Acknowledgments

• Paragon Vision Sciences
• Adoption of CRT certification slide for this generic talk

Corneal Refractive Therapy (CRT)

• Paragon Vision Sciences
• CRT
• Dual Axis CRT
• FDA approved up to -6.00 DS, <1.75 DC
• www.paragoncrt.com

Corneal Reshaping

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Vision Shaping Treatment (VST)

• Bausch & Lomb
  • BE Retainer
  • EXR
  • Contour OK E-System
  • DreamLens
  • Emerald
• FDA approved -1.00 to -5.00 DS

Material Considerations

• Overnight wear
  • High Dk/T
  • MiracLens
  • Orthofocus
  • Vissil Inc.
  • WAVE

• Anecdotal evidence of greater treatment effect with higher Dk material

Orthokeratology Terminology

Patient Considerations

• More difficult
  • Over 0.75 D ATR toricity
  • Final treatment takes BC below 38.00 D
    • Flat K = 41.00 D
    • MRS = -4.00 D
    • Overcorrect = 0.50 to 0.75 D
    • BC = 41.00 – 4.00 – 0.50 = 36.50 D
• Cylinder > Sphere
  • -0.75 to 1.75 D X 180

• Easiest
  • Current soft contact lens wearers
  • Moderate myopia
    • Sphere less than -4.00 D
  • Low astigmatism
    • Up to 1.00 D WTR corneal toricity
    • <0.75 D residual astigmatism

How Dispensed

• Fitting set
• Empirical
• Trial fitting
Base Curve / Treatment Zone
• Provides "mold" for treatment
• Not typically adjusted to change fit
• 5 to 6 mm diameter

Return Zone / Reverse Curve
• 1 to 2 mm wide

Return Zone Depth
• Returns lens to cornea
• Centration
• Treatment applanation
  Too deep / too steep
  Just right

Return Zone / Reverse Curve

Landing Zone / Alignment Curve
• Contour peripheral cornea
• Stability and centration

Landing Zone Angle
180°

Alignment Curve

Landing Zone / Alignment Curve
• Landing zone angle too high
• Alignment zone too steep

Landing Zone / Alignment Curve
• Landing zone angle too low
• Alignment curve too flat
**Landing Zone / Alignment Curve**
- Just right!

**Dispense CRT**
- Flat keratometry reading
- Manifest refraction sphere

Example: $K_s = 43.25@180 \ 44.25@90$
MR $-3.50 -0.50 \times 180$

**Case History**
- When do you want to wear CL?
- Do you swim regularly?
- Do you work around toxic substances?
- Do you have CL-related dry eye?
- Pupil size

**Preliminary Testing**
- Manifest refraction
- Keratometry
- Corneal topography
  - E-value
  - Simulated keratometry

**Base Curve**
- $BC = Flat \ K – \text{Myopia Correction} – 0.50 \text{ to } 0.75$
- Example
  - Flat $K = 44.00 \ D$
  - $Rx = -3.50 -1.00 \times 180$
  - $BC = 44.00 - 3.50 - 0.50$
  - $= 40.00 \ D$
  - $= 8.4 \ mm$

**Fit of Lens – BE Retainer**
- Apical Curvature (Ro)
- Corneal sagittal height
- Eccentricity or shape factor
- Horizontal visible iris diameter (HVID)
  - Medmont topographer or consultation will tell you initial lens for overnight trial

**Fit of Lens - CRT**
- Flat keratometry reading
- Manifest sphere
  - Pick corresponding lens from dispensing set

**Fit of Lens - DreamLens**
- Spherocylindrical refraction
- Corneal diameter
- Topography
  - Information emailed to lab

**Fit of Lens - Emerald**
- Refraction
- Keratometry
- HVID
  - Information sent to lab
Fit of Lens – OK Lens
- Keratometry and refraction
  or
- Keratometry, refraction, and topography
  or
- Dispensing fitting set
  - Call or email parameters to consultation
  - Pick first lens from dispensing set

Lens Evaluation
- Centration
  - Appropriate edge lift
  - Alignment in mid-periphery
  - 3-4 mm treatment zone

Decenters Lateral or Superior
- Increase sagittal depth
  - Increase return zone / steepen reverse curve

Decenters Inferior
- Decrease sagittal depth
  - Decrease landing zone → decrease return zone
  - Flatten reverse curve

Insufficient Central Applanation
- Decrease return zone / flatten reverse curve

Sagittal Depth Changes

Fitting Summary
- Looking for
  - Centration
  - Good edge lift
  - 3-4 mm treatment zone
  - Moderate tear film touch in mid-periphery

*Always confirm centration with each parameter change

Centration is the key to success with CRT
High Myopia
• Centration is the primary goal
• If necessary, sacrifice central applanation for centration

High Myopia
• Centration is primary goal
• Sacrifice central applanation for centration

Astigmatism
8.6-525-33
8.6-525/575-33

Care
• Day one visit
  • Patient arrives wearing lenses
  • VA with lenses
  • Spherical over-refraction (SOR), unless not 20/20 then spherocylindrical over-refraction (SCOR)
  • Slit lamp lens positioning and movement
  • Fluorescein & Wratten filter to evaluate fit
  • Ocular health

Management
• Should be within 0.50 D of plano
  • Plus Power (+) OR
    • Decrease BC by 0.10 mm for every 0.50 D
    • Change from +1.00 to +0.50
  • Minus Power (−) OR
    • Increase BC by 0.10 mm for every 0.50 D
    • Change from −1.00 to −0.50
  • Cylinder present in SCOR will likely remain untreated
  • Corneal cylinder corrected with lens in place

Follow-Up
• 10 days, 1 month, 6 months
  • Late in the day
  • VA
  • Refraction
  • Topography
  • Slit lamp
  • Progent q 6 mos

Treatment/Transition
• The rate of treatment not predictable

Safety

<table>
<thead>
<tr>
<th>Age at Fit</th>
<th>Patient-years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>12.2 ± 2.5</td>
</tr>
<tr>
<td>Adults</td>
<td>38.5 ± 14.3</td>
</tr>
</tbody>
</table>
**Safety**

<table>
<thead>
<tr>
<th>MK &lt; 13 Months Wear</th>
<th>CHILDREN</th>
<th>ADULTS</th>
<th>OVERALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>6</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Incidence (per 10,000 pt yrs)</td>
<td>11.9 ± 3.5</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
</tr>
</tbody>
</table>

**Comparison**

- Incidence = 7.7 per 10,000 years of wear
- 95% CI does not exceed 27.8 per 10,000 years
- Risk of MK similar to other overnight modalities

**Poor Vision During Adaptation**

- OK lenses can be worn during day
- Soft contact lenses
  - ½ and ¼ of pre-OK myopia
  - Kids can just wear their old glasses

**Why Kids / Adolescents**

- Only worn at home
- Wear every-other night
- No night driving
- No complaints
- ≈75% adapt
- Referrals

**What’s Different About Fitting Kids?**

- First time correction?
- Break / lose glasses

**What’s Different About Fitting Kids?**

- Anxiety
  - Be yourself
  - Nurturing
  - Goofy
  - Quick

**What’s Different About Fitting Kids?**

- Extremely active
- Glasses slide, get sweaty
- Sunglasses and helmets
- Side vision
- Swimming

**What’s Different About Fitting Kids?**

- 45 mins - 1 hour max for each training session
What’s Different About Fitting Kids?

- If you experience:
  - Red eyes
  - Painful eyes
  - Eye that can’t see
    - Remove CL and tell parent
    - Call doctor if worse or not improve

Look good, see good, feel good!

Conclusions

- Must have a topographer
- Initially fit several at same time
- Offer modality to all myopes
- All systems work well
  - Talk to lab to determine what “fits” you