Specialty Contact Lenses in Corneal Disease

Steven L. Sorkin, O.D., FSLS
Diplomate, American Board of Optometry
Fellow, Scleral Lens Society
Corneal Associates of New Jersey
Fairfield, New Jersey

Disclosures

- Bausch + Lomb Specialty Vision Products
- Blanchard
- Shire
- Visioneering Technologies
- Boston Sight
- Medical Advisory Board, International Ketatoconus Academy

Corneal Ectasia
Keratoconus
Steepening/thinning of cornea
Vertical Striae
Munson’s sign
Fleischer’s Ring
Scissors reflex on retinoscopy
Manual keratometry
Topography/Tomography
Pentacam-Belin Ambrosio incides

Modalities

- Soft Contact Lens (SCL)
  - Traditional
  - Specialty
- Gas Permeable (GP)
- Scleral
- Hybrid
The incidence of keratoconus is approx. 1 in 2000
Occurs evenly in males and females
Usually begins between the ages of 12 and 30
Only 10% of patients will undergo PKP
Non inflammatory
13% have family history
Atopic disease
Eye rubbing

Soft Contact Lenses

- **Early Keratoconus (KC) patients** can use traditional SCL or SCL Torics
- Select post PKP patients - watch neovascularization, rejection, infiltrates and microbial keratitis
- Corneal Dystrophies -Epithelial Basement Membrane Dystrophy and stromal dystrophies  
  *Bandage Contact Lenses (BCL)*
- Piggyback GP and SCL combo

Post PKP (watch neo)

Corneal Dystrophy  
(Epithelial Erosions)

Recurrent Corneal Erosions  
(EBMD)
Keratoconus Soft Contact Lens Designs

- Contamac Definitive SiHy material
- Customizable
- KC
- Post refractive surgery
- Post PKP
- Quarterly replacement
- **Kerasoft Thin** in 2018

(Rigid) Gas Permeables

- Standard of care and the only option for many years
- Ease of application and removal
- Readily available
- Relatively inexpensive and durable
- Multiple labs and designs
- Disadvantages: Lens displacement, loss and awareness
- Post PKP only option in first year post op

**Alden NovaKone**

- Benz Z (hioxofilcon D) material
- Quarterly replacement
- 90% of fits require Toric
- Concern with hydrogen peroxide solutions
- Watch for corneal neo-thick HEMA lens
- **IT Factor** variable lens center thickness
- Fitting curve similar to standard base curve

**CLEK Study**

(Collaborative Longitudinal Evaluation of Keratoconus)

Role of apical touch and staining
Anterior Segment OCT

Beyond the Limbus

Central Vault

Scleral Contact Lenses

Scleral Vault

Scleral Lens Classification

Intacs
Anterior Segment OCT

Scleral Shape and Anatomy

Application and Removal

Goals of Treatment with Scleral Lenses

Indications for Scleral Lenses

• Visual rehabilitation
• Protection and rehabilitation of corneal surface
• Reduction of symptoms

• Ectasias KC, Pellucid Marginal Degeneration (PMD) and post LASIK
• Graft versus Host Disease (GHVD)
• Post surgical (PKP, LASIK, CXL, Intacs, RK)
• Neurotrophic corneas
• Dry Eyes
  Sjogren’s, Stevens Johnson and Limbal Stem Cell Disease (LSCD)
• Dystrophies
• Exposure keratopathy
• Not curative • NOT 20/20 in certain cases

• Patient education
• DMV
• Mirror
• Preservative Free Saline
• Unisol 4 discontinued
• Inhalation NaCl 0.9 % saline
• Celluvisc and Oasis Tears

• DMV
• Mirror
• Preservative Free Saline
• Unisol 4 discontinued
• Inhalation NaCl 0.9 % saline
• Celluvisc and Oasis Tears

Specialty Contact Lenses in Corneal Disease  
Steven L. Sorkin, O.D., FLS
Avellino Corneal Dystrophy

Fitting Considerations
- Minimal conjunctival compression
- Minimal to no conjunctival impingement
- Corneal vaulting per manufacturer’s recommendations
- Limbal clearance
- Optimized materials for oxygen permeability
- Good endothelial function (PKP) specular microscopy—also monitor CV/Hex values
- Daily wear
- Nightly disinfection

Other Considerations
- Age of patient
- Dexterity
- Systemic health status
- Don’t forget about “normal” corneas
- High cyl
- Athletes
- Presbyopia
- Use smaller diameter lenses: minimizes scleral toricity

New Technology in Scleral Lens Practice
- sMap 3D- Visionary optics
- Eaglet Eye- ESP- Eye surface Profiler
- EyePrint Pro
- Oculus Pentacam
- Multifocals
- Optovue OCT has new scleral module
- Boston Sight Sclerals
HydraPeg

- Tangible Science
- Available from select laboratories in 2017
- Polyethylene glycol (PEG) based polymer mixture that is covalently bonded to surface of the contact lens
- Optimum materials-Comfort, Extra and Extreme and now Boston XO and XO2
- Do not use alcohol based cleaners with HydraPeg
- Approved solutions are Unique Ph, Clear Care, Boston Simplus ONLY
- Improves lens wettability, lubricity and reduces friction and prolongs tear break-up time

EyePrint Pro

- Improves lens wettability, lubricity and reduces friction and prolongs tear break-up time

Scleral Profile
Boston Sight Sclerals

- Available in 18.0, 18.5 and 19.0 mm diameters
- Separate right and left lens designs
- Uses data from over 7,000 patients
- Front surface eccentricity adjustment to enhance VA
- Fit Connect
- Patient Questionnaire
- Quadrant specific haptics

Boston Sight

Boston Sight Sclerals Patient Questionnaire
<table>
<thead>
<tr>
<th><strong>Intacs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of femtosecond laser to create channels</td>
</tr>
<tr>
<td>Concomitant with CXL</td>
</tr>
<tr>
<td>One ring vs two rings?</td>
</tr>
<tr>
<td>Predictability of Intacs?</td>
</tr>
<tr>
<td>Can use reverse geometry CL design</td>
</tr>
<tr>
<td>Can make CL fit more difficult</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Corneal Hydrops</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Break in descemet’s membrane</td>
</tr>
<tr>
<td>Treat with antibiotic/steroid/Muro</td>
</tr>
<tr>
<td>Alternate treatment is Timolol gtts or gas bubble in AC</td>
</tr>
<tr>
<td>Will lead to scarring, however may get flattening of cornea, necessitating CL refit</td>
</tr>
<tr>
<td>Sometimes may get improvement in BCVA</td>
</tr>
<tr>
<td>Often requires PKP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Collagen Cross Linking</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>FDA approval in 2017- epi off only</td>
</tr>
<tr>
<td>Avedro</td>
</tr>
<tr>
<td>Possible use in conjunction with Intacs and targeted PRK</td>
</tr>
<tr>
<td>Corneal ulcers</td>
</tr>
<tr>
<td>Post OP management is similar to PRK/PTK</td>
</tr>
<tr>
<td>Post OP haze more common on epi off procedure</td>
</tr>
<tr>
<td>Pain management</td>
</tr>
<tr>
<td>Patient expectations</td>
</tr>
</tbody>
</table>

**OBJECTIVE OF COLLAGEN CROSS LINKING:**

Stabilize cornea to prevent progression

Some patients will get slight flattening of steep K’s and improvement in BCVA

Can resume CL wear after 1-2 weeks epi on and 8 weeks epi off typically
Scleral Lenses after PKP
Wait until running suture removal at one year
Can fit corneal GP in first year post OP
Usually significant anisometropia after PKP—depending on status of fellow eye
Concern with contact lens insertion and removal
Watch sutures for neo/infiltrates/erosion
Endothelial cell count—monitor closely. Typical cut off has been 800 cells/mm squared. # Not set in stone

Terrien’s Marginal Degeneration
Location is usually superior—significant astigmatism
Contact lens options—
SCL Torics
GP
Scleral lenses

Irrational exuberance, there is a lot that we don’t know yet...
Non Preserved Saline
Addipacks:
Generic 0.9% Sodium Chloride solution
• Inhalation saline- off label use
• Can write script to fill at pharmacy or order online
Menicon Lacripure
B+L ScleralFil – introduced in 2017

Troubleshooting
Chamber debris
• Stagnation
• Epithelial “bogging”
• Excessive vault
• Lid disease
• Artificial tears
• Remove lens midday and refill

FDA Approved Saline Solution For Scleral Lens Insertion

Bausch + Lomb ScleralFil

Troubleshooting Complications
• How much vault is too much?
• Follow manufacturer’s recommendations
• Lens settling during day 100-200 microns 50% occurs in the first hour of wear
• Impingement
• Blanching
• Toric peripheral curves or haptics-now many labs have quadrant specific haptics
• Pay attention to the limbus!
Troubleshooting

- The sclera is “non rotationally symmetric”
- Nasal sclera is typically steeper than temporal sclera
- Quadrant specific designs
- Excessive limbal clearance
- What are the dangers of conj prolapse?

Realistic Expectations

- “Sick Eyes”
- Not curative
- No full-time wear for most
- 20/20 vision not possible for all
- May need to remove lens midday
- Concurrent use of eye drops
- Meibomian Gland Dysfunction (MGD)
Recurrent corneal Erosions

- History of corneal abrasions/trauma
- Defective EBMD

Corneal Dystrophies

- EBMD- map dot fingerprint
- Stromal Dystrophies- epithelial erosions/decreased BA due to scarring/irregularity
- Lattice Dystrophy
- Granular Dystrophy
- Macular Dystrophy
- Fuch’s Dystrophy-watch ECC

RCE/Corneal Abrasion Treatment

- Copious lubrication
- NaCl /Muro 128/Fresh Kote
- Bandage CL-FDA approved Oasys/N+D/Purevision
- Cycloplegia
- Prophylactic Ab- do not use Besivance/Moxeza-can delay epithelial healing
- Lotemax/Docycycline-MMP-9 inhibition
- Treat MGD/DES
- Punctal plugs
- Amniotic membranes
- ASP/debridement/PTK
Ocular Surface Disease
Sjogren’s syndrome
Severe Dry Eyes
Steven’s Johnson Syndrome
Limbal stem Cell Disease
Corneal Neuralgia
GVHD
Use of scleral lenses- larger diameter lenses
Tear reservoir- bathes cornea to promote healing and protect corneal surface
Hydrapeg
Use of autologous serum in the bowl

Hybrids
- Softperm discontinued 2012
- Synergeyes
- A
- KC
- PS
- ClearKone
- Duette and Duette Multifocal

Hybrid Lens Considerations
- Application and removal
- DMV and saline
- Finger cots
- Six-month replacement
- Solutions Biotrue and Clear Care are preferred
- Hydra Peg available for Duette and UltraHealth lenses

Filamentary Keratitis
BCL
Topical steroids
Restasis/Xiidra
Copious lubrication
Punctal plugs
Amniotic membranes
Acetylcystene- 10% mucomyst - compounded
Scleral lenses