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A rare case of *Raoultella planticola* urinary tract infection. A case report with literature review

Magdalena Koziol^a, Marcin Lewicki^b, Mateusz Pawlicki^a, Anna Łopuszyńska^a, Aleksandra Krasa^a, Ewa Piekarska^a, Danuta Krasowska^c

^aStudent Scientific Association at Department of Epidemiology and Clinical Research Methodology, Medical University of Lublin, ul. Radziwiłłowska 11, Lublin 20-080, Poland;

^bDepartment of Epidemiology and Clinical Research Methodology of the Medical University of Lublin, ul. Radziwiłłowska 11, Lublin 20-080, Poland;

^cStudents' Scientific Association at the Department of Dermatology, Venerology and Pediatric Dermatology, Medical University of Lublin, ul. Staszica 11, Lublin 20-081, Poland.

Corresponding author: Magdalena Koziol, magdalena.koziol@icloud.com

ORCID ID:

Magdalena Koziol <https://orcid.org/0000-0002-8671-5968>, magdalena.koziol@icloud.com

Marcin Lewicki <https://orcid.org/0000-0003-1906-9326>, lewicki-marcin@wp.pl

Aleksandra Krasa <https://orcid.org/0000-0002-0733-202X>, ola.AK62@gmail.com

Danuta Krasowska <https://orcid.org/0000-0002-3015-1120>, dana.krasowska@gmail.com

Mateusz Pawlicki <https://orcid.org/0000-0001-8318-6573>, pawlak32@gmail.com

Anna Łopuszyńska <https://orcid.org/0000-0001-5133-4180>, lopuszynskaania@gmail.com

Ewa Piekarska <https://orcid.org/0000-0002-4954-379X>; piekarskaewaa@gmail.com

Abstract:

Urine infections represent 40-50% of all infections in hospitalized patients. The most common uropathogens are *E.coli*, *S.saprophyticus*, and less commonly Enterobacteriaceae, such as *Proteus mirabilis* and *Klebsiella pneumoniae*. The spectrum of microorganisms isolated in hospital conditions may be wider. *Raoultella planticola* is a rare cause of human infections, so far only few cases of ZUM with this etiology have been described.

A 56-years-old patient, with a history of cardiac disease, with exacerbation of chronic kidney disease, was admitted to the Department of Internal Medicine. The reason for admission was general deterioration. Many abnormalities in laboratory tests were detected. The doctors' attention was focused on the significant bacteriuria. Moreover, the patient reported dysuria symptoms. Material for urine microbiological culture was taken and empirical antibiotic therapy with ciprofloxacin started. The obtained result of urine culture allowed to identify the bacteria by *R. planticola*. As a result of the applied treatment, the patient's condition improved.

An increasing number of infections with *R. planticola* etiology is observed. The bacterium may lead to infections in many systems. The group of patients at risk of the disease includes people with renal dysfunction, who are immunosuppressed. Infections of *R. planticola* etiology are usually characterized by good antibiotic response and positive prognosis.

Key words: *Raoultella planticola*; urine infections; resistance

Introduction:

Raoultella planticola from the family Enterobacteriaceae is a Gram negative, oxidase-negative, aerobic, poorly mobile bacteria without an envelope. It was first described in the 1980s as *Klebsiella planticola* and *Klebsiella trevisanii* [1], however, in 2001 it was reclassified to a new genus as *Raoultella planticola* together with *Raoultella ornithinolytica* and *Raoultella terrigena* [2]. This bacterium is commonly found in soil, water, aquatic plants, seafood [8] and clinically isolated from wounds, sputum, faeces and urine. A rare diagnosis of *R. planticola* infection may result from difficulties in the isolation and identification of this bacterium species - it is often confused with other types, e.g. *Klebsiella* spp. Infections are observed in immunosuppressed people, in the course of cancer [3-9,15], diabetes [10], in dialysis patients [11], using PPI. This pathogen attacks many systems without organic specification. The most common are urinary tract infections [9,12,13,15], pneumonia [3,4,14] and biliary tract infections [5,6,7]. In the case described by us, a patient with cachexia features was diagnosed with *R. planticola*'s etiology of urinary tract inflammation.

Case report:

A 56-year-old patient with a history of cardiovascular disease (ischaemic heart disease, condition after double myocardial infarction, hypertension), intensification of chronic kidney disease, alcohol use disorder, hyperbilirubinemia and features of cachexia was admitted to the Department of Internal Medicine in emergency due to deterioration of general condition and episode of fainting. Hypotension and bradycardia was examined.

Laboratory tests showed: hyperkalaemia (K⁺: 6.8 mmol/l), increase in creatinine concentration to 3.13mg/dl with eGFR decrease to 66.07 ml/min, significantly increased urea level (136.6mg/dl) and inflammatory parameters (CRP: 137.08mg/dl). NT-pro-BNP was 7153.0 pg/ml, which confirmed the ischaemic heart disease. In the general urine test, significant bacteriuria was observed. The patient reported dysuric symptoms. Material for microbiological urine culture was collected and empirical antibiotic therapy with ciprofloxacin started. Adequate fluid therapy and pharmacological treatment was implemented. An examination for alarm pathogens was carried out. Swab for CPE: negative. A urine culture result was obtained which confirmed significant bacteriuria (105 CFU/ml) and identified the pathogen as *R. planticola*. The antibiogram showed resistance to ampicillin (MIC 16) with preserved sensitivity to inhibited beta-lactams, cephalosporins, amikacin, trimetoprim with sulfamethoxazole and fluoroquinolones. The current antibiotic therapy with ciprofloxacin has been maintained. As a result of the applied treatment the patient's condition was improved, haemodynamic parameters were stabilized, inflammatory markers were lowered (4-fold decrease of CRP concentration) and kidney function parameters were partially normalized with creatinine concentration reduction to 1.4 mg/dl.

Discussion:

Hassan Mehmood et al. in 2018. described a similar case of a patient with diagnosed urinary tract infection of *R. planticola* etiology. A 65-year-old man with metabolic disease and end-stage renal failure as a result of IgA nephropathy, complained about dysuric symptoms and dark urine colour. In vital signs: blood pressure 164/89 mm Hg, heart rate 99/min, respiratory rate 20/min, fever 39.3°C. Physical examination shows subabdominal tenderness. Among the deviations in laboratory tests: neutrocytosis at normal WBC and creatinine 4.5 mg/dL. Urine analysis showed the presence of bacteria, WBC > 50/ HPF. Ceftriaxone was administered intravenously. Urine culture showed the presence of *R. planticola* bacteria, which were sensitive to all major antibiotics, including ceftriaxone, ciprofloxacin, nitrofurantoin, cefazolin, gentamicin and trimetoprim-sulfamethoxazole. As a result of antibiotic therapy, the patient was cured without complications [16].

Raoultella planticola has no specificity about the tissue involved; therefore, it may attack other organs and systems. Serkan Atıcı et al. described the case of a 28-week-old infant weighing 880 grams, born prematurely due to preeclampsia. On the 34th day of life, bilateral purulent eye discharge was detected. Netylmycin was used empirically. The swab taken showed the presence of *R. planticola*. The antibiogram revealed resistance of the strain to ampicillin and piperacilin and sensitivity to cefuroxime and netylmycin, among others. The administration of the selected antibiotic was continued, however, despite the bacterial sensitivity to the administered antibiotic, the patient presented clinical symptoms of sepsis after several days, which induced the change of antibiotic to meropenem and vancomycin. As a result of the applied treatment, the patient's health condition improved. The literature also describes cases of biliary tract occupation [5,6,7], lungs [3,4,14], pancreas [21], peritoneum [11], prostate [20], pleura, soft tissues after surgery [17].

The risk factors of *R. planticola* infection include kidney damage, cachexia, post-transplant condition, and immunosuppression. 2016r.

William Paul Skelton and others described the case of a 73-year-old woman with stage IIIA multiple myeloma. The patient underwent treatment with four cycles of cyclophosphamide - bortezomib-dexamethasone, followed by autologous stem cell transplantation after conditioning with melfalan. Three years later, as a result of a relapse, the patient was again treated with chemotherapy and a new peripheral blood stem cell transplantation was performed. The patient complained about loose stools, which were treated orally with vancomycin (etiology of *Clostridium difficile*). The study showed elevated body temperature to 39.3 °C, hypotension 94/66 mm Hg, tachycardia 108/min and leukocytosis about 10.1 thousand/mm³. The presence of respiratory viruses and *Giardia*, *Cryptosporidium*, *Vibrio*, *Yersinia* and parasite eggs were excluded. After a week, the ongoing fever was accompanied by dysuric symptoms. The urine analysis showed the presence of nitrites and 230 WBC/ww. Empirically cephalexin was applied, waiting for the culture result. *Raoultella planticola* cultured showed sensitivity to amikacin, cefoxitin, ciprofloxacin, levofloxacin, meropene, nitrofurantoin, piperacillin/tazobactam and trimetoprim/sulfamethoxazole. These bacteria were resistant to ampicillin, cefazolin, ceftazidim, ceftriaxon, gentamicin and triamycin. The treatment was continued for 7 days with 100 mg of nitrofurantoin twice a day [9]. The immunosuppression induced by chemotherapy, steroids and cachexia probably explains why the above-mentioned patient was predisposed to *Raoultella planticola* infection.

The sensitivity to *R. planticola* antibiotics has not yet been precisely tested. Many studies have demonstrated that *R. planticola* species are usually sensitive to third or fourth generation cephalosporins, β -lactam antibiotics with β -lactamase inhibitors, aminoglycosides, netilmycin, ciprofloxacin, levofloxacin, tigecycline and carbapenems [16]. However, *R. planticola* may acquire resistance to antibiotics by plasmid. The possibility of *R. planticola* resistance for carbapenems should be kept in mind. Tseng SP et al. and Xu Mu et al. separately described the cases of two pneumonia patients and isolated a strain of *R. planticola* bacteria resistant to carbapenems [3,18]. Jose Armando Gonzales Zamora et al. in 2018. described a case of a patient with second-degree burns and pneumonia in whom the above mentioned bacteria resistant to most antibiotics were isolated except for colistin, polymixin B, aminoglycosides, tetracycline and tigecycline. Additionally, carbapenemases were detected, which proves high pathogenicity of this bacteria [19].

Conclusions:

An increasing number of infections with etiology of *R. planticola* is observed. The bacterium invades many systems and organs. People with impaired immunity, exhausted, with many coexisting diseases and dialysis patients are exposed to the infection. Therefore, doctors should consider infection with this pathogen in people at risk. The bacterium invades many systems and organs. People with impaired immunity, exhausted, with many coexisting diseases, dialysis patients are exposed to the infection. Therefore, doctors should consider the infection with this pathogen in people at risk. The bacterium invades many systems and organs. People with impaired immunity, exhausted, with many coexisting diseases and dialysis patients are exposed to the infection. Therefore, doctors should consider the infection with this pathogen in people at risk. Avoiding contaminated water, soil and hygiene is prevention. *R. planticola* infection is characterized by good prognosis.

The main treatment is to early start antibiotic therapy. Like any other human pathogen, close monitoring of its resistance pattern, especially to carbapenems, is recommended.

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