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# Pyogenic Liver Abscess. Pet-Ct as a New Diagnostic Resource and Suction Drainage as an Effective Therapeutic Method

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## 1. Abstract

**1.1. Introduction:** Pyogenic liver abscesses develop most commonly following peritoneal infection via the portal circulation. PET-CT for diagnosis and suction drainage as effective therapeutic procedure are distinguished.

**1.2. Case Report:** A 61-year-old male, with no past medical history except cholecystectomy performed two months ago to treat calculous acute cholecystitis, presented to the Service complaining of anorexia and weight loss, since the procedure, without pain or fever. An intra-hepatic fluid collection was noted in the ultrasound, and the Positron Emission Tomography using F-18 fluorodeoxyglucose combined with computed tomography (PET-CT) revealed a rounded image, with a centre less dense than the periphery, 7 cm in diameter, in segment VIII of the liver, with no radiotracer uptake, characterizing a pyogenic liver abscess. The patient then underwent US-guided pigtail drainage, aspirating about 60 mL of thick purulent secretion, sent for bacterioscopy and culture, and then keeping the drain under continuous suction. A Hickman catheter was inserted for antibiotic therapy, using ertapenem. Three weeks later the drain was removed, and antibiotic therapy was terminated. Six-month follow-up demonstrated a healthy patient with body weight recovery.

**1.3. Conclusion:** PET-CT can reliably diagnose pyogenic liver abscess, while percutaneous suction drainage associated with antibiotic therapy can be very effective in its treatment.

## 2. Introduction

Pyogenic liver abscesses develop most commonly following peritoneal infection via the portal circulation. They can also result from arterial dissemination in the context of a systemic infection. Amebic abscesses are specific disease. Abscess rupture is not common. The mortality rate reaches up to 12%. Anaerobic infection, need for open surgical drainage and concomitant malignancy are independent risk factors for mortality [1]. Liver abscesses account for 50 per cent of all visceral abscesses [2]. Underlying hepatobiliary or pancreatic disease, organ transplantation and diabetes mellitus are the main risk factors. [3]. In 40 to 60 per cent of cases, a biliary disease such as gallstones or neoplasia is present. [1]. In several parts of Asia, K. pneumoniae is the major cause of pyogenic liver abscesses, frequently associated with underlying colorectal cancer [4], maybe resulting from bacterial translocation. However, many pathogens may be involved reflecting the different causes, medical interventions, or immunosuppression and geographic differences, not always identified in culture, and characterized in the laboratory. In specific circumstances, E. coli, K pneumoniae. Streptococci and Staphylococcus aureus can be recognized [2]. The presence of streptococcus or staphylococcal species in a liver abscess requires investigation of infectious endocarditis as another source of infection. Candida and mycobacteria has also been described [5]. Fever, nausea, vomiting, anorexia, weight loss, malaise and abdominal pain usually located in the right upper quadrant are common clinical manifestations of pyogenic liver abscess. Eventually jaundice and hepatomegaly can be observed [6]. Laboratory tests may

show leukocytosis, anaemia, hypoalbuminemia, increased levels of serum bilirubin and liver enzymes. Elevation of the right diaphragmatic dome with associated pleural effusion and atelectasis of the lung base may be seen on chest x-ray. Ultrasound (US) and computed tomography (CT) are typically used for identification of liver abscess. If US did not demonstrate any abnormalities, CT should be performed. This exam can also show a potential predisposing intra-abdominal disease, such as an acute cholecystitis or a diverticulitis. To confirm the diagnosis, we try to puncture all suspected liver abscesses, guided by CT or ultrasound, to obtain material for culture.

## 3. Case Report

This case report followed CARE Case Report checklist [7]. In addition, in accordance with the CARE guidelines, the patient's written consent was obtained previously. A 61-year-old male, with no past medical history except cholecystectomy performed two months ago to treat calculous acute cholecystitis, presented to the Service complaining of anorexia and weight loss, since the procedure, without pain or fever. He reported diabetes, treated with oral hypoglycemic agents, and kidney transplantation, submitted to immunosuppression with tacrolymus, azothiaprine and prednisone. The BP was120/82 mmHg, HR, 75/min and T,36.9oC; leucocytes 13000/mm3, with 68.8% of neutrophils, Hb 14.0g/dL, platelets 130.000/mm3, lactic acid 1.9 mmol/L, creatinine 1.0mg/dL, glucose129 mg/dL, albumin 2.5 g/dL, C-reactive protein (CRP) 12 mg/d, ALT 50 u/L, AST 45 u/L, GGT 25 u/L. There was a normal abdominal palpation, and the patient demonstrated a haggard appearance.

At the US, intra-hepatic fluid collection was noted (Figure 1) and we decided to request a Positron Emission Tomography using F-18 fluorodeoxyglucose combined with computed tomography (PET-CT), that revealed a rounded image, with a centre less dense than the periphery, 7 cm in diameter, in segment VIII of the liver, with no radiotracer uptake, characterizing a pyogenic liver abscess (Figure 2), without other changes, including normal appearance of the transplanted kidney. Entamoeba hystolytica was ruled out through serological examination.

The patient then underwent US-guided abscess drainage (Figure 3): a 14Fr pigtail drain was introduced into the lesion, aspirating about 60 mL of thick purulent secretion (Figure 4), sent for bacterioscopy and culture, as well as blood samples, and then keeping the drain under continuous suction, coupled to a J-Vac reservoir, obtaining around 5-10 mL of purulent liquid daily until the eighth day, and then progressively lower daily drainage of sero-hematic secretion until the third week of follow-up. Right after draining and blood samples collection, a Hickman catheter was inserted for antibiotic therapy, using ertapenem. A good clinical response was noted since the first day, the cultures were all negative, and we continued with the same antibiotic. Three weeks later ultrasound study did not show collection (Fig. 5), the drain was removed, and antibiotic therapy was terminated. The leucocytes count was 9000 /mm3and CRP 0,8 mg/dL. Six-month follow-up demonstrated a healthy patient with body weight recovery.

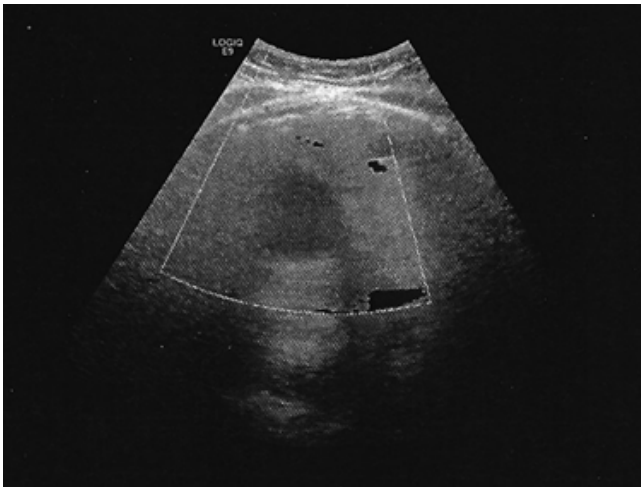


**Figure 1:** Ultrasound – intra-hepatic collection

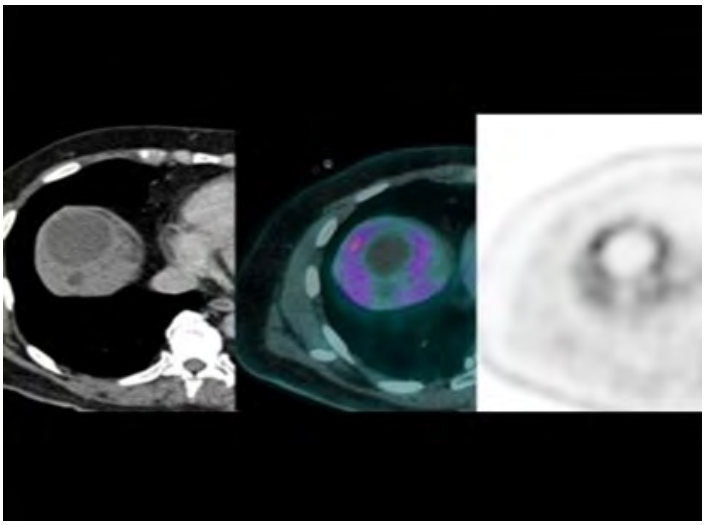

**Figure 2:** PET-CT – hepatic abscess

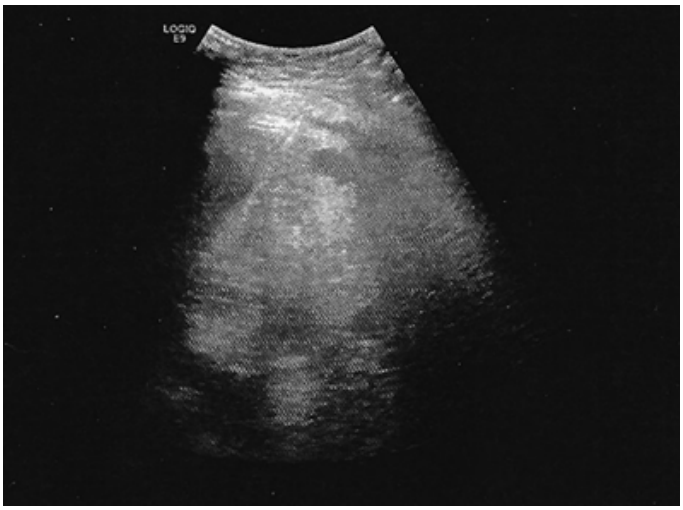

**Figure 3:** Ultrasound – abscess drainage

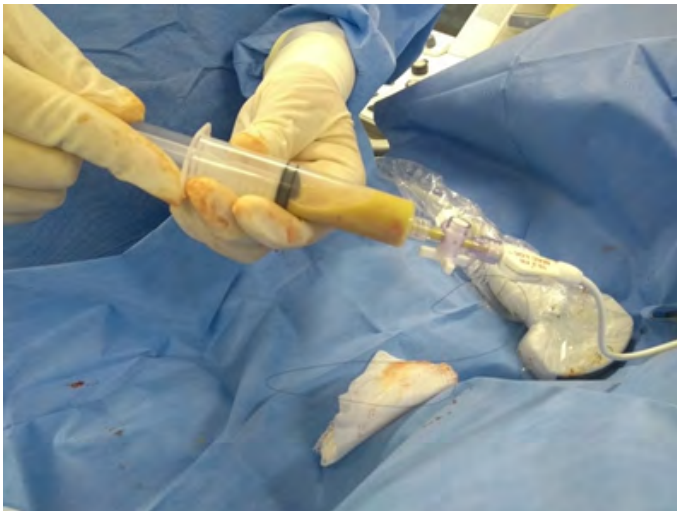

**Figure 4:** Initial aspiration of pus

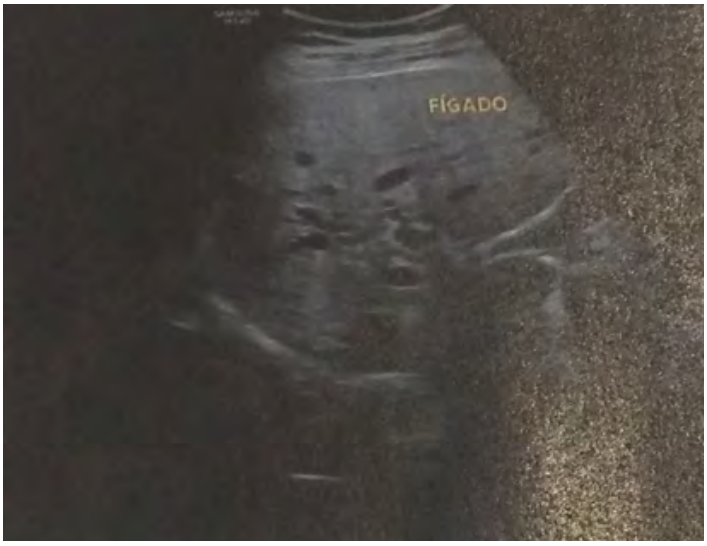


**Figure 5:** Ultrasound – three weeks later

## 4. Discussion

On US, pyogenic abscesses can exhibit septation or debris. On CT, loculated subcollections can be found. On magnetic resonance imaging (MRI), abscesses are easily distinguished from cysts and tumors by a central area of low signal on T1 and high signal on T2. Occasionally, tumors with central hemorrhage or necrosis may show a similar image [8]. We observed how to recognize a hepatic pyogenic abscess on PET-CT, as a round lesion with central hypoattenuation, with no radiotracer uptake, immediately differentiated from a necrotic or hemorrhagic neoplastic lesion. In the reported case, the exam was able to contribute decisively to the diagnosis, ruling out doubts, in a case without fever and pain, with a consumptive condition, that it could be a case of necrosis or bleeding within a tumor.

In the reported case, the triggering factor must have been the biliary infection and predisposing factors certainly included diabetes and post-renal transplant immunosuppression (tacrolymus, azotiaprine and prednisone). Abscesses are usually located in the right lobe of the liver, as in the case reported, due to its richer vascularization compared to the other hepatic lobes. Pyogenic abscess and amebic abscess of the liver are similar in imaging studies, justifying that blood cultures and aspiration or drainage of the lesion contents should be performed as soon as possible for diagnostic and potentially therapeutic purposes, mainly in critically ill, septic patient, in whom empirical antibiotic therapy should be started even before the abscess is punctured, as soon as samples are taken for blood culture. Serology and/or stool testing for Entamoeba histolytica are especially important for patients who have epidemiologic risk factors for amebic abscess (travel from or residence in African countries, India, and Central and South America). The empiric antibiotic therapy must be comprehensive and aggressive, as in the reported case. The antibiotic regimen can be tailored accordingly a germ identified in cultures, or we continue the empiric regimen

if there are no revealing microbiologic data. Metronidazol associated to a third-generation cephalosporin, or beta-lactamase inhibitor, or carbapenem are excellent antibiotic regimens to be used. In septic patient, addition of vancomycin can be recommended, if S. aureus is a concern. Allergy, history of drug intolerability, availability and cost can be important factors for the choice among the options. In the reported case ertapenem was highly effective. Drainage techniques include a computed tomography (CT)-guided or ultrasound-guided percutaneous aspiration, with a needle, for unilocular abscesses with a diameter ≤5 cm or a catheter placement, for those larger than 5 cm. Open surgical drainage or laparoscopic drainage are indicated for multilocular collections. If there is a communication of the abscess to the biliary tree, drainage by endoscopic retrograde cholangiopancreatography (ERCP) can be useful and, if the access to the abscess is previously seen as difficult, endoscopic ultrasound guided drainage appears to be safe and effective [9-12]. Catheter drainage results in a high success rate [13], reserving surgical treatment for cases of excessively viscous secretion [14]. Mortality and morbidity are similar for percutaneous drainage and surgical treatment in reported studies [15,16]. We preferred, in the reported case, use continuous suction drainage, inserting a pigtail drain into the abscess, promptly removing the purulent contents as much as possible, and keeping the drain in place coupled to a J-Vac reservoir, trying to shorten the resolution of the problem. The efficacy of drainage directly interferes with the time required for antibiotic therapy. Thus, abscesses only partially drained usually require long courses, more than five-six weeks, while we achieved complete cure in three weeks in the reported case. Ultrasound control reinforces the clinical evaluation in the follow-up of such cases [17].

## 5. Conclusion

PET-CT can reliably diagnose pyogenic liver abscess, while percutaneous suction drainage associated with antibiotic therapy can be very effective in its treatment.

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