Title: Risks and management of necrotizing central corneal ulcers

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Abstract: Immediate and aggressive treatment of dense central corneal ulcers is imperative in order to achieve the greatest chance of preserving vision. Contact lens users need to be aware of the risk of developing corneal ulcers.

I. Case History

- Patient demographics
  - 44 year old white male
- Chief complaint
  - Severely painful left eye that started after trying to take out contact lens five days ago
  - Decrease in vision, photophobia and redness of the left eye
- Ocular, medical history
  - Ocular history
    - Sleeps in contact lenses for several days at a time
    - Patient went to emergency room day after onset of symptoms and reports corneal abrasion, per patient
    - At emergency room, patient given a drop every 6 hours for pain
    - Few days later, seen at eye clinic and referred to a retinal specialist to rule out endophthalmitis
    - Same day, retinal specialist saw patient and referred patient to corneal specialist for emergent consult
  - Medical history
    - Hepatitis C
- Medications
  - No oral medications
  - Eye drop for pain given by emergency department, unsure of name, questionable compliance
- Other pertinent information
  - History of methamphetamine and marijuana abuse
  - Minimally responsive verbally possibly secondary to pain, presents crying
  - Accompanied by father, drove from an hour away

II. Pertinent findings

- Clinical
  - Entering visual acuity without correction
    - OD: 20/200
    - OS: light perception
  - Pupils
    - OD: round and reactive to light
    - OS: difficult view 2^corneal opacity
- Physical
  - Slit lamp findings
    - Lids/lashes: clear OU
    - Conjunctiva: clear OD, 4+ conjunctival injection OS, purulent discharge OS
    - Cornea: clear OD, 5mm by 6mm dense central corneal ulcer with an overlying epithelial defect OS
    - Iris: flat and intact OU
    - Angles: 4x4 OU
    - Anterior chamber: deep and quiet OD, 2mm hypopyon OS
• Laboratory studies
  o Corneal culture positive for *Pseudomonas aeruginosa*
  o Slides show numerous polymorphonuclear leukocytes

III. Differential diagnosis

• Primary/leading
  o Bacterial keratitis, presumed *Pseudomonas aeruginosa*

• Others
  o Acanthamoeba keratitis
  o Herpetic keratitis
  o Fungal keratitis
  o Trauma/abrasion
  o Endophthalmitis

IV. Diagnosis and discussion

• Condition
  o Bacterial keratitis with extended use of contact lenses, with contact lenses being the top predisposing factor for corneal infections in the United States
  o Common species cultured from corneal ulcers: *Pseudomonas, Staphylococcus, Streptococcus, and Serratia* (1)
  o Treatment initiated prior to obtaining results from corneal culture
  o *Pseudomonas* yields proteolytic enzymes that break down corneal tissue, including stroma
  o Risk of perforation requires careful monitoring by corneal specialist
  o Descemetocele is protruding decemet's membrane- sign of imminent perforation

• Unique features
  o Management of large, dense central corneal ulcer with risk of perforation
  o Level of pain- patient crying in exam chair
  o Concern about patient compliance secondary to history of methamphetamine use and limited patient response towards instructions, resulting in admittance into hospital
  o Contact lens related without initiation of immediate treatment, delayed management after onset of symptoms
  o Choice of antibiotics, treatment without fortified antibiotics

V. Treatment, management

• Treatment
  o Start Ciprofloxacin 500 mg PO BID, Besivance Q1H OS around the clock, fortified Vancomycin 33mg/cc QID OS (substitute Polytrim Q2H until Vancymycin ready), Cyclogyl TID OS, Tylenol #3 PO Q4H or PRN for pain
  o Protective eye shield OS, patient educated no eye rubbing
  o Admitted into St. Joseph Hospital’s emergency room in order to ensure proper administration of the drops

• Response to treatment
  o 1 day follow up (in hospital)
    ▪ Improvement in pain
    ▪ VA OS: light perception
    ▪ Slit lamp examination: stable
      ▪ No area of perforation, no descemetocele
    ▪ Continue present management (unable to obtain Vancomycin)
2 day follow up (in hospital)
  - Same as 1 day follow up

5 day follow up (in office)
  - Improvement in pain
  - VA OS: light perception
  - IOP: 25 mmHg OS (tactile)
  - Slit lamp examination: corneal appearance stable, hypopyon decreased
    - External photo taken
  - Treatment
    - Vigamox Q2H OS, Tobramycin TID OS, Cyclogyl TID OS, Ciloxan ung BID and QHS OS, Combigan QD OS
    - 2 drops of Durezol OS instilled in office

Follow up at eye clinic closer to patient's residence, waiting on records

Research
- Pathogenesis of bacterial keratitis
  - Virulence and adherence to cornea, glycoprotein receptors
  - Advancement in research on drug targets and drug-host interactions (4)
- Comparison of fluoroquinolones
  - Fourth generation fluoroquinolones better than second and third generation against gram positive, but similar efficacy against gram negative bacteria
  - Issue of resistance from overuse (3)
- Fluoroquinolones versus fortified antibiotics
  - No difference in treatment efficacy of bacterial corneal ulcers with fourth generation fluoroquinolones versus combination therapy of fortified antibiotics.
  - (6)
- Corticosteroid adjunctive therapy
  - Limited evidence of effectiveness and safety of topical corticosteroids for bacterial keratitis to improve visual acuity
  - Corneal healing and prevention of adverse effects not proven (2)
- Collagen crosslinking with photoactivated riboflavin
  - Strengthened cornea thought to increase resistance against penetration and effects of enzyme proteolysis from inflammatory cells
  - Antimicrobial properties, bactericidal against Pseudomonas (5)

Bibliography


VI. Conclusion

- Clinical pearls
  - Patient education for contact lens wearers, make aware of bacterial keratitis risks
  - Importance of immediate treatment and proper management of corneal ulcers, including hospitalization if necessary
  - With dense ulcer, be aware of signs of perforation/descemetocele
  - Know current treatment options, such as fluoroquinolones versus fortified antibiotics
  - New advancements in adjunctive therapy for the future