Rare disease

Isolation of *Leclercia adecarboxylata* from a wound infection after exposure to hurricane-related floodwaterVernissia Tam,¹ Seema Nayak²¹Johns Hopkins University School of Medicine, Baltimore, Maryland, USA²Division of Infectious Diseases, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

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Summary

A man in his early 80s presented to our emergency department with painless redness and swelling in his right leg. One week prior, he cleaned up floodwater in his basement after Hurricane Irene passed the Mid-Atlantic region of the USA in August 2011. Physical examination included large purple bullae and raised concern for necrotising fasciitis. Wound culture revealed a polymicrobial infection including *Leclercia adecarboxylata*.

BACKGROUND

Leclercia adecarboxylata is a rare gram-negative rod of the Enterobacteriaceae family that has been isolated from water and infrequently reported in the literature.

CASE PRESENTATION

An 81-year-old Caucasian male presented to our emergency department with painless redness and swelling in his right leg. The patient reported that 1 week prior to presentation, he cleaned up floodwater in his basement after Hurricane Irene, in August 2011, passed the Mid-Atlantic region of the USA. He did not recall whether he had any previous injuries or abrasions on his leg. His medical history was significant for poorly controlled diabetes, gout and hypertension.

At presentation, the patient had a temperature of 36.7°C, a pulse of 101 beats per min, blood pressure of 120/73 mm Hg, oxygen saturation of 99% and was breathing comfortably. White blood cell count was 25 960 with 77% neutrophils. Glycated haemoglobin level was 6.9%.

On physical examination, the right leg was warm, erythematous and swollen up to the mid-thigh. A small 3 mm weeping round lesion was located anteriorly and a large 5mm purple bullae was located on the lateral malleolus (figure 1). He displayed diminished sensation on the dorsal surface of his right foot but was able to voluntarily move his toes. No crepitus was appreciated.

INVESTIGATIONS

Plain films showed soft tissue swelling and no gas accumulation.

On day 3 of hospital admission, cultures from a wound swab grew few *L. adecarboxylata* in addition to heavy *Staphylococcus aureus*, heavy *Streptococcus pyogenes*, and few *Enterobacter cloacae*. The gram stain revealed heavy gram-positive cocci. Identification and antibiotic susceptibility testing was performed using the commercial automated system Microscan Walk Away 96 SI (Siemens Healthcare Diagnostics, Tarrytown, New York, USA) and biochemical testing by the API 20E System (Biomérieux, Marcy l'Etoile

France) using identification code 1044173 with an 81.6% CI. *L. adecarboxylata* was found to be susceptible to all antibiotics tested (trimethoprim/sulfamethoxazole, ampicillin, aztreonam, cefazolin, cefotaxime, cefoxitin, ceftazidime, ceftriaxone, cefepime, ciprofloxacin, gentamicin, levofloxacin, imipenem, meropenem, ertapenem and piperacillin/tazobactam).

DIFFERENTIAL DIAGNOSIS

There was initial concern for necrotising fasciitis, and given his recent water exposure and proximity to the Chesapeake Bay, suspicions for *Vibrio vulnificus* and *Aeromonas hydrophila*, among others. The laboratory risk indicator for necrotising fasciitis (LRINEC) score is an externally validated assessment tool to help distinguish early cases of necrotising fasciitis from other soft tissue infections.¹ It is based on six routine laboratory parameters: total white cell count, haemoglobin, sodium, creatinine, glucose and C-reactive protein. Patients are stratified into high-risk, moderate-risk, or low-risk categories that correspond to a <50%, 50–75%, and >75% probability, respectively, of developing necrotising soft tissue infections. A cut-off score of ≥6 has a positive predictive value of 92% and a negative predictive value of 96%. Our patient's presentation produced a LRINEC score of 5, which fell below the threshold to strongly suggest necrotising fasciitis.

TREATMENT

The patient was initially treated empirically with clindamycin, vancomycin and ceftazadime. After identification

Figure 1 Day 1. Left: medial view. Right: drained bullae on the lateral malleolus.

Figure 2 Day 7. Left: medial view. Right: lateral view.

and antibiotic susceptibility testing, the antimicrobial regimen was narrowed to ceftriaxone for daily dosing in addition to clindamycin for toxin suppression. The patient was discharged from the hospital on day 7 of his admission on a 10-day course of cefixime (figure 2).

OUTCOME AND FOLLOW-UP

The patient did not return to clinic for follow-up, but, when called 3 weeks after discharge, stated that his leg was healing well.

DISCUSSION

L. adedecarboxylata is a motile gram-negative bacilli that was first isolated from drinking water and originally described in 1962 by Leclerc as *Escherichia adedecarboxylata*.² Today it is recognised as being distributed widely in food and water, a part of normal flora in the gut of animals and in the stool of humans.³ Clinically, reported infections with *L. adedecarboxylata* occur mostly in patients who are immunocompromised or have medical comorbidities. In a recent review of 23 case reports, 21 of 31 patients infected with *L. adedecarboxylata* were immunocompromised in some respect.⁴ Despite infrequent reports, *L. adedecarboxylata* is capable of infecting a variety of bodily fluids; it has been cultured from blood, sputum, wounds, peritoneal fluid, urine, synovial fluid, gallbladder tissue and cardiac valve tissue.⁴ When cultured from a wound, *L. adedecarboxylata* is often part of mixed microbial growth in immunocompetent hosts. In previously described mixed wound infections, *S. aureus* and *E. cloacae* have similarly been recovered in wound and blood sources;⁴ however, this is the first report of a mixed infection including *S. pyogenes*.

Although it was first isolated from drinking water,² only one other case study reports a wound previously exposed to a suspicious water source infected with *L. adedecarboxylata*. Hess *et al*⁵ describes a previously healthy woman who received an accidental superficial incision during a pedicure and later went swimming in a chlorinated public pool. *L. adedecarboxylata* may be under-reported and misclassified as the phenotypically similar *Escherichia coli*. However, it can be distinguished by various biochemical reactions including the positive assimilation of malonate, fermentation of arabinitol and cellobiose, and negative expression of lysine decarboxylase.⁶ New technologies, such as DNA–DNA hybridisation and mass spectrometry, may allow laboratories to quickly identify unusual organisms and permit shorter hospital stays while reducing morbidity and mortality.

The wide antibiotic susceptibility pattern was consistent with a previous study of over 100 strains of *L. adedecarboxylata* which found natural sensitivity to tested tetracyclines, aminoglycosides, all but two beta-lactams, quinolones, folate pathway inhibitors, chloramphenicol, nitrofurantoin and azithromycin.⁶ Our strain was found

additionally to have sensitivity specifically to ertapenem and levofloxacin. In contrast to our patient's improvement on ceftriaxone, there has been one case report of a β -lactamase producing strain of *L. adedecarboxylata* found in the blood of a man with acute myeloid leukaemia that rendered resistance to third-generation cephalosporins.⁷

The role of *L. adedecarboxylata* in causing infections is still unclear. Previously, it has been isolated both as a pure culture, and in the context of polymicrobial infections.⁴ Because most reported cases involve individuals who were immunocompromised, it has been suggested that *L. adedecarboxylata* presents exclusively as an opportunistic pathogen.⁷ However, there have also been cases of infected individuals with no known immunodeficiency.^{5 8 9} In contrast to the overall good prognosis of *L. adedecarboxylata* infections and resolution with antibiotics, it has been reported to be fatal in one case of spontaneous bacterial peritonitis in a patient with hepatocellular carcinoma and liver cirrhosis.¹⁰

Learning points

- ▶ Skin infections associated with recent water exposure may involve *Pseudomonas aeruginosa*, *Vibrio vulnificus*, or *Aeromonas hydrophila*.
- ▶ *Leclercia adedecarboxylata* can be suspected in high-risk patients exposed to suspicious water sources, especially those who are immunocompromised with minor trauma.
- ▶ Particular attention should be paid to diabetic patients who may report no associated pain and will benefit from frequent foot exams to minimise the risk of infections and limb loss.

Competing interests None.

Patient consent Obtained.

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