# Rapid Fire Cornea COPE ID: 71785-AS

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#### Case One

• 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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### • Ocular Hx:

- Dry eye syndrome 10+ yrs
  Herpes stromal keratitis OS
- Inactive Last episode 2020
   Anterior scleritis OS
- Inactive
   POAG Mild OU
- Pterygium sx OU
  Phaco / istent OU
- Previous treatments
  - Amniotic membrane OS (2019, 2020)
    Punctal cautery (2011) OU
- Med Hx: NIDDM 15 yrs Osteoarthritis

  - Hypothyroid
    Seasonal allergies
- Meds:
- Ceterizine
- LactuloseLevothyroxone

### Clinical Exam

- Lids / Lashes Clear and good position
- Conjunctiva tr injection OU

Cornea
 OD 2+ Inf SPK



Anything else we should add???

- OS Dense SPK, 1+ K edema
  A/C Deep and Quiet
- PCIOL OU
- IOP 11 mmHg OU
- K Sensitivity OD Normal OS Reduced

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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 IA. Neuroparalytic 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
- latrogenic: 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
- · chemical and physical but
- Systemic: DM, multiple sclerosis, Vit A deficiency
- Increasing age, chronic DED<sup>3</sup>
- Banerjee PI. JAMA ophthalmology 2014;132:7.
   Tinley CG, Eye 2009;23:1819-23
   Ocul Surf. 2007 Apr;5(2):75-92.









#### 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 #2 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
- Started on tobramycin q2h OS

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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
- 4 mm epithelial defect
  Cultures obtained including blood, chocolate and fungal
- Tx???
  - Vancomycin q2h OS
     Tobramycin q2h OS



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

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### Work-up

• History

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



#### 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.

#### 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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### Polymerase chain reaction (PCR)

• Rapid diagnostic test - 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
- High sensitivity
- Unacceptable specificity
  - Low specificity = high false positives
     High amounts of unnecessary treatment
     Increased corneal toxicity

## **Confocal Microscopy**

- Historically used for endothelial cell evaluation
  - Fuch's dystrophyPost-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

• Scans all layers

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### Dx: Acanthamoeba Ulcer

- Day 1: Initial treatment?
- Day #2: epithelium debridement and subconj. Gentamicin injection

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 Added Bactrim DS 1 PO BID along with Polyhexamethyline Biguanide/PHMBG 9-11x/day





### 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

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#### Acanthamoeba

#### Symptoms

- Decreased vision
- PainLight sensitivity
- Redness

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- Foreign body sensation
- Lid edema
- Epithelial or subepithelial infiltrates

Signs

Satellite lesions

Epithelial irregularities

- Stromal infiltrates (ring-shaped, disciform)
- Anterior uveitis
- Scleritis
- Chorioretinitis

### Differential Diagnoses of Acanthamoeba

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

# Treatment and Management of Acanthamoeba

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

https://www.rwiewolopithalmology.com/article/acanthameeba-a-dargerous-pathogen lowreto-Monates, lacebet at: 7.4 update or Acanthameeba levaristic diagnosis, pathogenesis and susmouth devolte block, descel uni 33 (ddsf), sh

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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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### Post-Operative Care

- Moxifloxacin QID OD x 1 week and Difluprednate starting at QID OD and tapered down to Loteprednol QHS OD for maintenance
- Several corneal sutures removed after 6-9 months
- Cataract extraction OD
- Final BCVA 20/25 OD

#### Case #3 Under Pressure

- 47year white male presents with blurry vision OS for the past couple of months. Denies eye pain.
- Current drops: prednisolone QD-BID OS
- Ocular Hx

  - s/p PK in 1998 OS d/t keratoconus
     Localized vascularization of cornea OS in 10/2020
     Bevacizumab injection + Argon laser

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### Entrance testing & Slit lamp



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### Differentials for Increase in IOP

- Angle closure
- Steroid responder
- Herpes simplex / zoster virus

### Assessment & Plan

- Herpes Stromal keratitis

  - 1 gtt brinzolamide/brinzonidine instilled OS in office
     Start valacyclovir 500mg TID PO, increase prednisolone to TID-QID OS, and begin NaCL drops BID OS

• RTC 3 days

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### Follow up Visit 1

- IOP: 51 OS
- Pachy: 517 OS
- Instilled 1gtt of brinzolamide, brimonidine/timolol, bimatoprost OS and two 250mg acetazolamide tablets in office IOP lowered to 29 OS
- Scheduled SLT in 2wks OS
- Pt to continue valacyclovir 500mg PO TID and NaCL drops BID OS. Pt to decrease Prednisolone to BID OS
- RTC 3-5days for K check, IOP check and OCT-G

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### Follow up visit 2

- IOP: 15 OS
- OCT-G performed
- Cornea clearer than last week and haze has decreased
- Pt to continue valacyclovir 500mg PO TID and NaCL drops BID OS. Pt to increase Prednisolone to TID OS
- Pt start brimonidine / timolol BID OS and brinzolamide BID OS

• RTC 7-10days



#### HSV management

- HSV is a neurotrophic virus that lies latent in trigeminal ganglion following initial infection. Reactivation causes latent virus mediated by T lymphocytes to travel back to corneal epi along the axon
   Causes virus replication in corneal epi cells that causes production of inflammatory cells, cytokines and chemokines to gradually infiltrate the stroma
- · Can result in irreversible vision loss due to corneal opacity, edema, scarring, and neovascularization
- Herpetic Eye Disease Study (HEDS)
  - Use of oral acyclovir reduced reoccurrence of any type of herpetic eye disease by 41% within 1yr and reduced stromal keratitis by 50%
    Corticosteroids have a faster resolution of stromal keratitis

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#### Steroid Induced Glaucoma

- Post-PK glaucoma may be related to collapse of TM, suturing technique, postop inflammation, use of corticosteroids, PAS formation, and preexisting glauc
- Franca et al. results showed that 49 of 228 (21.5%) of patients developed glaucoma after PK
- Uncontrolled IOP after PK is one of leading causes of graft failures and visual loss
- Pramanik et al. reported steroid-induced glaucoma in 4 of 112 eyes (3.6%) of patients with keratoconus after PK with a mean follow-up of 13.8 years







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### **RCE** Treatment

- Treat abrasion first
- Loteprednol with taper X 2 mos
- Muro 128 ung X 2 mos
- Freshkote TID X 2 mos
- Doxy BID X 2 mos
- Restasis BID
- Superficial Keratectomy



Post op - Superficial Keratectomy

• Post op just like a PRK case

•Steroid, antibiotic, NSAID for 1 week with BCL

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# Dry Eye Preparation for Cataract Sx Measurements

- Frequent NPAT use
- Topical steroid course
- Upper and/or lower punctal occlusion
- MGD management: MiboFlo, Lipiflow, IPL, iLux
- Amniotic membrane Self-retaining AMT
- Address any other issues, i.e. blepharospasms, lagophthalmos, filamentary keratitis

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### Stand-Alone vs. Combined Procedures

- Significance of the cataract
- Does the cornea need surgical intervention?
- Sequential versus triple procedure
- Convenience, cost, visual recovery





Density of lens is directly proportional to amount of energy used

Phaco energy can hurt the k endothelium

Can anything be done??



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• Symptoms:

- Vision worse in the morning
- Recurrent erosions
- Improvement • Hypertonic sodium
  - (i.e., Muro 128)
  - Blow-dryer to eye
  - Later in the day



### Pre-op Considerations: Status of cornea

- Guttata: degrades Va
- Edema: view into AC
- Scarring

   Long-standing edema causes anterior haze, cannot be removed with DSAEK



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### Pterygium



- Evaluation
- EValuation
   A control in the second second
- Encroachment of
   Scarring
- Astigmatism
- Interstignment goals

### Pterygium Options

- Pterygium first
- Wait 3 months for CE • Phaco alone
- Pterygium no more than 2-3mm on cornea
- Combined pterygium/CE • SE should not change



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### Pterygium: Surgical Pearls

- Combined pterygium/CE surgery
   1<sup>st</sup> pterygium removal,
  - 2<sup>nd</sup> phaco/IOL, 3<sup>rd</sup> graft of choice
- Do not correct astigmatism intraoperatively

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### Rapid Fire Cornea: Final Thoughts

- Consider corneal sensitivity
- Aggressively treat the ocular surface
- Treat K abnormalities prior to cataract surgery

## Thank You!!

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