Fitting Modern Scleral Contact Lenses

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Disclosures

- Greg DeNaeyer OD, FAAO, FSLS
  - Visionary Optics
  - EUROPA SCLERAL™
  - B+L

- Keith Parker NCLEC
  - Serving on the CLMA Board of Directors for 18 years
  - Currently chairing the GP Committee/GPLI
  - President of Advanced Vision Technologies
  - I have a financial interest in the manufacturing and distribution of contact lenses.

Scleral Lenses

- History
- Indications
- Terminology and Design
- Fitting Principles
- Case Examples
- Hands-On Training
- Patient Education
- Resources

History

- Ancient
  - 1800s Fick/Muller/Kalt
    - Glass
    - PMMA
- 1950
  - Tuohy developed the corneal lens
    - PMMA
    - Oxygen
    - Fitting
- Sclerals
  - 1980's
    - Gas Permeable material
    - Diagnostic lens fitting

- 2007
  - Global Keratoconus Congress
- 2008
  - Contact Lens Spectrum
    - Christine Small
- 2009
  - Scleral Lens Education Society
Are Scleral Lenses a Fad?

Scleral Lens Indications

- Irregular Cornea
  - Keratoconus
  - Corneal transplant
  - Corneal trauma

Scleral Lens Indications

- Corneal Irregularity

Scleral Lens Indications

- Ocular Surface Disease
  - GVHD
  - Stevens-Johnson
  - Ocular pemphigoid
  - Neurotrophic Keratitis
  - Limbal Stem Cell Deficiency

Scleral Lens Indications

- Ametropia
- Presbyopia
- Aphakia

Prosthetic Scleral Lenses
Patient Considerations
- Orbital Anatomy
- Psychological
- Financial

Scleral Lens Terminology
- Sclerals
  - Rest on the scleral conjunctiva
  - Semi-sealed fit
  - Vault the cornea
    - Centered
    - Holds a fluid reservoir
      - Astigmatism
      - Irregular astigmatism
      - OSD

Scleral Lens Design
- Material
- Standard parameters
- Front Surface OZ
- Back Surface OZ
- Geometry
- Haptic

Scleral Lens Design
- Optic Zone
  - Front Surface OZ
  - Back surface OZ: Base curve
- Peripheral Curves
  - Cornea/Limbal-Geometry
  - Haptic

Standard Scleral Design
- OZ
Standard Scleral Design

- Center Thickness
  - 0.2mm - 0.5mm
- Lens Flexure
  - Astigmatism
  - Lens Seal off

Standard Scleral Design

- Material
  - GP materials
    - Hyper DK
    - Large lenses
    - Slow tear exchange
    - Performance
      - DK 100
      - Plasma

Scleral Design

- Front surface OZ
  - Spherical
  - Aspheric
    - Spherical Aberration

Front Surface Toric

- Residual Astigmatism
  - Glasses
  - Toric correction
    - Ballasted
      - Prism
      - Double slab-off
      - Truncation

Double Slab-Off

Multifocal

- Multifocal
  - Presbyopia
  - Center Near
  - Normal Cornea
  - Irregular Cornea
Higher Order Aberration
- HOA
  - Corneal Irregularity
    - Anterior
    - Posterior

Boston Foundation for Sight

Standard Scleral Design
- Back surface
  - Back surface OZ
  - Peripheral Curves
- Sagittal Height

Back Surface OZ
- Spherical
- Toric
- Quadrant specific

Corneal Curves-Geometry
- Standard
  - 1st peripheral curve is flatter than the base curve
  - Prolate
- Reverse
  - 1st peripheral curve is steeper than the base curve
  - Oblate

Scleral Lens Haptic
- Spherical
- Toric
- Quadrant Specific
**Scleral Lens Haptic**

- Spherical
  - Basic
  - Successful
  - Mild Asymmetry
  - Mini-sclerals
  - Conjunctiva

**Back Surface Haptic**

- Toric
- Quadrant Specific

**Toric Haptic Back Surface**

**Notches**

- Scleral Obstacles
  - Pterygium
  - Conjunctival blebs
- Beveled out by the lab
- 1 or more
- 15mm
- Diagnostic lens
  - Photographs

**Notches**

- Scleral Obstacles
  - Vault over
  - Smaller Lens
  - Notched Scleral

**Diagnostic Lens Fitting**

- Fitting Set
  - 7 piece
  - 14 piece
Fitting Philosophy

- Inside Out
  - Corneal Zone
    - 100 to 400 microns of corneal vault.
  - Limbal Zone
  - Scleral Zone
    - Haptic alignment

Where to start?

- First Diagnostic Lens
  - Ks
  - Sim Ks
- Formula to decide on first diagnostic lens.

Calculating the Scleral Sag

- Topography sag @ 10mm:
- Scleral sag factor:
- Initial apical clearance:
- Required Scleral Lens:

\[
\text{Weighted Average Height} + 400\mu m = 4300\mu m
\]

Diagnostic Lens Fitting

- Fill with saline.
- Stain the saline with a fluorescein strip.

Application of the Diagnostic Lens

- Assess the amount of vault of the diagnostic lens by comparing the thickness of the scleral lens with the thickness of the reservoir by turning the slit beam at a 45 degree angle.

Corneal Vault
**Lens Settling**

- Scleral contact lenses lens rest on the spongy bulbar conjunctiva. Expect the lens to settle and to lose up to 200 microns of corneal clearance.

**Corneal Vault**

- Bracket the lens fit until the stained reservoir is 200 microns more than the final vault that you are trying to achieve.
- Bracket by 2 to 6 diopter steps.

**Haptic Alignment**

- The haptic section of the scleral lens should rest evenly on the sclera without compression or impingement of the bulbar conjunctiva.

**Case Example- Keratoconus**

- 68 year-old complained of decreased vision after cataract surgery OS.
- +1.50 -2.25 X 072 20/200
- Diagnosed with KC

**Keratoconus**

- 18mm 46 diopter
- 18mm 50 diopter

**Keratoconus**

- 18mm Scleral Lens
  - Standard periphery
- Base Curve= 50 diopters
- Sag= 5.83
- Power= -5.75 (OR= +2.50)
- Final Power= -3.25 20/30
Keratoconus

Vault after application

Vault after lens settling

Corneal Transplant

- 71 year-old
  - Penetrating keratoplasty OS
  - BCVA with MR 20/200
  - Previously failed with contact lenses

Corneal Transplant

- Refit
  - Large diameter corneal GP 11.2mm
  - Lens decentration
  - Toric

Corneal Transplant

- Refit
  - Mini-scleral 15.8mm
    - 4.4 sagittal depth
    - -4.00 20/25
    - Success!

Corneal Transplant

Corneal Transplant

Ocular Surface Disease

- 58 year-old GVHD
  - Myelodysplastic syndrome
  - Bone Marrow Transplant
  - Ocular GVHD
    - Pred Forte BID OU
    - Restasis BID OU
    - Genteal gel q 1hr OU
  - VA OD 20/25, OS 20/60
Ocular Surface Disease

- Scleral lens fitting
  - Diagnostic lenses
  - Over-refraction
- Scleral 18.0mm
  - OU
    - BC= 50 diopters
    - Power = -1.50

OD 20/20 (20/25)
OS 20/20 (20/60)

Ocular Surface Disease

- Follow up
  - OD 20/25
  - OD 20/20
  - Better Comfort!!
- “Right eye is slightly tight”

Scleral Lens Application

- Application
  - Plunger
  - “Tripod” with thumb, index and middle finger.

Scleral Lens Application

- Saline (off-label)
- Dalsey Adaptives
  - dalseyadaptives.net
    - See® Lens Inserter
    - See Green® Lens Inserter
Scleral Lens Removal

- Contact Lens Plunger
  - Size
  - Positioning
- Scleral Lens Education Society
  - Scleralens.org

Starter kit/folder

Resources

- Scleralens.org

Insurance

- ABN
- Call insurance company
- Dictate letter
  - Medical necessity
    - Corneal irregularity
    - Ocular surface disease

Billing/Insurance

- Codes
  - CPT 92313 Scleral
  - 92072 Keratoconus
  - Contact lens
    - V2531 Scleral, Gas Perm
    - V2627 Scleral Shell

Resources

- Pacific University
- boston@bausch.com