

Patch Graft-Induced Corneal Irregularity Treated with a Scleral Lens

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Introduction:

Post-surgical corneal irregularity is a common condition in ocular disease management with specialty contact lenses. Corneal transplantation procedures often induce increased corneal irregularity. Patients with post-surgical corneal irregularities often experience decreased best-corrected visual acuity with spectacles, increased glare, ocular irritation, and foreign body sensation. Because of these symptoms, scleral lenses are often utilized. Scleral lenses vault the corneal irregularities and, using a tear lens, produce a smooth refractive surface and thus neutralize irregular astigmatism caused by corneal irregularities.

Case Presentation:

A 59 year old Caucasian female was referred to Ophthalmology for corneal thinning, currently experiencing "stabbing" eye pain, redness in the left eye x 12 days
 POHx: Surgery at age 1 to remove a limbal dermoid, OS
 PMHx: Hypertension, Skin cancer, Migraines
 PFHx: non-contributory
 Social Hx: Non-smoker
 Current Ocular medications:
 Vigamox q2h OS
 Restasis BID OU
 VA cc: OD: 20/20-1 OS: 20/150 NIPH
 PERRL, OU, EOMs: Full
 Confrontations: FTFC OD, Superior temp scotoma, OS
 Wearing Rx:
 OD: +1.00-1.50x 006
 OS: +3.75-4.75x 090
 Tonometry (Tonopen):
 OD: 13 mmHg OS: 13 mmHg
 Pachymetry:
 OD: 538 microns OS: 710 microns

Assessment:

Descmetocele, OS
 bacterial and fungal cultures obtained continue Vigamox Q2h and Restasis BID start Vancomycin Q1h

RTC in 1 week

1 week follow-up: Symptoms unchanged
 No bacterial or fungal growth on culture
 Start Prednisone 20 mg QD

2 week follow-up: Symptoms much improved
 Continue Prednisone 20 mg QD
 Scheduled for corneal patch graft, amniotic membrane graft, EDTA chelation left eye

7 months later: Cataract extraction with PCIOL implantation, OS

Refer for contact lens fitting, OS

Methods:

A diagnostic scleral lens fitting was conducted in the left eye. Prognosis with contact lenses was guarded as the patient had a history of strabismic amblyopia in the left eye, post corneal patch graft, and pseudophakic. Because of this, scleral lenses were used for the diagnostic fitting (Europa Scleral, Visionary Optics). Corneal topography was taken of the left eye to determine the degree of corneal irregularity secondary to the corneal patch graft procedure.

CC: Blurred vision with current glasses
 POHx:

Limbal dermoid of left eye removed at age 1
 Descmetocele of left eye
 2/2/2015: s/p corneal patch graft, amniotic membrane graft, EDTA chelation OS
 9/29/2015: s/p PEM IOL OS
 No history of previous CL wear
 Strabismic amblyopia of left eye
 BCVA cc 20/150 ecc viewing
 Current Ocular Medications:
 Restasis BID OU
 Maxitrol QD OS
 Refresh prn OU
Management:
 Diagnostic Scleral lens fitting
 Diameter: 16.0 mm (Europa, Visionary Optics)
 BC: 7.50
 Power: -4.50 sph

BCVA: 20/100+1 ecc

At Dispense Visit:
 With small OR, BCVA: 20/60 ecc
 Successful insertion and removal

Follow-up #1 visit:
 Patient able to tolerate 10+ hours of wear
 Dispensed lens with over-refraction
 BCVA: 20/60 ecc viewing
 Follow-up #2:
 BCVA: 20/60 ecc viewing
 Follow-up #3:
 BCVA: 20/50-2 ecc viewing with glasses Rx over scleral lenses

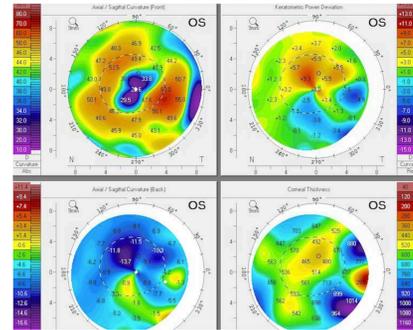


Figure 1: Corneal topography of left eye following corneal patch graft procedure. Overall, the cornea is highly irregular with areas of steepening temporally.

SLE:	OD	OS
External	Normal	Normal
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and Quiet	White and Quiet
Cornea	Clear	5x5mm corneal patch graft, intact sutures, irregular epithelium
Anterior Chamber	Deep and Quiet	Deep and Quiet
Iris	Round and Reactive	Round and Reactive
Lens	Clear	Centered PCIOL
Vitreous	Clear	Clear

Final Contact Lens Prescription:

	Brand	BC (mm)	OZD (mm)	Diameter (mm)	Power	Peripheral Curves	CT (mm)	Material	Vault
OS	Visionary Optics, Europa Scleral	7.50	8.50	16.0	-3.00	PC1: 7.37/2.10 PC2: 9.00/0.75 PC3: 13.00/0.50 PC4: 14.50/0.40	0.49	Boston XO2	350 microns

Discussion:

Limbal Dermoids arise from tissue of both ectodermal and mesodermal origin and make up about 3% of conjunctival and corneal tumors. They are most commonly located in the inferotemporal quadrant and can affect all histological structures from the anterior surface to the pigmented epithelium of the iris¹.

In cases of corneal thinning, mitigating inflammation is paramount in order to reduce the threat of perforation. Once active inflammation is absent, surgical intervention is considered in order stabilize the tissue and improve globe integrity². For smaller or isolated areas of thinning, such as a corneal descemetocoele, corneal patch grafts are considered. Smaller diameter corneal grafts have a decreased risk of rejection and are therefore the safest option for smaller areas of corneal thinning². However, for larger areas of thinning, such as severe corneal ectasia or extensive corneal necrosis, a penetrating keratoplasty is indicated. Penetrating keratoplasties are typically preferred over lamellar procedures due to the decreased risk of donor tissue preparation damage such as Descemet's membrane rupture².



Figure 6 (Left): A full-sized penetrating keratoplasty in fungal keratitis². Figure 7 (Middle): Corneoscleral patch graft². Figure 8 (Right): Anterior lamellar keratoplasty in necrotizing peripheral keratitis².

The most frequent cause of reduced visual acuity after corneal transplantation, whether a corneal patch graft or penetrating keratoplasty, is irregular astigmatism³. Irregular astigmatism consists of higher order aberrations that cannot be corrected with conventional optical aids⁴. In order to achieve best corrected visual acuity following a keratoplasty procedure, spectacles or contact lenses are likely needed. More than 50% of patients require a contact lens fitting after a successful keratoplasty³. Scleral lenses, particularly, are successful in patients with post-surgical irregular astigmatism as they offer improved comfort and stability over smaller diameter rigid gas permeable contact lenses. Scleral lenses are successful in managing irregular astigmatism when a spherical lens and an underlying layer of fluid are placed on the front surface of the irregular cornea⁴. This fluid layer forms a refractive tear lens that neutralizes the irregular corneal surface and allows light to be properly focused onto the retina rather than diffract and scatter within the eye. Numerous studies have shown that scleral lenses used in visual rehabilitation are effective and safe in patients that are post-keratoplasty⁵. In these patients, average best-corrected vision was 20/40 or better⁵. However, higher order aberrations on the back surface of the cornea cannot be corrected with scleral lenses and thus can limit the best-corrected visual acuity of post-surgical patients⁴.

Conclusion:

Scleral lenses are a growing visual rehabilitation device used to improve vision and reduce irregular astigmatism in post-surgical patients. Scleral lenses are often well tolerated, safe, and produce superior visual outcomes when compared with uncorrected or spectacle-corrected post-surgical eyes.

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Figure 3 (Left): Left eye with a temporal corneal patch graft and intact sutures with a 16.0mm scleral lens in place. The temporal conjunctival vessels show slight impingement but overall the edge of the lens is aligned. Figure 4 (Middle): Left eye with a temporal corneal patch graft with NaFl staining. Note areas of negative and positive staining illustrating the irregular surface of the corneal patch graft with intact sutures. Figure 5 (Right): Left eye with temporal corneal patch graft with intact sutures and 16.0 scleral lens in place.