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Case report

The first case report of *Raoultella planticola* liver abscess

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ABSTRACT

Raoultella species are a group of gram-negative, non-motile bacilli commonly isolated from the environment. The group was considered a member of the genus *Klebsiella* until the late 1990s. *Raoultella planticola* is a rare cause of human infections. We report the first case of liver abscess caused by this organism. The patient was successfully treated with appropriate antimicrobials combined with operative drainage.

Introduction

Raoultella planticola is a gram-negative, aerobic, non-motile, encapsulated rod-shaped bacterium belonging to the family Enterobacteriaceae [1]. It is closely related to *Klebsiella* bacteria species and thus is easily misidentified as *Klebsiella pneumoniae* or *Klebsiella oxytoca* [2]. The bacterium is commonly found in water, soil and damp environments. It is an uncommon pathogen and has rarely been reported to infect humans. To the best of our knowledge, this is the first reported case of a liver abscess caused by *R. planticola*.

Case report

A 62-year-old male patient with a history of diabetes mellitus type 2, hypertension and benign prostatic hypertrophy presented with complaints of fatigue, increased urinary frequency, mild epigastric tenderness, and nausea and vomiting for 5 days. On admission, physical examination revealed a mildly ill-appearing white male, alert and oriented, and in moderate distress. Vital signs revealed a temperature of 37 °C, pulse of 127 beats per minute, and a blood pressure of 117/76 mmHg. His physical exam was unremarkable except for tenderness to palpation in the right upper quadrant (Fig. 1).

Laboratory data on admission were notable for the following (reference ranges provided parenthetically): creatinine 3.1 mg/dL (0.8–1.3 mg/dL) with a baseline of 1.4 mg/dL, glucose 500 mg/dL, WBC 12 k/mm^3 with 93% neutrophils. Liver function results were: alkaline phosphatase 351 unit/L (50–100 U/L), and bilirubin 2.1 mg/dL (0.3–1.9 mg/dL). There was an anion gap of 26 with lactic acid of 1.74 mmol/L (0.5–1 mmol/L). Urinalysis revealed 2+ protein, large bacteria, negative nitrites, positive leukocyte esterase and 3 white blood cells/hpf. Treatment was initiated for diabetic ketoacidosis secondary to underlying sepsis with intravenous fluid resuscitation, insulin drip and empiric antimicrobials therapy with piperacillin-tazobactam. Initial blood and urine cultures grew gram-negative bacilli later identified as *R. planticola*.

An abdominal CT scan revealed a complex multicystic mass in the medial left hepatic lobe suggestive of a hepatic abscess. Based on these findings, antimicrobials were changed to ceftriaxone to provide better biliary and hepatic penetration and the patient underwent a percutaneous drainage of the hepatic abscess, during which 80 mL of purulent fluid was removed. A sample of the fluid was sent for gram stain and culture. Aerobic and anaerobic cultures of the aspirate revealed only *R. planticola*. The organism was found to be susceptible to ciprofloxacin, ceftriaxone and tobramycin. The patient's drainage tube was removed after 8 days and the patient discharged home to complete a 2-week course of IV ceftriaxone 2 g daily followed by ciprofloxacin 500 mg BID for an additional 28 days. Follow up of the patient at 2 months post treatment revealed resolution of his symptoms and improvement of his liver abscess on a CT scan.

Discussion

Raoultella species are gram-negative, non-motile, aerobic bacilli that are primarily considered as environmental bacteria closely related to the genus *Klebsiella* [1]. The organism has been isolated

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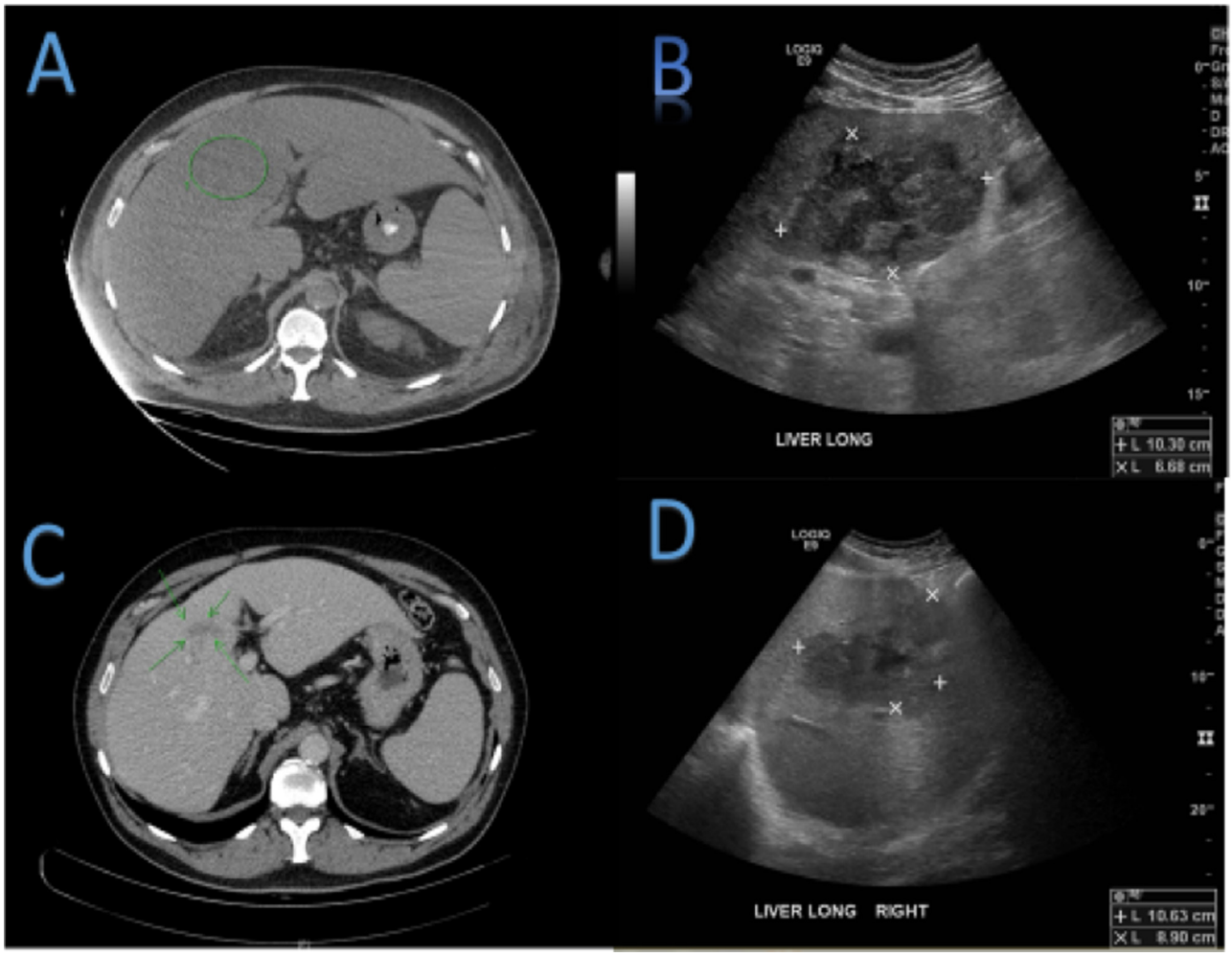

Fig. 1. (A) CT of the abdomen without contrast shows (green oval) ill-defined areas of heterogenous predominantly low attenuation throughout the medial segment of the left hepatic lobe, to a lesser degree within the lateral segment of the left hepatic lobe. Findings raise concern for a hepatic abscess. (B) Right upper ultrasound showing (white x's) complex mass with in the medial left lobe. The mass shows a heterogeneously hypoechoic echotexture and measures approximately $10.3 \times 9.3 \times 6.7$ cm. (C) CT scan of liver after drainage shows (green arrows) decreased sized/conspicuity of irregular areas of decreased enhancement in the liver, primarily involving the left hepatic lobe, suggestive of sequelae of previous hepatic abscesses. (D) Right upper ultrasound after IR-guided drainage shows (white x's)10 cm area of heterogeneous echotexture secondary to residual abscess.

from a variety of human tissues and biological fluids, and constitutes a potential, although rare, cause of severe infections in hospitalized and immunocompromised patients. *Raoultella planticola* and italicize R. ornithinolytica also have the ability to produce histidine decarboxylase and have been associated with scrombroid fish poisoning by metabolizing the histadine in the fish tissues to histamine[3] *Raoultella planticola* has been found to cause urinary tract infections [5], cholangitis [6], cholecystitis [7], pneumonia [10], and soft tissue infection [8], but has not previously been reported as a cause of liver abscess.

Raoultella planticola was originally considered a member of environmental *Klebsiella*, which consisted of *Klebsiella terrigena, Klebsiella ornithinolytica, Klebsiella planticola*, and *Klebsiella trevisanii*. In 1986, the last two species were combined under the name *K. planticola* because of indistinguishable phenotypic characteristics and high levels of DNA homology [9] In 2001, *K. terrigena, K. ornithinolytica*, and *K. planticola* were transferred to the new genus *Raoultella* on the basis of 16 S rRNA and *rpoB* sequences [12].

This case describes a liver abscess in a patient who presented with diabetic ketoacidosis, urinary tract infection and bacteremia. The putative primary causative organism *R. planticola* was isolated from urine, blood, and hepatic drainage. The most frequently isolated pathogens responsible for hepatic abscesses are *Escherichia coli*,*K. pneumonia and* Streptococcus anginosus group such as S. intermedius. Other causative organisms reported in the literature include *Actinomyces* species, Entamoeba histolytica and Staphylococcus *aureus*. Cases involving *Aspergillus* sp. and *Candida albicans* have also been reported. As a result, definitive bacteriologic diagnosis based on blood or tissue specimen cultures is necessary to guide antimicrobial treatment.

Chun and Yun provided a retrospective study of 20 patients with *R. planticola* bacteremia characterizing clinical features [11]. The majority of the patients had underlying malignant conditions, most commonly adenocarcinoma involving the gallbladder or bile duct. In fact, one possible scenario suggested for *R. planticola*'s natural course of infection is that it occurs when systemic impairment of the host immune system enables dormant colonizers to become invasive [6,12,13,14].

In the present report, *R. planticola* was the etiologic agent responsible for bacteremia, urinary tract infection, and liver abscess. The patient was successfully treated with surgical drainage and a 6-week course of antibiotics, including ceftriaxone and ciprofloxacin. This case represents the first reported case of a

liver abscess caused by *R. planticola* and illustrates the importance of recognizing that uncommon organisms can cause significant disease.

Conflicts of interest

None.

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