Efficiency of Microbiological Studies in the Diagnosis of Foot & Ankle Infections
Description of a Culture Technique

P. Mery ¹, I. Klaber ², P. Gras ², A. Villa ¹, J. Filippi ¹, J. Briceño ¹

¹Foot & Ankle Surgery. Orthopaedics & Trauma Department
²Orthopaedics & Trauma Department

Pontificia Universidad Católica de Chile
Disclaimer

Our disclosure is in the Final AOFAS Program Book. We have no potential conflicts with this presentation.
Introduction

- Osteoarticular infections (OAI) require proper etiological diagnosis is essential to get a successful outcome
  
  - It is reported that the use of blood culture bottles containing enriched liquid media with charcoal-based substances for absorption of antibiotics, like pediatric FAN blood culture bottle (PFBCB), had many advantages than cultures in regular media
  
  - Better sensitivity to detect bacteria in comparison with solid media
  
  - Growing of bacteria despite ongoing or previous antibiotic treatment
  
  - Growing of fastidious bacteria
  
  - Bone/Sinovial tissue homogenated sample can be used

Lipsky BA et al. Diagnosis and treatment of diabetic foot infections
Plast Reconstr Surg 2006

Moumou K et al. Bacterial etiology of acute osteoarticular infections in children
Acta Paediatr 2005

Garcia P et al. Rendimiento del estudio microbiológico en el diagnóstico de infecciones osteoarticular
Rev Chil Infect 2000

Krisher KK et al. Comparison of the BacT/Alert PF Pediatric FAN Blood Culture Bottle with the Standard Pediatric Blood Culture Bottle, the Pedi-BacT
J Clin Microbiol 2001

MMWR Morb Mortal Wkly Rep. 2004

Ferroni A et al. Prospective survey of acute osteoarticular infections in a French paediatric orthopedic surgery unit
Clin Microbiol Infect 2013
Introduction

- Few studies evaluating the use of PFBCB in OAI
  - None in OAI of foot & ankle / Diabetic foot


- Improvement in detection of bacteria in OAI of foot & ankle with PFBCB?

Objective

To evaluate the efficiency of pediatric FAN blood culture bottle (PFBCB) vs regular culture media (RCM) in the detection of bacteria in bone tissue samples of OAI of the foot & ankle
Material & Method

- Retrospective evaluation of patients operated with the diagnosis of foot & ankle OAI between 2008 and 2014 in one medical center
  - Compatible clinical history and physical findings, laboratory workout and diagnostic images
  - 49 cases

- In all cases, 2 samples of bone tissue, representative of the site of OAI, were sent to microbiological workout
  - One bone sample in RCM for aerobic culture
  - One bone sample homogenated in saline in sterile fashion by the surgical team, and injected with a 14G catheter in PFBCM
Material & Method
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Material & Method

• Sample size was calculated using an Alpha value of 0.05 and power of 0.80
  • Minimum of 40 cases

• Reported sensitivity of 60% for RCM and 75% for PFBCB cultures

• Registration of
  • Number of positive cultures
  • Number of bacteria detected
  • Type of bacteria detected

• Paired sample Student’s t-test was used to compare mean number of bacteria detected

• Sensitivity of each culture media was calculated
  • McNemar’s test was used to compare sensitivities

*Moumle K et al. Bacterial aetiology of acute osteoarticular infections in children
Acta Paediatr 2005*
Results

Mean of detected bacteria in PFBCB was 1.7 vs 1.36 in RCM (p<0.05)

Sensitivity of PFBCB culture was 96% vs 83.7% in RCM

McNemar’s test p < 0.024
In 6/8 cases of negative cultures in RCM, PFBCB cultures detected 1 or more bacteria

PFBCB
- Staphylococcus aureus
- Pantoea, Bacillus
- Staphylococcus aureus
- Pseudomona aeruginosa
- Bacillus spp No grupo cereus
- Corynebacterium spp

In 16/41 of the positive RCM cultures, PFBCB cultures detected additional bacteria

Additional bacteria detected with PFBCB

<table>
<thead>
<tr>
<th>Additional bacteria detected with PFBCB</th>
<th>Number of additional bacteria detected in relation to RCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudomona aeruginosa</td>
<td>1</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>1</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1</td>
</tr>
<tr>
<td>Bacillus spp</td>
<td>1</td>
</tr>
<tr>
<td>Bacillus spp</td>
<td>1</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>1</td>
</tr>
<tr>
<td>Bacillus spp cereus group</td>
<td>1</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>1</td>
</tr>
<tr>
<td>Staphylococcus aureus, Staphylococcus (-) coagulase</td>
<td>2</td>
</tr>
<tr>
<td>Proteus mirabilis, enterococcus faecalis</td>
<td>2</td>
</tr>
<tr>
<td>Staphylococcus (-) coagulase, Staphylococcus simulans</td>
<td>2</td>
</tr>
<tr>
<td>Enterococcus spp, Staphylococcus (-) coagulase</td>
<td>2</td>
</tr>
<tr>
<td>Enterococcus faecalis, Corynebacterium spp</td>
<td>2</td>
</tr>
<tr>
<td>Staphylococcus epidermidis, Bacillus sp non cereus group</td>
<td>2</td>
</tr>
<tr>
<td>Alcaligenes faecalis, Acinetobacter baumannii</td>
<td>2</td>
</tr>
<tr>
<td>Escherichia coli, Enterococcus faecalis, Alcaligenes faecalis</td>
<td>3</td>
</tr>
</tbody>
</table>

Mean of 1,5 additional bacteria detected (range 1-3)
Conclusion

The PFBCB cultures for bone samples in foot & ankle OAI had better sensitivity than RCM cultures.

The PFBCB cultures can detect additional bacteria to the ones detected in positive RCM cultures.

Thus, the use of PFBCB can change the antibiotic treatment of foot & ankle OAI, improving patient results.
References