Contact lenses for children:
changing lives for the better

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DISCLOSURE

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Lecture content always my own

Q: What is the top reason for adults wanting CL?

1. Cosmetic 31%
2. Sports 8%
3. Convenience (e.g., rain, cooking) 34%
4. Better vision 5%
5. Hate glasses 3%
6. Optical (e.g., anisometropia) [not asked]
7. Medical (e.g., keratoconus) 2%
8. Other 17%

Bowden & Harknett (2006)

Q: What is the top reason for adults wanting CL?

Main reason (Gupta & Naroo, 2006)

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2. Sports 8%
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Bowden & Harknett (2006)
Cosmesis

- CL better than specs for cosmesis
- Q: in which decade of your life did you worry most about your appearance?
  - 1-10 years
  - 11-20 years
  - 21-30 years
  - 31-40 years
  - 41-50 years

Sports

- CL better than specs for sports
- Q: in which decade of your life did you do most sport?
  - 1-10 years
  - 11-20 years
  - 21-30 years
  - 31-40 years
  - 41-50 years

Other reasons for kids in contacts

- Precision tinted contact lenses – specialist & rare
- Anisometropia — common
- Myopia control — very common & increasing
- UV protection

Anisometropia & contact lenses: conclusions

- Contact lenses are the best optical approach for correcting anisometropia
- Contact lenses may also treat anisometropic amblyopia
- Optimal clarity is the goal, so toric lenses often needed
  - If fitting a toric soft lens to one eye then choose a design that does not have a vertical prism in the optic zone; e.g., Acuvue Oasys for Astigmatism

(Hawke et al., 2013)
Other reasons for kids in contacts
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**How to reduce peripheral hyperopic defocus?**
- RPHD eliminated by OK, but not by CD BFSCL (Ticak & Walline, 2013)
- Large pupil diameters facilitate the effect of OK to slow axial growth in myopia (Chen et al., 2012)
- Centre-distance multifocal SCL creates peripheral myopic defocus during DV and to lesser extent during NV (Berntsen & Kramer, 2013)

**Safety of overnight orthokeratology (OOK)**
- For soft contact lenses, overnight wear increases risk of microbial keratitis (MK) by 10x
- Several cases of (MK) reported, mainly in Asian countries thought to be associated with poor hygiene
- Tap water, old contact lens cases, suction holders
- Prevalence of complications from OOK has not been established
- Risk of OOK similar to other overnight wear of contact lenses

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**Myopia: the new view**
Patient about to become myopic
- Image shell focused on retina at fovea
- Image focused behind retina in periphery
- Relative peripheral hyperopic defocus - RPHD

The eye grows so the peripheral image is in focus causing myopia at the fovea

Spectacles or contact lenses correct the focus at the fovea, but not the RPHD so myopia progresses

**Slowing of axial elongation with OK contact lenses**

**Slowing of myopia progression with multifocal (MF) or myopia control (MC) soft contact lenses**

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**Safety of Overnight Orthokeratology for Myopia**
A Report by the American Academy of Ophthalmology
Caveats
- Need more RCTs
  - But myopia control effective "on balance of probabilities" and need to start young
- Persistence of treatment effect
  - Unclear whether the treatment effect is sustained or wears off with time
  - May be rebound effect when stop intervention
  - Perhaps, not a problem with optical interventions:
    + We can’t yet cure myopia, so still likely to need Rx
    + No significant side effects to our interventions
- Axial length changes correlated with myopia changes ($r^2 = 65\%$)
- Followers of a theory tend to ignore other theories
  - If myopia wasn’t multifactorial, then we would have solved it by now!

Conclusions: myopia control in European children
- If NV esophoria or high accommodative lag, recommend multifocals
  - MF glasses likely to reduce progression rate by 30-40%
  - MF CL may reduce progression by up to 70%
  - Aim to eliminate esophoria; typical add $+2.00, CD$
- If not esophoric and normal lag, effect reduces
  - MF glasses likely to reduce progression by only 15%
  - MF CL success rate ~36-50%
- OK slows myopia progression by 32-63%
- Also encourage kids to go outdoors

Other approaches to myopia control
- Don’t under-correct
- Time outdoors & sport
- Atropine (low dose promising)
- Pirenzipine

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UV protection
- Ocular protection required for cataract, ocular melanoma, ARM
- UV-blocking CL greatly increase safe exposure time (Wai & Bergmanson 2011)
- Yam & Kwok (2013) review:
  - UV exposure linked to ocular pathologies including cataract & maybe AMD
  - UV blocking contact lenses offer effective protection

The reasons for adults wearing are even more relevant for children than adults
1. Cosmetic
2. Sports
3. Convenience (e.g., rain, cooking)
4. Better vision
5. Hate glasses
6. Optical (e.g., anisometropia)
7. Medical (e.g., keratoconus)
8. Other
**Perceived barriers to fitting CL to kids**
- Eyecare practitioners!
- Perceived cost
  - Yet, only about €1.50 a day
- Some people still think CL will hurt
- Some parents think that the child won’t be able to learn handling (Zeri et al., 2010)
- Fear of microbial keratitis
  - Our job is to allow informed choice
  - Parents accept risks if give children benefits
  - MK occurs 1 in 5,000 PA; risk minimised by good hygiene and prompt action
  - Only fit to motivated cases who can be hygienic

**Does compliance matter?**
- Solutions ineffective when used non-compliantly (Rosenthal et al., 2003)
- 55-99% are non-compliant, but think they are compliant (Donshik et al., 2007)
- It is difficult to improve compliance (Yung et al., 2007)
- Poor compliance increases microbial flora (Tuli et al., 2009)
- Patients who replace on time have better comfort (Yung et al., 2007)
- 1 in 5 college-age wearers rinse in tap water sometimes (Wagner et al., 2014)

**Why aren’t we doing better?**

**PLAN**

**BACKGROUND**

**WHY**

**HOW**

**CONCLUSIONS**

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**Some key research on CL for children**
- Soni et al. (1995): age 11-13y
  - 3 successful attempts in training
  - Exam helps
- CLIP study (Walline et al., 2007a,b; Jones et al., 2009)
  - 84 children (8-12) of 85 teens (13-17)
  - “No serious adverse events were reported during the 3 month study”; biomicroscopy of children similar to teens
  - Children do as well as teens
  - Similar chair time, slightly more tuition for children
  - Improved quality of life
- ACHIEVE study (Walline et al., 2009)
  - RCT of children (8-11), CL v. Specs, 3y
  - Physical appearance, athletic competence, social acceptance all significantly better with CL
  - 91% of CL group wore CL to 3 year check

**Lens types for children**
- Children are fitted with the highest proportion of daily disposable lenses (Efron, Morgan, Woods, 2011)
- Safest (for preserving vision) (Dart et al., 2008)
- Better compliance with daily disposable (Dumbleton et al., BCLA 2009)
- SiH monthly or fortnightly are a good lower cost option
- UV blocking is a good idea

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Top tips for fitting & tuition

- Address fear of the unknown
  - Soft lenses are mostly water
  - Let the child handle lenses
- Fitting
  - Don't put fitting lens directly on cornea
  - Avoid pain
  - If RGP, use anaesthetic at first insertion
- Tuition
  - Aim tuition & literature at child & parent
  - Be positive, realistic, encouraging
  - If your personality is at all impatient/stern, then delegate!
  - At aftercare, right time to be stern!

The quiz

1. When do you wear your lenses?
2. What do you do in the mornings?
3. What do you do in the evenings?
4. What are the danger signs?
5. What do you do if you have a danger sign?
6. What do you do if the danger sign does not get better over the next few hours?
7. How often do you replace your lenses?

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c.f., adults: Miller's pyramid

Potential for better compliance than adults

observation at aftercare

parents

tuition

the quiz

Miller (1990)

Conclusions on when to discuss CL

- Young people have greater need than adults
- Children benefit just as much as teenagers
- When to first mention?
  - When first refractive correction
  - When issuing an Rx
- How to discuss?
  - "This can be corrected with glasses or CL."
  - CL require motivation and hygiene, but have a high success rate at this age
  - Modern CL are comfy and child-friendly
  - Specialist CL can slow myopia progression
    - The corrector becomes a treat!

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