

Goal-directed ultrasound in a limited resource healthcare setting and developing country

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Abstract

Background In developing countries, access to diagnostic technology is limited by economic, social and geographical barriers. Diagnostic tools must be sustainable, effective and low cost.

Case A 30-year-old man was admitted in a rural hospital with fever and chest pain and managed successfully with a goal-directed sonographic approach.

Conclusion Ultrasound is a point of care, rapid, non-invasive and low-cost technology. Primary goal-directed ultrasound can be a high-impact diagnostic tool in scarce resource scenarios.

Keywords Developing country · Diagnostic equipment · Ultrasound

Introduction

In developing countries access to diagnostic technology is limited by economic, social and geographical barriers. One of the aims of primary health care is introduce acceptable, achievable, sustainable and effective diagnostic tools in remote settings [1].

Ultrasound is a point of care, rapid, non-invasive and low-cost technology. Goal-directed ultrasound performed by non-radiologist physicians is focused on clinical problems and not limited to single anatomical areas. For these reasons, primary goal-directed ultrasound may be a high-impact diagnostic tool in scarce resource scenarios [2].

Case report

A 30-year-old man was admitted to a rural hospital in North Burundi (East Africa) with fever and chest pain. The patient had a history of several malarial attacks and arrived from an area with difficult access to safe water.

Before 2 weeks of admission, he started to complain of fever and right sided pleuritic chest pain in absence of cough and dyspnea. He denied chills, night sweats, arthralgias or previous history of tuberculosis. Family history was unremarkable.

Before 5 days of admission, he was evaluated at another health center. Pneumonia was suspected and amoxicillin was administered without clinical improvement.

On admission, he was febrile and tachycardic. Other vital signs were normal. Physical examination revealed decreased breath sounds at right basal pulmonary field. Abdomen was tender in the right upper quadrant with negative Murphy's and Blumberg's signs. Chest x-ray was performed and revealed right-sided diaphragmatic

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Fig. 1 Chest x-ray: right-sided diaphragmatic elevation

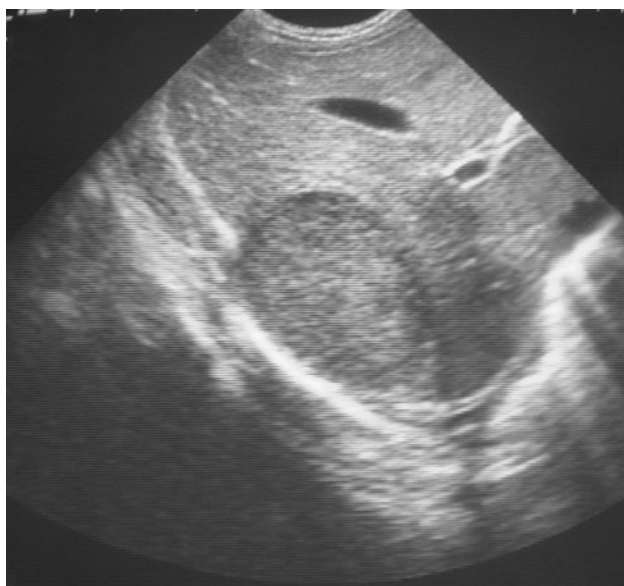


Fig. 2 Ultrasound image: liver lesion in the subdiaphragmatic area

elevation but no signs of alveolar consolidation (Fig. 1). Laboratory analysis showed mild elevation in levels of liver enzymes. A parasitologic stool examination resulted negative.

Goal-directed ultrasound examination was performed by a non-radiologist physician. An oval, hypoechoic, well-defined liver lesion was noted in the subdiaphragmatic area close to the liver capsule (Fig. 2). Ultrasound-guided aspiration was performed with removal of odorless dark reddish-brown fluid (Fig. 3). No post-procedural complications occurred.

Based on the anamnestic, clinical and ultrasound findings, a presumptive diagnosis of amebic liver abscess was made. The treatment with intravenous metronidazole was started. Clinical condition gradually improved with the disappearance of fever and pain. The patient was discharged on hospital day 10.



Fig. 3 Dark reddish-brown abscess fluid

Discussion

Amoebiasis is a common parasitic infection in developing countries with a worldwide distribution. The disease is caused by *Entamoeba histolytica* through ingestion of fecally contaminated water or food. Infection is self limiting in many cases, but can result in invasive disease, including intestinal and extra-intestinal manifestations [3].

Liver abscess is the most common extra-intestinal manifestation. Amebic abscess normally presents as an acute or subacute condition. Symptoms and signs include fever, abdominal tenderness, and hepatomegaly. Bowel symptoms are often absent and stool microscopy is negative for most patients. Usually abscess is single and occurs in right lobe [4]. The involvement of diaphragmatic surface is not usual and leads to pleuritic pain and diaphragm elevation.

Diagnosis may be difficult in limited resource setting. Antigen and antibodies detection in the serum (tests with high sensitivity) are unavailable due to high cost. Microscopic examination of stool and abscess fluid is often available, but is limited by low sensitivity.

Ultrasound is a useful tool for detecting liver abscess with accuracy comparable to computed tomography. Amebic abscess normally appears as hypoechoic, homogeneous, round or oval lesion, with a hyperechoic wall and location generally contiguous with the liver capsule [5]. Differential diagnosis, include echinococcal cyst, pyogenic abscess and hepatoma.

Furthermore, ultrasound allows in performing percutaneous drainage. In scarce resource scenarios, drainage may be useful for both diagnosis of liver lesions and therapeutic purposes. Fluid abscess contains necrotic material with few cells and appears as an odorless dark reddish-brown fluid (classically described as “anchovy paste”). Percutaneous drainage may be obtained with needle aspiration or catheter

drainage. Complications include hemorrhage, bowel transfection, abscess-peritoneum communication and sepsis. In a large series of ultrasound-guided drainage of abdominal abscesses, the frequency of complications was low (6.6%) and mostly related to catheter drainage rather than needle aspiration [6]. Therapeutic drainage is indicated for complicated abscesses (lesions localized in left lobe, multiple, with large diameter or with bacterial coinfection) and for non-responding abscesses. For uncomplicated abscesses, the role of therapeutic aspiration remains to be controversial [7].

In the present case, clinical and microbiological findings have not been sufficiently adequate to obtain the diagnosis. Goal-directed ultrasound, even performed by non-radiologist physician, plays a key role in diagnosis and clinical care revealing liver lesion and allowing in administering the appropriate medical therapy. Ultrasound-guided percutaneous aspiration was performed without complications and revealed a fluid abscess with features consistent with amebic abscess. However, percutaneous drainage for uncomplicated abscess is questionable.

Conclusion

In developed countries, ultrasound technology performed by non-radiologist physicians has seen widespread adoption in multiple areas of healthcare. Emergency medicine,

remote and out-of-hospital settings constitute an ideal scenario due to lack of alternative medical imaging.

In limited resource setting, lack of medical imaging is a common problem with serious public health consequences. Diffusion of ultrasound technology may be a cost-effective and durable solution to improve global healthcare in scarce resource scenarios [8].

Conflict of interest None.

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