

## Case Report

A Case Report of *Leclercia adecarboxylata* Pyogenic ArthritisHitanshu Dave, M.D.<sup>1</sup>, Lawrence Zhou, M.D.<sup>2</sup>, Deva Zamzow, M.D.<sup>3</sup>, Robert R. Wittler, M.D.<sup>1</sup>

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## INTRODUCTION

*Leclercia adecarboxylata* (*L. adecarboxylata*) is recognized as an emerging human pathogen, with most documented infections reported in adults. It is known to cause bacteremia in immunocompromised individuals, and there are few reports of wound infections.<sup>1</sup> However, there is limited documentation of this organism in the pediatric population.

A report by Keyes et al.<sup>2</sup> in 2020 highlighted the scarcity of pediatric cases, revealing only nine cases in comparison to 44 adult cases in a PubMed search using the term "*Leclercia adecarboxylata*." Common infections in the pediatric population have been associated with injuries resulting in cellulitis and/or a retained foreign body. Our case report contributes to the understanding of this emerging pathogen, specifically in the context of septic arthritis following penetrating trauma from a tree branch. Arasu et al.<sup>3</sup> published two cases in 2022 describing *L. adecarboxylata* pyogenic arthritis of the knee in immune-competent children. In both cases, the children sustained injuries involving environmental elements, such as falling onto a tree stump or the edge of a wooden garden wall.<sup>2,3</sup> Surgical interventions, including arthroscopy and debridement, were employed to manage the infections. The literature review in that paper identified only three cases of *L. adecarboxylata* in immune-competent children, all of which presented with cutaneous wound infections managed through surgical debridement and antimicrobial therapy. The reported injuries included a paper laceration, a penetrating injury from environmental debris, and a penetrating injury from a tree trunk.

In expanding the range of reported cases in pediatric literature, our contribution involves detailing a case of pyogenic arthritis in an immune-competent child.

## CASE REPORT

A 5-year-old male, previously in good health, presented to the emergency department (ED) with complaints of right-sided knee pain and fever, leading to his admission to the pediatric unit. Six days prior to admission (PTA), he experienced a fall in a field near his home, resulting in a penetrating injury to his right knee with a stick that he subsequently removed. Five days PTA, he sought medical attention at his primary care physician's office due to persistent right knee pain and swelling, where a normal X-ray was obtained. In response to ongoing pain and swelling four days PTA, he was prescribed amoxicillin/clavulonic acid.

On the day of admission, the patient was brought to the ED with a temperature of 103.1°F, accompanied by persistent pain and swelling in his right knee. A blood culture was collected, and the laboratory work-up revealed a white blood cell count (WBC) of  $6.5 \times 10^3/\mu\text{L}$  with 59% neutrophils and a platelet count of  $327 \times 10^3/\mu\text{L}$ . The C-reactive protein level was elevated at 46.0 mg/L. This clinical presentation raised concerns about a potential septic joint, a serious infection in the pediatric population. Orthopedics was consulted, and arthrocentesis was performed, yielding 5 mL of purulent fluid. The aspirated fluid was inoculated into a blood culture bottle and routine microbiology media. The patient was admitted to the pediatric floor and initiated on intravenous ceftriaxone and vancomycin.

The blood culture bottle inoculated with synovial fluid showed growth in the Enterobacterales order on a multiplex PCR panel. Subsequently, the patient was switched to intravenous meropenem for enhanced gram-negative coverage while awaiting final identification and susceptibilities. The culture ultimately identified *L. adecarboxylata*, susceptible to ampicillin, ampicillin/sulbactam, ceftriaxone, piperacillin/tazobactam, meropenem, and trimethoprim/sulfamethoxazole. A *Bacillus* species grew in the blood culture at 62 hours and was considered a contaminant.

Synovial fluid analysis, obtained during arthroscopic joint debridement and irrigation performed the day after admission, revealed a markedly elevated WBC count of  $234 \times 10^3/\mu\text{L}$ . Fragments of wood were removed during the procedure. The culture showed no growth on routine solid media. The patient clinically improved and was discharged on the fifth day of hospitalization with a prescription for oral amoxicillin/clavulonate to complete a four-week course of treatment.

## DISCUSSION

*L. adecarboxylata* is a motile, gram-negative bacillus belonging to the Enterobacteriaceae family and is infrequently isolated.<sup>4</sup> Widely distributed in nature, *L. adecarboxylata* can be found in water, food, soil, and other environmental sources.<sup>5</sup> It also is a part of the normal flora in human feces. Known to cause cellulitis, bacteremia, septic arthritis, and sepsis, the organism was initially named *Escherichia adecarboxylata* in 1962 but later reclassified as *L. adecarboxylata*.<sup>6,7</sup> Infections with *L. adecarboxylata* are more common in immunocompromised adults, with limited documented cases in the pediatric population including preterm infants in neonatal intensive care units (NICU).<sup>8,9</sup>

We presented a case involving a 5-year-old immunocompetent male who sustained a right knee injury with environmental contamination due to a foreign body penetrating the wound. The patient underwent a right knee aspirate, and the cultured synovial fluid was inoculated into a blood culture, resulting in the growth of *L. adecarboxylata*. Studies have indicated that inoculating a blood culture bottle with synovial fluid is more effective than conventional methods, leading to a higher recovery of pathogens.<sup>10</sup> The liquid blood culture medium, enriched for pathogen growth and containing saponin, aids in releasing phagocytosed microorganisms from white blood cells.<sup>10</sup> *L. adecarboxylata* typically demonstrates susceptibility to penicillin (ampicillin, amoxicillin/clavulanate, piperacillin/tazobactam), cephalosporins (ceftriaxone, cefepime), meropenem, fluoroquinolones (ciprofloxacin, ofloxacin), and trimethoprim-sulfamethoxazole.<sup>11</sup> While most cases of septic

arthritis in the pediatric population result from hematogenous spread, with *Staphylococcus aureus* being the most common organism, septic arthritis from penetrating wounds can have varied etiologies depending on the microbiology of the penetrating object, including bacterial, mycobacterial, and fungal pathogens.<sup>12,13</sup>

*L. adecarboxylata* should be included as a potential pathogen in the differential diagnosis of soft tissue and musculoskeletal infections in immune-competent children with a history of preceding injury. Additionally, consideration of *L. adecarboxylata* is warranted in patients with immune-compromised conditions, such as prematurity, malignancy, and chronic organ dysfunction. Notably, cases of multi-drug-resistant *L. adecarboxylata* have been reported, emphasizing the importance of tailoring antimicrobial therapy based on culture and susceptibility testing.

## CONCLUSIONS

*L. adecarboxylata* is an emerging pathogen with the potential to affect both pediatric and adult populations, spanning immune-competent and immune-suppressed individuals. This case report contributes to the scarce literature on *L. adecarboxylata* infections in the pediatric demographic, highlighting a preference for infections following injuries with lacerations or abrasions, particularly penetrating wounds. The case also underscores the effectiveness of inoculating synovial fluid into a blood culture bottle for improved pathogen recovery.

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