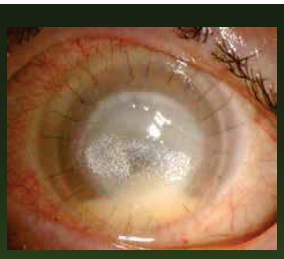
Corneal Ulcers



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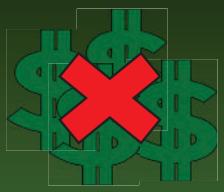
- I have no financial interests or relationships to disclose



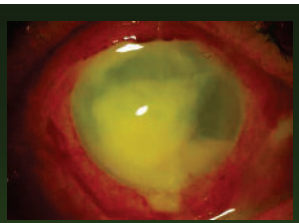
- I will be discussing off-label use of medications and devices

Outline

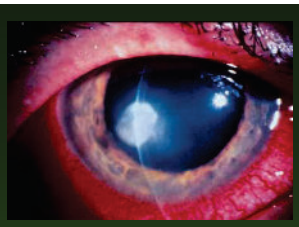
- Classic features different types of corneal ulcers
  - Bacterial
  - Fungal
  - Acanthamoeba
  - HSV
- Medical management
- Surgical management

Bacterial

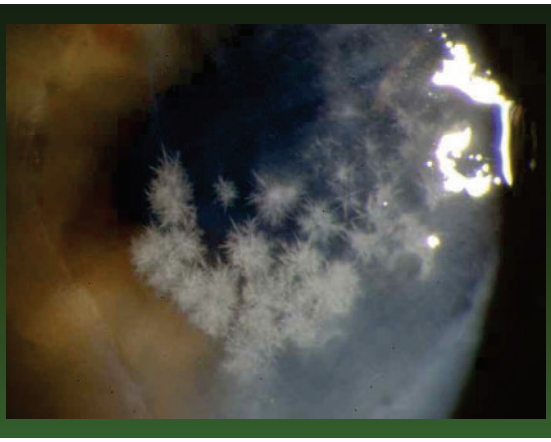
- Contact lenses > trauma
- History of 1-2 days
- Foreign body sensation ("rock in my eye")
- Mucopurulent discharge
- Gram positive more common but gram negative more virulent



- **Gram Negative**
  - Copious discharge
  - Hypopyon frequent
  - Significant tissue destruction
  - Edges ill-defined
  - May have ring



- **Gram Positive**
  - Minimal discharge
  - Mild A/C reaction
  - Minimal tissue destruction
  - Edges well defined
  - May have abscess



Crystalline Keratopathy

- Strep. Viridans or enterococci
- Patients on chronic steroids – usually corneal transplant patients
- No inflammation
- Glycocalyx protects organism
- Most need transplant as do not respond medically

Management

- Scrape and culture + smear
- Frequent fortified antibiotics – q ½ hour
  - –Tobramycin or Gentamicin 1.4%
  - –Vancomycin or Cefazolin 2%
- Modify based on Gram stain and culture
- Steroids within 48 hours if indicated*
- Cyclopentolate for pain and pupil
- Supplement with oral/subconjunctival in noncompliant

GPC	• Vancomycin • Cefazolin • Tobramycin/Gentamicin
GNR	• Tobramycin/Gentamicin • Fluoroquinolones • Ceftazidime/Ceftriaxone
GNC	• Ceftriaxone/Ceftazidime • Fluoroquinolones
GPR	• Vancomycin • Clindamycin • Amikacin
AFB	• Amikacin • Clarithromycin • Azithromycin
Nocardia	• Amikacin • Linezolid • Bactrim/sulfacetamide

SCUT

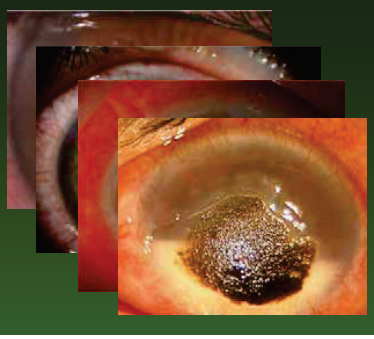
- Overall no benefit or harm using steroids in bacterial keratitis
- Larger, central, deep ulcers did benefit
- Nocardia did much worse with steroids
- Epithelial healing was a little slower
- Starting early may be better than later

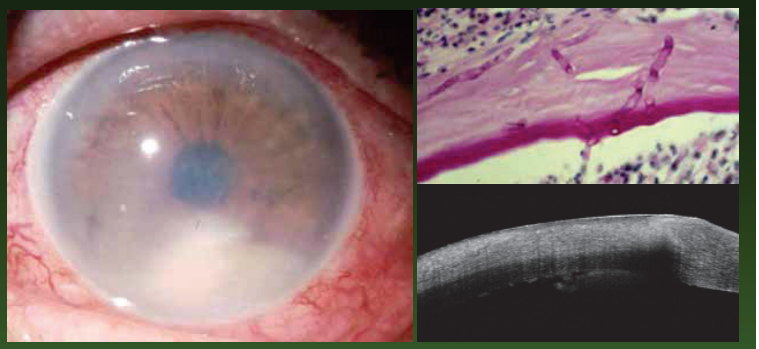
Fungal Keratitis

- 8-16% of culture-positive infectious keratitis
- Contact lenses > trauma now
- Slow progression over about a week
- Minimal discharge
- More photophobia/deep pain (”toothache in my eye”)

Fungal Keratitis Features

- Feathery borders
- Ring infiltrates
- Satellite lesions
- Endothelial plaque
- Formed hypopyon
- Pigmentation

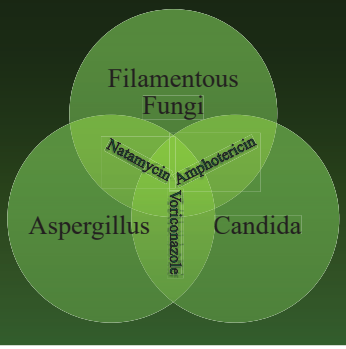




Treatment

- Therapy with any 2 - Natamycin 5%, Amphotericin B 0.15%, Voriconazole 1%
- Modify based on organism
- Duration 2-4 weeks
- NO steroids
- Adjunct treatment with oral/intrastromal/intracameral often beneficial

Treatment

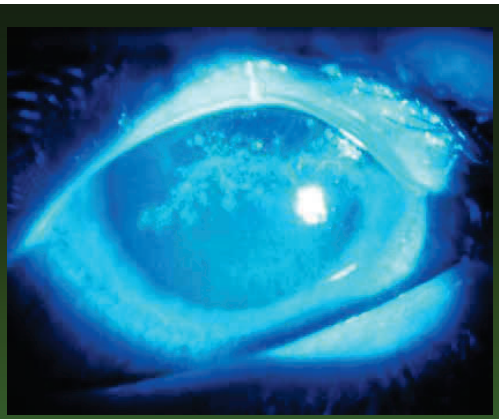


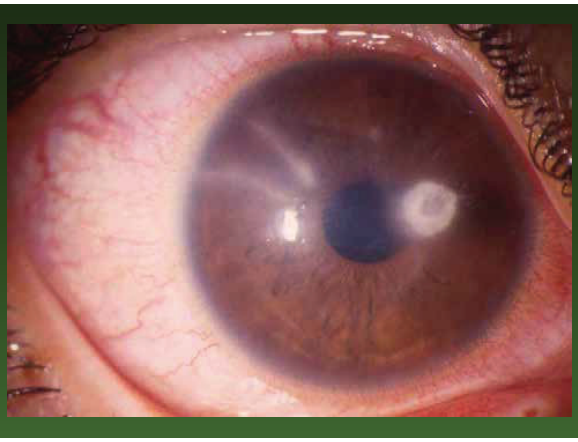
MUTT 1 & 2

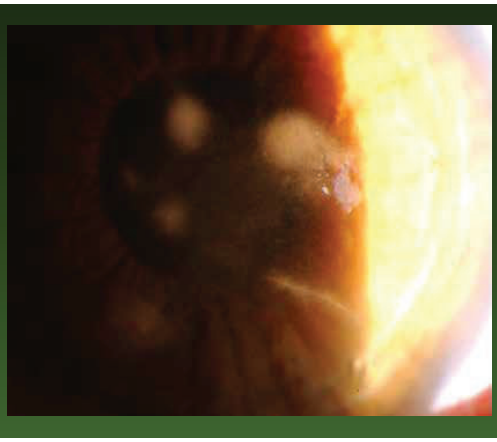
- Voriconazole vs Natamycin for filamentous fungi
- Natamycin significantly better
- Fusarium did not respond to Voriconazole
- Suggested not using Voriconazole as monotherapy
- Adding oral voriconazole to topical Natamycin may help in Fusarium but had significant side effects

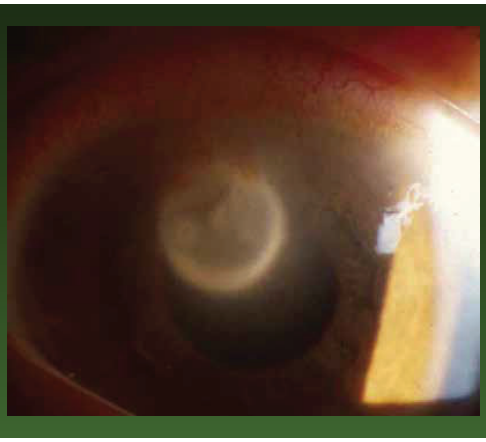
Acanthamoeba

- Incidence appears to be increasing
- Contact lens wearers – rarely trauma
- Masquerader – average time to diagnosis 4 weeks
- HSV misdiagnosis almost universal
- Severe pain (“Jacket over the head sign”)







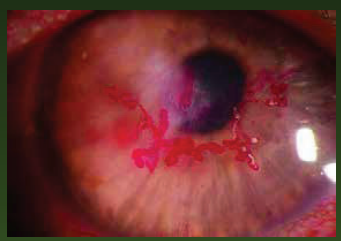


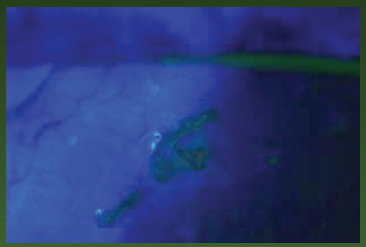
Treatment

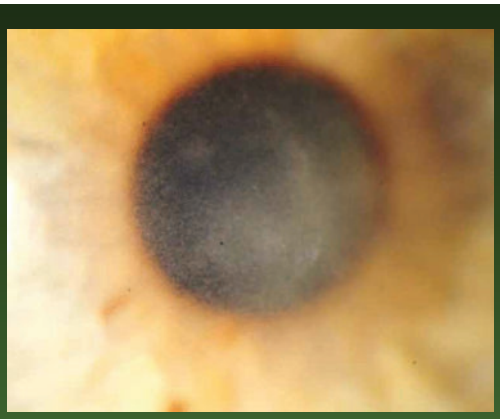
- Dual therapy with
  - PHMB / Chlorhexidine - 0.02%
  - Brolene / pentamidine / hexamidine – 0.1%
- Oral Miltefosine or Voriconazole may help
- Treat for at least 6 months decreasing medications and frequency

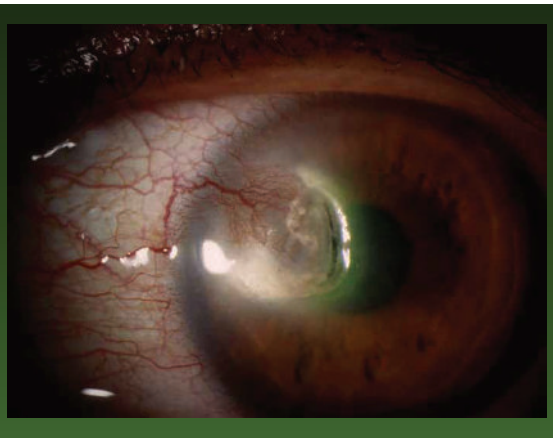
Herpes

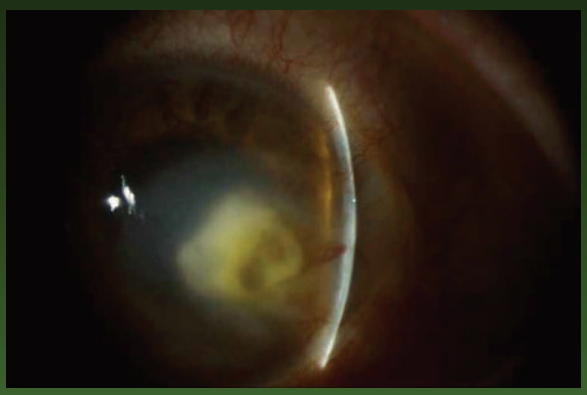
- Reactivation of latent herpes in TG
- Epithelial infectious, stromal immune
- Hypoesthesia sensitive sign
- Dichotomous branching, terminal bulbs in epithelial
- Keratic precipitates in stromal
- Necrotizing may resemble bacterial









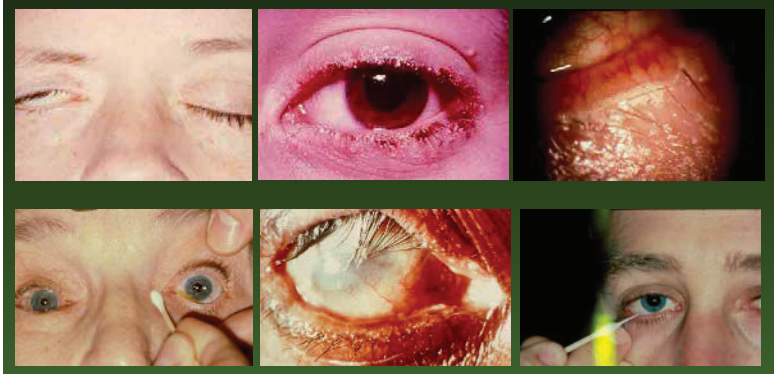


Treatment

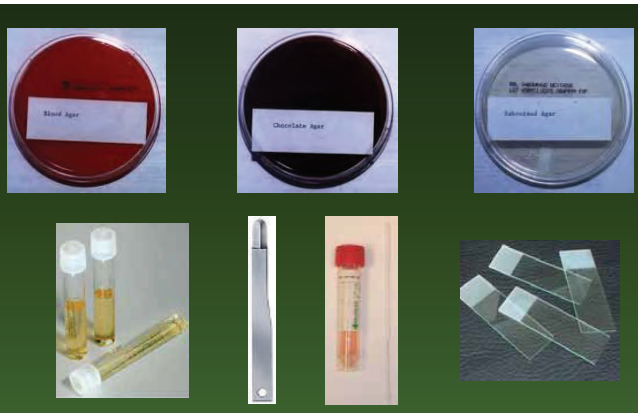
- **Epithelial**
  - **Gentle debridement**
  - **Topical antivirals – Trifluridine, ganciclovir**
  - **Oral antivirals – Acyclovir, Valcyclovir**
- **Stromal**
  - **Steroids with oral antiviral prophylaxis**
- **Necrotizing**
  - **Oral and topical antivirals followed by topical steroids**

	Drug	Treatment	Prophylaxis	Adverse Effects
Topical	Trifluridine	9 times a day	Not indicated	Follicular conjunctivitis Epithelial toxicity
	Ganciclovir	5 times a day	Not indicated	Epithelial toxicity
Systemic	Acyclovir	400 mg 5x/d	400 mg bid	HA, nausea Nephrotoxicity
	Valcyclovir	500 mg tid	500 mg qday	TTP & hemolytic uremic syndrome
	Famvir	250 mg tid	250 mg qday	Same as ACV

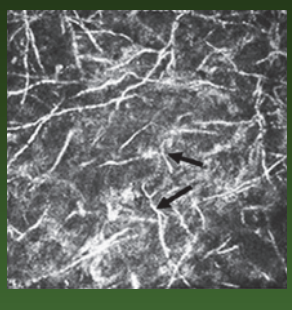
Treat Underlying Causes

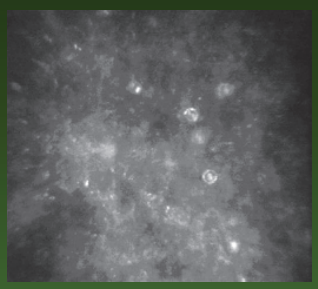


Culture



Confocal





Adjunctive Treatment

Doxycycline

- Inflammation = proteases (MMPs) = melting
- Doxycycline/minocyline/tetracycline - inhibit MMPs
- All ulcers but especially
  - Alkali burns and blepharitis related
- Doxy 100 mg bid for 1, then qday
- Topical erythromycin or azithromycin in intolerant

Ascorbate and Citrate

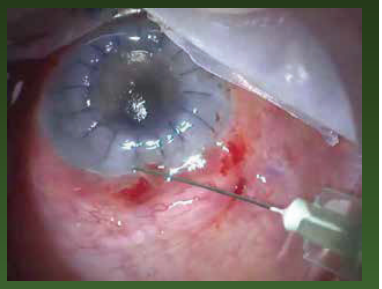
- Adjuvant to collagenase inhibitors
- Especially useful in alkali burns where low levels are seen
- May modulate neutrophil effects
- 1 gm vitamin C qday
- 10% topical drops

Steroids

- Decrease rate of epithelial healing, production of collagen and keratocyte proliferation
- However, in inflamed eyes WBC actively produce collagenases
- I'm confused…
  - Inflammation but no infection = use
  - No inflammation = do not use
  - Infection = use cautiously + antimicrobials

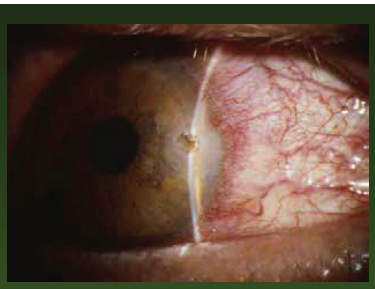
Intrastromal Injection

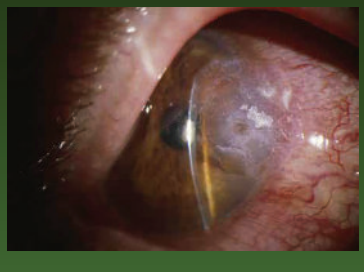
- Adjunct to medication in fungal keratitis
- Creates depot in cornea
- Penetrates deeper
- Ampho 5 μg/0.1mL or Voriconazole 50 μg/0.1mL

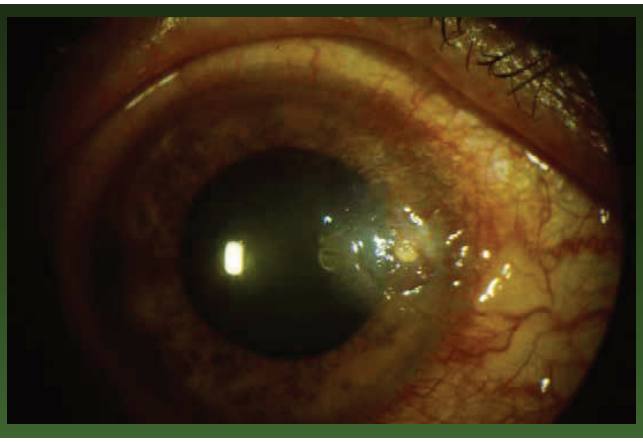


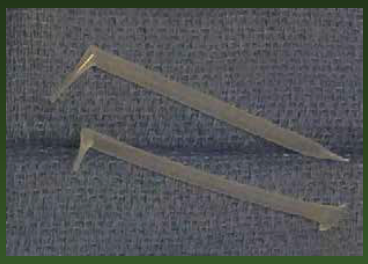
Other Therapies

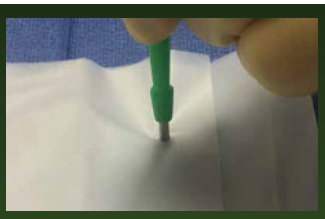
- Intracameral injections
  - Primarily for fungal as A/C reaction in others usually reactive
- Amniotic membrane
  - Decreases inflammation and promotes healing
  - Usually placed stromal side down
- Gluing
  - Cyanoacrylate glue of various brands used off-label

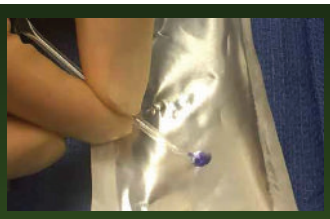


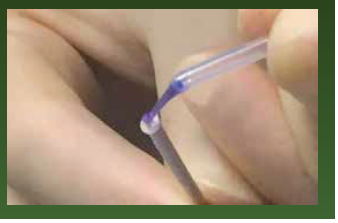


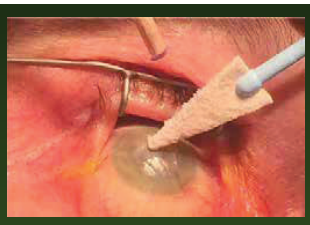


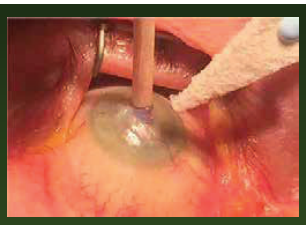


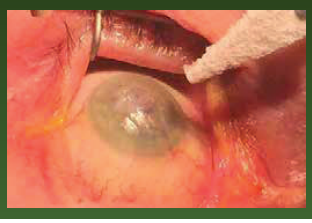


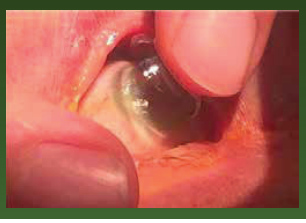




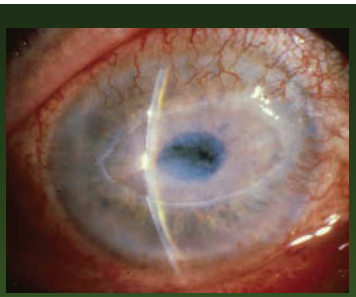


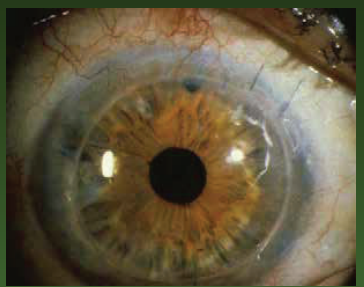


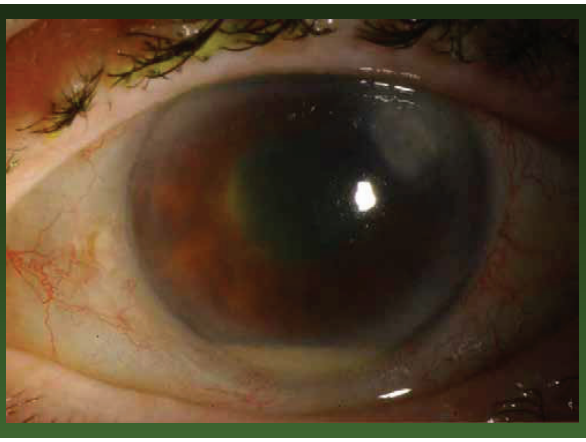


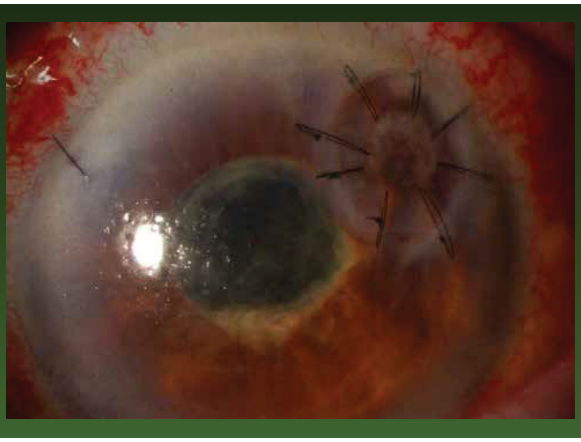


Surgical Management









Conclusions

- Determine the cause of the ulcer
- Remove aggravating factors
- Treat with antimicrobials
- Eliminate toxic medications, surface support, collagenase inhibitors
- Use adjunct therapy as indicated
- Surgical management if unresponsive to medical management

Thank You!