The Magic of Scleral Contact Lenses in a Patient with Keratoconus OU and Penetrating Keratoplasty Dehiscence Secondary to Traumatic Open Globe OS

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Abstract:

- This case report will dive into the importance of scleral contact lenses in management of irregular and post-surgical cornea, as well as, the need for interdisciplinary approach to ensure the best visual outcome for the patient.

Background:

- Patient is a 35 years old female that was referred by Ophthalmology for a medical contact lens fit for keratoconus of both eyes, and penetrating keratoplasty dehiscence secondary to traumatic open globe of the left eye. Patient presented with a chief complaint of longstanding blurred vision OS>OD with increased visual aberration within the past few years. Patient had previously tried RGP lenses OU but due to increased discomfort and lens awareness, patient discontinued lens wear after a few weeks.

Imaging:

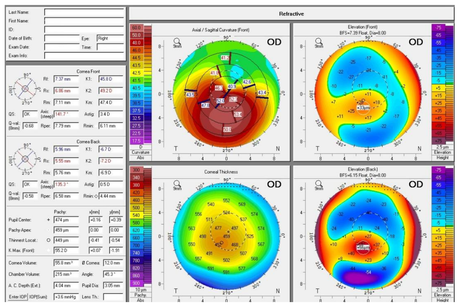


Figure 1. *Initial Pentacam OD 08/2022*

Steep K: 49.2D
Flat K: 45.8D
Astigmatism: 3.4D
Pattern: Inferior Steepening

Front Difference: +33um
Back Difference: +66um
Thin Pachs: 449um
HVID: 12.0mm

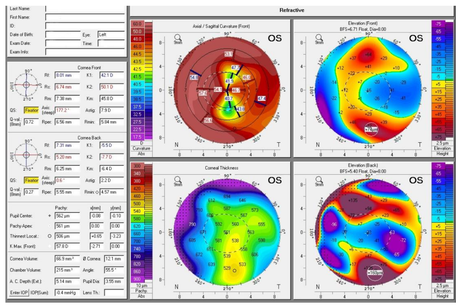


Figure 2. *Initial Pentacam OS 08/2022*

Steep K: 50.1D
Flat K: 42.1D
Astigmatism: 7.9D
Pattern: Oblate Symmetric Bow Tie

Front Difference: +74um
Back Difference: +160um
Thin Pachs: 506um
HVID: 12.1mm

Pertinent Findings:

	OD	OS
VA cc-SVLs:	20/25 PH: 20/20	20/400 PH: 20/60
Manifest Refraction:	-5.75 + 3.75 x 140 DVA: 20/25	+4.25 + 6.00 x 165 DVA: 20/60
Intraocular Pressure via GAT:	10 mmHg	9 mmHg
Cornea:	Inferior apical thinning and steepening, (-) scarring, fleischer ring, vogt striae	PK graft clear centrally with circumferential peripheral scarring (densest nasally); 5 intact sutures remaining, neovascularization of host superior leading up to graft but not crossing GVH junction
Iris:	Unremarkable	Iridodonesis, sluggish iris movement
Lens:	Phakic; unremarkable	Aphakic, (-) evidence of retained lens fragment

Decision Making:

	OD	OS
Diagnostic Lens:	SynergEyes VS 3600 36-42 BC: 8.4, Diameter: 16.0, Power: Plano	SynergEyes VS 4000 36-42 BC: 8.4, Diameter: 16.0, Power: Plano
Overrefraction:	+1.00 sph DVA: 20/20	+10.25 – 1.00 x 115 Vertex: +11.75 – 1.00 x 115 DVA: 20/20
Contact Lens Fit Assessment:	Well-centered lens with no areas of fluting or toe-down/heel-down blanching; good mid-peripheral and limbal clearance with fluorescein expanding evenly across the limbal area; excessive central clearance, hash marks at 4:30/10:30 o'clock; will need to decrease sagittal depth and incorporate the over-refraction. Patient reports excellent comfort.	Well-centered lens with no areas of fluting or toe-down/heel-down blanching; excessive mid-peripheral and limbal clearance with thick fluorescein pooling across the limbal area; excessive central clearance; hash marks at 2/8 o'clock; will need to decrease sagittal depth, steepen base-curve, and incorporate the over-refraction. Patient reports excellent comfort.
Final Lens Ordered:	SynergEyes VS 3600 36-42 BC: 8.4, Diameter: 16.0, Power: +1.00 DS Material: Optimum Extra Blue, Aberration Control	SynergEyes VS 3800 36-42 BC: 8.2, Diameter: 16.0, Power: +11.75 – 1.00 x 115 Material: Optimum Extra Blue, Aberration Control

Vault: 494um after 30 minutes
Excessive, uniformed clearance

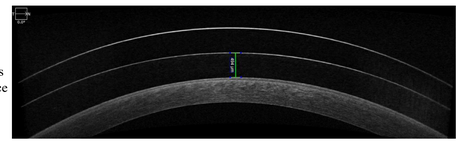
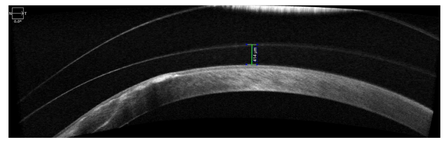


Figure 3. *Anterior Segment OCT OD 08/2022*



Vault: 414um after 30 minutes
Excessive, wing-shaped with insufficient curvature

Figure 4. *Anterior Segment OCT OS 08/2022*

4-Weeks Follow-up (09/06/2022):

	OD	OS
BCVA cc-CLs:	20/20	20/20-
Contact Lens Fit Assessment:	Well-centered lens with uniformed clearance and no movement; no toe-down/heel-down blanching or fluting; good mid-peripheral and limbal clearance with fluorescein expanding evenly across the limbal area; hash marks at 4/10 o'clock. Patient reports excellent comfort.	Well-centered lens with uniformed central clearance and no movement; mild increased peripheral and limbal clearance but overall acceptable; no toe-down/heel-down blanching or fluting; good limbal clearance with fluorescein expanding evenly across the limbal area; hash marks at 2/8 o'clock.

Vault: 218um after 34 minutes
Acceptable, uniformed clearance

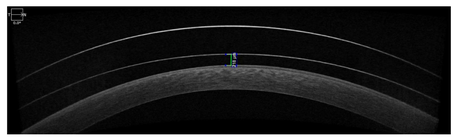
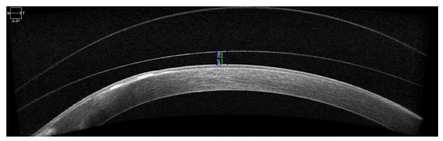


Figure 5. *Anterior Segment OCT OD 09/2022*



Vault: 262um after 34 minutes
Mild winged appearance but acceptable overall clearance

Figure 6. *Anterior Segment OCT OS 09/2022*

3-Weeks Follow-up (09/28/2022):

	OD	OS
BCVA cc-CLs:	20/20	20/20
Contact Lens Fit Assessment:	No change since last exam.	No change since last exam.

Vault: 189um after 3+ hours
Acceptable, uniformed clearance

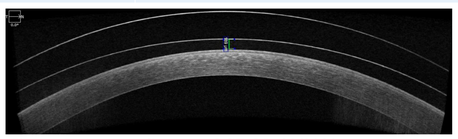
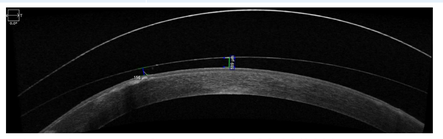


Figure 7. *Anterior Segment OCT OD 09/2022*



Vault: 189um centrally, 156um over thinnest area after 3+ hours
Mild winged appearance but acceptable overall clearance

Figure 8. *Anterior Segment OCT OS 09/2022*

Discussion:

Scleral lenses are indicated in the management of:
- Corneal irregularity
  - Keratoconus
  - Pellucid Marginal Degeneration
  - Terrien's Marginal Degeneration
  - Corneal Dystrophy, etc.
- Ocular Surface Disease
  - Chronic GVHD
  - Exposure Keratopathy
  - Sjogren Syndrome, etc.
- Post-surgical Cornea

In one study, it showed that 82% of patients achieved functional vision that was 20/40 or greater when fitted with scleral lenses after PK. 30% demonstrated at least one graft rejection episode and was successfully treated and controlled with topical corticosteroids. The incidence of rejection was higher in group 1 (transplant <20 years) than grade 2 (transplant >20 years). 6% had an episode of microbial keratitis related to patient non-compliance. Graft rejection may or may not be related to scleral lens wear. Another study showed that regardless of scleral lens wear, primary PK grafts had the best 10-year survival estimate (81%), followed by second grafts (33%), and third (16%). Patients who were order than 50 years, 10-year survival estimate was between 44%-47%.

Lastly, a study performed at the University of Michigan Kellog Eye Center between August 1, 2012 and December 31, 2018 showed that patients with keratoconus who were treated with either SCL or RGP CLs were less likely to undergo keratoplasty than patients with no CLs use. Patients with successful use of CLs have almost 1/5 risk of undergoing keratoplasty.

Conclusion:

- Scleral lenses have been proven to be effective in the management of ectatic corneal disorders, post-surgical corneal irregularity, corneal scarring and opacity, and ocular surface diseases. They neutralize the irregular corneal surface by providing an enclosed liquid reservoir that in theory should produce a smooth and regular refractive surface. Prior to scleral lens, our patient reported increased visual discomfort secondary to visual aberration. With the scleral lens and aberration control that SynergEyes VS utilizes, our patient now reports symptoms of visual aberration and distortion are essentially gone. Our patient stated that her quality of life for the past few months have drastically improved since wearing scleral lenses. It is important in cases like these that optometry and ophthalmology continue work in a collaborative fashion to ensure the best visual outcome for our patients.

Acknowledgement:
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References:
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