

# Treatment of Horizontal Diplopia with Prism Correction in Scleral Gas Permeable Prosthetic Device



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### BACKGROUND

The EyePrintPro (EP) is a gas permeable (GP) scleral prosthetic that allows customization of both the optics and fit over the ocular surface. The EP uses Elevation Specific Design (ESD)<sup>TM</sup> Technology in order to create a cover shell that precisely matches the individual's eye. The exact fit of the EP creates a stable platform in order to allow more advanced and custom optics to be placed on the device. Common rotationally symmetric designs are limited to base down prism correction. ESD allows the EP to have stable prism correction in any direction. This case report will discuss a patient with horizontal diplopia treated with base out prism prescribed in an EyePrintPro scleral contact lens device.

### HISTORY

#### Chief Complaint and History of Present Illness

A 73-year-old Hispanic male presented to clinic with history of constant horizontal double vision and blurry vision uncorrected. His diplopia was due to a previous head trauma after falling off a moving truck 5 years prior. The patient's blurry vision was from irregular astigmatism due to radial keratotomy (RK) surgery performed 20 years ago. Although his diplopia and irregular astigmatism was corrected with both corneal GP lenses and prismatic spectacles he wanted to be free of spectacles.

#### Ocular/Medical History

The patient's ocular history was positive for bilateral RK surgery 20 years prior, primary open angle glaucoma treated with pilocarpine and latanoprost, cataract extraction and implantation of posterior chamber intraocular lenses in both eyes, and double vision as a result of head trauma 5 years prior. The patient had a significant medical history of systemic hypertension and dyslipidemia that were both controlled by hydrochlorothiazide and simvastatin respectively.

### EXAM FINDINGS

#### Entering Visual Acuity

Patient reported single clear vision with spectacle prescription over habitual corneal GP lenses:

OD plano 2BO +2.50 Add 20/20  
OS plano 2BO +2.50 Add 20/25

#### Anterior Biomicroscopy

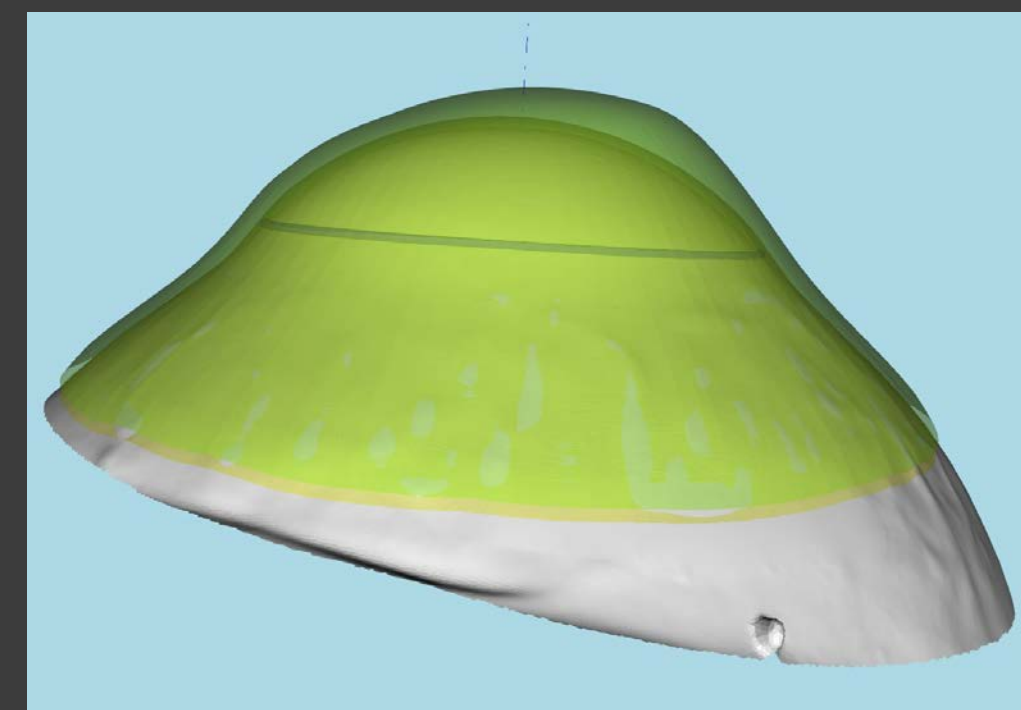
8 cut RK surgery RK scars noted on the cornea OU. The conjunctival showed pinguecula nasal and temporal OU. PCIOL was noted OU. The rest of the ocular surface was noted to be unremarkable in both eyes.

#### Additional Testing

Vergence testing revealed fusion of his horizontal diplopia from 4BO to 6BO with his corneal habitual GP lenses.  
Intraocular Pressures were 15mmHg in both eyes.



**Figure 1.** Virtual EyePrintPro with BO prism correction over OD (above) and OS (right).



### PROSTHETIC LENS EVALUATION AND DESIGN

The first step to creating an EP with prismatic correction is taking an impression of the ocular surface utilizing an imprint material that is safe for mucous membranes. Once the impression is obtained, it is converted into a digital image using a scanning laser. Next, this digitalization is used to produce a 7-micron accurate 3D image of the front surface of the eye. The resultant image is so exact that it includes the conjunctival tissue, which is invisible to ocular coherence tomography (OCT) devices. Finally, the data from the image is transferred into a proprietary software program to create a virtual lens. The software allows sphere, toric, multifocal, and prism to be placed all within the same device.

Since the patient fused with 4BO in his spectacles, an EP was created for this left eye. The vision in his left eye improved to 20/20 however he needed 2D more BO prism in order to fuse his horizontal double vision. A 2BO prism lens was created for his right eye, which gave him a total of 6D BO prism between both eyes. The patient was happy and had single vision with the following final prescription:

#### EyePrintPro Final Prescription

OD 46.25/-8.00/17.8 4BO  
OS 43.75/-4.37/17.5 2BO

\* Note: The prism correction stayed in its proper orientation on the EP in both eyes due to the rotational stability of the ESD technology.

**Figure 1** shows the virtual lenses created for this patient in both eyes.

#### Lens Assessment

The final lenses showed good vault (about 200 microns) in both eyes. Complete alignment was noted 360 around in the landing in both eyes with no conjunctival blanching in either eye.

#### Follow-up

Corneal evaluation at every follow-up (1 week, 3 months, and 6 month) showed no conjunctival or corneal edema. The patient was happy with vision and comfort with his EyePrintPro prism corrected lenses. He reported good clear vision and was able to maintain single vision at distance and at near with over the counter reading glasses.

### SUMMARY

Due to limitations in stability of conventional rotationally symmetric contact lens design, prism has been restricted to correction of vertical diplopia in the base down direction. EyePrintPro allows for prescription of horizontal prism in scleral contact lens devices. For horizontal diplopic patients who prefer not to wear prismatic spectacles, the EyePrintPro should be considered for contact lens correction since it allows for stabilization of base out prism.