

CASE IN POINT

PEER REVIEWED

Urinary Tract Infection Caused by *Kluyvera ascorbata*

Authors:

Mariam Kirvalidze, DO

Second-Year Family Practice Resident, Peconic Bay Medical Center, Riverhead, New York

Michael Kim, DO

Family Practice Attending Physician, Peconic Bay Medical Center, Riverhead, New York

Sandeep A. Gandhi, MD

Infectious Diseases Consultant, Peconic Bay Medical Center, Riverhead, New York, and Associate Professor of Clinical Medicine, New York Institute of Technology College of Osteopathic Medicine, Old Westbury, New York

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A 38-year-old woman with no significant medical history presented to an urgent care center with mild dysuria, urgency, and hesitancy of 1 week's duration. She denied nausea, vomiting, fevers, abdominal pain, or hematuria.

Physical examination revealed no costovertebral angle tenderness, and the remainder of the examination findings were unremarkable. Vital signs included a temperature of 36.8°C, a pulse of 75 beats/min, and a blood pressure of 104/70 mm Hg.

Urinalysis results were remarkable for 500 leukocytes/ μ L but negative for nitrite. A urine sample collected in a sterile cup via clean catch was sent for culture, and the patient was initiated on empiric antibiotic therapy for an acute urinary tract infection (UTI) with nitrofurantoin, 100 mg every 12 hours, for 5 days.

for 3 days.

The urine sample was grown on blood agar/MacConkey biplate, and antimicrobial susceptibility testing was performed with the MicroScan method. Three days later, urine culture results showed more than 100,000 colony-forming units/mL of *Kluyvera ascorbata*, susceptible to nitrofurantoin. These results were discussed with the patient, who reported improvement of symptoms with the current antibiotic regimen.

DISCUSSION

K ascorbata is an aerobic, gram-negative, catalase-positive, flagellated bacterium. It was initially regarded by Kluver and colleagues in 1936 as a distinctive group in the family Enterobacteriaceae. Asai and colleagues later described a group of organisms that they believed were the same as those identified by Kluver and colleagues, and they proposed the genus be named *Kluyvera*, only to later propose the elimination of the genus, because they believed the organism was phenotypically identical to *Escherichia*.¹ In 1981, Farmer and colleagues proposed that *Kluyvera* should exist as its own genus again, and *Kluyvera ascorbata* was identified as its own species in the genus using DNA hybridization techniques.²

This genus has 4 identified species: *K ascorbata*, *K cryocrescens*, *K georgiana*, and *K intermedia*.^{3,4} This organism has been recognized as part of the normal flora of the human gastrointestinal, respiratory, and urinary tracts, but it also is present in the environment, particularly in water, soil, sewage, and hospital sinks.⁵ Despite being a part of the normal human flora, several case reports and literature reviews demonstrate the organism's potential to be a significant pathogen,^{1,4-6} although it is largely not encountered in clinical practice.

A recent retrospective medical record review and systematic review of the literature on *K ascorbata* by Lee and colleagues⁵ has improved understanding of infections caused by the aerobe. Their PubMed search identified 40 cases of *K ascorbata* infection from 1971 to 2018, and 3 more cases were identified in the researcher's own hospital in a retrospective review. The most common site of infection in the 43 cases was the urinary tract, identified in 19 cases, followed by the bloodstream (12 cases), intra-abdominal (10 cases), the soft tissue, respiratory tract, meninges, and rectourethral fistula. The infections were seen in pediatric and adult patients alike, and there was no statistically significant difference between frequency of bloodstream infections and UTIs between the two groups. The clinical outcome was favorable for most patients, but 3 immunocompromised patients of the 43 died due to sepsis and multifocal abscesses, despite adequate antibiotic treatment. Outcome was favorable in those who were immunocompetent. It is possible that the immunocompromised patients who died did so because of their underlying conditions rather than as a result of the bacterium itself.⁵

In a case report by Alfreijat,⁶ a 73-year-old woman with a recent diagnosis of a right lower-lobe lung mass presented to an emergency department with a several-week history of dysphagia and ultimately

was admitted for severe sepsis. Urine culture grew *K ascorbata* and *Streptococcus agalactiae*. Her hospital course was complicated with new-onset atrial fibrillation, left femoral artery occlusion, aspiration pneumonia, and death after 2 weeks of hospitalization.⁶ It is unlikely that the patient died solely due to infection with *K ascorbata*, but the case demonstrates the potential for the organism to cause severe sepsis secondary to a UTI.

In our patient, the lack of comorbidities contributed to a favorable outcome. However, it is important to address culture results of *K ascorbata* and to treat the infection appropriately. Little is known about the first-line antibiotic treatment for *K ascorbata*.⁴ The literature suggests treatment with third-generation cephalosporins, cefepime, piperacillin-tazobactam, ciprofloxacin, amikacin, and carbapenems have led to favorable outcomes.⁵ In our patient, treatment with nitrofurantoin improved her symptoms.

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