

## **A Retrospective Observational Radiographic Assessment of the Efficacy of Laparoscopic Treatment in the Management of Intra-Abdominal Ruptured Liver Abscess.**

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### **Abstract**

**Aim:** The aim of the study was to assess the efficacy of laparoscopic treatment in the management of intra-abdominal ruptured liver abscess.

**Methods:** This was a retrospective observational study of Department of Radio Diagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India for one year, patients with intra-abdominal ruptured liver abscess. 50 patients were included in the study. 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.

**Results:** The study group consisted of 50 patients with a median age of 54.6±15.5 years (range, 24-85 years). There were more men than women in the study. Diabetes mellitus was the most common underlying medical condition (30%), followed by bacterial pneumoniae (20%), hypertension (8%), bile duct stones (4%). Most of the patients were suffering from abdominal pain (94%), malaise and anorexia (94%), fever (80%), peritonitis (76%). The mean time interval between the onset of fever and CT was 8.4 days (range, 1-30 days). The mean size of the liver abscess was 8.2 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 46 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 right lobe affected more commonly than left lobe.

**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. Abdominal pain was the most common symptom. Computed tomography is an ideal tool for diagnosing hepatic abscesses and its complications.

**Keywords:** Liver abscess; Ruptured; Laparoscopic.

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## Introduction

Liver abscess remains an important clinical problem with a significant mortality rate in both developing and developed countries. It could result as a complication of various intraabdominal infections; by hematogenous spread via portal vein from the gastrointestinal tract; or, may develop after traumatic injury to the liver. The two most common varieties of liver abscess are pyogenic and amoebic. [1] Amoebic liver abscess is an important cause of space-occupying lesions of the liver; mainly in developing countries accounted for 3-9% of all cases of amoebiasis. [2] This infection is caused by the protozoa *E. histolytica*, which ascends the portal venous system. Liver abscesses are the most common type of visceral abscess; in one study of intraabdominal abscesses, pyogenic liver abscesses accounted for 48% of visceral abscesses and 13% of intraabdominal abscesses. [3] The annual incidence of pyogenic liver abscess has been estimated at 2.3 cases per 100,000 populations and is higher among men than women (3.3 vs. 1.3 per 100,000). [4-6]

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. [7] 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. [7,8]

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%. On CT, an

hepatic abscess appears as a single or multiloculated mass with low attenuation. [9] 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. [10] Therefore, the early detection of complications associated with hepatic abscesses is important. In hepatic abscess, various complications have been described [11-13], and the rate of complications was reported to be 10.3%. [10] Reports of complications in pyogenic hepatic abscess are rare, however, and the imaging appearance has been studied in only a small number of patients. [13,14]

The aim of the study was to assess the efficacy of laparoscopic treatment in the management of intra-abdominal ruptured liver abscess.

## Materials and Methods

This was a retrospective observational study of Department of Radio Diagnosis, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India for one year. patients with intra- abdominal ruptured liver abscess. The study was approved by the Hospital Ethical Board. 50 patients were included in the study. 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 CT examinations were performed using Somatom Sensation 64, Siemens, Germany. 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  $\geq 1$ -mm-thick septations), multilocular abscess; (e) solid or cystic appearance ( $>50\%$  of the abscess cavity appears hypodense or liquefied, with an attenuation value of  $\leq 20$  HU) in most of the sections showing the abscess cavity, cystic abscess; (f) gas within the abscess cavity; and (g) spontaneous rupture of the abscess (based on CT and clinical symptoms).

### Results

**Table 1: Underlying diseases of patients with intra-abdominal ruptured liver abscess**

Underlying diseases	Frequency	Percentage (%)
Hypertension	4	8
Diabetes mellitus	15	30
Bacterial pneumoniae	10	20
Bile duct stones	8	4

The study group consisted of 50 patients with a median age of  $54.6 \pm 15.5$  years (range, 24-85 years). There were more men than women in the study. Diabetes mellitus was the most common underlying medical condition (30%), followed by bacterial pneumoniae (20%), hypertension (8%), bile duct stones (4%).

**Table 2: Clinical presentations of intra-abdominal ruptured liver abscess**

Clinical presentations	Frequency	Percentage (%)
Abdominal pain	47	94
Malaise and anorexia	47	94
Nausea/vomiting	30	60
Fever $>38^{\circ}\text{C}$	40	80
Jaundice	8	16
Peritonitis	38	76
Hepatomegaly	6	12

Most of the patients were suffering from abdominal pain (94%), malaise and anorexia (94%), fever (80%), peritonitis (76%).

**Table 3: CT characteristics of intra-abdominal ruptured liver abscess**

CT findings	N
Abscess size (cm)	8.2 (4.0–14)
No. of abscesses	
1	18 (36)
>1	32(64)
Lobar involvement	
Unilobar	46 (92)
Bilobar	4 (8)
Abscess appearance	
Completely liquefied	40 (80)
Gas in the abscess cavity	10 (20)
Lobe involved	
Right	35 (70)
Left	15 (30)
Peritoneal effusion	50 (100)

The mean time interval between the onset of fever and CT was 8.4 days (range, 1-30 days). The mean size of the liver abscess was 8.2 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 46 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 right lobe affected more commonly than left lobe.

### 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. [15,16] There are various complications associated with hepatic abscesses, of which, rupture of the abscess is the most common. [17,18] Intra-peritoneal 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] Liver abscess is an important tropical

gastrointestinal disorder. [21,22] Liver abscess can be classified into pyogenic and amoebic, both having its serious implications, especially when presented late. In developing countries, it forms a major cause for mortality and morbidity. [23,24] With the advent of modern radiological modalities, diagnosis of hepatic abscess is possible in early stages resulting in nonsurgical management; however, fraction of patients either due to late presentation or refractory disease presents with ruptured liver abscess thereby increasing the mortality, presents with fatal disease course, and requires surgical intervention at the earliest. [25]

Most of the patients were suffering from abdominal pain (94%), malaise and anorexia (94%), fever (80%), peritonitis (76%). This results were comparable to study by Hind S. Alsaif with the most common presentation was fever and/or chills, followed by gastrointestinal symptoms (eg, gastrointestinal upset, diarrhea, vomiting, nausea, discomfort, pain), respiratory symptoms(eg, cough, dyspnea, chest distress), and Jaundice. [26]

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 amebic 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. [27]

A single abscess was found in 18 patients, and multiple abscesses were seen in 32 patients. Unilobar involvement was seen in 46 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 right lobe affected more commonly than left lobe. Study by Alexopoulou A et al, the majority (69.7%) of liver abscess involved the right lobe, they were 5-9 cm in size (63.6%) and solitary (75.7%). Multiple abscesses were observed in 24.2% of patients. The presence of elevated hemidiaphragm (42.4%), pleural effusion (18.2%) and basilar infiltrate (6%) in chest radiography was also noted. Liver abscess was accompanied by pylephlebitis in 1 patients. Gas forming were observed in 4 patients (12.1%) and loculated sub collections in the abscess in 3 (9%). [17]

A definitive diagnosis of liver abscess requires imaging, with both sonography and CT being useful. Sonography is operator-dependent and the operator may have difficulty picking out a small, solitary abscess. Its sensitivity is around 79%, compared with 98% for CT [28], but emergency bedside sonography may be

very useful in making a rapid diagnosis. Kim et al. suggested certain CT characteristics suggestive of a Klebsiella abscess, such as a hairball sign or air-fluid level [29]. However, while such imaging distinctions may be sought, culture and sensitivity results are the key to choosing the appropriate antibiotics.

With the development of laparoscopic techniques, laparoscopic drainage may replace traditional open drainage in the treatment of liver abscess. A laparoscopic drainage group is better than an open drainage group in operation time, blood loss and length of hospital stay and laparoscopic drainage is safe and feasible in patients who have no response to conservative's treatment. [30,31] All surgically accessible liver abscesses are candidates for laparoscopic drainage. If a coexisting abdominal pathology is present that cannot be resolved by laparoscopy, then open surgery should be preferred. Laparoscopic drainage of ruptured liver abscess has had been successfully attempted. Laparoscopic method decreases the size of the incision and avoids the post-operative complications like burst abdomen commonly associated with open surgery for ruptured liver abscess. It also has the added advantage of being able to give ample peritoneal lavage and insight into other intra-abdominal pathology. [32,33]

### 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. Abdominal pain was the most common symptom. Computed tomography is an ideal tool for diagnosing hepatic abscesses and its complications.

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