

Clinical & Refractive Optometry is pleased to present this continuing education (CE) article by Dr. Ron Melton and Dr. Randall Thomas entitled **Neurotrophic Keratitis**. In order to obtain a 1-hour Council of Optometric Practitioner Education (COPE) approved CE credit, please refer to page 282 for complete instructions.

Neurotrophic Keratitis

Ron Melton, OD; Randall Thomas, OD

SUBJECTIVE

A 38-year-old white woman presents with a left irritated eye, since having a non-Hodgkin's lymphoma removed and subsequently irradiated 11 months prior. She had been seeking care at another eye doctor's office over the past six months without improvement. Antibiotics, steroids, and antiviral drugs had been tried. In desperation, she sought a second opinion.

OBJECTIVE

- Best visual acuity is OD 6/6 (20/20); OS 6/24 (20/80)
- OD normal
- Lids — eversion is unremarkable
- Conjunctiva — 1+ injection OS
- Cornea — OS shows a loss of corneal transparency and there is an irregularity of the epithelial cells seen under high magnification with optic section (Fig. 1); dense, coalesced punctate epithelial defects with a central area of frank epithelial breakdown (Fig. 2). There is no infiltration and no evidence of infection. The anterior chamber is deep and clear. The tear lake has a normal volume. The BUT is 3 to 5 seconds OS.

ASSESSMENT

- Neurotrophic keratitis secondary to inadvertent corneal irradiation

PLAN

- A well-fitting bandage silicone hydrogel soft contact lens was placed OS
- She was instructed to use preservative-free artificial tears, q.1h. and instill a drop of fluoroquinolone, h.s.

Follow-up 1 week

- Marked improvement in patient's symptoms
- Vision had improved to 6/18 (20/60)
- Modest improvement in the corneal epithelial status

Follow-up 1 month:

- The lens was removed and frequent lubrication was continued

Follow-up 3 months:

- Vision leveled at 6/12 (20/40)
- Superficial punctate keratitis (SPK) picture stabilized at about 30% of the baseline finding
- She is followed up every three months

Comments: This case resulted from inadequate corneal protection during therapeutic radiologic intervention. Proper lubrication is the centerpiece of tissue healing. However, once the nasociliary nerve endings have been sufficiently compromised or destroyed, physiologic restoration is impossible. She has had punctal plug closure, which has helped decrease her need for exogenous tears. But there has been no improvement beyond what was achieved in the first three months. In time, she will likely need a partial or complete tarsorrhaphy.

GENERAL OBSERVATIONS

- This relatively rare keratitis commonly follows any loss of fifth cranial nerve innervation. The nasociliary branch of the trigeminal nerve provides sensory innervation to the cornea. Lack of such physiologic innervation commonly results in corneal anesthesia, which leads to chronic pathologic changes in epithelial structure and function, even if precorneal tear film integrity is normal. The mechanism for this cascade of events remains unknown.
- Causes include the fifth (trigeminal) nerve palsy from a variety of disease states such as MS, acoustic neuroma and other tumors, stroke, etc., as well as any surgical demise of trigeminal function; sequelae of herpes zoster or simplex disease; or localized damage from therapeutic irradiation and edema.

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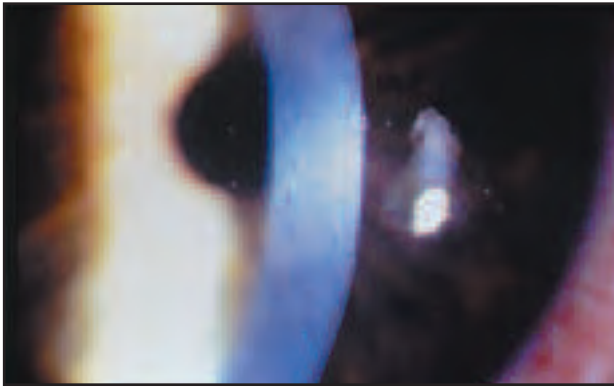


Fig. 1 Notice the loss of corneal transparency and the irregularity of the epithelial cells due to the corneal denervation associated with neurotrophic keratitis.

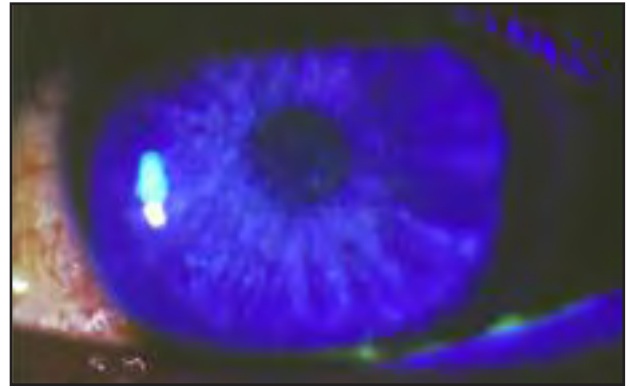


Fig. 2 Fluorescein dye shows an active superficial punctate keratitis of the corneal epithelium.

- Clinical findings include persistent epithelial defects of diffuse, coalescing SPK. There is usually associated conjunctival hyperemia. There may be iritis with lid erythema and/or edema. Stromal ulceration and melting can be seen in advanced states. This usually follows development of atrophic epithelial defect, similar to that occasionally seen in metaherpetic keratitis.
- Therapy should be directed at preservation of epithelial tissue integrity. This can range from frequent instillation of preservative-free artificial tears alone, or in combination with a therapeutic soft contact lens. Cycloplege when indicated. Instillation of a prophylactic fluoroquinolone q.d. or b.i.d. may be wise at progressed levels of epithelial compromise while wearing a therapeutic soft lens. Incomplete tarsorrhaphy seems to be a final common pathway of therapy following months or years of medical therapy.

- Prognosis is guarded and chronic. Consultation and comanagement with a corneal specialist may be appropriate.
- An excellent up-to-date reference on neurotrophic keratitis is found in the article entitled “New Insights into the Diagnosis and Treatment of Neurotrophic Keratopathy,” by Kenneth Goins, MD, and found in the April 2005 issue of *The Ocular Surface*.

Disclaimer: Not every detail of every case is discussed, rather the key clinical findings are described. For example, if nothing is said about the corneal status, you should assume that the cornea is normal, etc. When vision is recorded, it should be assumed to be best corrected or pinholed. Regarding therapy, we show how we treated the particular case. Given that medicine is an art, as well as a science, therapy will — and often does — vary with each unique patient presentation depending on severity, known drug allergies, prior treatment, response to therapy, etc.



INSTRUCTIONS FOR CE CREDITS

In order to obtain a 1-hour COPE-approved CE credit, please follow these steps:

- Fill in the identification section and answer the 10 multiple choice questions in this CE credit application form
- Prepare a cheque for \$25.00 made out to Medicconcept
- Mail your completed CE credit application form and cheque to the Journal at: *Clinical & Refractive Optometry*, 3333 Cote Vertu Blvd., Suite 300, St. Laurent, Quebec H4R 2N1

Your answers will be sent for marking to the School of Optometry, University of Montreal, Quebec. If you score 70% or more, a COPE-approved CE Credit Certificate will be issued by the University of Montreal and *Clinical & Refractive Optometry* for your records and display in your office.

COPE-APPROVED CE CREDIT APPLICATION FORM

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QUESTIONNAIRE

Neurotrophic Keratitis

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- Which of the following statements does **NOT** describe this case?
 - There was a loss of corneal transparency OS
 - The cornea showed dense, coalesced punctate epithelial defects
 - Tear lake volume was deficient
 - There was no evidence of infection
- All of the following statements describing this case are true, **EXCEPT**:
 - Lid eversion was unremarkable
 - The patient's visual acuity OS was not diminished by the neurotrophic keratitis
 - Conjunctiva was 1+ injection OS
 - OD was normal
- Which of the following was **NOT** part of the treatment plan in this case?
 - Non-steroidal anti-inflammatories
 - Preservative-free artificial tears, q.1h.
 - Fluoroquinolone drops, h.s.
 - Hydrogel soft contact lens
- Which of these occurred in follow-up?
 - 1 week: Vision had improved to 6/18 (20/60)
 - 1 month: The contact lens was removed
 - 3 months: Superficial punctate keratitis (SPK) picture stabilized at about 30% of baseline finding
 - All of the above

5. Which of the following statements is **TRUE**?
 - This case was caused by inadequate corneal protection during therapeutic radiologic intervention
 - Extensive damage to the nasociliary nerve endings cannot be reversed
 - Punctal plug closure can help decrease the need for exogenous tears
 - All of the above

6. Which of the following statements is **FALSE**?
 - Neurotrophic keratitis commonly follows loss of fifth cranial nerve innervation
 - The nasociliary branch of the trigeminal nerve provides sensory innervation to the cornea
 - Corneal anesthesia commonly results form lack of nerve innervation
 - Cases such as this one virtually always respond well to antibiotics

7. This patient will likely need a partial or complete tarsorrhaphy because:
 - She waited an extensive period of time before seeking medical advice
 - There was a hereditary factor present
 - The antiviral drugs she had been taking made her susceptible to keratitis
 - She had inadequate corneal protection during therapeutic radiologic intervention

8. Which of the following statements is **TRUE**?
 - Corneal anesthesia leads to chronic pathologic changes in epithelial structure and function
 - Incomplete tarsorrhaphy is a likely outcome following months or years of medical therapy
 - Prognosis in this case is guarded and chronic
 - All of the above

9. Which of the following is **NOT** a clinical finding of neurotrophic keratitis?
 - Persistent epithelial defects of diffuse, coalescing SPK
 - Conjunctival hyperemia
 - Stromal ulceration and melting in mild cases
 - Iritis with lid erythema and/or edema

10. Recommended therapy in progressed cases does **NOT** include which of the following?
 - Corrective surgery to restore epithelial tissue integrity
 - Frequent instillation of preservative-free artificial tears
 - Cycloplege when indicated
 - Instillation of a prophylactic fluoroquinolone q.d. or b.i.d.