

An Uncommon Cause of Intra-Abdominal Sepsis: A Case Report



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ABSTRACT

The abdomen is the second most common site for sepsis. This potentially life-threatening condition necessitates finding the source and providing prompt medical and/or surgical treatment. This presentation reveals an uncommon cause of intra-abdominal sepsis.

A 43-year-old woman presented to the emergency department with abdominal pain, tachycardia, tachypnea, and generalized abdominal tenderness. The evaluation of the laboratory tests showed an elevation in white blood cell count and liver enzymes. Ultrasonography of the liver revealed the presence of hydatid cysts, and the abdomino-pelvic computed tomography scan with contrast displayed multiple pyogenic cysts in her liver, one of which had ruptured into the peritoneum. She underwent surgery, received antimicrobial agents, and was successfully discharged without experiencing any complications.

One clinical presentation of a hepatic hydatid cyst could be intra-abdominal sepsis, which requires emergency surgery along with antibiotic and anti-helminthic drugs.

Introduction

The importance of sepsis as a potentially life-threatening condition is well-known, and timely identification of the source and prompt treatment could prevent the associated mortality [1]. The abdomen is the second most prevalent source of sepsis [2]. Common causes of secondary peritonitis (as opposed to spontaneous bacterial

peritonitis) in the developed world are ruptured appendicitis, cholecystitis, perforated gastrointestinal cancers, and diverticular disease [3]. However, several diseases could present with their uncommon complications. For instance, a hepatic hydatid cyst is mostly asymptomatic, and the most common presentation is non-specific chronic upper abdominal pain due to its pressure on the surrounding structures [4]. In this case, we describe a patient with intra-abdominal sepsis and peritonitis, secondary to a

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ruptured hepatic hydatid cyst that had been super-infected with *Escherichia coli* (*E. coli*).

Case presentation

A 43-year-old woman was brought to the emergency department, complaining of abdominal pain in the right upper quadrant and right flank, nausea, vomiting, and loss of appetite. The pain started 25 days ago but had worsened over the past seven days and had been associated with fever and chills. The patient denied any respiratory or urinary symptoms, and there was no history of recent trauma or notable medical history. However, she mentioned having had contact with livestock during her childhood.

During the physical examination, the patient's blood pressure was measured at 116/78 mmHg, pulse rate was 136/min, respiratory rate was 30/min, oxygen saturation was 92% while breathing room air, and the temperature was recorded as 36.8°C. Upon palpation, the abdomen was found to be rigid and showed signs of generalized tenderness and rebound tenderness. Laboratory results indicated a white blood cell count of 27,500/mm³ (with 91.7%

neutrophilia without eosinophilia), hemoglobin levels of 8.3 g/dl, and a platelet count of 705,000/mm³. The patient also had increased levels of lactate dehydrogenase (LDH) and C-reactive protein (CRP). Liver enzymes were slightly elevated, and other laboratory results, including total and direct bilirubin, were within the normal range.

Upon performing ultrasonography (US), a hypoechoic cyst measuring 139x94 mm with internal septation was detected in the right lobe of the liver, indicating the presence of a hydatid cyst. The World Health Organization (WHO) classification was not reported. A computed tomography scan (CT-scan) with intravenous (IV) contrast was performed, which identified a calcified cyst, a pyogenic and ruptured cyst, multiple subcapsular collections, portal vein branch thrombosis, and peritoneal free fluid (Figures 1-3).

An immediate laparotomy was conducted, which revealed the presence of multiple liver cysts with connecting septa. Total cystectomy and peritoneal lavage were performed. A histopathologic examination of the primary cyst confirmed its identity as a hydatid cyst (Figure 4).

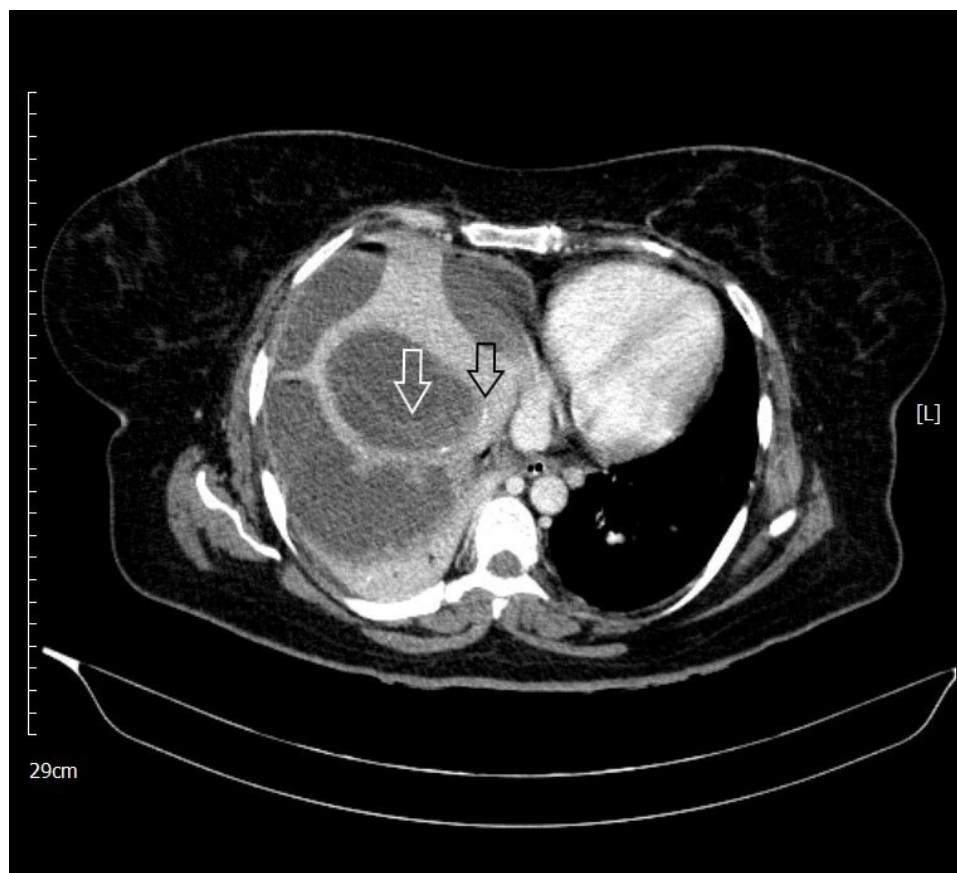


Fig. 1. Hydatid cyst with an internal membrane (white arrow) and calcification foci in the cyst wall (black arrow).



Fig. 2. Infected hydatid cyst with disrupted wall (asterisk), subcapsular collection (black arrow), and gas containing fluid spreading to liver parenchyma (arrow).



Fig. 3. Free fluid and fat stranding in the peritoneum (asterisk).



Fig. 4. Periodic acid-Schiff stain, the laminated layer (LL).

The microbiologic culture of the pyogenic cysts yielded positive results for *E. coli*. The postoperative treatment course included oral Albendazole, along with intravenous Cefepime and Metronidazole. The patient was discharged 11 days after surgery without experiencing any complications.

Discussion

Limitation

We acknowledge the lack of ultrasonography images and the corresponding WHO classification as the most significant limitation. However, this presentation focused on the hydatid cyst complication: superinfection and rupture. To the best of our knowledge, the occurrence of both is rare. In this case, a CT-scan was more necessary for investigation.

Cystic echinococcosis (CE) is a parasitic, zoonotic infection caused by *Echinococcus granulosus* [5]. Within the life cycle, definitive hosts include dogs and other carnivores, while humans accidentally become intermediate hosts by ingesting the eggs released in carnivore feces [6]. Given the high burden posed by this disease worldwide, the WHO has classified it as a neglected disease and aims to control or eliminate it by 2050 [6].

CE typically manifests in the liver and lungs; however, it can also affect various other organs such as the spleen, heart, kidneys, and peritoneum [7]. Hepatic CE is commonly detected incidentally during routine imaging [7, 8], but symptoms, such as abdominal pain (the most common presentation), nausea or vomiting, palpable mass, hepatomegaly, and jaundice, develop when the cyst surpasses 10cm in diameter and causes damage to the bile ducts, hepatic artery or

vein, and portal vein [7, 9]. In addition, it can lead to complications such as cysto-biliary communication, rupture into the peritoneum, anaphylaxis, and secondary infection [9]. Superinfection complicates nearly 7% of CE, with *E. coli* found as the most common organism. Fever and localized pain are the most frequent signs [10]. It has been estimated that 1-8% of CE rupture into the peritoneum [11] and may occur spontaneously, iatrogenically, or as a result of trauma [12]. Patients with acute rupture into the peritoneum typically present with pain, fever, allergic reaction, localized abdominal guarding, and circulatory collapse [13]. When a secondary infected cyst ruptures into the abdominal cavity, it irritates the peritoneum and could initiate a series of compensatory and/or dysregulatory systemic responses that result in sepsis.

The gold standard diagnostic tool is Ultrasonography (US). Pathognomonic features include “hydatid sand,” which refers to floating protoscolices, “honeycombing” caused by daughter cysts, or the “water-lily sign,” which depicts the internal membranes suspended inside the cyst [14]. In cases of obese patients or when US fails to provide a definitive diagnosis, CT-scans are frequently used to investigate extrahepatic dissemination. IV contrast is necessary to examine inflammatory changes, infection, or communication with the biliary tree. Magnetic Resonance Imaging (MRI) and Magnetic Resonance Cholangiopancreatography (MRCP) have also proved beneficial in diagnosing extrahepatic cysts or complicated cases [5].

There are various treatment strategies for CE, with surgery being the definitive and curative choice of treatment. Emergency surgery is necessary for patients with CE rupture [11]. For intact cysts, rupture or intra-operative release of hydatid fluid containing protoscolices is a significant concern, in which using protoscolices injected into the cyst or as agents for peritoneal lavage has reduced cyst recurrence [6]. Conservative procedures, such as partial cystectomy and drainage, are preferred over radical approaches, including total cystectomy and segmental liver resection, especially outside endemic regions [7, 9]. Anti-helminthic drugs such as benzimidazoles are beneficial in cases of multiple small cysts or deep parenchymal cysts, or for those who are not suitable candidates for surgery. These drugs may also be used as adjunct therapy before and after surgical interventions [14, 15].

The most common complication patients with hepatic hydatid cyst rupture suffer is wound infection and cyst recurrence. However, mortality in the early post-operative period is also reported [11]. It has been suggested that copious peritoneal lavage and

albendazole therapy for 12 months could prevent recurrence, and follow-up with imaging and serologic tests at 6-month intervals is warranted [13].

Take away lessons

When we confront a patient with sepsis, it is important to evaluate intra-abdominal causes since they are the second most prevalent sources. Although hepatic pyogenic abscess commonly presents with RUQ pain and fever, hepatic hydatid cyst usually is found incidentally or presents with chronic abdominal pain. So, the sole finding of the cyst in US did not explain it as the source of sepsis which prompted us to perform CT-scan. The rupture of an infected hydatid cyst needs an emergent surgery with appropriate antibiotics.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article (and its supplementary information files).

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KA: writing - original draft, FS: data curation and supervision, MZ: writing – review and editing, and supervision, SM: resources, ME: conceptualization, methodology, writing – review and editing, and supervision. All authors read and approved the final manuscript.

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