Scleral Lens Grand Rounds: Basic

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FINANCIAL DISCLOSURES

- In the past year, Dr. Walker has received research funding or honoraria from the following for-profit companies:
  - Alcon Laboratories
  - ABB Optical
  - Bausch Health Specialty Vision Products

Scleral Lenses in 2022

- Over 20 brands from over 15 manufacturers
- 14-22mm in diameter
- Advancements in:
  - Design
  - Free-form landing zones
  - Multifocal aberration control optics
  - Material
    - High Dk (e.g., 80 to 200)
    - Coatings
    - Technology for fitting
    - Scleral topography
    - Aberration measurement
    - Understanding of outcomes
    - Edema/IOP/corneal health
    - Safety of SL more established

Indications for SL wear

- Keratoconus
- Pellucid Marginal Degeneration
- Post-LASIK Ectasia
- Post-Radial Keratotomy
- Post-Penetrating Keratoplasty
- Post-Infectious irregularities
- Herpetic
- Post-Scarring / Surgical
- Penetrating injury scars
- Suture irregularities

Indications for SL wear

- Graft versus Host disease
- Sjogren's
- Rheumatoid Arthritis
- Corneal surface exposure (post-surgical)
- Neurotrophic Keratopathy
- Limbal Stem Cell Deficiency
- Disciform Lamellar Pempigoid
- Fetal Dysplasia
- Discular Allergies
- Stevens Johnson's syndrome

Case 1:

Keratoconus

- Patient SP, 38yo WM
- KC for 15+ years
- Wears Peruvian toric PD
- -4.75-1.75x020 20/20
- Scleral lens OD
- Fit without scleral topography
Keratoconus

- Patient SP, 38yo WM
- KC for 15 years
- Wears PureVision toric DB
  - -2.25-1.75x020 20/20
- Scleral lens OS
  - Fit without scleral topography

Initial lens parameters
- Diameter: 17.0
- Shape: prolate
- SAG: 500
- PWR: -3.25-1.75x180
- Landing zone: flat 2 x steep 2
- Material: Dk 100 (Boston XO)

Late Forming” Bubbles
- Small micro-bubbles
- Indicative of edge lift
- NaFl can help visualize

New lens ordered:
- flat 2 x steep 6
  (120um more toricity)
- -3.00-1.75x160
  (20deg rotation)

TRIAL 2 LENS
- Diameter: 17.0
- Shape: prolate
- SAG: 4950
- PWR: -3.00-1.75x160
- Landing zone: flat 2 x steep 6
- Material: Dk 100 (Boston XO)

New lens ordered:
- flat 2 x steep 9
  (90um more toricity)
- -3.50-1.25x172
  (SCOR over-refraction)

Case 1: Keratoconus
- FINAL LENS
- Diameter: 17.0
- Shape: prolate
- SAG: 4950
- PWR: -3.00-1.75x160
- Landing zone: flat 2 x steep 9
- Material: Dk 100 (Boston XO)

Comparing between initial and final lenses
- Initial lens: flat 2 x steep 2
- Final lens: flat 2 x steep 9
- Rotational differences, power updates
**Case 1: Keratoconus**

- Monitoring at f/u visits
- IOP
  - 02/22/19: 15 OD, 16 OS (NCT)
  - 11/12/19: 8 OS (immediately post SL removal, iCare)
  - 10/7/20: 10 OS (immediately post SL removal, iCare)
  - 06/16/21: 12 OS (NCT)

**Key Takeaways:**

Keratoconus Case

- You usually need more lens landing zone toricity than you think
- Appearance (especially of a flat edge) may be misleading
- NaFl can be extremely useful in evaluating the edges of a lens
- Tomography is useful for disease progression and monitoring health during SI wear

- Additional consideration (not appreciated here): Don't expect a uniform fluid reservoir
Case 2: High Myopia

- Patient HR, 44yo Asian female
- Longtime corneal GP wearer - new patient to UEI, unhappy with comfort of GP
- (+)refractive amblyopia OS
- Refraction:
  - -14.75 +1.75
  - -17.25 -1.25x001 +1.75

Multifocal Scleral Lenses

- Offset of multifocal optic
- 0.5mm superior nasal
- Near zone with different diameters
  - 1.5mm on dominant eye
  - 2.0mm on non-dominant eye

High Myopia

- Mild impingement temporally OS
- Discomfort starting at hour 4-5
- "Extreme" discomfort and "extreme" redness lasting overnight

High Myopia

- TRIAL 1 LENS
  - Diameter: 14.8 OD
  - SAG: 3900 / 4000
  - PWR: OD: -14.00; OS: -15.25
  - Landing zone: OS: flat 5/steep 3
  - Material: Dk 100 (Boston XO)

Quadrant-Specific Lenses

- NaFl to visualize landing zone
**Quadrant-Specific Lenses**
+ White light and NaFl post-removal to visualize landing area

**Tip: Use Lissamine Green & NaFl**

**OCT**
+ Can be useful for areas of low clearance
+ Consider side effects of excessive clearance (MDF, hypoxia)

**Case 2: High Myopia**
+ Progressing staphyloma
+ 9/23/21: 15 OD, 15 OS (NCT)
+ 10/3/21: 15 OD, 15 OS (immediately post SL removal, iCare)
+ 11/11/21: 16 OD, 17 OS (immediately post SL removal, iCare)

**Key Takeaways: High Myopia Case**
- Every patient has different sensitivities to lens fits
- Landing edge modification needs can be subtle
- Technology is only as useful as the data you get from it
- Don’t forget to manage and monitor the underlying disease
Case 3: Keratoconus (#2)

- Patient SW, 41yo AA female
- KC – official Dx recently but history of reduced vision for “years”
- Seen 3 mo ago and referred for CXL consult - here for 2nd opinion
- Also being monitored as glaucoma suspect – IOP fluctuated with recent weight loss
- Medical h/x (+) for recent gastrectomy
- Currently not wearing any lenses – Aho OP wear with poor comfort
- KC eval and scleral lens fit OD
- Used static scleral topography

Keratoconus

- Patient SW, 41yo AA female
- KC evaluation
- OD: relatively mild
- OS: more severe
- (+)FR, no other signs
- (+)HA, trimming, striae, masses

RIGHT eye: Scleral topography

LEFT eye: Scleral topography

Keratoconus

- Initial lens parameters: OD
  - Diameter: 14.9
  - Shape: prolate
  - PWR: -6.00
  - Material: Dr. Green
- Landing zone: 142° at axis 90

Material: Dr. Green (version)
Keratoconus

- Initial lens parameters: OS
  - Diameter: 16.0
  - Shape: prolate
  - SAG: 4992
  - PWR: -2.50
  - Landing zone: 134um toric at axis 090
  - Material: Dk 100 (Hexa100)

Keratoconus

- Using OCT technology
  - Area of close fit apically
  - Kc typically has uneven FR

One…and, done!

- Advantages of scleral topography
  - Faster to get to final lens
  - Saves time and money later
- Disadvantages of scleral topography
  - Can be challenging to acquire scan
  - Money for you and patient $$$

Main factor affecting scan:
Palpebral aperture size
Tip: select scleral topography patients that will be successful!

Keratoconus: Case 3

- RIGHT eye
  - Assessment of fit with NaFl
  - Tear exchange
  - Landing zone

Keratoconus: Case 3

- LEFT eye
  - Assessment of fit with NaFl
  - Tear exchange
  - Landing zone

Keratoconus: Case 3

- MOST-removal staining
  - Epithelial mugging
  - Kc-type staining
  - Vertical anterior striae

POST-removal staining
Epithelial bogging
Kc-type staining
- Vertical anterior striae
Case 3: Keratoconus

- Monitoring at f/u visits

Factors:
- Age
- Progression
  - (risks for further progression)
- Cost

Corneal-crosslinking candidate?

Case 3: Keratoconus

ONH: 0.4 c/d OU
- IOP
  - 10/7/21: 13 OD, 6 OS (NCT)
  - 12/02/21: 9 OD, 5 OS (immediately post 6% removal, iCare)

Discussion of IOP and ONH health in SL wear

Key Takeaways:

Keratoconus (2nd) Case

- Scleral topography can have many benefits
- Reduces lens remakes
- Makes fitting process more efficient for doctor and patient
- NaFl can be extremely useful in evaluating the edges of a lens
- Proper counseling on CXL and who is candidate is important

Thank you for your attention

Questions?

Feel free to email me with questions:
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