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Case Report

CASE REPORT

Community-acquired infection to *Raoultella ornithinolytica* presenting as appendicitis and shock in a healthy individual

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ABSTRACT

Raoultella ornithinolytica and *Raoultella planticola* are histamine-producing bacteria that are usually found in fish and water. They are associated with scombroid syndrome that presents with vomiting and flushing. A wide range of infections with these germs is reported, but mainly in fragile hospitalized patients with multiple comorbidities. We report the case of a 54-year-old healthy patient who presented with 24-hours abdominal pain, vomiting, flushing and shock. The abdominal examination showed guarding in the right lower quadrant (RLQ), and the abdominal CT scan images showed a thickened terminal ileum and a distended appendix. The patient underwent a surgical exploration revealing a normal terminal ileum but an inflamed appendicular base. *Raoultella ornithinolytica* was found in blood cultures and in the liquid retrieved from the RLQ. To the best of our knowledge, this is the first report of a severe life-threatening intra-abdominal presentation due to a community-acquired *R. ornithinolytica* infection.

INTRODUCTION

Raoultella ornithinolytica is a Gram-negative, oxidase-negative, aerobic, encapsulated, non-motile rod, belonging to the *Enterobacteriaceae* family [1, 2]. It is commonly found in fish, water and soil. *Raoultella ornithinolytica* was previously classified as a *Klebsiella* specie, but in 2001, the genus *Raoultella* was created to include this germ along with *Klebsiella planticola* and *Klebsiella terrigena* [1]. *Raoultella ornithinolytica* and *Raoultella planticola* are recognized as histamine-producing bacteria that convert histidine to histamine, due to their pyridoxal phosphate-dependent histidine decarboxylase [3]. Their presence in fish, especially in *Scomberesocidae* families, has been linked to histamine fish poisoning, also known as scombroid syndrome [3]. It usually

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presents with flushing, vomiting, diarrhea, and sometimes oral swelling and respiratory compromise [2, 3]. It resembles a self-limited allergic reaction that usually resolves after a few hours, but can also occasionally persist for several days.

Acute appendicitis is characterized by transmural appendicular inflammation usually due to the obstruction of the lumen. Since the inflamed appendix displays usually a different flora than its normal counterpart, an infectious process has been suggested to contribute to this disease. Terminal ileum can also be involved in the inflammatory reaction. However, ileitis is more commonly due to inflammatory bowel disease or infectious agents, such as *Mycobacterium spp*., *Yersinia spp*., *Salmonella spp*. or cytomegalovirus in immunocompromised patients [4].

We present here the first case in the literature of a healthy patient with appendicitis and shock caused by *R. ornithinolytica*.

CASE PRESENTATION

A 54-year-old man, with no significant past medical or surgical history and no recent travel, presented to the emergency room with a 24-h history of nausea, vomiting, diarrhea and abdominal pain. The patient denied any ingestion of fish, contaminated food or water. He had generalized skin flushing and his vital signs were as follow: blood pressure 60/39 mmHg, heart rate 131/min and temperature 37,8°C. Aggressive fluid resuscitation and intravenous ciprofloxacin and metronidazole were initiated.

Blood tests' results were as follow: white blood count 18.9 × 10^9/L, neutrophils 17,63 × 10^9/L, hemoglobin 162 g/L, platelets 120 × 10^9/L, creatinine 445μmol/L and an estimated glomerular filtration rate (GFR) of 12 mL/min. The venous blood gas (VBG) displayed metabolic acidosis with a pH of 7,29.

A non-injected computed tomography (CT) scan of the abdomen and pelvis showed a thickened terminal ileum and a distended appendix reaching 13 mm, with mild stranding of the surrounding fat.

Hemodynamic instability and a suspected intra-abdominal source warranted surgical exploration. Turbid fluid retrieved from the right lower quadrant (RLQ) was sent for Gram stain and culture. A 1 cm necrotic zone was noted at the base of the appendix, without any other significant signs of appendicular or ileal inflammation. Appendectomy and peritoneal lavage were performed.

As these findings were deemed insufficient to explain the severity of the patient's presentation, intraoperative short colonoscopy and transesophageal echocardiography were performed. Both were normal. The patient was then admitted to the intensive care unit (ICU) where support with vasopressors continued for 2 days. He developed disseminated intravascular coagulation (DIC). After 7 days of empirical intravenous treatment with ciprofloxacin and metronidazole, the patient received an additional 7 days course of oral amoxicillin/clavulanic acid. The flushing syndrome persisted for 6 days. The patient left the ICU after 6 days, and recovered uneventfully before being discharged on post-operative Day 10.

Blood drawn at arrival and liquid from intraoperative RLQ fluid were analyzed using the MALDI-TOF MS technique (Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectroscopy). Results indicated the presence of *R. ornithinolytica*, which was multisensitive, notably to ciprofloxacin and amoxicillin/clavulanic.

Pathological analysis of the appendectomy specimen showed acute inflammation of the appendicular muscularis, with no inflammation of the mucosa. No perforation was objectified. Periappendicular inflammation of the fatty tissue was also noted.

DISCUSSION

We report the case of a healthy 54-year-old male who presented with *R. ornithinolytica* septic shock, associated with appendicitis. To our knowledge, this clinical presentation has not been previously described in the literature with *R. ornithinolytica* nor *R. planticola*.

Previous reports of *R. ornithinolytica* and *R. planticola* infections include cases of bacteremia, pneumonia, urinary tract infection, cellulitis, surgical site infection and necrotizing fasciitis [5, 6]. Freney *et al.* [7] reported the first clinical manifestations related to these organisms in the 1980s as septicemia to *Klebsiella trevisanii* in patients hospitalized for cardiac comorbidities.

Regarding gastrointestinal infections to *R. ornithinolytica,* cholangitis and pancreatitis were described [6]. One recent case of spontaneous peritonitis in a healthy individual was published [8]. As for *R. planticola*, reports included cases of pancreatitis, cholangitis, hepatic abscess, acute cholecystitis and peritoneal dialysis-associated peritonitis [5, 9]. A case of gastroenteritis-associated bacteremia has been described in a patient who recovered uneventfully with antibiotics [10]. A recent case of a necrotizing appendicitis managed with an uneventful laparoscopic appendectomy was also described [11].

The majority of the reports on *R. ornithinolytica* and *R. planticola* describe nosocomial infections in patients with significant systemic comorbidities such as chronic kidney disease, diabetes and cancer. It has even been suggested that infection with these organisms occurs mainly in patients with impaired defense mechanisms and weakened immune system. Our patient was a healthy middle-aged man with no recent hospitalizations, infections nor impaired immune system that could explain the severity of his clinical presentation. Moreover, initial imaging and surgical exploration failed to reveal any significant gastrointestinal injury that would properly explain the septic shock and severe acute kidney failure. Although significant vasodilation has been described in scombroid syndromes, the patient did not present symptoms of an allergic reaction, such as bronchospasm, oral swelling or respiratory distress that could suggest histamine poisoning rather than a septic process. He presented however with unexplained cutaneous flushing for several days.

In conclusion, *R. ornithinolytica*, along with *R. planticola*, have long been believed to be harmless environmental organisms, usually found in water or soil. The present report along with other recent papers suggest rather a wide spectrum of life-threatening clinical presentations even in healthy individuals.

CONFLICT OF INTEREST STATEMENT

None declared.

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