Corneal Reshaping
Jeffrey J. Walline, OD PhD

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

Vision Shaping Treatment (VST)
- Bausch & Lomb
  - OXR
  - Coretex OX E-System
  - DreamLens
  - Emerald
- FDA approved -3.00 to -5.00 DS

Material Considerations
- Overnight wear
  - High-Dk
    - HDS-100
    - Menicon Z
    - Boston Equaxem II
- Anecdotal evidence of greater treatment effect with higher Dk material

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

Orthokeratology Terminology

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°

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!
How Dispensed
• Fitting set
• Empirical
• Trial fitting

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

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

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

*Always confirm centration with each parameter change*

Fitting Summary
- Centration is the key to success with CRT
- Looking for
  - Centration
  - Good edge lift
  - 3-4 mm treatment zone
  - Moderate tear film touch in mid-periphery

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

Care

Management

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

Over-Refraction

- Should be within 0.50 D of plano
- Plus Power (+) OR
  - Decrease BC by 0.50 D for every 0.50 D
  - OR = +1.00 D
  - Change 8.8 BC to 8.6 BC
- Minus Power (-) OR
  - Increase BC by 0.50 D for every 0.50 D
  - OR = -0.50 D
  - Change 9.0 BC to 9.1 BC
- Cylinder present in SCOR will likely remain untreated
  - Corrected cylinder corrected with lens in place

Follow-Up

- 10 days, 1 month, 6 months
  - Late in the day
  - VA
  - Refraction
  - Topography
  - Slit lamp
  - Progesterone 6 mos

Treatment/Transition

- The rate of treatment not predictable

Safety

- 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 ¾ of pre-OK myopia
- Kids can just wear their old glasses

Why Corneal Reshaping for Kids?

- Kids adapt faster than adults

The Effect of Age on Short-Term Orthokeratology

JANIHEI, J.; KUO, W.; and HELLEN J. PREMNER, MD, FASSO
School of Optometry and Vision Sciences, University of New South Wales, Sydney, Australia

Why Corneal Reshaping for Kids?

- Kids can wear glasses that over-correct

Why Corneal Reshaping for Kids?

- There's no place like home
Why Corneal Reshaping for Kids?
• Expand your practice

Why Corneal Reshaping for Kids?
I am going to make you so proud!
• Note to self

...and the #1 reason...

Why Corneal Reshaping for Kids?

What’s Different About Fitting Kids?
• Topical anesthetic drops control reflex tearing
• Allows accurate sodium fluorescein pattern evaluation

What’s Different About Fitting Kids?
• Extremely active
• Glasses slide, get sweaty
• Sunglasses and helmets
• Side vision
• Swimming

What’s Different About Fitting Kids?
• First time correction?
• Break / lose glasses

What’s Different About Fitting Kids?
• Anxiety
  • Be yourself
  • Nature
  • Society
  • Quick

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 the same time
• Offer modality to all myopes
• All systems work well
  • Talk to lab to determine what “fits” you