

## Piogenic liver abscess—A challenge for cooperation between family medicine and clinics

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### ABSTRACT

A liver abscess is defined as a pus-filled mass in the liver that can develop from an intra-abdominal infection disseminated from the portal vein or from injury to the liver. Liver abscesses can be broadly divided into two categories: amoebic and pyogenic. The clinical presentation of pyogenic liver abscess is nonspecific; thus, a high index of suspicion is required for timely diagnosis. The classic triad of right upper quadrant discomfort, fevers/chills, and malaise is only present in approximately 30% of patients.

A 66-year-old patient reports to a family doctor for pain below the right costal arch that lasts for about eight days and occurs after strenuous physical work, and he is occasionally feverish to 38 degrees. No physical signs of ascites were found, liver, and spleen were unpalpable during the physical examination. He was examined by ultrasound of the abdomen and multiple focal liver lesions in both liver lobes were detected. He was referred to a gastroenterologist and CT showed multiple hypodense irregular formations intraparenchymal and sub-capsular in the liver. *Micrococcus luteus* and *Enterococcus faecalis* were detected in blood cultures. Ultrasound-guided drainage of the largest focal lesion was performed. Parenteral and i.v. antibiotic therapy is introduced into the therapy. In the further course, the patient was in good general condition, afebrile, laboratory parameters were in the reference interval and he was discharged for further home care.

Without treatment, pyogenic liver abscess has a mortality rate of 100%. When treated, this value currently drops to about 2.5% and 14%. Recognition of the features of pyogenic abscess on imaging, laboratory findings and clinical picture allows early diagnosis and rapid introduction of appropriate therapy resulting in better prognosis and reduction of complications and risk of mortality.

**Keywords:** abscess, liver, piogenic abscess

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### INTRODUCTION

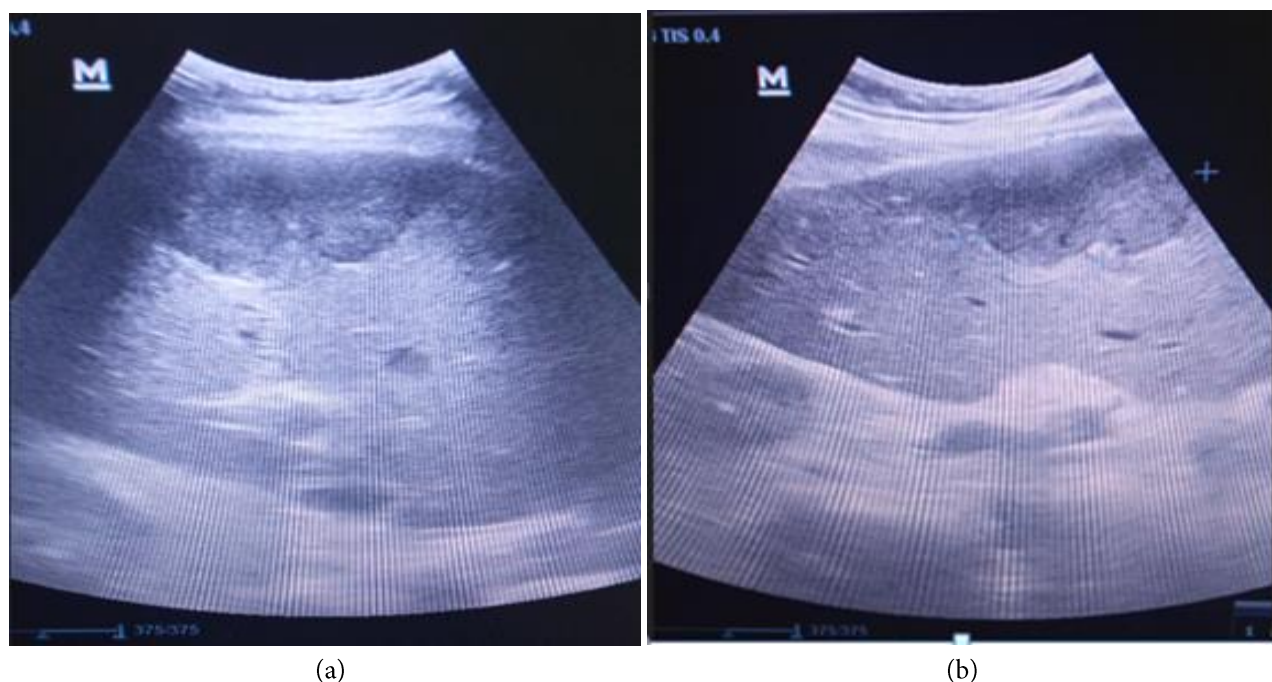
Liver abscess is defined as a liver lesion caused by the invasion and multiplication of microorganisms in a healthy or damaged liver parenchyma. Despite significant advances in treatment, liver abscess is still a major clinical, diagnostic and therapeutic problem [1]. The incidence of liver abscesses is about 8-15 cases per 100,000 patients, and autopsy findings indicate 0.3-1.4% of cases [2]. They most commonly occur in the 40-60 age group and are twice as common in men [3]. Other diseases, such as immunodeficiency, biliary and intestinal tract infections, liver cirrhosis, diabetes, or malignancies, also pose a significant risk for liver abscesses [4]. The most common cause

of liver abscesses are biliary tract infections and they are usually multiple. In 90% of cases, they are in both liver lobes. The second cause of liver abscesses could be intestinal infections that can enter the liver through the portal vein system [5]. Most of these abscesses can be caused by endogenous anaerobic and/or aerobic microflora of the patient's biliary or digestive tract, *E. coli*, *Klebsiella pneumoniae*, *Bacteroides* species or many others, and in more than 50% of cases the causative agent cannot be isolated and proven [1,6,7]. Mortality in patients with liver abscess is 11-31%, and is particularly high in patients with multiple liver abscesses, biliary obstruction, and immunodeficiency [4,8,9].

**Received:** 01.03.2022,

**Accepted:** 02.04.2022

<https://doi.org/10.29333/jcei/12190>



**Figure 1.** (a) and (b) Ultrasound examination of a liver abscess in a 66-year-old patient

The classic triad in the form of fever, right upper quadrant pain and hepatomegaly is rarely seen today due to significantly improved treatment of pyogenic abscess, emergency application of potent antimicrobial agents, advances in diagnostic and percutaneous procedures guided by ultrasound and CT techniques [10-14]. Treatment of abscesses in the past has been exclusively surgical, while modern treatment has shifted to intravenous antibiotics and percutaneous needle aspiration or percutaneous imaging-guided catheter drainage. Surgical intervention is still reserved for inaccessible abscesses that cannot be managed percutaneously.

### CASE REPORT

A 66-year-old patient, a butcher by profession, reports to a family doctor for pain below the right costal arch that lasts for about eight days and occurred after strenuous physical work. The pain lasts for an hour, is independent of breathing and movements, and is stabbing. In addition, he is occasionally feverish to 38 degrees, feels chills and shivers, mostly in the evening. He denies vomiting, nausea and diarrhea. The day before, he was in the emergency room, where he was prescribed an analgesic–ibuprofen.

When he came to GP' office his pressure was 120/70 mmHg, with rhythmic heartbeat, frequency 70/min, normal respiration, abdomen was elastic, soft, mild discomfort on palpation in the right hemiabdomen. During the physical examination no physical signs of ascites were found, liver and spleen were unpalpable. But the patient seemed exhausted, pale and tired.

He was immediately examined by ultrasound of the abdomen, during which multiple focal liver lesions of various

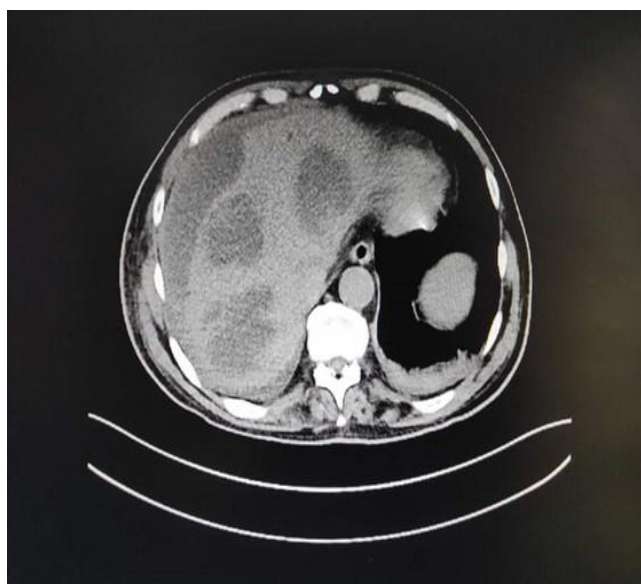
echogenic characteristics and sizes were detected, and they were located in both liver lobes (**Figure 1**).

The patient was recommended treatment by a gastroenterologist. Blood tests showed elevated levels of alkaline phosphatase 191 (U/L), neutrophil leukocytosis  $24.0 \times 10^3/L$ , elevated transaminases AST 112, ALT 159, GGT 130 (U/L) and elevated sedimentation rates 89 mm/3.6 kp and CRP 180.9 (mg/L), INR 1.40. Blood cultures were taken and *Micrococcus luteus* and *Enterococcus faecalis* were detected in it. Cultures of abscess biopsies remained sterile on several occasions.

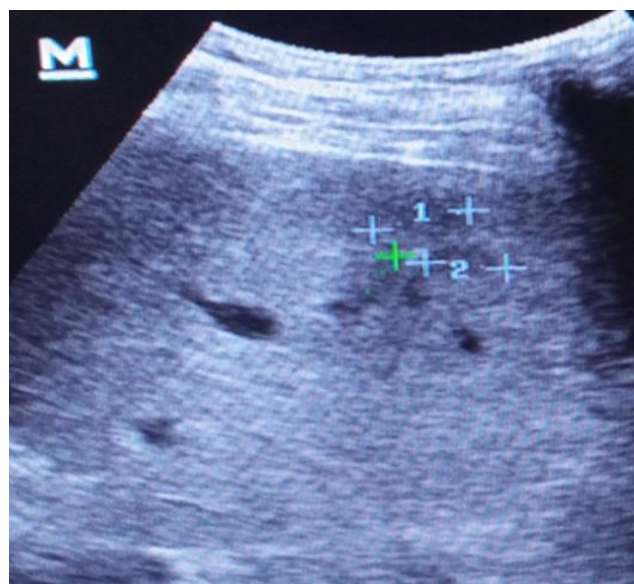
Ultrasound examination of the abdomen was repeated, indicating an enlarged liver (18 cm) with visible three focal inhomogeneous lesions, two right and one left lobe with hypoechoic central parts, looking as necrosis of about 6 and 5 cm in cross section. Parenteral and i.v. antibiotic therapy is introduced into the therapy (ciprofloxacin, metronidazole with amoxicillin/clavulanic acid i.v.–vancomycin i.v. is introduced into therapy later when results of the blood culture came).

Contrast-enhanced CT revealed multiple hypodense irregular formations intraparenchymal and subcapsular in the liver, little free fluid along the liver and in the right paracolic recess, and right-sided reactive pleural effusion with lower right lung lobe atelectasis (**Figure 2**).

On the seventh day after admission to the hospital, ultrasound-guided drainage of the largest focal lesion (9 centimeters) was performed, and 55 milliliters of purulent contents were evacuated. On the tenth day, an ultrasound-guided cytology needle puncture was performed on the remaining two smaller collections and a total of 30 milliliters of pus was obtained. After calming the symptoms and



**Figure 2.** Computerized tomography (CT) scan of multiple focal liver lesions



**Figure 3.** Ultrasound image of the residue after evacuation of the liver abscess

improving the clinical status, additional processing (colonoscopy and gastroscopy) was performed, which determined that the patient has diverticulosis of the sigmoid colon and colon polyps that were removed. During his hospitalization, he was diagnosed with diabetes and prescribed therapy by an endocrinologist.

In the further course, the patient was in good general condition, afebrile, satisfactory laboratory parameters and was discharged for further home care with a recommendation to take antibiotic therapy for the next two weeks. After one month, the patient was examined by a family doctor and underwent ultrasound examination of the liver, which showed residues after abscess in the right lobe in the form of a connective focal lesion about 2 cm in cross section (**Figure 3**). Laboratory findings were normalized. After three months, the ultrasound re-examination of the liver showed there were no more visible signs of the disease.

## DISCUSSION

Pyogenic liver abscess is an uncommon and a potentially fatal entity. In general, liver abscesses can cause major complications (sepsis or multiorgan dysfunction) and can lead to death if left untreated [15]. The incidence is about 1-45/1,000,000, with the highest incidence in the fifth decade of life and increases in the elderly population, when the clinical status becomes atypical and subtle [15,16]. Abscesses in the elderly occur with common clinical conditions in older age, such as hepatobiliary pathology (gallstones, strictures, congenital diseases, and cancer), diverticular disease, and malignant neoplasms of the colon [17,18].

Due to its double blood supply, the liver is an organ particularly susceptible to abscess formation that may result from: bacterial spread through the hepatic artery (disseminated sepsis), portal vein spread (gastrointestinal

infection), ascending cholangitis, peritoneal cavity continuity, or necrosis of infected tissue. In over 90% of cases, the right lobe is affected due to the dominant vasculature [15,17].

About half of liver abscesses are cryptogenic. However, the work [19] shows that colonoscopy, in as many as 21% of cases of cryptogenic liver abscess, revealed intestinal causes of abscesses, such as cancers, diverticula, and inflammatory bowel disease.

Microorganisms associated with liver abscesses include the most common gram-negative enteric bacteria (*E. coli*, *K. pneumoniae*, *Pseudomonas*, and *Proteus*), gram-positive aerobes (*Streptococcus milleri*, *Enterococcus*). Usually, these pathogens are polymicrobial in cancer patients with liver abscess. Infection with *K. pneumoniae* is most prevalent in Asia, but is also on the rise in the western population. *Micrococcus luteus*, the second isolated microorganism in our patient, is an aerobic gram-positive, gram-variable, immobile, saprophytic, urease, and catalase-positive bacterium, belonging to the Micrococcaceae family. It can also be found in the oral cavity as a normal flora, as it colonizes the upper pharynx and respiratory tract. It is a non-pathogenic organism but can still be contagious in some patients.

According to previous studies, *M. luteus* is not included among the pathogens that cause liver abscess [20]. The fact that this microorganism was isolated from a liver abscess and that it was not clarified how it caused a liver abscess in our immunocompetent patient makes this case very interesting.

Clinical manifestations are variable and depend on the size of the abscess, general condition of the patient, accompanying comorbidities and complications. The clinical picture often includes pain in the upper right abdomen, fever, nausea and vomiting. Jaundice, pleural



effusion, loss of appetite, and ascites may occur less frequently. The most common sign is pain on palpation in the right hypochondrium on palpation of the liver and hepatomegaly. This clinical entity does not have specific clinical features, so it is sometimes an obstacle in making an early diagnosis [21,22].

Ultrasound, CT, and MRI play a key role in the recognition and diagnosis of these lesions. The ultrasonic appearance of an abscess depends on the degree of its maturation. In the initial stage of its formation inflammatory changes are hyperechoic, while in the second stage, when the abscess becomes necrotic, it shows as a progressive hypoechoic formation with fluid content, surrounded by edema of the adjacent liver parenchyma. On CT, the liver abscess may present as a unilocular or multilocular lesion, and after contrast application, most liver abscesses show peripheral absorption.

Treatment includes the use of wide-spectrum intravenous antibiotics and, where appropriate, percutaneous drainage. The most commonly used antibiotics are third-generation fluoroquinolones or cephalosporins in combination with metronidazole. Antibiotic therapy is started empirically, and after the isolation of the causative agent, causally.

Percutaneous drainage in combination with systemic antibiotics is a safe and effective treatment and is considered the first line of treatment for abscesses of 5-7.3 cm in size. The greater the distance of the abscess from the liver capsule is, the more successful percutaneous drainage will be [15]. For abscesses larger than 7.3 cm in cross-section, percutaneous drainage is not recommended due to the risk of spontaneous rupture and thus higher mortality. In these abscesses, surgical drainage is the option of choice.

The duration of antibiotic therapy is not standardized. Cessation of fever and resolution of leukocytosis and normalization of CRP values are used as indicators for cessation of antibiotic use [15]. Without treatment, pyogenic liver abscess has a mortality rate of 100%. When treated, this value currently drops to about 2.5% and 14%, which once again emphasizes the importance of making an early diagnosis [15].

## CONCLUSION

Recognition of the features of pyogenic abscess on imaging, laboratory findings and clinical picture allows early diagnosis and rapid introduction of appropriate therapy resulting in better prognosis and reduction of complications and risk of mortality. When detecting a pyogenic liver abscess in the absence of an obvious infectious focus, intra-abdominal sources of infection should be sought.

To identify the intestinal etiology of pyogenic liver abscess that was once considered cryptogenic, colonoscopy is the method of choice and must always be done. It is especially important in excluding diverticulitis as the cause

of abscesses because despite being among the rarer etiologies, it is still responsible for some cases, as in this clinical case.

**Author contributions:** All authors have sufficiently contributed to the study, and agreed with the results and conclusions.

**Funding:** No funding source is reported for this study.

**Declaration of interest:** No conflict of interest is declared by authors.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

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