Contact Lenses For the Treatment of Pediatric Aphakia

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Objectives

- Review importance of fitting children in contact lenses for aphakia
- Review different types of pediatric contact lenses
- Learn recommendations for fitting patients with aphakia

Indications for Contact Lenses for Aphakia

- Aphakia due to congenital cataracts or trauma is the most frequent indication for fitting young children or infants in contact lenses[5].
- Cataract surgeons often don't implant an intraocular lens in children under two years old as the eye is growing and changing during development. Depending on the situation and child, implanting an intraocular lens may be delayed until the child is much older[5].

Vision Correction for Infants who have Aphakia

- The resultant aphakia after congenital cataract removal is best corrected with contact lenses[6].
- In unilateral aphakia, glasses have the drawback of aniseikonia and issues with magnification[6].
- In bilateral aphakia, the high Rx needed in glasses can distort vision by creating a “pincushion” effect.
- Contact lenses may be worn indefinitely if it is determined that an IOL is contraindicated[3].
- The child may be in contacts for many years until the eye has developed completely.

Importance of Fitting Patients in Contact Lenses

- Most surgeons prefer to perform cataract surgery between 6 and 12 weeks of age but will often not implant an intraocular lens until later in life[4].
- This is a critical time for visual development and preventing deprivation amblyopia. If sufficient visual correction is not obtained within this window, visual prognosis is worse.

Ideal Aphakic Contact Lens

- High plus lenses and extended sleep of infants necessitate the need for high DK/t lenses[3].
  - Ideally want:
    - Steeper lens
      - Average K's of infants are steeper than adults average K's[7,8]
        - Infants: Km = 45.07, although studies vary considerably[9]
        - Adults: Km = 43.57
        - Higher plus power lenses in younger aphakic patients needed due to the shorter axial length of infants and young children[3]
    - Small contact lens due to smaller fissures

Soft Lenses VS. Gas-Permeable (“GP”) Lenses

- Soft lenses:
  - Advantages:
    - Potentially more comfortable, easier to fit, high Dk of Silsoft lens
  - Disadvantages:
    - Difficult to insert/remove, limited parameters, more expensive, potentially doesn’t provide as good of vision when compared to GP lenses
    - Non-Silsoft lenses have low Dk
- GPs:
  - Advantages:
    - Potentially better vision, fully customizable, easier to insert/remove, more cost-effective
  - Disadvantages:
    - Harder to fit, possibly less comfortable, easier to lose

Soft Lenses

- Many companies make soft lenses to accommodate pediatric aphakia such as:
  - Bausch & Lomb
  - Flexlens
  - Alden
  - Continental
  - Kontur and Optech
- Silsoft by Bausch & Lomb is made with silicone and allows for the highest oxygen transmissibility available and therefore is commonly fit. Dk = 340

SilSoft Lenses

- Silsoft Super Plus pediatric lenses
  - BC: 7.5, 7.7, 7.9 mm
  - Dia: 11.3 mm
  - Power: +23.00D to +32.00D (3.00D steps)
  - OZ: 7.0 mm
- Silsoft Aphakic - adult lenses
  - BC: 7.5, 7.7, 7.9, 8.1, 8.3 mm
  - Dia: 11.30 mm, 12.5 mm
  - Power: +12.00D to +20.00D (1.00 steps)
  - OZ: 7.0 mm

Fitting Process of Soft Lenses on Infants

- Most infants do well with an initial lens diameter of 11.3mm Silsoft
- Due to the relatively steep corneas in infants, the patient usually requires a steeper base curve than traditional soft contact lenses[8]
    - 7.5 or 7.7 is commonly used
- As the child gets older, larger diameters are usually needed

Fitting Process

- The ideal fit will have:
  - 1-2 mm of movement on the eye
  - Full coverage and extension beyond the limbus
  - The optic zone centered over the pupil
- Using a 20D lens is often a necessary alternative to evaluate the contact lens fit due to the difficulty of using a slit lamp with a child

Dispensing and Following up with a Lens Fit

- With a high Dk lens, the infant should continuously wear the lens for the next 24-48 hours until the next appointment
- At that next visit:
  - Evaluate the fit
  - Perform retinoscopy to evaluate needed power changes
  - Remove lens and stain the cornea to ensure there are no corneal complications
- Once these steps are performed, order a lens with the appropriate power to focus at the infant's near point

What Power to Order for Contact Lens

- Once the fit of the contact lens is deemed acceptable, the appropriate power is needed to maximize visual development
- Ideally with infants and very young children the goal is to provide a clear nearpoint, which requires an overcorrection of the contact lens[5]
- As a general rule, you want to over-plus a pediatric aphakic by the following:
  - +3.00D from age 0-1
  - +2.00D to +2.50D for age 1-2
  - +1.00D to +1.50D for age 2-3
- It is critical to ensure you are not overminusing the child for proper visual development.

Importance of Bifocal Glasses Over Contact Lenses

- Beginning at about 4 years of age, patients benefit from wearing bifocal glasses over the contact lens correction.
- Aphakia causes loss of accommodation, so without the help of bifocals the child will struggle in school and with near tasks.

Average Power Needed for the Aphakic Eye

- Note: these are averages[2,5]
- 0-12 months
  - +29D to +32D
- 12-24 months
  - +20D to +26D
- > 2 years
  - +12D to +20D
- If an infant with aphakia needs more power than a soft Silsoft lens can offer, the patient will need to be fit in a gas-permeable lens, a custom soft contact lens, or wear glasses with more plus power over the contact lens.

Replacing Silsoft Lenses

- Silsoft are approved for continuous and overnight wear, but it is recommended that they should be removed at least once weekly while the child sleeps
- This allows the lenses to be cleaned thoroughly and to give the child a break from continuous wear
- Soft contact lenses for aphakia should be replaced every 3-6 months due to accumulation of deposits
- However, lenses may need to be changed sooner due to changes in fit or power

Gas-Permeable Lenses for Aphakia

- Gas-permeable (or “rigid”) lenses can also be used to treat aphakia. They are also imperative when parameters for soft aphakia lenses cannot match the visual needs of the patient
- Common concerns with gas-permeable lenses and children are if the infant/child can tolerate the lens and if they will remain on the eye centered over the visual axis
- Studies show, however, that this should not be a big concern. Most patients will tolerate gas-permeable lenses well and getting the fit right is not as difficult as one may think[1,4]

Gas-Permeable Lenses for Aphakia

- Gas-permeable (“GP”) lenses have great oxygen transmissibility and also offer more customizable steps in refractive power and fitting parameters
- GP lenses must also be taken out at night as they are not approved for extended wear
- However, GP lenses, if fit properly, can offer excellent potential for visual development

Typical gas-permeable (“GP”) Lens Parameters

- Typical parameters of a GP lens
  - Diameter:
    - 9.2 to 9.8mm
  - Base curve:
    - 44.00 - 47.00 diopters, but does vary
  - Dk: higher Dk is ideal
    - Examples: Optimum Comfort (Dk = 65)
  - Be sure to always lenticulate when ordering
- Rules for over-correcting the power are the same for GPs and soft contact lenses

Fitting GP Lenses for Aphakia

- Fitting a GP for an infant can be challenging, but corneal topography measurements can help streamline the process.
- These measurements can often be taken using a handheld topographer or keratometer during cataract surgery.
- However, this data is not often available or done during cataract surgery.
- The ideal fit of a GP lens on an infant is similar to that of an adult patient. However, the process usually requires putting diagnostic lenses on with steeper base curves and evaluating the fit and overrefraction[6].

Ideal Fit for a GP Lens

- Best evaluated with fluorescein and using a Burton or handheld cobalt light
- Elements of a good fit:
  - Centered
  - Light central clearance (helps with stability and centration)
  - 1-2mm of fluorescein at the edge to ensure lift is ideal
  - Minimal amount of movement, but not adhered to the cornea
- Often lenses decenter inferiorly. That is acceptable as long as the optic zone provides sufficient coverage over the pupil

Picking the Correct Lens

- There are pros and cons to fitting soft or GP lenses on an infant. Ultimately, choosing the correct contact lens to fit a child requires collaboration with the provider and parents in determining what is most beneficial to the patient.

What to Expect for Visual Outcome

- It is difficult to determine how much improvement is expected in the visual outcome of aphakic patients as there are often many variables at play
- Patients with congenital cataracts commonly have other ocular complications that confound visual acuity improvement.
- Treatment of deprivation amblyopia requires patching and other therapies in addition to wearing a pediatric contact lens
- The faster a proper contact lens fit can be obtained for a patient, the better potential visual outcome. This can be extremely important when dealing with bilateral aphakia

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