Microbiological Epidemiology in Patients Experiencing Microbiological or Clinical Failure Following Reimplantation After a 2-stage Exchange Strategy for Hip or Knee Prosthetic Joint Infection (PJI)

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Background

Patients with late PJI are at risk for superinfection at the time of reimplantation. Different commercially available antibiotic-loaded cements (gentamicin, vancomycin, gentamicin+clindamycin [G+C], gentamicin+vancomycin [G+V]) could be used for the fixation of the new prosthesis and could be effective to treat or prevent superinfection. We aim to determine the microbiological epidemiology in patients experiencing failure following reimplantation to establish, based on the drug susceptibilities, which cement could be the most active.

Method

Prospective cohort study including all patients qualifying for a 2-stage exchange between 2013-2015 in the CRIOAc Lyon (Centre de Référence pour les Infections Ostéoarticulaires Complexes). Microbiological failure was defined by positive culture at the time of reimplantation (≥2 positive samples were required for Propionibacterium spp, Corynebacterium spp and coagulase-negative Staphylococci [CoNS] such as methicillin-resistant S. epidermidis [MRSE]). Clinical failure was defined by patients presenting clinical signs of infection after the reimplantation, that required a new surgery.

Results

117 patients were included (median age 70 years) with 57 hip (49%) and 60 knee (51%) PJI.

Among them, 14 experienced a treatment failure (table 1).

Based on the usual antimicrobial activity and antibiograms, considering the use of a vancomycin-loaded cement, this antibiotic was inactive on C. albicans (n=3) and Gram-negative isolates (n=5). Considering the use of gentamicin, this antibiotic was inactive on C. albicans (n=3) and 5 bacterial isolates. These 5 latter isolates were also not susceptible to clindamycin. Considering the use of gentamicin+vancomycin, this combination was inactive on C. albicans (n=3) and only 1 bacterial isolate: a gentamicin-resistant K. pneumonia. As a consequence, we calculate the rate of potential activity of each antibiotic-loaded cement to treat or prevent superinfection (table 2)

Table 1. Microbiological epidemiology in patients experiencing a treatment failure

<table>
<thead>
<tr>
<th>Type of antibiotic-loaded cement</th>
<th>Potential activity to treat or prevent superinfection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gentamicin</td>
<td>42.9%</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>42.9%</td>
</tr>
<tr>
<td>G+C</td>
<td>42.9%</td>
</tr>
<tr>
<td>G+V</td>
<td>71.4%</td>
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</tbody>
</table>

Table 2. Potential activity to treat or prevent a superinfection depending on the antibiogram

Conclusions

Considering the commercially available antibiotic-loaded cements and the microbiological epidemiology of patients experiencing microbiological or clinical failure following reimplantation: (i) none of the C. albicans superinfection could be locally treated; (ii) the gentamicin+vancomycin-loaded cement could treat or prevent most bacterial superinfections.
