

## Are Gas Permeable Lenses Always the Answer? A Case Report in Correcting Retinopathy of Prematurity Combined With Band Keratopathy

Amy Conner, OD, MBA

University of Houston, TERTC Fellow, Cornea and Contact Lens

### Case Findings:

#### Case Description:

A 14 year-old Caucasian male presents to the Contact Lens Clinic with a referral from the Low Vision Clinic. Patient has been diagnosed with Retinopathy of Prematurity at birth that includes peripheral vitreous traction and forced the retina into early adolescent onset Pathological Degenerative Myopia with possible Staphyloma at optic nerve. Patient was also diagnosed with Band Keratopathy on both corneas at the age of eight years old.

#### Noteworthy Systemic Conditions:

Tourette Syndrome with intermittent hand and leg tremor and low-functioning Autism.

#### How Can Contacts Benefit this Patient:

Contacts were recommended to decrease the minification effects and off-center blur induced by highly myopic corrective spectacles. The patient presents wearing full-time spectacles used with an iPad program to enlarge schoolwork. Patient has never tried contact lenses in the past due to limited mental capacity and physical tremors.

#### Contacts:

No trial lenses were placed upon initial fitting visit. Trial lenses were not placed in office as patient would be confused by a prescription that does not match his refractive error as trial fitting contact lenses include prescriptions that would cause the patient blur.

Two types of trial lenses were ordered empirically: custom soft contact lenses and comfort korne corneal gas permeable lenses. The lenses were empirically ordered based on topography, manifest refraction, horizontal visual diameter, and pupil size.

#### Measurements Used:

##### Manifest Refraction:

OD: -16.50-0.75x105 BCDVA and NVA: 20/80--  
OS: -17.25-0.25x045 BCDVA and NVA: 20/70

##### HVID:

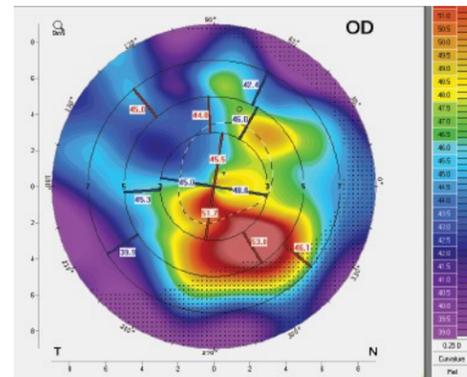
10.8mm OD/ OS

##### Pupil Size:

4mm OU in bright

##### Ks:

OD 46.1/48.6@  
068.4° OS 42.0/44.3@  
007.4°

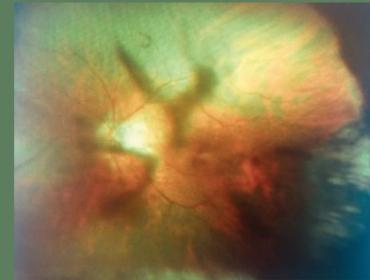
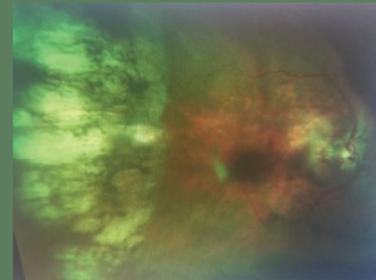


Measurement 1- Axial Topo OD showing Cone like Band-K (OS unreliable Topo)

Fig. A Band Keratopathy OU



Fig.B Retinopathy of Prematurity OU



### Background:

#### ROP and Band-K Correlation:

Retinopathy of Prematurity (ROP) is an aggressive retinal disease affecting immature vasculature of premature babies that can lead to neovascularization, retinal detachment, or peripheral blindness [1]. It is congenital in nature but leaves lasting effects.

Separately, Calcific Band Keratopathy is a corneal degeneration that is characterized by metastatic deposition of calcium onto epithelial basement membrane, Bowman's layer (anterior limiting lamina), and the anterior stroma [2]. These deposits begin just inside the limbus in the 3 and 9 clock hours of the corneal periphery and can progress to the visual axis- causing decreased vision.

Rarely, ROP can be correlated to anterior diseases like cataracts, glaucoma, and band keratopathy [1]. Smith et. al postulates the correlation is early hypoxia caused by immature vessel formation starving the entire eye of oxygen, not just the retina.

#### ROP and Pathological Myopia Correlation:

ROP is correlated to high myopia due as there is an increased lens thickness seen in ROP eyes. Likewise, ROP is typically accompanied by shallower anterior chamber depth suggesting a mechanism of altered anterior segment development and lens development in ROP leading to high myopia [3].

#### Considerations in Disease Relation:

- If ROP and Band- K are related due to hypoxia, why is there no neovascularization on other structures of the anterior segment?
- If Band-K is from hypoxia, why is it on the palpebral fissure on the front surface of the cornea where oxygen comes into contact?
- If ROP and pathological myopia are related, does any elongation correlate to this type of myopia? Where does Staphyloma's occur if myopia is strictly lenicular? If so, how does the eye continue to elongate with oxygen deprivation?

### Conclusions:

Due to comfort and vision, soft custom lenses were dispensed. With mother's help for insertion and removal, patient now wears soft custom lenses on a daily basis. Due to the low DK on the soft lenses, patient only wears the contacts during the eight school hours and places spectacles upon arriving at home with no extended-wear. Custom soft contacts corrected this patients visual acuities by 4-6 lines. Patient objectively reports crisp vision and less minification with wearing custom soft contacts. Likewise, Patient feels that he can see the board at school better and reports less reliability on low vision devices.

Even with the physical, mental, and ocular limitations, contact lenses are a viable option for the combination of anterior and posterior segment diseases.

### References:

- Smith B. and Tasman W. "Retinopathy of Prematurity: Late Complications in the Baby Boomer Generation (1946-1964)." Transactions of the American Ophthalmological Society, vol 103, no.4, 5 Dec.2005, pp 225-236. Pubmed [www.ncbi.nlm.nih.gov/pmc/articles/PMC1447576](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447576). Accessed 6 Sept. 2017
- Fledelius, Hans, and Hanne Jensen. "Late subsequent ocular morbidity in retinopathy of prematurity patients, with emphasis on visual loss caused by insidious 'involutive' pathology: an observational series." Acta Ophthalmologica, vol. 89, no. 4, 5 Jan. 2010. Wiley Online Library, [onlinelibrary.wiley.com/doi/10.1111/j.1755-3768.2009.01707.x/pdf](http://onlinelibrary.wiley.com/doi/10.1111/j.1755-3768.2009.01707.x/pdf).
- Garcia-Valenzuela, E, and LM Kauffman. "High myopia associated with retinopathy of prematurity is primarily lenicular." Journal of the American Association for Pediatric Ophthalmology and Strabismus, vol. 9, no. 2, Apr. 2005, pp. 121-128. NCBI, [www.ncbi.nlm.nih.gov/pubmed/15838438](http://www.ncbi.nlm.nih.gov/pubmed/15838438).

### Lenses Ordered and Evaluation of Lenses:

#### I. Custom Soft: Xcel Specialty FlexLens

- OD/OS: 7.8mm BC/ 13.5mm dia/ -14.00D/ 59% water content/ Dk/t 28 / CT .20m  
OD DVA: 20/40+ , NVA:20/20+ OS DVA: 20/25+ , NVA: 20/20+
- Design:** Same parameters were used OU to make maintenance easier, blue tint was added to help mother upon removal, thicker center thickness placed to decrease aberrations caused by inferior irregular corneal shape, high modality used to aid in insertion and removal, smaller OAD needed for small HVID
- Evaluation:** slightly decentered inferior OU but overall good fit, good movement with blink, palpebral fissure immediately expands with soft lenses over spectacles

#### II. Gas Permeable: Metro Optics ComfortKone

- OD: 6.49mm BC/ 9mm dia/ -19.50D / A Value 1.6/ Optimum Comfort/ DK/t 65  
OS: 6.37mm BC / 9.5mm dia/ -26.00D/ A Value 1.1/ Optimum Comfort/ Dk/t 65  
OD/OS VA: unable
- Design:** include a low-center cone to mimic the inferior Band-k
- Evaluation:** no evaluation was performed as anesthetized patient did not like the comfort and made the practitioner remove lenses immediately