Title: Fitting Gas Permeable Contact Lenses on Aphakic Infants with Congenital Cataracts: Case Report

I. Case History

Patient demographics:
9-month-old Caucasian female

Purpose of visit/Chief Complaint:
Contact lens fitting on aphakic eye (OD)

Ocular history:
1. Congenital Cataract, OD
2. Monocular nystagmus, OD
3. Dense Deprivation amblyopia, OD

Medical history:
1. Spinal Muscular Dystrophy
2. h/o bilateral femur fracture
3. Club foot of both feet
4. Congenital vertical talus deformity
5. Congenital joint contractures
6. Feeding problem

Ocular Medications:
- Vigamox BID OD; Atropine QD OD; Prednisolone Acetate BID OD;
  Tobradex BID OD

Systemic Medications:
- Glycerin (bulk) solution
- Acetaminophen (Tylenol)

II. Pertinent findings

Visual Acuity/Fixation:
OD: Central, Unsteady, Unmaintained.
OS: Central, Steady, Maintained.
(strong fixation preference detected per induced tropia test using 16 pd BD)

Cycloplegic Refraction:
OD: +21.00
OS: +1.50 +0.50 x090

Pertinent Anterior Segment findings:
Cornea OD: superior wound well apposed
Lens OD: aphakic
IOP: 11/12 mmHg with iCare

Posterior segment findings:
   OD: c/d 0.10 round, macula flat, evenly pigmented
   OS: c/d 0.10 round, macula flat, evenly pigmented
   Peripheral retina flat and attached 360 OU
All else unremarkable

Patient was fit with a GP lens made of Menicon Z material (Menicon, Japan) using the Dyna Intralimbal design (Lens Dynamics, CO)

Trials: BC/Power/Diameter and Observations
# 1: 7.50/ +24/10.4: too steep ~2D central bubble
# 2: 7.80/ +24/10.4: 0.50-1D steep still. Plano over-retinoscopy
# 3: 8.00/ +24/10.4: inferior bubble with slight central bearing- flat
# 4: 8.20/ +24/10.4: slight superior central bearing and inferior bubble

Dispensed from spare set 7.85/+27.00/10.4 after successful I and R training completed by the parents. The intended over-refraction for aphakic children at this age is -3.00 D to provide the best clarity for the infant at a near focal point.

Final: DIL: MZ to be ordered: 7.90/+27.50/10.2

III. Differential diagnosis

Primary/leading
   Congenital Cataract OD

Fitting Options:
   • Spectacles
   • Soft contact lens
   • Rigid gas permeable
   • Scleral lenses
   • Intra-ocular lens

After discussing with the family the different treatment options, the parents elected to try rigid gas permeable lenses.
IV. Diagnosis and discussion

Congenital cataracts are a treatable vision impairment that affects approximately 3-4.5 per 10,000 in the United States and 3 per 10,000 in the United Kingdom. The etiologies of congenital cataracts are diverse with idiopathic being the most common cause. Other causes include familial, autosomal dominant, galactosemia, persistent hyperplastic primary vitreous, rubella, salt and pepper chorioretinitis, microphthalmos, and Lowe syndrome. The primary concern with congenital cataracts is severe deprivation amblyopia.

V. Treatment, management

Congenital Cataracts are treated with the surgical removal of the cataract in a timely manner to avoid deprivation amblyopia. There are relatively high risks associated with infants that undergo anesthesia and surgical procedures. Vishwanath et al and Khan et al demonstrate case reports which show a higher incidence of glaucoma occurrence in infants who underwent cataract extraction earlier than 4 weeks. However, Birch and Stager demonstrated that if the cataract extraction was delayed beyond 6 weeks, than the visual prognosis was worse.

Immediately following cataract extraction, patients are either fit into spectacle correction, soft contact lenses, rigid gas permeable lenses or intra-ocular lenses. Spectacle corrections aren't usually chosen because of the poor optical performance, cosmesis, and aniseikonia with monocular aphakia.

The infant aphakia treatment study is a prospective, randomized control trial aimed to evaluate and compare intra-ocular lenses and contact lenses. There was no significant difference between mean visual acuity of both groups at 1 year of age with grating acuity and 4.5 years with HOTV optotype acuity. There was 5-fold increase in additional intraocular operations in the IOL group, most of them due to opacities which developed in the first 3-6 months after IOL implantation. The theory behind the lower rate of lens reproliferation into the visual axis and pupillary membranes were thought to be because the anterior and posterior capsular bag fuse together prevents the lens material from migrating. The IOL provides a scaffold for the remaining lens epithelial cells to reproliferate, especially in infants.

Glaucoma developed in 18% of the patients with no difference between pseudophakic and aphakic eyes. The risk of developing glaucoma or being a glaucoma suspect was 31%. There was a 3.2 times higher risk of developing glaucoma in the younger age group 24-48 days old versus 48 days. However, the patients who had earlier surgery had a better median visual acuity. Ninety-five percent of the glaucoma was primary open angle glaucoma.
Cataract extraction with a primary IOL implantation was 7% more expensive than treatment with contact lens ($27090 vs $25331) at age 5 years. However, the costs of supplies were more expensive with contact lens. The average number of contact lenses used by a patient was ten in the first year, nine in the second year, seven in the third year, and five in both the fourth and fifth year.

Bibliography
10. Khan AO, Al-Dahmesh S. Age at the time of cataract surgery and relative risk for aphakic glaucoma

VI. Conclusion

Clinical pearls

• Both contact lenses and IOL implantations are viable options in the treatment of infant aphakia
• Treatment options should be thoroughly explained with the family, including benefits and risks of each option
• Optometrists should be equipped and prepared to fit aphakic babies
  • Pediatric gas permeable fitting sets
  • Blue LED micro flashlight (ex Ize Inova Microlight)
  • Loose lens retinoscopy
• Compliance with patching and contact lens is equally important for a good outcome
• Early cataract removal usually results in better visual prognosis, however, it is linked with increased risk of glaucoma