Case Report

Manipulating your Ampleye fits using LLZ and PCZ

by Jeffrey Sonsino, OD, FAAO, Dipl AAO

The Ampleye design has a powerful tool to precisely manipulate fits. The fitter has precise specific control over the mid-periphery, periphery, and haptics of this lens design. KB is a 28 year old AA male with keratoconus s/p Penetrating Keratoplasty (PK) OD. He arrived to his annual visit this year wearing:
Ampleye 9.37/3800/-0.50sph/15.5/125u toric haptic
Ampleye 8.04/4000/-3.75sph/16.0/125u toric haptic

Visual acuity was 20/25 OD, 20/20 OS. His lenses had some surface scratches and were poorly wetting. OCTs of his habitual OD lenses were as follows:

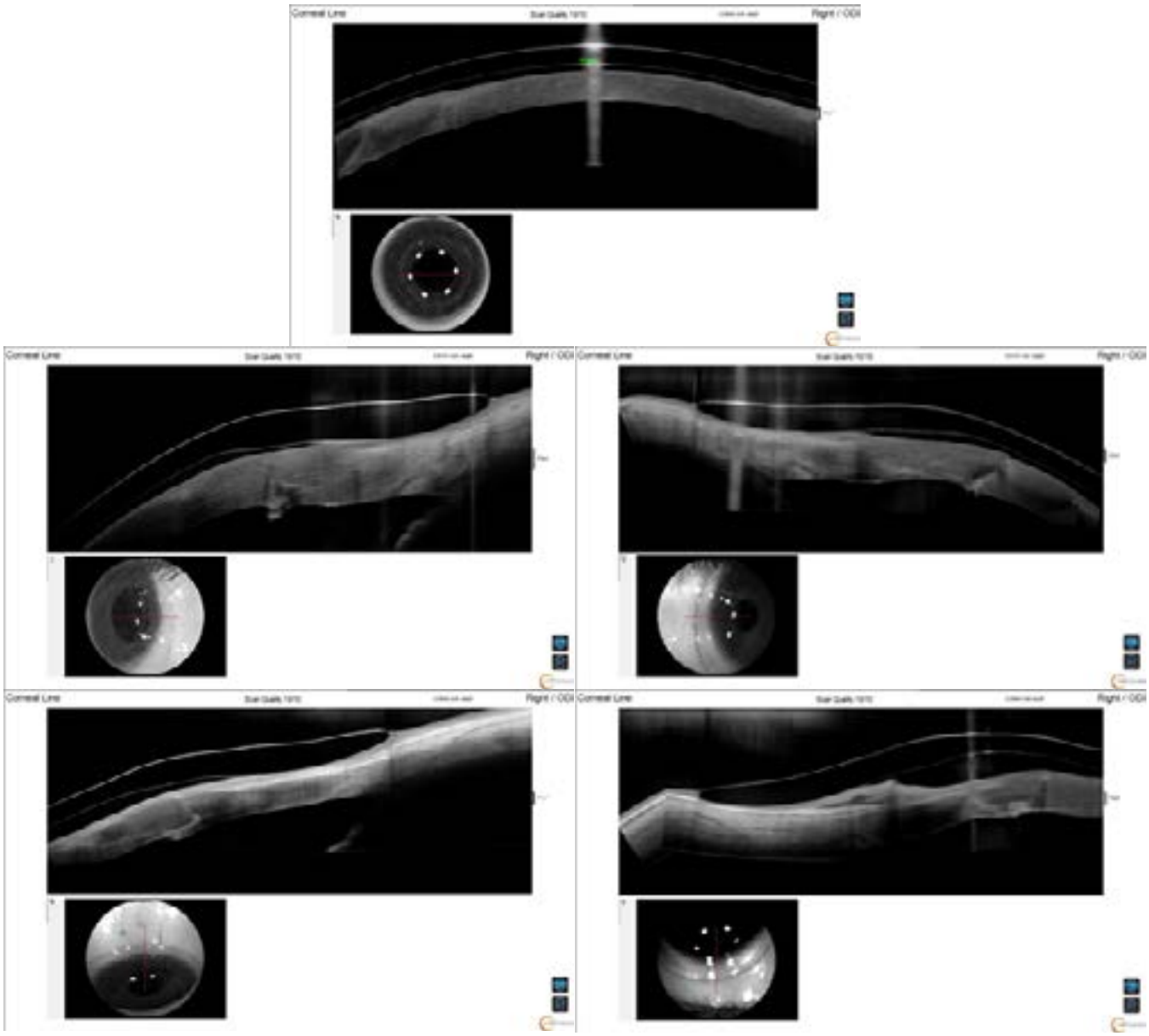


Figure 1. OCT evaluation of KB's habitual right lens (with PK). At 12:15pm, central vault measured 125u. There was bearing on the limbus laterally and minimal inferior decentration of the lens. One has to assume that with settle, at the end of the day, there is even less central vault and clearance at the limbus.

The fit was generally acceptable in both eyes, although the bearing on the limbus OD>OS is not optimal for long term health of the limbal stem cells. The central vault over the right eye graft may have been a tad shallow.

The Ampleye design has zones of the lens that are independentally controlled from the other aspects of the lens (Figure 2). For example, In other words, if you increase the angle of the Peripheral Cornea Zone (PCZ) by two steps (50u), that will increase clearance in the peripheral cornea as well as central vault by 50u but will have no bearing on the limbal clearance or scleral landing.

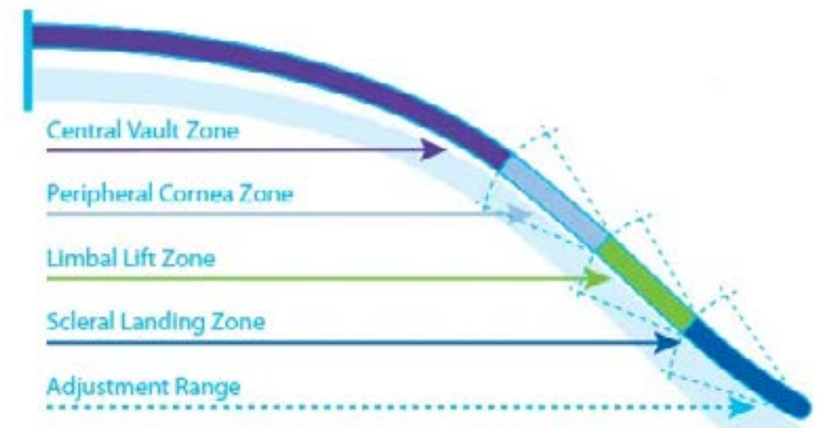
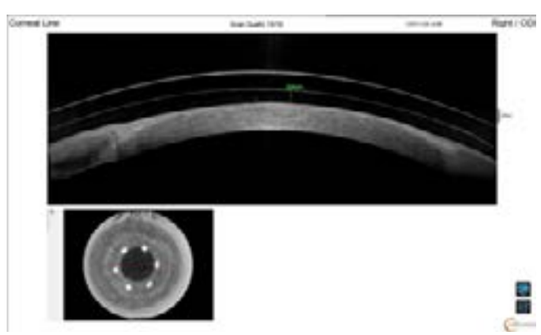


Figure 2. The design of the Ampleye scleral lens. Central vault zone can be controlled by changing the base curve of the lens, PCZ or LLZ. Peripheral Cornea Zone (PCZ) and Limbal Lift Zone (LLZ) are the most common variables to change. They are controlled in "steps" equaling 25u each. If you need 100u of additional central vault, you can add 4 steps of PCZ, add 4 steps of LLZ, or any combination of the two. Adding or increasing the angle is indicated with a "+" and removing or decreaseing the angle is indicated with a "-". Scleral Landing Zone is usually reserved for tucking in or increasing the edge lift of a lens, but this is rare in this design. Nearly all of our fits are ordered with toric peripheral curves.

The only changes we decided to make on our annual order were as follows:
OD +4 LLZ and -2 PCZ
OS +2 LLZ and -4 PCZ
For the OD, this would give us 100u more clearance at the limbal region but only 50u of additional central vault in the right lens (+100u(llz)-50u(pcz)=+50u). In the left lens, this would give us 50u more clearance at the limbal region but 50u less central vault (+50u(llz)-100u(pcz)=-50u).



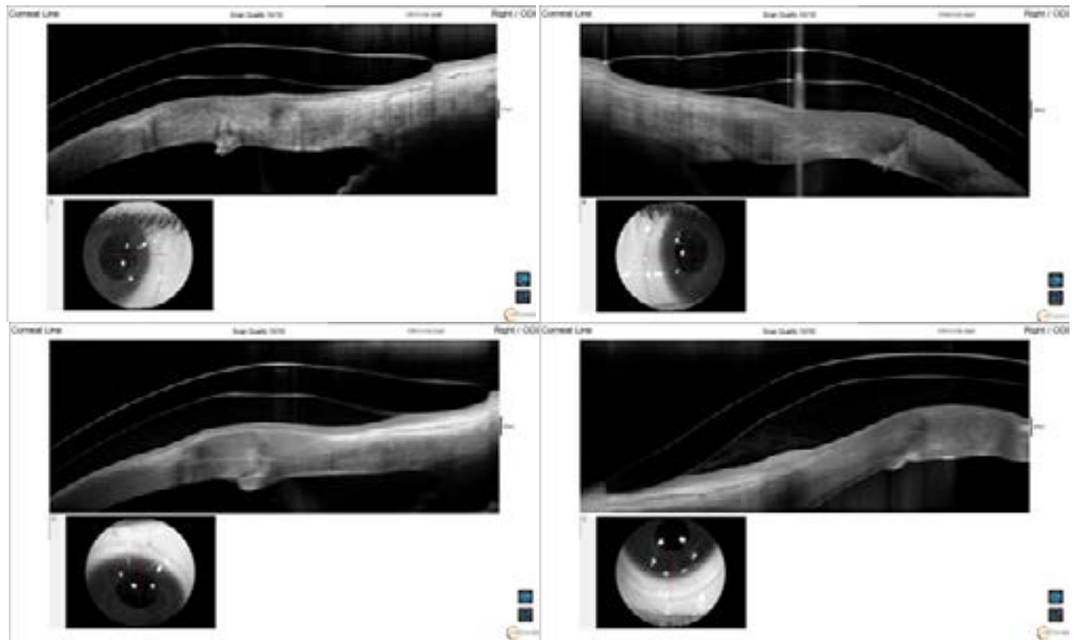


Figure 3. Dispensed right lens at the second visit of the year. Of note is that the central vault at dispense (5 minutes after insertion of lens) was 245u. In a post-PK eye, we are trying for vault of right around 200u at dispense. This ensures adequate oxygenation, assuming we are using the highest Dk/t materials available and minimizing lens thickness.1,2 We achieved our goal of increasing vault slightly from the previous habitual lens, as well as contouring the lens around the graft. The limbus is cleared by a larger angle than in the habitual lens. We can interpolate that even with settle, there will be no central or peripheral corneal touch.

Summary

The best scleral lens fits are achieved when there is central clearance, limbal clearance and haptic alignment, all after settling on the eye. The astute clinician needs to be able to interpolate what will happen to the lens after settling. The Ampleye design allows for precise control of the contouring of a scleral lens around a PK graft. The most common way to contour the eye with an Ampleye is to modify the PCZ and LLZ. Once a precision fit is achieved, each annual visit may take only mild modification. We tell our patients that the first year that we are fitting a lens, there may be multiple visits. In the case of KB, we perfected a complex fit after two total visits and only one lens order.

References:
1. Michaud L, van der Worp E, Brazeau D, Warde R, Giasson CJ. Predicting estimates of oxygen transmissibility for scleral lenses. Cont Lens Anterior Eye. 2012 Dec;35(6):266-71. doi: 10.1016/j.clae.2012.07.004. Epub 2012 Aug 9. PMID: 22878418.
2. Giasson CJ, Morency J, Melillo M, Michaud L. Oxygen Tension Beneath Scleral Lenses of Different Clearances. Optom Vis Sci. 2017 Apr;94(4):466-475. doi: 10.1097/OPX.0000000000001038. PMID: 28027273.

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