



A Dry Topic: Tangible Hydra-PEG Coated Hexafocon A Scleral Lenses for Severe Keratoconjunctivitis Sicca

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Background

Keratoconjunctivitis sicca, or dry eye syndrome, is characterized by scant tear meniscus (<1mm), decreased tear breakup time (<10 seconds), corneal staining with sodium fluorescein, and excess mucin or debris in the tear film [1]. Patients can have symptoms of burning, foreign body sensation, fluctuating and/or mild to moderate decrease in vision, and excess tearing [1]. Severe cases of keratoconjunctivitis sicca may potentially lead to spontaneous corneal abrasion, and subsequent recurrent corneal erosion. Recurrent corneal erosion is characterized by spontaneous corneal epithelial defect, typically upon awakening [2]. Symptoms include pain, foreign body sensation, photophobia, tearing, and red eye [1]. The underlying mechanism is the result of damage to the corneal epithelium or epithelial basement membrane [2].

Case Summary

Case History:

Patient Demographics: 53 year-old Caucasian Female

Chief Complaint: Burning, redness, fluctuating vision and mild pain OU

HPI: Constant burning, redness, fluctuating vision and mild pain OU secondary to severe keratoconjunctivitis sicca, especially upon awakening. Associated recurrent corneal erosion as a sequelae of a spontaneous central corneal abrasion 2 months ago

Ocular history:

Corneal erosion and iritis secondary to keratoconjunctivitis sicca OS, keratoconjunctivitis sicca OD: has tried Restasis, Xiidra, preservative-free artificial tears, and Refresh gel with no improvement

Medical history:

High blood pressure, high cholesterol, hypothyroidism, asthma

Medications:

Systemic: spiro lactone 25mg, fluoxetine 40mg, topiramate 100mg, tramadol 50mg, cyclobenzaprine 5mg, diclofenac sodium 1%, promethazine 25mg, fluticasone 50mcg, proventil HFA 90mcg, lisinopril 2mg, clorazepam 1mg, montelukast 10mg, pantoprazole 40mg, Qvar 40mcg, synthroid 175mcg, hydrocodone-acetaminophen 5-325mg

Ocular: Refresh preservative-free artificial tears, Refresh gel

Allergies: Sulfa (anaphylactic shock), NSAIDs (nausea), Ceclor (anaphylactic shock)

Pertinent Findings:

Visual Acuities (cc): OD: 20/20

OS: 20/20

Refraction: OD -2.00 -0.50 x 175 20/20

OS -2.00 -1.00 x 175 20/20 Add: +2.00 OU

Intraocular Pressures (IOP): 14mmHg OD, 14mmHg OS

Slit Lamp Exam:

Lids: OU: multiple capped glands, atrophied Meibomian glands

Conjunctiva: OU: 2+ injection

Cornea: OD: 2+ diffuse SPK

OS: 2+ diffuse SPK, area of negative staining from previous erosion

Tear film: OU: decreased TBUT, debris, moderate oily tear film

Diagnosis:

1. Keratoconjunctivitis sicca, not specified as Sjogren's, bilateral
2. Recurrent corneal erosion, OS

Treatment:

Patient elects to be fit in a scleral lens, OS to protect eye from exposure. Continue the use of Xiidra BID OU, preservative-free artificial tears OU, and instructed to use Bruder mask warm compress BID OU.

Treatment

Evaluation of Contact Lens Fit:

OU: ZenLens RC Toric PC

Central vault approximately 300um, good peripheral edge, excessive movement with blink (lid picking up lens due to dryness)

VA: 20/20 @ D/N OU

Contact Lens Ordered

	Power	Sagittal Depth	Diameter	Advanced Peripheral System (APS)	Manufacturer	Design
OD	-1.50D	4.000 mm	14.8 mm	Steep 4	Alden Optical	ZenLens RC
OS	+1.25D	4.000 mm	14.8 mm	Steep 5	Alden Optical	ZenLens RC

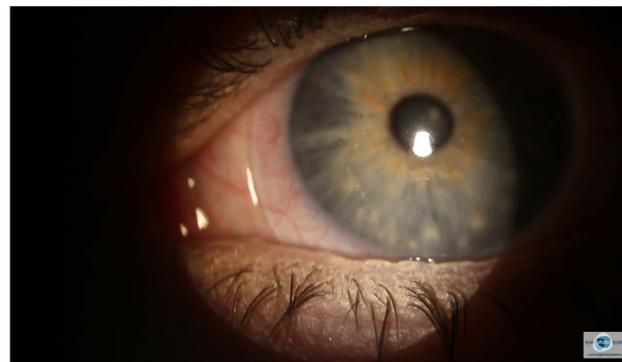


Image 1: ZenLens RC without Tangible Hydra-PEG coating, OS, shows increased injection

Addition of Tangible Hydra-PEG OU



Image 2: ZenLens RC with Tangible Hydra-PEG coating, OS, shows a whiter and healthier eye

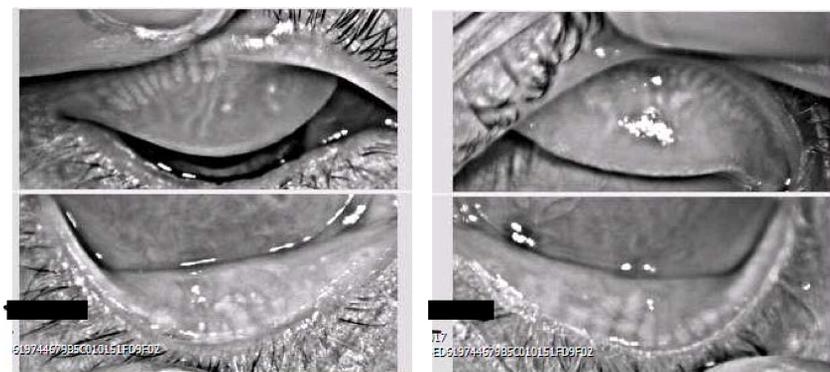


Image 3: Meibomian gland imaging with Keratograph software

Results

- Patient was successfully fit in medically necessary scleral contact lenses that provided a fluid reservoir and protection for her eye.
- Tangible Hydra-PEG coating allowed for a successful fit, and a smooth surface to minimize lid friction.
- Combined with current lubrication therapy and warm compresses, the patient has noticed great improvement with her symptoms.
- There has been no recurrence of the corneal erosion since being fit in medically necessary scleral contact lenses.

Discussion

Keratoconjunctivitis Sicca:

- Due to the increased use of digital devices and near work, the prevalence of keratoconjunctivitis sicca has increased. Compliance with drops and daily lid hygiene poses as an issue; patient concern and compliance typically increases with increased signs and symptoms.
- Mild to moderate cases of keratoconjunctivitis sicca require frequent non-preserved artificial tears and nighttime ointment along with lid hygiene care. Advanced cases often require the use of external aids, such as punctal occlusion, moisture chamber or goggles at night, and the consideration of permanent lateral tarsorrhaphy as a last resort [1].

Challenges Encountered:

- Insertion and removal was difficult, depending on the patient's diet and caffeine intake for the day, which directly affected her dexterity.
- The patient's inability to tolerate a scleral lens in the eye for longer than 6 hours per day, due to symptoms of dryness. However, minimal wear time was still proven to be beneficial.
- In accordance to the patient's personality, constant reminder, with verbal and written instructions, was necessary on the cleaning care of scleral lenses with Tangible Hydra-PEG coating, and emphasis to avoid abrasive and alcohol-based cleaners.
- Keeping the area of the conjunctiva that is not covered by the scleral lens hydrated with constant application of artificial tears, even when the eye does not feel dry.

Conclusion

- Hexafocon A (Boston XO) is a high Dk GP lens material with FDA clearance for use in treating severe ocular surface disease.
- Hydra-PEG lens coating technology improves surface wettability and increases deposit resistance, but is not commercially available on hexafocon A lenses [3].
- Hydra-PEG is an encouraging new technology that will serve to increase overall tolerance and quality of comfort, improving the overall experience for patients [3].
- The permanent polymer provides a population of patients with the benefits of contact lens wear, that would otherwise be unable to tolerate scleral lenses.
- Patient education is important in the cleaning and care of lenses with Hydra-PEG coating technology.

References

1. Friedbert, Mark A. Rapuano, Christeroph J. The Wills Eye Manual, 6th edition. Philadelphia: Lippincott Williams and Wilkins, 2012.
2. Friedman, Niel J. Kaiser, Peter K. The Massachusetts Eye and Ear Infirmary. 4th edition, Elsevier, 2014.
3. Caroline, P. André, M. Contact Lens Dryness and Discomfort with SiHy Lenses. *Contact Lens Spectrum*. Vol. 30; pg 56. May 2015.