Managing Infants and Toddlers with Contact Lenses

Buddy Russell, FCLSA, COMT, FSLS, LDO

Disclosures

Consultant — GPLI advisory board

Honorariums — B&L SVP, Euclid
Paragon Vision Sciences
BostonSight

No financial interest in any products

Pediatric work is "unique"

- Can't use "cool toys"
- Differences of opinions
- Not a lot of updates to discuss


Great
Rewards

Goals

- Optimize outcomes
- Minimize / eliminate complications
- Earn caregivers trust

Cornea. 2006 Dec;25(10 Suppl 1):S78-81.

The brilliant beauty of the eye: light reflex from the cornea and tear film.

Goto E.

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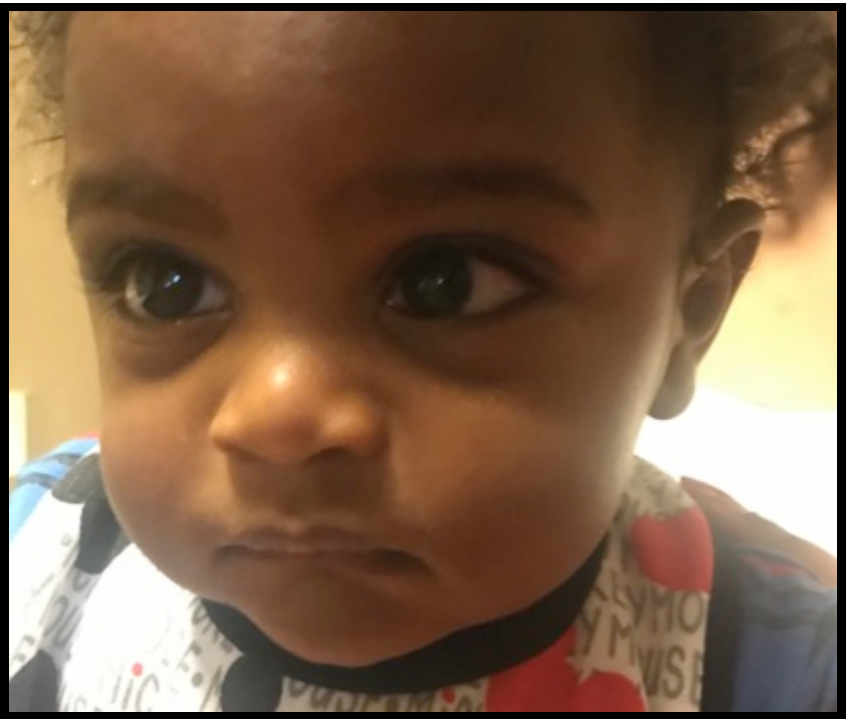
Abstract

PURPOSE: Light reflex from the cornea and tear film as contributors to beautiful eyes ("eye sparkling") are reviewed.

METHODS: A systematic literature review was conducted using "Purkinje-Sanson image," "corneal light reflex," "corneal topography," "corneal wavefront aberration," and "tear interference image" as search terms.

RESULTS: Articles on corneal surface regularity and stability and tear interferometry of the precorneal tear lipid layer were reviewed. PS-1 image, that is light reflex from the cornea and tear film, is widely used in practical ophthalmic examination.

CONCLUSION: To achieve a brilliant beauty of the eye ("eye sparkling"), it is important that the tear film (aqueous layer) surface is smooth and stable with adequate tear volume and that the tear lipid layer is present in adequate thickness.



WHICH "BUTTON" TO PUSH?

WHAT DOES THE KID RESPOND TO?

Reward Cooperation

Practitioner Challenges

REFRACTIVE INDICATIONS

MEDICAL INDICATIONS

Clin Exp Optom. 2019 Nov;102(6):556-565. doi: 10.1111/cxo.12881. Epub 2019 Feb 21.

Aniseikonia and anisometropia: implications for suppression and amblyopia.

South J[1], Gao T[1], Collins A[1], Turuwhenua J[1], Robertson K[2], Black J[1].

Author information

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Abstract

Aniseikonia is a difference in the perceived size or shape of images between eyes, and can arise from a variety of physiological, neurological, retinal, and optical causes. Aniseikonia is associated with anisometropia, as both anisometropia itself and the optical correction for anisometropia can cause aniseikonia. Image size differences above one to three per cent can be clinically symptomatic. Common symptoms include asthenopia, headache and diplopia in vertical gaze. Size differences of three and more impair binocular visual functions such as binocular summation and stereopsis. Above five per cent of aniseikonia, binocular inhibition or suppression tend to occur to prevent diplopia and confusion. Aniseikonia can be measured using a range of techniques and can be corrected or reduced by prescribing contact lenses or specially designed spectacle lenses. Subjective testing of aniseikonia is the only way to accurately measure the overall perceived amount of aniseikonia. However, currently it is not routinely assessed in most clinical settings. At least two-thirds of patients with amblyopia have anisometropia, thus we may expect aniseikonia to be common in patients with anisometropic amblyopia. However, aniseikonia may not be experienced by the patient under normal binocular viewing conditions if the image from the amblyopic eye is of poor quality or is too strongly suppressed for image size differences to be recognised. This lack of binocular simultaneous perception in amblyopia may also prevent the measurement of aniseikonia, as most common techniques require direct comparisons of images seen by each eye. Current guidelines for the treatment of amblyopia advocate full correction of anisometropia to equalise image clarity, but do not address aniseikonia. Significant image size differences between eyes may lead to suppression and abnormal binocular adaptations. It is possible that correcting anisometropia and aniseikonia simultaneously, particularly at the initial diagnosis of anisometropia, would reduce the need to develop suppression and improve treatment outcomes for anisometropic amblyopia.

If patching is prescribed,,,

- Arrive for visit with CL on eye
- And patched
- Don't forget the candy

Vision Assessment

- BTL — Blink To Light
- F&F — Fix & Follow
- CSM — Central Steady Maintained
- CS(U)M — Central Steady UnMaintained
- Grading
- HOTV
- Snellen

Keratometry
CL group baseline to 1 yr

Treated eye
mean 45.94
SD 2.42,
min 40.13, max 51.4

Non treated eye
mean 45.46
SD 1.82,
min 41.75, max 49.25

Treated eye
mean 44.09
SD 1.48,
min 41.25, max 49
-1.76 D (SD 2.06)

Non treated eye
mean 43.30
SD 1.42,
min 39.75, max 46.70
-2.08 (SD 1.68)

Keratometry
CL group baseline to 1 yr

After stratified by age, the mean decrease in keratometric power of treated eyes **decreased 0.2 D per month**
(SD 0.2 D)

The mean time interval between baseline and 1 year of age was 8.5 months and varied from 4.1 to 10.4 months

Eye Contact Lens. 2017 Nov;43(6):352-357. doi: 10.1097/ICL.0000000000000291.

The Infant Aphakia Treatment Study Contact Lens Experience to Age 5 Years.

Russell B[1], DuBois L, Lynn M, Ward MA, Lambert SR; Infant Aphakia Treatment Study Group.

Author information

1 Department of Ophthalmology (B.R., L.D., M.A.W., S.R.L.), Emory University School of Medicine, Atlanta, GA; and Department of Biostatistics and Bioinformatics (M.L.), Rollins School of Public Health of Emory University, Atlanta, GA.

Abstract

PURPOSE: To describe our experience treating a cohort of unilateral aphakic infants with contact lenses in the Infant Aphakia Treatment Study (IATS).

MATERIALS AND METHODS: Fifty-seven of the 114 infants in the IATS were randomized to contact lens wear; all were followed until age 5 years, although a few had lapses in care. An examination under anesthesia, including keratometry, was performed at the time of enrollment and at approximately 1 year of age; keratometry was performed again at 5 years of age. A traveling examiner assessed visual acuity at approximately 1 year of age and again at 4.5 years of age.

RESULTS: Twenty-four treated eyes (46%) wore silicone elastomer (SE) contact lenses, 11 eyes (19%) rigid gas permeable (GP) contact lenses and 17 eyes (29%) wore both lens types at various points of time. Median logMAR visual acuity was +0.70 (interquartile range (IQR), +0.30 to 1.20) in the SE group and 2.03 (IQR, +0.20 to 2.28) in the GP group at age 4.5 years. The mean (±SD) keratometric power of the treated eyes was 46.3±2.8 diopter (D) at baseline, 44.6±2.3 D at 1 year of age, and 44.3±1.7 D at 5 years of age. Keratometric astigmatism of treated eyes was 1.98±1.37 D at baseline, 1.62±0.98 D at 1 year of age, and 2.00±1.00 D at 5 years of age. Thirteen contact lens-related adverse events occurred among 7 patients after age 1 year.

CONCLUSIONS: A cohort of infants with unilateral aphakia successfully wore contact lenses with relatively few adverse events.

Keratometry
CL group 1 yr – 5 yr

Average Central Keratometric Power at Ages 1 and 5 Years

Of the 57 patients randomized to the CL group, there were 46 patients who had K-readings at both the age 1 year EUA and the clinical exam at age 5 years. The mean (± SD) age at the age 1 year EUA was 11.0 ± 0.4 months and was 59.9 ± 0.7 months at the age 5 years clinical exam. The mean time between the two measurements was 48.9 ± 0.7 months.

Table 4: Average Central Keratometric Power (D) at 1 and 5 Years of Age for Treated and Fellow Eyes For 46 patients with Measurements at Both Age 1 and Age 5

Age	Treated Eye	Fellow Eye	Difference	p-value*	95% CI**
1 Year	44.5 (1.9)	43.5 (1.5)	1.0 (1.9)	0.001	0.4 – 1.6
5 Years	44.3 (1.7)	43.5 (1.4)	0.8 (1.9)	0.008	0.2 – 1.4
Change†	-0.14 (0.8)	0.06 (1.1)	-0.2 (1.3)	0.29	-0.6 – 0.2

Table 5: Change in Average Central Keratometric Power from 1 to 5 Years of Age for Treated Eyes According to Type of CL Worn

Type of CL Worn	n	Change* in Keratometric Power (D) Mean (SD)	p-value**	Difference Between the Means of RGP and Silsoft†	
				Mean (SD)	95% CI‡
RGP	11	-0.4 (1.0)	0.23	-0.3 (0.8)	-0.9 – 0.2
Silsoft	35	-0.06 (0.7)			

The change was calculated as (Age 5 – Age 1) and therefore negative values indicate a decrease in average central keratometric power.

IATS CL Group
5 year VA

Table 3: Categories of Visual Acuity According to the Type of CL Worn

Visual Acuity	Type of CL Worn	
	RGP (n=12) n (%)	Silsoft (n=45) n (%)
20/20 to < 20/40	4 (33%)	9 (20%)
20/40 to < 20/80	0	9 (20%)
20/80 to < 20/200	0	7 (16%)
20/200 or worse	8 (67%)	20 (44%)
p-value*	**0.13**	

* p-value for Fisher's exact test comparing the percentages in the visual acuity categories between the two

Corneal Astigmatism
CL group 1 yr - 5 yr

CATS – Contact Lens Patients

Table 1: Keratometric Astigmatism at Ages 1 and 5 Years

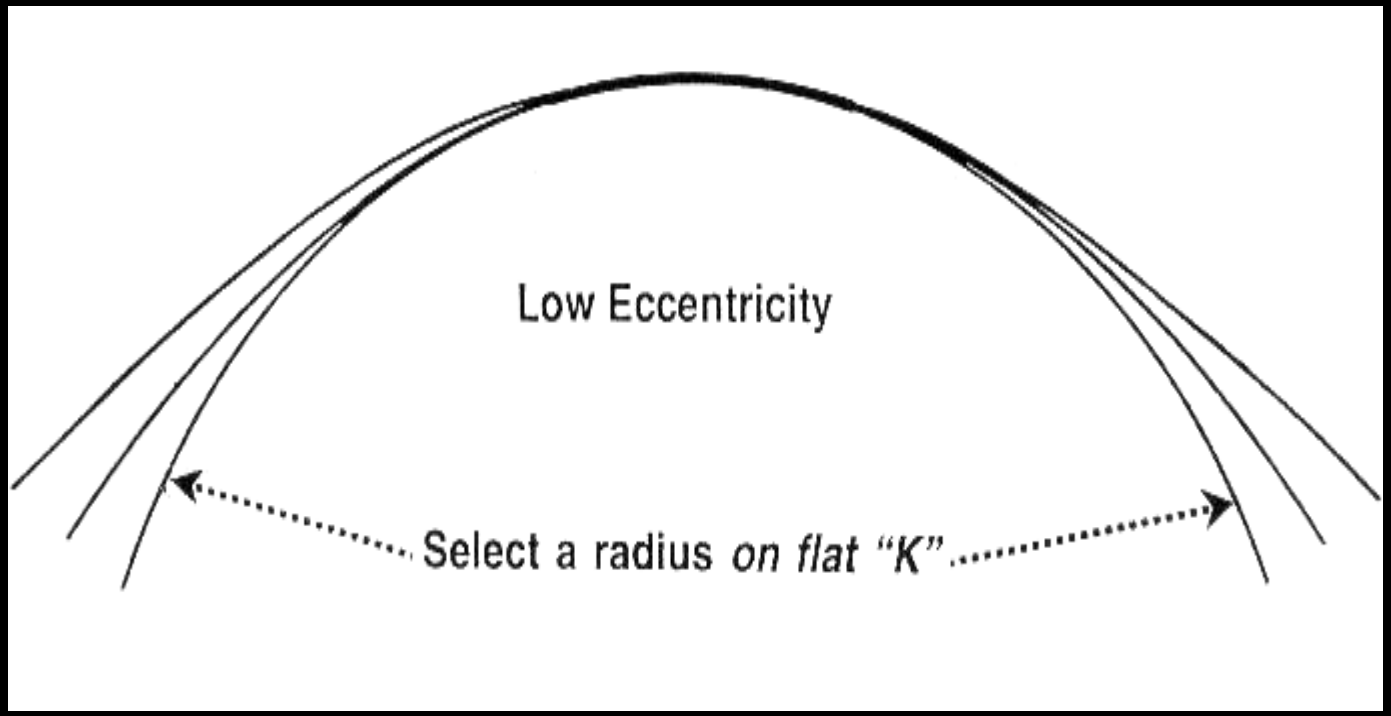
Age	Measure	Mean (Std Dev)	Range
1 Year (n = 52)	Astigmatism	1.62 (0.98)	0.00 – 5.00
	Steep Meridian	45.40 (2.34)	42.00 – 54.87
	Flat Meridian	43.78 (2.34)	40.25 – 53.62
5 Years (n = 51)	Astigmatism	2.00 (1.00)	0.36 – 4.03
	Steep Meridian	45.34 (1.60)	41.77 – 52.00
	Flat Meridian	43.34 (1.86)	39.02 – 49.78
Change* (n = 46)	Astigmatism	0.40 (1.28)	-3.12 – 3.38

The change was calculated as Year 5 – Year 1 so that negative values indicate a decrease in astigmatism.

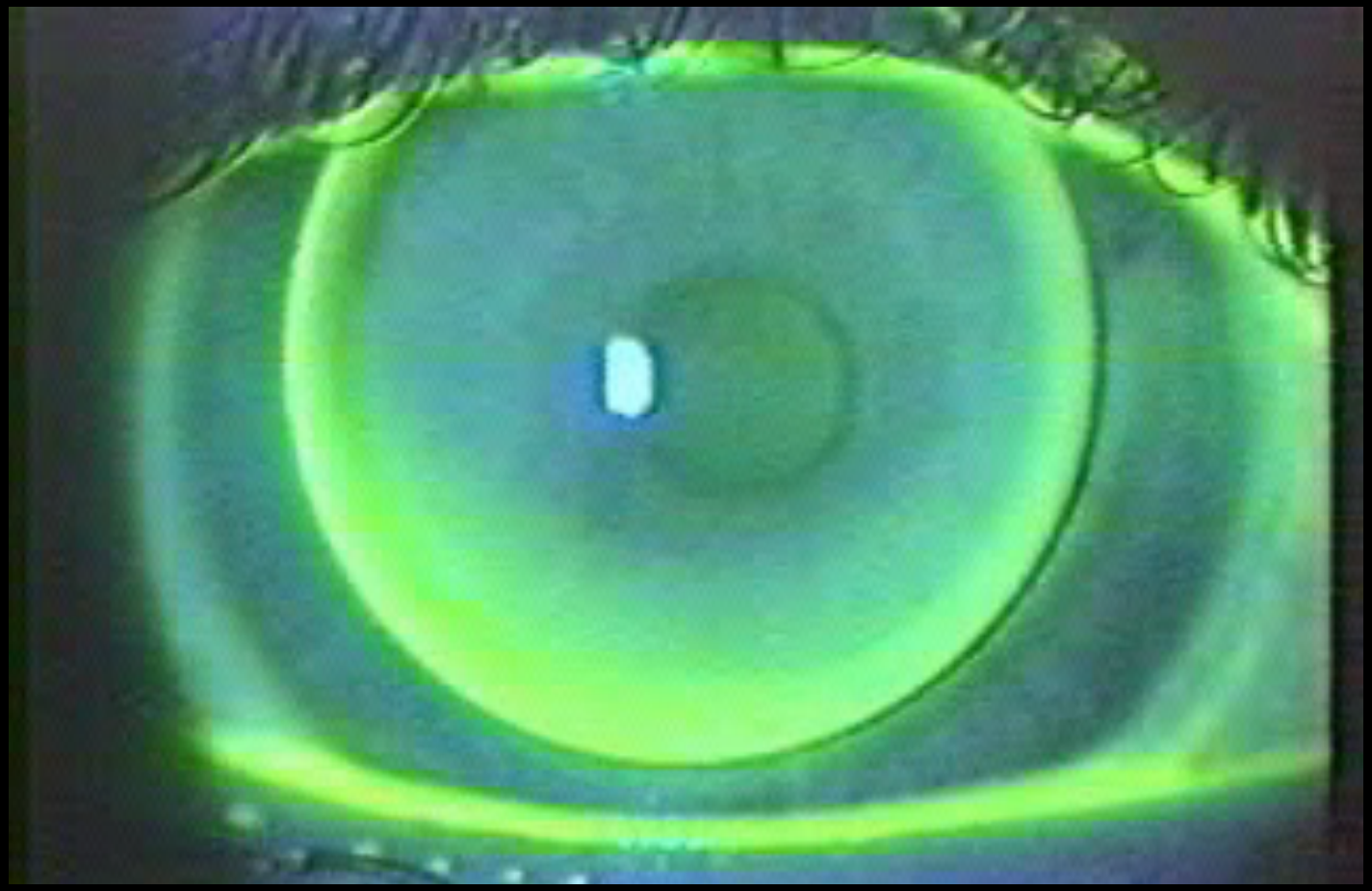
LOW ECCENTRICITY

ECCENTRICITY 0.00 - 0.31

SHAPE FACTOR 0.00 - 0.09



Interpretation of topography is easier with flatter lens



DX GP is 44.00D / 9.7

The lens is your best "elevation map"

Determine Flat K Example

Refraction +12.00 +1.50 x 90

+13.50 -1.50 x 180 VD 13

+13.50 @ 0 VD = +16.50

DX GP 44.00 +15.00 10.0

O / RX +3.00

= 44.00 +18.00

+18.00 – 1.50 = +16.50

44.00 +18.00 = 45.50 +16.50

Flat K 45.50 *flat central pattern DX GP

Eye Contact Lens. 2012 Jul;38(4):234-9. doi: 10.1097/ICL.0b013e3182562dc0.

The infant aphakia treatment study contact lens experience: one-year outcomes.

Russell B[1], Ward MA, Lynn M, Dubois L, Lambert SR; Infant Aphakia Treatment Study Group.

⊕ Collaborators (87)

⊕ Author information

Abstract

PURPOSE: We describe our experience correcting a cohort of infants with contact lenses in the Infant Aphakia Treatment Study.

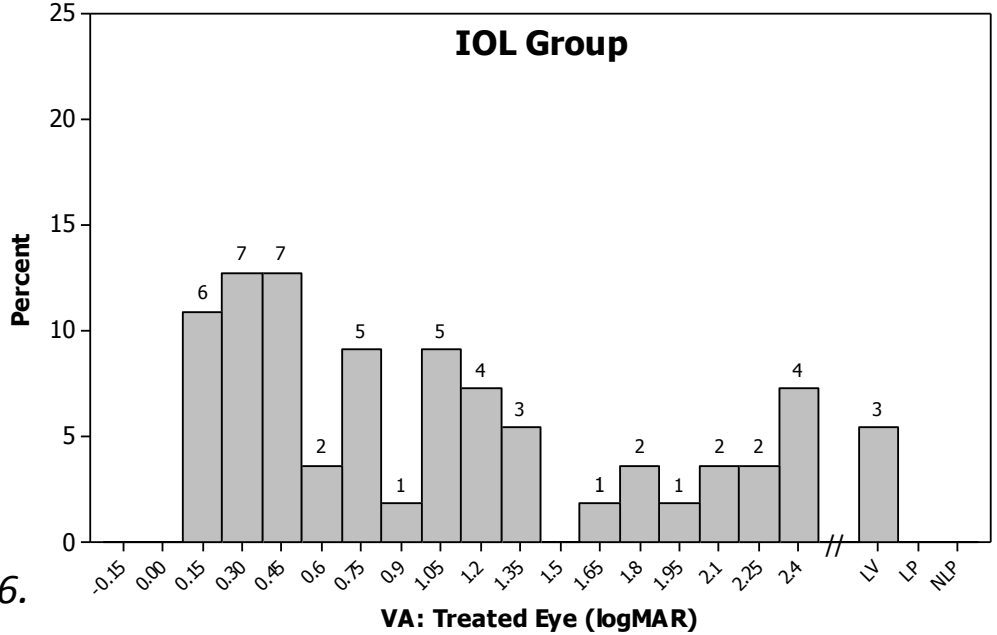
MATERIALS AND METHODS: Fifty-seven infants 1-6 months of age were randomized to contact lens wear. An examination under anesthesia was performed at the time of enrollment and at approximately 1 year of age. A traveling examiner assessed visual acuity at approximately 1 year of age.

RESULTS: Forty-two treated eyes (74 %) were fitted with silicone elastomer (SE) contact lenses; 12 eyes (21 %) with rigid gas permeable (RGP) contact lenses, and 3 eyes (5%) wore both lens types. Median visual acuity was +0.80 logMAR in both lens type-wearing groups. The mean (± SD) keratometric power of the treated eyes was 46.3±2.8 D at baseline and 44.6±2.3 D at 1 year of age for a mean decrease of 0.2±0.2 D/mo. Keratometric astigmatism of treated eyes was 1.98±1.37 D at baseline and 1.62±0.98 D at 1 year of age for a mean decrease of 0.05±0.2 D/mo. The mean RGP lens base curve at baseline was 47.62 D±2.62 D versus 47.00 D±3.50 D at 12 months after surgery. Children wearing SE lenses required a mean of 10.9 replacements (range 2-24) compared to 16.8 replacements (range 8-32) for children wearing RGP lenses. Three adverse events occurred.

CONCLUSIONS: Contact lenses were worn successfully with relatively few adverse events by a cohort of infants with unilateral aphakia. The visual acuity results were identical independent of the contact lens material or modality. RGP lenses needed replacement more often than SE lenses.

Visual Acuity of Treated Eyes at Age 4.5 Years

	LogMAR Visual Acuity	
	Median	**Quartiles**
CL	0.90	0.30, 1.60
IOL	0.90	0.40, 1.73
P-value	0.54	



Lambert et al. JAMA Ophthalmol 2014;132:676.

VA at 4.5 years of age according to the type of CL CL worn

Table 1: Categories of Visual Acuity at 5 year According to the Type of CL Worn

Visual Acuity	Type of CL Worn	
	RGP (n=12) n (%)	Silsoft (n=45) n (%)
20/20 to < 20/40	4 (33%)	9 (20%)
20/40 to < 20/80	0	9 (20%)
20/80 to < 20/200	0	7 (16%)
20/200 or worse	8 (67%)	20 (44%)
p-value*	**0.13**	

* The p-value for Fisher's exact test comparing the percentages in the visual acuity categories between the two groups.

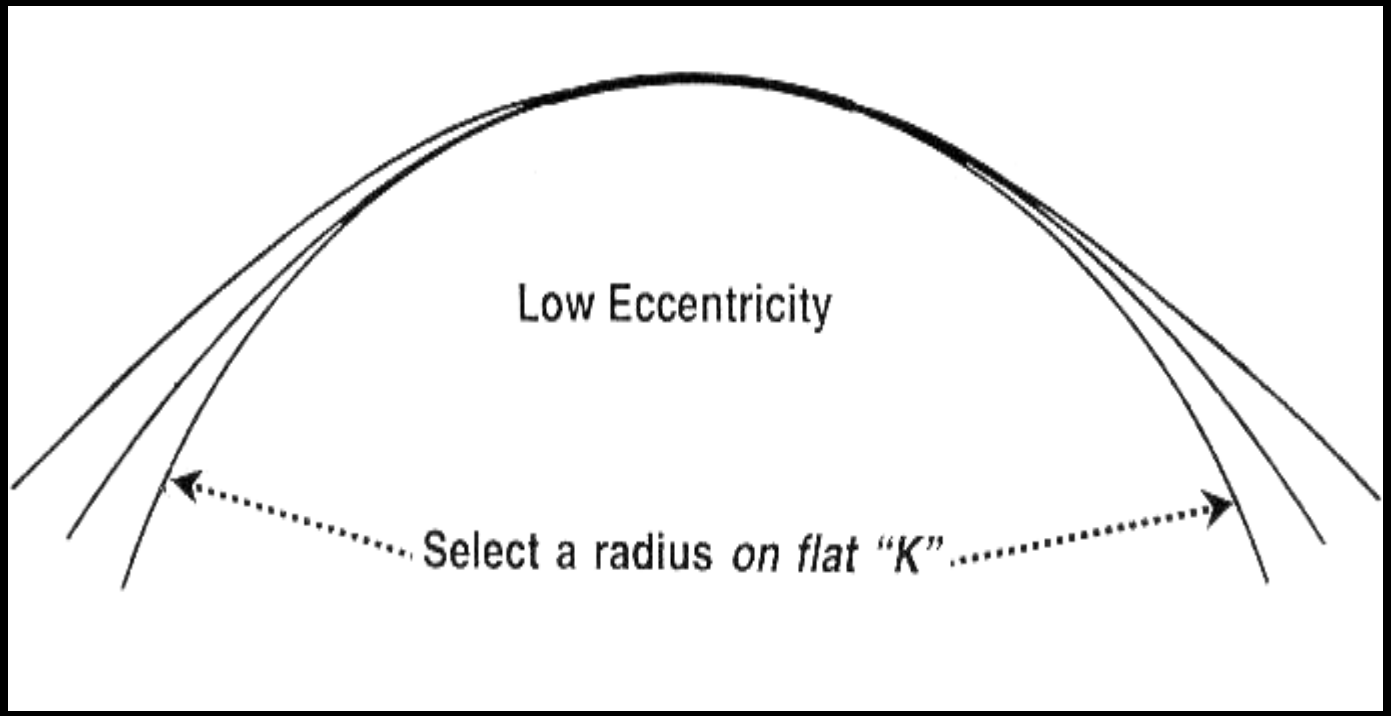
Snellen Acuity in Treated Eyes at Age 4.5 years

	CL (57 patients) n (%)	IOL (55 patients) n (%)
20/20 to < 20/40	**13 (23%)**	**6 (11%)**
20/40 to < 20/80	9 (16%)	14 (25%)
20/80 to < 20/200	7 (12%)	8 (15%)
20/200 or worse	28 (49%)	27 (49%)

LOW ECCENTRICITY

ECCENTRICITY 0.00 - 0.31

SHAPE FACTOR 0.00 - 0.09



Case Hx

- 4 yo M trauma OD
- s/p ruptured globe repair
  - endophthalmitis
  - RD s/p PPV / SB /oil
  - K scar
  - aphakia
- "Not co-op" on all office notes (except EUA)

Case Hx

- No K
- No RX
- NO CO-OPERATION

Case Hx

- Dx 7.60 +13.75 10.0
- Trapped central bubble
- Dx 8.00 +13.75 10.0
- Ret over + 2.50 (+4.00 D LL)
- Order 8.10 +16.75 10.2 (FAP)
  default design 8.8 oz
  .5 / 9.40
  .2 / 11.50
  8.7 lent
- No UV initial lens

Eye Contact Lens. 2016 Jan 22. [Epub ahead of print]

Improved Vision and Contact Lens Wear Time With Piggy-Back Contact Lens Systems in Children After Penetrating Corneal Trauma.

Cromelin C[1], Russell B, Lambert SR.

Author information

Abstract

OBJECTIVE: Consecutive case series of children treated successfully with "piggy-back" (PB) contact lens systems after corneal trauma.

METHODS: We reviewed the medical record of all children ages 4 to 14 years treated at the Emory Eye Center between January 11, 2003 and January 11, 2013 with PB contact lens systems.

RESULTS: Four children with a history of corneal penetrating trauma were treated with a PB lens system, with a mean age of 7±0.08 (range: 6-8) years. Best-corrected spectacle vision was count fingers in two children and logMAR +0.70 (Snellen equivalent 20/100) and logMAR +0.6 (Snellen equivalent 20/80) in the remaining two. The PB lens system was introduced with a mean of 15.7±6.5 (range: 9-22) months after the injury. All patients were initially fitted with gas-permeable (GP) lenses. Each child achieved 11 or more hours of daily contact lens wear time in PB systems. The mean best-corrected logMAR visual acuity using the PB system was 0.26±0.21 (Snellen equivalent 20/36). The mean improvement in best-corrected logMAR between GP and PB lens systems was +0.21±0.11, which corresponds to an improvement of greater than two lines on the Snellen chart.

CONCLUSION: Piggy-back contact lens systems can be helpful to improve vision and contact lens wearing time in children with irregular astigmatism after corneal trauma, who are intolerant of GP contact lenses.

Nomenclature

Axial edge lift

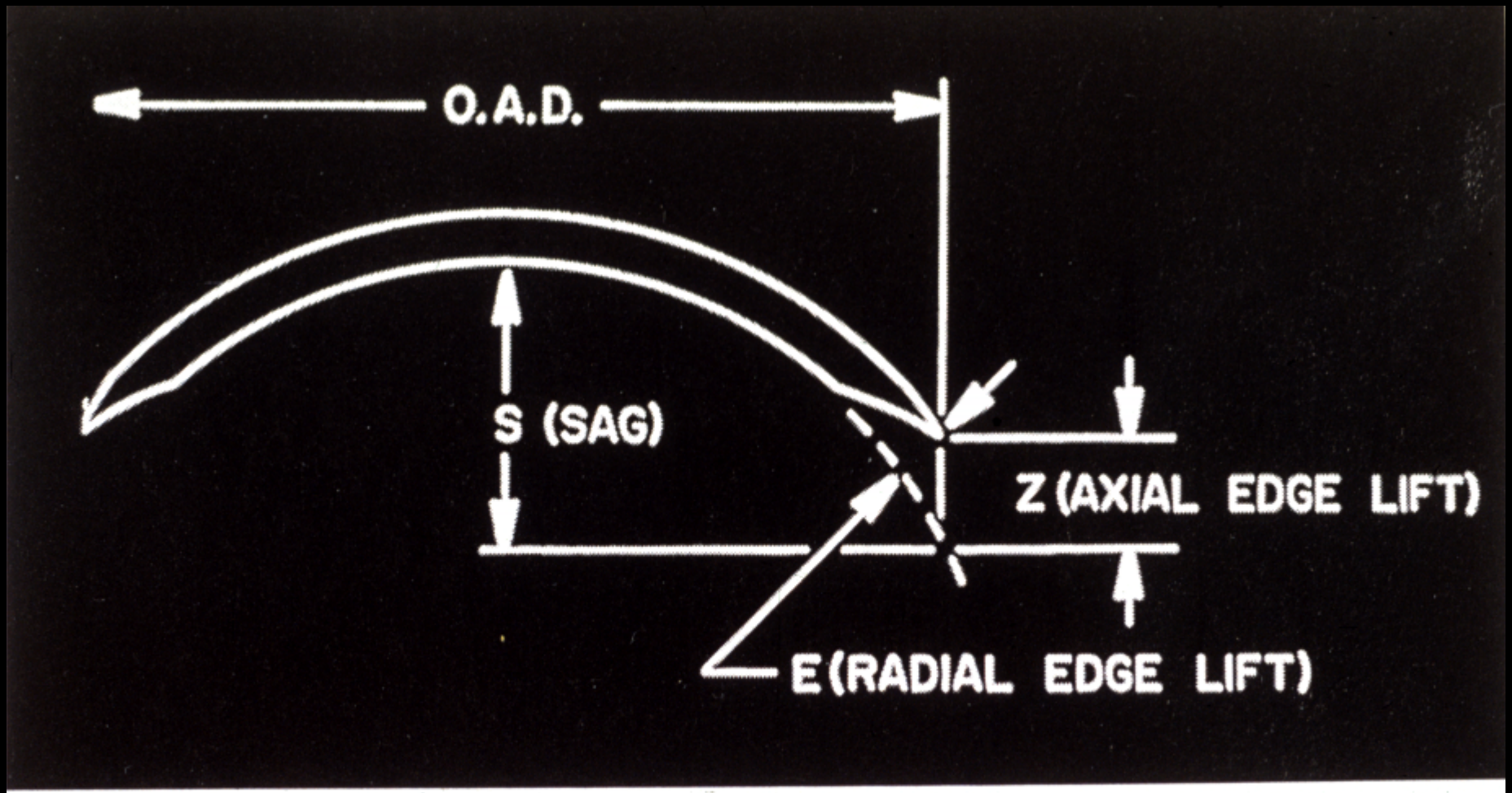


FIG. 1: DIAGRAM SHOWING THE DIFFERENCE BETWEEN AXIAL EDGE LIFT AND RADIAL EDGE LIFT. THE DOTTED LINE REPRESENTS THE CONTINUATION OF THE BASE CURVE.

Thank you
for your attention

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