

Channeling a Scleral Lens for a Delicate Post-PKP Cornea with Gundersen Conjunctival Flap

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BACKGROUND

A Gundersen conjunctival flap is a surgical procedure, first described in 1958, where a contiguous flap of conjunctival tissue is sutured over the cornea. The introduced vascularization improves resistance to infection, inflammation and corneal melt. It is most often indicated in cases of poor visual potential such as herpetic infection and bullous keratopathy but in this case was used to promote healing post-penetrating keratoplasty (PKP).^{1,2} Approximately one third of patients have more than five diopters of corneal astigmatism post-PKP³ and can benefit from specialty lens fitting.

CASE HISTORY

Chief Complaint:

- A 60-year-old Hispanic male was referred for a scleral contact lens fitting OS to improve vision & activities of daily living post-PKP and IOL removal. Current spectacle wearer (+2.75 OTC); Previous daily soft contact lens wearer OU.

Ocular History:

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2020

UNKNOWN – Acanthamoeba keratitis OS secondary to swimming in a freshwater lake in daily SCL OU (removed that night)

UNKNOWN – PKP #1

NOV – PKP #2

+

2021

NOV – PKP #3, CEIOL, Iridoplasty

NOV – IOL removal, Anterior vitrectomy

DEC – Wound revision, Tutoplast

99

2022

JAN – Wound revision with keratolimbal allograft (KLAL), glue, and bandage contact lens (BCL)

FEB – PKP #3 at risk of transplant failure

- Recurrent wound leakage and subsequent choroidal folds
- Leakage persists with ten unsuccessful visits for glue/sutures/BCL

MAR – Gundersen conjunctival flap successfully seals wound & resolves choroidal effusion

MAY – Referred by ophthalmology for specialty lens fitting OS

JUN – Scleral lens fitting initiated OS

AUG – Progressive superior thinning of PKP

SEP – KLAL #2, scleral lens wear paused

- PKP #4 planned for 6-12 months after sutures heal

- Pred Forte BID OS
- Polytrim BID OS
- Cosopt PF BID OS

- Doxycycline 100mg QD
- Amlodipine 5mg QD
- Lipitor 80mg QD
- Losartan 50mg QD

EXAMINATION FINDINGS

OD

OS

Unaided VA	20/30, PH 20/20	CF, PH 20/150
Best Corrected VA (spectacles)	+2.75 -0.50 x 050, Add +2.00 DVA 20/20, NVA 20/20	+15.00DS, Add +2.00 DVA 20/300, NVA 20/300
Tomography/Keratometry	Prolate cornea 42.40/43.40 @ 179	Oblate cornea per anterior segment OCT (topography / tomography unable to capture)
Pachymetry	552um	2 x 4 mm area of elevation and thinning (215um) at the superior graft-host junction (GHJ)
Cornea	Clear	PKP with overlying conjunctival flap, 11:00 suture, superior & circumlimbal vascularization sparing visual axis
Sclera	White & quiet	3 superior sutures s/p KLAL
Iris	Round & reactive	Iris atrophy, 8:00 iris root remains
Lens	Clear	Aphakia

MANAGEMENT

Anterior Segment OCT

Fluorescein Evaluation

1

BostonSight®

DIA 18.5

BC 8.0

+14.75 DS

SAG 2050um

350 – 10° x 0.1mm depth channel

2

BostonSight®

DIA 20.0

BC 7.0

+8.75 DS

SAG 2350um

90 – 115° x 0.3mm depth channel

3

BostonSight®

DIA 20.0

BC 8.0

+14.75 DS

SAG 2100um

85 – 115° x 0.3mm depth channel

First Modification

• Diffuse touch over area of thin transplant; mild staining

• Added temporal channel for tear exchange

20/150 DVA

Second Modification

• Focal touch over area of thin transplant; mild staining

• ↑ diameter, sagittal height

• ↓ power/CT with steeper BC

20/125 DVA

Last Modification

• Lens not dispensed due to unplanned corneal surgery

• Returned to flatter BC for less harsh bearing

• ↓ OZD to extend channel over area of touch

N/A

- Binocularity and visual comfort improved with scleral lenses (20/20 OD, 20/150 OS) and overlay spectacles (+2.75DS OU) for ocular protection.
- Graft failure and hypoxia were concerns in a high plus scleral lens given a center thickness of 930um.
 - Optimizing material, optical zone diameter, central clearance, and a custom channel promoted tear exchange.
- Decreasing the optical zone allowed customized spline curve adjustments in the landing zone. It also lengthened the channel, which extends from the transition to the landing zone, which was intended to vault the elevated and thinned superior cornea.
- All prior lens orders settled to diffusely touch the graft-host junction across the three-month fitting process, which was halted before the final modification could be dispensed.
- Due to progressive thinning of the cornea, the patient underwent a second KLAL with a fourth PKP planned next year. An impression-based scleral lens or a corneal GP lens will be considered for a future refitting.

CONCLUSION

- Scleral contact lenses can improve visual outcomes caused by irregular astigmatism by vaulting over delicate corneal transplant tissue.
- Surgeons often employ conjunctival flaps in cases of poor, but not necessarily no visual potential. Vision can be appreciated through transparent areas of the conjunctiva when carefully dissected from underlying Tenon's tissue.¹
- Gundersen conjunctival flap introduces vascularization that helps resist corneal ulceration and perforation,¹ but it is unclear if it also supplies the cornea with enough oxygen to lessen hypoxia concerns with scleral lens wear.
 - However, graft rejection rates post-PKP (~30%) are comparable in contact lens and non-contact lens wearing groups.⁴
- Correcting residual refractive error in over-spectacles rather than prescribing full correction in contact lenses can promote compliance to protective eyewear in patients with monocular visual impairment.

REFERENCES

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