Functional medicine

Urinary tract infection with rare pathogen Raoultella Placticola: A post-operative case and review

Charlotte Fager (BS)*, Ladin Yurteri-Kaplan (MD, MS)

Columbia University Medical Center, New York, NY, USA

Introduction

Raoultella Placticola is a gram-negative, non-motile, anaerobic bacterium of the Genus Raoultella most commonly found in water, soil, and aquatic environments. Originally classified as a member of the genus Klebsiella, it was reclassified as Raoultella spp. in 2001 based on 16S rRNA and rpoB gene sequencing. This bacterium is a rare source of infection in humans; current literature provides few serious cases. The first Raoultella invasive human infection was found in 1984 in a patient with sepsis. Most reported cases since then have been associated with bacteremia.

We present a case of R. Planticola in a patient with UTI, as well as a review of prior reported cases of R. Planticola associated with cystitis. There is weak evidence for susceptibility to R. Planticola cystitis; risk factors include immunosuppression, invasive procedures, and contaminated equipment.

Case report

A 50-year old woman with lupus and a medical history of dysphagia, degenerative disc disease with lumbar-sacral spinal stenosis, and peripheral neuropathy underwent a total vaginal hysterectomy with bilateral salpingectomy, uterosacral ligament suspension, anterior and posterior repair, and cystoscopy for stage 4 utero-vaginal prolapses. Preoperatively she was on methotrexate. Her postoperative course was notable for failing her post-operative day one void trial and being discharged home with a Foley catheter. She re-presented to our outpatient office on postoperative day 5 and subsequently passed the void trial. Two weeks later she presented with intermittent dull pain in her right lower quadrant, which had persisted for five days. The patient had also noticed small amounts of brown discharge. Her macroscopic urinalysis revealed she was positive for blood, nitrites, and +3 leukocyte esterases. Urine culture was positive for Raoultella Planticola, sensitive to Nitrofurantoin.

The patient returned for her routine post-operative appointment one month following surgery, shortly after being treated for UTI. She had completed the macrobid and her UTI symptoms had resolved. Her repeat culture showed no growth, confirming clearance of the bacteria.

Discussion

In recent years Raoultella spp. strains have been recognized as important emerging pathogens and should be seriously considered in cases of infection. Most recently, R. Planticola was discovered in a case of bacteremia-induced fatal septic shock following a burn injury. Cystitis is the most common type of infection associated with R. Planticola. According to a 2015 retrospective review over a five-year period, 50% of R. Planticola infections were UTIs. We identified 32 serious cases of human infection associated with Raoultella spp. reported between 1984 and 2018, of which 6 were associated with UTI.

Other clinical infections resulting from R. Planticola growth have included septicemia, pancreatitis and retroperitoneal abscess, pneumonia, cellulitis, cholangitis, necrotizing fasciitis, gastroenterocolitis, peritonitis, conjunctivitis, prostatitis, appendicitis, surgical site infection, and catheter-related bacteremia.

The cause of R. Planticola infection cystitis is not well understood. According to a review of the literature, 4 out of 6 cases were attributed to immunosuppression. Immuno-compromised infection occurs when systemic impairment of the host immune system enables dormant colonizers to become invasive.

The fifth case was reported in 2016 when a 57-year old man with end-stage renal disease was hospitalized with cystitis by R. Planticola, and the infection was attributed to contaminated urodynamic testing equipment, in addition to immunosuppression. The sixth case occurred in 2017 when a 56-year-old woman presented with recurrent urinary tract infections over a span of 4 months. Though the cause was unknown, it was hypothesized that seafood consumption and a history of urinary stress incontinence may have caused the infection.

In our case, similar to other case reports, the patient developed an infection with R. Planticola due to immunosuppression from her lupus in the post-operative setting one week after catheter use. It is well documented that people with urinary catheters are at higher risk of developing a urinary tract infection. Catheter-related bacteremia results

---

* New York Presbyterian, CUMC, 138 W 87th street, 4F, New York, NY 10024, USA.
E-mail address: cf2693@columbia.edu (C. Fager).

https://doi.org/10.1016/j.eucr.2018.11.004
Received 8 October 2018; Received in revised form 5 November 2018; Accepted 7 November 2018
Available online 08 November 2018
2214-4420/ © 2018 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
| Author            | Patient (age/gender) | PMH                                                                 | Relevant Symptoms                                      | (Hypothesized) Source of Infection | Treatment                           | Recovery                              |
|-------------------|----------------------|----------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------|-------------------------------------|---------------------------------------|
| Olson Jr. et al., 2012 | 89/male              | Biventricular heart failure, chronic kidney disease, coronary artery disease, obesity, hypertension, anemia, atrial fibrillation, penicillin allergy | Fever, hypotension, tachypnea, tachycardia, somnolence, leukocytosis | Immunosuppression                  | Ciprofloxacin x 14 days              | Full recovery                         |
| Yoon et. Al. 2014. | 16 months/male       | Embryonal rhabdomyosarcoma in the bladder neck unresolved with two courses of chemotherapy. | Voiding difficulty                                      | Immunosuppression                  | Cefotaxime, Ampicillin/ Sulbactam, Cefpodoxime x 10 days | Full recovery from R. P., subsequent UTI developed 6 weeks later due to E. Coli. Full recovery, live kidney transfer recipient 1 month later. |
| Tugcu et al., 2016 | 57/male              | End-stage renal disease, diabetes mellitus                            | Dysuria, fever, chills, supra-pubic tenderness          | Contaminated urodynamic testing equipment, immunosuppression | Ceftriaxone 1g q12h x 7 days         | Full recovery                         |
| Skelton IV et al., 2016. | 73/female           | State IIIA IgA kappa multiple myeloma, two autologous stem cell transplant treatments following melphalan conditioning, hypertension, atrial fibrillation, clostridium difficile diarrhea | Fever, loose stools, dysuria                           | Immunosuppression, autologous peripheral stem cell transplant, hospital contamination. | Nitrofurantoin 100mg x 7 days         | Full recovery                         |
| Brito, J. et. Al. 2016. | 56/female           | Urinary stress incontinence, foodborne illness, recurrent UTI        | Recurrent UTI, hematuria                                | Seafood consumption, Urinary stress incontinence       | Ceftriaxone IV 2g x 4 weeks          | After four weeks overall improvement, confirmed test of cure with negative urinary culture |
| Howell, Fakhoury 2017. | 2 months/female    | Resolved hyperbilirubinemia, Hematochezia                            | Hematochezia, loose stools, fever, diminished appetite, oliguria, intermittent cough, rhinorrhea, and dehydration. | Unknown, no significant concurrent medical history.     | Ceftriaxone, Cefalexin x 10 days     | Symptoms resolved, anticipated full recovery |
| Author(s)                          | Title                                                                 | Journal                                                                 | Year of publication |
|----------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------|
| Adindu, C., Dierkes, C., Leyrane, D., Baumman, J., Hervey, Y. | A Cardiac implantable device infection with Raoultella planticola in an immunocompromised patient: A case of septicemia complicated by Raoultella Planticola infection treated with ceftazidime | American Journal of Kidney Diseases                                                  | 2008 (5)           |
| Alonso, M., Roca, J., Almenar, R., Díaz, L., Carrillo, M. | Diabetes mellitus and renal failure: A case of septicemia complicated by Raoultella planticola in a patient with diabetes and renal failure | American Journal of Kidney Diseases                                                  | 2009 (4)           |
| Alvarez, M., Mace, D., Cardoso, C., Cruz, C., Macia, C., Vela, J. | A case of pneumonia complicated by Raoultella Planticola infection treated with meropenem | Clinical Microbiology and Infection | 2010 (1) |
| Baker, M., Bay, J., Wieland, J., Jenkins, P. | Recurrent cystitis due to Raoultella Planticola infection treated with cephalosporin | Infectious Diseases in Clinical Practice | 2011 (6) |
| Cattaneo, M., DiBenedetto, L., D'Agostino, J., Krieg, J., Weiss, D. | First description of blaKPC in Raoultella spp. (R. Planticola and R. ornithinolytica): A case of septicemia complicated by Raoultella Planticola infection treated with carbapenem | Journal of Clinical Microbiology | 2008 (12) |
| Drancourt, M., Bollet, C., Carta, A., Rousselier, P. | Phylogenetic analyses of Klebsiella species delineate Klebsiella and Raoultella gen. nov, with description of Raoultella ornithinolytica comb. nov, Raoultella terrigena comb. nov. and Raoultella planticola comb. nov. | International Journal of Systematic and Evolutionary Microbiology | 2001 (3) |
| Ershadi, A., Weiss, E., Verduzco, E., Chia, D., Sadigh, M. | Emerging pathogen: a case and review of Raoultella planticola infection treated with ceftriaxone and amoxicillin | Infectious Diseases and Infection Control | 2010 (10) |
| Kim, S.H., Koh, H.K., Yoon, Y.K., Kang, D.O., Lee, D.W., Kim, M.J., Sohn, J.W. | Necrotizing fasciitis involving the chest and abdominal wall caused by Raoultella planticola infection treated with piperacillin-tazobactam | BMC Infectious Diseases | 2012 (5) |
| McKinnell, J., Stollenwerk, N., Jung, C., Miller, L. | Nitrofurantoin compares favorably to recommended agents as empirical treatment of uncomplicated urinary tract infections in a decision and cost analysis | Mayo Clinic Proceedings | 2011 (6) |
| Naganathan, G., Amin, N.K. | Raoultella planticola associated necrotizing appendicitis: A novel case report | International Journal of Surgery Case Reports | 2018 (3) |
| Nicolle, L.E. | Catheter associated urinary tract infection treated with fluoroquinolones | Antimicrobial Resistance and Infection Control | 2013 (9) |
| O'Connell, K., Kelly, J., Niriain, U. | A case of septicemia complicated by Raoultella planticola infection treated with meropenem | International Journal of Surgery | 2014 (3) |
| Rodriguez, M., Olmedo, R., Plaza, M. | Bacteremia with Raoultella planticola in the setting of acute pancreatitis complicated with acute cholangitis | Revista Española de Enfermedades Digestivas | 2017 (6) |
| Sekowska, A. | Raoultella spp. – clinical significance, infections, and susceptibility to antibiotics | Folia Microbiologica | 2017 (3) |
| Sia, C.S., Wilson, A., Hornung, H., Mills, J., Aung, M., Schuster, W., Ahearn, Y., Hsu, J. | Refractory Raoultella planticola peritonitis in an HIV-positive patient treated with fluoroquinolones | Nephrology | 2016 (11) |
| Yumoto, T., Nakao, H., Nishiya, K., Takashina, K., Ohn, T. | Retrospective study of Raoultella planticola bacteremia-induced fulminant sepsis following burn injury | Annals of Clinical Microbiology and Infection | 2018 (1) |
from bacterial biofilm that forms in the catheter lumen. When organisms adhere to the film, they are essentially protected from host defenses (Table 2). Due to the immune-compromised state of our patient, catheterization both in and out of the hospital may have made her susceptible to this infection. Interestingly, this particular bacterium is usually found in aquatic environments, and she developed this in an urban setting. It is unclear where she may have been exposed to such a bacteria; however, we do practice in a metropolitan hospital where patients come from afar and possible cross-contamination could have occurred.

Treatment for UTI with R. Plantaclola consists of a single course of antibiotics. In each case antibiotics have led to full recovery and resolution of symptoms. Antibiotics that have successfully treated R. Plantaclola UTIs include Ciprofloxacin, Ceftriaxone, Cefotaxime, Nitrofurantoin, Cephalexin, Cefpodoxime, and Ampicillin/Sulbactam. In our case report, we chose to treat with Nitrofurantoin, given its high sensitivity to most uropathogens (Table 2).

R. Plantaclola is an emerging pathogen in UTIs in immunosuppressed patients. It is imperative to consider this in the potential differential in such patients and understand treatment options including Nitrofurantoin as an affective agent to clear such infections.

References
1. Bagley ST, Seidler RJ, Brenner DJ. Klebsiella planticola sp. nov.: a new species of enterobacteriaceae found primarily in nonclinical environments. Curr Microbiol. 1981;6(2):105–109.
2. Frenay J, Gavini F, Alexandre H, et al. Nosocomial Infection and Colonization by Klebsiella Terrisum. 1986; 1986:948–950 (5).
3. Olson Jr DS, Asare K, Lyons M, Hofinger DM. A novel case of Raoultella planticola urinary tract infection. Infection. 2013;41(1):259–261.
4. Tugcu M, Ruhi C, Gokce A, Kara M, Aksay S. A Case of urinary tract infection aused by Raoultella Planticola after a urodynamic study. Braz J Infect Dis. 2016;21(2):196–198.
5. Howell C, Fakhoury J. A case of Raoultella planticola causing a urinary tract infection in a pediatric patient. Transl Pediatr. 2017;6(2):102–103.