

Orthokeratology

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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

• BE Retainer	• Night Move
• CKR	• MiracLens
• Contex OK E-System	• Orthofocus
• DreamLens	• Vipok Inc.
• Emerald	• WAVE
- FDA approved -1.00 to -5.00 DS
- <http://www.bausch.com/en/Our-Products/Contact-Lenses/Vision-Shaping-Treatment>



Material Considerations

- Overnight wear
 - High Dk/t
 - HDS-100
 - Menicon Z
 - Boston Equalens 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 WTR corneal toricity
 - <0.75 D residual astigmatism



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 -1.75 X 180

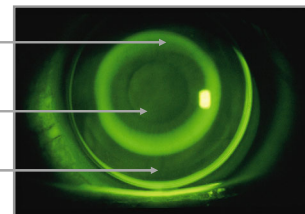


Orthokeratology Terminology

Return Zone
Reverse Curve

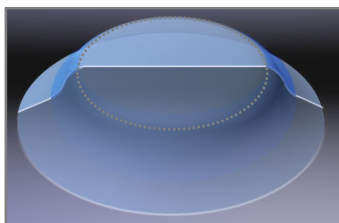
Base Curve
Treatment Zone

Landing Zone
Alignment Curve

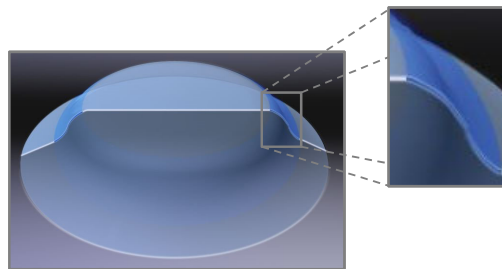


Base Curve / Treatment Zone

- Provides "mold" for treatment
- Not typically adjusted to change fit
- 5 to 6 mm diameter



Return Zone / Reverse Curve



- 1 to 2 mm wide



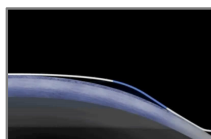
Return Zone Depth

- Returns lens to cornea
 - Centration
 - Treatment applanation

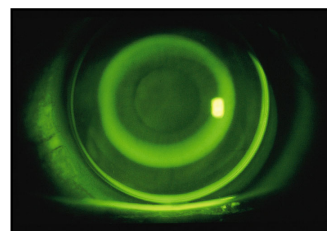
Too deep / too steep



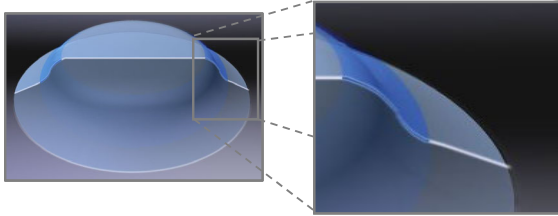
Just right



Return Zone / Reverse Curve



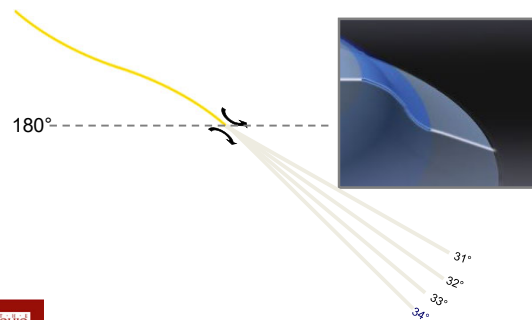
Landing Zone / Alignment Curve



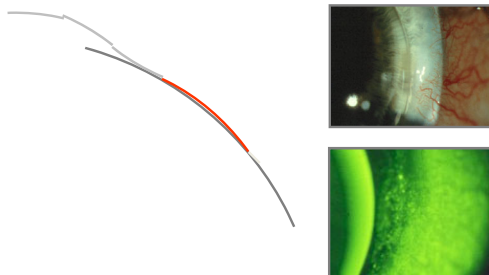
- Contour peripheral cornea
- Stability and centration



Landing Zone Angle

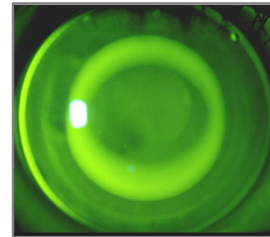


Alignment Curve



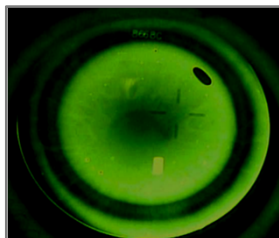
Landing Zone / Alignment Curve

- Landing zone angle too high
- Alignment zone too steep



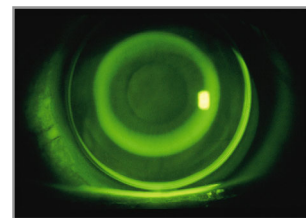
Landing Zone / Alignment Curve

- Landing zone angle too low
- Alignment curve too flat



Landing Zone / Alignment Curve

- Just right!



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
- HVID

OD	OD	
Fit Option	Lens Type	Paragon CRT
R1	BC	8.7
R2	RZD ₁	575
VSD	LZA ₁	33
Optic Zone Diameter	DIA	10.5
Axis	Optic Zone	6mm
Jessen Factor	PWR	+0.50
+0.50D		



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?
- Interested in myopia control?
- Pupil size



Preliminary Testing

- Manifest refraction
- Keratometry
- Corneal topography
 - E-value
 - Simulated keratometry



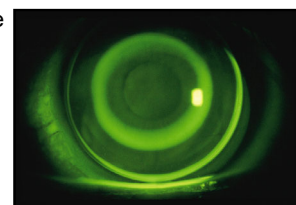
Anesthetic for Orthokeratology

- Put a drop in the OK lens before insertion
 - Displace most of the drop by putting finger in lens
 - Can't teach I/R <15 minutes, so won't leave with anesthetized cornea

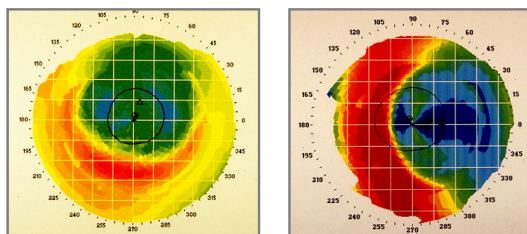


Lens Evaluation

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

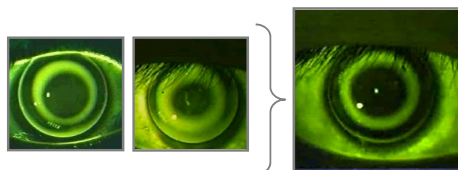


Decenters Lateral or Superior

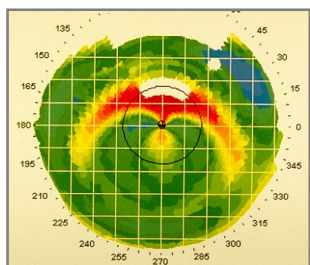


Decenters Lateral or Superior

- Increase sagittal depth
 - Increase return zone / steepen reverse curve

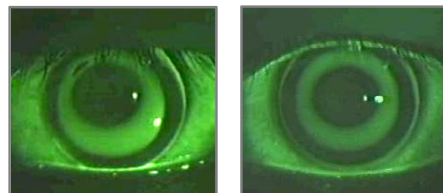


Decenters Inferior



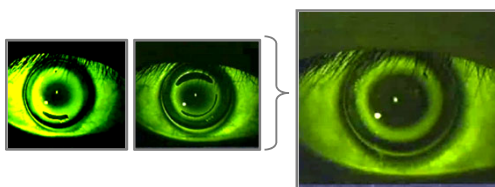
Decenters Inferior

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



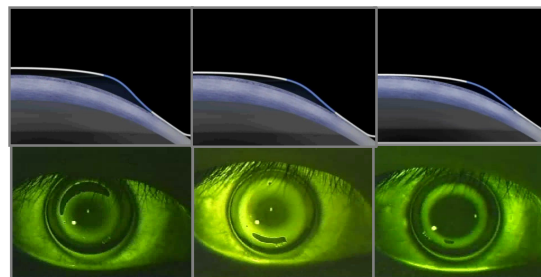
Insufficient Central Applanation

- Decrease return zone / flatten reverse curve



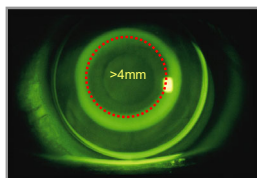
*Always confirm centration with each parameter change

Sagittal Depth Changes



Fitting Summary

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

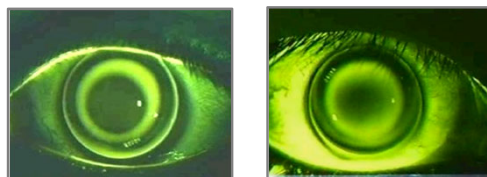


Centration is the key to success with CRT



High Myopia

- Centration is the primary goal

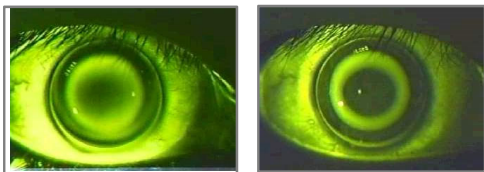


- If necessary, sacrifice central applanation for centration

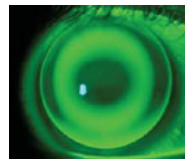


High Myopia

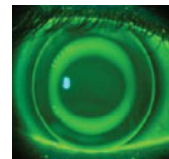
- Centration is primary goal
- Sacrifice central applanation for centration



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



Care

- Multipurpose solution
- Hydrogen peroxide system
- Deposit and protein remover



Management

- 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



Over-Refracton

- Should be within 0.50 D of plano
- Plus Power (+) OR
 - Decrease BC by 0.10 mm for every 0.50 D
 - OR = +1.00 D
 - Change 8.8 BC to 8.6 BC
- Minus Power (-) OR
 - Increase BC by 0.10 mm 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
 - Corneal cylinder corrected with lens in place



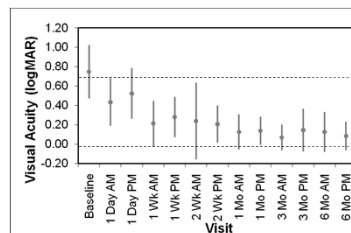
Follow-Up

- 10 days, 1 month, 6 months
 - Late in the day
 - VAsc
 - Refraction
 - Topography
 - Slit lamp
 - Progent q 6 mos



Treatment/Transition

- The rate of treatment not predictable



Safety

- Microbial keratitis
 - 7.7 cases / 10,000 pt-years (CI: 0.9 to 27.8)
 - 4.9 cases / 10,000 pt-years (CI: 2.1-11.4)
 - 95% CI does not exceed 27.8 per 10,000 years
 - Risk similar to other overnight modalities

Lens Type	Any Presumed Microbial Keratitis (95% CI)
Daily wear RGP	1.2 (1.1-1.5)
Pure LW soft	1.9 (1.8-2.0)
Pure LW TD soft	2.0 (1.7-2.4)
Pure LW SH	11.9 (10.0-14.6)
Oce C/N soft	2.2 (2.0-2.5)
Oce C/N TD soft	4.2 (3.1-4.6)
Oce C/N SH	5.5 (4.5-7.2)
Overnight wear soft*	19.5 (14.6-29.5)
Overnight wear SH	25.4 (21.2-31.5)
Any lens type	4.2 (3.4-5.3)

Bullimore MA, et al. ECL 2021;47:420-5
Bullimore MA, et al. OVS 2013;90:937-44



Poor Vision During Adaptation

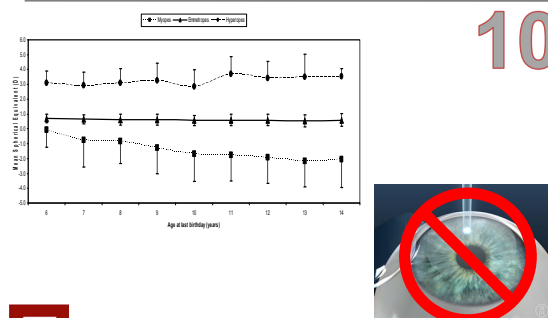
- OK lenses can be worn during day
- Soft contact lenses
 - ½ and ¼ of pre-OK myopia
- Kids can just wear their old glasses



Why Corneal Reshaping for Kids?



Why Corneal Reshaping for Kids?



Why Corneal Reshaping for Kids?

9



Why Corneal Reshaping for Kids?

8

- Kids adapt faster than adults

The Effect of Age on Short-Term Orthokeratology

JAIKISHAN JAYAKUMAR, BSOpt, and HELEN A. SWARBRICK, PhD, FFAO
School of Optometry and Vision Science, University of New South Wales, Sydney, Australia



Why Corneal Reshaping for Kids?

7

- Kids can wear glasses that over-correct



Why Corneal Reshaping for Kids?

6



Why Corneal Reshaping for Kids?

5

- There's no place like home



Why Corneal Reshaping for Kids?

4



Why Corneal Reshaping for Kids?

- Expand your practice

3



Why Corneal Reshaping for Kids?

2

I am going to make
you so proud!

-Note to self



Why Corneal Reshaping for Kids?

...and the #1 reason...



Why Corneal Reshaping for Kids?



Controlling
MYOPIA
in Children



2020mag.com/l-and-t/49785

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
 - Nurture
 - Goofy
 - Quick



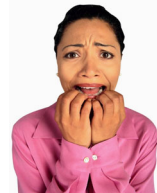
What's Different About Fitting Kids?

- 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 same time
- Offer modality to all myopes
- All systems work well
 - Talk to lab to determine what "fits" you

