Management of a Cornea When a Standard Scleral Lens Induces Corneal Edema in a Compromised Endothelium
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Abstract
Case report: Management of compromised endothelium from chronic uveitis, steroid induced glaucoma, failed Ahmed valve, and significant ocular surface disease using a scleral lens to maximize vision, provide support and reduce risk of corneal edema.

Case History
- 67 year old Caucasian male
- Referred by his corneal specialist to the Boston Foundation for Sight June 2015 for improvement in best corrected visual acuity and ocular surface disease and symptoms.
- History of chronic uveitis OU, steroid induced glaucoma OU, Ahmed valve implant complicated by hypotony OS, s/p PKP with non-healing epithelial defect OD, filamentary keratitis OS, neurotrophic keratitis OU, cataract extraction OU.
- Treatment included:
  - Baerveldt implant OD
  - Ahmed valve implant OS
  - Tarsorrhaphy OD
  - Penetrating Keratoplasty OD
  - Combigan BID
  - Durezol QD
  - Polymyxin B Ointment QID
  - Refresh PFAT 6-7x per day
- Systemic medical history: Diabetes Mellitus, Hypercholerterolemia, Hypothyroidism, Hypertension, kidney stones.
- Systemic medications: aspirin 81mg, cod liver oil, fenofibrate, fish oil, lantus subcutaneous, levothyroxine, lisinopril, methotrexate, Prednisone 15mg, Slo-Niacin

Pertinent Findings
- Uncorrected visual acuity for the right eye was LP due to tarsorrhaphy and then later LP OD after tarsorrhaphy was opened and OS 20/50+ to 20/80 ranging over multiple visits based on severity of SPK.
- Manifest refraction in the left eye showed no improvement in visual acuity with plano - 0.50 x 180
- Near visual acuity in the left eye was J7 @ 6 inches
- Right eye full tarsorrhaphy and then later partial tarsorrhaphy with full corneal opacity due to failed penetrating keratoplasty.
- Left eye 2-3+ injection, with superior suture and partial Ahmed valve (hardware later removed), plaque nasally with dellen, IK touch temporally, inferior endothelial pigment, diffuse grade III SPK Oxford Grading scale, surgically peaked pupil, PCIOLs.
No Cells and Flare
No infiltrates
Intraocular pressure by Tonopen OS ranged from 20mmHg to 14mmHg through multiple visits from June 2015 to November 2015.
Posterior findings: OD not viewable, OS cup to disk ratio .80 Horizontal and Vertical, small 3 to 4 disc diameter fain pigment lesion stable, no signs of diabetic retinopathy.

Differential Diagnosis
- Differential Diagnosis:
  - Neurotrophic keratitis
  - Filamentary keratitis
  - Medicommentosa
  - Chronic uveitis
  - Steroid induced glaucoma with failed Ahmed Valve

Diagnosis and Discussion
- Neurotrophic keratopathy is a degenerative corneal disease that can lead to:
  - Poor healing
  - Decreased reflex blinking
  - Persistent epithelial defects/ Ulceration
  - Permanent vision loss
- Chronic Uveitis with long term steroid use and secondary glaucoma
- Poor ocular surface:
  - Medicommentosa
    - Multiple topical IOP lowering medications and long term steroid use
  - Filamentary keratitis
  - Superficial punctate keratitis
- This case:
  - Ocular surface disease was significant causing decreased vision in a monocular patient
  - Previous topical and surgical interventions failed
  - Microcystic corneal edema occurred from compromised endothelial cells after multiple surgeries and chronic inflammation from uveitis when attempted a scleral contact lens.
  - While, typical well-fitting scleral lenses with high DK materials provide adequate oxygen permeability, however, in a cornea predisposed to swelling any type of contact lens would induce corneal edema.
  - Adding a fenestration allows an already oxygen compromised cornea enough oxygen to support scleral lens wear while supporting the ocular surface.

Treatment and Management
- Prosthetic replacement of the ocular surface system (PROSE) treatment
- Use of scleral prosthetic devices.
  - These are FDA-approved custom designed and fabricated prosthetic devices:
    - Restore vision
    - Support healing
    - Reduce symptoms
    - Improve quality of life for patients suffering with complex corneal disease
  - Large diameter (average 15.5–23 mm)
    - Designed to rest entirely on the sclera
    - Vault entirely the cornea
    - Creating a space filled with preservative-free artificial tears or saline
    - Fenestrated design allows mobile bubble to float with in pool of artificial tears.
  - Minimize topical medications as is possible with preservative free alternatives
  - This case:
    - Custom-fitted with a non-fenestrated scleral prosthetic device, induced corneal edema after 1.5 hours wear time.
    - Initial improvement in DVA was 20/20-3
    - After initiating fenestration to allow oxygen bubble wear time improves to 4 hours maintaining 20/20-3.
  - PROSE treatment:
    - Adequate ocular surface support in refractory disease
    - Viable and excellent choice for neurotrophic keratopathy, filamentary keratitis, superficial keratitis to improve ocular surface
    - Fenestrated design increases oxygen supply to allow for longer wear time.

Conclusion
- After surgical procedures and chronic inflammation from uveitis the endothelium can be compromised. When this occurs in severe ocular surface disease in conjunction with irregular astigmatism it can be difficult to utilize scleral lenses as they can induce unwanted edema. Utilizing a fenestrated PROSE design can maximize oxygen availability while also allowing a continuous fluid layer to support the ocular surface and providing an adequate refractive surface.

References
Epithelial Ingrowth After What?

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I. Introduction

This case report documents the presence of an unlikely, and not previously reported, complication after PRK. A patient undergoes primary LASIK with no complications. After she undergoes a PRK enhancement several months later, she develops epithelial ingrowth under her original LASIK flap. This presentation reviews the risk factors for epithelial ingrowth, details its clinical appearance and charts out current treatment methodologies.

II. Initial presentation

a. Contact lens fitting in preparation for surgery to know if likes monovision

III. Procedure #1 – LASIK

IV. Epithelial Basement Membrane Dystrophy

a. Clinical appearance, incidence

V. Procedure #2 – PRK enhancement

a. Post operative follow up

VI. Epithelial ingrowth

a. Appearance, incidence
   1. Increased incidence with multiple enhancement procedures

b. Potential causes
   1. Very peculiar after PRK enhancement

c. Further complications
   1. Irregular astigmatism
   2. Encroaching upon visual axis

d. Treatment
   1. Lift/scrape
   2. Tissue glue – results of our published study
   3. PTK
   4. Suturing
   5. Nd:YAG laser

VII. Case outcome

a. Stable, monitoring for now

VIII. Take home points

a. Importance of detailed preoperative refractive screening and ancillary testing

b. Be prepared for anything!
   a. Possibility of complications, even ones never before seen or reported in literature

c. Be confident in your findings
   a. “The flap is not lifted during a PRK enhancement,” says the surgeon.

d. Conservative management of finicky patients
A UNIQUE PIGGY BACK SYSTEM TO RESTORE CORNEAL REGULARITY

I. Case History

• Patient demographics: CG, 54 YO, Caucasian Female
• Chief complaint: Contact lens intolerance since the last 6 months
• Ocular, medical history: Fitted in gas-permeable contact lenses > 30 years ago. Always been comfortable with no issue about lenses or ocular health. Her last pair of contact lenses was purchased 14 months ago (Boston Envision OD (dominant) -13.00 BC 7.85 Diam 9.5 – lenticular OS -10.00 BC 7.90 Diam 9.5 – lenticular; fitted in monovision). History of laser photocoagulation as a prophylaxis for retinal breaks OU. (5 years ago). No contributive medical background.

• Medications None
• Other salient information CG works as a white collar for a governmental agency. She is doing computer work 8h00/day in the same dry environment for the last 15 years.

II. Pertinent findings

• Clinical BCVA (contact lenses) OD 20/25 OS 20/50 OU 20/25 @ distance
  BCVA at near 1.8M OD 0.5 M OS 0.5 M OU
  Lens positioned low OU touching the lower limbus, increased movement upon blinking (N+). Surfaces coated with lipid deposits. Fluorescein pattern showing apical (decentered) touch with appropriate tear exchange. No lens chaffing.

  Refraction (at lens removal): OD -16.00 -0.75 x 30 20/30
  OS -15.50 -0.75 x 110 20/30 +1 20/25-2OU
  Add +2.75 0.50M
  Binocular vision: well compensated eso (distance) and exo (at near)

  Slit lamp: Posterior Blepharitis OU (grade 1- easy expression of slightly turbid meibum). Conunctival hyperemia (Nasal/Temporal) grade 2-. Papillae (upper conjunctiva) grade 1+ OD, grade 1 OS. Significant 3-9 o’clock staining (grade 2+) with neovascularization. Cornea guttata grade 1 OU.

  Corneal topography: moderate corneal warpage OU (pseudokeratoconus)

III. Differential diagnosis

• Primary/leading Corneal warpage
  Corneal vascularized limbal keratitis OU (VLK)
  Lens spoilage

IV. Diagnosis and discussion

Elaborate on the condition VLK is mostly seen in long-term RGP/PMMA lens wearers, especially for those showing high refractive errors. It is generated by a non uniform distribution of the tear film, drying of the nasal/temporal corneal areas, then development of dellens, scars, and at the end, neovascularization secondary to this chronic inflammatory condition. First reported by Lebow in the ’80s.
Expound on unique features  Typically, high myopes rely only on contact lenses to see. Corneal warpage and VLK may require the cessation of lens wear. Because of the corneal and refractive changes, expected during the restoration process, prescribing a pair of glasses is not suggested.

V. Treatment, management

Treatment and response to treatment  - Cessation of rigid lens wear. Since no glasses were available, a high-permeable silicone hydrogel contact lens is suggested. Starting with comfilcon A trial lenses of -12.00D OD and -10.00D for 1 month. Instruction provided for handling and cleaning of soft lenses. Topical steroid (loteprednol 0.5%) is prescribed QID x 2 weeks then BID x 2 weeks, with instruction to remove lenses when applying drops. Prophylactive AB given HS. F/U @ 1 wk (IOP) and 1 month.

Findings ± 1 month: patient complaint about reduced vision at distance.
Over –refract: -1.25 -1.25 x 20 (20/25) OS -4.50 -1.50 x 135 (20/25)

Cornea partially restored in shape (more regular topo maps – astigmatic pattern). Redness reduced. Vascularization is fading. Scars still present. No staining :
Refraction: OD -17.50 -1.50 x 20 20/25- OS -16.75 -1.75 x 140 20/25

Refit: maximum power in SiHy disposable lenses is -12.00D. Astigmatism becomes in play. It is decided to fit in soft lens piggyback system (2 SiHy lenses on the same eye, one spherical and one toric)
Monovision:
OD: -3.50 -1.25 x 20 + -10.00 spherical on top of it 20/25-
OS: -3.50 -1.25 x 140 + -9.00 spherical on top of if 20/25
Recmm: to cease steroids and AB. F/ x 1 month
The patient was seen every month for 7 months. Condition was considered stabilized when 2 topo maps, at different visits, were found similar.

Final Rx: -16.50 -2.75 x 15 20/25+1 -15.50 -2.50 x 135 20/25
Add +2.50

Patient wanted to go back to just one pair of lenses. Small gas permeable lenses were considered but sclerals were preferred to alleviate further corneal warpage. Multifocal scleral lenses were fitted with success – leading to 20/20 binocularly, at distance and at near.

Over the months. A faint scar remained on temporal cornea OU. Vascularization was eliminated. Ocular health was restored.

VI. Conclusion

- Corneal warpage is often met, in RGP wearers but can exist also in fair number of soft lens patients
- There are several ways to manage warped cornea.
- Method employed here involved the use of a unique soft SiHy piggyback system to compensate for high myopia and astigmatism
- This method can be applied with success in presbyopic patients with high ametropia as well.