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FINANCIAL DISCLOSURES

In the past year, Dr. Walker has received research funding or honoraria from the following for-profit companies:

- Alcon Laboratories
- ABB Optical
- Bausch Health Specialty Vision Products

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Scleral lens indications: advanced considerations

- Managing more advanced conditions:
 - Ectasias: Keratoconus, PMD, post-LASIK ectasia; Post-surgical; Ocular surface disease
 - When do problems arise?
 - Discussion of underlying diseases
- Case series today:
 - Keratoconus (2 patients)
 - Presbyopia (1 patient)
 - Ocular surface disease (1 post-herpetic infection)
 - Complications: hydrops, edema, visual quality, bubbles

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Scleral Lens Complications

Application trouble/bubble	Difficulty with lens removal	Surface non-wetting	Surface depositions	Apical bearing/excess	Limbal bearing/excess
Scleral impingement/bleeding/stand-off	Conjunctival compression	Inflammation	Solution sensitivities	Poor comfort	Residual aberrations
Conjunctival prolapse	Corneal bogging	Midday fogging	Corneal epithelial cysts	Increased IOP?	Infection

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Overview of Scleral Lens Fitting Technique

- Central clearance zone: goal is to vault over the cornea
- Limbal clearance zone: goal is to align (barely vault)
- Scleral landing zone: best when even and smooth landing.

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Keratoconus: Case 1

- Patient LC, age 17
- Referred from America's Best on 8/24/21
- Pt reports that 1 month ago, was traveling and woke up with hazy, slightly painful eye
 - Saw an urgent care OD out of state ~1mo prior - told he had Kc and hydrops OS
 - Was prescribed 3 drops - unknown, finished last week
 - Took a photo to share with his friends ☺

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Initial exam 8/24/21

- Never worn any contact lenses or glasses
- OD has been blurry in the past but more noticeable over the past year

video

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OD - PRIOR TO SL WEAR
MILD STROMAL HAZE

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OD - PRIOR TO SL WEAR
SMALL PERIPHERAL EPITHELIAL SCAR

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OD - PRIOR TO SL WEAR
HORIZONTAL STRIAE

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CASE REPORT

Bilateral horizontal Vogt's striae in keratoconus


Horizontal Vogt's striae

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Initial exam 8/24/21

- Reports no pain, but hazy vision OS worse than before the incident
- Currently not taking any drops
- Very interested in getting a contact lens to improve vision OS
- Nervous about prospect of needing corneal transplant


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OS

- Corneal hydrops
- No CL wear for now
- Treatment started:
 - Prednisolone acetate 1% BID
 - Muro 128 QPM and as desired (not more than 6x per day)

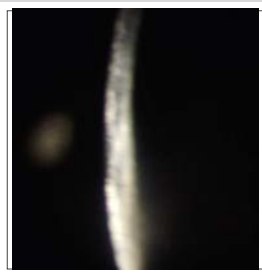
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OS – first visit
~1 month post hydrops

- Photophobic
- (+) edema
- (+) probable scarring
- VA: 20/300
- IOP: 13 (OU)

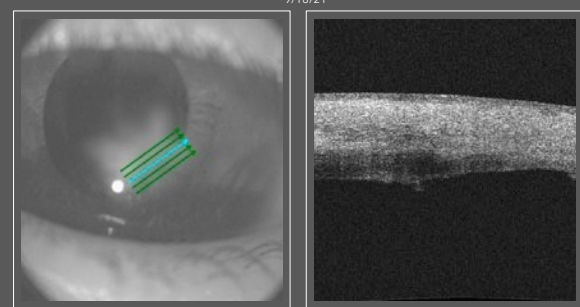
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OS – first visit
~1 month post hydrops

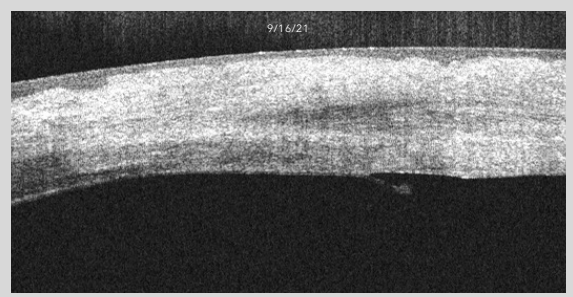
- Photophobic
- (+) edema
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- VA: 20/300
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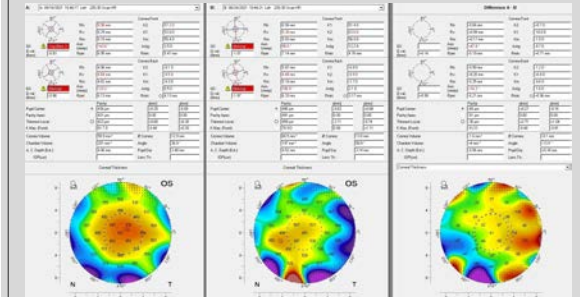
9/16/21

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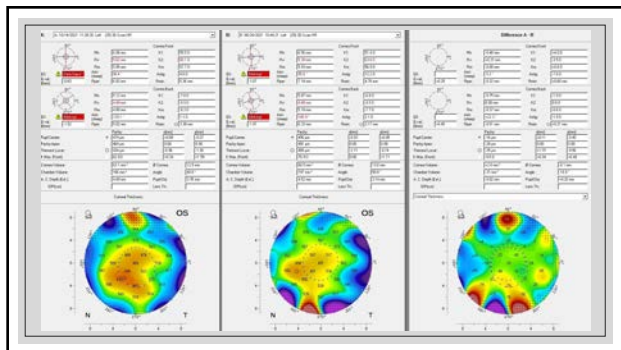


9/16/21

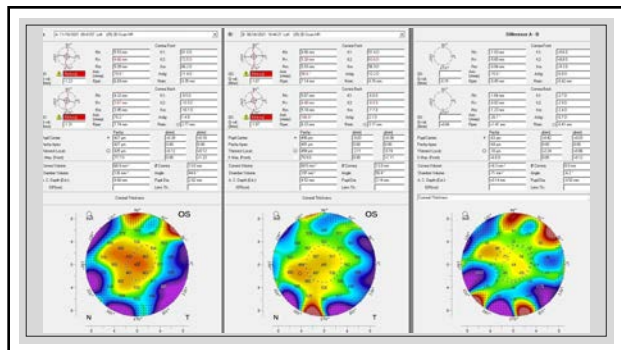
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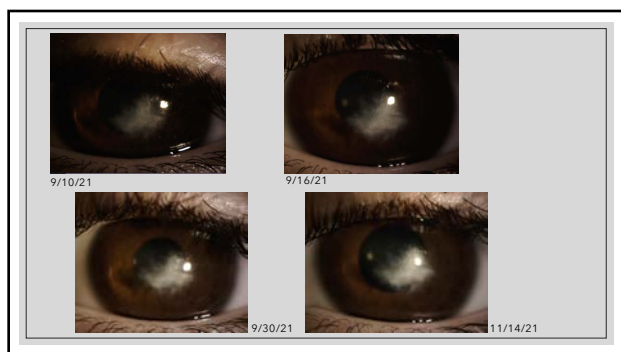
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21



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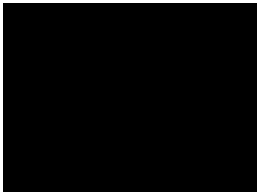


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OD: SCLERAL LENS FITTING

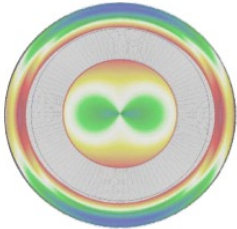
Initial lens:

- Front surface toric
- SAG: 5104
- PWR: -3.25-1.75x165
- DIA: 16.8
- BC: 7.46
- Material: Hexa 100




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FRONT SURFACE TORICS



DUAL THIN ZONES



PRISM BALLAST PERI BALLAST THIN ZONE


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OD: SCLERAL LENS FITTING

Dispensed 9/30/21

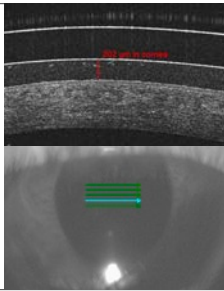
New Lens (Trial 2):

- Front surface toric
- SAG: 5215 deeper
- PWR: -4.25-1.75x165 more
- DIA: 16.8
- BC: 7.30 steeper
- Material: Hexa 100



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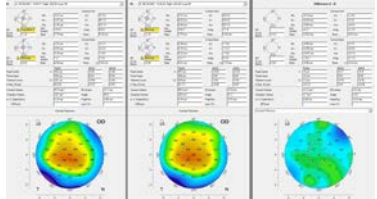
OD: SCLERAL LENS FOLLOW-UP



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Health of right eye

• 1 month SL wear



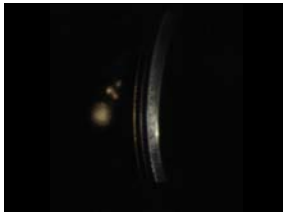
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OD: SCLERAL LENS FITTING

10/14/21

Final Lens (Trial 2):

- Front surface toric
- SAG: 5215
- PWR: -4.25-1.75x165
- DIA: 16.8
- BC: 7.30
- Material: Hexa 100




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FINAL VISIT

OD: WEARING SL FOR 2.5 MONTHS

OS: HYDROPS 5 MONTHS AGO

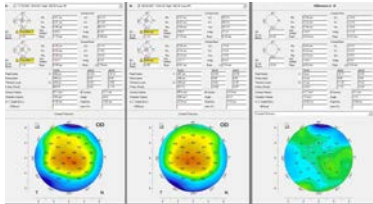


11/18/21

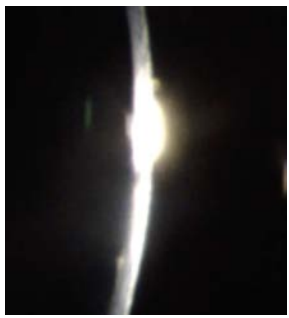
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Health of right eye

• 2 months SL wear



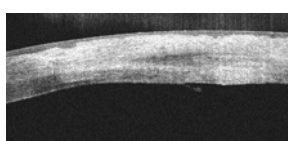
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OS: hydrops f/u

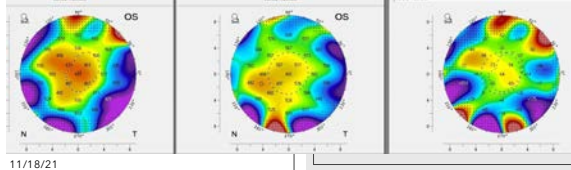
- Continued to treat with Pred 1%, tapering at the end and finishing after 11/18/21

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OS: hydrops f/u

- Continued to treat with Pred 1%, tapering at the end and finishing after exam on 11/18/21




11/18/21

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Keratoconus:
Case 2

- Patient JM, age 35
- University Eye Institute (UH) patient - LEE 2018
- Pt reports broken lens OD, had good comfort, fit and vision with SL OU; wearing lenses >10y
- Wears 16h per day, uses Clearcare and ScleralFil
- Manifest spec Rx:
 - OD: -3.00-3.00x082 20/40
 - OS: -1.00-4.00x017 20/100

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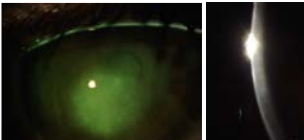

Initial exam 9/7/21

- Presenting SL OS:
 - Toric prolate lens
 - PWR: -3.00
 - BC: 6.4
 - SAG: 5650
 - DIA: 16.0
 - Landing zone: flat 4 x steep 1 (150um difference)
 - VA: 20/40 (typical)
- Re-ordered habitual OS, increased SAG OS, set for patient to pick-up lenses without dispense and return for f/u in 2 weeks

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Emergency Visit:
9/16/21

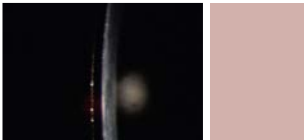

- Pain OD started two days ago
- Tried rinsing with saline and that didn't help
- (+) photophobia
- Had picked up lenses a few days ago - was wearing the lenses when presenting for the visit
 - Reported lenses made things more comfortable OD
 - VA: 20/50
- Started treatment:
 - Tobradex TID
 - Prednisolone acetate 1% TID
 - Muro 128 QPM and QAM
 - D/C scleral lens wear until healed

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Follow-up:
9/21/21

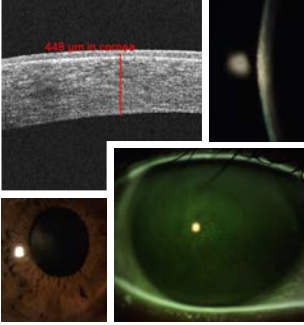
- Patient reports everything is "back to normal"
- Compliant with drops
 - He had not stayed out of lenses as recommended, but tried to reduce wear
 - Wore lenses OU to appt
- Vision: 20/30. OD: 20/40 OS
- Treatment:
 - Continue with Tobradex until 9/24
 - Reduce Pred to BID on 9/25
 - Continue with Muro BID or as needed - do not put in SL

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**Follow-up:
10/5/21**

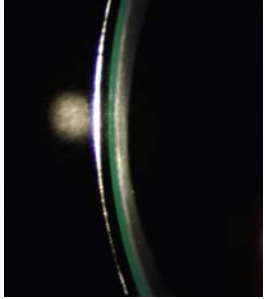
- Reports complete "resolution"
- Compliant with drops
- Wore lenses almost full time, tried to limit at night and weekends
- Vision: 20/20- OD; 20/40 OS
- Updated treatment plan



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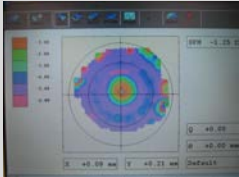
**Final Follow-up:
10/19/21**

- Resolved hydrops
- Vision: 20/20- OD; 20/40 OS
- Discontinue all drops
- Continue with scleral lenses



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Multifocal Scleral Lenses



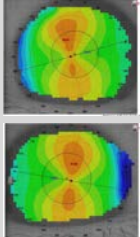
Optical metrology of a center-near multifocal design.

- Minimal movement/rotation and are very stable
 - simultaneous vision multifocal designs are necessary
- Majority center-near designs, but some labs offer center-distance designs
- Optical placement highly customizable

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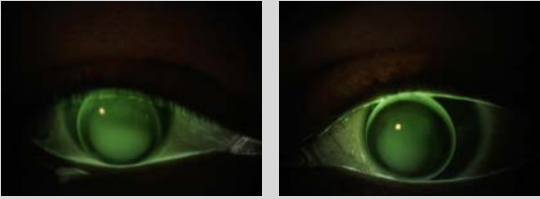
Multifocal lens case example

- 44 yo white female
- Denied LASIK 1y ago due to dryness
- Strongly interested in presbyopic option
- OD: +0.75 - 4.25 x 175
- OS: -0.25 - 3.00 x 007
- First lens design: bitoric translating bifocal GPs
- Second lens design: MF sclerals



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Multifocal lens case example



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Multifocal lens case example

- 15.4 mm diameter
- Plano power (7.67 base curve)
- +1.00 OD, 1.5 mm near zone, dec 0.5mm SN
- +1.25 OS, 1.5 mm near zone, dec 0.5mm SN
- Both lenses made with toric landing for stabilization
- VA distance 20/20, near 20/20-
 - Monocular 20/30 OD, 20/20 OS

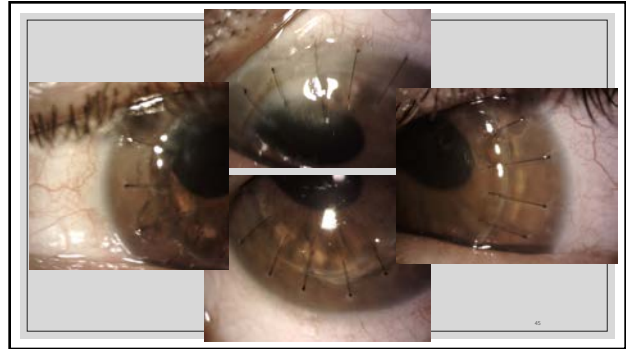
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Post-transplant SL fitting

- Patient IB
 - 69yo HM
 - Monocular patient (OS)
 - Corneal transplant (injury) early 2020
 - Taking Prednisolone acetate 1% QPM
 - DM type II, HTN
 - Presented for SL fit 04/2021



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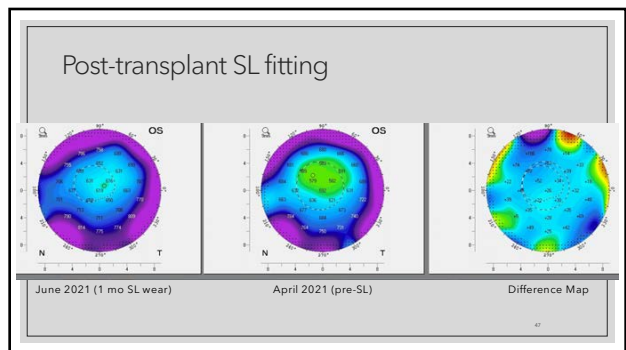
Post-transplant SL fitting

Monitoring signs of a poor response to SL wear

- Patient IB
 - Lens - monitoring clearance over sutures
 - IOP - monitoring effect of Pred + SL
 - Monitoring neo, edema for signs of hypoxia and risk of infection



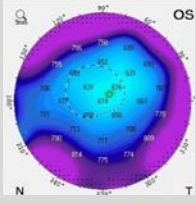
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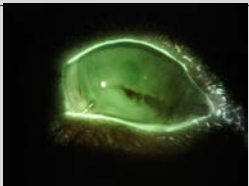
Post-transplant SL fitting

- Patient IB - IOP tracking
 - 4/21/21: 8mm Hg (GAT)
 - 6/29/21: 17mm Hg (iCare)
 - 9/9/21: 15mm Hg (iCare)
 - 10 mm on GAT 15 min later

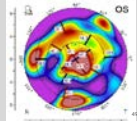


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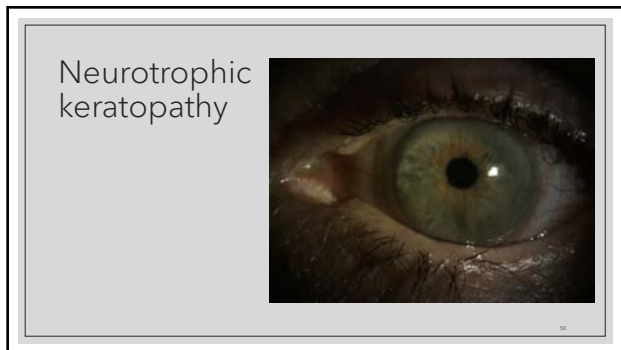
Neurotrophic keratopathy



- Patient SW, 70yo WM
- Post-herpetic NK - OS only
- Fitted with 14.8 dia SL (tried 15.4+ - unable to apply)
- ClearCare for disinfection, MPS conditioner
- PF application solution: polyethylene glycol 400 (0.4%, propylene glycol 0.3% (Systane®))



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Neurotrophic keratopathy corneal edema management

- Wearing lenses for 6 months
- C/o blur, redness, discomfort after several hours of lens wear
- Specular microscopy
 - OD 2220 cells/mm
 - OS 3389 cells/mm

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Management of Edema with SL

- Diffusion through lens and tears
- Lens thickness (SAM/FAP)
- Lens Dk (lost ROI after 100?)
- Tear reservoir thickness (Fisher 2020)
- Application solution?

Take home:

- Make lens with Dk > 100 and thickness < 400
- Fluid reservoir about 200 μ m

Dhallu et al 2020
Increase Dk 100 to 200
CT: 350; FR: 325

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Neurotrophic keratopathy corneal edema management

- Increased Dk to 200 (fluid reservoir thickness unchanged)
- Fluid reservoir thickness ~300

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Neurotrophic keratopathy corneal edema management

- 100 μ m clearance
- 200 Dk lens
- Removes if any s/s of swelling

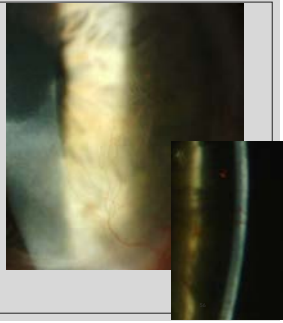
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Neurotrophic keratopathy Complication: bubbles

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Neurotrophic keratopathy

- d/c lens wear
- Treat w/broad spectrum Antibiotics and RTC every few days until healed
- Returned to SL wear when resolved



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Summary and Conclusions

Thank you, and please feel free to email with any questions:
mkwalker@central.uh.edu

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