STATE UNIVERSITY OF NEW YORK
COLLEGE OF OPTOMETRY®

Say Good "**Bi**" to **Toric** Corneal Problems

A Bitoric Piggyback System for Correction of Highly Asymmetric Corneal Astigmatism Following DMEK

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INTRODUCTION

Descemet's Membrane Endothelial Keratoplasty (DMEK) is a partial corneal transplantation procedure differing from Descemet's Stripping Automated Endothelial Keratoplasty (DSAEK) only by its superior visual outcome and precision of the corneal layers affected[1]. In a DMEK, the thin donor tissue contains only Descemet's membrane and corneal endothelium. As this procedure doesn't replace the anterior surface, front surface astigmatism is consistently more regular than status-post Penetrating Keratoplasty (PK). A myriad of contact lens options to maximize visual potential following corneal surgery exist but well-fit rigid gas permeable (GP) lenses are often a top consideration[2]. For patients requiring improved comfort and an even more precise fit, a piggyback system (GP worn over a soft contact lens) may be applied. Using a piggyback system, particularly with high dK materials fit in a daily wear modality, allows for normal corneal function[3,4].

CASE REPORT

A 56-year-old female medical doctor was referred by her corneal surgeon for GP fitting OS only and complained of distorted, "shadowy" vision OS. Due to her compromised eyesight, she had not practiced as a radiologist for over a year. Her medical history is significant for stable psoriasis. Her ocular surgical history began with cataract extraction/multifocal IOL implantation OU but she soon suffered IOL displacement OS and subsequent damage of the corneal endothelium OS. This complication required additional surgeries on her left eye: DMEK, IOL repositioning, and an LPI. She was taking DUREZOL® (difluprednate ophthalmic emulsion) 0.05% 1gt OS at the time of consultation.

Entering uncorrected distance acuities and best-corrected visual acuities are provided in the table below. Corneal topography revealed no irregularity OD and high corneal astigmatism in the left eye with fair symmetry apically.

	OD	OS
Entering Acuities	$20/20^{-1}$	$20/250^{-2}$
Refraction	+0.50 -0.50 x 117	+2.75 -6.00 x 163
Final VA	20/20	$20/40^{-1}$

Table 1: Patient's entering uncorrected DVA and refraction DVA

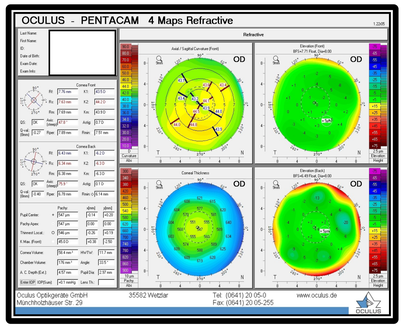

Figure 1: Corneal Pentacam OD

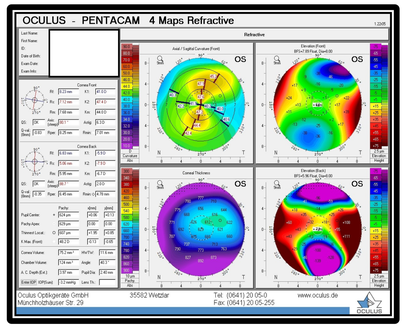

Figure 2: Corneal Pentacam OS

	OD	OS
K Readings	43.50/44.20 @ 47.8°	41.00/47.40 @ 80.1°

Table 2: Patient's keratometry readings exhibiting high front surface astigmatism OS

Slit lamp examination revealed, as expected, a cataract extraction incision scar and a well-centered, clear multifocal IOL implant OD and OS. The left cornea status-post DMEK revealed peripheral haze with an irregular surgical pupil and patent LPI. No sutures remained OS. Otherwise, anterior and posterior segment findings were unremarkable OU.

CONTACT LENS FITTING

Following her ocular surgeries, the patient was left with high corneal astigmatism, anisometropia (hyperopic shifts are common following endothelial transplantation), and mild corneal haze. A soft contact lens was trialed first on the left eye: Biofinity XR Toric 8.7 / +2.75 -5.75 x 165. While the comfort was tolerable, the resultant VA of 20/30 OS was unsatisfactory. Therefore, a bitoric GP was designed empirically.

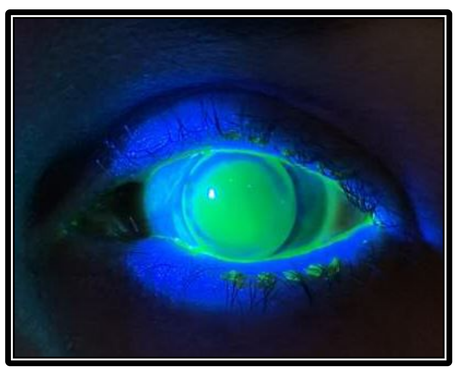

Figure 3: Bitoric GP viewed with cobalt blue light

Power	+3.25 / -4.50 D
Base Curve Radii	8.23 / 7.28 mm
Diameter	9.50
Material	Optimum Extra

Table 3: Final bitoric GP parameters

The vision with the empirically ordered GP was 20/25+ OS at dispense. However, lens awareness affected the patient's ability to leave wearing the trial lens. A soft lens as a carrier for the GP was trialed yielding immediate relief. After making modifications to the parameters and power of the GP, the patient achieved 20/20 OS with good comfort at the next visit and the lens system was finalized: a +0.75 sph ACUVUE OASYS® 1-Day soft lens placed under the bitoric GP. A glasses Rx of OD: +0.50 -0.75 x 115, OS: pl, ADD +2.25 OU was dispensed to wear over the piggyback system.

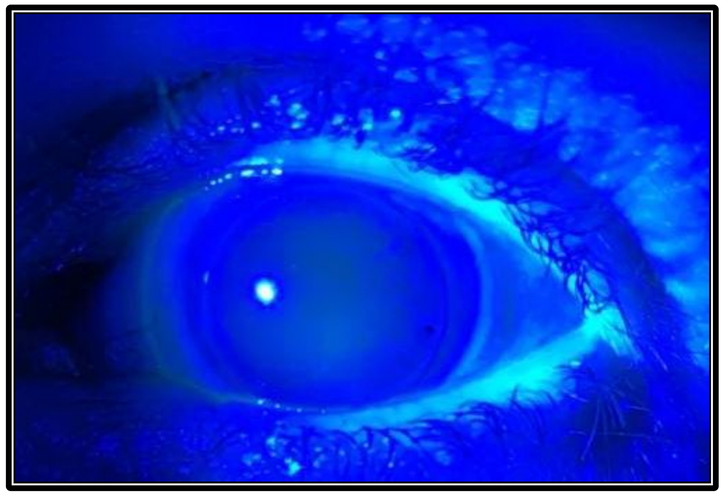

Figure 4: Final bitoric piggyback system viewed with cobalt blue light

CONCLUSIONS

Contact lens fitting following partial corneal transplantation often has exceptional, unique considerations: oxygen demand, endothelial health, anterior and posterior corneal shape, presence and location of sutures, use of topical medications, and visual potential. This case highlights the use of a rare solution -- a bitoric GP piggyback system which helped maximize the patient's vision, corneal health, and comfort.

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