Leclercia Adecarboxylata Infection in an Immunocompetent Child

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ABSTRACT

Leclercia adecarboxylata is a motile Gram negative rod that is not often pathogenic in immunocompetent patients. We will present the first case report of a L. adecarboxylata in a pediatric patient with no systemic medical disease and present a detailed literature review.

KEYWORDS: Leclercia adecarboxylata, L. adecarboxylata, Pediatric infection, Rare bacteria

INTRODUCTION

Leclercia adecarboxylata is a motile Gram negative rod that is rarely pathogenic, especially in immunocompetent patients. We present the first case report of a L. adecarboxylata in a pediatric patient with no systemic medical disease. The bacterium was discovered in 1962 by Leclerc but was originally called Escherichia adecarboxylata. Additional, biochemical assessments showed it was a distinct genus, therefore it was renamed Leclercia adecarboxylata in honor of Leclerc. Due to the similarity with Escherichia species, L. adecarboxylata infections may be more common than the literature suggests because until recently bacterial assays often could not distinguish the different bacteria. Additionally, L. adecarboxylata tends to be pan-sensitive to standard antibiotics, empiric therapy would likely treat most infections so definitive speciation is not necessary.

CASE REPORT

A healthy two-year-old boy presented with increasing right thumb swelling and pain after suffering a laceration over the base of his thumb two days prior. The mother reported that the laceration initially appeared as a paper cut that she cleaned with soap and water before applying bacitracin ointment to the wound. The next day his thumb became swollen and painful, and he refused to use his hand. He was evaluated by his primary care doctor who prescribed amoxicillin/clavulanic acid. The following day purulent fluid drained from the wound and the patient was brought to a pediatric emergency department. On examination, the patient was afebrile and vital signs were normal. He had swelling and localized erythema about the thenar eminence that was exquisitely tender to palpation. There was an approximately one centimeter healing laceration over the ulnar base of the thumb with expressible purulence. He was otherwise neurovascularly intact. Hand radiographs showed soft tissue swelling of the volar aspect of the thumb and no evidence of a foreign body. Ultrasound evaluation of the thumb revealed an echogenic, approximately 8 mm, foreign body and significant inflammatory changes but no discrete abscess. In the emergency department, the patient was given intranasal versed and local anesthetic and a bedside incision and drainage was performed. Pus was sent for gram stain and culture. A decision was made not to perform an exploration of the wound in the emergency department for the foreign body given the proximity of the foreign body to neurovascular structures. The wound was left open to drain and placed in a soft dressing.

The patient was admitted and started on intravenous ampicillin/sulbactam and hand soaks were performed, with half parts hydrogen peroxide and saline, three times daily. The patient continued to improve. His swelling and erythema subsided and he was able to use his right hand without pain. He remained afebrile throughout his hospital stay. The gram stain revealed no organisms but on the second hospital day, the cultures grew out 1 + Leclercia adecarboxylata, identified by a VITEK automated microbiological system (BioMérieux, Inc, Durham, NC). Additional microbiologic testing was not done to confirm this identification. Antibiotic susceptibilities was determined by microtiter [Trek Di-agnostic Systems, Cleveland, OH]. The bacteria was pan-sensitive except for intermediate sensitivity for piperacillin/tazobactam.

The patient was transitioned to oral amoxicillin and given his clinical improvement a decision was made not to further explore for the foreign body in the operating room and to allow the body to naturally expel the foreign body. The patient was discharged on hospital day three, on oral amoxicillin and hand soaks three times daily. As an outpatient he failed conservative management and had continued thumb swelling. A repeat ultrasound was obtained which again showed the linear 8mm foreign body. In the operating room a 1 cm Brunner type incision was made at the ulnar thumb base over the visible swelling. After dividing the skin, careful dissection identified the foreign body surrounded by a pseudocapsule. The foreign body was removed and identified as a 1 x 8 mm splinter. The wound was irrigated and closed with 5–0 plain gut suture, followed by Dermabond and a compressive dressing. The patient recovered uneventfully and he has normal function of his thumb.
DISCUSSION

This is the first case of Leclercia adecarboxylata infection in a pediatric patient without serious comorbidities or a central line. Pathologic infections with L. adecarboxylata are rare. There are some trends in terms of infection type and context. The bacteria is most often pathologic in patients with underlying immunosuppression or serious systemic disease. There are scattered reports of it occurring in immunocompetent patients including a positive blood culture in an asymptomatic platelet donor. L. adecarboxylata is often found as a co-infecter, in particular wound infections. Central line infections are also well documented. However, a wide range of infections have been documented including pneumonia and pharyngeal and peritonsillar abscesses.

A recent PubMed search of the literature found only 7 reported cases of L. adecarboxylata infection in children. Most pediatric cases of L. adecarboxylata involve sepsis or bacteremia (See Table 1). Previous cases of L. adecarboxylata involved preterm infants in the NICU or children with leukemia. Other cases involved children with serious co-morbidities including a boy receiving dialysis for end-stage renal disease and a child with history of gastrochisis and required total parenteral nutrition through a central line. There are two reported pediatric deaths from the infection. The first from an infant born at 24 weeks of gestation who died of multiple organ failure following L. adecarboxylata sepsis. Another case involved a 5-year-old with L. adecarboxylata infection that developed cerebral herniation. The latter child died of L. adecarboxylata sepsis but it is unclear if the cerebral herniation was precipitated by disseminated intravascular coagulation or by hemorrhage of the brain stem from septic emboli.

It would be speculative to say how our patient came in contact with the bacterium. Our patient’s course was relatively mild, though he did require surgical intervention despite appropriate antibiotic therapy. The presence of a foreign body in the brain stem is often found as a co-infecter, in particular wound infections. Central line infections are also well documented. However, a wide range of infections have been documented including pneumonia and pharyngeal and peritonsillar abscesses.

Table 1. Case reports of pediatric patients with Leclercia adecarboxylata infections

<table>
<thead>
<tr>
<th>Age</th>
<th>Underlying condition</th>
<th>Type of infection</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-day-old</td>
<td>Ex-26 week infant in NICU</td>
<td>Bacteremia</td>
<td>14-day course of cefotaxime</td>
<td>Survived</td>
</tr>
<tr>
<td>31-day-old</td>
<td>Ex-24 week infant in NICU</td>
<td>Bacteremia/sepsis</td>
<td>21-day course of cefotaxime</td>
<td>Died</td>
</tr>
<tr>
<td>8-month old</td>
<td>Gastrochisis/intestinal atresia (TPN dependent)</td>
<td>Bacteremia</td>
<td>14-day course of ceftazidime and gentamicin</td>
<td>Survived</td>
</tr>
<tr>
<td>11-month old</td>
<td>Acute lymphoblastic leukemia</td>
<td>Bacteremia</td>
<td>10-day course of IV gentamicin and cefazolin</td>
<td>Survived</td>
</tr>
<tr>
<td>5-year old</td>
<td>End-stage renal disease</td>
<td>Peritonitis</td>
<td>10-day course of IV and peritoneal gentamicin and ceftazidime</td>
<td>Survived</td>
</tr>
<tr>
<td>5-year old</td>
<td>Colonic neuropathy, pseudo-obstruction</td>
<td>Sepsis</td>
<td>Ceftriaxone and amoxicillin/ clavulanic acid</td>
<td>Died</td>
</tr>
</tbody>
</table>

Table 2. Emerging antibiotic resistance in Leclercia adecarboxylata

<table>
<thead>
<tr>
<th>Culture source</th>
<th>Country</th>
<th>Resistant</th>
<th>Susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood culture</td>
<td>Greece</td>
<td>Meropenem, imipenem, aztreonam, piperacillin/tazobactam, cefuroxime sodium, cefoxitin, cefazidime, ceftriaxone, cefepime, aztreonam, nitrofurantoin, ciprofloxacin, norfloxacin, fosfomycin, amikacin</td>
<td>Gentamicin, tobramycin, ampicillin, amoxicillin/clavulanate, cefazolin, piperacillin, trimethoprimer/sulphmethoxazole</td>
</tr>
<tr>
<td>Bronchial lavage from female patient with pneumonia</td>
<td>Alabama (United States)</td>
<td>Amikacin, cefazolin, levofloxacin, and piperacillin–tazobactam</td>
<td>Ampicillin, gentamicin, tobramycin, and trimethoprimer-sulphmethoxazole</td>
</tr>
<tr>
<td>Blood of a man with acute myeloid leukemia</td>
<td>Italy</td>
<td>Cefazidime, cefotaxime, aztreonam, and cefepime (produced extended-spectrum beta-lactamase)</td>
<td>Resistance reversed with addition of clavulanic acid</td>
</tr>
<tr>
<td>Hands of health care professionals</td>
<td>Czech Republic</td>
<td>Aztreonam</td>
<td>Cefepime, cefotaxime, cefazidime, piperacillin, piperacillin–tazobactam and meropenem</td>
</tr>
<tr>
<td>Blood from catheter in female with breast cancer</td>
<td>Korea</td>
<td>Carbapenems and quinolones</td>
<td>Aminoglycosides (amikacin, gentamicin, tobramycin), most β-lactams, including broad spectrum cephalosporins (cefotaxime and cefixime) and trimethoprimer-sulphmethoxazole</td>
</tr>
</tbody>
</table>
body likely served as a nidus for infection and for abscess formation. While pathologic infections with *L. adecarboxylylata* are rare, the bacterium is ubiquitous. Our patient lived on a horse farm but our review of the literature found no specific connection between *L. adecarboxylylata* and horses but the bacterium has been found in other farm animals such as cattle\(^\text{21}\), hen's eggs\(^\text{22}\) and as part of the normal gut flora in pigs.\(^\text{23}\) *L. adecarboxylylata* has been isolated from the mouths of sharks\(^\text{24}\) and in the Colorado potato beetle.\(^\text{25}\) It has been found as a contaminant in baby formula sold in Japan.\(^\text{26}\)

While *L. adecarboxylylata* infection is still very rare, it should be considered as a potential human pathogen of concern, as there are reports of antibiotic resistance (see Table 2). Mazzariol et al found a strain that produced an extended-spectrum beta-lactamase (SHV-12) from the blood of a man with acute myeloid leukemia, which made it resistant to aztreonam, cefotaxime and cefazidime.\(^\text{4}\) A sample of *L. adecarboxylylata* cultured from the hands of healthcare professionals in the Czech Republic found a species that was susceptible to aztreonam but resistant to several other commonly used antibiotics.\(^\text{27}\) Other strains are resistant to multiple classes of antibiotics.\(^\text{3}\) Multiple-drug resistant *L. adecarboxylylata* pneumonia has also been reported in Alabama.\(^\text{15}\)

### References


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