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A Case Report of Cellulitis Caused by *Leclercia adecarboxylata* in a Thai Boy: A Common Infection From a Rare Pathogen

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Leclercia adecarboxylata is a gram-negative bacillus that rarely causes infections in children, especially in Thailand. We report a case of a boy with a wound infection and cellulitis after a punctate injury caused by *L. adecarboxylata*. A previously healthy 12-year-old boy presented with a 2-month history of infected wound and cellulitis on his left sole after a punctate injury in the garden. He experienced recurrent swelling and purulent discharge despite an incision and drainage and a full course of appropriate antibiotics. Plain films of his left foot showed no radiopaque foreign body or evidence of osteomyelitis. *L. adecarboxylata* was isolated from the wound tissue culture. Incision and drainage followed by a 2-week course of oral amoxicillin/clavulanic acid was prescribed which resulted in a complete resolution of the lesion. This case emphasizes the significance of identifying *L. adecarboxylata* as a possible cause of soft tissue infections in Thai children, especially those with a history of puncture wounds. Unusual pathogens should be considered when standard treatments fail to eliminate the infection.

Keywords: *Leclercia adecarboxylata*, Soft tissue infection, Puncture wound

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Introduction

Leclercia adecarboxylata is a facultative anaerobic gram-negative bacillus in the family Enterobacteriaceae. The bacteria exhibit growth in the presence of potassium cyanide and yield positive results for both the oxidase and motility tests.[1, 2] Although infections caused by *L. adecarboxylata* were primarily reported in immunocompromised individuals, mostly in adults in the form of healthcare-associated infections if healthcare devices are present, there has been an increasing recognition of infections in immunocompetent hosts in recent decades.[3, 4] These infections most commonly present as community-acquired skin and soft tissue infections that are associated with exposure to an aquatic environment and penetrating injury. However, the information on *L. adecarboxylata* infections in children and adolescents, particularly those with a normal immune status, is still limited.[3, 5] We present a case of a previously healthy boy from Thailand who presented with a persistent and recurrent wound infection on his left sole, later identified to be caused by *L. adecarboxylata*, a rare pathogen that is not commonly recognized in Thailand.

Case Report

A previously healthy 12-year-old boy presented with a 2-month history of a lesion on his left sole. He had sustained a punctate wound caused by unrecognized material while playing in the garden and was treated with unknown antibiotics at a local hospital. After initial treatment, the wound failed to improve and eventually became painful, swollen, and drained purulent discharge. At the initial visit to our institution, he presented with a tender, erythematous lesion with fluctuation and purulent discharge on his left sole. The patient denied any previous medical conditions. He was clinically diagnosed with subcutaneous abscess. Treatment consisted of incision and drainage of the lesion and a 2-week course of 250 mg of oral dicloxacillin 4 times daily to cover methicillin-susceptible *Staphylococcus aureus* and *Streptococcus pyogenes*, which are common pathogens for community-acquired skin and soft tissue infections. After 2 weeks, the lesion healed with mild residual erythema and swelling.

The patient presented with recurrent swelling and turbid discharge from the lesion 1 week later (Figure 1A). To rule out osteomyelitis or a retained foreign body as a potential underlying cause of the recurrent symptoms, plain films of the left foot were performed. These films revealed mild soft tissue swelling at the plantar side of the left foot with normal joint space, bony alignment, and no evidence of bone destruction or radiopaque foreign body (Figure 2). The patient underwent another incision and drainage with a tissue sample sent for conventional bacterial culture to identify the possible pathogen. A susceptibility test was performed using an automated microbroth dilution technique, using a cut-off value regarding the latest Clinical and Laboratory Standards Institute (CLSI) standards for interpretation. No foreign body was found during the procedure. A 2-week course of oral amoxicillin/clavulanic acid 1000 mg twice daily was empirically prescribed to additionally cover gram-negative bacteria and anaerobes, along with daily wet dressing by healthcare providers to ensure proper wound care.

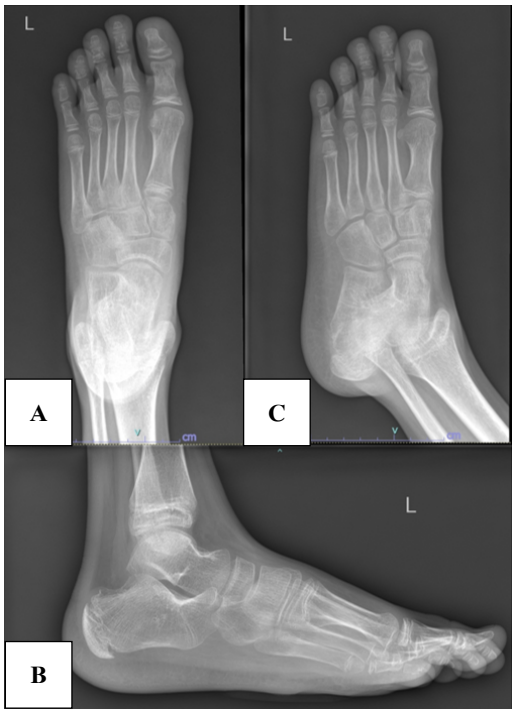
At the 2-week follow-up, the lesion showed significant improvement and almost completely healed (Figure 1B). Tissue culture revealed the presence of *L. adecarboxylata*, which was susceptible to the prescribed antibiotics and other agents (Table 1). The patient continued another 2-week course of oral amoxicillin/clavulanic acid to cover possible coinfection with anaerobic pathogens, and at the 3-week follow-up, the lesion fully healed without any signs of erythema or swelling.

Figure 1. Lesion on the Patient's Left Sole

A, Recurrent lesion on the patient's left sole at 1-week after a complete course of dicloxacillin.

B, Healed lesion on the patient's left sole after a 2-week course of amoxicillin/clavulanic acid.

Figure 2. Plain Films of the Left Foot



A, Anterior-posterior view. B, Lateral view. C, Oblique view.

Table 1. Antibiotic Susceptibility Test Result of *Leclercia adecarboxylata* Isolated in This Report

Antibiotics	MIC	Interpretation
Ampicillin	≤ 8	S
Cefuroxime	≤ 8	S
Cefotaxime	≤ 1	S
Ceftazidime	≤ 1	S
Ceftriaxone	≤ 0.5	S
Cefepime	≤ 1	S
Cefoxitin	≤ 4	S
Doripenem	≤ 0.5	S
Ertapenem	≤ 0.5	S
Imipenem	≤ 0.5	S
Meropenem	≤ 0.5	S
Amikacin	≤ 8	S
Gentamicin	≤ 2	S
Netilmicin	≤ 8	S
Trimethoprim/Sulfamethoxazole	≤ 1	S
Ciprofloxacin	≤ 0.06	S
Levofloxacin	≤ 0.06	S
Colistin	≤ 1	I
Amoxicillin/Clavulanate	≤ 4	S
Ampicillin/Sulbactam	≤ 4	S
Piperacillin/Tazobactam	≤ 8	S

Abbreviations: I, intermediate resistance; MIC, minimal inhibitory concentration; S, susceptible.

Discussion

L. adecarboxylata is a facultatively anaerobic, oxidase-positive, gram-negative bacillus that colonizes in the environment and various animal gastrointestinal tracts, including humans. This bacterium typically demonstrates susceptibility to standard antibiotics.[1, 2, 6-8] The majority of reported cases are confined in adults, particularly those with preexisting health issues including altered immune status and those receiving medical procedures. The infections result in various presentations including bacteremia, pneumonia, soft tissue infection, and the infection associated with retained foreign material or surgical procedure such as peritonitis in patients undergoing peritoneal dialysis, catheter-associated bloodstream infection, and surgical site infection following orthopedic surgery.[3, 9, 10] Infections in immunocompetent adults can be occasionally found worldwide with a soft tissue infection as the most prevalent presentation. Puncture wounds from environmental material and retained foreign bodies are frequently associated with pathogens.[3] The mortality rate from an infection caused by *L. adecarboxylata* is not well established.

The publications of infections caused by *L. adecarboxylata* in children are significantly fewer compared to those in adults (Table 2).[5, 11-26] The majority of infections in children also occur in those with immunosuppression and those with retained medical devices, including both term and preterm neonates admitted in the neonatal intensive care unit.[5, 11-16, 21-23, 25, 26] Infections in children without those risk factors are mostly soft tissue infections associated with puncture wounds or retained foreign material.[5, 17-20, 24] Our patient's presentation included recurrent wound abscesses and a history of puncture wounds, which were similar to the manifestations described by previous case reports.[5, 17-19, 24] Failure of initial treatment options led to further investigations, which resulted in the identification of *L. adecarboxylata* from the infected soft tissue in this particular case. This report is one of the limited publications on community-acquired soft tissue infections caused by *L. adecarboxylata* in children. Although *L. adecarboxylata* can be found ubiquitously in clinical and environmental specimens, there are few reports from Thailand. Chotelersak et al[8] reported the isolation of *L. adecarboxylata* from fecal material of Thai neonates. To the best of our knowledge, this is the first case report of an *L. adecarboxylata* infection in humans in Thailand, which may reflect either underestimation or underdiagnosis of the condition in the country.

Table 2. Publications of Infection Caused by *Leclercia adecarboxylata* in Children

Publication	Patient	Diagnosis	Management	Result
Fattal O,[11] 2000, USA	5-year-old, end stage renal disease on chronic peritoneal dialysis	Peritonitis	IV/IP cefazolin + IV gentamicin then IV/IP ceftazidime + IV gentamicin, total 10 days	Cured
Longhurst CA,[12] 2001, USA	11-month-old, acute lymphoblastic leukemia	Bacteremia	IV gentamicin + cefazolin 10 days	Cured
Myers KA,[13] 2011, USA	16-day-old, preterm 26 weeks, in NICU	Bacteremia	IV cefotaxime 14 days	Cured
Shah A,[14] 2011, Canada	8-year-old, acute lymphoblastic leukemia, bitten by a bug	Ecthyma gangrenosum, cellulitis	IV cefepime + vancomycin + gentamicin 5 days then PO clindamycin + ciprofloxacin 2 weeks	Cured
Sethi K,[15] 2012, USA	5-year-old, intestinal inertia, central venous catheter use	Bacteremia, brainstem hemorrhage	IV ceftriaxone	Died
Nelson MU,[16] 2013, USA	31-day-old, preterm 24 weeks, in NICU	Bacteremia	IV cefotaxime 21 days	Died
Hurley EH,[17] 2015, USA	2-year-old, retained foreign body in a laceration wound	Infected wound, cellulitis	IV ampicillin/sulbactam then PO amoxicillin/clavulanate, foreign body removal	Cured
Grantham WJ,[18] 2015, USA	9-year-old, retained foreign body in a penetrating injury on a corn field	Infected wound, cellulitis	PO levofloxacin 14 days, foreign body removal	Cured
Capretta N,[19] 2017, USA	9-year-old, avulsion laceration in park	Infected wound, cellulitis	IV ampicillin/sulbactam then PO amoxicillin/clavulanate, total 2 weeks	Cured
Broderick A,[20] 2019, USA	12-year-old, swimming in chlorinated public pool	Folliculitis	PO ciprofloxacin 3 weeks	Cured
Sanchez-Codez M,[21] 2019, USA	11-year-old, mitochondrial neurogastrointestinal encephalopathy, central venous catheter use	Catheter related blood stream infection	IV cefotaxime + amikacin	Cured
Hassan I,[22] 2020, Spain	7-year-old, nephrotic syndrome on steroid use	Peritonitis	IV ceftriaxone 7 days then PO antibiotic	Cured
Courtois MF,[23] 2020, Argentina	8-year-old, acute lymphoblastic leukemia, central venous catheter use	Catheter related blood stream infection	IV ceftriaxone + amikacin	Cured

Table 2. Publications of Infection Caused by *Leclercia adecarboxylata* in Children (Continued)

Publication	Patient	Diagnosis	Management	Result
Keyes J,[5] 2020, USA	11-year-old, retained foreign body in penetrating wound on a garden	Infected wound, cellulitis	IV clindamycin then PO cephalexin	Cured
	16-year-old, high grade reflux nephropathy, solitary left kidney and neurogenic bladder	Urinary tract infection	PO cephalexin then IV ceftriaxone then PO cefdinir	Cured
Arasu R,[24] 2021, Australia	7-year-old, retained foreign body in laceration wound on a garden	Septic arthritis	IV ceftriaxone 7 days then PO amoxicillin/clavulanate 3 weeks, debridement and foreign body removal	Cured
	3-year-old, retained foreign body in laceration wound on a garden	Septic arthritis	IV ceftriaxone 11 days then PO cephalexin 6 weeks, synovectomy and foreign body removal	Cured
Aarab A,[25] 2021, Morocco	9-days-old, in NICU Hirschsprung disease	Bacteremia, meningitis	IV ceftriaxone + gentamicin + PO amoxicillin then IV imipenem	Cured
Bronte Anaut M,[26] 2022, Spain	4-days-old, preterm 24 weeks, in NICU	Bacteremia	IV ampicillin + gentamicin	Died

Abbreviations: IP, intraperitoneal; IV, intravenous; NICU, neonatal intensive care unit; PO, oral.

Conclusions

This case report highlights the importance of recognizing *L. adecarboxylata* as a potential pathogen in soft tissue infections in Thai children, particularly those with a history of punctate wounds. Such uncommon pathogens for common infections should be kept in mind. A diagnostic culture from a proper specimen should be conducted, especially when the infection does not respond to standard common treatment. A definitive antibacterial agent should be chosen based on the susceptibility test of the culprit pathogen.

Article Information

Ethics Approval

The patient and his guardian provided informed consent for this publication. This case report was approved by the ethical committee of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (MURA2022/770 on December 15, 2022).

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Conflict of Interest

The authors declare no competing interests.

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