

DIFFUSE ABDOMINAL UPTAKE MIMICKING PERITONITIS IN GALLIUM INFLAMMATORY SCAN: AN UNUSUAL FEATURE OF ACUTE Q FEVER

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The clinical features in patients with acute Q fever are variable. We present a patient with fever, abdominal distension, pericardial effusion, and diffuse gallium uptake in the abdominal cavity, mimicking peritonitis or peritoneum carcinomatosis. Serologic surveys revealed acute infection by *Coxiella burnetii*. The patient responded poorly to doxycycline and improved with oral levofloxacin. During the afebrile period, gallium inflammatory scan showed resolution of previous diffuse uptake in the abdomen, and cardiac echo resolution of pericardial effusion, which was suggestive of peritoneal inflammation related to acute *C. burnetii* infection. Therefore, clinicians in Taiwan should be alert to the possibility of acute Q fever in patients with fever of unknown cause, especially with clinical evidence of peritoneal and/or pericardial inflammation.

Key Words: *Coxiella burnetii*, gallium scan, pericarditis, peritonitis, Q fever
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Q fever caused by *Coxiella burnetii* is an infectious disease with variable presentations. The spectrum of acute Q fever ranges from self-limited febrile illness to hepatitis, pneumonia, myocarditis, and endocarditis. Endocarditis is the major form of chronic Q fever and hepatitis has been reported as the major clinical manifestation of acute Q fever [1]. In southern Taiwan, acute febrile illness with acute hepatitis is the predominant presentation of acute Q fever [2,3].

Although gallium scan has been widely used in the detection of acute and chronic infectious diseases, there are no reported characteristic features in patients with acute Q fever. Herein, we describe the clinical and imaging

characteristics of a patient with *C. burnetii* infection that manifested as acute peritonitis and pericarditis. To our knowledge, this is the first case report of this unique presentation together with nuclear images.

CASE PRESENTATION

A 55-year-old man with type 2 diabetes mellitus complained of fever and chills for 20 days prior to admission. During that time, he also felt the sensation of abdominal fullness. He could not recall any history of traveling or insect bite during the 1 month prior to admission. However, there were sheep breeding in his neighborhood. Initially, he visited a local hospital and abdominal sonography showed a hepatic nodule only. Abdominal computed tomography (CT) revealed no definite lesion. Finally, he visited our hospital and was admitted for further evaluation of the fever with suspected hepatic origin.

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During admission, physical examination disclosed hepatomegaly and diffuse abdominal fullness without tenderness or rebounding pain. The white blood cell count was $11,500/\text{mm}^3$ and the platelet count was $365,000/\text{mm}^3$. The patient had mild anemia with a hemoglobin level of 11.6 g/dL. The prothrombin time was 13.2 seconds (reference, 11.4 seconds) and the activated partial thrombin time (aPTT) was prolonged at 74.5 seconds (reference, 29.6 seconds). Blood biochemistry showed normal renal function and serum bilirubin level, but abnormal levels of hepatic enzymes: aspartate aminotransferase 71 U/L (reference range, RR, 5–40 U/L), alanine aminotransferase 86 U/L (RR, 5–55 U/L), alkaline-phosphatase 141 U/L (RR, 30–110 U/L), γ -glutamyl transpeptidase 169 U/L (RR, 8–80 U/L), and total bilirubin/direct bilirubin 1/0.6 mg/dL (RR, 0.2–1.4/0–0.4 mg/dL). Urine analysis findings were negative. No hepatic nodules or ascites were detected on abdominal CT, but hepatomegaly was noted. Tests for antinuclear antibody, anti-nDNA, anti-ENA, CA125, and CA199 were negative, indicating no autoimmune or malignant diseases. Thyroid function tests and serum cortisol levels were within reference ranges. Initial echocardiography showed a dilated left atrium with preserved left ventricular function. There was a small amount of pericardial effusion but no vegetation. Chest CT showed pericardial effusion, pleural effusion, and a small nodule in the lower part of the right lung. The initial gallium scan showed hepatomegaly with diffuse uptake in the abdomen (Figure 1), and peritonitis or peritoneum carcinomatosis was suggested. The patient refused laparoscopy or liver biopsy. High fever persisted and, due to his history of animal exposure, Q fever was suggested and doxycycline was administered. The fever did not resolve after 2 weeks of therapy.

Blood bacterial cultures were negative. In addition, antibody survey for HIV-1, acute hepatitis A, B, or C infections, cytomegalovirus, Epstein-Barr virus, and *Rickettsia typhi* was negative, but a high titer of anticardiolipin antibody was detected (IgG 1,168 phospholipid U/L, IgM > 3,000 phospholipid U/L). Serologic survey for *C. burnetii* infection in acute serum revealed no detectable titer of IgG or IgM antibody to phase I antigens, but high titers of IgG and IgM (both $\geq 1:2,560$) to phase II antigens. Due to the poor responsiveness of the patient to doxycycline therapy, 500 mg/day of oral levofloxacin was given. Fourteen days later, the symptoms resolved completely without any sequelae. There was resolution of the pericardial effusion, shown by follow-up echocardiography and absence of abdominal uptake in gallium inflammation scan, 1 month after starting doxycycline therapy (Figure 1B).

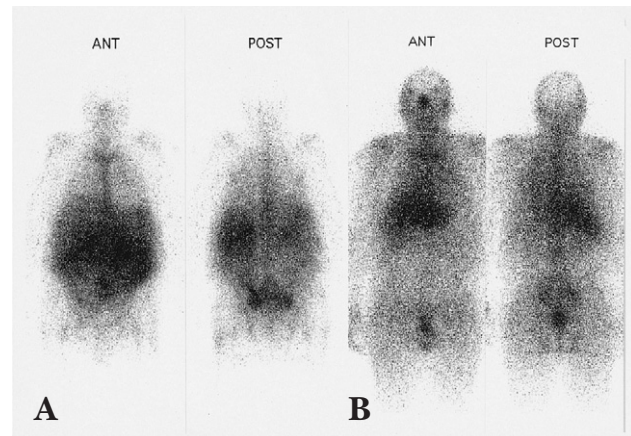


Figure 1. Gallium scan in a case of acute Q fever. (A) Diffuse increased activity in the abdominal cavity and increasing size of liver; (B) resolution of diffuse uptake in the abdomen 6 weeks after the initial scan.

DISCUSSION

We present an unusual patient with acute Q fever and diffuse increased abdominal uptake on inflammation scan. A follow-up gallium scan 6 weeks after the initial report showed normalization of uptake in the abdomen. A gallium scan in one patient with Q fever showed diminished hepatic uptake and markedly increased uptake in the myocardium, right breast, kidneys, and knee joints [4]. A follow-up study showed resolution of gallium uptake in the myocardium, right breast, liver, kidneys and knee joints. Our patient had not only liver involvement but an extended area secondary to active inflammation in the peritoneum. These findings show the diverse presentation of acute Q fever on gallium scan.

Gallium citrate scanning is an important diagnostic procedure in the evaluation of fever of unknown origin, and is indicated for patients who may have malignancy or inflammation but have no localized symptoms or signs [5]. It can also provide valuable information in the evaluation of therapeutic responses in such patients. Our patient had a clinical course suggestive of peritoneal involvement in acute Q fever: diffuse uptake on the gallium scan that mimicked tuberculous peritonitis [6], peritoneal carcinomatosis [7], or salmonella infections [8]. Patients with tuberculous peritonitis can present with diffuse or focal abdominal localization and decreased hepatic accumulation of gallium. The symptoms may imitate a host of miscellaneous diseases, including starch peritonitis [9], hypoproteinemia [10], and peritoneal mesothelioma [11]. In addition, tuberculous peritonitis is often associated with elevated CA125.

None of these disease processes were compatible with the clinical course of our patient. A follow-up scan during the afebrile period and positive serologic test results after effective antimicrobial therapy showed resolution of the diffuse uptake in the abdomen, which suggested correlation of acute Q fever and diffuse abdominal uptake on inflammatory scan.

Cardiac sonography in this patient initially revealed a small amount of pericardial effusion, and very trivial pericardial effusion in a subsequent study. It is possible that, based on the apparent clinical scenario, pericardial effusion and serologic data, he had acute pericarditis caused by *C. burnetii*. Only 1% of patients with acute Q fever present with pericarditis [12], which is a recently recognized clinical manifestation of acute Q fever [13]. Therefore, this pathogen is not listed in the etiology of pericarditis in major textbooks on internal medicine [14]. In Taiwan, tuberculosis is not an uncommon cause of pericarditis or pericardial effusion. Three echocardiographic intrapericardial abnormalities (i.e. exudative coating, fibrinous strands, and thickened pericardium), which were absent in our patient, have been observed in patients with tuberculous pericarditis [15], and can be helpful in the differential diagnosis of pericardial effusion.

Therapy with oral doxycycline for 2 weeks is the treatment of choice in patients with acute Q fever [14]. Recent *in vitro* studies have shown minimal inhibitory concentrations in the range of 1–2 µg/mL for doxycycline, trovafloxacin, and ofloxacin; 1–4 µg/mL for pefloxacin; 4–8 µg/mL for ciprofloxacin [16]; and 0.5–1 µg/mL for moxifloxacin [17]. Accordingly, fluoroquinolones are regarded as the alternative of choice, if tetracycline or its analogue is contraindicated or not clinically effective. The superior clinical response to levofloxacin in our patient supported the therapeutic role of fluoroquinolones in treating patients with acute Q fever.

According to our previous studies [2,3], abnormal liver function has been noted in all patients with acute Q fever. Most patients with serologically confirmed acute Q fever (17/19, 89%) had elevated titers of anticardiolipin antibody [2]. In another study, enzyme-linked immunosorbent assay for antiphospholipid antibodies was positive in 21 of 26 (81%) patients when cardiolipin was used as the antigen [18]. In addition, four of 15 patients (27%) had a prolonged aPTT [2]. There were some clues to acute Q fever in our patient. First, there was a history of breeding sheep in his neighborhood. Second, liver function was abnormal, aPTT was prolonged, and there was a high titer of anticardiolipin antibodies. Nevertheless, there were several unusual

findings, including the presence of diffuse uptake in the abdomen and pericardial effusion, and an unsatisfactory clinical response to doxycycline.

Taiwan clinicians should be alerted to the possibility of acute Q fever in any patients with fever of unknown origin, especially those with positive titers of anticardiolipin antibodies, prolonged aPTT, abnormal liver function, and clinical evidence of peritoneal inflammation or pericardial effusion.

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Ga^{67} 掃描呈現散發性攝入摹倣腹 膜炎之影像 — 一位急性 Q 熱病例 不尋常的表現

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Q 熱具有多樣化的臨床表現，在此提出一位五十五歲男性病例，最初以發燒、腹脹及心包膜積水來表現，而在腹部核醫攝影 (Gallium scan) 呈現腹膜炎同時懷疑腹膜有癌細胞轉移，血清學檢查呈現急性 Q 熱，這位病人對 Doxycycline 反應不佳，但對 Levofloxacin 反應頗佳，此點並不尋常。待病人退燒後，核醫攝影在腹部影像高度攝入現象已消失，同時心臟超音波也顯示心包膜積水消退，據此推斷此病例腹膜發炎與核醫影像表現應和急性 Q 熱感染有關，因此臨床醫師對於發燒病人特別是有腹部發炎或併有心包膜炎必需考慮到急性 Q 熱。

關鍵詞： *Coxiella burnetii*，核醫掃描，腹膜炎，心包膜炎，Q 熱
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