

Case Report

***Raoultella planticola* and urinary tract infection: The first laboratory-confirmed case in an HIV-infected patient in Mali**

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Abstract

Raoultella planticola is a Gram-negative, aerobic, non-motile bacterium, abundant in the environment, but rarely associated with pathology in humans. Notably, few urinary tract infections caused by *R. planticola* have been reported. To our knowledge, we are presenting here the first case of urinary tract infection caused by *R. planticola* in an HIV-infected individual. It is a 50-year-old female, with a history of HIV-1 infection treated for three years. At admission, her CD4 count was 70 cells/mL, and the main complaints were severe diarrhea and cough. She was diagnosed and treated for pulmonary tuberculosis (TB) and *E. Coli* enteritis. Initially, we observed a good evolution. However, on day 21 of hospitalization, she presented with fever and dysuria. Urinalysis revealed the presence of *R. planticola* with resistance to multiple antibiotics. We also detected that she has an HIV-2 but not HIV-1 infection. After receiving the right regimen, she was confirmed cured of her bacterial infections.

Key words: *Raoultella planticola*; Urinary Tract Infection; HIV.

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Introduction

The emergence of pathogens that are resistant to current medications such as antibiotics is a major threat to human health, especially in the developing world where the health systems are weak. Besides this issue, due to immunosuppression some microorganisms, normally non-pathogens in humans, cause severe opportunistic infections. *Raoultella planticola*, previously known as *Klebsiella planticola*, is a Gram-negative, oxidase-negative, facultative anaerobic bacteria belonging to the *Enterobacteriaceae* family [1]. *R. planticola* is a very rare pathogen in humans that has been sporadically associated with fatal infections in the past [2-4]. It has been shown to cause bacteremia, pneumonia, intra-abdominal infections, urinary tract infections, conjunctivitis, as well as infections of implants, bones, joints, and soft tissues [5]. Immunocompromised patients such as those having myeloma, nephropathies caused by Immunoglobulin A, and individuals who have received organ transplantation are usually the most susceptible to this pathogen [6]. Only one case of peritoneal infection has

been reported in an HIV-infected patient [3] and since the first description of *R. planticola* urinary tract infection in 2012 [2], only ten cases were reported worldwide [2,3,8-15]. Here, we report the first case of *R. planticola* urinary tract infection from Africa and in an immunocompromised HIV-infected patient.

Case report

A 50-year-old female with a medical history of HIV infection, diagnosed as HIV-1 infected in June 2014, and under c-ART regimen consisting of Tenofovir + Lamivudine + Efavirenz since August 2014, with CD4 count at 70 cell/mm³, and an unknown initial viral load presented at the Department of Infectious Diseases at the Teaching Hospital of Point G in Bamako. Her clinical status was consistent with poor adherence to c-ART, as she confirmed not taking her antiretroviral treatment for the past 2 years.

She was admitted to the ward of the Department of Infectious Diseases at the Teaching Hospital of Point G in Bamako, Mali on July 1st, 2019 after experiencing watery diarrhea, cough, and weight loss. We diagnosed

the presence of pulmonary tuberculosis (TB) and started anti-TB treatment with Rifampicin + Isoniazide + Pirazinamid + Ethambutol (RHZE) on July 5th, 2019. She also received thiamphenicol 1.5 g/day to treat enteritis, which was caused by an *Escherichia coli* infection. A week later, we noticed an improvement in her medical conditions as evidenced by a substantial regression of her fever, diarrhea, cough, and an increase in appetite. However, on 22nd July 2019, she presented oedema of lower member, dysuria, and fever up to 39.9 °C. We performed an abdominal ultrasound that showed bilateral kidney impairment. There was no proteinuria, but we detected a clearance of creatinine at 52.98 mL/min. The alanine aminotransferase (ALT) was normal at 16 UI/L and uricemia was at 8.3 mg/dL. Likewise, the cell blood count (CBC) indicated normochromic, normocytic and regenerative anemia at 6.2 g/dL with a thrombocytopenia at 61,000 cells/mm³. Analysis of urine specimen showed a leucocyte count of 18,000 cell/mL, erythrocytes < 1/mL, rare epithelial cells, and the presence of Gram-negative bacilli > 10⁵ colonies forming units (CFU). The bacteria were later identified as *Raoultella planticola*. The antibiogram showed sensitivity to few molecules, notably Colistin and Imipenem. In contrast, the bacteria isolates were resistant to betalactamines, aminosides, tetracycline, fluoroquinolone and phenicoles. We treated her with Imipenem 1.5 g/day, which was sufficient to resolve symptoms associated with her urinary tract infections (UTI) symptoms. A second analysis that was performed ten days after the Imipenem treatment confirmed the absence of *Raoultella planticola* in her urine.

As the HIV-1 viral load was undetectable with a CD4 count at 70 cells/mm³ at the time of her hospitalization, we performed a new HIV test that revealed an HIV-2 infection, which was confirmed by Western blot assay. We could not perform HIV-2 viral load because the kit is not locally available. Nevertheless, we changed cART regimen to Zidovudine + Lamivudine + Lopinavir/ritonavir. Six

months later, we confirmed that she was also cured from pulmonary tuberculosis.

Discussion

Raoultella planticola has been recently recognized as an important emerging opportunistic pathogen, and should be seriously considered in immunocompromised hosts [13]. Following bacteremia that can be fatal, 9 deaths out of 11 cases were published as of today [2,4]. Urinary tract infection (UTI) is the most common infection associated with *R. planticola* in the eleven cases reported, including the present paper [2,3,8-15] (Table 1). The pathogenesis of cystitis due to *R. planticola* is not well understood. However, current data suggest a strong link with immunosuppression (75% of all reported cases) [14]. Immuno-compromised infection usually occurs when there is a systemic impairment of the host immune system which enables dormant or opportunistic micro-organisms to become more invasive. Possible influence of additional factors such as age, sex and invasive urinary exploration should be also considered. For example, the fifth case published in 2016 was a 56-year-old woman presented with recurrent UTI over 4 months, yet the cause was unknown. It was hypothesized that consumption of seafood and a history of urinary stress incontinence may have caused the infection [10]. Furthermore, the sixth case was reported in 2017 in a 57-year-old man with end-stage renal disease and diabetes mellitus presented with dysuria, fever, chills, and suprapubic tenderness following urodynamic testing. The patient was diagnosed with cystitis caused by *R. planticola*, and the infection was attributed to contaminated urodynamic testing equipment, in addition to his immune-compromised status [11].

Our case is an immunocompromised female with HIV-2 infection, misdiagnosed as having HIV-1 and treated for more than five years with a regimen without protease inhibitors. Furthermore, she was not under tritherapy and she was not compliant with her

Table 1. Published cases of urinary tract infection by *Raoultella planticola* worldwide since 2013.

Author [reference]	Year	Country	Underlying condition	Nosocomial	Antibiotic used
Olson [2]	2013	USA	Multi antibiotherapy	Yes	Ciprofloxacin
Yoon [9]	2015	Korea.	Rhabdomyosarcoma	Yes	Cefotaxime, ampicillin/sulbactam
Ganguangco [8]	2015	USA	Dementia and recurrent UTI	No	Ceftriaxone
Brito [10]	2016	USA	Urinary stress	No	Ceftriaxone
Tuğcu [11]	2016	Turkey	Urodynamic testing	Yes	Ceftriaxone,
Skelton [3]	2017	USA	Multiple myeloma	Yes	Nitrofurantoin
Howell [12]	2017	USA	Children (2 m/o)	No	Ceftriaxone/cephalexin
Mehmood [13]	2018	USA	IgA Nephropathy	No	Ceftriaxone
Fager [14]	2019	USA	Post-surgery	Yes	Nitrofurantoin
Harmon [15]	2019	USA	Renal Transplant	Yes	Nitrofurantoin.
Present study	2021	Mali	HIV2	Yes	Imipenem

treatment. According to literature, misdiagnosis between HIV 1 and 2 can be explained by serological cross-reactivity that is limited to the gag and pol viral proteins [16]. The nosocomial characteristics of *R. planticola* have been found in most cases [17]. In our patient even if she did not undergo an invasive procedure, it is worth noting that she is a middle-aged female adult who was immobilized in bed most of the time during the first week of her hospitalization. Thus, we cannot rule out the possibility that she has contracted this infection, while in our ward. Moreover, *R. planticola* has been found in the environment even in liquid soap used in a hospital setting [18]. Patients taking many antimicrobial treatments such as immunocompromised subjects are at higher risk of developing a multidrug-resistant infection. Many *R. planticola* isolates are described to be pan-sensitive, however number of resistant isolates are being reported [5]. Even cases of carbapenem-resistant *R. planticola* infections have been reported [19,20]. Particular attention is needed for antibiotic resistance surveillance. While our case was infected by a strain of *R. planticola* sensitive to only colistin and imipenem, resistance to nitrofurantoin, quinolone, and cephalosporins has been reported by previous authors.

Conclusions

In summary, we report a female patient who developed an infection with *R. planticola* three weeks after hospital admission due to immunosuppression linked to HIV-2 infection. She was treated for two other infections, namely *Mycobacterium tuberculosis* and *E. coli* enteritis. After receiving imipenem, and the appropriate c-ART regimen she was cleared of *R. planticola* and was discharged from the hospital.

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