Postoperative spondylodiscitis due to *Kytococcus schroeteri* in a diabetic woman

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*Kytococcus schroeteri*, a Gram-positive coccus, is usually regarded as part of the human skin flora. It has been described in prosthetic valve endocarditis but never as being involved in osteoarticular infections. We report here the first case of a spondylodiscitis due to *K. schroeteri* identified by 16S rRNA gene sequencing.

**Case report**

A 50-year-old untreated type 2 diabetic woman was admitted to the Hôpital Lariboisière in June 2008 for lumbar pain. Eight months earlier, she underwent an L3–L4 discectomy for sciatica. After surgery, nerve root pain disappeared but lumbar pain gradually increased despite treatment with analgesics and non-steroidal anti-inflammatory drugs. On examination, the patient was apyretic and no signs of endocarditis were noted. Laboratory findings showed a moderate increase in erythrocyte sedimentation rate (33 mm h⁻¹) and C-reactive protein level (25 mg l⁻¹), associated with a white blood cell count of 7 × 10⁹ l⁻¹. No valvulopathy was detected by transthoracic echocardiography but magnetic resonance imaging of the lumbar spine disclosed L3–L4 spondylodiscitis. Vertebral biopsies were carried out for microbiological analysis and yielded a micro-organism subsequently identified as *Kytococcus schroeteri*. According to the antimicrobial susceptibility of the micro-organism, antibiotic treatment combining ofloxacin (200 mg t.i.d.) and rifampicin (600 mg t.i.d.) was administered intravenously for the first 2 weeks, and by oral route for the following 4 weeks. A lumbar cast was added. After 6 months, the patient remains clinically well.

**Microbiological methods**

Six sets of blood cultures were drawn, and three vertebral biopsies and two washouts were executed. Discal biopsy tissues were crushed in a mini bead-beater (MM200 Retsch) and cultivated on blood and chocolate agar plates and in brain heart infusion broth. Direct examination of the vertebral biopsies did not show any bacteria, and May-Grünwald Giemsa staining exhibited few neutrophils. Cultures on blood agar plates yielded muddy-yellow, circular, entire, convex, smooth, catalase-positive and oxidase-negative colonies after 72 h at 37 °C under an aerobic atmosphere. All agar plates and brain heart infusion broths were positive. Gram stain performed on colonies showed large Gram-positive cocci in tetrads. The micro-organism was identified with an unreliable profile as *Micrococcus luteus* by the API ID 32 Staph system (bioMérieux). The identification of the isolate was finally performed by 16S rRNA gene amplification as previously described (Fihman *et al.*, 2007). The sequence of the corresponding amplicon (1276 bp) was submitted to the NCBI Database (GenBank accession no. GU180084) and showed more than 99% identity with *Kytococcus schroeteri* (GenBank accession no. AJ297722) (Becker *et al.*, 2002).

Blood cultures remained negative after 6 days. The antibiotic susceptibility of the isolate was tested using standard disc diffusion and MICs were determined using E-test (AB Biodisk) (Table 1). The results were interpreted according to the Clinical and Laboratory Standards Institute guidelines established for staphylococci and identified that the isolate was susceptible to vancomycin, gentamicin, ofloxacin, rifampicin and linezolid but resistant to penicillins, cephalosporins, fosfomycin, erythromycin, clindamycin and cotrimoxazole.

**Discussion**

Infectious spondylodiscitis usually occurs from haematogenous dissemination and is associated with infective endocarditis in 3.7–15% of cases (Le Moal *et al.*, 2002).
Table 1. Antimicrobial susceptibility of the Kytococcus schroeteri isolate

<table>
<thead>
<tr>
<th>Drug</th>
<th>MIC (µg ml⁻¹)</th>
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<tbody>
<tr>
<td>Levofloxacin</td>
<td>0.5</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td>0.032</td>
</tr>
<tr>
<td>Oloxacin</td>
<td>1</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>0.75</td>
</tr>
<tr>
<td>Rifampicin</td>
<td>0.06</td>
</tr>
<tr>
<td>Linezolid</td>
<td>0.19</td>
</tr>
<tr>
<td>Daptomycin</td>
<td>1</td>
</tr>
<tr>
<td>Tigecycline</td>
<td>0.5</td>
</tr>
<tr>
<td>Cotrimoxazole</td>
<td>&gt;32</td>
</tr>
<tr>
<td>Fosfomycin</td>
<td>&gt;1024</td>
</tr>
<tr>
<td>Vancomycin</td>
<td>0.5</td>
</tr>
<tr>
<td>Teicoplanin</td>
<td>0.38</td>
</tr>
</tbody>
</table>

However, no endocarditis was found in our report according to the Duke criteria but chronological features were in agreement with postoperative spondylodiscitis. The incidence of infectious complications in spine surgery can be related to invasiveness of the procedure and spans from less than 1% for microdiscectomy to 12% for an addition of fixation device (Kim et al., 2007; Chaudhary et al., 2007). Besides the surgical aspects, several patient-related factors are linked to the pathogenesis of infection, and criteria such as advanced age, obesity and diabetes mellitus are considered predisposing factors for postoperative infections (Chaudhary et al., 2007). The most common micro-organisms involved in postoperative infections are Staphylococcus aureus (31%), Pseudomonas aeruginosa (11%) and bacteria from the skin commensal flora such as coagulase-negative staphylococci (11%) and anaerobic bacteria (19%), but no micrococci (Cottle & Riordan, 2008).

To our knowledge, this is the first case of spondylodiscitis after surgery due to K. schroeteri, a micro-organism highlighted by the reclassification of the genus Micrococcus. In 1995, the genus Micrococcus was split on the basis of phylogenetic (16S rRNA gene sequencing) and chemotaxonomic (menaquinone composition, peptidoglycan types and cellular fatty acid composition) analysis (Stackebrandt et al., 1995). Hence, the revision of the genus Micrococcus produced five genera: Kocuria, Nesterenkonia, Dermacoccus, Micrococcus and Kytococcus. Kytococcus sedentarius was the only known species described in the genus Kytococcus. In 2002, K. schroeteri was the second Kytococcus species described (Becker et al., 2002), using chemotaxonomic and phylogenetic tools described above. It displayed 97.9% similarity by 16S rRNA gene sequencing with K. sedentarius. Bacteria belonging to the former genus Micrococcus are usually regarded as contaminants from skin and mucous membranes. However, these micro-organisms have already been described in human infectious diseases (Becker et al., 2003) and reclassification of the former genus Micrococcus highlighted micro-organisms with unambiguous pathogenicity, such as K. schroeteri, already reported in five prosthetic endocarditis cases, in one case of fatal pneumonia in an immunocompromised patient, and in a ventriculoperitoneal shunt infection in a child (Aepinus et al., 2008; Becker et al., 2003; Mohammedi et al., 2005; Renvoise et al., 2008; Le Brun et al., 2005; Jourdain et al., 2008). The involvement of this micro-organism, misidentified by conventional identification methods as unspecified Micrococcus, is probably underestimated.

Concerning treatment of infections due to K. schroeteri, all strains hitherto described have been resistant to oxacillin, and patients were administered vancomycin and gentamicin, associated or not with rifampicin (Aepinus et al., 2008; Becker et al., 2003; Mohammedi et al., 2005; Renvoise et al., 2008; Le Brun et al., 2005; Jourdain et al., 2008). In one case of prosthetic valve endocarditis (Aepinus et al., 2008), rifampicin and levofloxacin were given by oral administration following an intravenous treatment as described above. Interestingly, moxifloxacin displayed very low MICs for our strain as well as the one described by Le Brun et al. (2005). Therefore, moxifloxacin seems to be a promising antibiotic in the treatment of infections due to this bacterium. Nevertheless, a combination of ofloxacin and rifampicin, first intravenously and then by the oral route, was successfully used in our postoperative spondylodiscitis patient for a total treatment duration of 6 weeks.

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References


