Tangible™ Hydra-PEG Scleral Lens Treatment for Post-Surgical Dry Eye Disease-A Case Report

Casey L. Hogan, O.D., F.A.A.O., Diplomate, American Board of Optometry* Michelle K. Man O.D.*

Illinois College of Optometry, Chicago, IL

INTRODUCTION

The hydrophobicity of silicone-based lens materials and poor surface wetting is a challenge that the most experienced scleral lens fitter deals with in practice, particularly in post-surgical patients with ocular surface disease. Severance of corneal nerves during refractive surgery can lead to dry eye disease[1] complicating contact lens wearability. A wettable contact lens is crucial for successful wear, and the industry has made strides towards improving wettability of silicone hydrogel lenses[2-3]. This case report will demonstrate that despite an adequate scleral lens fit, poor wettability can lead to lens failure. Incorporation of Tangible™ Hydra-PEG technology allowed for scleral success and improved patient quality of life.

CASE REPORT

A 62 year-old-Caucasian female was referred for a contact lens evaluation to postpone penetrating keratoplasty. This patient is a certified public accountant with a heavy visual demand. Chief complaints at time of examination were poor vision, significant dryness, and contact lens intolerance. Personal ocular history was significant for bilateral radial keratotomy, S/P Acrysof Restor® multifocal intraocular implants OU, and dry eye disease. Previous failed contact lens modalities included silicone hydrogels, hybrids, and corneal gas permeable lenses. Clinical examination revealed best corrected acuities of 20/80 OD, 20/60 OS with refraction. Corneal topography revealed irregular astigmatism OU. Slit lamp examination revealed bilateral radial incisions with t-cuts OU. No neovascularization was present OU. Vital dye staining revealed inferior punctate erosions of the cornea and minimal lissamine green staining of the conjunctiva OU. Tear break up time was rapid OU. Inspection of the lid margins revealed minimal meibomian expression OU. RPS Inflammadry® testing was positive OU. TearLab values were elevated OU. Testing with the OCULUS Keratograph® 5M revealed significant meibomian gland truncation and dilation OU. (Photo 1/2).

MEIBOSCANS

LOWER RIGHT MEIBOMIAN GLANDS

PHOTO 1

LOWER LEFT MEIBOMIAN GLANDS

PHOTO 2

MANAGEMENT

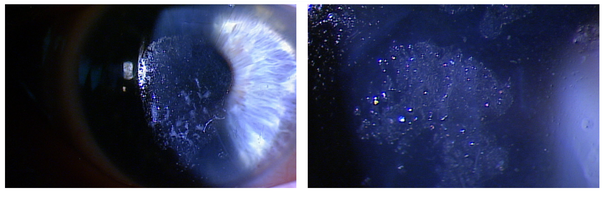
The goal in treatment was to maximize vision, control the ocular surface and lid disease, and protect the cornea OU. Maximum dry eye therapy was initiated including Restasis® 1gt BID OU, Oasis Medical Oasis Tears™ non-preserved 1gt BID OU, po Doxycycline Hyclate 50 mg tablets BID, and PRN® Omega-3 daily. The patient was scheduled to return for a scleral lens fitting (Table 1).

TABLE 1

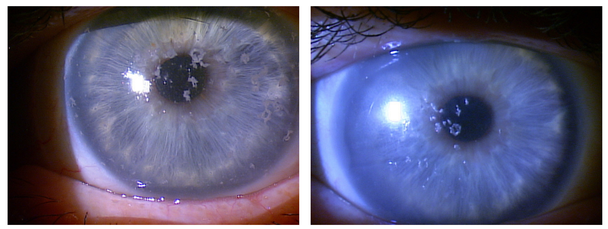
OD: Alden Zenlens™ 16.00 OAD 9.10 BC Standard APS Boston XO2 Plasma 20/30
OS: Blanchard MSD™ Select 15.8 OAD 4.80mm Sagittal II Increased Profile 1Flat Edge Boston XO2 Plasma 20/25

The patient was prescribed a 16.0mm diameter Alden Zenlens™ OD. A 9.10 BC/ Standard APS achieved 20/30 acuity and adequate apical and limbal clearance with good alignment. Initial lens material ordered was Boston XO2 plasma treated. Acuity of 20/25 and adequate fit was achieved OS with a 15.80 Blanchard MSD™ Select 4.80mm sagittal depth lens with a double increased profile and 1 flat edge. Initial lens material was Boston XO2 plasma treated. Bausch + Lomb PeroxiClear® was recommended for disinfection. AddiPak 3mL Sterile 0.9% NaCl inhalation saline with OasisTears™ was prescribed for the tear reservoir. The patient was very happy with vision and comfort on initial dispense OU and at one month follow up visit. Upon three month follow-up examination, the patient reported marked lens coating and blurred vision within several hours of wear. Examination revealed an adequate fit of the lenses with poor surface wetting and marked coating OU. (Photograph 3/4 OD & 5/6 OS) Alternative Contamac Optimum Extra material was ordered along with changing care regimen to Optimum by Lobob® CDS and a Biotrue "rub". There was no improvement in symptomatology or degree of lens deposits with these changes. The patient's lenses were shipped to Tangible Science (formerly Ocular Dynamics) for Hydra-PEG surface coating. The new lenses were dispensed and care regimen changed to Menicon Unique pH®. Follow-up examination of the Hydra-PEG coated lenses revealed improved wettability and no surface deposits. (Photograph 7/8) The patient reported reduced to minimal lens deposits and improvement in vision. The patient reported being able to wear her lenses 12-14 hours a day with good comfort and stated her quality of life had improved dramatically. Comparison of Oculus Keratograph NIKBUT scans revealed improved non-invasive keratometric break up time post-treatment of lenses compared to pre-Hydra-PEG treatment.

PHOTOS 3/4: OD COATED LENSES



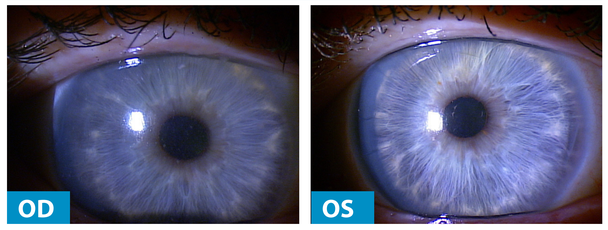
PHOTOS 5/6: OS COATED LENSES



OD OS

PHOTOS 7/8: DEPOSIT FREE LENSES.

"POST Hydra-PEG Treatment"

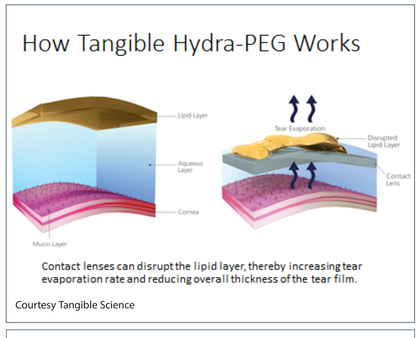


OD OS

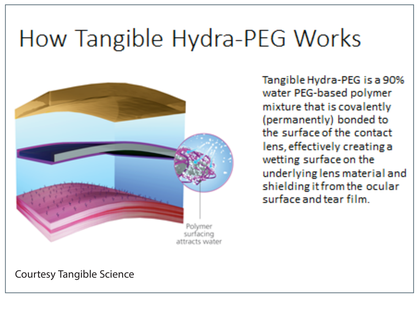
DISCUSSION

What is Tangible Hydra-PEG?

- A breakthrough novel coating technology that enables eye care providers to end the frustrations caused by custom contact lens discomfort
- Improves lens wettability and lubricity
- Increase surface water retention
- Prolong tear breakup time
- Minimize friction and deposition



Courtesy Tangible Science



Courtesy Tangible Science

CONCLUSION

Despite the most precise custom lens fit, fifty percent of contact lens wearers experience discomfort[4] which is the most common cause for contact lens drop out. Silicone based materials are hydrophobic by nature, and present the challenge of adequate wettability, especially in a patient with dry eye disease. Scleral contact lens success for patients with concomitant post-surgical corneal irregularity and dry eye disease depends on a healthy fit and stable lens surface. Tangible Hydra-PEG is a surface coating clinicians will soon be able to order through the laboratory network for patients who experience contact lens related ocular discomfort and are heavy depositors. At time of presentation, Contamac has received FDA authorization to apply the Tangible Hydra-PEG coating to the Optimum line of gas permeable materials. FDA authorization is specifically limited to the Optimum family of materials at this time.

ACKNOWLEDGEMENTS

Vic McCray, MD. President & CEO, Tangible Science, LLC
Katharine Gifford. Chemist, Tangible Science LLC

REFERENCES

1. Szczesna DH, Kulas Z, Kasprzak HT, Stenevi U. Examination of tear film smoothness on corneae after refractive surgeries using a noninvasive interferometric method. J Biomed Opt. 2009 Nov-Dec;14(6):064029.
2. Sindt, C. Evaluation Polyethylene Glycol Surface Coating on Gas Permeable Lenses to Improve Wearability and Wettability. Poster presented at Annual Meeting of the Association for Research in Vision and Ophthalmology 2016 (poster # 1462–A0142).
3. Lin CH, et al. Improvement of the surface wettability of silicone hydrogel contact lenses via layer-by-layer self-assembly technique. Colloids Surf B Biointerfaces. 2015.
4. Nichols JJ1, Willcox MD, Bron AJ, Belmonte C, Ciolino JB, Craig JP, Dogru M, Foulks GN, Jones L, Nelson JD, Nichols KK, Purslow C, Schaumberg DA, Stapleton F, Sullivan DA; members of the TFOS International Workshop on Contact Lens Discomfort. The TFOS International Workshop on Contact Lens Discomfort: executive summary. Invest Ophthalmol Vis Sci. 2013 Oct 18;54(11): TFOS7-TFOS13. doi: 10.1167/iovs.13-13212.

CONTACT INFORMATION

Casey L. Hogan, OD, FAAO
chogan6465@aol.com