

## Intraabdominal Ruptured Liver Abscess: Computed Tomography and Clinical Features

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### Abstract

**Aim:** The aim of the present study was to assess the Computed Tomography (CT) and clinical findings of intraabdominal ruptured liver abscess.

**Methods:** This was a retrospective observational study of patients with intraabdominal ruptured liver abscess presenting in the Department of Radiology. The study group consisted of 50 patients. All diagnosed cases of ruptured liver abscess based on radiology and laparoscopic investigation were included in the study.

**Results:** Diabetes mellitus was the most common underlying medical condition (26%), followed by bacterial pneumoniae (18%), hypertension (6%), bile duct stones (4%). Most of the patients were suffering from abdominal pain (96%), malaise and anorexia (96%), fever (78%), peritonitis (78%), and other positive clinical signs. The mean size of the liver abscess was 8.6 cm (range, 4.0-14 cm). A single abscess was found in 18 patients, and multiple abscesses were seen in 32 patients. Unilobar involvement was seen in 45 patients. The abscesses were completely liquefied in 40 patients and gas in the abscess cavity in 10 patients. Free intraperitoneal fluid was seen in all patients.

**Conclusion:** A ruptured hepatic abscess is more life-threatening than an unruptured one. A rapid and accurate diagnosis and prompt surgical intervention are essential. Most of the cases had an acute presentation and the right lobe is commonly affected. Pain in the abdomen was the most common symptom which presented in most cases. Computed Tomography is an ideal tool for diagnosing hepatic abscesses and its complications.

**Keywords:** Liver; Abscess; Ruptured; Computed Tomography; Clinical features

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### Introduction

Recent reports have recommended computed tomography (CT) as the primary radiologic method for the detection of suspected hepatic abscess. [1,2] Despite this recommendation, the CT appearance of hepatic abscess has not been described in detail. In the only reported series with pathologic documentation, Rubinson et al [2] noted that intrahepatic abscess was often indistinguishable from simple hepatic cyst. Disease symptoms and signs are not specific neither are laboratory tests: liver function tests may be more or less normal, depending on the extent of abscess, its causes and sepsis severity.

The diagnosis is mainly based on imaging. Ultrasound (US) and computed tomography (CT)

scans allow diagnosis in over 90% of cases, and often give information about etiology. [3] Treatment of choice is represented by image-guided percutaneous drainage in combination with antibiotic therapy but, in some selected cases, surgical treatment is necessary although associated with increased morbidity and mortality. [3,4] In extremely rare cases, spontaneous rupture of liver abscess may occur, free in the peritoneal cavity or in neighboring organs, an event which is generally considered a surgical emergency. [5,6]

Computed tomography (CT) is an ideal tool for diagnosing hepatic abscesses, and the sensitivity of CT for detecting hepatic abscesses is as high as 97%. [7] On CT, a hepatic abscess appears as a single or

multiloculated mass with low attenuation. [7] Early diagnosis and prompt therapy are essential to reduce the morbidity and mortality associated with a pyogenic hepatic abscess. The mortality rate is low when the abscess is confined to the liver; however, the mortality rate is increased when the hepatic abscess extends into the chest, peritoneal cavity, or pericardial cavity. [8] Therefore, the early detection of complications associated with hepatic abscesses is important. In hepatic abscess, various complications have been described [9-11] and the rate of complications was reported to be 10.3%. [8] Reports of complications in pyogenic hepatic abscess are rare, however, and the imaging appearance has been studied in only a small number of patients. [11,12]

Improving imaging techniques have aided the clinicians in the diagnosis of hepatic abscesses and have subsequently become important treatment tools, decreasing the number of cases treated with surgical intervention. Furthermore, the demographics of the hepatic abscess have changed. [13] Though open surgery still remains most commonly used management modality, with advent of minimally invasive surgery, laparoscopic drainage of the ruptured abscess has been described with few complications. Thus, multiple management options are available today and ruptured liver abscess is a preventable and manageable pathology. However, what to do is decided by the clinicians based on the patient’s medical status. No specific guidelines are available for choosing the modality of treatment.

The aim of the present study was to assess the Computed Tomography (CT) and clinical findings of intraabdominal ruptured liver abscess.

**Materials and Methods**

This was a retrospective observational study of patients with intraabdominal ruptured liver abscess presenting in the Department of Radiology, Shree Krishna Medical College and Hospital, Patna, Bihar, India from November 2021 to September 2022 . The study group consisted of 50 patients. All diagnosed cases of ruptured liver abscess based on radiology and laparoscopic investigation were included in the study. Details of demographics, clinical features, Computed Tomography were recorded.

**Clinical Parameter**

Demographic and clinical characteristics comprised age, sex, underlying medical conditions (Diabetes

mellitus, biliary disorders, hemodialysis, liver cirrhosis, malignancy, immunosuppression, cavities from old calcified echinococcus cysts, simple benign liver cysts), symptoms and signs at presentation and origin of the abscess. Patients receiving empiric therapy with antibiotics prior to admission were also recorded.

**Liver CT Characteristics**

All patients underwent contrast enhanced CT of the liver before laparoscopic drainage of the liver abscess. In some patients, CT studies were also performed during follow-up to assess the size of the abscess cavity, monitor complications. However, we only reviewed the contrast-enhanced CT images obtained before drainage of the liver abscess, for the purpose of this study. The scanning parameters varied during the study period and with different scanners: collimation ranged from 1.25 mm to 7 mm; pitch ranged from 0.75 to 1.5; section thickness ranged from 1 mm to 5 mm. Liver examinations were conducted using 100 ml of intravenous non-ionic iodinated contrast medium (Ultravist, Schering, Berlin, Germany) and dosage was calculated based on the patients’ weight and administered via a power injector at a rate of 3 mL/sec.

Axial sections of 3-5 mm thickness were reconstructed, reported, and archived. The scans were reviewed by two radiologists who reached agreement between them. The following features were recorded:

- a) Lobe involvement (unilobar [right or left] or bilobar);
  - b) Number of abscesses (single or multiple);
  - c) Maximal abscess diameter, with the largest abscess measured when there were multiple abscesses;
  - d) Unilocular or multilocular (presence of ≥1-mm-thick septations), multilocular abscess;
  - e) Solid or cystic appearance (>50% of the abscess cavity appears hypodense or liquefied, with an attenuation value of ≤20 HU) in most of the sections showing the abscess cavity, cystic abscess;
  - f) Gas within the abscess cavity;
  - g) Spontaneous rupture of the abscess (based on CT and clinical symptoms).
- Data was analyzed using SPSS software.

**Results**

**Table 1: Underlying diseases of patients with intraabdominal ruptured liver abscess**

Underlying diseases	Frequency	Percentage (%)
Hypertension	3	6
Diabetes mellitus	13	26
Bacterial pneumoniae	9	18
Bile duct stones	2	4

Diabetes mellitus was the most common underlying medical condition (26%), followed by bacterial pneumoniae (18%), hypertension (6%), bile duct stones (4%).

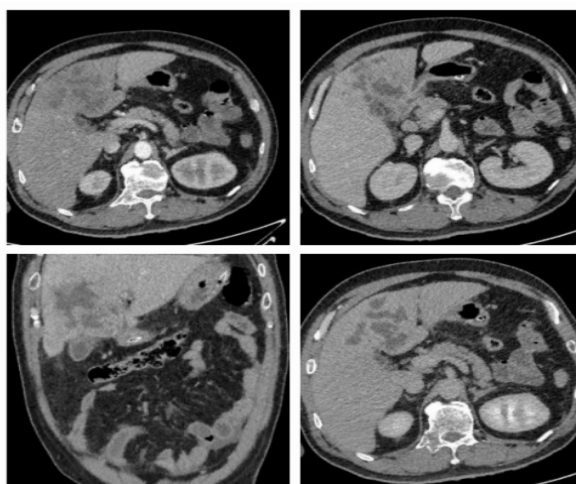
**Table 2: Clinical presentations of intraabdominal ruptured liver abscess.**

Clinical presentations	Frequency	Percentage (%)
Abdominal pain	48	96
Malaise and anorexia	48	96
Nausea / vomiting	32	64
Fever > 38°C	39	78
Jaundice	8	16
Peritonitis	39	78
Hepatomegaly	6	12

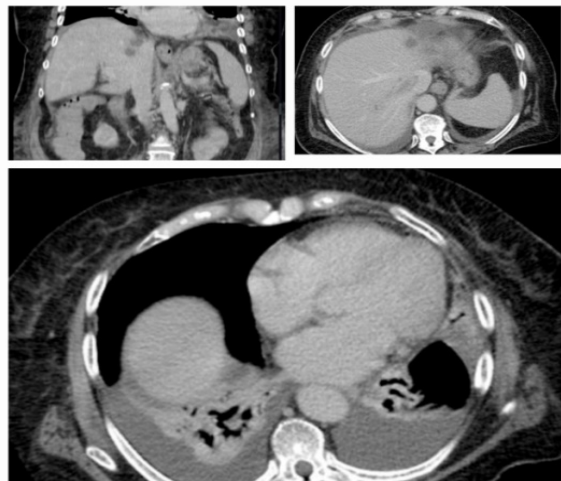
Most of the patients were suffering from abdominal pain (96%), malaise and anorexia (96%), fever (78%), peritonitis (78%), and other positive clinical signs.

**Table 3: CT characteristics of intraabdominal ruptured liver abscess**

CT findings	All patients (n=50)
Abscess size (cm)	8.6 (4.0–14)
No. of abscesses	
1	18 (36)
>1	32 (64)
Lobar involvement	45 (90)
Unilobar/Bilobar	5 (10)
Abscess appearance Completely liquefied	40 (80%)
Gas in the abscess cavity	10 (20)
Peritoneal effusion	50 (100%)



**Figure 1: Ruptured liver abscess in different phases**



**Figure 2: Ruptured liver abscess with perihepatic fluid and bilateral pleural effusion**

The mean size of the liver abscess was 8.6 cm (range, 4.0-14 cm). A single abscess was found in 18 patients, and multiple abscesses were seen in 32 patients. Unilobar involvement was seen in 45 patients. The abscesses were completely liquefied in 40 patients and gas in the abscess cavity in 10 patients. Free intraperitoneal fluid was seen in all patients.

### Discussion

Liver abscess is a common condition in tropical countries and is associated with significant morbidity and mortality. Traditionally, there are two major classifications of hepatic abscess; pyogenic and amoebic. [14,15] There are various complications associated with hepatic abscesses, of which, rupture of the abscess is the most common. [16-18] Intraperitoneal rupture of liver abscess is a rare but potentially fatal disease, often involving the elderly, who are commonly of poor surgical risk with background of significant medical illness. [19,20] Accurate preoperative diagnosis is difficult and often necessitates exploratory laparotomy for peritonitis. [21]

Diabetes mellitus was the most common underlying medical condition (26%), followed by bacterial pneumoniae (18%), hypertension (6%), bile duct stones (4%). Most of the patients were suffering from abdominal pain (96%), malaise and anorexia (96%), fever (78%), peritonitis (78%), and other positive clinical signs. Computed Tomography may provide important information regarding the extent of intraperitoneal spread of the liver abscess. Dal Mo Yang et al [22] study 81 patients who had a confirmed pyogenic hepatic abscess, the complication was encountered in 3 patients (3.7%) and 2 types could be recognized: a loculated perihepatic abscess (n = 2) and diffuse peritonitis (n = 1). In diffuse peritonitis secondary to rupture of a hepatic abscess, a large amount of ascites and diffuse thickening of the parietal peritoneum could be seen on CT. Although an amoebic peritonitis secondary to rupture of a hepatic amoebic abscess showed a poor survival rate despite surgical intervention, all the patients with intraperitoneal rupture of the pyogenic hepatic abscess could be treated with percutaneous drainage and antibiotic treatment.

The mean size of the liver abscess was 8.6 cm (range, 4.0-14 cm). A single abscess was found in 18 patients, and multiple abscesses were seen in 32 patients. Unilobar involvement was seen in 45 patients. The abscesses were completely liquefied in 40 patients and gas in the abscess cavity in 10 patients. Free intraperitoneal fluid was seen in all patients. The CT appearance of liver abscess is variable and nonspecific. One or more round or oval low-density lesions 2-16 cm in diameter may be seen. The margin of the abscess may be smooth or

nodular, and one or more internal septations may be present. An enhancing wall is common but not universal. However, the wall may not be apparent if unenhanced CT is not performed. Thus, the CT differential diagnosis of amoebic liver abscess in the adult includes simple hepatic cyst, infected or hemorrhagic cyst, pyogenic liver abscess, echinococcal cyst, hematoma, biloma, cystic or necrotic hepatic metastasis, undifferentiated embryonal sarcoma, and biliary cystadenoma. In the few cases in which a rim of edema is seen peripheral to the lesion, diagnostic consideration may be limited to inflammatory conditions. [23] A feature of amoebic liver abscess that may aid in distinguishing it from other focal hepatic lesions is its tendency to extend beyond the surface of the liver.

Kim et al [24] suggested certain CT characteristics suggestive of a Klebsiella abscess, such as a hairball sign or air-fluid level. However, while such imaging distinctions may be sought, culture and sensitivity results are the key to choosing the appropriate antibiotics. The advancement in radiologic techniques has been credited with the improvement in mortality rates. Ultrasonography and CT evaluation with contrast remain the radiologic modalities of choice in screening procedures and also can be used as techniques for guiding percutaneous aspiration and drainage. With advancement in multidetector CT scan technology, image quality has improved dramatically, allowing for improved detection. Besides, gallium and technetium radionuclides can be used in diagnosis.

### Conclusion

A ruptured hepatic abscess is more life-threatening than an unruptured one. A rapid and accurate diagnosis and prompt surgical intervention are essential. Most of the cases had an acute presentation and the right lobe is commonly affected. Pain in the abdomen was the most common symptom which presented in most cases. Computed Tomography is an ideal tool for diagnosing hepatic abscesses and its complications.

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