Correlation between the Treatment Result and Causative Bacteria in Amputation of Diabetic Foot

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My disclosure is in the Final AOFAS Mobile App.
I have no potential conflicts with this presentation.
Purpose

- To evaluate correlation between the clinical results and causative bacteria in diabetic foot patients with lower extremity amputation
Materials and Methods

- 129 patients, 131 feet
  - Male : 81 / Female : 48
  - Rt. foot : 72 / Lt. foot : 59
- Mean Age : 68.3 years (51~89)
- Mean F/U : 31 months (12~64)
- Mean duration of diabetes : 14.1 years (1~28)
- Mean preop. BST : 212 mg/dL (105~514)
- Mean preop. HbA1c : 8.65% (5.6~15.9)
- Medication
  - Oral : 74 patients,
  - Insulin inject : 34 patients
  - Combination : 21 patients
Materials and Methods

- **Severe systemic disease** was excluded
  - sepsis, malignant neoplasm, severe heart failure, severe grade of chronic kidney disease & liver cirrhosis

- **Angio CT**
  - for evaluation of lower limb vascularity
  - 12 patients excluded
d/t arterial stenosis or occlusion

- Tissue specimens or material obtained from the bottom of a washed wound
- **Abscess aspiration**

- **Gram staining** and **Culture** for microbial sensitivity
Materials and Methods

In culture,

- MSSA: 34
- MRSA: 24
- Enterobacter cloacae: 12
- Pseudomonas aeruginosa: 10
- Enterococcus faecalis: 12
- Mixed infection: 14
- Other microorganisms: 8

- Escherichia coli (3)
- Acinetobacter baumannii (2)
- Serratia marcescens (1)
- Klebsiella pneumonia (2)
- Proteus vulgaris (1)
- Enterobacter aerogenes (2)
Materials and Methods

Mixed infection : 14 cases

- *Acinetobacter baumannii* + *Enterococcus faecalis*: 3 cases
- *Acinetobacter baumannii* + *Proteus mirabilis*: 2 cases
- *Acinetobacter baumannii* + *Serratia marcescens*: 2 cases
- *Staphylococcus aureus* + *Klebsiella pneumoniae*: 2 cases
- *Acinetobacter baumannii* + *Streptococcus pneumoniae*: 2 cases
- *MRSA* + *Enterobacter cloacae*: 1 case
- *Staphylococcus aureus* + *Enterobacter cloacae*: 1 case
- *Escherichia coli* + *Enterobacter cloacae*: 1 case
Results

→ More major amputation in mixed infection group

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Major (n)</th>
<th>Minor (n)</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSA</td>
<td>2</td>
<td>32</td>
<td>34</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>MRSA</td>
<td>4</td>
<td>19</td>
<td>24</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>6</td>
<td>8</td>
<td>14</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>No growth</td>
<td>0</td>
<td>17</td>
<td>17</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>
Results

More complication in mixed infection group

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Necrosis/Reinfection (n)</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSA</td>
<td>2/5</td>
<td>34</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>MRSA</td>
<td>4/8</td>
<td>24</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>4/6</td>
<td>14</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Enterobacter cloacae</td>
<td>0/1</td>
<td>12</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>0/2</td>
<td>10</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>0/1</td>
<td>8</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>No growth</td>
<td>0/1</td>
<td>17</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>
**Results**

- Longer duration of treatment in mixed infection group

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Duration of treatment (days)</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSSA</td>
<td>37.5</td>
<td>34</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>MRSA</td>
<td>41.5</td>
<td>24</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Mixed infection</td>
<td>53.4</td>
<td>14</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>36.8</td>
<td>12</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>35.5</td>
<td>10</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>34.7</td>
<td>8</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>No growth</td>
<td>32.5</td>
<td>17</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>
Discussion & Conclusion

In this study,

- **Mixed infection - treatment duration**
  
  longer than other microorganism groups: 53.4 days

- **Incidence of major amputation, complication**
  
  More in mixed infection group

- **The predominance of *S. aureus*** is in agreement with the results of previous reported studies
  
  *S. aureus*: 58/114 (50.9%)
  
  - MSSA: 34 cases (29.8%)
  
  - MRSA: 24 cases (21.1%)

- **The most common pathogen** in diabetic foot patients with lower extremity amputation was *Methicillin-sensitive Staphylococcus aureus*

- **Mixed bacterial infected patients** have higher major amputation and complication rate, longer duration of treatment than the other bacterial infected patients group
References


