

## Background

- Neurotrophic keratitis (NK) is a rare, neurodegenerative disease that is characterized by a loss of corneal nerve function and results in decreased or absent corneal sensitivity<sup>1</sup>.
- Damage to the trigeminal nerve (CV V) from ocular or systemic conditions can lead to corneal epithelial defects, stromal edema, and corneal perforation if severe<sup>1</sup>.
- Due to the limited effectiveness of treatments, patients are closely monitored and treatment is often reactive.
- Management of NK often requires a multi-step approach that includes ocular lubricants, topical antibiotics (ABX), topical cenegermin 0.002% (Oxervate), and scleral lens (SL) wear<sup>2</sup>.

## Case Presentation

**Presentation:** A 17-year-old female presented for a NK progress visit OS. Clinical assessment included questionnaires, esthesiometry, slit lamp examination (SLE), and confocal microscopy.

**Current treatment:** SL wear OS, instruction to instill preservative free artificial tears (PFATs) QID.

**Chief Complaint:** patient reported getting soap in OS a week ago, with associated redness and mild lid swelling that resolved within 3 days

- Rarely wears SL OS
- Not instilling preservative-free artificial tears (PFAT) or gel drops often (~1-2x/day)

### Ocular History:

- Infantile esotropia – strabismus surgery OS
- Congenital nystagmus
- Bilateral chorioretinal coloboma
- Multiple eye infections OU – possible herpes simplex dendritic keratitis, OS when pt was a toddler (mother reported)
- Neurotrophic keratitis OS** – diagnosed a year ago
  - History of corneal ulcer – poor resolution w/ topical antibiotic
  - Completion of Oxervate (topical cenegermin 0.002%) treatment – aided in complete resolution of corneal ulcer
  - Fitted in SL to prevent epithelial defects

**Presenting VAs (sc):** 20/25-3 OD, 20/70+1 OS

### Slit Lamp Corneal Exam Findings:

OD: faint, round stromal scar from previous infection, scattered SPK OS: 1x1mm corneal ulcer inferior to visual axis; (+) NaFl staining within anterior stroma with mild edema, 2+ diffuse SPK- greater inferior ½

**Assessment:** Recurrent corneal ulcer secondary to NK OS

### Plan:

- Rx Vigamox 1gtt Q1-2H OS
- Instill PFAT 4-5x/day or more, if possible
- D/C SL wear until condition resolves

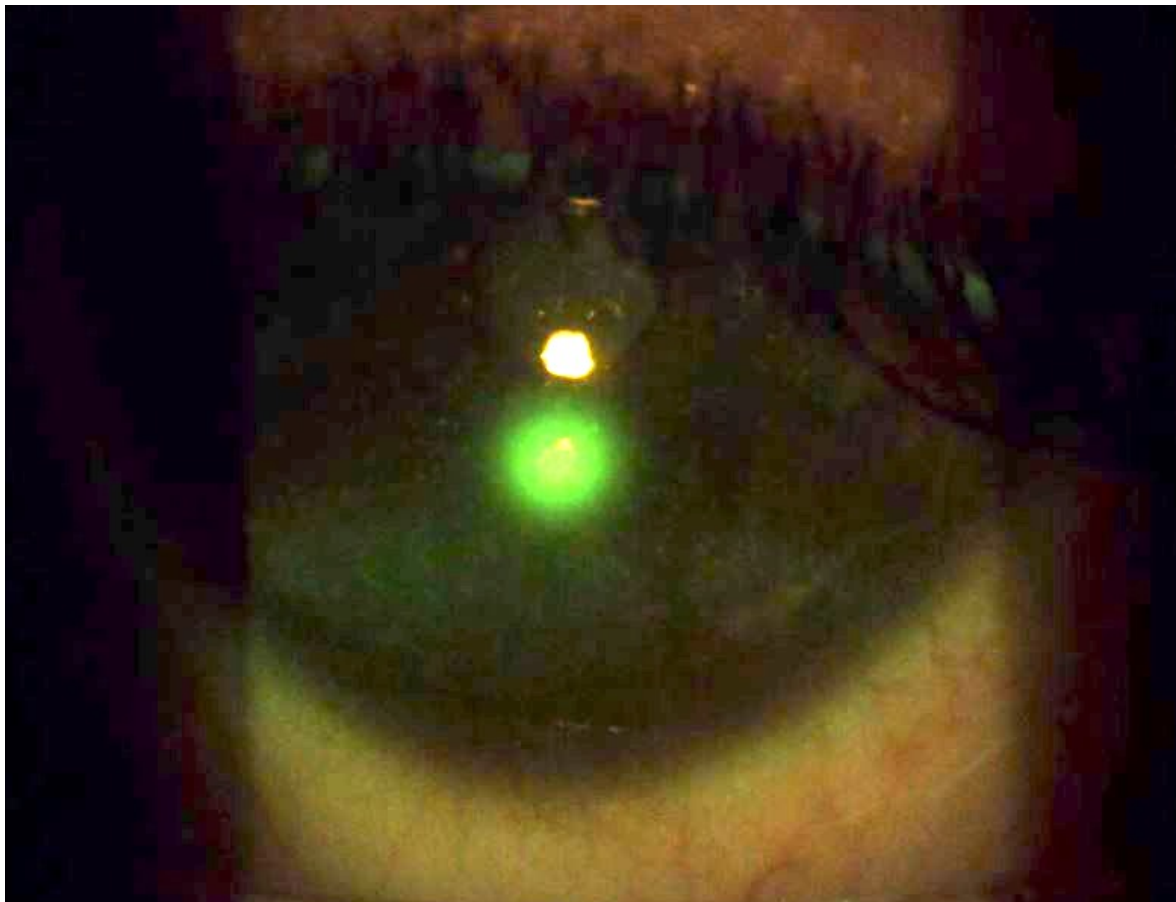
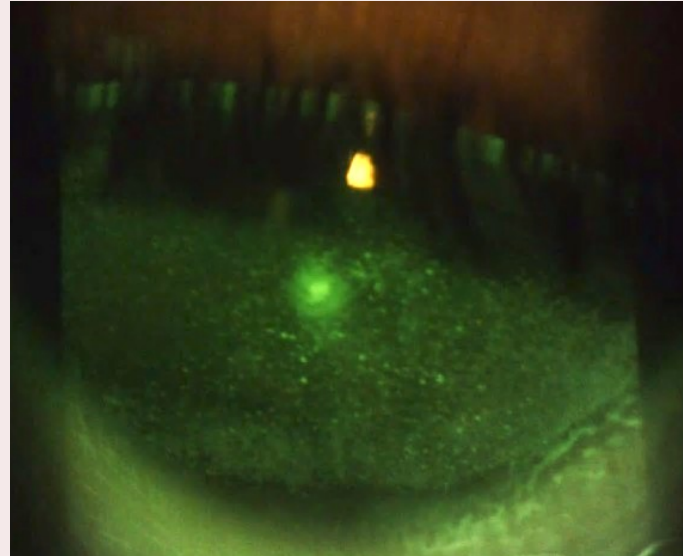
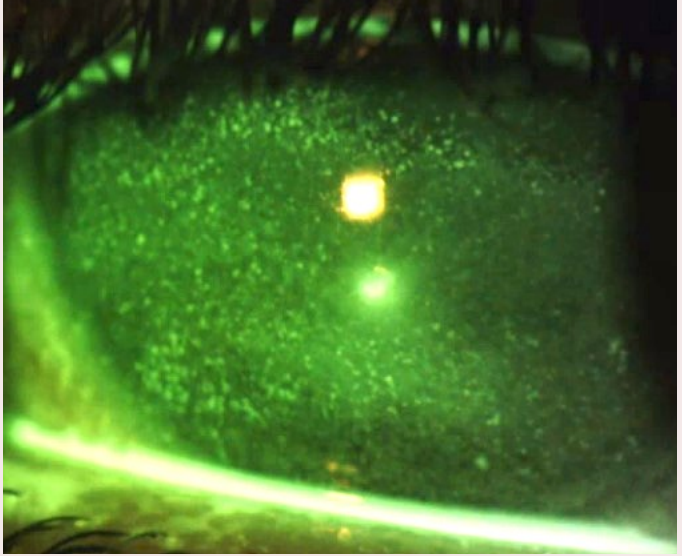
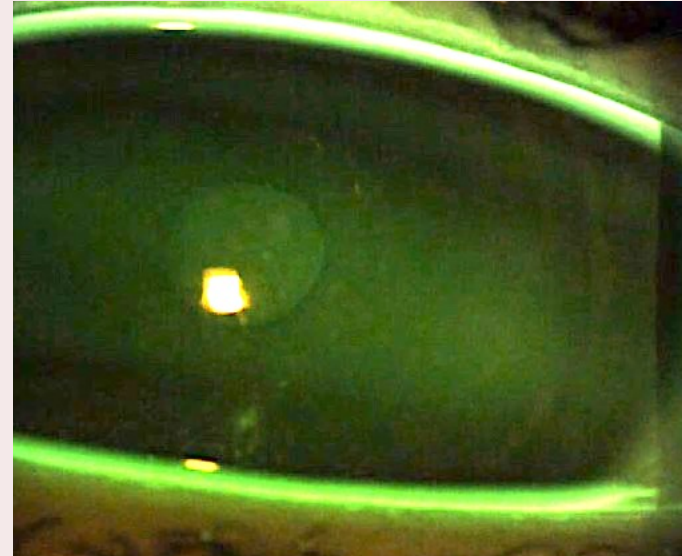

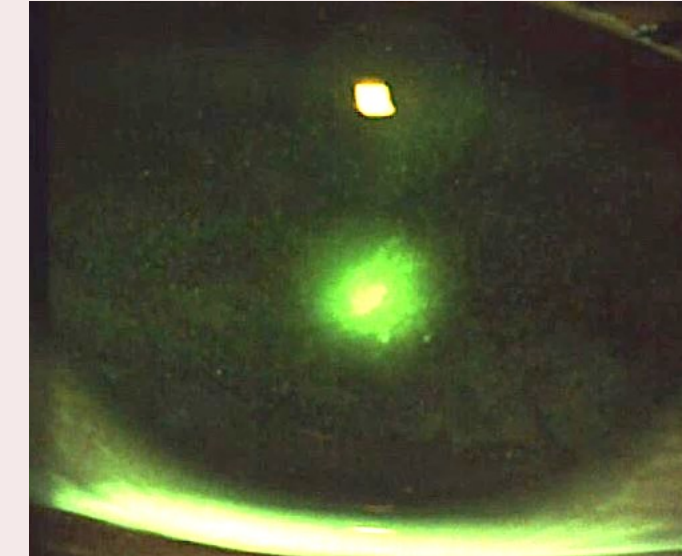
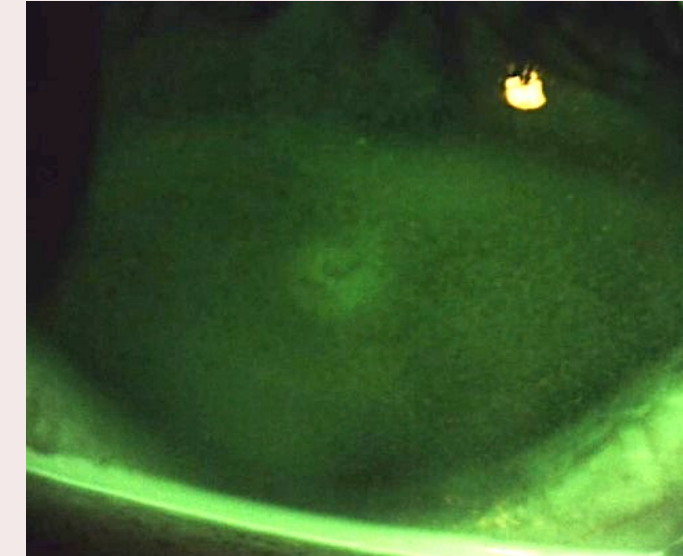
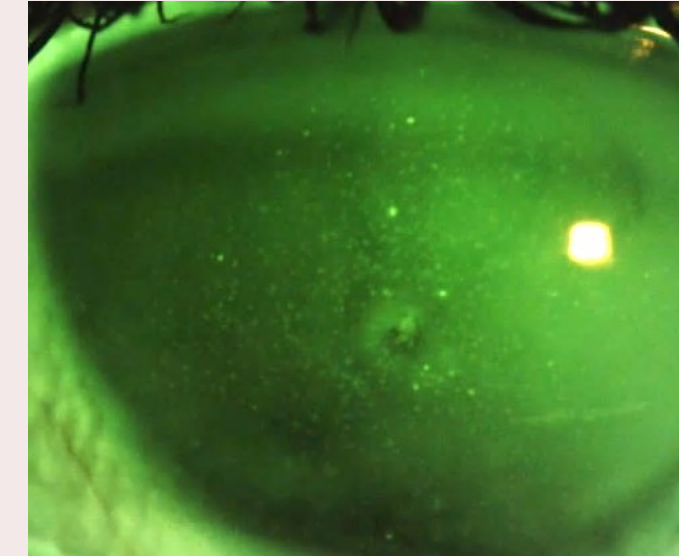


Figure 1. Anterior segment photo of corneal ulcer secondary to NK with NaFl staining.

## Summary of Follow-Up Visits

TABLE 1. Summary overview of follow-up visits s/p recurrent corneal ulcer secondary to NK OS.

Visit	1-Day F/U	3-Day F/U	10-day F/U	3-week F/U	4-week F/U	6-week F/U	8-week F/U
CC/HPI	instilled ABX drop 5-6x and PFAT Q1-2H	ABX drop QID, PFAT Q1-2H, <b>+little sensation w/ instilling drops</b>	ABX drop QID, PFAT Q1-2H	PFAT BID-QID, gel drop once	PFAT 5-8x/day, no gel drops, no SL wear	ABX drop BID-QID, PFAT 4-6x/day, wore SL 5x	<b>Oxervate Q2H- mild soreness associated,</b> PFAT QD-BID, wore SL 2x
VA (OS)	20/60-1	20/70+1	20/60+1	20/60+2	20/60+1	20/60-1	20/60-2
A & P	corneal ulcer and SPK <b>improved</b> Cont. ABX drops and PFAT	corneal ulcer <b>improved</b> , SPK <b>worsened</b> Cont. ABX drops & PFAT; <b>rec'd gel drops</b>	corneal ulcer <b>95% resolved</b> , SPK <b>improved</b> D/c ABX drops, cont. PFAT/gel drops	corneal ulcer and SPK <b>slightly worsened</b> Cont. PFAT/gel drops, <b>wear SL</b>	corneal ulcer <b>worsened</b> Rx'd ABX drops QID, cont. PFAT/gel drops, wear SL, <b>initiate Oxervate re-tx</b>	corneal ulcer <b>improved</b> Cont. ABX drops until <b>Oxervate starts</b> , cont. PFAT/gel drops	corneal ulcer <b>improved</b> Continue Oxervate, PFAT/gel drops, wear SL more often
							
	Figure 2. Corneal ulcer & SPK w/ NaFl s/p 1 day.	Figure 3. Corneal ulcer & SPK w/ NaFl s/p 3 days.	Figure 4. Corneal ulcer & SPK w/ NaFl s/p 10 days.	Figure 5. Corneal ulcer & SPK w/ NaFl s/p 3 weeks.	Figure 6. Corneal ulcer & SPK w/ NaFl s/p 4 weeks.	Figure 7. Corneal ulcer & SPK w/ NaFl s/p 6 weeks.	Figure 8. Corneal ulcer & SPK w/ NaFl s/p 8 weeks.

## Additional Testing

### Before re-treatment of Oxervate:

#### Cochet-Bonnet Esthesiometry:

- 0cm superior
- 0.5cm nasal
- 1.0cm temporal
- 1.5cm inferior

#### Confocal Microscopy:

- Sub-basal corneal layer
- Results: almost complete absence of sub-basal corneal nerves– single nerve ending observed

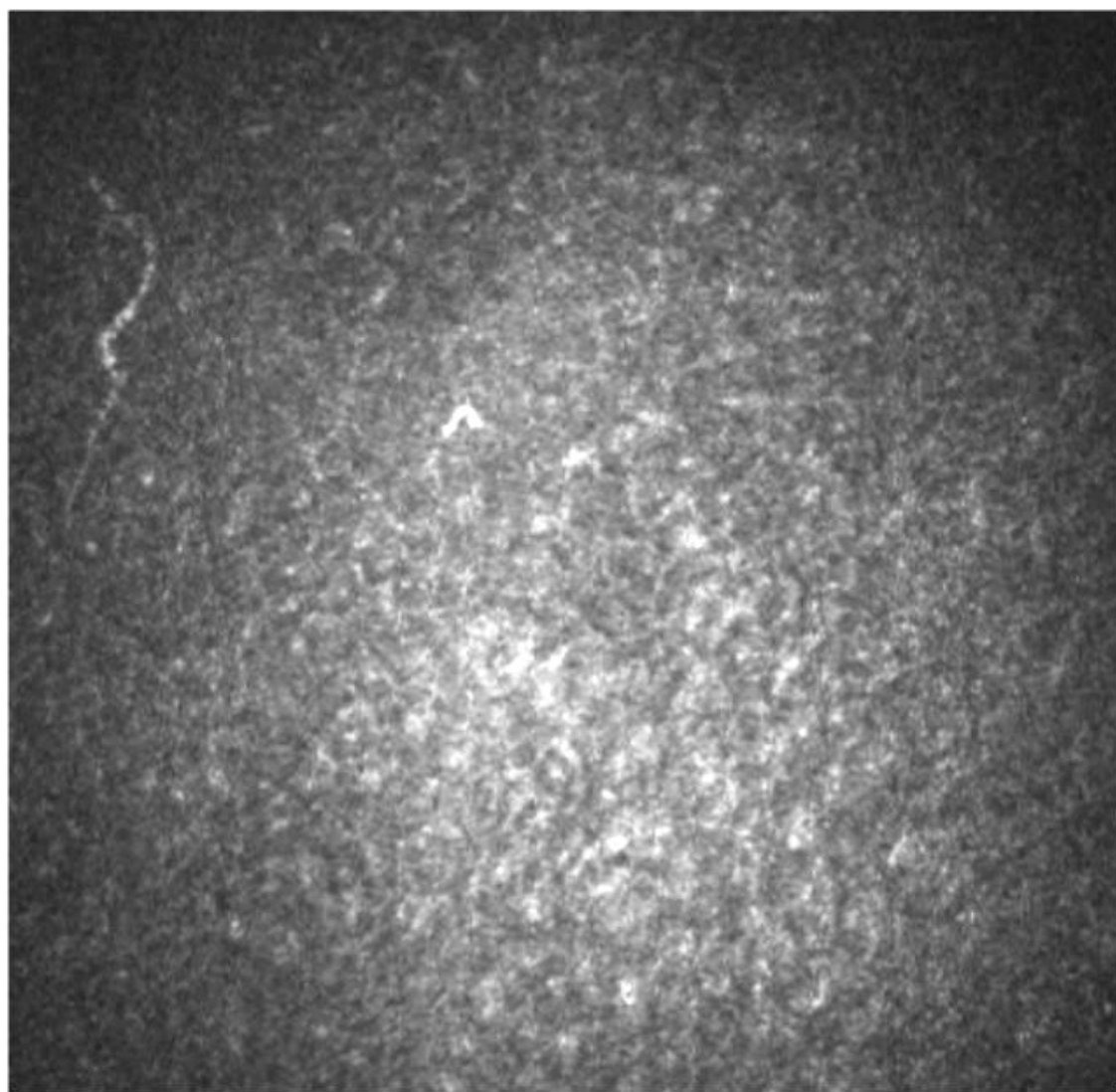


Figure 9. Confocal microscopy. Sub-basal corneal layer showing one single nerve ending (upper left).

## Clinical Insights

- Ocular lubricants, specifically PFAT/gel drops, can improve the corneal surface at all stages of the condition.
- Topical cenegermin 0.002% (nerve growth factor, NGF): stimulates corneal epithelial cell proliferation and differentiation, maintains limbal stem cell health and promotes tear production.
  - It may be beneficial to re-treat periodically with NGF, which could provide necessary support for long-term corneal health in NK.
- Scleral lenses promote epithelial healing, protect the cornea from blink trauma and other environmental insults, reduce the need for surgical intervention, improve VA, and can improve comfort.
- Careful monitoring and early intervention of sequelae can improve outcomes.

## Conclusions

- Ocular lubricants and topical antibiotic drops can be effective in managing early NK; however, in more severe NK, additional interventions (i.e., SL wear, cenegermin) can aid in the re-epithelialization and corneal healing time while also reducing the need for surgical intervention.
- With SL wear, protection is provided from blink trauma and environmental factors; it can also improve comfort and visual acuity<sup>3</sup>.
- Topical cenegermin promotes tear production and epithelial integrity by stimulating cell proliferation and differentiation, and it helps maintain limbal stem cell health<sup>4,5</sup>.
- The intended response with re-treatment of cenegermin in this patient is increased corneal sensation and improved corneal nerve morphology.

## References

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