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Predisposing Factors, Microbial Characteristics, and Clinical Outcome of Microbial Keratitis in Hong Kong: A 10-Year Experience

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All authors have no proprietary interests in the materials discussed in this presentation
Background

Microbial keratitis

• Knowledge of microbial distribution and antibiotic susceptibility pattern essential to guide initial treatment before corneal scraping results available
• Geographical variations exist
  → Local epidemiological data essential

Purpose

• To study the predisposing factors, microbial characteristics and clinical outcome of microbial keratitis in a tertiary centre in Hong Kong in the past 10 years
Method

- Retrospective study
- Period: Jan 2004 – Dec 2013 (10 years)
- Venue: Queen Mary Hospital, Hong Kong
- All corneal scrapings results reviewed
  - Culture results
  - Antibiotic susceptibility patterns
- Case notes review
  - Risk factors
  - Presenting features
  - Clinical outcome
Result (1) – Culture Results

- Total scraps: **347**
- Age: 46 +/- 21
- **32.3%** culture positive
- 130 micro-organisms
- 4.6% polymicrobial

**Overall most prevalent:**
1. Coagulase-negative *Staphylococcus*
2. *Pseudomonas*
3. *Staphylococcus aureus*

- **90.8%** Bacteria
  - **57.6%** Gram-positive
    - 50% coagulase-negative *Staphylococcus*
    - 25% *Staphylococcus aureus*
  - **42.4%** Gram-negative
    - 66% *Pseudomonas*

- **9.2%** Fungus
  - **33%** *Fusarium*
Result (1) – Culture Results

No shifting trends observed:
Gram-positive: $p=0.634$, $r=0.172$
Gram-negative: $p=0.722$, $r=-0.129$
Result (2) – Antibiotic Susceptibility

- Overall:
  - Fluoroquinolones: 93.6% (tested in 47 Gram -isolates)
  - Aminoglycoside:
    - Overall 88% (tested in 92 isolates)
    - Gram – only: 93.3% (45 tested)
  - Ceftazidime: 100% (tested in 38 Gram – isolates)

- For *Pseudomonas*:
  - 100% susceptibility to all commonly employed agents:
    - Fluoroquinolones
    - Aminoglycosides
    - Ceftazidime

- For *S. aureus*:
  - Only 1 case *MRSA* (5.9%)
Result (2) – Antibiotic Susceptibility

Figure 2. Susceptibility and resistance to fluoroquinolone, vancomycin, gentamicin, cefuroxime, ceftazidime, and fusidic acid in bacterial isolates tested.
82.3% cases had at least 1 identifiable risk factors.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>% of cases</th>
<th>age</th>
<th>% culture positive rate</th>
<th>Commonest growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact-lens wear</td>
<td>42.7%</td>
<td>28.4</td>
<td>34.2</td>
<td><em>Pseudomonas</em></td>
</tr>
<tr>
<td>2. Keratopathies / Ocular surface diseases</td>
<td>31.5%</td>
<td>58.0</td>
<td>52.3</td>
<td>Coagulase-negative <em>Staphylococcus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>3. Systemic conditions*</td>
<td>18.5%</td>
<td>62.4</td>
<td>56.3</td>
<td>Coagulase-negative <em>Staphylococcus</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>4. Traumatic</td>
<td>10.4%</td>
<td>40.3</td>
<td>22.2</td>
<td><em>Staphylococcus aureus</em></td>
</tr>
</tbody>
</table>

*immunocompromised state or mental illness resulting in poor self-care. Includes: diabetes mellitus, end-stage malignancy, chronic renal or liver impairment, bed-bound or institutionalized patients (incapable of self-care), chronic steroid therapy
Result (4) – Clinical Presentation

- **Lesion size**
  - 87.6% ulcer < 3mm
  - 12.4% ulcer > 3mm

- **Hypopyon**
  - 13% cases
    - Significantly associated with *Pseudomonas*
    - 48.3% in *Pseudomonas* vs 13.5% in non-*Pseudomonas*, p <0.0005 (chi-square test)

- **Treatment regime**
  - 91.5% started topical fluoroquinolones as first line
    - 38% of these combined with aminoglycosides
  - 6.5% started with combined fortified antibiotics (ceftazidime plus tobramycin or vancomycin).

- **90% cases good initial response**
  - Improvement in pain, infiltrate size, epithelial defect size or amount of hypopyon
  - 12% cases needed to step up treatment

- **lack of treatment response after 48-72 hours,**
  - or guided by the antibiotic susceptibility result
Result (5) – Clinical Outcomes

• 90.7% good outcome
  – resolved keratitis without loss in VA

• 9.3% poor outcome
  – dropped VA
  – serious complication
    • Endophthalmitis: 2
    • Therapeutic PK: 1
    • Enucleation: 1

• Associated with poor outcome (dropped VA)
  – Age (average 62.7 in poor outcome cases), p=0.05
  – Traumatic, p=0.009
  – Larger presenting lesion size, p=0.044

*Univariate logistic regression
Conclusion

• Slightly Gram-positive predominant

• Commonest:
  – Coagulase-negative *Staphylococcus*
  – *Pseudomonas*
  – *Staphylococcus aureus*

• No shifting trend in the isolate distribution nor emergence of resistant strains in the past 10 years

• Commonest risk factor: Contact lens-wear
  – *Pseudomonas* being the most frequent isolate in this group.

• *Pseudomonas* remained 100% susceptible to fluoroquinolones, aminoglycosides and ceftazidime

• Risk factors for poor outcome:
  – Age
  – Traumatic keratitis
  – Large presenting ulcer size
THANK YOU

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