CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 44 (2018) 38–41

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Raoultella Planticola associated necrotizing appendicitis: A novel case report

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ARTICLE INFO

Article history:
Received 16 September 2017
Received in revised form 14 January 2018
Accepted 27 January 2018
Available online 9 February 2018

Keywords:
Raoultella planticola
Appendicitis
Case report

ABSTRACT

INTRODUCTION: Raoultella Planticola is a gram negative, aerobic, rod bacteria found in water and soil and is rarely reported to cause infections in humans. This case study is the first of its kind in reporting *R. planticola* appendicitis.
PRESENTATION OF CASE: We report a case of a woman presenting with a two-day history of increased weakness, fatigue and anorexia, localized pain to the right lower quadrant, and elevated white blood cell count. CT results demonstrated acute uncomplicated appendicitis which was managed via laparoscopic appendectomy. The patient became febrile on the day of the procedure and was found to have R. *planticola* bacteremia which was treated with amoxicillin-clavulanate. She was discharged on postoperative day two and reported an unremarkable recovery at her five-week follow-up appointment.
DISCUSSION: R. planticola is a common organism that is rarely, though increasingly, associated with human infection. Interestingly, prior to hospitalization, this patient did not have any risk factors commonly associated with *R. planticola* infection, such as seafood consumption. However, she may have had gastrointestinal tract colonization with *R. planticola* prior to onset of appendicitis and appendectomy. Bacteremia likely resulted from micro-perforation of the appendix.
CONCLUSION: Although infection with *R. planticola* is typically benign when treated appropriately, this pathogen has homology with *Klebsiella* species, and has the potential to acquire antimicrobial resistance. The case presented here suggests that R. planticola should be considered as a potential source of bacteremia in inflammatory/infectious gastrointestinal tract diseases even in the absence of typical risk factors.

1. Introduction

Raoultella Planticola is a gram negative, aerobic, rod bacteria found in water and soil and is rarely associated with human disease [1]. In humans, *R. planticola* is associated primarily with bacteremia and gastrointestinal infections and is usually linked to invasive procedures in health care settings. Although infection with *R. planticola* is typically benign when treated appropriately, this pathogen has homology with *Klebsiella* species, and in fact was first described as *Klebsiella planticola* [2]. As such, this pathogen has the potential to acquire antimicrobial resistance. In fact, one recent case study from China reported that a multidrug resistant strain of *R. planticola* was isolated from an 82-year old patient [3]. *R. planticola* infections in humans, though rare, must be managed carefully and adequately.

Risk factors for *R. planticola* infection include invasive devices and procedures such as feeding tubes, catheters and endoscopy, age (including premature infants and newborns), prolonged hospital stay in ICU, long-term antibiotic use, and immunocompromised states such as patients with diabetes and those with cancer undergoing chemotherapy [1]. *R. planticola* infections have also been reported following consumption of seafood [4].

The first case of *R. planticola* infection in humans was reported in 1984 in a patient with septicemia [5]. Since then, *R. planticola* has been associated with pancreatitis [6], pneumonia [7], bacteremia [4], cellulitis [8], surgical site infection [9], cholecystitis [10], cholangitis [11], necrotizing fasciitis [12], urinary tract infection [13], gastroenterocolitis [14], peritonitis [15], conjunctivitis [16] and prostatitis [17]. To our knowledge, no prior case of *R. planticola* appendicitis has been reported; this case study is the first of its kind. This work has been reported in line with SCARE criteria [18].

2. Presentation of case

A 63-year old Caucasian woman presented to our institution, a tertiary care center in Hamilton, Ontario, Canada, with acute

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https://doi.org/10.1016/j.ijscr.2018.01.021

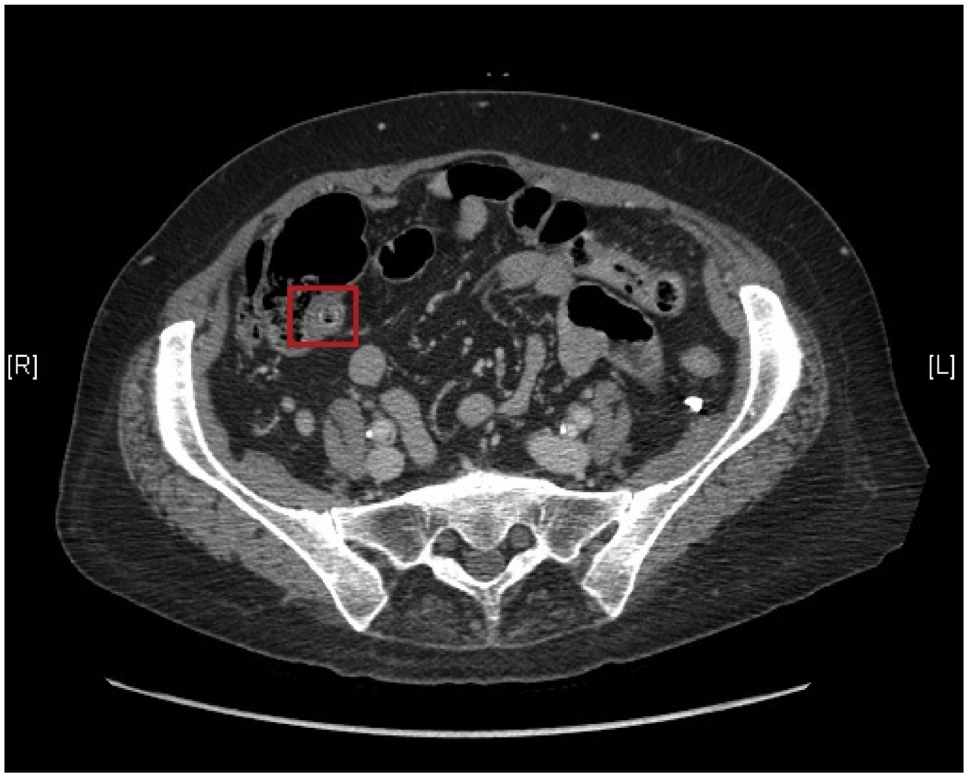

Fig. 1. CT abdomen demonstrating an air and fluid-filled appendix, highlighted by the red rectangle. The radiology report described the appendix as grossly dilated, measuring 1.3 cm and demonstrating peripheral fat stranding. Additionally, a 0.9 cm appendicolith was noted at the appendiceal base. The findings were reported as most in keeping with acute appendicitis. Further, no intra-abdominal free air, free fluid, or fluid collections suggestive of perforation were noted at the time of the CT scan.

onset of right lower abdominal pain following a two-day period of increased weakness, fatigue, and anorexia. Initially, the pain was diffuse in the lower abdomen, and then began to localize to the right lower quadrant. She also reported nausea, a small amount of emesis, chills, and diaphoresis at home. Her last bowel movement was the morning of the day she presented to the hospital. There was no frank blood noted in her stool or diarrhea reported. Her last meal was the evening prior to the day she presented to the hospital, but she had consumed clear fluids with her medications on the day she presented to the hospital. She was afebrile at presentation, but her white blood cell count was elevated at 17, 000 cells/uL with an absolute neutrophil count of 16,700 cells/uL.

At her five-week follow up visit, the patient denied any skin trauma or lacerations. She further denied any features of scombroid poisoning commonly associated with bacteria, like *R. planticola,* that convert histidine to histamine. These symptoms typically include hives or generalized pruritis, facial plethora, sweating, "burning-peppery taste" sensation, dizziness, headache, and edema. The patient denied all features of scombroid poisoning except nausea.

She also did not report any risk factors related to R. *planticola* infection including consumption of seafood or any exposure to new soil, animals, or environments. She also denied any animal bites or scratches.

Her medical history was notable for ulcerative colitis, GERD, asthma, and a right breast lumpectomy, which was found to be benign. The patient was diagnosed with ulcerative colitis at 13 years old but had no flares until June 2016 which self-resolved and did not require treatment. She had a colonoscopy during her last flare up in June 2016. She had no history of invasive medical procedures prior to the onset of her initial symptoms of right lower quadrant pain, nor hospitalizations.

Her medications included rabeprazole 20 mg PO daily, meloxicam 15 mg PO daily and fluticasone two puffs two to three times daily. She has been taking these medications for over 10 years.

She further reported that she had worked in retail as a sales associate prior to receiving disability benefits beginning in 2004. She denied any occupational exposures. She also reported that she is divorced and lives alone in her apartment unit.

The patient was admitted to hospital under the general surgery service in preparation for a laparoscopic appendectomy. On the morning of the procedure, she was febrile with a temperature of 38.6 ◦ Celsius. She was started on empiric antibiotic therapy (intravenous ceftriaxone) and blood specimens were sent for culture. She also received intravenous cefazolin in the operating room prior to the commencement of the procedure. The 12-h blood culture report noted gram negative bacilli. At this time amoxicillin 875-clavulante 125 mg was initiated. The presence of *R. planticola* in the blood culture specimen was determined using VITEK and outlined in the final report. No other pathogens were isolated. This was noted to be susceptible to ciprofloxacin, gentamicin, tobramycin, and trimethoprim/sulfamethoxazole, but resistant to ampicillin. Notably, a urine culture ordered in the emergency department prior to admission revealed a colony count of 10–100 * E6 CFU/L, but mixed growth of doubtful significance.

CT aided diagnosis of acute appendicitis (see Fig. 1) was managed with laparoscopic appendectomy and a markedly enlarged, necrotic and microperforated appendix was removed without complication. The patient tolerated the procedure well and her postoperative recovery in hospital was uncomplicated.

The patient was treated with a 14-day course of oral amoxicillin 875-clavulanate 125 mg and discharged home two days following the procedure. Notably, the antibiotic therapy was not tailored to the reported sensitivities because the patient was discharged prior

to reporting of the final sensitivity results. At the time of discharge, the patient was afebrile, ambulating at her baseline, and tolerating oral intake. At her five-week follow-up appointment she reported that she experienced severe shivers and incision site pain on post operative day 5, which self-resolved. Her course following appendectomy was otherwise unremarkable. Pathological assessment of the appendiceal specimen revealed acute purulent appendicitis.

3. Discussion

R. planticola is a common organism that is rarely, though increasingly associated with human infection. Among reported cases, *R. planticola* has been isolated in sputum, urine, and bile, as well as other sources [1]. Human cases of *R. planticola* infection have been associated with seafood consumption, interaction with soil/water, immunocompromised conditions, or invasive procedures.

Symptoms of scromboid poisoning have been described as associated with R. *planticola* infection as this pathogen converts histidine to histamine [19]. These symptoms include the rapid onset of hives, generalized pruritus, facial redness, nausea, vomiting, and diarrhea [19].

In previous cases of R. *planticola* infection in the gastrointestinal tract, clear evidence of risk factors such as seafood consumption were identified [14]. Interestingly, prior to hospitalization, the patient in this case study did not have any identified risk factors commonly associated with *R. planticola* infection. However, this patient did report a long-standing history of ulcerative colitis which was in remission until six months prior to her hospitalization for appendicitis. Individuals with ulcerative colitis have been shown to have overgrowth of bacteria and specifically overgrowth of aggressive bacterial strains [20]. The recent flare up experienced by our patient may have resulted in opportunistic colonization of the gastrointestinal tract by *R. planticola* due to the disruption of the intestinal mucosa.

In addition, the patient had a longstanding history of proton pump inhibitor use. In a recent Canadian case report, Lam and Salit noted that their patient had used esomeprazole prior to consumption of seafood and subsequent gastroenteritis and R. *planticola* bacteremia [4]. The chronic use of a proton pump inhibitor decreases gastric acidity and therefore allows enteric organisms to survive and colonize the gut. Our patient was likely colonized with *R. planticola* in the gastrointestinal tract prior to onset of appendicitis and prior to appendectomy. As the appendix was found to be necrotic and containing a micro-perforation, this was likely the source of *R. planticola* bacteremia.

In addition, while a limited number of antibiotic sensitivities were reported in this case study, the case reports published to date on R. *planticola* suggest a wide range of antibiotics that are effective against this pathogen. In a recent case report on R. *planticola* bacteremia secondary to conjunctivitis in a pediatric patient, the pathogen was found to be resistant to ampicillin and piperacillin but susceptible to amoxicillin-clavulanate, gentamicin, netilmicin, cefuroxime, trimethoprim/sulfamethoxazole, piperacillin-tazobactam and carbapenems [16]. As such, R. *planticola* thus far has been easily managed with available antibiotic therapy. However, as Lam and Salit and other authors have noted, multi-drug resistant strains of the pathogen have been reported and given is relatedness to Klebsiella species and prevalence in the soil and environment, R. *planticola* may serve as a reservoir for genes for antibiotic resistance [4].

4. Conclusion

In summary, this case adds to the small but growing literature on human infection by *R. planticola* and demonstrates that this organism can also be associated with appendicitis with appendiceal perforation likely causing bacteremia. Unlike previously described cases, no common risk factors of *R. planticola* infection were identified in this patient. However, chronic inflammatory bowel disease and long-term use of a proton pump inhibitor may have facilitated enteric colonization of this pathogen in this case. Given the potential for antibiotic resistance in this organism, it is important to have a higher index of suspicion of *R. planticola* as a potential pathogen in bacteremia related to inflammatory/infective gastrointestinal tract diseases despite the absence of typical risk factors.

Conflicts of interest

No conflicts of interest.

Funding source

No funding was used for this study.

Ethical approval

Ethical approval has been exempted by our institution for this case report.

Consent

Signed informed consent was obtained from the patient for use of deidentified information and images.

Author contribution

Dr. Nalin Amin conceived the study concept and facilitated data collection, as well as reviewed and contributed to data interpretation and analysis.

Gayathri Naganathan contributed to study design, data collection, analysis and interpretation, and writing of the paper.

Guarantor

Dr. Nalin Amin.
Gayathri Naganathan.

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