Moving Orthokeratology Forward in 2022

GSLS 2022 Workshop, Friday, January 21, 2022 8:00 AM to 9:50 AM

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Course Outline

Introduction

- **What are our techniques when it comes to orthokeratology? Why do we use them? Can we improve upon lens construction or method?**

Creating an epithelial response

- **Construction of an orthokeratology lens**
  - **Diameter selection: VID – 0.8mm**
  - **Base curve: Jessen formula of 0.50D flatter than Kf**
    - **Modified Jessen formula of 1.75D flatter than Kf**
  - **Reverse curve: creating ~7 microns of apical clearance**
  - **Alignment zone: creating a sealed landing**
  - **Edge lift: Appropriate edge lift to create a healthy fit, comfort and response.**
- **Tissue response**
  - **Negative suction forces on the epithelium drive orthokeratology effect**
  - **Treatment zone size assessment – axial map and determining the point of zero effect.**

- Plus power assessment – using the graph to evaluate the myopia control signal (plus power signal)
- Low versus high myopic treatment and the resultant myopia control signal

Alignment zone and centration

- Lens to surface relationship – construction options
  - Radius: curve to aspheric surface
  - Tangent: angle zone on aspheric surface
  - Aspheric: Changing radius on aspheric surface
- Flat versus steep axis
  - Radius of the central cornea: range of corneal cyl acceptable
  - Sagittal differential at 8mm – flat versus steep sag
  - Threshold of fitting a toric lens – 30 microns
  - Case example of symmetric versus toric landing
- Toric lens studies in orthokeratology
  - List of previous findings with toric landing lenses
  - Pacific et al, 2015
  - Tan et al, 2019
  - Guo et al, 2021

Fluorescein assessment

- Optimal pattern of an orthok lens
- Determining apical clearance
  - Case example of various sags on eye
  - Decentration with apical bearing present

- **Case example: Ideal NaFl pattern and topographical outcome**
- **Case example: Poor pattern with an ideal topographical outcome**
- **Observations of an ideal pattern: open eye centration, 360 degree alignment, 0.5mm width of edge lift.**

Post wear response

- **Tangential analysis: the commonly used assessment but what do we miss?**
- **Post wear map: axial or tangential doesn't give us the full story**
- **Subtractive/difference/comparison map**
  - **Axial: Rx change using the comparison of apical radius**
    - **Treatment zone position – position of blue area of flattening**
    - **Treatment zone size – diameter of the blue area of flattening**
    - **Myopia controlling effect – measuring apical versus power at the pupil margin**
  - **Tangential: lens position**
    - **Determine the position of the red ring (epithelial steepening) in relationship to the pupil**
    - **Determine the position of the blue ring (alignment zone flattening) in relationship to the pupil**
- **Visual response: what should be the target effect?**
  - **AM refraction: Plano to +1.00 with a target of +0.50D**

Improving myopia control response

- **Treatment zone size and its relationship to spherical aberration**
- **Spherical aberration studies**
  - **Lau et al: SA and myopia control**

- **Optical zone manipulation**
  - **5.0 vs. 6.0 study – Carracedo et al: small optical zone, smaller treatment zone**
  - **5.0 vs. 6.0 study – Guo et al: less axial growth with the smaller treatment zone**
  - **5.0 vs. 5.5 vs. 6.0 study – Carracedo et al.: similar spherical aberration findings with 5.0 and 5.5mm**
- **Reservoir Depth manipulation**
  - **Reservoir depth of a -1.00D treatment – case example**
  - **Reservoir depth of a -4.00D treatment – case example**
  - **Hong Kong poly study: modified Jessen factor to increase reservoir depth**
  - **Asphericity in the optical zone of the lens**
  - **Altering optical zone alone results in lower reservoir depths and must be coupled with asphericity**
  - **Chow study: high asphericity in orthokeratology – 5 year findings**
  - **Guo study: high asphericity in orthokeratology – 1 year findings**
- **Decentration in orthokeratology**
  - **Do we really want to center orthokeratology perfectly? Example of an ideal bulls-eye response**
  - **Angle alpha and the lack of centration possible in most eyes – typical temporal decentered treatment**
  - **Hiraoka et al: Higher coma produces better myopia control (higher decentration)**
  - **Wang & Yang: Decentration produces better myopia control**

Conclusions

Fluorescein patterns should not dominate the decision making in orthokeratology fitting

Create a toric landing for all patients with 30 microns or more of sagittal differential at 8mm

Smaller treatment zones should be used for better myopia control

Asphericity should be coupled with smaller treatment zone to increase the reservoir depth and suction force