



Inflammation and infection

Leclercia adecarboxylata urinary tract infection in a patient with bladder cancer and recurrent hematuria

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ABSTRACT

Leclercia adecarboxylata is a rare human pathogen, mostly affecting immunocompromised individuals or as one microbe in polymicrobial infections in immunocompetent patients. *L. adecarboxylata* is rarely isolated from the urinary tract. We describe a case of pan-sensitive *L. adecarboxylata* isolated from a polymicrobial urinary tract infection from an immunocompetent older adult with recently diagnosed bladder cancer.

Introduction

L. adecarboxylata was identified in 1962 by Leclerc and was described as *Escherichia adecarboxylata*.^{1,2} The organism was later renamed as its own entity based on a unique nucleic acid and protein signature derived from electrophoresis.¹ *L. adecarboxylata* is a Gram-negative, facultative-anaerobic, oxidative, motile bacillus in the *Enterobacteriaceae* family.¹

Leclercia is widely distributed in nature and can be isolated from food, water and other environmental sources. It is part of normal gut flora in animals and humans. The organism has been isolated in clinical samples of blood, feces, sputum, urine, pus, synovial fluid, peritoneal fluid, gallbladder tissue, and cardiac valve tissue.^{1,3} Although *Leclercia* is pervasive, it is often mistaken for *Escherichia coli*, and the true incidence of infections may be higher than reported.¹ Both species share several biochemical features and can be easily confused with *E. coli* if not investigated further.⁴

The clinical significance of *L. adecarboxylata* is not well established. Most commonly, it causes opportunistic infections in immunocompromised patients or those with underlying medical conditions; however, it may also be found in immunocompetent patients.^{1,3} *L. adecarboxylata* is a less potent pathogen in immunocompetent hosts, and is usually isolated from polymicrobial infections.^{4,5}

Makanera et al. reported the first case of a urinary tract infection (UTI) due to *L. adecarboxylata* from a monomicrobial urine culture. The isolate demonstrated multi-drug resistance, raising concern for this

organism's potential as an emerging health threat.³ We present a case of an older, immunocompetent adult with *L. adecarboxylata* UTI.

Case presentation

The patient is a 93 year old male with a history of prostate cancer treated with brachytherapy 25 years prior. He had ongoing radiation cystitis with gross hematuria and urinary retention. He had a 20 French Foley catheter to placed in January 2019. One month later, he presented for cystoscopy but dipstick urinalysis was concerning for infection with positive nitrites and large leukocyte esterase. He did not have a fever and denied symptoms of UTI; however, history was difficult to obtain due to dementia. A urine culture was sent and grew *Leclercia adecarboxylata*, *Enterobacter cloacae*, and an unspecified *Enterococcus* species. *L. adecarboxylata* isolates were sensitive to ampicillin, cefepime, ceftriaxone, ciprofloxacin, gentamicin, nitrofurantoin, and trimethoprim-sulfamethoxazole.

He was treated with a 5 day course of trimethoprim-sulfamethoxazole 800-160 mg twice daily and nitrofurantoin 100 mg twice daily and returned for Foley catheter removal and cystoscopy two weeks later. Dipstick urinalysis at the time was negative for nitrites and the patient was afebrile. Cystoscopy demonstrated mild bladder erythema and papillary changes on the right lateral wall. He underwent cystoscopy, fulguration and bladder biopsies of a papillary tumor. Pathology revealed Ta low grade urothelial carcinoma. Following this, the patient had recurring hematuria episodes due to radiation cystitis. He

Abbreviations: UTI, urinary tract infection.

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required repeated endourological interventions. He decided in December 2019 to transition to palliative care due to his multimorbidity. From the time of the *L. adecarboxylata* culture until May 2020, he had 10 negative urine cultures and 2 consecutive urine cultures in November 2019 and January 2020 that were positive for *Enterococcus* species.

Discussion

This case description has several similarities to other accounts of this organism. As described in other case reports, this patient had a polymicrobial infection and the *Leclercia adecarboxylata* isolate was sensitive to nearly all antibiotics. The most commonly reported route of entry is from wounds that develop into soft-tissue infections. There are other reports of this bacteria causing venous catheter-associated infections, which suggests increased susceptibility in patients with foreign bodies.⁴ *L. adecarboxylata* peritonitis due to peritoneal dialysis has been reported.⁴

In our case, the patient had an indwelling Foley catheter, which likely contributed to the UTI. To our knowledge, there is only one report of *L. adecarboxylata* UTI, and no reported cases in the setting of an indwelling Foley catheter. As part of the *Enterobacteriaceae* family of intestinal flora, risk of UTI is theorized to be secondary to proximity and hygiene (vaginal swabs, gluteal abscess).

Though numerous antibiotic sensitivity studies have been conducted, there are currently no guidelines for the treatment of *Leclercia adecarboxylata* infection. In the first large database of 100 *Leclercia adecarboxylata* strains, 19 strains were isolated from UTIs. The UTI strains were sensitive to all tested aminoglycosides and tetracyclines, most beta lactams, quinolones, folate pathway inhibitors, azithromycin, chloramphenicol and nitrofurantoin. Resistance was found to few beta lactams, erythromycin, linezolid, rifampin, and fosfomycin. Fosfomycin resistance was of interest as it can be given in uncomplicated urinary tract infections and generally has adequate coverage for *E. coli*.¹

While most reported cases have favorable sensitivities and low fatality following antibiotic therapy, multidrug resistant strains secondary to acquired resistance genes have been reported. A review of 74 *Leclercia adecarboxylata* infections summarized susceptibility patterns across the literature. Several strains showed resistance towards ampicillin (9/30) and fosfomycin (8/10), despite most showing pansensitivity.⁴ In a urine culture isolate described by Makanera et al. resistance was found to nearly all antibiotic families tested including quinolones, aminoglycosides, folate pathway inhibitors, nitrofurantoin, all cephalosporins and nearly all penicillins except piperacillin/tazobactam. The only antibiotic with unrestricted sensitivity was imipenem.³

One explanation for multidrug resistance in *Leclercia adecarboxylata* infections is transferable drug resistance via R plasmids.⁵ One report describes isolating the organism from the hands of hospital staff which resulted in transferring plasmids with resistance genes. This particular strain was resistant to several antibiotics, which may be due to plasmid transfer from other hospital-associated pathogens.⁴ For example, one strain produces extended spectrum beta-lactamase and has resistance to aminoglycosides, trimethoprim-sulfamethoxazole, and beta lactams. These genes were located on mobile genetic elements and could be easily transferred between bacteria.

Conclusion

In this report, we described a rare case of UTI from *L. adecarboxylata*, an emerging entity in bacterial infections. While most strains are sensitive to a range of antibiotics, there is a potential for multi-drug resistance due to transferred resistance genes. Multimorbidity, aging, and immunocompromised status may increase the risk of this rare pathogen, particularly in urologic patients.

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Declaration of competing interest

Tullika Garg served as a paid consultant to WebMD and reports an immediate family member is an employee of DRPLZ and is a stockholder. All other authors report no conflict of interest.

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