Primary peritonitis caused by *Raoultella ornithinolytica* in a 53-year-old man

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**Introduction:** *Raoultella ornithinolytica* is a Gram-negative bacillus. This bacillus was until recently often confused with *Klebsiella* spp. It is known primarily for causing histamine fish poisoning or scombroid syndrome, and rarely causes human infections. This case report discusses a patient who presented with generalized primary peritonitis due to *R. ornithinolytica*.

**Case presentation:** A 53-year-old Scandinavian man resident in Botswana, sub-Saharan Africa, presented to the emergency department shortly after onset of lower abdominal pain and dysuria. He was treated for urinary tract infection and discharged. He came back after 16 h with more severe, generalized abdominal pain and a fever of 38°C. Abdominal sonography was unremarkable. Examination confirmed peritonitis, particularly marked in the right iliac fossa. He had mild leukocytosis 13.1 x 10⁹ l⁻¹, a C-reactive protein level of 372.7 mg l⁻¹ and his serum albumin level was 31 g l⁻¹. He was admitted for parenteral antibiotics, laparoscopic peritoneal lavage and appendectomy. He had 500 ml of free pus in the abdomen with no evident focal source. A pus swab grew *R. ornithinolytica*. The pathology showed mild early acute appendicitis with severe periappendicitis and suppurative peritonitis. He was discharged home after 7 days of parenteral antibiotics.

**Conclusion:** *R. ornithinolytica* infections are rare in humans, but they can be life-threatening.

**Keywords:** appendicitis; infections; laparoscopy; primary peritonitis; *Raoultella ornithinolytica*.

**Introduction**

Primary peritonitis is a rare life-threatening infection often associated with liver disease among other immunocompromised states. The commonest causative organisms are Gram-negative bacteria like *Escherichia coli* and Gram-positive organisms like *Streptococcus* spp. *Raoultella* spp. are Gram-negative, non-motile bacilli largely regarded as environmental bacteria, and were only recently distinguished phylogenetically from *Klebsiella* spp. (Drancourt et al., 2001). *Raoultella* is known for causing histamine fish poisoning following consumption of stale scombroid fish (Masashi et al., 2002). Few human infections by members of the genus *Raoultella* have been reported (Hadano et al., 2012; Kim et al., 2010; Lebloenya & Christians, 2011; Mau & Ross, 2010; Morais et al., 2009; Yalcin et al., 2011). It is against this background that we report this case of primary peritonitis due to *R. ornithinolytica* in a previously well, male European resident in Botswana.

**Case report**

A 53-year-old Scandinavian man was admitted with peritonitis. This was suspected to be due to a ruptured appendix. Ten weeks prior, he had been diagnosed with Parkinsonism while back in Europe on vacation. He was not yet on medication. His past surgical history was significant for twice being operated on for perianal abscess. He had been in Botswana for 8 weeks since returning from his European vacation.

He presented within 4 h onset of suprapubic abdominal pains, loss of appetite and dysuria. Urinalysis was positive for blood only. Other tests including full blood count, electrolytes and glucose levels were normal. He was treated empirically for a urinary tract infection on an outpatient basis. He was given an outpatient abdominal ultrasound scan (USS) referral. He came back 16 h later with more intense pain, having vomited once, with a temperature of 38°C and feeling exhausted. Examination confirmed peritonitis, more marked on right lower quadrant. An abdominal USS revealed bilateral small renal cysts and a moderately enlarged prostate and some free fluid in the pouch of Douglas. He was admitted for surgery on suspicion of a ruptured appendix and immediately started on intravenous amoxicillin/clavulanic acid, gentamicin and metronidazole.

Repeat laboratory tests showed mild leukocytosis of 13.1 x 10⁹ l⁻¹, a C-reactive protein level of 372.7 mg l⁻¹,
normal liver function profile but an albumin level of 31 g l⁻¹, normal renal function and normal plasma glucose.

Laparoscopic peritoneal lavage and appendectomy was favoured to minimize morbidity. There was 500 ml free pus in the pelvis, right subphrenic area and between the terminal ileum loops. He also had adhesions in the periappendical right iliac fossa area and a non-oedematous hyperaemic pelvic appendix. Appendectomy was done and the abdomen was thoroughly washed. Post-operatively, the patient was admitted to the high-care unit.

His fever immediately resolved after laparoscopy. Two subsequent temperature spikes to 38 °C occurred approximately 36 h after surgery. He was noted to have sympathetic small pleural effusions with bilateral basal atelectasis apparent at 48 h after surgery. Drainage was not necessary for these and they were resolving by the time he left the hospital after 7 days.

At 24 h, microbiology tests reported a profuse growth of Gram-negative bacilli from the peritoneal pus swab. By 48 h, the cultures had grown *R. ornithinolytica*. No further characterization of the bacillus was possible in our laboratory. The bacillus was sensitive to all antibiotics tested except ampicillin on the antibiogram. The other antibiotics on the empiric regimen were stopped and treatment continued with intravenous amoxicillin/clavulanic acid. Enteric feeds were re-introduced starting on day 3. He was discharged from the high-care unit on day 4. A follow-up abdominal computed tomography scan and chest radiographs confirmed progressive improvement in both the abdomen and the pleuropulmonary aspects of his disease.

The pathology report described an intact appendix with features of early acute appendicitis with severe periappendicitis. Additionally, a review of submitted omental tissue confirmed severe suppurative peritonitis. There was no evidence of peritoneal tuberculosis or malignancy.

At the last review 3 months after discharge, he remained well.

**Discussion**

*R. ornithinolytica* rarely causes human infections. No cases of peritonitis due to this organism have been reported. The few cases of human infections reported to date are all in patients with co-morbidity (Hadano *et al.*, 2012; Kim *et al.*, 2010; Leholeny & Christians, 2011; Mau & Ross, 2010; Morais *et al.*, 2009; Yalcin *et al.*, 2011). The patient in this report was apparently well, although his human immunodeficiency virus status was unknown and he was not willing to be tested at the time. This is, to the best of our knowledge, the first case of spontaneous *R. ornithinolytica* peritonitis.

Primary peritonitis is rare, more so in apparently healthy humans. *E. coli* and Gram-positive organisms such as *Streptococcus* spp. are the leading causes. Peritonitis caused by *R. ornithinolytica* has not been reported previously, as far as we are aware. We speculate that the source of infection in our patient was his colon, as the majority of *R. ornithinolytica* isolates from humans are from the colon (Al-Hulu *et al.*, 2009). This patient was not on antibiotics, was seemingly well, had not eaten fish for over 2 months and had generally lived a healthy life-style.

Despite the expectation of extreme flushing/redness due to histamine produced by the infecting organism, at no point did I or any other staff members caring for this patient make such an observation. His high fever at admission could possibly have been blamed for any flashing, if any had been noted.

We find the report of a 45-year-old man with pancreatitis and a retroperitoneal abscess that had *Raoultella planticola* cultured from the peritoneal fluid samples interesting (Alves *et al.*, 2007). *R. planticola* has much in common with *R. ornithinolytica*, including their β-lactamase phenotype (Walckenaer *et al.*, 2004). The authors of the pancreatitis case felt that previous antimicrobial use may have biased selection for the organism. They did not speculate why these administered antibiotics would spare the pathogen. Interestingly, however, there is a striking resemblance of the sensitivity patterns of the two isolates. The antibiogram in their isolate, as in our patient, showed resistance to only ampicillin and exhibited no extended-spectrum β-lactamase activity (Walckenaer *et al.*, 2004). Both isolates were sensitive to amikacin, first-generation cephalosporins, cefuroxime, cefepime, ceftazidime, ceftriaxone/cefotaxime, ciprofloxacin, amoxicillin/clavulanic acid, co-trimoxazole, gentamicin/netilmicin, imipenem, meropenem, piperacillin/tazobactam and tobramycin.

**Conclusion**

While the sensitivity patterns and good outcomes in our patient and in the other *R ornithinolytica* infection cases so far suggest a pathogen with low antibiotic resistance, it nevertheless can cause severe life-threatening infections.

**References**


