Case Report

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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; Martinez *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 immunocompromised 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

Immunodeficiency	Culture source	Bacterial/fungal co-infection	Reference
None	Blood	<i>Staphylococcus aureus</i>	Temesgen <i>et al.</i> (1997)
None	Wound	<i>Enterobacter cloacae</i> , <i>Citrobacter freundii</i> , <i>Klebsiella pneumoniae</i> , <i>Stenotrophomonas maltophilia</i> , <i>Corynebacterium</i> , <i>Acremonium</i> , <i>Penicillium</i> , <i>Mucor</i> , <i>Enterococcus</i> , <i>Geotrichum</i>	Temesgen <i>et al.</i> (1997)
None	Wound	<i>Acinetobacter calcoaceticus</i> , <i>Enterobacter agglomerans</i>	Temesgen <i>et al.</i> (1997)
None	Wound	<i>Escherichia coli</i> , <i>Klebsiella oxytoca</i> , <i>Haemophilus influenzae</i>	Temesgen <i>et al.</i> (1997)
None	Wound	<i>Staphylococcus epidermidis</i>	Greco <i>et al.</i> (2001)
None	Wound	<i>Shewanella putrefaciens</i> , <i>Enterobacter cloacae</i> , Group B streptococcus	Greco <i>et al.</i> (2001)
Infant with intestinal atresia, on parenteral nutrition	Blood	None	Otani & Bruckner (1991)
Cirrhosis	Blood	None	Daza <i>et al.</i> (1993)
Diabetes	Wound	None	Beltran <i>et al.</i> (2004)
Diabetes	Wound	None	Martinez <i>et al.</i> (1998)
Chemotherapy	Sputum	None	Temesgen <i>et al.</i> (1997)
Chemotherapy	Blood	<i>Escherichia hermannii</i>	Lee <i>et al.</i> (1999)
Dialysis	Peritoneal fluid	None	Fattal & Deville (2000)
Dialysis	Peritoneal fluid	<i>Acinetobacter lwoffii</i>	Rodriguez <i>et al.</i> (2001)
Renal transplant	Urine	None	Woo <i>et al.</i> (2001)
Renal transplant	Blood	None	Greco <i>et al.</i> (2001)
<i>Candida</i> sepsis	Gall bladder	None	de Baere <i>et al.</i> (2001)
<i>Candida</i> sepsis	Blood	None	de Baere <i>et al.</i> (2001)
Leukaemia	Blood	<i>Staphylococcus aureus</i>	Longhurst & West (2001)
Leukaemia	Blood	None	Mazzariol <i>et al.</i> (2003)
Unknown (undiagnosed chronic diarrhoea)	Synovial fluid	None	Perez-Moreno <i>et al.</i> (2003)
Bladder malignancy	Urine	<i>Enterococcus faecalis</i>	Sawamura <i>et al.</i> (2005)
Not reported	Stool	Not reported	Cai <i>et al.</i> (1992)
Not reported	Cardiac valve	Not reported	Dudkiewicz & Szewczyk (1993)

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.

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