Microbial keratitis: Treatment recommendations

Presented by
Professor Stephanie Watson
Save Sight Institute
Maria Cabrera-Aguas, Pauline Khoo, Monica Lahra

Microbial keratitis: Sight threatening
Elderly
- 10% loss eye
- 40% loss vision
Children
- Amblyopia

Disclosure

Diversity of Microbial Species Implicated in Keratitis: A Review
Elizabeth E. Kwa,1 Stephanie Louise Mason,2 and Leslie John Bay Foote1

Objective: To systematically review the diversity of microbial species involved in keratitis.

Methods: A search of peer-reviewed publications, online expert panels, and comprehensive searches of databases identified 38 studies for review.

Results: A total of 688 species representing 271 genera from 145 families were identified. The most common group was bacteria, followed by fungi and amoeba. The most common bacterial species were Pseudomonas aeruginosa and Staphylococcus epidermidis.

Conclusions: The diversity of microbial species implicated in keratitis is vast and expanding, highlighting the need for ongoing research and improved management strategies.

Keywords: Microbial keratitis, corneal scraping, fungal keratitis, bacterial keratitis, viral keratitis, amoebic keratitis

TREATMENT STRATEGIES
Simplified initial management of keratitis

• Corneal scrape & culture
• Document baseline indices
• Choose antimicrobial
• Initiate sterilization phase
• Modify antimicrobial
• Determine end point

https://vimeo.com/184614216

Corneal scrape

1. Arrange 7 blades, anaesthetic drops, and sample collection vessels
2. Draw a circle on the back of the slide
3. Label slide with patient and sample details
4. Wash hands
5. Wear gloves
6. Instil anaesthetic drops
7. Avoid the visual axis during sample collection
8. Inoculate the plates with cross-hatched streaks
9. Do not break the agar surface
10. Place label on side of agar plate
11. Place sample into Sabouraud's agar slope
12. Sterilize the blade after sample collection
13. Dispose of the blades in a laboratory waste container
14. Post sample to be ready for the laboratory

Document baseline indices

1. Thinning
2. Epithelial defect
3. Epithelial infiltrate
4. Hypopyon
Simplified initial management of keratitis

- Choose antimicrobial
  - Use local epidemiological data
  - Monotherapy with quinolones
  - Consider dual therapy

Keratitis isolates: Sydney 2012 - 2016

1051 eyes: 66% positive culture rate

- CoNS
- Staph aureus: 59% (407)
- MRSA: 16% (407)
- Corynebacterium: 6% (38)
- Strept pneumoniae: 4% (29)
- Pseudomonas aeruginosa: 55% (110)

KARSP: 2017-2018

- 75% (282/376) Gram-positives
- 46% (173/376) Coagulase-negative staphylococci
- 20% Coagulase-negative staphylococci resistant to cefalotin

Fortified antibiotics vs Fluoroquinolones

- Chemical conjunctivitis
- Ocular discomfort increased risk up to 78%
- Delayed epithelialisation
AAO Bacterial keratitis: Preferred Practice Pattern

- Most community acquired infection resolves with empiric Rx
- Scrap
  - Infiltrate >2 mm
  - History of corneal surgery
  - Atypical features
- Cycloplegia
  - Decrease pain
  - Inhibit synechia for substantial AC inflammation

Simplified initial management of keratitis

- Initiate sterilisation phase
  - Hourly for two days day only or day and night for severe ulcers
  - Continue hourly for three days after assessment

Simplified initial management of keratitis

- Modify antimicrobial
  - Review at 48 hours
  - Alter if culture & sensitivity results suggest primary therapy inappropriate

Simplified initial management of keratitis

- Determine end point ( sterilisation usual by 5 days):
  - Improvement at 5 days
    - Enter healing phase
  - Deterioration at 5 days
    - Exclude compliance failure
    - Reassess microbiology
    - Enter algorithm for progression

Progressive keratitis

1. Ensure adequate therapy
2. Establish microbiological diagnosis
   - Cultures & stains for rare causes
   - Biopsy to obtain larger sample
3. Eliminate toxicity
4. Treat host response

Corneal biopsy

1. Trephination
   - Skin biopsy punch 3 - 5 mm
   - Depth 0.2 to 0.3 mm
   - Remove large portion of lesion
   - Avoid visual axis
2. Free lamellar dissection with knife
   - Knife to outline area and shape to depth
3. Posterior biopsy
Posterior corneal biopsy

Corneal biopsy

- 15 positive biopsies from 38 patients
- Identify hard to grow organisms
  - Fungi (3)
  - Acanthamoeba (1)
  - Mycobacteria (1)
  - New organisms (11) 73%


Strategies for managing progressive keratitis

Causes
- Acanthamoeba
- Fungi
- Herpes simplex
- Mycobacteria
- Anaerobes
- Nocardia
- Microsporidia

Fungal keratitis: Sydney 8 years

- 47 eyes from 46 patients
- Risk factors
  - External eye n=17 (37%)
  - Corneal disease n=14 (30%)
  - Corneal trauma n=12 (26%)
  - Contact lens wear n=10 (21%)
  - Fusarium sp n=16 (27%) and Candida parapsilosis n=12 (20%)
  - Surgical intervention 21 (27%)
  - Anti-fungal injections (11)
  - Corneal transplantation (8)
  - Evisceration (2)

Fungal keratitis: Treatment recommendations

- Avoid steroids if fungus is suspected
- Make an early diagnosis
  - Confocal microscopy
  - PCR
- Topical natamycin: empiric therapy
  - commercial availability and association with better clinical outcomes in filamentary fungal keratitis
- Topical and/or oral voriconazole

Fungal keratitis: Sydney 15 years

52 patients (4 bilateral)

Risk factors
- Contact lens wear
- Scleral lens
- Surgery

Mislagnosis of HSK in 1/3rd

Onset of treatment within 21 days better visual outcome.

Complications
- Corneal scarring and vascularization (n=23), recurrent (3) and late-onset (n=11)

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**TREATMENT PROTOCOL**: use a protocol for therapy. This can be tested against your institutional results and adapted when other become available.

**Eliminate toxicity**
- Aminoglycosides
- Preservatives
- Topical acyclovir
- Antifungals
- Anticanthamoeba agents

**Treat host response**
- Steroids in keratitis controversial
  - Benefit:
    - Decrease inflammation, reduce scarring and stromal melt
  - Risk:
    - Delayed epithelial healing, promote infection

**Cochrane review: Steroids vs topical antibiotics alone**
- 3 small RCT's
  - VA, healing times the same
  - SCUT: topical prednisolone sodium phosphate 1.0% after a 48-hour course of topical moxifloxacin 0.5%
    - 3-month visual acuity, 3-month scar size, rate of perforation the same

**Anticollagenases**
- In vivo data
  - Reduced perforation rate in pseudomonas ulcers
  - No high quality human RCTs
  - Side-effects
    - GIT upset
    - Sun-sensitivity
    - Skin pigmentation
    - Inactivates OCP

*All you do is eat and drink in front of that TV all day long. You are such a lazy eye!"*
**Progressive keratitis**

- Glue perforation
  - Temporary and antibacterial
- Therapeutic or tectonic graft
  - Fungus:
    - wide excision
    - topical cyclosporin to avoid steroids
  - Acanthamoeba:
    - where possible delay keratoplasty until the eye is uninflamed and medically cured of Acanthamoeba.

**Special tools**

- PCR and confocal for diagnosis
  - Acanthamoeba
  - Filamentous fungi
- CXL
- New antimicrobials

**MICROBIAL KERATITIS**

- Most cases respond to simplified initial Rx
- Failure results from
  - Iatrogenic disease
  - Precipitating causes untreated
  - Ineffective or misdirected treatment
- Epidemiology and drug choice critical

Thank you