Mixed Bacterial and Fungal Corneal Infections from Rural India

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The Authors have no financial in the subject matter of this poster
Introduction

- Bacterial, Fungal & Mixed Keratitis is a Diagnostic and Therapeutic challenge for the Ophthalmologist.

- Difficulties related to Mixed Infections
  - Establishing a clinical diagnosis as the clinical picture is not classical for any one microbe.
  - Isolating the Etiologic Organism in the Laboratory, in view of the Corneal Ulcer being previously treated.

- Management remains a challenge because of the poor corneal penetration, and the limited commercial availability of drugs.

<table>
<thead>
<tr>
<th>Total cases seen in 2 yrs</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Organism isolated</td>
<td>20</td>
</tr>
<tr>
<td>Gram positive cocci</td>
<td>1</td>
</tr>
<tr>
<td>Acanthamoeba cyst</td>
<td>1</td>
</tr>
<tr>
<td>Filamentous Fungus</td>
<td>2</td>
</tr>
</tbody>
</table>
Markers for Diagnosis

Detailed History
- Long term use of Antimicrobials / Steroids
- Trauma / Abrasions
- Foreign Body – e.g. vegetable matter
- Contact lens
- Contaminated Medications and Dispensers
- Chronic Dacryocystitis
- Dry eyes
- Bullous Keratopathy
- Reduced Corneal Sensations
- Trachoma with sequelae
- Lack of immediate medical care and Home Therapy

General
- Malnutrition
- Immuno-compromised Patient
- Diabetes
- Chronic Alcoholism
- Collagen Vascular Diseases

Clinical Examination
- Visual Acuity
- External Examination- Lid oedema, Blepharospasm, Conj and Ciliary Injection - present in Bacterial and minimal in Fungal Ulcers.
- Lid Abnormalities, Lagophthalmos
- Biomicroscopy - Corneal Ulcer characteristics thinning or perforation, Stromal oedema
- Iritis/Hypopyon
- Sac Syringing- for focus of Infection

Smear and Culture
- Scraping from ulcer margins

Fluorescein Microscopy
- Acridine Orange
- Calcofluor white stain.
Clinical Characteristics

- The **Bacterial infections** are fulminant yellowish white ulcers with irregular swollen overhanging margins and necrotic grayish floor which progress fast. Stromal haze and Iritis with Hypopyon may occur.

- Symptoms are Severe: Diminution of Vision, lacrimation, photophobia and blepharospasm. Also pain, discharge and foreign body sensation.

- The **Fungus** grows slowly in the cornea and has feathery margins and/or satellite lesions and proliferates to involve the Stromal layers. The patient presents a few days or weeks later with symptoms.

- It breaks through the Descemet's membrane and passes into the anterior chamber to cause Hypopyon.

- Immune ring of Wessley

**Mixed Infections** were suspected when the clinical characteristics were of both Bacterial and Fungal and the predisposing factors were relevant...
Variety of Clinical presentation

- Dense Keratitis
- Corneal Abscess with Necrotic floor
- Descemetocele
- Satellite lesions
- Feathery margins
- Perforated Corneal Abscess
Lab Diagnosis

**Bacterial-Smear**
- Gram Stain
- Giemsa Stain
  - Culture
  - Blood Agar
  - Nutrient Agar

**Fungal Smear**
- 10 % KOH
- LPCB mount
- Culture
  - Saboraud’s Agar
    - 25 deg & 37 deg
  - Brain-Heart Infusion Broth

**Anaerobic Org**
- Thyoglycolate broth

**Acanthamoeba**
- Saline smear
- Calcofluor white

- Gram Positive Cocci
- Gram Negative Rods
- Filamentous Hyphae on KOH
- Colonies of Fungal growth
- Acanthamoeba Cyst
Treatment Protocol

Control of Infection with appropriate drugs is based on

- Clinical judgment
- Findings of Smear report
- Culture and Sensitivity report

Along with

Supportive Therapy

- Oral Analgesics/NSAIDS
- Oral Acetazolamide and Local Anti-Glaucoma agents
- Atropine eye ointment 1%
- Septidine 5%
- Protection of the eye from the environment with dark glasses
- Therapeutic Contact Lens
- Control of DM / HIV
- Tear substitutes
- Treatment of - Local conditions viz. Dacryocystitis, Trichiasis etc
  - Systemic conditions viz. Malnutrition, Diabetes
## Treatment Anti-Microbials

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Organism Name</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anti-Bacteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobramycin</td>
<td>Broad Spectrum</td>
<td>Topical 0.3%, S/C 20 mgm in 0.5ml.</td>
</tr>
<tr>
<td></td>
<td>Gram Negative Rods</td>
<td></td>
</tr>
<tr>
<td>Amikacin</td>
<td>Gram Negative Rods</td>
<td>Topical 8mgm/ml, S/C 20 mgm in 0.5 ml.</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>Gram Positive Cocci</td>
<td>Topical 15 - 50 mgm/ml, S/C 25 mgm in 0.5 ml.</td>
</tr>
<tr>
<td>Fluroquinolones</td>
<td>Broad Spectrum</td>
<td>Topical 0.5%, S/C 3 mgm/ml.</td>
</tr>
<tr>
<td></td>
<td>Gram Negative Rods/Cocci</td>
<td></td>
</tr>
<tr>
<td>Cefixime</td>
<td>Broad Spectrum</td>
<td>Orally 8mgm/kg body weight per day</td>
</tr>
<tr>
<td>Cefazolin</td>
<td>Broad Spectrum</td>
<td>Topical 50 mgm/ml, S/C 100 mgm in 0.5 ml.</td>
</tr>
<tr>
<td></td>
<td>Gram Positive Cocci</td>
<td></td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>Gram Negative Rods/Cocci</td>
<td>Topical 50 mgm/ml, S/C 100mgm in 0.5 ml.</td>
</tr>
<tr>
<td>Ceftriaxone</td>
<td>Gram Negative Cocci</td>
<td>Topical 50 mgm/ml, S/C 100 mgm in 0.5 ml.</td>
</tr>
<tr>
<td><strong>Anti-Protozoal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHMB/ Chlorhexidine</td>
<td>Acanthamoeba</td>
<td>Topical 0.02%</td>
</tr>
<tr>
<td><strong>Anti-Fungals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluconazole</td>
<td>Broad Spectrum</td>
<td>Topical 0.3%, Orally 150 mg/d, 1 to 2 tablets per day</td>
</tr>
<tr>
<td></td>
<td>Candida</td>
<td>Topical 1%</td>
</tr>
<tr>
<td></td>
<td>Aspergillus</td>
<td></td>
</tr>
<tr>
<td>Voriconazole</td>
<td>Candida</td>
<td>Topical 1%</td>
</tr>
<tr>
<td></td>
<td>Aspergillus</td>
<td></td>
</tr>
<tr>
<td>Natamycin</td>
<td>Fusarium</td>
<td>Topical 5%</td>
</tr>
<tr>
<td></td>
<td>Aspergillus</td>
<td></td>
</tr>
<tr>
<td>Amphotericin B</td>
<td>Candida</td>
<td>Administration is every 30 minutes for the first 24 hours, every hour for the second 24 hours, and then is slowly tapered</td>
</tr>
<tr>
<td></td>
<td>Other filamentous fungi</td>
<td></td>
</tr>
<tr>
<td>Nystatin</td>
<td>Candida</td>
<td>Topical 1%</td>
</tr>
<tr>
<td>Itroconazole</td>
<td>Broad Spectrum</td>
<td>Topical 1%</td>
</tr>
</tbody>
</table>
Treatment

Treatment of Indolent and Progressive ulcers

- Systemic Treatment: Cefixime 200mgm. Intravenous Tobramycin, Amikacin, Oral Fluconazole etc
- Sub-Conjunctival Antibiotics /Antifungal for imminent scleral spread or where compliance to medications is questionable.
- Collagen shield or soft contact lenses soaked in antibiotics are sometimes used to enhance drug delivery.
- The Eye is Re-evaluated for Drug toxicity and Non-infectious causes.
- Unusual organisms such as Non-tubercular Mycobacteria, Nocardia or Acanthamoeba are ruled out.
- Debridement of Necrotic Corneal Stroma. Scraping of ulcer floor followed by cauterization with pure (100%) carbolic acid or 10-20% trichloracetic acid or 5% Povidone Iodine

Treatment of Keratocele/Descemetocele or Perforation

- In addition to Local and Systemic Antimicrobials the following may be done
- Systemic acetazolamide, bandage contact lens, atropine, topical antiglaucoma medication, Use of tissue adhesive (Glue): N-butyl 2-ethyl cyanoacrylate
- Therapeutic Penetrating Keratoplasty
- Conjunctival Flap
Sequential healing Pattern

Corneal ulcer with Hypopyon (Fungal)

Mixed Corneal Abscess (Fungal + Bacterial)

Mixed Corneal Abscess (Fungal + Acanthamoeba)
In Conclusion

- It is a challenge to successfully treat Mixed Infections from Rural Areas as
  - There is extensive Agricultural exposure,
  - There is a lack of prompt expert medical care
  - There are a host of predisposing factors

- The success is significant only if
  - The microbes can be identified early (Clinically or in the Laboratory) - i.e. before significant visual loss.
  - The Medications are used sparingly and correctly to get adequate dosages without significant side effects.
  - Complications and Recurrences are prevented.


