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(R)GP Lenses After Penetrating Keratoplasty Surgery

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Introduction

Penetrating keratoplasty (PKP) results in a massive change in corneal structure and topography. The contact lens needs to fulfill visual demands as well as provide the least physiological impact to the weakened cornea.

Unfortunately, the most commonly used (R)GP designs and fitting philosophies worldwide do not always address those goals in a sufficient manner. Traditional fitting strategies put massive pressure on both the graft itself and the graft-host interface. Additionally, because the (R)GP lens frequently dislocates, vision can be compromised too.

Another approach is to fit the (R)GP lens on the more stable and healthier peripheral cornea. This case report describes the peripheral fitting philosophy in general, with particular emphasis on the fitting procedure of reverse geometry designs.

Case Report

A 52-year-old female underwent PKP about 2 years ago. The shape of the cornea changed dramatically, from a steep keratoconus-induced shape to a very flat central graft; additionally a big transition ‘hump’ in the graft-host interface was present (Figure 1).

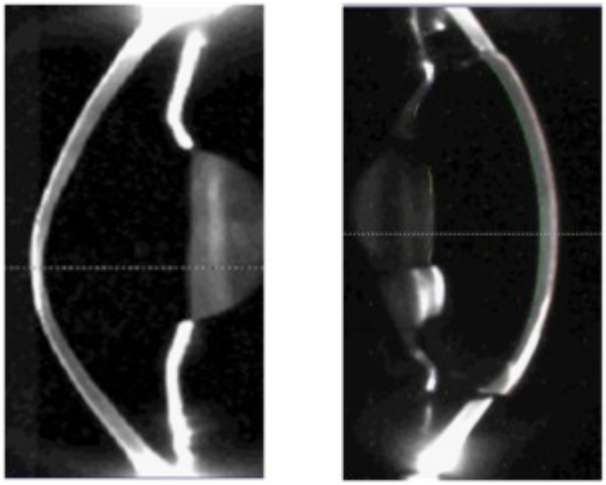

Figure 1: Cornea shape pre- and post-penetrating keratoplasty surgery.

Previous (R)GP fittings had failed because of discomfort and frequent loss of the contact lens. The current aspheric, rotationally symmetrical design (R)GP lens with a 9.30mm diameter resulted in dramatic inferior lift-off, as can be seen in Figure 2 (red arrow).

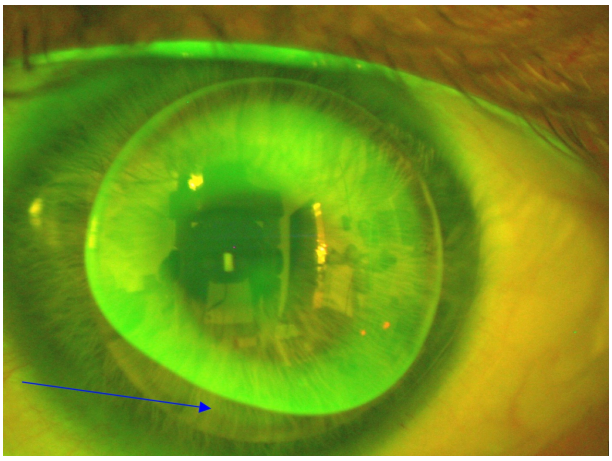

Figure 2. Fluorescein pattern with current aspheric (R)GP.

The new approach was to start the fitting process from the peripheral cornea. Once parallel fitting in the periphery was achieved, the next step was to avoid pressure on the graft-host interface. Finally, the central base curve was defined. To overcome the transition hump in the graft-host interface, the best option was a reverse geometry design. Once again, the idea is to avoid pressure on the graft-host interface as well as on the graft itself. Reverse geometries mimic this shape of the cornea after a PKP and so result in the least amount of physiological impact on those corneas. (Figure 3)

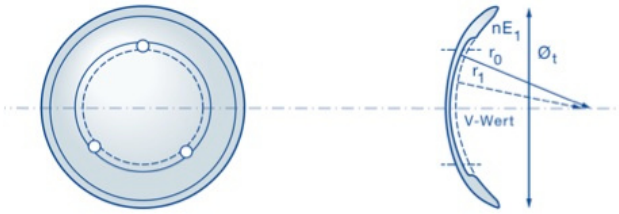

Figure 3: Illustration of a reverse geometry design (courtesy of Falco Switzerland).

For our patient, we used a peripheral toric, reverse geometry design. The fluorescein pattern showed graft-host interface vaulting quite similar to an orthokeratology pattern. The horizontal two ‘dots’ near the lens edge illustrate the flat meridian of this lens. If the volume in the reverse zone reaches a certain amount, the manufacturer will produce 3 ventilation holes to allow air bubbles after insertion to move out easily. (Figure 4)

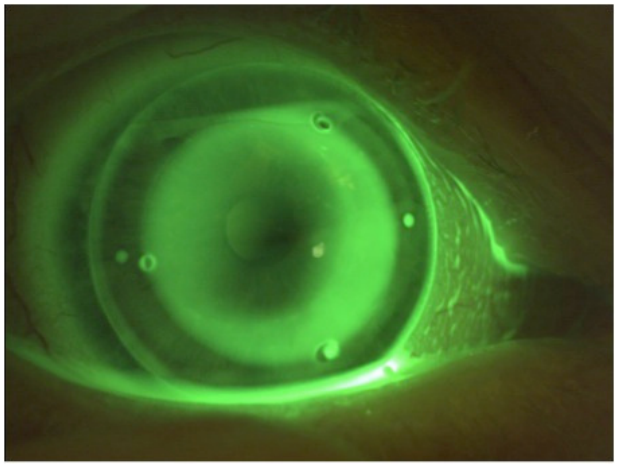

Figure 4: Peripheral toric, reverse geometry lens design with ventilation holes

Discussion

Reverse geometries offer a fascinating approach for fitting (R)GPs after PKP. Due to their unique geometry, the contact lens mimics the topography of a PKP cornea, which allows us to combine the least physiological impact with a superb optical result. Starting the fitting in the periphery is key when working with these newer geometries. Our next I-site Newsletter contribution will discuss how we calculate the sagittal depth and width of the reverse geometry lenses in PKP cases. Stay tuned!

Michael Baertschi

Michael Baertschi was the senior optometrist at the University Eyehospital Basel from 2000 to 2007. He is the owner of Kontaktlinsenstudio Baertschi in Bern, Switzerland and the CEO of Eyeness AG in Bern. Michael graduated from Pennsylvania College of Optometry as M.Sc. Optom. and from the University of Bern as M.med. Educ. Michael Baertschi is a fellow of the American Academy of Optometry and president of the Swiss Interlens group.

Michael Wyss

Michael graduated from Olten SHFA in Switzerland and did his MSc at the Hochschule Aalen Germany (in cooperation with New England College of Optometry and Pacific University, USA). Since 1999 he has worked in a private practice (kontaktlinsenstudio Baertschi in Bern, Switzerland) as Optometrist for specialty contact lens fitting. Additionally, he is an adjunct Faculty Member at the New England College of Optometry USA, Hochschule Aalen Germany, TVCI in Prague (Czech Republic) and FHNW Optometry in Olten Switzerland. Michael is a clinical investigator for several Industry Partners and has published or lectured on several topics in the contact lens field throughout the world. Michael is a Fellow of the American Academy of Optometry and serves as a the vice chairman of the Admittance Committee for new Fellows outside the USA.

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