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The fitting of a prosthetic soft contact lens in a patient with a Boston Keratoprosthesis

Abstract
A young female with a history of two failed penetrating keratoplasties, now with a Boston Keratoprosthesis, is in need of a prosthetic soft contact lens for enhanced cosmesis and communal acceptance.

I. Case History
Ms. Jones, a 31 year old Caucasian female, presented to the clinic with concerns of cosmesis. Her history is vague as she cannot recall specific dates with the care she has already received by outside providers, but does report it all began with an initial acanthamoeba infection of her right eye. She reported prior history of sleeping in her soft contact lenses (Acuvue Oasys, no known parameters), as well as swimming with them on. Ms. Jones received an unknown treatment for the infection, but due to failure, a penetrating keratoplasty (PKP) was needed. After failure of the donor cornea, a second PKP was performed. After her second PKP failed, a Boston Keratoprosthesis (K-Pro) procedure was performed. Because of subsequent development of glaucoma (which is common after a K-pro procedure), a trabeculectomy was performed in that eye. Her current medications include Durezol twice-a-day (BID), Vigamox BID, and Combigan BID, all in the right eye only. Her systemic health is unremarkable—currently not being followed for any systemic conditions and not taking any systemic medications. Ms. Jones reported no known allergies. Due to the appearance of having one normal cornea and one artificial cornea, she was in need of a soft contact lens that can mask the appearance of her K-pro. Not only is cosmesis a concern, but of equal importance is comfort. Ms. Jones has had a successful match of iris diameter and color in previous years, but the correct base curve has yet still to be determined.

II. Pertinent findings
At a previous exam two years prior, an Alden HP49 Walnut#2, 15.0mm diameter, 12.5mm iris diameter, 3.0mm clear pupil, 8.0 base curve (BC) was dispensed to Ms. Jones. Follow up visits showed a tight fitting lens, but Ms. Jones reported good comfort. An additional trial lens was ordered in same parameters except the base curve was flattened to 8.6 to allow more movement on the eye. At the follow up visit three weeks later, she reported discomfort; she could feel the edge of the lens and reported excessive movement on her eye, even after six to eight hours of wear. Objectively, however, the lens was centered with adequate limbal coverage and 0.5mm of movement in primary gaze and 1.0mm in up gaze. We then ordered an additional trial lens in the same parameters except steepened the base curve to 8.3. A follow up visit was scheduled for three weeks for dispensing visit but she failed to show and was lost to follow up for six months.

Ms. Jones presented to our clinic on June 1, 2013 after being lost to follow up for about six months wearing an unknown parameter prosthetic soft lens in the right eye and a 1-Day Acuvue Moist (8.5 base curve, 14.2 diameter, -3.75sphere) in the left eye. Her visual
acuity was 20/50+2 at distance OD and 20/20 at distance OS. Pinhole acuity at distance OD showed no improvement. Pupil OS was round and reactive to light, immeasurable OD secondary to the K-Pro, and no afferent pupillary defect (direct and indirect). Extraocular muscles were unrestricted in all gazes. Contact lens assessment by slit lamp examination (SLE) revealed a tight fitting prosthetic soft contact lens on the right eye with adequate centration and limbal coverage but no movement in primary or up gaze. Left lens showed adequate centration and limbal coverage, as well as adequate movement in primary and up gaze (half millimeter each). Right lens was clear with no deposits, while the left lens showed protein deposits on the anterior surface. Anterior segment by SLE revealed trace bulbar injection OD and a quiet conjunctiva OS; a thin tear film OU; a clear cornea OS and Boston K-pro OD with non-exposed uninterrupted sutures 360 and trace neovascularization 360 (temporally greater than nasally); iris was flat and intact OS; anterior chamber deep and quiet OS; angle open by Von Herrick OS.

III. Differential diagnosis
First and main differential is that the contact lens is too steep causing a tight fit. Tight fitting lens have symptoms of overall good comfort throughout day, but difficulty with removal, end of day redness, and eye irritation upon removal.

Second differential is the patient has ocular surface disease causing irritation. This differential is less likely as the patient is currently not having any issues with her left contact lens (1-Day Acuvue Moist, 8.5/14.2/-3.75 sph, etafilcon A, 58% water content); however, it cannot be ruled out since this lens is an FDA Group 4 material (high water, ionic) which is different from the right eye—an FDA Group 1 material (Alden HP49, 8.3/15.0/-4.25 sph, hioxifilcon B, 49% water content).

Third differential, which correlates with second differential, is poor choice in contact lens material for patient’s eye. The Alden HP49 lens is an FDA Group 1 material (low water, non-ionic). As a lens dehydrates, lens may steepen and become tighter on the eye. Typically, a low water content lens is used with dry eye patient due to less evaporation and less wettability, but since Ms. Jones has had success with a Group 4 material in her left eye, there is no correlation in this case. Perhaps a similar material lens (Group 4) may be necessary in the right eye for success.

IV. Diagnosis and discussion
After further examination, it was determined that the unknown parameter lens in the right eye was the original 8.0 base curve lens. Because of the tight fit with no movement, the patient reported good comfort throughout the day, but mild irritation upon lens removal. The age of the lens was over two years old, and then lens showed mild deposits on the anterior surface. She reported using Clearcare solution nightly for the right eye, and disposed her lens nightly for the left eye. It is important to have an adequate fit to allow oxygen permeability, as well as adequate surface protection without irritation.

A Boston Keratoprosthesis is used in cases of failed penetrating keratoplasties, as well as in cases in which a PKP does not have a good prognosis. It made of clear plastic, and composed of three parts. Once assembled and ready for insertion, the patient’s intraocular
lens will also be removed due to the subsequent development of cataract after surgery. For long-term post-operative safety, a bandage contact lens will be worn indefinitely. A regimen of topical antibiotic and steroid drops will be used. Development of glaucoma after surgery is common, so most patients will also need medications to reduce intraocular pressure. With standard bandage contact lenses (approved by the FDA), topical medications can be used concurrently, however, with an Alden HP49 lens, it is not FDA approved. Luckily for Ms. Jones, her dosaging is only twice a day for all medications so she inserts before and after contact lens wear.

V. Treatment, management
We decided to trial the 8.3 base curve lens since we still had it since it was never dispensed (patient was lost to follow up). Upon insertion in-office, Ms. Jones reported good comfort and vision. We dispensed the lens and followed up after three weeks of wear. She presented to her follow up visit, having worn the lenses for 12 hours per day. She reported excellent comfort and no discomfort upon removal. Objectively, the lens was well centered with adequate limbal coverage, as well as adequate movement in primary and up gaze (0.50mm each). We ordered three additional lenses, as the lenses were intended for quarterly replacement, so that she would have a year supply. She also ordered a year supply of 1-Day Acuvue Moist lenses for her left eye. We educated her to follow up with her cornea specialist, and made a contact lens follow appointment at our clinic in one year. It was also stressed of the importance of daily disposal of her 1-Day Acuvue Moist lenses and not to reuse them, as it can lead to infection and subsequent developments similar to her right eye.

VI. Conclusion
The fitting of a therapeutic soft contact lens after Boston K-pro is important for the protection of the ocular surface. Long-term prophylactic topical antibiotics will also be necessary. But for cosmetic concerns, a cosmetic contact lens can be used instead of a clear lens. The fitting of a soft prosthetic soft contact lens is similar to standard soft contact lenses. You want to make sure you have an adequate diameter and base curve, accurate power for correction, and adequate fit on the eye (with appropriate follow up to assess end-of-day fitting and comfort). The difference is in the appearance of the lens and matching the other eye in iris diameter, pupil size, and iris color. Using color samples in-office, you can choose the best match or you can customize the color of the lens (but with higher costs). Taking measurements of iris diameter and pupil size is crucial for the order. Having a warranty on the lens will allow you to exchange the lens if need to change parameters.

VII. Bibliography
www.masseyeandear.org/specialties/ophthalmology/cornea-and-refractive-

Pictures to include:
*Before:*

*After:*