

Received: 2018.12.02
Accepted: 2019.01.26
Published: 2019.04.10

Successful Diagnosis of a Longstanding Giant Amoebic Liver Abscess Using Contrast-Enhanced Ultrasonography (CEUS): A Case Report in a Western Country

Authors' Contribution:
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Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: None declared

Patient: Male, 59
Final Diagnosis: Amoebic liver abscess
Symptoms: Acute abdomen • dyspnoea
Medication: —
Clinical Procedure: Percutaneous CT guided drainage
Specialty: Surgery

Objective: Rare disease
Background: *E. histolytica* liver abscess results from extra-intestinal diffusion of amebiasis, which is responsible for up to 100 000 deaths per annum, placing it second only to malaria in mortality. Currently, the criterion standard for the diagnosis of liver abscesses is ultrasound, but CEUS (contrast-enhanced ultrasound) is emerging as a more accurate method for liver study, and it could be more accurate than ultrasound and non-invasive compared to CT.
Case Report: A white man (59 years old) with a 2-day history of dyspnea, acute abdominal pain in right upper quadrant, and raised inflammatory markers was admitted to a second-level Emergency Department in Rome (Italy). He reported several trips to tropical areas many years before, during which he ingested non-potable water and became infected with *Entamoeba histolytica*. This was treated medically with success. After administration of antibiotics (meropenem and metronidazole), a liver CEUS (contrast-enhanced ultrasonography) with administration of SonoVue (sulphur hexafluoride microbubbles) confirmed a giant liver abscess (15×16 cm). One day later, CT-guided drainage was performed without complications and the patient was discharged on the 25th post-procedure day, with improved blood results.
Conclusions: Acute abdominal pain can be caused by a variety of diseases, but a diagnosis of parasitic abscess should not be overlooked in non-endemic Western countries. CEUS is a new, promising, and more accurate technique that can be utilized to recognize liver abnormalities, including abscesses; however, retrospective population-wide studies are necessary to define the differential diagnoses.

MeSH Keywords: Abdomen, Acute • *Entamoeba Histolytica* • Liver Abscess, Amebic • Liver Diseases • Tomography, X-Ray Computed • Ultrasonography

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/914378>

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Background

E. histolytica liver abscess results from extra-intestinal diffusion of amebiasis and is responsible for up to 100 000 deaths per annum, placing it second only to malaria in mortality [1]. Recent studies and reports show various frequencies of asymptomatic *E. histolytica* infection in different populations, ranging from 2% in southern Africa, 9.6% in Vietnam, 13.8% in rural areas of Mexico, and 21% in Egypt. However, it can also occur in people who travel to endemic areas, such as tropical and sub-tropical regions, or who live in conditions with poor hygiene and have unhealthy lifestyles [2–4].

The infection can either result in an asymptomatic colonization of the gastrointestinal tract or cause an extra-intestinal colonization. After invading the enterocytes, the parasite reaches the portal circulation and diffuses to other organs, causing abscesses [5]. The most common site of extra-intestinal diffusion of *E. histolytica* is the liver [6], but it can also colonize other organs, such as the lungs [7], heart [8], and brain [9], especially when the liver abscess is not treated.

The diagnosis of amebiasis is based on anamnestic findings, clinical symptoms, and instrumental exams. Currently, ultrasound scanning is the best method for diagnosis of liver abscess, and it can also differentiate cholecystitis [10].

Echinococcus hydatid cysts can have the same clinical manifestations and radiological findings as *E. histolytica*, but serology gives the correct diagnosis [11].

While metronidazole is drug of choice for management of abscesses up to 10 cm, there is evidence that larger or complicated abscesses need simultaneous percutaneous drainage. Needle aspiration and catheter drainage are both helpful treatments, but new studies have shown the best results with the latter [12–14].

Case Report

A white man (59 years old) with a 2-day history of dyspnea, acute abdominal pain in the right upper quadrant and raised inflammatory markers was admitted to the Emergency Department of a tertiary referral center in Italy. He reported several trips to tropical areas many years before, during which he ingested non-potable water and became infected with *Entamoeba histolytica*, which was treated medically, with success. Other comorbidities, drug abuse, and alcohol consumption were denied.

At examination, the abdomen was soft and tender on the right upper quadrant, and there was evident hepatomegaly.

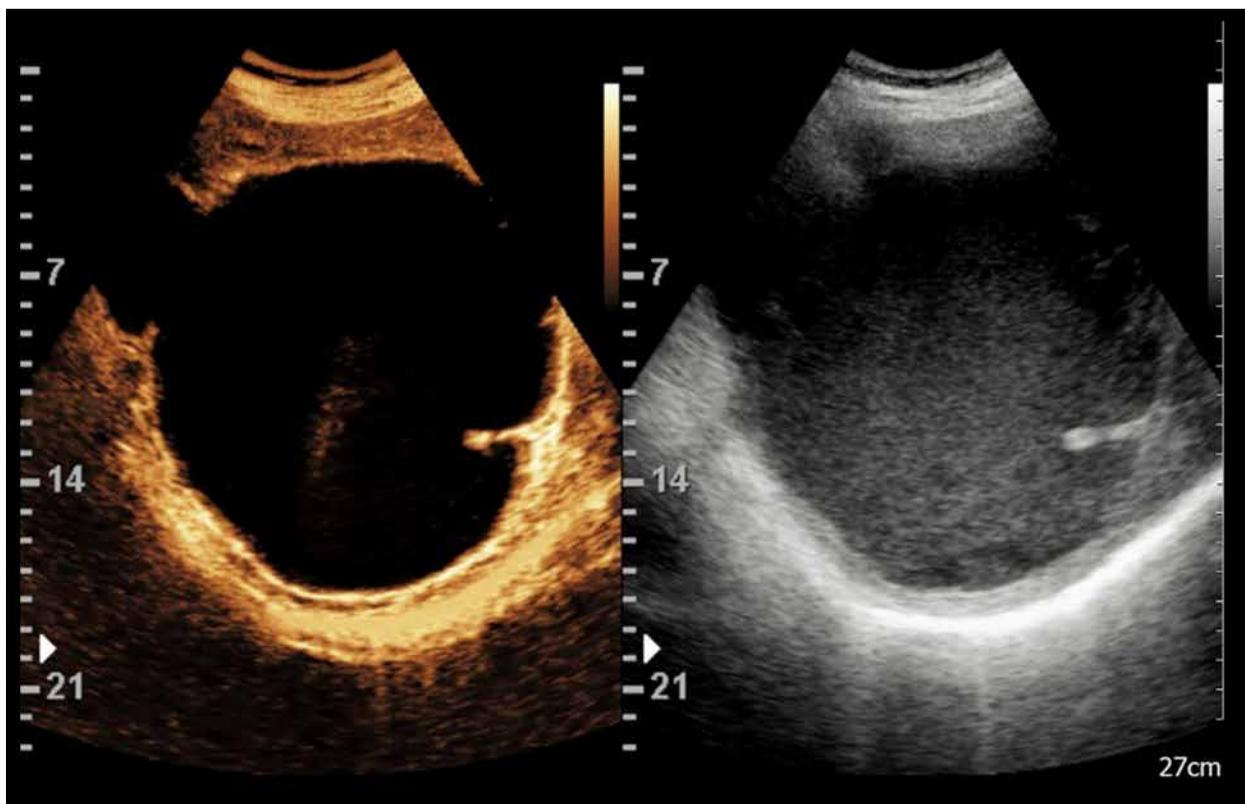


Figure 1. CEUS liver ultrasound examination.



Figure 2. Abdominal Axial CT: (A) non-contrast view, (B) arterial phase showing peripheral hypervascular ring, (C) axial venous phase CT.

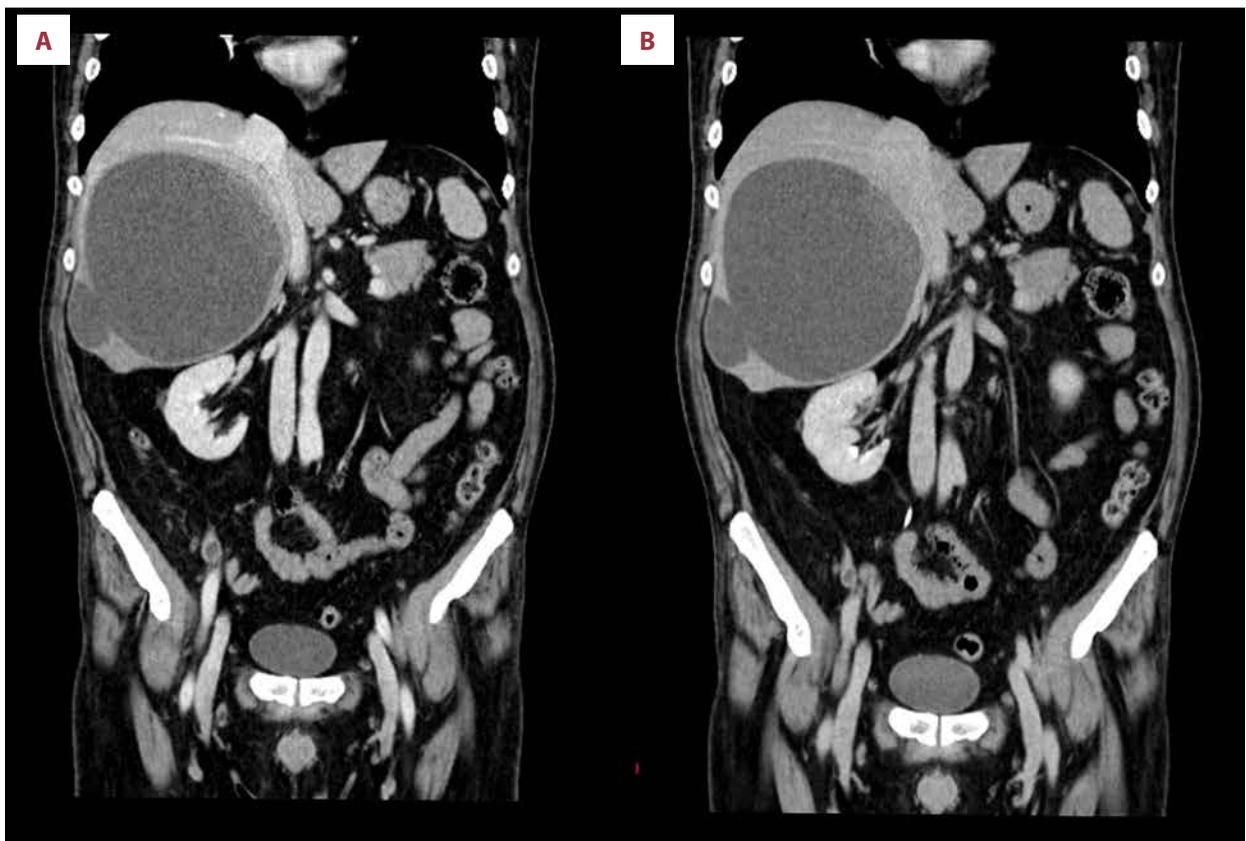


Figure 3. CT: (A) coronal venous phase cystic abdomen hypodense lesions with a vague rim enhancement, (B) late venous phase CT the peripheral ring disappears.

Blood tests showed: HB 9.5 g/dL; HCT 30.2%; MCV 78.6 fL; WCC 16 190; neutrophils: 13.52 thou/mm³; and CRP 18.6 mg/dL. No fever, tachycardia, or other signs of sepsis were recorded.

The patient was admitted and antibiotic therapy for a suspected parasitic infection was started (meropenem 2000 mg 3 times a day and metronidazole 500 mg 3 times a day). Serological tests confirmed *E. histolytica* infection. On the same day, a liver CEUS (contrast-enhanced ultrasonography), performed before and after administration of SonoVue (Sulphur Hexafluoride

Microbubbles) with grayscale scanning technique in real time, revealed a giant liver abscess (15×16 cm) occupying the V-VI hepatic segments (Figure 1). After SonoVue contrast administration, a slight strengthening of the parietal portion of the lesions was revealed, with no further findings of solid contextual components. The reported characteristics referred to intrahepatic localization of amoebic parasitosis. The diagnosis of amoebic liver abscess was confirmed by an IHA titer of 1: 1358 and pathogenic organisms were detected in a stool examination.

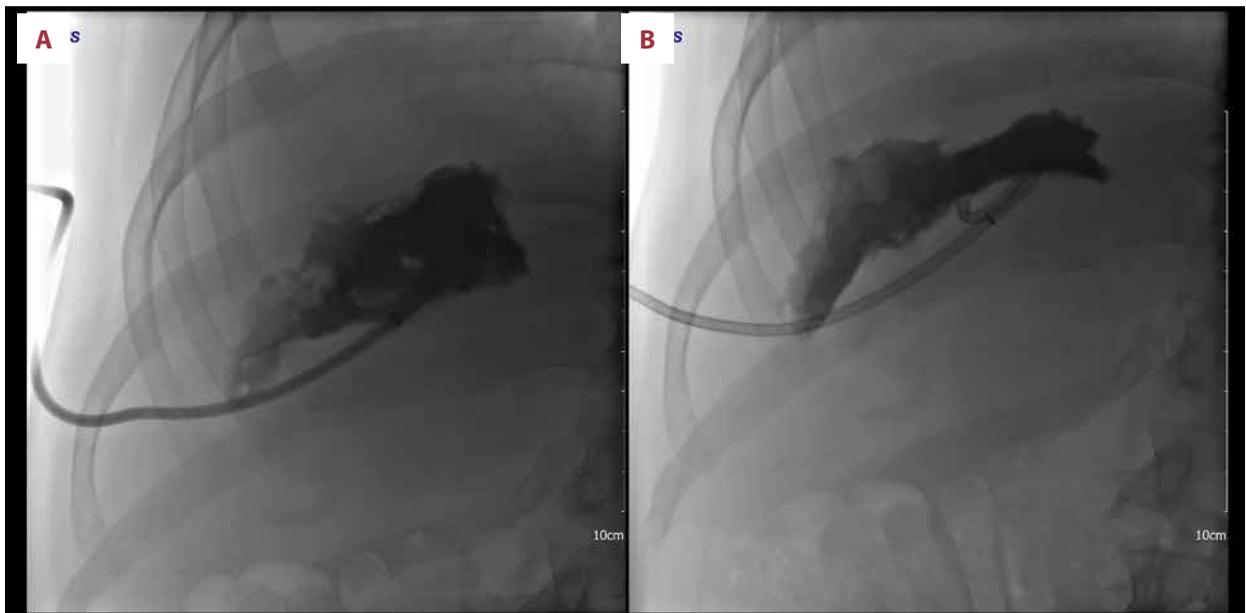


Figure 4. (A, B) Interventional radiology procedure: Percutaneous-guided drainage.

Because the abscess was large, a CT-guided percutaneous drainage was scheduled for the following day. Non-contrast axial view (Figure 2A), axial arterial phase (Figure 2B), axial venous phase (Figure 2C), coronal venous phase CT (Figure 3A), and coronal late venous phase CT (Figure 3B) are the most important images taken during the CT, which was done to study the abscess before drainage.

The percutaneous CT-guided drainage (Figure 4A, 4B) released a large volume of fluid (approx. 700 ml), and the drainage fluid was thick, purulent, and wine-colored. A small drainage catheter connected to a bag was left in place for 20 days. The patient was discharged on the 25th post-procedure day, with improved blood results. There were no complications, and the patient was completely asymptomatic at 6-month follow-up.

Discussion

According to the WHO/PAHO/UNESCO report of 1997, amebiasis infection is responsible for up to 100 000 deaths per annum, placing it second only to malaria. Many people infected by *E. histolytica* never develop symptoms, but still may have intestinal and extra-intestinal disease [15]. In extra-intestinal disease, the most common complication is liver abscesses, which can become quite large before causing clinical symptoms and can simulate other diseases with compression of close organs.

An accurate differential diagnosis is important, especially in Emergency Departments, where patients need quick assessment and treatment. In our case, the diagnosis and a definitive treatment was carried out in less than 24 h.

New studies suggest that liver abscesses due to *E. histolytica* may occur in people that live in poor conditions, drink non-purified water and eat not home-cooked food [16]. Although in literature there are some connections between extra-intestinal spread of amebiasis and HIV [17] or alcohol consumption [18], our patient lived in good hygiene environment and denied any drug or alcohol abuse. For this reasons, *E. histolytica* infection should be taken into consideration also in Western countries where the rate of the disease is much lower.

Currently, abdominal ultrasound is the criterion standard for the diagnosis of liver abscesses (about 65% of them are single and localized in the right lobe) [19]. However, the recent literature describes contrast-enhanced ultrasound (CEUS) as a new advanced method to study the liver and detect abscesses, with a diagnostic value comparable to that of CT and MRI [20,21]. Moreover, it can also be used to assess hepatic function in different diseases. For example, in liver cirrhosis, the enhancement curve in a retention rate time of 15 min can be analyzed with good sensitivity (85.7%) and specificity (92.3%) [22].

Contrast-enhanced ultrasound is a method based on detecting a microbubble bolus (SonoVue) administrated through the venous system. According to a 2016 study on patients with ischemic stroke, SonoVue did not cause any serious adverse effects, and only 6.5% of patients had mild or transient adverse effects. SonoVue is also safe in patients with acute stroke [23]. However, microbubble administration can be disrupted if the scanning is continued and in a single plane or if the acoustic power is not at the recommended level (less than 1%). This disruption results in a time- and depth-dependent loss of contrast, which reduces image quality and can lead to spurious

signal loss [24]. According to current guidelines, the injection of SonoVue is given at about 1–2 ml/s to avoid the risk of microbubble disruption and artefacts [25,26].

Some authors confirm that CEUS can be also used to study lesions after placement of a drain in abdominal or pelvic abscesses to evaluate the correct placement [27].

In our case, we performed the CEUS before doing the CT scan in order to compare the 2 diagnostic methods, and we found an excellent correspondence between the accuracy offered by CEUS and CT scan. CEUS may be superior to CT scan for the study of hepatic lesions, which are currently studied in almost all cases with CT scan. Furthermore, we believe that it could be a valid study method to use as an alternative, especially in situations in which CT could be harmful; for example, in patients with important comorbidities.

In our case, the content of the abscess appeared to be inhomogeneous, with an extended bi-lobed fluid-corpouscular component. In particular, after administration of contrast material, a slight enhancement of the parietal portion of the lesions described above was appreciated, and, in the absence of further findings, it is referred to as solid contextual components. The reported findings, although not definitive, suggested intrahepatic localization of amoebic parasitosis; however, the clinical-laboratory and instrumental re-evaluation was useful in discriminating its possible different origins. IHA titer (1: 1358) confirmed the diagnosis, and pathogenic organisms were detected by stool examination.

There are no retrospective studies to date on the possible differential diagnoses between pyogenic abscess, amoebiasis, and *E. histolytica*, so we cannot say if the CEUS can be used to make the differential diagnosis. Our case report is proposed as a starting point for new and future studies that could clarify the possibility of immediately performing a differential diagnosis of hepatic lesions with the CEUS, subsequently confirmed by serological tests.

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At present there are few studies on this topic and further prospective analyses are needed to better validate this procedure. Furthermore, CEUS is available in few hospitals and only in major centers of Western countries.

While administration of metronidazole is the management of choice for abscesses up to 10 cm, there is evidence that larger or complicated abscess need simultaneous percutaneous drainage due to the high risk of abscess rupture if the cavitory diameter is more than 10 cm [28].

Needle aspiration or catheter drainage are both helpful treatments, but recent studies have shown best results with the latter. A related complication to the procedure is thoracic or intraperitoneal rupture of the abscess, with consequent diffuse sepsis.

Conclusions

Acute abdominal pain can be caused by a variety of disease, but considering the increase of migratory flows, the possibility of amoebic abscess or parasitic cyst should not be underestimated in non-endemic countries. Amoebic abscesses should be considered in patients who arrive to an Emergency Department presenting abdominal pain, dyspnea, and hepatomegaly. Timely diagnosis and treatment are essential to avoid complications.

Although abdominal ultrasound is currently the criterion standard for diagnosis of liver abscesses. CEUS with administration of SonoVue is emerging as a promising and accurate method to study the liver.

Conflicts of interest

None.

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