

## CSI: Anterior Segment Case Files COPE# 72510-AS

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Vision Expo East 2022

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Financial Disclosures – Presenters have received consulting fees, honorarium or research funding from:

- Dr. Koetting – Ocular Therapeutix, Glaukos, Horizon, Quidel, Eyevance, Oyster Point, RVL Pharmaceuticals
- Dr. Whitley – Aerie, Alcon, Allergan, Azura Ophthalmics, Bausch & Lomb, BVI Medical, Biostissue, Bruder, Diopsys, Eyevance, Glaukos, J&J Vision, Kala, LeoLens Pharma, Novartis, Ocusoft, Science Based Health, Sight Sciences, Sun Pharmaceuticals, Tarsus Pharmaceuticals, TearLab, Thea Laboratories, ThermoMedx, Visus

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### Case #1

- 28 YOA AA Female
- Presenting for LASIK evaluation
- On exam it is noted that she has a slight droop to the left side of her face with asymmetry of forehead wrinkling and smile.
- Pt lid closure OS is not tight when compared with OD
- Pt states she has never noted this before or when it may have begun

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- BCVA OD: 20/15; OS 20/15
- Corneal findings:
  - OD: WNL, no SPK
  - OS: 1+SPK

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### Bell's Palsy

- Facial palsy caused by compression or inflammation and swelling of the facial nerve
- Usually only one side of the face
- Can occur at any age
- Rapid onset of mild weakness to total paralysis on one side of the face
  - Within hours to days
- Facial droop with drooling
- Pain around jaw or behind ear on affected side
- Decreased taste
- Changes in amount of tears and saliva produced

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### Risk Factors

- Pregnancy
  - Higher risk during the third trimester and within the first week after giving birth
- Upper respiratory infection
- The flu or a cold
- Diabetes Mellitus Type 1 and Type 2

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### Causes of Bell's Palsy

- Often related to viral infection
  - Herpes Simplex
  - Chickenpox and shingles (herpes zoster)
  - Infectious mononucleosis (Epstein-Barr)
  - Cytomegalovirus infections
  - Respiratory illnesses (adenovirus)
  - German measles (rubella)
  - Mumps (mumps virus)
  - Flu (influenza B)
  - Hand-foot-and-mouth disease (coxsackievirus)

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### Causes of Bell's Palsy

- Less often
  - Tumor
  - Skull fracture
- Ordering an MRI or CT to help rule out these causes

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### Treatment

- Most people will recover with or without treatment
- Will start to improve within a few weeks with complete recovery within about 6 months
  - Occasionally permanent symptoms for life
  - Can reoccur
- Oral corticosteroids
  - Helps decrease swelling of facial nerve
- Antiviral drugs
  - Although studies have shown no benefit compared with placebo

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### Meibomian Gland Disease



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### Case #2

- The 84 year old, AA female presents for 3-4 month DES check (no touch) and MMP-9 testing. Pt has a h/o DES and POAG mild OU. Pt states OS>OD has some itching. Pt states she has only been using her cyclosporine 0.05% and AT's. She never picked up fluoromethalone drops and is not using AT's ointment or a heat mask.

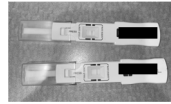
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- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Ocular Hx:               <ul style="list-style-type: none"> <li>• Dry eye syndrome – 10+ yrs</li> <li>• Herpes stromal keratitis OS                   <ul style="list-style-type: none"> <li>• Inactive – Last episode 2020</li> </ul> </li> <li>• Anterior scleritis OS                   <ul style="list-style-type: none"> <li>• Inactive</li> </ul> </li> <li>• POAG - Mild OU</li> <li>• Pterygium sx OU</li> <li>• Phaco OU</li> <li>• Previous treatments                   <ul style="list-style-type: none"> <li>• Amniotic membrane OS (2019, 2020)</li> <li>• Punctal cautery (2011) OU</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Med Hx:               <ul style="list-style-type: none"> <li>• NIDDM 15 yrs</li> <li>• Osteoarthritis</li> <li>• Hypothyroid</li> <li>• Seasonal allergies</li> </ul> </li> <li>• Meds:               <ul style="list-style-type: none"> <li>• Ceterizine</li> <li>• Lactulose</li> <li>• Tirosint</li> </ul> </li> </ul> |
|--|--|

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## Clinical Exam

- Lids / Lashes – Clear and good position
- Conjunctiva – tr injection OU
- Cornea
  - OD 2+ Inf SPK
  - OS Dense SPK, 1+ K edema
- A/C – Deep and Quiet
- PCIOL OU
- IOP – 11 mmHg OU
- K Sensitivity – OD Normal OS Reduced



Anything else we should add???

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## Neurotrophic Keratitis: Classification

### Mackie classification

- Stage I is characterized by hyperplasia and/or irregularity of the epithelium, evolving to punctate keratopathy, corneal edema, neovascularization, stromal scarring.
- Stage II is defined by a recurrent or persistent epithelial defects or a PED without stromal thinning.
- Stage III: stromal involvement leads to corneal ulcer, melting and perforation

Mackie JA. Neurotrophic keratitis. Current Ocular Therapy. Philadelphia, PA: WB Saunders; 1995:452-4.

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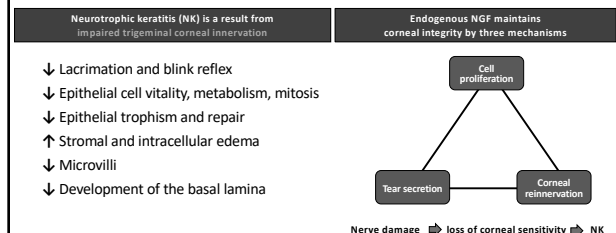
## Neurotrophic Keratitis: Etiology

1. Infectious: HSV, VZV, leprosy
2. CN V palsy
  - Surgery for trigeminal neuralgia, neoplasia (acoustic neuroma), aneurysm, facial trauma, congenital, familial dysautonomia (Riley-Day syndrome), Goldenhar-Gorlin syndrome, Möbius syndrome, familial corneal hypesthesia
- Topical medications: anesthetic abuse
- Iatrogenic: LASIK/PRK, corneal incisions (RK, AK), contact lens wear, scleral bands, vitrectomy and photocoagulation to treat diabetic retinopathy<sup>1,2</sup>
- Chemical and physical burns
- Systemic: DM, multiple sclerosis, Vit A deficiency
- Increasing age, chronic DED<sup>3</sup>

1. Barer J, et al. JAMA ophthalmology 2004;122:750-2.  
2. Tilly C, et al. Ophthalmology 2009;116:2029-32.  
3. Ocular Surf 2005;13:20-25.

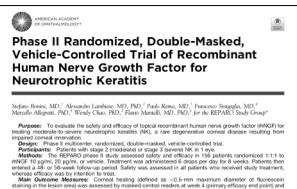
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## Endogenous nerve growth factor (NGF) and its role in NK:



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## cenegermin-bkbj 20 mcg/ml was approved by FDA in August 2018

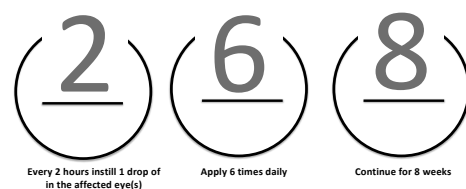


- Approved for the treatment of neurotrophic keratitis in adults and children age 2 and older
- Available for ordering since January 2019
- Available through specialty pharmacy

Bastis L, Lamba A, Rama P et al. Phase II Randomized, Double-Masked, Vehicle-Controlled Trial of Recombinant Human Nerve Growth Factor for Neurotrophic Keratitis. Ophthalmology 2018;125:1332-1343.

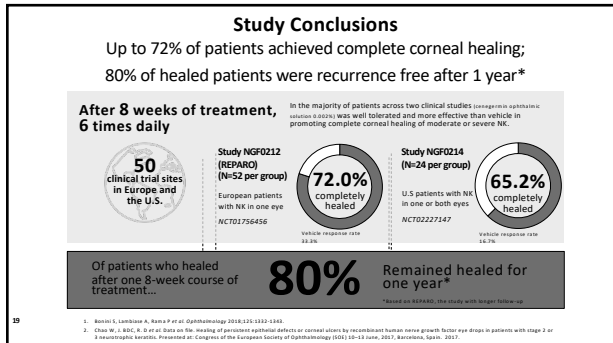
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## Dosing and Administration



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OSERVATY Prescribing Information, 2018.



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**Treatment**

- Continue:
  - Cyclosporine 0.05% BID OU
  - Heat Mask
- Stop
  - Oral ceterizine
- Order
  - Cenegermin 20 mcg/mL – Patient to call once meds come in to review meds / demo proper usage
  - Ceterizine ophth sol BID OU
- Follow Up
  - 3-4 months glaucoma / Dilate OCT - G

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**Case #3**

- 30 year old woman complains of decreased vision. Pt wearing CL for the last 16 years. Occasionally sleeps in CL. Pt also notes her eyes are itchy and feels like her allergies have worsened since last appointment.
  - BCVA OD 20/40 OS 20/50
  - Corneal staining shows whorl like pattern in both eyes

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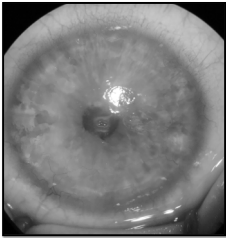
**Limbal Stem Cell Deficiency**

- Limbal stem cells help to regulate the renewal of stratified non-keratinized corneal epithelium
  - When these cells are damaged or destroyed LSCE can occur
  - Eventual conjunctivalization of the cornea

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**LSCD**

- Signs and symptoms
  - Neovascularization
  - Persistent epithelial defects
  - Chronic pain
  - Conjunctivalization of the cornea
  - Decreased vision



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**LSCD**

- Diagnostic exam findings
  - Conjunctivalization of cornea
    - Late fluorescein staining
    - Pill shaped staining
      - Different from more punctate staining of SPK
    - Whorl like pattern of staining extending from limbus inward to apex of cornea
  - Areas of negative staining from abnormal epithelial elevation

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## LSCD

- Congenital causes
  - Aniridia
  - Ectodermal dysplasia
- Acquired (more common)
  - Typically inflammatory related
    - Contact lens overwear
    - Toxicity from topical medications
    - Severe dry eye
    - Chemical injury
    - Thermal injury
    - Stevens Johnson syndrome
    - Mucous membrane pemphigoid

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## LSCD

- Treatment
  - Remove offending agent if possible
  - Decrease inflammation
    - Topical steroids
    - Oral omega-3 fatty acid supplements
    - Cyclosporine or lifitegrast
  - Amniotic membrane
    - Grafts vs topical drops
  - Surgical limbal stem cell transplantation



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## Case #4 Somebody Help Me

- NP 29 yowf presents for significant dry eyes. Eyes are always in pain, burning, gritty and feels like sand paper. Currently using serum tears 50% qid ou and would like to get serum tears 75%.
- Oc Hx: 8 years
- Med Hx: ADHD, Hypothyroid
- Meds: Nortriptyline, synthroid
- What questions do you want to ask?

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## Previous Treatments

- Omega III – stopped on her own – NI
- Cyclosporine BID OU – stopped after 1 month / made eyes worse
- Prednisolone QID OU – stopped due to NI
- Plugs – 3 month plugs all puncta / NI
- Lifitegrast BID OU – stopped after 2 mos / made eyes worse
- Loteprednol 0.2% - NI
- Doxycycline 100 mg BID po – stopped after 2 weeks
- Erythromycin ung – NI
- Neomycin/polytrim/dexamethasone ung – NI
- Multiple preservative free drops

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## Clinical Exam

- Normal eye
- Nafi Normal eye

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## Any Other Tests??

Diagnosis??

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## Neuropathic Pain

- Treatment to either:
  - Regenerate nerves
  - Reduce inflammation that makes nerves more sensitive
- Treatment Options
  - Serum tears
  - Steroids
  - Amniotic membrane
  - Neurostimulation
  - Blue filter glasses
  - Systemic neuro-modulatory therapies
  - Biologics

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## Differentiate Your Practice – Advanced Treatments



Patient Name: \_\_\_\_\_  
 DOB: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Disp: **Autologous Eye Serum 20%**  
 Sig: **Instill one drop OU QID**  
 Refills: 8  
 Signature: \_\_\_\_\_  
 Lic #: \_\_\_\_\_

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## Autologous Serum

- Blood drawn via 18 gauge needle – 40 mL blood collected into blood tubes
- Blood set aside to clot at room temperature for two hours, then centrifuged at 5600 rpm for 10 minutes
- Serum filtered to remove fibrin strands before mixing with saline
- Typically start with 20% AS up to 50%
- Unopened bottles stored in freezer up to 3 months; open bottles in refrigerator for 48 hours
  - Potential for safe refrigerator storage for up to 1 month

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## Benefits and Pitfalls of Autologous Serum

### Benefits

- Preservative free and innately allergy free
- Adverse events rare
- Improvement in symptomology
- Demonstrated improvement in staining (Tsubota – SS pts)

### Complications

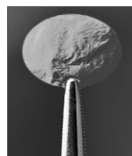
- Cost – no insurance coverage
- Frequent blood draw
- Availability of labs to make ASED
- Strict handling

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## Amniotic Membranes Amniotic Membrane Extract Eye Drop (AMEED)



Cryopreserved  
Membranes



Dry Membranes



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## Pros and Cons of Amniotic Membrane Modalities

### Cryopreserved

- Self-retaining on cornea
- Higher levels of regenerative complex HC-HA/PTX3
- Shorter storage life – requires refrigeration
- Potential discomfort from symblepharon ring
  - Avoid with filtering procedures

### Dehydrated

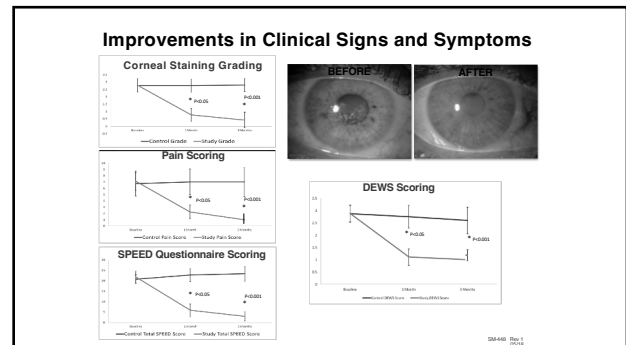
- Longer storage life – room temperature
- No ring = better comfort
- Frequent slippage
- Requires bandage lens to maintain position

\*\*\*For all amniotic membranes, RCTs limited

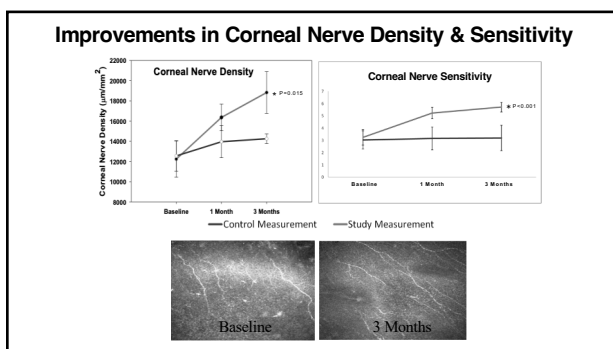
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**Amniotic Membrane Extract Eye Drop (AMEED)**

- Sterile, acellular biologic made from 771 anti-inflammatory cytokines, and growth factors

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**Case Example AD 6/17**

- F/u dry eyes OU. Currently on lifitegrast bid. Doesn't feel current drops help. Tried everything including cryopreserved AM, plugs, thermal pulsation
- BCVA: OD 20/25+ OS 20/40
- SLE: 1+MGD / 2+ Diffuse SPK
- Tear Oz: 302 / 320
- Tx: Omegas, PF ATs, d/c lifitegrast
  - Start amniotic cytokine extract (ACE) bid

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**AME Follow Up**

- 7/17 "DE Improving"
  - BCVA OD 20/25 OS 20/30
  - SPEED 11
  - SLE - 1+SPK OU
  - Tear Oz - 280 / 286
- 11/17 "Eyes felt worse the past few days. Haven't taken ACE drops for a week due to travel!"
  - BCVA OD 20/25 OS 20/40-
  - SPEED 17
  - SLE - 2+ Inf SPK
  - Tear Oz - 310 / 316

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## AME Follow Up

- 7/17 "DE Improving"
  - BCVA OD 20/25 OS 20/30
  - SPEED 11
  - SLE – 1+SPK OU
  - Tear Oz – 280 / 286
- 11/17 "Eyes felt worse the past few days. Haven't taken ACE drops for a week due to travel"
  - BCVA OD 20/25 OS 20/40-
  - SPEED 17
  - SLE – 2+ Inf SPK
  - Tear Oz – 310 / 316

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## Efficacy and tolerability of Nortriptyline in the management of neuropathic corneal pain

- **Purpose:**
  - Off-label use of Nortriptyline has been used successfully in the management of non-ocular neuropathic pain – helpful in the management of neuropathic corneal pain (NCP)?
- **Methods:**
  - Retrospective cohort study at the New England Eye Center, Tufts Medical Center, Boston, Massachusetts from July 2015-March 2019
    - 54 patients with NCP with centralized component who were treated with Nortriptyline
    - Centralized NCP:
      - Discordance in clinical signs and symptoms
      - Persistent ocular discomfort/pain after 90s of instillation of 0.5% proparacaine hydrochloride
    - Nortriptyline dosed at 10mg initially and tapered upward to 100mg based on response and tolerability
  - Response to treatment measured using Ocular Pain Assessment Survey (OPAS)

Ozmen et al. 2020

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### Results:

- 30 patients included in final efficacy analysis:
  - 40% (n = 12) reported 50% or greater reduction in overall pain score (table 5)
  - Statistically significant reduction in all pain level dimensions (table 6)
  - Statistically significant reduction in many quality of life dimensions (table 7)
- 19 of 54 discontinued due to side effects:
  - 8 of 19 were included in final analysis and discontinued despite reduction in pain score by 22.4%
  - Lethargy, dry mouth, constipation, nausea, headache, tachycardia, unspecified

### Conclusion:

- Noteworthy pain decrease in patients with centralized component of NCP

**Table 6**  
Results from the questions in pain level dimensions of the Ocular Pain Assessment Survey

P	Question	First Visit Score	Last Visit Score	Percent Change	P
4	Worst in 24 h	7.3 ± 2.3	5.3 ± 2.7	-13.3 ± 16.3	0.008
5	Worst in 12 h	5.6 ± 2.6	3.4 ± 2.0	-14.7 ± 15.3	0.003
6	Average in 24 h	5.7 ± 2.3	3.6 ± 2.3	-17.4 ± 10.6	<0.0001

**Table 7**  
Results from the questions in quality of life dimensions of the Ocular Pain Assessment Survey

P	QOL dimension	First Visit Score	Last Visit Score	Percent Change	P
13	Reading/working	6.8 ± 3.3	4.3 ± 2.4	-24.2 ± 16.3	0.007
14	Walking/working	5.3 ± 3.5	3.9 ± 3.5	-11.5 ± 107.7	0.207
15	General activity	5.3 ± 2.8	3.9 ± 3.1	-26.8 ± 124.9	0.033
16	Stress	6.7 ± 2.8	4.4 ± 3.1	-16.6 ± 101.9	0.009
17	Sleep	3.8 ± 4.0	1.5 ± 2.7	-41.1 ± 122.7	0.001
18	Enjoying life	6.3 ± 3.2	4.0 ± 3.2	-26.4 ± 102.5	0.004
19	Time spent thinking about pain	7.6 ± 3.3	5.2 ± 3.5	-23.9 ± 17.6	0.001

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## Case #5

- 84 YOA African American Female
- CC started to see a white spot in her OD. Pt has graft failure OD and OS has been enucleated. She woke up 4 days ago and could only see white light taking up her entire vision. It is not flashing and vision has not improved since the day it happened. She reports a gritty feeling starting at the same time. Currently on timolol maleate 0.5% BID OD, prednisolone acetate 1% BID OD and muro 128 BID OD.

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## Findings

- BCVA OD HM; OS prosthesis
- IOP OD 19
- SLE OD
  - Conjunctiva 2-3+ injection
  - Cornea ulcer approx. 5mm epi defect 40% thinning, PK, 2+ edema
  - AC deep and quiet
  - IK touch 3-9 o/c
  - PCIOL

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## Treatment Time!

- Cultures taken
  - Blood, chocolate and fungal
- In office sub conjunctival injection of Gentamicin 0.3%
- moxifloxacin ophthalmic solution 0.5% Q2hr (odd hours) and gentamicin ophthalmic solution 0.3% Q2hr (even hours)

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- Amniotic membrane placed on the cornea 1 week later and another gentamicin 0.3% sub conjunctival injection
  - No growth on cultures taken
- Steroids restarted at 2 weeks and decreased antibiotics to Q3Hr
- Complete resolution and all medications discontinued at 1 month
- Vision prior to ulcer OD 20/400, post ulcer OD CF @face
  - PK was failing prior to ulcer and was awaiting decision on repeating the procedure.

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## SCUT Trial

Randomized Controlled Trial > Am J Ophthalmol. 2014 Feb;157(2):327-333.e3.  
doi: 10.1016/j.ajo.2013.09.025. Epub 2013 Oct 1.

**The steroids for corneal ulcers trial (SCUT): secondary 12-month clinical outcomes of a randomized controlled trial**

Muthiah Srinivasan <sup>1</sup>, Jeena Mascarenhas <sup>1</sup>, Revathi Rajaraman <sup>2</sup>, Meenakshi Ravindran <sup>3</sup>, Pragna Lalitha <sup>4</sup>, Kiran S O'Brien <sup>5</sup>, David V Gildien <sup>6</sup>, Kathryn J Ray <sup>6</sup>, Catherine E Oldenburg <sup>6</sup>, Michael F Zegans <sup>6</sup>, John P Whitcher <sup>6</sup>, Stephen D McLeod <sup>7</sup>, <sup>10</sup>.

**Conclusions:** Adjunctive topical corticosteroid therapy may be associated with improved long-term clinical outcomes in bacterial corneal ulcers not caused by *Nocardia* species.

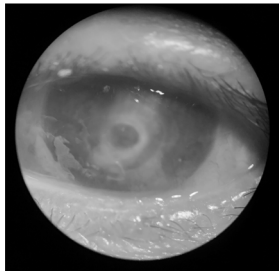
PMID: 24395294 PMCID: PMC3946999 DOI: 10.1016/j.ajo.2013.09.025  
Free PMC article

**Abstract**

**Purpose:** To determine whether topical corticosteroids as adjunctive therapy for bacterial keratitis improves long-term clinical outcomes.

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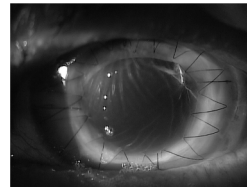
Unfortunately, her cornea perforated...



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## Penetrating Keratoplasty

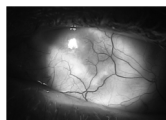
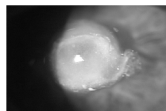
- The first successful human corneal transplant was performed in 1905 in the present day Czech Republic.



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## PK Indications / Contraindications

- Indications
  - Deep scarring
  - Endothelial pathology
  - Perforation
  - Disease corneas
- Contraindications
  - Glaucoma
  - Vascularization
  - Previous graft failure



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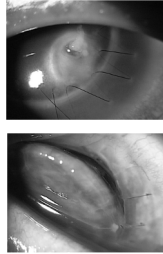
## Complications of Penetrating Keratoplasty

- Intraoperative complications
  - Damage to lens/iris from instruments
  - Irregular trephination of host
  - Poor graft centration onto host bed
  - Excessive bleeding from iris and wound edge
  - Choroidal hemorrhage and effusion
  - Iris incarceration in the wound
  - Damage to donor tissue during handling
- Immediate postoperative complications
  - Wound leak
  - Flat chamber/iris incarceration in wound
  - Primary donor failure
  - Persistent epithelial defect
  - Endophthalmitis

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### Complications of Penetrating Keratoplasty

- Long-term complications
  - Glaucoma
  - Microbial keratitis
  - Suture-related problems
  - Wound dehiscence
  - Immunologic graft rejection
  - Late endothelial failure
  - Graft failure
- Refractive error, astigmatism



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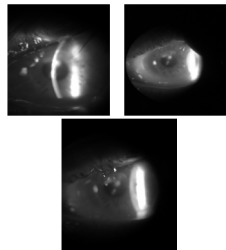
### Case #6 Culture Club

- 51 y/o Caucasian male referred for corneal ulcer
- Patient complains of blurry and foggy vision, discomfort, and redness OS
- H/o soft contact lens wear
- Drops: OTC anti-histamine

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### Ulcer Case

- VA: 20/200
- Conjunctiva: 2+ injection
- Cornea: central ulcer with multiple (8) infiltrates, 3mm x 1.4 mm epithelial defect
- Cultures obtained including blood, chocolate and fungal
- Tx???



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### Bacterial Keratitis: Risk Factors

- Contact lens wear - #1
- Nonsurgical trauma
- Surgical trauma
- Lid dysfunction
- Ocular surface disease
- Corneal epithelial abnormalities
- Systemic diseases
- Topical medications

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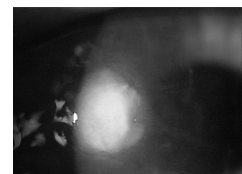
### Indications for Cultures

- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| • Hyperacute conjunctivitis         | • Post-traumatic infections          |
| • Neonatal conjunctivitis           | • Marginal infiltration / ulceration |
| • Post-operative infections         | • Atypical external disease          |
| • Chronic conjunctivitis            | • Severe dry eye                     |
| • Central corneal ulcers            | • Bullous keratopathy                |
| • Membranous / Pseudoconjunctivitis | • Axial and severe keratitis         |
| • Preseptal / Orbital cellulitis    |                                      |

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### Work-up

- History
- Slit lamp examination
- Photodocumentation
- Culture - Rules of 1-2-3
  - Within 1 mm of visual axis
  - Ulcers with 2 or more infiltrates
  - 3 mm or more in diameter



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### Equipment

- Slit lamp
- Sterile Kimura spatula
- #15 Blade, sterile
- Calcium alginate swab
- Culture media
- Microscopy slides
- Alcohol lamp



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### Procedure

- Anesthetize the cornea
  - Preservative-free tetracaine
- Scrape ulcer base / leading edge of infiltrate
- Place specimen on slide, then culture media
  - Smears – fixing organisms to be stained / observed
  - Culture – microbial growth
- Sterilize spatula over flame between slides / cultures

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### Slides / Stains

- Multiple slides
  - Bacterial
  - Fungal
  - Acanthamoeba if suspected
- Routine
  - Gram stain – bacteria, yeasts
  - Giemsa stain – cytology, bacteria, fungi, chlamydia
  - Calcofluor white – acanthamoeba, fungi
- Optional
  - Acid-fast, KOH wet mount, etc.

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### Medium

- Routine
  - Blood agar – all-purpose, grows most bacteria
    - Except for Neisseria and Haemophilus
  - Chocolate agar – Haemophilus, Neisseria
  - Sabouraud's agar – fungal isolation
- Optional
  - Lowenstein-Jensen – mycobacteria, Nocardia
  - Non-nutrient agar w/E. coli overlay – acanthamoeba
  - Thayer-Martin agar – gonococcal isolation

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### Example of Culture Report

- Hold for
  - Bacteria 1 week
  - Viral 2 weeks
  - Fungal 1 month
- Test for all sensitivities



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### Polymerase chain reaction (PCR)

- Rapid diagnostic test
- Results within hours vs days to weeks (culture)
- Procedure
  - Obtain sample via cotton swab, metal spatula, or recently developed FTA filter paper
  - DNA of micro-organisms is extracted and amplified
  - DNA compared to DNA in literature using software

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## Polymerase chain reaction (PCR)

- High sensitivity
- Unacceptable specificity
  - Low specificity = high false positives
    - High amounts of unnecessary treatment
    - Increased corneal toxicity
- Ongoing studies to improve sensitivity

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## Confocal Microscopy

- Historically used for endothelial cell evaluation
  - Fuch's dystrophy
  - Post-surgical bullous keratopathies
- Recently, studied for use in diagnosing infectious keratitis
  - Acanthamoeba
  - Fungal keratitis

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## Confocal Microscopy & Fungal Keratitis

- Studies show
  - Sensitivities: 80-94%
  - Specificities: 78-93%
- Procedure
  - Thick fluid-coupling agent on cornea
  - Scans all layers



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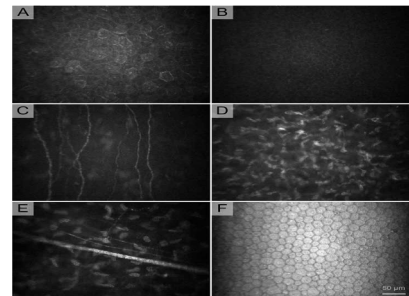
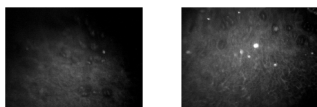


Figure 1. Confocal microscopy pseudocolor images of corneal keratitis.

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## Dx: Acanthamoeba Ulcer

- Monitored daily
  - Day #2: epithelium debridement and subconj. Gentamicin injection
    - Added Bactrim DS 1 PO BID along with Polyhexamethylene Biguanide/PHMBG 9-11x/day



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## Acanthamoeba

- Parasitic infection
  - *A. castellanii* and *A. polyphaga*
- Typically pain is out of proportion to findings
- Culture on dish of *E. coli* plated over non-nutrient agar

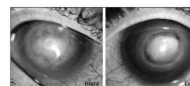


Figure 1. Acanthamoeba keratitis.

<http://journals.lww.com/ophtho/abstract/2005/05000/00005.aspx>  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1444444/>  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1444444/>

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## Acanthamoeba

### Symptoms

- Decreased vision
- Pain
- Light sensitivity
- Redness
- Foreign body sensation
- Lid edema

### Signs

- Epithelial irregularities
- Epithelial or subepithelial infiltrates
- Satellite lesions
- Stromal infiltrates (ring-shaped, disciform)
- Anterior uveitis
- Scleritis
- Chorioretinitis

<http://jamaophth.com/cgi/content/full/134/10/1488>  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1454444/pdf/ptophth.134.pdf>

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## Differential Diagnoses of Acanthamoeba

- Herpes Simplex Virus Keratitis
- Recurrent Corneal Erosion
- Bacterial Keratitis
- Fungal Keratitis
- Contact Lens Associated Keratitis
- Dry Eye Syndrome

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## Treatment and Management of Acanthamoeba

- Early stages- topical antibiotics
- Cationic antiseptics- polyhexamethylene biguanide (PHMB) and Chlorhexidine
- Combination therapy with a diamidine
- Debridement of tissue
- Penetrating keratoplasty
- Steroids?

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1454444/pdf/ptophth.134.pdf>

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## Back to Patient...

- All satellite lesions healed ~15 days following initial evaluation
- Prokera was inserted at 1 month visit
- Patient continued to improve; PHMG was tapered weekly (7x/week, 6x/week, 5x/week, 4x/week, etc.)

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## Case #7

- 74 YOA white male
- CC eye injury to the right eye when walking through the woods and he stepped on a piece of rebar that flipped up and hit him across the right side of his face.
  - "My eye feels gritty and wet. I can see out of it, but its like looking through broken glass. There are a lot of floaters."

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## Findings

- VA sc OD 20/20 OS 20/20
- IOP applanation OD 16 (after SLE) OS 16
- SLE OD
  - Eyelids: bruising 2+edema
  - Conjunctiva: subconj heme superior, 12mmx 2-3mm superficial laceration superior under eyelid, not involving sclera
  - Cornea: WNL
  - AC: D&Q
  - IOL PCIOL in Good position s/p YAG
  - Posterior few floaters, CD 0.3, (-)holes/tears/RD

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### Conjunctival Abrasions

- Consulted cornea specialist
  - Closing wound vs leaving open
- Bandage contact lens
  - Larger size 22mm
- Antibiotic QID
- Follow up on Monday
  - Started ocular topical steroid and decided against closure

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### Ocular trauma

- Evaluate eyelids and periocular structures first
- Ocular surface
  - Subconjunctival hemorrhage??
    - Check for a laceration
    - Rule out open globe
  - Scleral rupture from blunt trauma near limbus or posterior to muscle insertion most common

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### Conjunctival Laceration

- Identify using NaFL strip or drop to highlight area of abrasion
  - Check Seidel sign
- Cotton tip applicator to look for residual foreign matter
- Deep or non-mobile FB or if uveal tissue showing refer out
- Dilated fundus exam with ocular trauma
  - Avoid if uveal tissue prolapsed in wound or foreign body in AC or glob disorganization

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### Treatment

- Small laceration
  - Antibiotic ointment or drop QID until defect closed
  - No rubbing, discontinue CL
    - Plastic shield
- Moderate or large laceration
  - Consider referral, may require surgical repair
    - Cauterization, absorbable sutures
    - Sterilization of the wound

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### Case #8 You've Got to be Kidding Me!

- 27yowm presents with red, painful, blurry VA OS. Started 10 days ago after returning from a trip to Italy. Taking 500mg Naprosyn for HA.
- Health – Unremarkable
- Allergies: PCN
- Vask: OD 20/20-3 OS 20/25-3 with NI
- IOP: 9 / 10
- SLE:
  - OD Mild limbal flush / 1+ Cells
  - OS 2+ Inj / 2+ Cells

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### What is Your Treatment?

- Prednisolone acetate 1% vs. difluprednate 0.05% vs. loteprednol etabonate .5%
- Homatropine 5% vs. Scopolamine 0.25% vs. Atropine 1%
- Would you consider lab testing?
- Would you prescribe an oral medication?

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### When Should Lab Tests Be Ordered?

- Bilateral cases
- Atypical age group
- Recurrent uveitis
- Recalcitrant cases
- Hyperacute cases
- Worsens with tapering
- VA worsens
- Immunosuppressed

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### Case #9

- 20 YOA Hispanic female
- CC Headaches occurring daily, referred by her optometrist. Constant headache everyday for about 4 weeks that seem to be getting worse. She states she feels headaches mostly behind her eyes. Went to the ER last weekend and had an MRI done and they wanted to admit her for a spinal tap but she refused. States her vision is blurry occasionally appearing pixilated. Currently using gtts polymyxin B sulfate and trimethoprim QID OU as prescribed by ER.

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### Findings

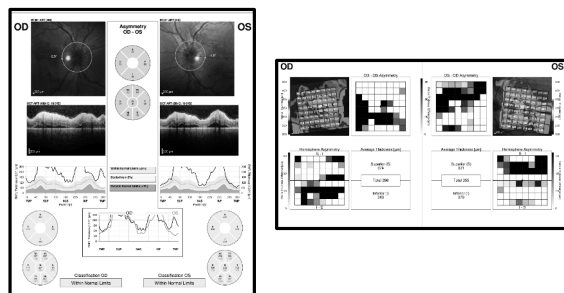
- BCVA OD 20/25; OS 20/20
- IOP Applanation OD 17; OS 18
- SLE
  - Conjunctiva 2+ injection OU
  - Cornea WNL OD; early KP's on endothelium OS
  - AC 4+cell, 4+ flare OU
  - Iris Synechiae @ 2 o/c OD; WNL OS

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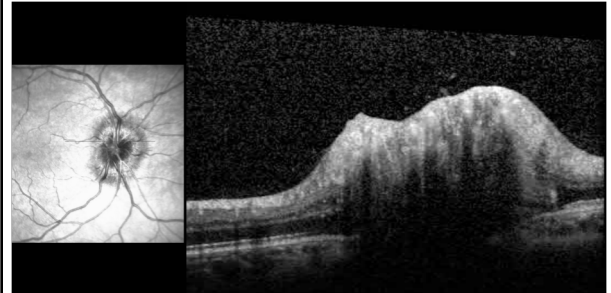
### But wait, that's not all

- Posterior:
  - ONH 4+edema, disc margins indistinct OU
  - CD 0.1 OU
  - Macula: edema OU
  - Vessels: WNL OU
  - Periphery: WNL OU

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## VKH

- Early manifestation
  - Bilateral granulomatous panuveitis with or without extraocular manifestations
    - Subretinal fluid or bullous serous retinal detachment
    - Focal delayed choroidal perfusion, leakage, and pooling within subretinal fluid
    - Diffuse choroidal thickening
- Late manifestation
  - Ocular depigmentation or nummular chorioretinal depigmented scar/ RPE clumping, chronic anterior uveitis
  - Neurological auditory findings
    - Malaise, fever, HA, neck/back stiffness, abdominal pain
    - Tinnitus
    - Cerebrospinal fluid pleocytosis
  - Alopecia, poliosis, or vitiligo

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## Treatment

- Neurology, Ophthalmology, Rheumatology and Internist
- IV steroids in ER
  - Methylprednisolone 1g x 3-5 days
  - High dose oral steroid after slowly tapered
- Long term immunosuppressants

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## Case #10 Teary Eyed

- 67 year old white female – OS has been tearing for 3 weeks, some burning and irritation, h/o allergies
- Ocular Medications – Visine prn
- Meds: OTC Zyrtec, lisinopril
- NKDA
- Assessment: Epiphora OS

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## 9 Steps to Evaluating the Tearing Patient

1. History
2. Lid Exam, Palpation of Lacrimal Sac
3. Slit Lamp Exam
4. Schirmer Tear Testing
5. Dye Disappearance Test & Jones I
6. Lacrimal Irrigation, Probing, & Jones II
7. Lower Lid Taping
8. Nasal Speculum Exam
9. Radiography

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## The Big Four

1. History
2. Lid Exam
3. Dye Disappearance Test
4. Lacrimal Irrigation

Not all steps are needed in every patient

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## Step 1: History

- Usually will distinguish hyperlacrimation from reduced excretion:
  - Hyperlacrimation associated with discomfort
    - Blepharitis—itch, burn
    - Allergic conjunctivitis—itch
    - Corneal foreign body—pain
    - Trichiasis—irritation
    - Dry Eyes—FB sensation, burn
    - Iritis—ache, photophobia
    - Photosensitivity—photophobia

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### Step 1: History

- Usually will distinguish hyperlacrimation from reduced excretion:
  - Hyperlacrimation associated with discomfort
  - Hyperlacrimation usually not monocular
  - Hyperlacrimation rarely causes frank epiphora
- Prior treatment:
  - Artificial tears, allergy drops
  - Punctal plugs, lacrimal probings

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### Step 1: History

- Time course, duration
  - Severe epiphora, intermittent: lacrimal stone
  - Duration less than 6 months: may benefit from probing or intubation
  - "Slowly progressive" does not really help distinguish between PANDO and secondary (neoplasia, infiltration)
- Associated disorders
  - Previous surgery, trauma
  - Previous infections (conjunctivitis, dacryocystitis, sinusitis)
  - Facial nerve palsy

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### Step 2. Lid Exam

- Facial musculature
- CNVII weakness
- Lid laxity
- Ectropion
- Entropion
- Lacrimal sac palpation

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### Step 3. Slit Lamp Exam

- Canalicular punctal size, position
- Tear meniscus
- Lid motion during blink
- Conjunctivochalasis
- Ocular Surface
- Everted upper lid for papillae
- Lid margin, lashes for blepharitis

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### Step 5. Dye Disappearance Test

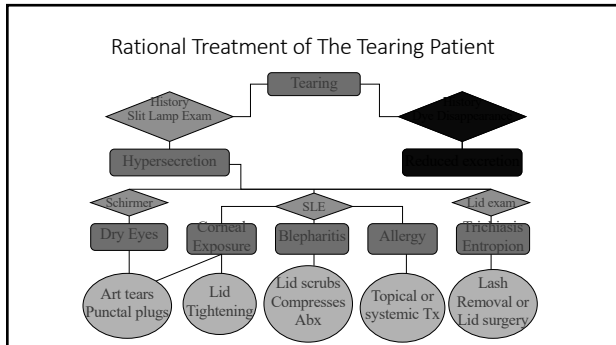
- Functional tear drainage test, positive result could be due to:
  - Tear lake malposition
  - Poor tear pump function
  - Punctal stenosis or blockage of canaliculus, sac or NLD

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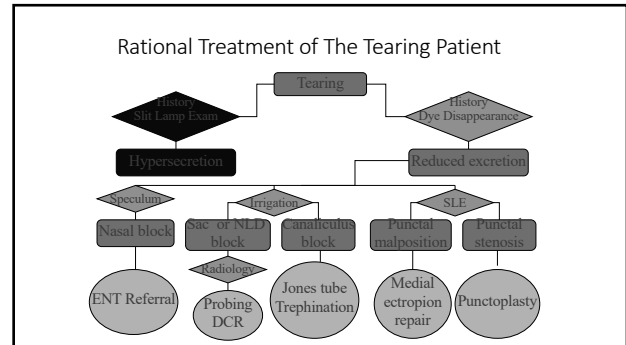
### Step 6. Lacrimal Irrigation

- So what is positive?
- Three possible outcomes
  - Free flow to nose—No obstruction (beyond punctum)
  - Reflux out upper punctum upon irrigating lower—obstruction beyond common canaliculus
  - Resistance to irrigation or reflux around irrigation cannula—canalicular obstruction

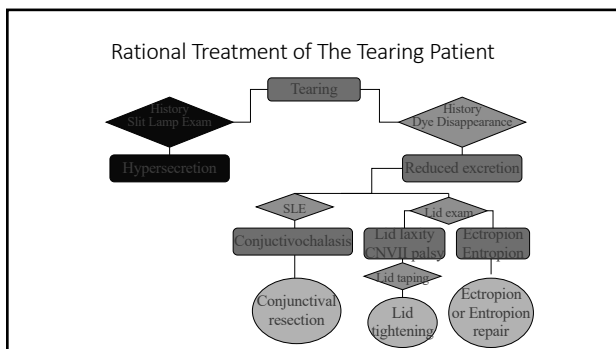
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Thank You!

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