# MicroVault designing utilizing Profilometry

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**Introduction**

Over the last decade scleral lens designs have seen a large progression because of better knowledge of the scleral shape. One of these new developments is the ability to design a local vault in the landing zone of the lens. These local vaults can help to reduce the pressure and impingement on scleral elevated irregularities, such as pingueculas. In Cyprus there are a lot of eyes with pingueculae, probably due to the large amount of sunshine.

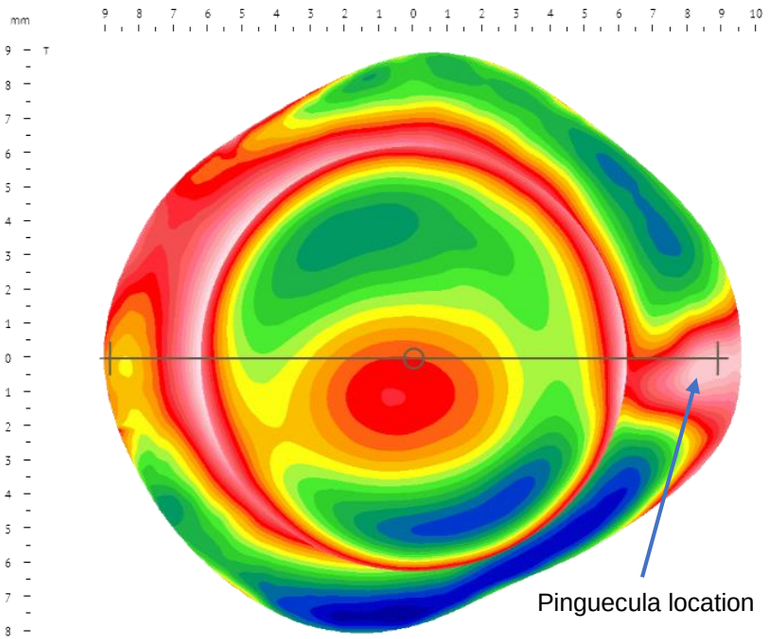



Image 1: Sagittal height map used to design the scleral lens as well as the microvault

**Methods**

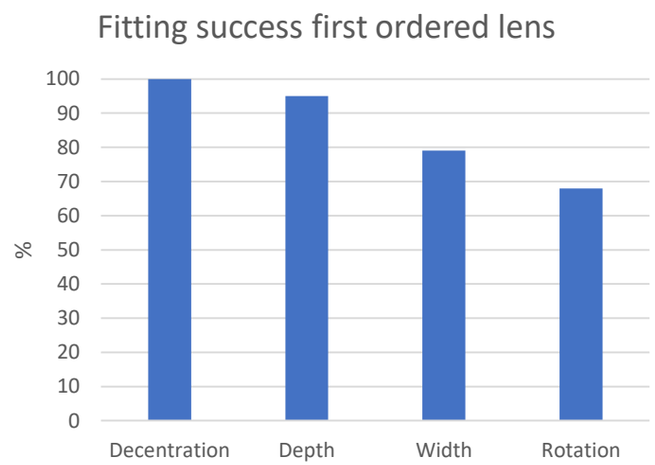
For this research Zenlens (Bausch+Lomb, USA) with Microvault (MV) technology has been used as well as an Eye Surface Profiler (Eaglet Eye, Netherlands, ESP) measurement. Image 1 shows a typical nasal pinguecula imaged with the ESP.

Nineteen patients were fitted with an MV based on the measurement. MV order requires 4 parameters (rotation, width, decentration and depth). After the initial fit maximum two refits have been done.

The method of prescribing a MV based on scleral profilometry has been described in a previous poster

**Results**

We considered smaller than 5 degrees of change for the rotation as not clinically significant as well as lower than 0.5mm for the width and the decentration. For the depth we considered up to 50 microns as not clinically significant.
Decentration never required a change in design. Only in one case the depth was changed 100 microns. 95% showed no to clinical insignificant changes for the depth. Width showed 79% of fitting success not requiring any update. Rotation was successful in 68% of the cases.




**Discussion**

Three of the four required parameters have shown a success rate above 79%. The rotation showed a success rate of 68%. The rotation is closely related to the overall rotation of the lens. The rotation of the lens is sensitive for changes in the landing zone design (alignment and the amount of toricity). The influences of the landing zone changes and lens rotiation have not been studied. A learning curve was observed, considering the relation of the MV and the lens rotation over time, but the number of MVs fitted is too small for further analysis.

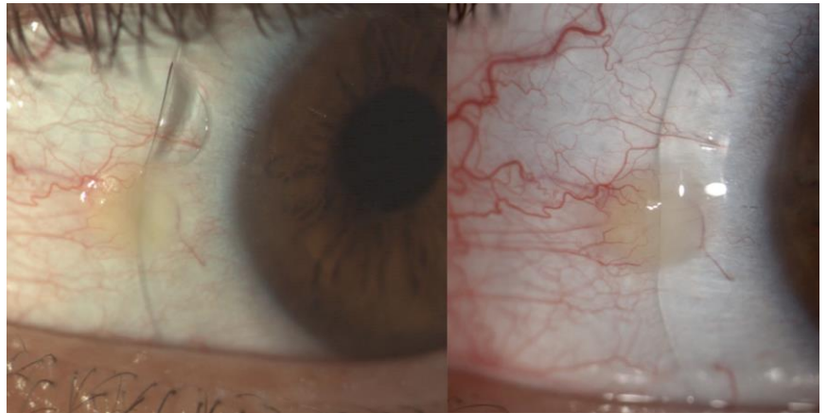


Image 2: Left shows lens impingement as well as rotated MicroVault
On the right it shows good alignment of the landing zone and MicroVault

Image 2 illustrates impingement and misalignment of the MV as well as a perfect alignment.
Without scleral profilometry often the choice is made to exclude a MV from the first fitted lens while several parameters are impossible to measure: Scleral lens rotation, amount of scleral toricity and MV depth. Therefore often a MV is included only in the 2nd or 3rd fitted lens.

**Conclusion**

Profilometry assists designing microvaults precisely and it may help to reduce chair time and refits. Microvaults may offer more comfort to a scleral lens wearer resulting in longer wearing times as well as less red eyes and lens awareness. Future studies could look into the relation between the amount of scleral lens toricity and the rotational stability.

**References**

Kyriakos Telamitsi, BSc et al, Scleral MicroVault, Poster Rome 2018 Ailes

**Contact and disclosure**

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