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CLINICAL CASE

Massive pleural empyema secondary to amoebic liver abscess in a child

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Abstract

Background: *Pleural empyema secondary to a ruptured amoebic liver abscess is a rare complication in the pediatric population.* **Case report:** *We report the case of a 13-year-old male with right flank abdominal pain, productive cough with foul-smelling sputum, fever, and respiratory distress. Physical examination revealed breathlessness, decreased vesicular murmur in the right hemithorax, abdominal distension, hepatomegaly, and lower limb edema. Laboratory tests revealed mild anemia, leukocytosis without eosinophilia, elevated alkaline phosphatase, hypoalbuminemia, and positive immunoglobulin G antibodies against Entamoeba histolytica in pleural fluid. He required a chest tube and treatment with metronidazole. After 2 months of follow-up, the abscesses disappeared, and the empyema decreased.* **Conclusions:** *Massive pleural empyema secondary to a ruptured liver abscess is a rare complication. The epidemiological link associated with the symptoms and serological tests can help in the diagnosis.*

Keywords: *Amebic liver abscess. Pleural empyema. Pediatric patient. Entamoeba histolytica. Metronidazole.*

Empiema pleural masivo secundario a absceso hepático amebiano en un niño

Resumen

Introducción: *El empiema pleural secundario a ruptura de absceso amebiano hepático es una complicación poco frecuente en la población pediátrica.* **Caso clínico:** *Se reporta el caso de un paciente de sexo masculino de 13 años que presentó dolor abdominal en flanco derecho, tos productiva con esputo de mal olor, fiebre y dificultad respiratoria. Al examen físico se encontró amplexación y murmullo vesicular disminuido en hemitórax derecho, distensión abdominal, hepatomegalia y edema de miembros inferiores. Los resultados del laboratorio evidenciaron anemia leve, leucocitosis sin eosinofilia, elevación de fosfatasa alcalina, hipoalbuminemia y anticuerpos IgG contra Entamoeba histolytica positivo en líquido pleural. Requirió tubo de drenaje torácico y tratamiento con metronidazol. A los dos meses de seguimiento los abscesos desaparecieron y el empiema disminuyó.* **Conclusiones:** *El empiema pleural masivo secundario a ruptura de absceso hepático es una complicación poco frecuente. El nexo epidemiológico asociado con la sintomatología y pruebas serológicas pueden ser de ayuda en el diagnóstico.*

Palabras clave: *Absceso hepático amebiano. Empiema pleural. Paciente pediátrico. Entamoeba histolytica. Metronidazol.*

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Introduction

Entamoeba histolytica amebiasis, a common cause of gastrointestinal infections in developing countries with a high burden of morbidity and mortality[1], affects approximately 40 million people annually, although these estimates are confused with the non-pathogenic agent *Entamoeba dispar*[2]. *E. histolytica* is transmitted through contaminated food or water, with food handlers and mechanical vectors which are potential sources of infection[3].

Liver abscess is a severe manifestation of extraintestinal involvement caused by portal dissemination of the pathogen, commonly affecting males aged 18-50 years and rarely children[1]. Pulmonary involvement is rare and occurs by rupture of the abscess into the pleural cavity[4] or by hepatobronchial fistula[5], resulting in pleural empyema[6,7]. This study aimed to report a case of pleural empyema secondary to an amebic liver abscess in a pediatric patient.

Clinical case

We describe the case of a 13-year-old male from Huánuco (jungle region of Peru) who presented to the emergency room with a 4-week history of sharp abdominal pain in the right flank that worsened with physical exertion, decreased appetite, increased fatigue, and fever. In the past 7 days, he referred a productive cough with foul-smelling yellowish sputum, night sweats, fever, and shortness of breath. No diarrhea or changes in stool consistency were reported. He had no previous hospitalizations or surgeries; before hospitalization, he had only received outpatient symptomatic treatment and no antibiotics. He did not report any significant family history. He lives in a rustic two-room mud house with electricity and non-potable water. He breeds domestic animals such as pigs, sheep, and dogs.

On physical examination, he was alert with 28 breaths/min, heart rate 58 beats/min, weight 32.5 kg, temperature 36.7°C, and oxygen saturation 92% with an inspired oxygen fraction of 0.21, requiring supplemental oxygen through a nasal cannula at 2 L. There was no skin or scleral jaundice. The right hemithorax amplexation was decreased, and the vesicular murmur was absent; the right hemithorax also showed dullness to percussion in the lower 2/3 of the right hemithorax. The abdomen was distended with a palpable liver 6 cm below the costal margin with associated dullness; the lower limbs had moderate edema.

Blood tests showed hemoglobin (10.2 g/dL), leukocytosis (24.9 × 103/mm^3), neutrophilia (22.1 × 10^3/mm^3), band cells (1.2 × 10^3/mm^3), lymphocytosis (2.4 × 10^3/mm^3), eosinophils (0.0 × 10^3/mm^3), thrombocytosis (457 × 10^3/mm^3), C-reactive protein (250.79 mg/dL), hypoalbuminemia (2.3 g/dL), alkaline phosphatase (601 U/L), aspartate aminotransferase (30 U/L), alanine aminotransferase (44 U/L), lactate dehydrogenase (296 U/L), urea (17 mg/dL), and creatinine (0.38 mg/dL). Bilirubin, coagulation profile, and serum electrolytes were within normal limits. Serologies for hepatitis B, hepatitis C, and human immunodeficiency virus were negative.

Chest radiography showed complete radiopacity of the right hemithorax with contralateral displacement of the mediastinum. Chest ultrasound showed a heterogeneous encysted accumulation extended over the entire right hemithorax and collapsing the ipsilateral lung. Abdominal ultrasound showed the liver with multiple heterogeneous cystic lesions involving the right lobe without free fluid in the cavity. Thoracic-abdominal tomography showed total right lung atelectasis and massive pleural effusion with a mediastinal shift to the left. In the abdomen, the liver had multiple subdiaphragmatic hepatic collections (the largest measuring 74.3 mm × 82.6 mm × 60.3 mm) with peripheral contrast enhancement in the right hepatic lobe with communication to the right pleural space (Figure 1).

A chest tube was placed due to the massive right pleural effusion. In addition, 1500 cc of thick, chocolate-colored, and foul-smelling fluid were obtained. The pleural fluid examination showed leukocytes > 100 cells, polymorphonuclear 72%, mononuclear 28%, lactate dehydrogenase 109 U/L, total protein 2.1 g/dL, albumin 0.9 g/dL, and red blood cells 10-12 × C, Gram (–) bacteria. Cultures for aerobic bacteria, amoeba (culture and direct examination), and fungus were performed before antibiotic administration. The results were negative, as was the Western blot for hydatidosis. Anaerobic cultures were not performed. Due to the cystic images in the liver and the housing conditions (rustic house without environmental sanitation), it was decided to test for immunoglobulin G antibodies against *E. histolytica* by enzyme-linked immunosorbent assay (ELISA) according to the manufacturer's specifications (DRG brand, Germany). The result was positive, reporting 1.82 optical densities suggestive of infection (reference value > 0.30 OD).

The patient received ceftriaxone 100 mg/kg/day and clindamycin 60 mg/kg/day for suspected common organisms. When the serology results for *E. histolytica* were received 5 days later, intravenous metronidazole 50 mg/kg/day was added. Ceftriaxone, clindamycin,

and metronidazole were administered for 28 days. The patient showed symptomatic improvement 7 days after starting antibiotic therapy and chest tube placement (which remained for 21 days); fever peaks persisted until day 10 of hospitalization, and he had a hospital stay of 42 days. Clinical evolution at 2 months follow-up was favorable, with the resolution of the hepatic abscesses and some sub-segmental atelectasis of the right lower lobe (Figure 2).

Discussion

Transudative pleural effusion is common in amoebic liver abscess; however, amoebic pleural empyema is a serious and rare complication in the pediatric population[4]. This condition occurs when a right lobe liver abscess contiguously invades the diaphragm and produces an empyema or bronchopleural fistula[1,8], which may initially lead to a misdiagnosis of complicated pneumonia[1].

Clinical manifestations include fever, vomiting, abdominal pain, and distention with respiratory distress due to pulmonary involvement[5,9-12], and hemoptysis[13-16] and dysenteric diarrhea in some cases[6,7,17]. The duration of of this condition ranges from weeks to months, especially in patients from an endemic area. In our patient, symptoms developed over 4 weeks; however, shorter periods[5,10] of even days[9,11] have been reported.

Diagnostic suspicion arises in residents or persons who recently traveled to regions with relevant epidemiology of parasitic diseases associated with clinical manifestations such as fever, abdominal pain[5,9,10], or chest pain with dyspnea[11,12] when pulmonary involvement is extensive, as in this patient (Figure 1). Imaging studies, such as ultrasound and tomography, demonstrate cystic intrahepatic cavities and pulmonary involvement, and confirmatory tests, such as serology or antigens, support the diagnosis[1].

Detection of antibodies against amoebae in serum through ELISA is used to estimate seroprevalence in epidemiologic studies and to diagnose extraintestinal amoebiasis[18]. However, serologic testing may be limited in differentiating between recent and past infections in highly endemic areas. In addition, negative serology in a patient with a clinical presentation compatible with the disease requires repeating the test 7-10 days later[3,18].

Antibodies against *E. histolytica* are detected in 85-95% of patients with amoebic liver abscess after one or more weeks of symptoms[2] and in pleural parenchymal amebiasis at the time of presentation[18]. Serologic testing for recombinant *E. histolytica* antigens provides a diagnosis in 96% of cases of amoebic liver abscess before treatment and is negative in approximately 95% of patients 2 weeks after treatment initiation, making it important for diagnosis and monitoring of therapeutic response[18].

As stool microscopy is usually negative for extraintestinal amebiasis, such as liver, pleuropulmonary, cardiac, or brain abscesses[19], it is not recommended on its own when other diagnostic modalities are available[18]. Polymerase chain reaction (PCR) testing of *E. histolytica* DNA in stool, tissue, or abscess aspirates is considered

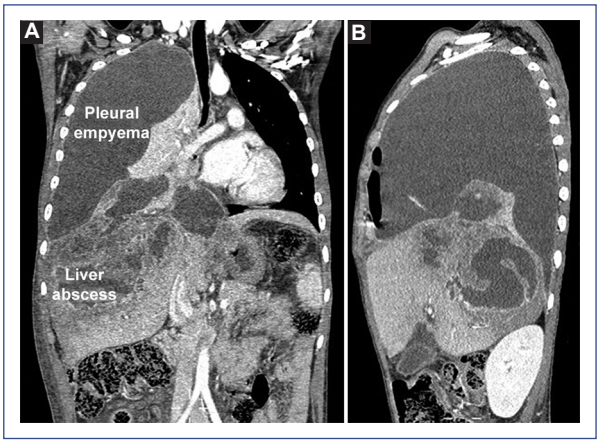

Figure 1. Chest and abdominal tomography. **A:** coronal plane and **B:** sagittal plane. Multiple hepatic collections (the largest measuring 74.3 mm × 82.6 mm × 60.3 mm) with diaphragmatic elevation and communication with the right pleural space, associated with hydropneumothorax and total lung collapse.

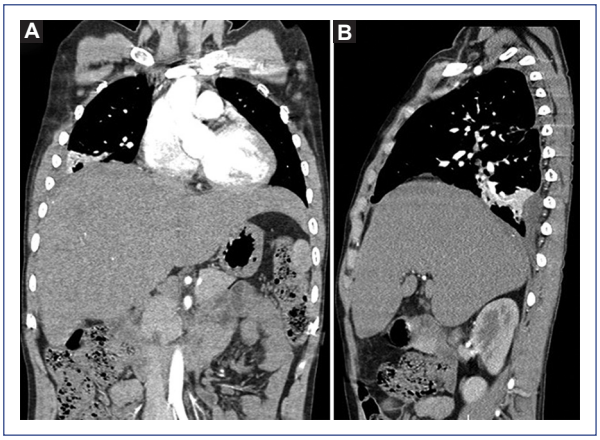

Figure 2. Chest and abdominal tomography (control 2 months later). **A:** coronal plane and **B:** sagittal plane of the right lung. Residual septated hydropneumothorax and segmental atelectasis in the right lower lobe. The liver abscesses are no longer visible.

the gold standard for diagnosis of amebiasis; however, high cost and lack of technical experience are important limitations in resource-limited countries[3,18].

Our patient came from Huánuco (a jungle region of Peru), where a high frequency of *E. histolytica* isolation has been reported (26.2%)[20]. Based on the high prevalence, clinical presentation, and associated imaging data, we suspected pulmonary involvement secondary to a liver abscess of probable amebic etiology, which was confirmed by positive serology for *E. histolytica*. Neither antigen-based serologic tests nor PCR for *E. histolytica* were available in our setting.

Treatment of extraintestinal amebiasis consists of a compound such as metronidazole, tinidazole, or nitazoxanide, and an intraluminal agent such as paromomycin or iodoquinol to eradicate intestinal colonization[1].

Unfortunately, cases of extraintestinal amebiasis are not diagnosed in the early stages. In these cases, a history of dysenteric diarrhea is not common. As the diagnosis requires a high index of suspicion, treatment in cases of pleural empyema as the initial manifestation is based on broad-spectrum antibiotics directed against common pathogens, as in this patient and other cases[9-11]. In uncomplicated patients, percutaneous aspiration of the liver abscess is not routinely performed but is justified when associated with clinical deterioration, risk of rupture, or to exclude other diagnoses[21]. However, in patients with hepatic and pulmonary involvement, thoracic drainage can reduce respiratory distress and improve pulmonary distensibility[5,9-12] coupled with drainage of the liver abscess if extensive[9,11].

The duration of antibiotic treatment with metronidazole is 7-10 days, with recommended doses of 35-50 mg/kg/day divided every 8 h (maximum dose 750/dose)[18]. Lack of response to metronidazole after 4-5 days of treatment leads to diagnostic uncertainty and increases the suspicion of an aggregated pyogenic abscess[1,3]. In our case, as the fever persisted until day 10 after metronidazole, we continued the broad-spectrum antibiotic treatment.

Clinical improvement has been reported between 3 and 6 weeks of follow-up[5,10,11]. However, there are also reports of fatal cases due to multisystemic involvement and liver failure[9,12]. In our case, clinical improvement and absence of liver abscesses were observed after 2 months of follow-up.

Pulmonary empyema is a rare complication of amoebic liver abscess with variable outcomes, from fatal to favorable depending on the degree of pulmonary and hepatic involvement.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author has this document.

Conflicts of interest

The authors declare no conflicts of interest.

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