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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
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

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

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