

Clinical features, laboratory characteristics and treatment outcomes of liver abscess at the Institute of Clinical Infectious Diseases - 108 Military Central Hospital

Pham Van Chung, Nguyen Thi Hiep, Hoang Dinh Nhu,
Vuong Phuc Duong, Nguyen Tri Thuc, Trinh Van Son,
Nguyen Dang Manh

108 Military Central Hospital

Summary

Objective: To describe clinical features and laboratory characteristics, treatment outcomes of liver abscess treated at Institute of Clinical Infectious Diseases. **Subject and method:** This is a retrospective descriptive study on 65 patients with liver abscess, treated at the Institute of Clinical Infectious Diseases - 108 Military Central Hospital, from January 2018 to June 2022. **Result:** The majority of patients were male (85%), from 41 to 70 years of age, had diabetes (44.62%). Clinical symptoms were prolonged fever: (92.31%); chills (75.38%), right upper quadrant pain (83.08%), jaundice (21.54%). Inflammatory marker: leukocytosis 75.4%; elevated procalcitonin (68.75% PCT > 10ng/ml). Liver function test: Elevated liver enzyme 83.1%, increased bilirubin 52.3%, prolong prothrombin time 47.7%; decreased albumin (63.1%) and thrombocytopenia 21%. About 94% liver abscess were single foci, located in the right liver lobe (81.54%), large size > 5cm accounted for 75.35% with mixed features on ultrasound (84.62%). Among 41 strains of bacteria isolated, *Klebsiella pneumoniae* (87.8%); *E. coli* (9.75%) and *Streptococcus* sp. (2.45%). Mortality rate: 1.54%. In total: 83.07% patients underwent invasive procedure (Aspiration: 50.77% and Percutaneous drainages: 32.3%). Mean duration in hospital (days): 14.77 ± 6.37 with mean deferverescent time was: 4.45 ± 2.36 (days). **Conclusion:** The clinical features of LA still remain typical with prolonged fever, chills and right upper quadrant pain. Patients with an advanced ages and diabetes mellitus as an underly condition appear LA. The sub-clinical characteristic were an increased inflammatory marker and abnormal liver function tests. On ultrasound, majority of patients had one abscesses > 5cm on the right liver lobe. Treatment with broad spectrum antibiotics and minimal invasive procedures including aspiration and percutaneous drainage showed good response.

Keywords: Liver abscess, clinical features.

1. Background

Liver abscess (LA) is defined as a pus-filled mass in the liver that can develop as a result of liver injury or an intra-abdominal infection that spreads from

the portal circulation [1]. The majority of these abscesses were classified as pyogenic or amoebic, although in some case, LA were caused by parasites and fungi. Most amoebic infections are caused by *Entamoeba histolytica*. Recent reports indicated an increasing incidence of pyogenic LA (especially *Klebsiella pneumoniae*) in older adults [2-4] accompanied by an increase in metabolic diseases (diabetes, obesity ...). While the incidence is low

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Correspondence to: Pham Van Chung, Institute of Clinical Infectious Disease - 108 Military Central Hospital

Email: dr.chung1107@gmail.com

(about 1.1/100,000 to 17.6/100,000 individuals [5]), the high rate of mortality made LA one of the health threads that need strict monitoring in the hospital [6]. Despite much progress has been made in the management of LA, treatment remains challenging [7, 8] due to the increasing antibiotic resistance of bacteria and in many cases, no pathogens have been identified [2, 9]. This study was conducted to further explore the clinical and pathological features of liver abscess and provide background information for treatment of such challenging disease.

2. Subject and method

2.1. Subject

Inclusion criteria: Liver abscesses were diagnosed based on the clinical presentation, laboratory findings, and imaging studies such as computed tomography, ultrasonography, or magnetic resonance imaging. Microbiologic data were collected from at least 1 set of blood cultures or from pus obtained through an invasive procedure. Culture-negative liver abscess (CNLA) was diagnosed if no organism grew on the initial blood culture or from pus obtained through an invasive procedure. Invasive procedures included aspiration, percutaneous drainage.

Exclusion criteria: The presence of ≥ 2 pathogens cultured from blood or aspirated pus. Patients with hepatocellular carcinoma.

2.2. Method

This is a retrospective descriptive study, 65 patients with definitive diagnosis of LA, treated at the Institute of Clinical Infectious Diseases from January 2018 to June 2022 were enrolled to the study.

Data collection: The following data were collected: age, sex, underlying disease, clinical presentation, laboratory findings, imaging data, microbiologic data, treatment strategy, and clinical outcomes. In-hospital mortality was used as the main outcome for assessing mortality in patients with a liver abscess.

Statistical analysis: Statistical analysis was performed using the SPSS (version 22.0) statistical software package.

3. Result

In total, 65 patients met the inclusion criteria were selected to our study.

3.1. Baseline characteristics of the study group

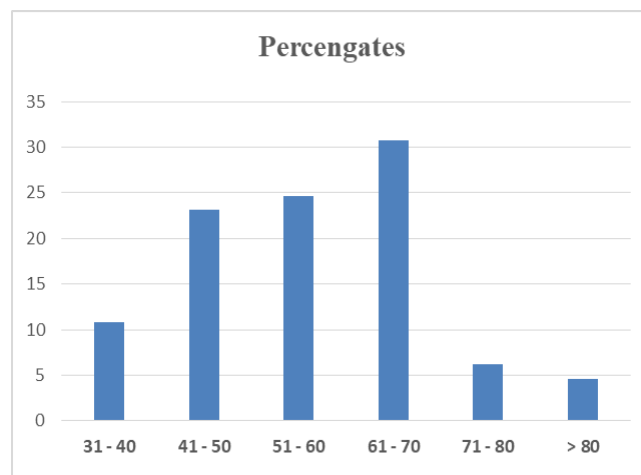


Figure 1. Distribution of patients according to ages

The mean age of the patients was 58 years \pm 25 years with a peak from 61-70. The majority of patients were male with the percentage at 85%.

Table 1. Comorbidity

| Comorbidity | Cases | |
|------------------------|-------|--------------|
| | n | Percentage % |
| Diabetes | 29 | 44.62 |
| Hypertension | 19 | 29.23 |
| Biliary tract diseases | 5 | 7.69 |
| Dialysis | 2 | 3.08 |
| Asthma | 2 | 3.08 |
| Stroke | 2 | 3.08 |

Comment: The most common comorbidity was diabetes accounted for 44.62%, followed by hypertension (29.23%) and biliary tract diseases accounted for 7.69%.

3.2. Clinical presentation of patients with LA

Table 2. Common clinical presentations

| Clinical findings | Cases | | |
|------------------------------------|------------------|--------------|-------|
| | n | Percentage % | |
| Right abdominal tenderness | 54 | 83.08 | |
| Fever | 60 | 92.31 | |
| Duration of fever before admission | | 7.78 ± 6.61 | |
| Chills | 49 | 75.38 | |
| Jaundice | 14 | 21.54 | |
| Nausia and vomiting | 6 | 9.23 | |
| Respiratory symptoms | Dyspnea | 7 | 10.77 |
| | Pneural effusion | 9 | 13.85 |
| Hepatomegaly | 4 | 6.15 | |
| Ascites | 4 | 6.15 | |
| Chest pain | 2 | 3.08 | |

Common clinical symptoms were prolonged fever: (92.31%) about 7.78 ± 6.61 days before admission with chills (75.38%), right upper belly pain (83.08%), jaundice (21.54%), and pleural effusion 13.85%.

3.3. Laboratory characteristics of patients with LA

Table 3. Laboratory findings

| Variables | n | Percentage % | |
|-------------------------|----------|--------------|-------|
| WBC (G/L) (n = 65) | < 4 | 2 | 3.1 |
| | 4-10 | 14 | 21.5 |
| | > 10 | 49 | 75.4 |
| | Mean | 12.59 ± 4.24 | |
| PCT (ng/ml) (n = 34) | ≤ 0.05 | 0 | 0 |
| | > 0.05-2 | 12 | 18.75 |
| | > 2-10 | 8 | 12.5 |
| | > 10 | 45 | 68.75 |
| Platelet < 150G/L | 14 | 21 | |
| Prothrombin < 70% | 31 | 47.7 | |
| Bilirubin > 17µmol/L | 34 | 52.3 | |
| GPT < 40 | 36 | 16,9 | |
| 40 < GPT < 200 | 25 | 38.5 | |
| GPT > 200 | 29 | 44.6 | |
| Albumin < 35g/L | 41 | 63.1 | |
| Creatinin > 120µmol/L | 7 | 10.8 | |

Inflammatory marker: 100% had elevated procalcitonin (68.75% PCT > 10ng/ml; and 75.4% had leukocytosis with mean leukocytes: 12.59 ± 4.24G/L.

Liver function test: 83.1% of patients had elevated liver enzyme with 44.6% > 200U/L. Half of patients had elevated bilirubin and prolong prothrombin time; 41 cases (63.1%) decreased albumin and 21% patients had thrombocytopenia.

There were 7 cases (10.8%) with kidney injury.

Table 4. Features of liver abscess on ultrasound

| Criteria | | Cases | |
|--------------------|-------------|-------|--------------|
| | | n | Percentage % |
| Location | Left liver | 12 | 18.46 |
| | Right liver | 53 | 81.54 |
| | Both | 0 | 0 |
| Number of lesion | 1 | 61 | 93.85 |
| | ≥ 2 | 4 | 6.15 |
| Diameter | < 3cm | 1 | 1.54 |
| | 3-5cm | 15 | 23.08 |
| | > 5cm | 49 | 75.38 |
| Echo | Hypoechoic | 8 | 12.31 |
| | Hyperechoic | 2 | 3.08 |
| | Mix | 55 | 84.62 |
| Air in the abscess | | 10 | 15.38 |

Liver abscess usually formed a single foci (93.85%), mostly in the right lobe of the liver (81.54%), large size > 5cm accounted for 75.35% with mixed features on ultrasound (84.62%). There were 10 (15.38%) cases of gas-producing bacteria in the abscess.

Table 5. Bacteriological classification of abscess and blood culture

| | | n | Percentage % |
|---|------------------------------|----|--------------|
| Gram negative | <i>Klebsiella pneumoniae</i> | 36 | 55.38 |
| | <i>Escherichia coli</i> | 4 | 6.15 |
| Gram positive | <i>Streptococcus sp.</i> | 1 | 1.34 |
| Negative cultures on blood or aspirated pus | | 24 | 36.92 |

Comment: Negative cultures on blood or aspirated pus accounted for 36.92%. Among 41 strains of bacteria isolated (63.08%), *Klebsiella pneumoniae* (87.8%); *E. coli* (9.75%) and *Streptococcus sp.* (2.45%).

3.4. Treatment outcomes of patients with LA

Table 6. Treatment outcomes

| Treatment outcomes | n | Percentage % |
|------------------------------------|--------------|--------------|
| Recovered | 64 | 98.46 |
| Mortality | 1 | 1.54 |
| Aspiration | 33 | 50.77 |
| Drainages | 21 | 32.3 |
| Mean length of hospital stay (day) | 14.77 ± 6.37 | |
| Time to defervescence (day) | 4.45 ± 2.36 | |

Mortality rate: 1.54%. In total: 83.07% patients underwent invasive procedure (Aspiration: 50.77% and percutaneous drainages: 32.3%). Mean duration in hospital (days): 14.77 ± 6.37 with mean defervescence time was: 4.45 ± 2.36 (days).

4. Discussion

The mean age of the patients in our cohort was 58 years \pm 25 years. The majority of patients were male from 41 to 70 years of age with a peak from 61 to 70. Our data was in line with recent findings that showed the increasing number of cases with LA among aging population [5]. In addition which the most common comorbidity was diabetes accounted for 44.62% of the case, followed by hypertension (29.23%) and biliary tract diseases 7.69%. Proportion of patient with diabetes in cohort of Tian and Zhu were 44.3% and 51.1% respectively [10], [11]. Diabetes is considered a risk factor for liver abscess, because high level of glucoses in blood plasma is a favorable condition for bacteria to grow as well as inhibit phagocytosis, interfere with cellular immune mobilization [12]. Since the liver has double blood supplies, that is, the hepatic artery and the portal vein. The portal vein, and the gastrointestinal tract are connected, leading to an increased chance of pathogenic invasion of the liver and the subsequent inflammation of the liver parenchyma as well as necrosis of the hepatic tissue. Number of LA patients with biliary tract diseases in cohort of Feng CT [13] was (14.6%) higher than our study group 7.69%. This difference might be due to the sampling method.

Common clinical symptoms of LA in our cohort included prolonged fever (92.31%) about 7.78 ± 6.61 days before admission with chills (75.38%), right upper quadrant pain (83.08%), jaundice (21.54%), and pleural effusion 13.85%. These are classical presentation of LA also evidenced in other studies however they are not specific and do not help differentiate underlying pathogens of LA [8, 9]. It is also worth to remark that, LA is one important differential diagnosis in patient with prolonged fever. Patients in our study were diagnosed with LA after about 7.78 days of fever. About 17% of them

do not have right upper quadrant pain (which suggest liver pathology and LA in febrile patients). This symptom could be underestimated if patients do not report any discomfort in right upper quadrant and physicians do not undertake physical examination thoroughly.

Most of patients in our study had increased inflammatory marker: 75.4% patients had leukocytosis with mean leukocytes: 12.59 ± 4.24 G/L. Our number is in agreement with a report from 175 Military hospital with 75% patients had leukocytosis [14]. Noticeably 100% patients had elevated Procalcitonin with 68.75% patients had PCT > 10 ng/ml. These highly increased inflammatory marker indicates systemic response to local LA might lead to severe infection and sepsis (in our cohort, at least 13 cases (20%) had positive blood culture as confirmed evidence of sepsis). There were 7 cases (10.8%) with kidney injury documented in our cohort. This could be evidence of systemic effect of local LA might lead to other organ dysfunction and indicate severity of disease. Liver function test in our cohort demonstrated 83.1% of patients had elevated liver enzyme with 44.6% patients had GPT elevated significantly > 200 U/L. Our number is higher than the report of Dao Duc Tien from 175 Military hospital with the respective number is 83.07% [14]. Elevated liver enzymes are a consequence of hepatocellular damage, which can cause liver dysfunction. Half of patients had elevated bilirubin and prolong Prothrombin time; 41 cases (63.1%) with decreased albumin, with 21% of the patients had thrombocytopenia.

Liver abscesses in our cohort mostly form a lesion (93.85%), mostly in the right lobe of the liver (81.54%), large size > 5 cm accounts for 75.35% with mixed features on ultrasound (84.62%). There are 10 cases (15.38%) of gas-producing bacteria in the abscesses. Our number is in agreement with the report of Dao Duc Tien from 175 Military Hospital with the respective numbers are: 91.7%, 79.2%, 77.1%, 87.5% and 20.8% [14].

Report of Jai Hoon Yoon from Korea about 402 cases with LA suggested that the prognosis

including mortality, recurrence and metastatic infection was no different between the patients with culture negative liver abscess (CNLA) and culture positive liver abscess (CPLA), although the length of hospital stay was shorter for CNLA patients compared with CPLA patients [9]. Microbiology data in our study shows that negative cultures on blood or aspirated pus accounted for 36.92%. On average, patients had 7 days of fever and some of them undertook antibiotics before admission. That is part of the reason why the positive culture rate in our study was quite low. Among 41 strains of bacteria (63.08%) isolated, *Klebsiella pneumoniae* (87.8%); *E. coli* (9.75%) and *Streptococcus* sp. (2.45%). In line with recent publications worldwide, our data stresses the emerging of *Klebsiella pneumoniae* as major pathogen of LA [4, 14]. This gram negative bacteria is becoming pathogen of concern for healthcare system with potential of causing severe infection and broadly resisted to treatment of advanced antibiotics.

In our cohort, 83.07% of patients underwent invasive procedures (Aspiration: 50.77% and Percutaneous drainages: 32.3%) in combination with broad spectrum antibiotics pending for antibiotic profiles (3rd generation cephalosporin and fluoroquinolon and metronidazole). The other 11 patients (16.93%) were not treated with any invasive procedures, either because the LA was less than 4cm or located at a challenging location for the aforementioned procedures. Those patients were managed solely by prolonged antibiotics and regular check-up. Our data showed good response to broad spectrum antibiotic and the mean deferverescent time was: 4.45 ± 2.36 (days). However, the mean length of hospital day was 14.77 ± 6.37 (days). This was because of severe complications and some challenging to drainage LA. We document 1 patient had septic shock after underwent aspiration of the abscess and proceeded to multi-organ dysfunction afterward, making the mortality rate of our cohort 1.54% and the discharge rate was 98.46%.

5. Conclusion

The majority of liver abscess patients were male from 40 to 70 years old, often with diabetes. The

clinical features of liver abscess still remain typical in recent years with presentations were prolonged fever with chills and right upper quadrant pain. Diagnosis was supported by highly increased inflammatory marker and abnormal liver function tests. Ultrasound was essential to confirm the diagnosis reveal majority of patients had one abscesses > 5cm on the right liver lobe. Our data showed good response to treatment with broad spectrum antibiotics and minimal invasive procedures including aspiration and percutaneous drainage.

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