Leclercia adecarboxylata in an immunocompetent patient

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Leclercia adecarboxylata is a rarely reported human pathogen, most commonly affecting immunocompromised individuals. In reported cases of immunocompetent patients infected with this organism, it is seen exclusively in the context of polymicrobial infections. We report here the case of an abscess in an immunocompetent patient that grew out L. adecarboxylata as a pure culture. The limited literature available on this organism is reviewed, and the potential implication of this finding is discussed.

Introduction

Leclercia adecarboxylata is a motile, Gram-negative rod, formerly identified as Escherichia adecarboxylata (Armentrout & Brown, 1981; Daza et al., 1993; Izard et al., 1985; Leclerc, 1962; Pokhil, 1996; Rice et al., 1991; Richard, 1989; Spierings et al., 1993; Tamura et al., 1986). Although generally sensitive to most antibiotics (Stock et al., 2004; Temesgen et al., 1997), there is a report of resistant strains (Mazzariol et al., 2003).

Since its initial identification in 1962 (Leclerc, 1962), only a score of clinical reports have been published; the majority of affected patients described were immunocompromised in some way (Beltran et al., 2004; Cai et al., 1992; Daza et al., 1993; de Baere et al., 2001; Dudkiewicz & Szewczyk, 1993; Fattal & Deville, 2000; Lee et al., 1999; Longhurst & West, 2001; Martinez et al., 1998; Mazzariol et al., 2003; Otani & Bruckner, 1991; Perez-Moreno et al., 2003; Rodriguez et al., 2001; Sawamura et al., 2005; Temesgen et al., 1997). In those described as previously healthy, the organism was present as part of a post-traumatic polymicrobial infection (Greco et al., 2001; Temesgen et al., 1997). We report here an infection by L. adecarboxylata as the sole pathogen causing infection in an immunocompetent woman.

Case report

A 40-year-old previously healthy female presented to an urgent care clinic with a wound on her right foot. Four weeks previously, she had received a pedicure during which the technician inadvertently nicked her heel with an instrument, leaving a very small, superficial incision. Later, she went swimming in a chlorinated public swimming pool. Over the interval from injury to presentation, a slow-growing abscess developed and subsequently began draining. The patient was a runner, primarily utilizing asphalt surfaces, and the lesion caused her significant discomfort, which prompted the visit to the clinic. Her past medical history was significant only for remote thyroiditis, mitral valve prolapse, a mood disorder and mild pedal oedema. Her current medications were limited to bupropion and hydrochlorothiazide.

Examination revealed she was afebrile, non-toxic, and not in distress. On her heel was a 2 cm bulla with a stellate break in the overlying callous. Localized erythema was present, without significant spread beyond the raised area. The area was slightly tender to palpation. An X-ray showed no periosteal reaction. A small quantity of clear, non-purulent drainage was expressed and cultured. The patient was placed on moxifloxacin empirically; ultimately the culture was reported as showing heavy growth of Leclercia adecarboxylata, which was identified by its biochemical profile and antibiotic susceptibility (Stock et al., 2004) utilizing a Vitek 2 automated microbiological system. No other organisms, aerobic or anaerobic, were present. Because of this organism’s strong association with being immunocompromised, the patient was recalled for an evaluation of comorbidities that could result in a depressed immune status. None was identified. Following the course of antibiotics, the infection resolved without complication or sequela.

Discussion

L. adecarboxylata is a member of the Enterobacteriaceae family, the members of which are regarded as normal flora in the gut of animals, and has been isolated from human stool (Cai et al., 1992). It has also been isolated from the skin of an asymptomatic blood donor (Davenport & Land, 2007) and from a variety of environmental sources, including one strain from an oil-spill site that was capable of utilizing polyaromatic hydrocarbons as its sole carbon source (Sarma et al., 2004). The organism is cosmopolitan,
with cases reported from around the globe (Cai et al., 1992; Daza et al., 1993; Dudkiewicz & Szewczyk, 1993; Greco et al., 2001; Leclerc, 1962; Lee et al., 1999; Martínez et al., 1998; Sawamura et al., 2005; Temesgen et al., 1997). The epidemiological significance of *L. adecarboxylata* is not clear. The paucity of reports of human infection may reflect misdiagnosis, as the organism shares many biochemical features with *E. coli*, rather than a true infrequency of human infection. Increased routine use of antimicrobial susceptibility patterns (Stock et al., 2004) and molecular typing (Woo et al., 2001) in the clinical laboratory will likely reveal a more complete picture of the extent of this organism’s effects on human health.

In at least 12 of the 18 published cases of infection involving this organism, clear evidence of being immuno-compromised was present in the affected patients (Table 1). This led to the suggestion by some authors that it is exclusively an opportunistic pathogen in humans (Mazzariol et al., 2003; Stock et al., 2004). An unusual feature of this organism is its frequent association with polymicrobial infections (de Baere et al., 2001; Lee et al., 1999; Longhurst & West, 2001; Rodriguez et al., 2001; Sawamura et al., 2005; Temesgen et al., 1997), particularly in previously healthy, immunocompetent patients.

Referring to Table 1, the association between a lack of any known immunodeficiency and the presence of polymicrobial cultures is striking. It suggests that *L. adecarboxylata* is dependent on the presence of other pathogens in order to cause disease. This raises the possibility that some synergism exists between the organisms, enhancing the virulence of *L. adecarboxylata*. Further study is needed to elucidate whether this is the case, and if so, whether it is due to modification of the microenvironment or the transfer of genetic factors via the well-known promiscuity of Gram-negative bacteria.

The infection reported in this case is of interest in that it is believed to be the first report in the literature of a pure culture – without other coinciding pathogens – of *L. adecarboxylata* from a wound infection of an immunocompetent patient. The success of this strain in infecting a healthy individual without the apparent aid of other organisms suggests that it may possess unique virulence

Table 1. Association between immune status and polymicrobial cultures in *L. adecarboxylata* infections

<table>
<thead>
<tr>
<th>Immune Deficiency</th>
<th>Culture Source</th>
<th>Bacterial/fungal co-infection</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Blood</td>
<td><em>Staphylococcus aureus</em></td>
<td>Temesgen et al. (1997)</td>
</tr>
<tr>
<td>None</td>
<td>Wound</td>
<td><em>Enterobacter cloacae</em>, <em>Citrobacter freundii</em>, <em>Klebsiella pneumoniae</em>, <em>Stenotrophomonas maltophilia</em>, <em>Corynebacterium</em>, <em>Acremonium</em>, <em>Penicillium</em>, <em>Mucor</em>, <em>Enterococcus</em>, <em>Geotrichum</em></td>
<td>Temesgen et al. (1997)</td>
</tr>
<tr>
<td>None</td>
<td>Wound</td>
<td><em>Acinetobacter calcoaceticus</em>, <em>Enterobacter agglomerans</em></td>
<td>Temesgen et al. (1997)</td>
</tr>
<tr>
<td>None</td>
<td>Wound</td>
<td><em>Escherichia coli</em>, <em>Klebsiella oxytoca</em>, <em>Haemophilus influenzae</em></td>
<td>Temesgen et al. (1997)</td>
</tr>
<tr>
<td>None</td>
<td>Wound</td>
<td><em>Staphylococcus epidermidis</em></td>
<td>Greco et al. (2001)</td>
</tr>
<tr>
<td>None</td>
<td>Wound</td>
<td><em>Shewanella putrefaciens</em>, <em>Enterobacter cloacae</em>, <em>Group B streptococcus</em></td>
<td>Greco et al. (2001)</td>
</tr>
<tr>
<td>Infant with intestinal atresia, on parenteral nutrition</td>
<td>Blood</td>
<td>None</td>
<td>Otani &amp; Bruckner (1991)</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>Blood</td>
<td>None</td>
<td>Daza et al. (1993)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Wound</td>
<td>None</td>
<td>Beltran et al. (2004)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Wound</td>
<td>None</td>
<td>Martinez et al. (1998)</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Sputum</td>
<td>None</td>
<td>Temesgen et al. (1997)</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Blood</td>
<td><em>Escherichia hermannii</em></td>
<td>Lee et al. (1999)</td>
</tr>
<tr>
<td>Dialysis</td>
<td>Peritoneal fluid</td>
<td>None</td>
<td>Fattal &amp; Deville (2000)</td>
</tr>
<tr>
<td>Dialysis</td>
<td>Peritoneal fluid</td>
<td><em>Acinetobacter lwoffii</em></td>
<td>Rodriguez et al. (2001)</td>
</tr>
<tr>
<td>Renal transplant</td>
<td>Urine</td>
<td>None</td>
<td>Woo et al. (2001)</td>
</tr>
<tr>
<td>Renal transplant</td>
<td>Blood</td>
<td>None</td>
<td>Greco et al. (2001)</td>
</tr>
<tr>
<td><em>Candida</em> sepsis</td>
<td>Gall bladder</td>
<td>None</td>
<td>de Baere et al. (2001)</td>
</tr>
<tr>
<td><em>Candida</em> sepsis</td>
<td>Blood</td>
<td>None</td>
<td>de Baere et al. (2001)</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>Blood</td>
<td><em>Staphylococcus aureus</em></td>
<td>Longhurst &amp; West (2001)</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>Blood</td>
<td>None</td>
<td>Mazzariol et al. (2003)</td>
</tr>
<tr>
<td>Unknown (undiagnosed chronic diarrhoea)</td>
<td>Synovial fluid</td>
<td>None</td>
<td>Perez-Moreno et al. (2003)</td>
</tr>
<tr>
<td>Bladder malignancy</td>
<td>Urine</td>
<td><em>Enterococcus faeaeis</em></td>
<td>Sawamura et al. (2005)</td>
</tr>
<tr>
<td>Not reported</td>
<td>Stool</td>
<td>Not reported</td>
<td>Cai et al. (1992)</td>
</tr>
<tr>
<td>Not reported</td>
<td>Cardiac valve</td>
<td>Not reported</td>
<td>Dudkiewicz &amp; Szewczyk (1993)</td>
</tr>
</tbody>
</table>
factors that are absent from those strains responsible for the earlier reported cases. The day the culture results were reported, efforts were made to acquire a specimen for further biochemical and molecular analysis. Tragically, the culture had already been discarded by the clinical laboratory, per their routine practice for Enterobacteriaceae isolates.

References


