When Keratoconus and Degenerative Myopia Collide

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INTRODUCTION

Keratoconus is characterized by corneal thinning and ectasia that results in increased levels of myopia and astigmatism. When the degree of myopia is measured to be very high in keratoconic patients, there may be a concurrent diagnosis of degenerative myopia and an elongated axial length. It is important to consider the degenerative myopia diagnosis to better manage the patient's ocular health and contact lens options.

CASE STUDY

A 42-year-old Hispanic female with a history of keratoconus was referred for a contact lens evaluation. She reported a history of GP lens intolerance and was currently wearing Hydrasoft Toric lenses with inadequate vision. Entering visual acuity in her soft lenses was measured to be 20/40 in the right eye and 20/50 in the left. Slit lamp findings were significant for mild stromal thinning and inferior punctate epithelial defects in both eyes. Pentacam topography and Corneal Scleral Profile (CSP) reports were taken and confirmed the diagnosis of moderate keratoconus OS>OD.

A scleral lens fit with the Alden Zenlens was initiated. During the fit a significant myopic over refraction was found over –2.00 trial lenses: -21.00-1.50x085 in the right eye and -23.00-1.50x180 in the left. Quality of vision improved in scleral lenses and visual acuity was measured as 20/30- in the right eye and 20/25- in the left. Axial length measurements were taken and confirmed the presence of degenerative myopia in addition to keratoconus with readings of 33.57 mm and 33.56mm in the right and left eyes, respectively.

Finalized Lens Parameters:

	Power	BC/SAG	Diameter	LCD	Edge	Material
OD	-24.25 sph	7.10/4600	16.0	0	F6/S6/S6/S9	BostonXO2
OS	-23.00 sph	7.10/4700	16.0	0	F3/S3/STD/S8	BostonXO2

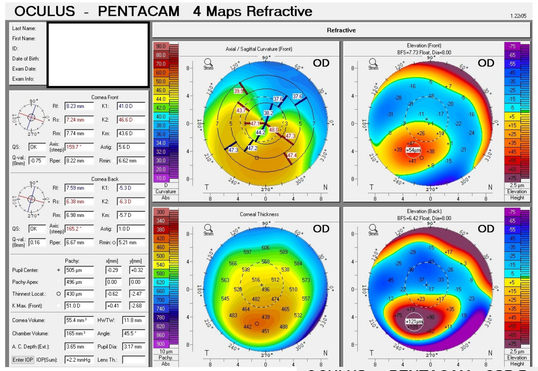

Figure 1A. Pentacam Topography of right eye

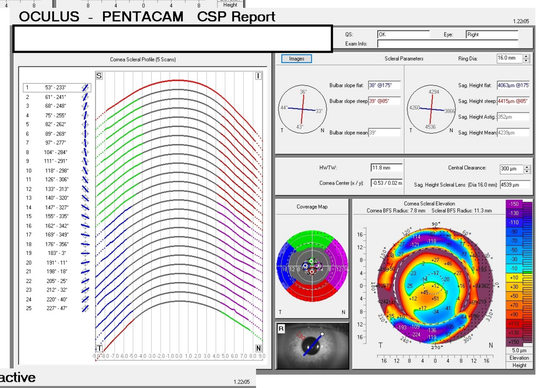

Figure 1B. Corneo-scleral Profile of right eye

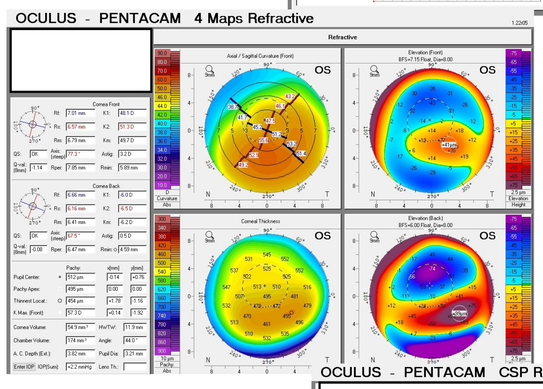

Figure 2A. Pentacam Topography of left eye

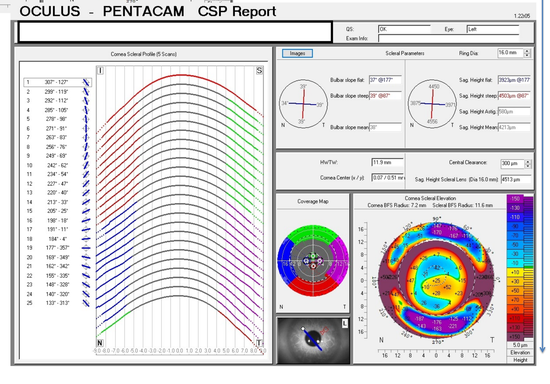

Figure 2B. Corneo-scleral Profile of left eye

DISCUSSION

While scleral fitting philosophies can vary, it is always important to consider oxygen permeability and the balance that is needed among the lens parameters. Our patient has a high minus prescription, so the lens is very thick in the periphery over the sensitive limbal region. Scleral lenses are already thick lenses and have a substantial tear layer, so it is important to select a highly oxygen permeable material. Boston XO2 was selected for our patient with its high Dk of 141. Lens vault is critical as well because excessive clearance will decrease oxygen to the cornea, but minimal clearance may cause the lens to settle and touch the cornea. Central vault in our patient was estimated to be 175 microns after 4 hours of lens wear. Similarly, lens thickness is a crucial factor as we do not want excessive thickness to decrease oxygen delivery, but minimal lens thickness can cause lens flexure.[1] Our lens thickness measured at 350 microns.

Additional modifications were made to improve the contact lens fit for our patient. A –1.0 flex control design was incorporated which thins out the lens about 100 microns in the periphery. A Tangible® Hydra-PEG® coating was added due to the patient's history of fogging and wettability issues in lenses. We also switched her cleaning system to Tangible® Clean to avoid the use of abrasive cleaners that can interfere with this coating. A quadrant specific edge design was incorporated to better align the edge of the lens with the sclera.

It is important to measure axial length in patients with degenerative myopia and arguably more so in patients who have multiple ocular diseases. While clinical manifestations of keratoconus persist in the cornea and anterior segment, manifestations of myopic maculopathy span from the vitreous to the sclera. These include epiretinal membrane, vitreomacular traction, foveoschisis, and macular atrophy, among others. The risk and severity of the maculopathy increases as axial length increases.[2,3] By measuring the axial length in patients with highly myopic prescriptions, we as providers can be proactive in our exams, patient education and referrals.

CONCLUSIONS

Axial length measurements should be considered when suspicious of concurrent degenerative myopia and keratoconus. Increased axial length is associated with increased risk of myopic maculopathy and retinal detachment. This measurement can help improve your patient management plan as well as your patient education. It is important to educate these patients on signs and symptoms of retinal detachment. If such patients are fit in scleral lenses, additional considerations should be made to promote oxygen transmission in their lenses.

REFERENCES

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