Ortho-K Fitting and Myopia Control for the Primary Care Practitioner
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Disclosures

- Research
  - Alcon Research, Ltd.
- Clinical Education and Patient Care
  - Alcon Research Ltd.
  - Defined Health
  - Wink Productions
Definition

“Specially designed contact lenses that alter the curvature of the cornea to temporarily correct myopia (and less commonly, astigmatism, hyperopia and presbyopia)”

Evolution

Low Dk lens materials to high Dk lens materials
Daily wear to overnight wear
Standard geometry to reverse geometry lens design
Keratometry to corneal topography
Mechanism

• Corneal contour
  – Central corneal flattening and “sphericalization”
• Corneal physiology
  – Epithelium, hydrodynamic tissue response
• Vision
  – Reduction of refractive error and improvement in vision

Patient Selection

• Refractive error (spherical component)
• Keratometry/simulated keratometry readings
• Other pre-fit considerations
Custom

Initial Lens Selection

- Diagnostic lens selection (inventory)
- Empirical methods
- Use of corneal topographic analysis
Lens Anatomy

- Base curve radius (treatment)
- Secondary curve or reverse curve (centration & stability)
- Intermediate curve (alignment)
- Peripheral curve (tear exchange)

Fluorescein Pattern

Adequate applanation (i.e. treatment), centration, peripheral tear exchange

Note: Rather than the appearance of the lens, success is ultimately determined by the effect on uncorrected vision and post-wear corneal topography.
Over-refraction

- Target (**plano** to +0.50 D)
- Adjustments (0.10 mm = 0.50 D)
  - Minus over-correction (flatten BCR)
  - Plus over-correction (steeple BCR)

Topography: Ideal
Topography: Lens Superior

- Happy face (decentration superior): increase sagittal depth

Topography: Lens Inferior

- Sad face (decentration inferior): decrease sagittal depth
Topography: Central Island

- Central island (inadequate applanation): decrease sagittal depth

Follow-up Schedule

- Initial
- Treatment phase
- Periodic “well visits”
Initial Follow-up

- Morning (after 1 night of wear)
  - Present wearing lenses
- Procedures
  - Focused history
  - Entering visual acuities (VAs)
  - Lens evaluation with over-refraction
  - Refraction with best-corrected VAs
  - Biomicroscopy
  - Corneal topography

Treatment Phase

- Later in the day
  - Bring lenses to the appointment
- Procedures
  - Same procedures
  - Address “retainer” issues
- Well visits thereafter
Well Visits

• Periodic follow-up eye health and vision care
• Special concern for lenses prescribed for overnight wear

Best Practices for Safety

• Insertion, removal, recentering
• Cleaning and disinfection
• Rewetting drops
• Accessories
• Case replacement
• When parent/caregiver is away
Lens Application, Removal, Recentering

• Teach patient and parent/caregiver
• As with adults, may need additional visits
• Lens removal critical
  – Lubrication may minimize lens adherence

Cleaning & Disinfection

• Young wearers (children)
• Older wearers (adolescents and adults)
• Rinsing solution (no more tap water initiatives)
Orthokeratology

The "No Water Campaign"

A campaign was launched in 2011 to raise awareness of the risks associated with using non-sterile water to clean contact lenses. Established by Renie Ikkehs, who lost the sight in her right eye after contracting a corneal infection called Acanthamoeba keratitis, the No Water Initiative won Campaign of the Year at the inaugural awards ceremony in London (June 2016).

In the video below, Renie Ikkehs talks about her successful "no water warning" campaign to help raise awareness of a disease that can affect people who wear contact lenses.

http://www.paragonvision.com/consumer/you-and-crt/no-water-on-lenses

Rewetting Drops
Periodic Cleaners (?)

Accessories (?)
Case Replacement

Educate the “Village”

• Situations where primary parent/caretaker(s) away from child
  – Extended family
  – Sleepovers
  – Other travel
Myopia Management

• Off-label; nothing is FDA-approved for myopia control
  – Manufacturers cannot advertise for myopia control
  – You, as an eye care professional, can share this option with your patients.
    • Evidenced-based approach
    • Your professional judgement

ROMIO Study

Clinical Trials | October 2012
Retardation of Myopia in Orthokeratology (ROMIO) Study: A 2-Year Randomized Clinical Trial
Pauline Cho; Sin-Wan Cheung

Conclusions: On average, subjects wearing ortho-k lenses had a slower increase in axial elongation by 43% compared with that of subjects wearing single-vision glasses. Younger children tended to have faster axial elongation and may benefit from early ortho-k treatment. (ClinicalTrials.gov number, NCT00962208.)
Other Studies of Interest


Epidemiology

https://issuu.com/paragon_vision/docs/me_waiting_room__stand_up_banner_33
The Myopia “Epidemic”

Since 1971, the prevalence of myopia has increased 66% in the USA. Myopia is a rapidly increasing epidemic. By 2020, it is estimated that the number of people with myopia will grow to one-third of the world’s population (2.5 billion). It is reported that greater than 80% of urban Asian children suffer from some form of nearsightedness (myopia).

Non-treatment Consequences?

- Uncorrected vision
- Myopia as a disease process
  - Minimize myopia; presumably minimize disease process
  - Open angle glaucoma, retinal detachment, cataract, macular degeneration
Peripheral Optics


Slowing Myopia Progression

- Ortho-k
- Soft multifocals
- Atropine (Pirenzapine outside of US)
Soft Multifocals

• Distance center multifocals with higher add powers
  – CooperVision Proclear
  – CooperVision Biofinity

Outside the US

https://coopervision.com.my/contact-lenses/misight/misight-activcontrol-technology (Note: Malaysia)

Safety Profile

- Soft contact lens wear
- Ortho-K

Age and Other Risk Factors for Corneal Infiltrative and Inflammatory Events in Young Soft Contact Lens Wearers from the Contact Lens Assessment in Youth (CLAY) Study

Robin L. Chalmers,1 Heidi Wagner,2 G. Lynn Mitchell,3 Dawn Y. Lam,4 Beth T. Kimoshita,5 Meredith E. Jansen,6 Kathryn Richardson,7 Luigina Sorbara,6 and Timothy T. McMahon8

Peak: 15 to 25 years
Orthokeratology


case report

Acanthamoeba Keratitis During Orthokeratology

Xinh H. Whithorne, MD, PhD

Orthokeratology Lens–Related Corneal Ulcers in Children

A Case Series

Alex Le Tong, MMedSc (Med) FRCS; Alfred T. J. Low, FRCS;
Lai L. Ching, BMedSc, MBBS (Ophthal); Roky W. K. Law, FRCS; Angus K. K. Wong, FRCS; Doris C. C. Lam, FRCS, FRCS(Ophth)

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The Risk of Microbial Keratitis With Overnight Corneal Reshaping Lenses

Mark A. Ballinmore*, Loraine T. Simont; and Lisa A. Jones-Jordan

Abstract

Purpose: To estimate the incidence of microbial keratitis (MK) associated with overnight corneal reshaping contact lenses and to compare rates in children and adults.

Methods: A retrospective study of randomly selected practitioners, stratified by order volume and lens company, was conducted. Practitioners were invited to participate and those agreeing were asked to provide deidentified patient information for up to 50 lens orders and to complete a comprehensive event form for any of these patients who have attended an unscheduled visit for a painful red eye. Duration of contact lens wear was calculated from the original fitting date or January 2003 (whichever was later) to when the patient was last seen by the practitioner wearing the lenses on a regular basis. Cases of MK were classified by majority decision of a 5-member expert panel.

Results: For the 191 practitioners who could be contacted, 119 (62%) agreed to participate. Subsequently, 11 withdrew, 22 did not respond, and 9 (43%) returned completed forms corresponding to 2002 lens orders and 1698 patients. Limiting the sample to those patients with at least 3 months of documented contact lens wear since 2005 resulted in a sample of 1377 patients: 940 adults (49%) and 437 children (51%), representing 2590 patient-years of wear (adults = 1164; children = 1426). Eight events of corneal infiltrates associated with a painful red eye were reported (six in children and two in adults). Two were classified as MK: Both occurred in children but neither resulted in a loss of visual acuity. The estimated incidence of MK was 7.7 per 10,000 years of wear (95% confidence interval [CI] = 0.0 to 27.8). For children, the estimated incidence of MK is 13.9 per 10,000 patient-years (95% CI = 1.7 to 59.4). For adults, the estimated incidence of MK is 0 per 10,000 patient-years (95% CI = 0 to 31.7).

Conclusion: The risk of MK with overnight corneal reshaping contact lenses is similar to that with other overnight modalities. The fact that the CI for the rates estimated overlap should not be interpreted as evidence of no difference. True differences fewer than 50 cases per 10,000 patient-years were beyond the study’s power of detection.
Ortho-K Benefits

• Spectacle-free
• No lenses during sports (i.e. no swimming in CLs, lens loss)
• Parents “in-control”
  – Kids wear lenses at home
  – Parents/caregivers can remind and directly oversee

Ortho-K in Children

• No driving concerns
• Glare complaints rare
• Fewer complaints in general
• No accessory SCLs
• Novel
Value Added

• Children and adolescents who don’t like wearing glasses
• Boost in self-esteem (physical appearance, athletic competence, social acceptance)
• Quality of life

Presenting Options

• Ortho-K
• Other myopia management options (also off-label)
Soliciting Interest

• Waiting room materials/grabbers

Education

• Evidenced-based educational materials describing myopia management options
Being Proactive

• Present to all or some?
  – Waiting for them to ask
  – Targeting those who you believe will experience greatest benefit
  – Presenting all options to each patient and parent

Dillehay Project

Being proactive rather than reactive! (old project but its implications applicable)

Do’s

• Select the first patients carefully and build upon that success
• Develop presentation materials that fit you and your practice
• Dispel myths (what is the earliest age to begin contact lens wear?)
• Keep other providers in the practice in the loop
• Train staff to ensure that the practice has a unified message

Don'ts

• Avoid situations where the parents and children not both on board
• Overpromise
• Forget to tell anyone about it!
Resources

- Prevalence of myopia
- Peripheral optics and treatment strategies for myopia progression
- Efficacy of orthokeratology
- Other benefits of contact lens wear for children and adolescents

http://u.osu.edu/wagner.10