



## CASE REPORT

# Emphysematous cholecystitis complicating liver abscess due to *Clostridium baratii* infection

Wen-Cheng Huang<sup>a</sup>, Wen-Sen Lee<sup>b,\*</sup>, Tzesian Chang<sup>c</sup>, Tsong-Yih Ou<sup>b</sup>, Carlos Lam<sup>a</sup>

<sup>a</sup>Emergency Department, Wan Fang Hospital, Taipei Medical University, Taipei 116, Taiwan

<sup>b</sup>Division of Infection Disease, Department of Medicine, Wan Fang Hospital, Taipei Medical University, Taipei 116, Taiwan

<sup>c</sup>Division of Gastroenterology, Department of Medicine, Wan Fang Hospital, Taipei Medical University, Taipei 116, Taiwan

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### KEYWORDS

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*Clostridium baratii* bacteremia is a rare but severe anaerobic infection. Its major clinical features are neurological presentation, and significant risk factors include hemodialysis, intestinal disease or malignancy. We describe a case of emphysematous cholecystitis complicated by a liver abscess due to *C. baratii* infection in a healthy adult without neurological manifestation.

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## Introduction

*Clostridium* species are important anaerobic infections. Over 200 *Clostridium* species of this genus cause various invasive and toxigenic diseases. Most septic syndrome and complicated intra-abdominal infections (IAI) are attributed to *Clostridium perfringens*, followed by *C. septicum*.<sup>1</sup> Barash reported the first case of infantile botulism caused by *C. baratii* producing neurotoxin type F in 2005.<sup>2</sup> Here, we

report a case of emphysematous cholecystitis complicated by a liver abscess due to *C. baratii* infection without neurological manifestations in a healthy adult patient.

## Case report

A 54-year-old man patient presented himself to our emergency department with fever and chills for 3 days. He complained of fluctuating and persistent dull pain over the epigastric area. The abdominal pain could be relieved by lying down, but was aggravated by the decubitus position. He did not have nausea, vomiting, muscle spasm or focal neurologic signs. He denied any contact with animal or travel to foreign countries in recent days. On physical

\* Corresponding author. 111 Section 3, Hsing-Liong Road, Taipei 116, Taiwan.

E-mail address: [89425@wanfang.gov.tw](mailto:89425@wanfang.gov.tw) (W.-S. Lee).

examination, the patient was acutely ill and had a body temperature of 39°C. The abdomen revealed right upper quadrant tenderness with Murphy's sign. In addition, the laboratory examinations revealed leukocytosis (17,330/uL) with a left shift, elevated C-reactive protein (11.16 mg/dL), and mild jaundice (total bilirubin: 1.63 mg/dL). The result of a computed tomography (CT)-scan revealed emphysematous cholecystitis with a liver abscess (Fig. 1). The patient was admitted to an inpatient ward for further management.

Because the patient suffered from complicated IAI presenting with emphysematous cholecystitis and liver abscess, we prescribed three antibiotics for broad spectrum coverage initially. The patient had received empirical antibiotics (Ceftriaxone 2 g Q12H intravenous drip, Metronidazole 500 mg Q6H intravenous drip, Amikacin 500 mg Q.D. intravenous drip) for 3 days, but he was still febrile. The blood culture yielded *C. baratii* on the 4<sup>th</sup> admission day. A general surgeon was consulted and surgical intervention was suggested because of calculous cholecystitis with gas formation and the complicating liver abscess by CT-scan findings. The patient received cholecystectomy and surgical debridement of the liver abscess on the 5<sup>th</sup> admission day. The postoperative course went smoothly without any complication or neurological manifestations. After receiving the same three antibiotics therapy for 14 days, he recovered well without any neurological sequelae.

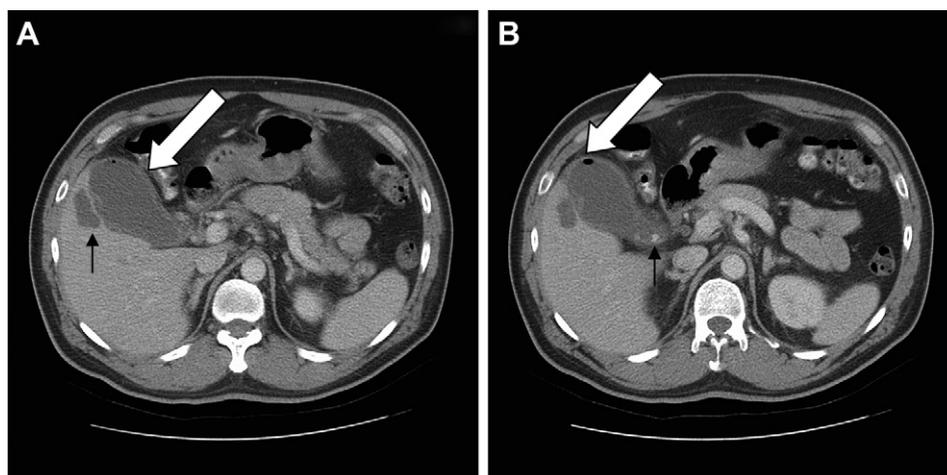
## Discussion

*C. baratii* is characterized as anaerobic, gram-positive rods that are capable of forming endospores.<sup>1</sup> In the literature review, infectious diseases due to *C. baratii* include infantile botulism, lung abscess and Kawasaki syndrome.<sup>2,3</sup> More than 50% of biliary tract infections are due to *C. perfringens*, followed by *C. septicum* and other *Clostridium* species.<sup>1,4</sup> The frequency of anaerobic bacteremia has been declining in recent decades. Previous studies from 1970 to 1980 reported a decrease in the number of anaerobic bacteremia cases. This finding is probably related to the

use of prophylactic antibiotic agents with anaerobic coverage and the routine implementation of bowel preparation before abdominal surgery. Many authors questioned the usefulness of performing anaerobic blood cultures. Nonetheless, more recent studies in the late 1980s to 2000s showed a paradoxical surge in the incidence of anaerobic bacteremia, which emphasized the importance of performing anaerobic blood cultures. Many explanations for this shift have been proposed. Among them, antimicrobial resistance, demographic and epidemiologic changes are of pivotal importance.

The risk factors of clostridial infections included uremia, diabetic foot, intestinal disease or malignancy. Our patient had an underlying disease of asymptomatic gall stone. It may have been the only risk factor. Infection caused by *C. baratii* is rare and there are only a few case reports of botulism in the literature.<sup>1,3,5</sup> In reviewing the published papers, we have not found any case of *C. baratii* bacteremia complicating acute emphysematous cholecystitis and liver abscess in a healthy adult.

*Clostridium* species, second only to *Bacteroides* species, as clinically significant anaerobic isolates, account for less than 3% of all blood cultures.<sup>6</sup> On cancer wards, the rates of anaerobic bacteremia are relative higher than those on general wards, reflecting the importance of underlying intestinal carcinoma and leukemia.<sup>6</sup> Its strains are widely distributed in the environment and normal microflora of humans and animals. More than 200 species have been described, but fewer than 20 species are associated with human diseases.<sup>1,2</sup> The *C. baratii* is a gram-positive spore forming bacilli and classified as a saccharolytic nonproteolytic species. The characteristic biochemistry of *C. baratii* are gelatin hydrolysis(-), glucose fermentation(+), and lecithinase(+). *C. baratii* infection is rarely reported in the literature because it lacks an overt pathogenesis and fails to produce a lethal toxin. In the literature search, we found that its most clinical feature is neurotoxiogenesis in adults and infants (type F botulism). Moreover, in previous studies *C. baratii* has been known to cause other morbidities including Kawasaki disease, and lung abscess.<sup>2,7</sup>



**Figure 1.** (A) The computed tomography (CT) images of the abdomen revealed a distended inflammatory gall bladder (white arrow) and liver abscess (black arrow). (B) The CT images of the abdomen revealed gas formation (white arrow) and a small stone (black arrow) in the gall bladder.

A complicated IAI is defined as an intra-abdominal infection or peritonitis with structural abnormality, for example, IAI with abscess formation, obstruction, gas gangrene, and local co-morbid gastrointestinal illness which requires an invasive procedure (drainage) or surgical intervention. In our case, the patient had acute emphysematous cholecystitis complicated by a liver abscess, which fulfilled the definition. In general, liver abscess could be treated by adequate antibiotics and pig-tail drainage.<sup>8</sup> Because of persistent fever and gas gangrene of gall bladder, he received surgical intervention. The operation note revealed that the gall bladder wall was found to be tense with gangrenous mucosa and adhesion to the liver surface, and that there was gas under pressure in the lumen of gall bladder.

Most clostridial infections are polymicrobial and surgical intervention depends on the specific infections. Included in this group are emphysematous cholecystitis, neutropenic enterocolitis, crepitant cellulites, and all cases of gas gangrene.<sup>9</sup> Penicillin G is generally considered the drug of choice for clostridial infections except *C difficile* associated diarrhea. Alternative agents that are highly active *in vitro* include chloramphenicol, imipenem, metronidazole, clindamycin and combinations of a  $\beta$ -lactam and  $\beta$ -lactamase inhibitor.<sup>1,3</sup>  $\beta$ -Lactamase production has been noted with *C butyricum*, *C clostridiiforme*, and *C ramosum*. Because of concerns of resistance raised by *in vitro* data and animal studies, alternative drugs should be considered.<sup>10</sup>

To conclude, a healthy adult with a rapid progression of acute emphysematous cholecystitis and liver abscess may suggest the superimposed infection due to an anaerobic bacterial species, such as *C baratii*. We highlight that *C baratii* infection has been known to always cause sepsis with neurologic manifestations in the past decades, but our patient was an interesting case presenting with complicated IAI without neurologic manifestation. For a positive prognosis, early alertness of complicated IAI patients and appropriate antibiotics therapy with surgical intervention are necessary.

## Conflict of interest

The authors have no commercial associations or source of support that might pose a conflict of interest.

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## References

1. Lykkegaard NM, Justesen T. Anaerobic and aerobic bacteriological studies in biliary tract disease. *Scand J Gastroenterol* 1976;**11**:437–46.
2. Barash JR, Tang TW, Arnon SS. First case of infant botulism caused by *Clostridium baratii* type F in California. *J Clin Microbiol* 2005;**43**:4280–2.
3. Iaria C, Stassi G, Salpietro DC, La Mazza A, Silipigni L, Arena A, et al. *Clostridium baratii* bacteremia associated with Kawasaki syndrome: first case report. *New Microbiol* 2007;**30**:481–4.
4. Edinburgh A, Geffen A. Acute emphysematous cholecystitis: a case report and review of the world literature. *Am J Surg* 1958;**96**:66–75.
5. Keet CA, Fox CK, Margeta M, Marco E, Shane AL, Dearmond SJ. Infant botulism, type F, presenting at 54 hours of life. *Pediatr Neurol* 2005;**32**:193–6.
6. Bodey GP, Rodriguez S, Fainstein V. Clostridial bacteremia in cancer patients. A 12-year experience. *Cancer* 1991;**67**:1928–42.
7. Harvey SM, Sturgeon J, Dassey DE. Botulism due to *Clostridium baratii* type F toxin. *J Clin Microbiol* 2002;**40**:2260–2.
8. Malik I, Ghosh S, Nutt C, Macdonald A, Bal AM, Collier A. *Gemella haemolysans* bacteraemia in a patient with solitary liver abscess. *J Microbiol Immunol Infect* 2010;**43**:438–41.
9. Andrew B, Onderdonk I, Wendy SG. *Gas gangrene and other Clostridium associated disease*. Principles and practice of infectious diseases. 7th ed. Orlando, FL: Churchill Livingstone; 2010. p. 3103–8.
10. Brazier JS, Levett PN, Stannard AL. Antibiotic susceptibility of clinical isolates of *Clostridia*. *J Antimicrob Chemother* 1985;**15**:181–5.