Case Report

Surgical treatment of hepatic abscess guided by intraoperative ultrasound

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Abstract: Pyogenic liver abscesses are one of the complications of acute cholecystitis. Its dissemination can occur hematogenous, through the hepatic artery or the portal vein, or through biliary dissemination, due to ascending cholangitis. The germs involved are Escherichia Coli, Klebsiela pneumoniae, Anaerobic Streptococci and Enterococci. The importance of a prompt diagnosis and treatment is based on the severity of the clinical picture and its complications, such as morbidity and mortality. The main risk factors are Diabetes, Hypertension, cholelithiasis and previous abdominal surgery.

The purpose of this study is the evaluation of the case and discussion about the forms of treatment and the demonstration of the importance of using the Ultrasound for localization of deep intrahepatic collections.

Keywords: Pyogenic abscesses; Liver; Liver abscesses; Ultrasound.

1. Introduction

Pyogenic liver abscesses (PLA) represent a serious medical condition with high mortality rates among hospitalized patients, ranging from 5.6% to 10%, depending on their underlying cause [3, 5]. Its incidence has been on the rise and is linked to various factors such as cirrhosis, hypertension, chronic kidney disease, and diabetes. Additionally, it is closely associated with abdominal surgeries, particularly cholelithiasis (gallstones) and acute cholecystitis [2, 3]. Its incidence is increasing and carries a considerable mortality rate [9]. In recent years, there has been a trend away from surgery as the initial approach, with aggressive antibiotic therapy and percutaneous aspiration or drainage as pillars of treatment [10].

Liver abscesses linked with cholecystitis have an incidence rate of up to 20%. They may be linked to gallbladder perforation, which can lead to abscesses being categorized as either pericolecystic (located in segments IV and V) or distant (occurring in non-contiguous segments) [4]. Pericolecystic abscesses, in most cases, stem from type 2 gallbladder perforations (perforations in the subacute phase), as per Fletcher’s classification. Early intervention for acute cholecystitis plays a pivotal role in reducing the occurrence of complications such as PLA [6] and subsequently lowers mortality rates, which can be notably high in cases where gallbladder perforation is the underlying cause, potentially reaching 40% [6].

Typically, perforation takes place at the base of the gallbladder, as it is the region with the poorest vascular supply. This area is farthest from the cystic artery and consequently more prone to perforation (referred to as Niemeier type 2 perforation) [7]. The
primary cause of perforation is the obstruction of the cystic duct, leading to an increase in
gallbladder volume and distension of its walls, thereby compromising vascularization [7].
C-reactive protein is often elevated - in 100% of cases in one series [9]. The most commonly
isolated germs from blood or pus cultures among American patients are species of Strept-
tococcus, followed by Escherichia, Staphylococcus, and Klebsiella [10]. The incidence of PLA
is increasing: a large American series described an incidence of 3.59 cases per 100,000 in-
habitants per year, and this rate is increasing by 4% annually [10].

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otic therapy and percutaneous aspiration or drainage as pillars of treatment [10]. Pyogenic
liver abscess (PLA) appears to be associated with diabetes mellitus. Although the initial
presentation is like PLA caused by other bacteria, distant infection, including high rates
of bacteremia, endophthalmitis, meningitis, septic pulmonary emboli, and empyema, has
been reported. The finding of a K. pneumoniae infection outside the liver should prompt
an examination for hidden PLA. Other notable pathogens include Yersinia enterocolitica,
which is reported to cause PLA in patients with hemochromatosis, and Staphylococcus,

The etiology of PLA can be divided into six categories: biliary infection, portal vein
seeding (pyelophlebitis), direct extension, hepatic arterial seeding, penetrating trauma,
and cryptogenic cause. The Johns Hopkins series that defined these categories described
a shift from appendicitis with transvenous spread as the primary cause of PLA to biliary
obstruction, commonly by cholangiocarcinoma, especially after palliative stent placement
[12]. Immunosuppression should also be considered in the etiology of PLA. Potential
causes include systemic chemotherapy, immunosuppressive drugs in transplant recipi-
ents and those with inflammatory and autoimmune disease, hereditary immunodefici-
cy syndromes, and acquired immunodeficiency states such as HIV/AIDS [13]. It is re-
ported that ultrasound has a sensitivity of 94% for PLA, allows for the evaluation of the
biliary tree, and is widely available; therefore, it is an appropriate initial imaging modality
[14].

Ultrasound, however, may not depict smaller abscesses and is less capable
distiguishing metastases from abscesses compared to CT scans. While hypointense on
T1 and hyperintense on T2, it is not favored for diagnosis due to longer image acquisition
times. It is inadequate for drainage guidance and has lower sensitivity in detecting other
intra-abdominal pathology compared to CT [13].

2. Case Report

Female patient, 52 years old, admitted for elective laparoscopic cholecystectomy
(LC). During the surgery, a gallbladder with thickened walls (indicative of acute chole-
cystitis) and a hepatic bulge in segments 6 and 7 were identified. LC and drainage of the
hepatic abscess were then performed, involving de-roofing and irrigation of the hepatic
space, along with the placement of a tubular drain. The patient received a course of anti-
biotic therapy with Ciprofloxacin and Metronidazole for 7 days. She was discharged on
the 8th day, without the drain, and was asymptomatic.

The patient returned to the hospital 38 days after the initial surgery with symptoms
of fever, chills, and abdominal pain. An abdominal tomography was performed, revealing
a sizable hepatic abscess. Intravenous antibiotic therapy was initiated, and she underwent
a reoperation the following day, during which the abscess was drained once again. How-
ever, this time, the surgery was performed conventionally, through a supraumbilical mid-
line incision. The patient experienced a protracted postoperative clinical course without
improvement. A repeat computed tomography (CT) of the abdomen and pelvis was per-
formed 17 days after the second surgery (Figures 1 and 2), which showed persistent ab-
scess, located in segments V, VI, and VIII.
4. Conclusion

In the case reported here, the patient underwent three surgeries. The first surgery involved the removal of the gallbladder and drainage of the hepatic abscess. The second surgery only drained the subhepatic collection. It was only during the third intervention, with the use of ultrasound (US) (Figure 3 and 4), that it was possible to not only select the optimal drainage site, but also ensure the proper emptying of the abscess and placement of the drain, as the abscess occupied three segments of the liver. The absence of ultrasound guidance during the second surgical approach led to unsuccessful abscess drainage, resulting in uncontrolled infection. This holds significant clinical importance, as previously mentioned, given that the mortality rate for a pyogenic liver abscess can be as high as 20%.

We aim to demonstrate the importance of intraoperative ultrasound (US) in hepatic approaches for abscess drainage. It is not always possible to visually identify the exact location on the hepatic surface. In this case, it became evident that with the guidance of ultrasound, we achieved a broad and effective abscess drainage. Therefore, whenever feasible, we should utilize imaging methods like ultrasound during surgical procedures to accurately address an intrahepatic collection.
Figure 3: Puncturing the liver abscess.

Figure 4: Pyogenic Liver Abscess shown on US.

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Conflicts of Interest: None.

Supplementary Materials: None.

References