Design
  - Concentric symmetrical (spherical) scleral lens
  - Non-toric back surface
- Optic Zone
  - Centermost zone
  - Optics/Lens power
    - Anterior surface
  - Back surface
    - Ideally mimics corneal shape
    - Completely vaults cornea

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Basic Design Features

- Spherical Design
  - Concentric symmetrical (spherical) scleral lens
  - Non-toric back surface

  **Transition Zone**
  - Mid-periphery or limbal zone
  - Creates the sagittal height
  - Can be reserve geometry
  - Completely vaults limbus

- Toric Lens Designs
  - Front
    - Anterior surface front toric optics to improve vision
    - Located on the front surface of the central optical zone
    - Indicated when residual cylinder over-refraction is found
    - Needs stabilization
      - Dynamic stabilization zones or prism ballast
      - LARS

- Toric Lens Designs
  - Back
    - Landing zone is made toric to improve fit
    - Does not interfere with central zone of scleral lens
    - Better ocular health
      - Fewer areas of localized pressure
      - Decreased bubble formation
      - Longer wearing time and better patient comfort
    - More frequently needed in larger diameter sclerals

- Toric Lens Designs
  - Bitoric
    - Front surface toric optical power
    - Back surface toric periphery
    - No need for lens stabilization

- Multifocal Scleral lens design
  - Simultaneous Multifocal Lens Design
    - Aspheric or concentric
    - Center Near and Center Distance Designs
Basic Design Features

- Lens Material
  - High Dk lens material; plasma or hydrapeg
    - Considerably thicker when compared to corneal GP
    - 250 microns to 500 microns
  - Optimum Extra, Boston XO, Tyro 97

- Increasing Oxygen transmissibility
  - 1. high Dk material
  - 2. minimal tear clearance behind the lens
  - 3. Reduced center thickness of the lens

Example Parameters:
- BC: 7.50
- PC1: 7.85 (if reverse geometry 6.89)
- PC2: 9.00
- PC3: 12.25
- PC4: 14.00

Fitting Basics

- Completely vault the cornea and limbus while aligning to the bulbar conjunctiva

How can I vault a steep cornea with a flat lens?

BC much flatter than “K”

Very steep cornea

Fitting Basics

- 1. Diameter
- 2. Clearance
- 3. Landing Zone Fit
- 4. Lens Edge
- 5. Asymmetrical Back Surface Design
  - Some trial sets are toric back surface

Fitting Basics

- 1. Diameter
  - Choose a Fitting Set
    - Direct vs Indirect control
  - Laboratory warranty/exchange policy
  - Overall Diameter
    - Larger – more clearance needed, ectasias
    - Smaller – easier to handle, less clearance
Fitting Basics

• 1. Diameter
  – HVID
    • <12mm
      – Start with a 16.0 or smaller lens
    • >12mm
      – Start with a 16.0 or larger lens
  – Diameter of the optical zone and the transition zone chosen roughly 0.2mm larger than the corneal diameter

Fitting Basics

• 2. Clearance
  – Minimum of 100 microns
  – Typically aim for 200-300 microns after settling
  – Maximum of 600 (if desired)
  – Base Curve Determination
    • Select an initial base curve that is flatter than the flat k value

Fitting Basics

• Evaluate overall corneal chamber appearance
  – Diffuse beam, low mag, medium illumination
  – Observe centration, areas of bearing, tear lens appearance, look for bubbles

Fitting Basics

• Evaluate central clearance
  *Compare lens thickness to tear lens thickness and estimate central clearance in microns

Fitting Basics

Look for continuity of the tear lens...

Acceptable clearance:

Too little clearance:
Fitting Basics

• Change lens base curve/sagittal depth until desired central clearance is reached
  – Considerations:
    • All scleral lenses will settle over a period of hours
    • Expect ~90 to 150 microns settling
    • Aim for 150 to 300 microns after settling
    • Build-in settling time into fitting session ~30 min

Fitting Basics

• UMSL Study:
  – No significant settling after 4 hours of wear
  – Most settling within the 1st hour
  – Large Diameter Scleral settle ~90 microns, slower
  – Mini Scleral ~130 microns, faster

Fitting Basics

• Evaluate remaining corneal chamber
  – Optic Section
  – Sweep limbus to limbus noting tear lens thickness
  – Looking for tears in optic section beyond the limbus and should increase in thickness toward the central cornea
  **Adequate limbal clearance is critical for an acceptable fit and good tear exchange**

Fitting Basics

• Anterior Segment OCT

Fitting Basics

• 3/4. Landing Zone Fit/Edge
  • Bulbar conjunctival vessels
  • Look for blanching
    – Inappropriate scleral curve alignment
    – Typically indicates PC is too tight
    – Or new toric back surface haptics
  • Confirm no lens movement

Fitting Basics

• Ideal alignment when vessels course unobstructed under the scleral curves
Fitting Basics

• Properly fitted scleral curves
  ▸ Vessels course unobstructed
  ▸ No blanching seen
  ▸ No movement
• Improperly fitted scleral curves
  ▸ Blanching seen in primary gaze
  ▸ Patient discomfort likely
  ▸ Difficult removal
  ▸ Redness after removal

Fitting Basics

• Anterior Segment OCT

Fitting Basics

• 5. Asymmetrical Back Surface Design
  – Allows for more equal pressure distribution
  – Can help center a inferiorly decentered lens
  – Flat and steep meridian
    ▸ Can adjust either independently
    ▸ Flat meridian is typically marked
    ▸ Will lock into place
    ▸ Usually has a dot for correct insertion

Fitting Basics

• Over-Refraction
  – Expect close to spherical OR
  – If OR yields significant cylinder check - flexure
    ▸ Do over-keratometry or over-topography
  – Residual Cylinder
    ▸ Front surface toric
    ▸ Usually has a great visual outcome

Fitting Basics

• Design and Order
  – Often lens modifications will need to be made from the best trial lens fit
  – Lab Consultants are helpful
    ▸ Some warranties require consultation when re-ordering
Fitting Basics
Scleral Lens Handling

• Insertion
  – Prepare Lens
    • Large DMV
    • Clean lens, rinse
    • Fill with non-preserved sol
      – 0.9% NaCl inhalation sol
      – Off label: Addi-pak, modudose
      – Lacripure, scleral-fil
      – Refresh Optive single vials
      – Celluvisc

• Removal
  – Loosen Lens – gently nudge lens
  – Medium DMV
    • placed on inferior portion of lens
  – Hold both lids

Fitting Basics
Lens Insertion

• Place paper towels on patient’s lap
• Have patient tuck chin to chest and look straight down
• Have patient hold lower lid
• Clinician hold upper lid
• Insert lens straight onto cornea
Fitting Basics
Scleral Lens Handling

- Educate patient about proper lens orientation upon insertion
  - Dots at 6 o'clock

Parameter Considerations

- Common Parameter Changes:
  - Sagittal Height
  - Overall diameter (OAD)
  - Optic Zone Diameter (OZD)
  - Base Curve (BC)
  - PC width
  - PC radius of curvature
  - Center Thickness

Parameter Considerations

- Common Parameter Changes:
  - Adjustments to the transition zone
  - Allows clinician to increase or decrease central lens clearance without adjusting base curve or peripheral lens curves
  - Indicate to lab the amount of clearance you want to gain or lose

Parameter Considerations

- OZD changes: often done to improve fit
  - OZD increase without BC compensation

Parameter Considerations

- Increase OZD with BC compensation
  * Increased OZD without increasing sagittal height of lens
Parameter Considerations

- Common Parameter Changes:
  - Base Curve (BC)
    - Typically adjusted during initial fit
    - Flatter base curve to address peripheral lens tightness or excessive central clearance
    - Steeper base curve to increase central clearance or loose periphery
  - If you need to adjust the central clearance, but you are happy with peripheral alignment
    - Adjust sagittal height NOT base curve

- Scleral Curve Changes
  - Steeper PCs
    - Sag: 2.8 mm
    - 100 mic
  - Flatter PCs
    - Sag: 2.7 mm

Tips for Fitting

1. Go flatter than flat K value for initial lens selection
2. Use Fluorescein for initial lens selection
   - Use BLUE Light – GET THE PICTURE
   - Use WHITE Light – to evaluate everything else
3. Analyze Superior and Inferior lens edges in Primary Gaze
4. Try not to make parameter changes at dispensing

Tips for Follow-up

1. Ask patient: “How do you take care of your lenses”
2. Follow-up should be at least 2 hours after lens insertion
3. Paint the front of the lens to look for fluid exchange
4. Remove lens and evaluate cornea

Troubleshooting

- Problem: Decreased vision after insertion
  - Often caused by mucin build-up in tear lens
  - Begins ~30 min to 4 hrs after insertion

Patient states vision gets foggy after 2 hours of wear and gradual decreases in clarity over time ~200 microns clearance OD/OS
NaFL seeps under lens superiorly OD and 360 OS
Re-order: steeper PC OU
Troubleshooting

• **Problem:** Decreased vision after insertion

• **Possible Solutions**
  – Reinsert lens with fresh solution/ use solution mixture
  – Rx lid hygiene
  – Rinse eye prior to insertion
  – Refit with decreased central clearance/better peripheral alignment
  – Change lens material or Lens coating – Hydra-PEG

Troubleshooting

• **Conjunctival Prolapse**
  – Caused by negative pressure under the lens
  – More prominent in patients with loose conjunctival tissue or elderly patients

• **Solution**
  – Fit a asymmetrical back surface scleral lens to help alleviate the problem

Troubleshooting

• **Problem:** Diffuse Corneal Staining on follow-up
  – Due to fill media, care systems, AT’s or meds
  – Can be difficult to isolate cause
  – Can be more significant if tear exchange is low

• **Possible solutions:**
  – Switch Care systems
  – Rx 0.9%NaCl inhalation solution
  – Completely rinse MPS off lens
  – Confirm compliance with prescribed care

A severe case of stain

– 27 yo patient with Keratoconus OU
  • Wearing scleral lens OU – 2014
  • Hx of Corneal Crosslinking OU ('09)

• Presents 7/2017
  – Cc: blurred vision OS> OD
  – using clear care to clean lenses
  – sometimes sleeps in lenses
  – uses Boston Advance to fill lenses prior to insertion...
A severe case of stain

- 27 yo patient with Keratoconus OU
  - VA: 20/30 OD, 20/125 OS
  - SLE: Punctate staining OU, mild corneal edema OS
  - 150 microns clearance OU
  - Adequate limbal clearance
  - No peripheral blanching or impingement
- Plan: educated patient about proper lens care; RTC 1 week fitting

Troubleshooting

- Problem: Poor surface wetting
  - MGD can contribute / cause problem
  - Multipurpose Solution (MPS) may cause problems
  - Lens Material
- Possible Solutions:
  - Evaluate lid margins / tear film
  - Prescribe lid hygiene if necessary
  - Change MPS / Lens material
  - Lens Coating – hydra-PEG

Troubleshooting

- Problem: Corneal edema at follow-up
  - Can arise after weeks / months => f/u is important!
  - More common in post PK corneas
  - Higher risk in corneas with low endothelial cell count
  - Consider Dk/L as Dk is likely not the issue
- Possible Solutions:
  - Prevention: do endothelial cell count before fitting (1000 +?)
  - Scrutinize grafts at every visit!
  - Educate graft patients on symptoms of rejection: pain, light sensitivity, redness, blurred vision
  - Pain, light sensitivity, redness, blurred vision

Case TS: KCN and Fuchs

- Zenlens
  - Lens diameters of 16.0 mm and 17.0 mm – appropriate for a wide range of corneal sizes
  - Prolate and oblate designs to fit a wide range of corneal shapes
  - Smart Curve™: modify only the parameter you want, not the ones you don’t
  - Unique Options: Toric PC, MicroVault

Case TS: KCN and Fuchs

- Zenlens – initial lens selection
  - 16.0 diameter: 11.7 mm or smaller HVID
  - Prolate: KCN or normal cornea
    - Mild KCN or normal cornea
      - 4500 (16.00) sag / 4900 (17.0mm) sag
    - Advanced KCN
      - 4800-5500 sag
  - Oblate: Post graft, post refractive surgery, degenerations
Case TS: KCN and Fuchs

- Zenlens – assessment of fit
  - 1. Proper Central Vault
    - Adjust Lens SAG
  - 2. Mid-Peripheral Clearance
    - Adjust Base Curve
  - 3. Limbal Clearance
    - Adjust limbal clearance curve
  - 4. Scleral Alignment
    - Adjust peripheral curve

Case TS: KCN and Fuchs

- Keratoconus and Fuchs! Oh My!
  - At one year follow-up: family History of Fuch's

Troubleshooting

- Problem: Discomfort after several hours of wear
  - Poor peripheral fit
  - Lens is too small to support its weight
  - Corneal chamber too small

- Possible solutions:
  - Adjust peripheral systems for proper alignment
  - Increase surface area of scleral curves
  - Increase OAD or corneal chamber size if appropriate

Troubleshooting

- Problem: Lens hurts upon removal with subsequent difficulty wearing it the next day
  - Poor peripheral fit – scleral compression
    - Causing rebound hyperemia and inflammation

- Possible solutions:
  - Changing Diameter
  - Changing peripheral curves

Troubleshooting

- Problem: lens hurts upon application but otherwise the eye feels fine
  - Mucus may adhere to back surface of lens

- Possible Solutions
  - Clean inside of lens bowl daily
  - Rx Progent (Menicon) to remove mucus
Troubleshooting

• Problem: Bubbles under the lens
  • Too much sagittal height/too flat peripheral curves
    – Improper insertion
    – Fenestration hole
• Possible Solutions:
  – Fill bowl completely with solution prior to insertion
  – Remove fenestration hole
  – Central bubble: Adjust lens parameters to decrease sagittal height
  – Peripheral bubbles: steepen peripheral curves or increase lens diameter

Troubleshooting

• Problem: Lens Fogging
  – Non-wetting lens
• Possible Solutions:
  – Change solutions
  – Polish lens surface
  – Avoid lotions with lanolin base
  – Plasma coat lens / Hydra-PEG

Patient GH (age 63)

• History: RK OU; 1991
• Lens history: Corneal Rev geo lenses; SO2 Clear
  – Discomfort OU in CLS, gets worse as day goes on, blurred vision, boston simplus solution, OD 1 month old; OS 1 year old
• Examination findings
  – 20/50 OD 20/25+ PH
  – 20/40 OS 20/25+ PH

Patient GH

• Lens Fitting
  – Diameter selection
    • Pt happy with current 14.5
  – Base curve
    • Current lenses 7.5
  – Valley Contax - Custom Stable Scleral Lens
    • 14.8 – 17.8 diameters
    • Toric PC and MF options

Central Touch in both eyes

Patient GH

• Examination findings
  – +2.25 -2.25 090 20/40+ +1.75 add
  – -1.00 -1.25 x 050 20/40+ +1.75 add
  – SO2Clear Aspheric Cone (fit in 2013)
  • OD: 7.50 / -7.00 / 14.5 20/50
  • OS: 7.5 / -7.50 / 14.5 20/40

• Lens Fitting Custom Stable Scleral Lens
  • OD: 7.5 / 14.8 / -4.00 OR -5.00 20/30
    – Good fit peripheral; minimal clearance centrally
      – Order changes: steepen the limbal curve to provide more central clearance
  • OS: 7.18 / 14.8 / -2.75 OR -2.75 20/25
    – Tight limbal curve with inferior blanching; excessive central clearance
      – Order changes: flatten limbal curve to decrease central clearance; flatten scleral curve to decrease peripheral compression
Patient GH

• Follow-up - Custom Stable Scleral Lens
  • OD: 7.5 / 14.8 / -8.75 1.5 steep limbus
    – 20/40; adequate central clearance
    – OR: +1.25 -1.50 x 010 20/30
  • OS: 7.18 / 14.8 / -8.75 1 flat limbus; 1 flat scleral
    – 20/40; adequate central clearance
    – OR: +0.50 -1.75 x 160 20/40+

– Patient notes improved comfort and vision with new lenses.

Patient CR (age 23)

• History: KCN OU
  – First presented for a new Hybrid Rx in summer 2016
  – Returned to clinic 8 months later with complaints:
    • Burning upon lens instillation OU; using Clear Care
    • Switch to Biotrue – now notes haze throughout the day....

• Current Lenses: Ultrahealth Hybrid OU
  – OD: -6.00 / 250 vault / medium skirt 20/20-
  – OS: -7.00 / 250 vault / flat skirt 20/20

• First Question: did you forget to replace your Clear Care case.......

Patient CR

• Yes – she forgot to replace her clear care case!

Patient GH

• Custom Stable Scleral Lens
  • OD: 7.5 / 14.8 / -7.50 -1.25 x 013 20/30
    – 1.5 steep LCZ
  • OS: 7.18 / 14.8 / -8.25 -0.75 x 162 20/40-
    – 1 step flat LCZ; 1 step flat SLZ

– Patient notes improved comfort and vision with new lenses.

• Patient is interested in exploring other lens options.
  – Wants comfortable lenses
  – Re-fit patient in a scleral lens

Patient CR
Patient CR

- MR:
  - OD -9.00 -3.25 x 047
  - OS -12.00 - 2.00 x 015
- Average K’s OD ~ 51  OS ~49
- Select a scleral lens slightly flatter than ave K
  - 7.18 (47.00D)
- Diameter
  - Ultrahealth lenses 14.5
  - No issues with I and R – selected 15.8

Patient CR

- 7.18 / 15.8 / -6.00 OU
  - OD OR +1.00 -1.50 x 125  20/20
    - Excessive central clearance; peripheral alignment
  - OS OR +0.25 20/20
    - Excessive central clearance; peripheral alignment

Patient CR

- Ordered/Dispensed: 7.18 / 15.8 OU
  - OD: -5.00 -1.50 x 125; 1.25 steep Limbus 20/20
  - OS: -5.75; 1.00 steep Limbus 20/20

Patient TH (age 19)

- Presents for a contact lens evaluation
  - New diagnosis of KCN, age of 16
    - Never worn correction
    - Dad just wants him to have surgery!
      - Autism, ADD, plays Cello and video games
      - Student
  - 20/60 OD  20/400 OS
  - PH 20/30  20/60
Patient TH (age 19)

- MR
  - -13.00 -3.00 x 030  20/50
  - -9.50 -2.50 x 090  20/100
- SLE: KCN OU; significant central scarring OS

Patient TH

- Small diameter scleral lens
  - Patient has an amazing blink reflex....

- 43.00 / 15.8 / -2.00 OR -0.75 20/25
  - 210 micron clearance, good periphery
- 47.00 / 15.8 / -6.00 OR -1.00 20/50
  - 113 micron clearance, good periphery

• Adjust limbal curve  0.50 OD / 1.00 OS steeper

Patient TH

- Dispensing
  - 43.00 / 15.8 / -2.75  20/20-
  - 47.00 / 15.8 / +7.00  20/50 OR -0.50 20/30+
- I and R training......
Patient TH

- Follow-up
  - OD 20/20: OR +0.50 20/20
    • Central clearance good; slight blanching 5-6 o'clock
  - OS 20/30: OR pl
    • Slightly tight periphery 360; central clearance good
- I and R update
- Re-order
  - OS only: 1 step flat PC

Patient TH

- OD 20/20
  - 258 micron central clearance
  - Alignment in periphery
- OS 20/50
  - 342 central clearance
  - OR: -0.50 20/30+
    • Decrease central sag 50 microns
  - Re-order OS again
    - 47.00 / 15.8 / -7.50
    - Limbal 0.50 step steep
    - Periphery 1 step flat

Patient BK, age 33

- History: KCN OU (Dx age 15); intacs OD
- Lens history: corneal GP lenses; piggyback OD
- Current lenses:
  - OD: -7.00 / 7.85 / 10.0 20/70+
  - OS: -5.25 / 7.25 / 10.0 20/50+
- MR
  - OD: -6.25 – 3.75 x 065 20/20
  - OS: -8.25 – 5.50 x 109 20/20

Patient BK

- Lens selection
  - Specialty Corneal
  - Scleral
- K values
  - OD: 44.5D / 47.4D
  - OS: 45.4D / 47.6D

Patient BK

- Intralimbal (prism 1.25 OU)
  - OD: 7.85 / 11.2 / -4.37 – 1.50 x 145
  - OS: 7.34 / 11.2 / -8.00 – 1.75 x 014
  - 20/25+ OR: -0.50 20/20
  - 20/40: OR: -0.75 20/30

Patient BK

- Lens fitting
  - Intralimbal; previous lenses wear 10.0
  - OD: 7.85 / -1.12 / 11.2 OR: -3.25 -1.50 x 145
    - 20/20
  - OS: 7.34 / -1.75 / 11.2 OR: -6.75 – 2.00 x 014
    - 20/20
Patient BK

• OD:
  - Good visual outcome
  - Centrally good lens to cornea relationship
  - Inferior edge lift

• Re-order
  - OR
  - 2 steps steep inferior quad only

• OS:
  - Poor visual outcome
  - Bubble and steep fit
  - Re-fit smaller diameter
    - See if can improve vision without front surface toric
    - Looking for improved fit

Patient BK

• OS: Dyna-Z cone
  - -4.00 / 7.20 / 8.8  OR -6.75  20/20
  - Central alignment
  - Inferior edge lift
  - Order
    • OR
    • 2 steps steep inferior quad

Patient BK

• Final lenses??:
  - OD…… / Corneal OS

• Patient experienced discomfort with new intralimbal.
  - Attempted fit with reverse geometry IL

Patient BK

• Patient is unhappy with visual outcome with soft toric (not surprising)
• He lives 2 hours away from clinic
• Per a phone conversation, I convinced him to try scleral lenses

Patient BK

• Synergeyes VS Scleral lens
  - Toric Periphery
    • Control both Flat and Steep Meridians

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Fit</th>
<th>Synergeyes VS Scleral lens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sagittal Depth</td>
<td>Flat and Steep Meridian Toric</td>
<td>0.05 to 0.30 D  vs 0.05 D max</td>
</tr>
<tr>
<td>Base Curves</td>
<td>3.2 to 0.3 mm  in 0.1 mm steps</td>
<td>2.4 to 5.5 mm  in 0.1 mm steps</td>
</tr>
<tr>
<td>Diameter</td>
<td>14.0 to 17.5 mm  in 0.5 mm steps</td>
<td>18.0 to 19.0 mm  in 0.5 mm steps</td>
</tr>
</tbody>
</table>

Fitting Set: Flat/Steep ~180 microns difference at lens edge
Patient BK

- Synergeyes VS Scleral lens
  - Central Optic Zone — controlled by adjusting sagittal depth (3000 microns to 4600 microns)
  - Scleral Landing Zone — adjust both flat and steep meridians of toric periphery
  - Mid-Peripheral (Limbal Zone) — adjust SLZ or Base Curve

*After settling: 200 microns central clearance and 100 microns limbal*

Patient BK

- Synergeyes VS Scleral lens
  - Diameter 16.0
  - Base curve 8.4
  - Sagittal Depth: 3400 OD 3600 OS

Patient BK

- Synergeyes VS Scleral lens — Lenses Ordered
  - OD:
    - BC 8.4 Periphery: 36 flat curve / 42 steep curve
    - Sagittal Height: 3400 Power -2.25
  - OS:
    - BC 8.4 Periphery: 36 flat curve / 42 steep curve
    - Sagittal Height: 3600 Power -2.75

Patient BK

- Synergeyes VS
  - Initial Lens selection:
    - 1. start with yellow circle
    - 2. Use Rx fitting resource
    - 3. Use Experience

Patient BK

- Synergeyes VS Scleral lens
  - OD: 300 microns central clearance
    - Rotated 22 degrees N
    - Alignment in periphery
    - OR: -2.25 20/25
  - OS: 400 microns central clearance
    - Rotated 20 degrees N
    - Alignment in periphery
    - OR: -2.75 20/25+

Patient BK

- Follow up
  - OD: 250 microns central clearance (50 at limbus)
    - Aligned 18 degrees nasal from 3 o’clock
    - Alignment in periphery — no blanching or impingement
    - OR pl 20/20
  - OS: 340 microns central clearance (50 at limbus)
    - Rotated 25 degrees nasal from 3 o’clock
    - Alignment in periphery — no blanching or impingement
    - 20/25 OR -0.50 20/20
Patient BK

- Follow up

Patient AB

- History: KCN OU; crosslinking OU
- Lens history: soft toric lenses

Patient AB

- Examination findings
  - MR:
    - OD +0.75 -3.50 x 060 20/70+
    - OS -0.25 -0.75 x 142 20/100+
  - Lens options
    - Specialty Corneal lens
      - Patient attempted to wear and could not adapt
    - Intralimbal design
      - Patient attempted to wear and could not adapt
    - Scleral Lens

Patient AB

- Boston XO: 15.8; 7.85 bc OU
  - Excessive clearance noted OU
    - Need to reduced by 100 microns each eye
  - OD: 20/20
  - OS: 20/20
  - Adjusted Limbal curve to adjust central clearance
    - Adding reverse curve into lens adjust corneal chamber without adjusting base curve
Patient AB
- New lenses feel great.

Final Thoughts
- Consider mini-scleral / scleral for appropriate patients
  - Select one lab, one design
- First couple fits are the most challenging
- Scleral lenses are not going away

Final Thoughts
- Consultants are a great resource
- Huge practice building opportunity