The beginning...

Scleral lenses are used in most cases to compensate optical aberrations caused by corneal irregularities ${ }^{1}$. Although its use in regular corneas is becoming more and more widespread ${ }^{1}$. Especially for dry eye treatment ${ }^{2}$ and in cases of elevated astigmatism. A scleral lens corrects optical aberrations ${ }^{3}$ but also induces other aberrations ${ }^{4}$.
There are currently criteria for establishing the minimum separation (vault) between the posterior surface of the scleral lens and the corneal epithelium ${ }^{5}$. But the final vault can be variable according to the specialist's criteria.

## The question is. .

How does the vault and scleral lens induced optical aberrations influence the optical quality of our patients?
The purpose of this study is to assess the variation in optical quality in healthy eyes by increasing the sagitta of a scleral lens.

## What we did. .

Eleven spherical scleral lenses of diameter 16.50 were adapted with sagittas between 3900 um and 4900 um in 10 healthy eyes of 10 young patients ( $23.5 \mathrm{y} . \pm 2.5$ ) Aberrometry was performed (Visionix vx120) for a pupil of 5 mm on each of the lenses after thirty minutes of use. Finally, a regression analysis was performed between the sagitta of the lens and the third and fourth order optical aberrations as well as the second order spherical aberration.

## The outcome..



Fig. 1 Horizontal coma


Fig. 3 Oblique trefoil
 Fig. 5 Oblique quadrafoil

Fig. 7 Oblique secondary astigmatism


Fig. 4 Vertical trefoil


## Discussing the result..

As we can see in all figures (except in figure 9) there is no relationship between the increase of sagitta of the scleral lens and the change in the optical aberrations studied. However, figure 9 shows an increase in primary spherical aberration with increased sagitta. That change could affect the vision ${ }^{6}$. This can be explained by the change in spherical aberration caused by the increase in curvature. The main parameter for controlling the vaulting of the scleral lens over the cornea is the base radius of the optical zone. To increase the sagitta of the lens, the curvature of the optical zone is increased. It is therefore advisable to keep the vault at the lowest possible value for purely optical reasons.

## Finally...

By increasing the sagitta of the scleral lens used in this study the spherical aberration increases significantly ( $p$ $0.05)$, the other aberrations do not change significantly. So, in general, we advice not to fit scleral lenses with too much vaulting.

## The references. . .

[^0]
[^0]:    1. Harthan J, Nau CB, Barr J, et al. Scleral Lens Prescription and Management Practices: The SCOPE
    Study. Eye Contact Lens 2017
    2. Kok J.H., Visser R.. Treatment of ocular surface disorders and dry eyes with high gas-permeable 2. Kok J.H., Visser R.. Treatment of ocular surface
    scleral lenses. Cornea 1992 Nov; 11(6):518-22
    scleral lenses. Cornea 1992 Nov; 11(6):518-22
    3. Lopez Alcon D, Gonzalez Meijome JM, Lopez Gil N. Contactología en la era de frenter
    Gonzalez Meijome JM. Villar Collar C. Superficie ocular y lentes de contacto. 2016
    4. Hecht E. Optics. 5th ed, Pearson 2016.
    5. Hecht E. Optics. Sth ed,. Pearson 2016 .
    6. Michaud L, van der Worp E, Brazeau D, Warde R, Giasson CJ. Predicting estimates of oxygen . Mransmissibility for scleral lenses. Cont Lens Anterior Eye 2012; 35( 6): 266-71. [ http:// dx.doi.org/ 10.1016/ j.clae. 2012.07.004] [PMID: 22878418]
    7. Benard Y , Lopez-Gil N , Legras R. Optimizing the subjetive depth-of-focus with combinations of fourth- and sixth-order spherical aberration. Vision Research. 2011 Dec; 51(23-24):2471-2477
