

CLINICAL AND LABORATORY CHARACTERISTICS OF LIVER ABSCESS PATIENTS AT NGUYEN TRI PHUONG HOSPITAL

Huynh Thanh Long*, Nguyen Manh Khiem*

ABSTRACT

Background: Liver abscess is a common disease in tropical countries, including Vietnam. Nguyen Tri Phuong Hospital has treated many cases of liver abscesses since 2010. However, there has not been a research report summarizing the clinical and subclinical characteristics of liver abscess cases here. **Subjects and methods:** Retrospective study of patients diagnosed with a liver abscess at Nguyen Tri Phuong Hospital from January 2017 to December 2022. **Results:** There were 61 patients diagnosed with a liver abscess at the General Surgery Department of Nguyen Tri Phuong Hospital from January 2017 to December 2022 with the following characteristics: male/female ratio of 1.65/ first; average 56.1 ± 12.3 years old, history of diabetes accounted for 32.8%; The prominent clinical symptoms are fever (88.5%), right upper quadrant pain (85.2%). The average volume of liver abscess on ultrasound was 377.2 ± 50.4 ml, the liver abscess located in the right liver accounted for 73.4%, most of which was a single abscess (78.7%). *Klebsiella pneumoniae* was cultured with the highest rate of 42.6% (26/61) **Conclusion:** Liver abscess is more common in the elderly, more in men than in women with common symptoms including fever and right upper quadrant pain. *Klebsiella pneumoniae* became the most common cause of the liver abscess.

Keywords: liver abscess, clinical, subclinical, *Klebsiella pneumoniae*

* Nguyen Tri Phuong Hospital

Responsible person: Huynh Thanh Long

Email: bs.huynhlong1967@gmail.com

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I. INTRODUCTION

Liver abscess is a collection of pus in the liver parenchyma, usually due to the invasion of bacteria, parasites through the blood or biliary system. The disease is common in tropical countries, including Vietnam.

The clinical symptoms of liver abscess such as fever, right upper quadrant pain, hepatomegaly, anorexia... are non-specific and vary from patient to patient, so sometimes it is misdiagnosed. Poor diagnosis and treatment of liver abscess can lead to sepsis, multiple organ failure, and death.

Nguyen Tri Phuong Hospital is one of the major frontline hospitals in Ho Chi Minh City that has treated many cases of liver abscess since 2010. However, there is no research report summarizing clinical characteristics, subclinical and microbiological characteristics of liver abscess cases here.

Therefore, we carried out the study "Evaluating clinical and subclinical characteristics of liver abscess patients at Nguyen Tri Phuong hospital" with the following two objectives:

- Describe the clinical characteristics of patients with liver abscess.
- Describe the paraclinical and microbiological characteristics of patients with liver abscess.

II. STUDY DESIGN AND PATIENTS

2.1. Study design: Retrospective descriptive study of patients diagnosed with liver abscess at Nguyen Tri Phuong Hospital

from January 2017 to December 2022 who met the study selection criteria.

Disease selection criteria:

- Patient > 15 years old
- All patients were diagnosed with liver abscess according to ICD-10 diagnosis code K75.0 or A06.4, based on clinical signs and symptoms such as fever and leukocytosis, characteristic picture of liver abscess on ultrasound or computed tomography, serology, culture evidence and analysis of blood or pus samples.

- The patient was treated at the Department of General Surgery, Nguyen Tri Phuong Hospital.

- Medical record.

Exclusion criteria:

- Broken liver abscess.
- Abdominal effusion.
- Liver abscesses in liver cancer patients.

2.2. Method of implementation :

Looking back through the old records of the research subjects and making a research case record the variable:

- Clinical features of liver abscess: Age, sex, clinical symptoms (fever, right upper quadrant pain, fatigue - anorexia, jaundice, hepatomegaly), medical history, source of

infection (venous portal, artery, biliary tract, idiopathic)

- Paraclinical features: leukocytes, total bilirubin, glucose, AST, ALT, ultrasound (abscess location, abscess volume, abscess characteristics), X-ray (pleural effusion).

- Microbiological characteristics: blood culture results, abscess pus culture results

- Data processing using SPSS 26.0 software.

III. RESULTS

61 patients was diagnosed with liver abscess and treated at General Surgery Department of Nguyen Tri Phuong Hospital from January 2017 to December 2022. When studying on patients, we have the following comments and results:

3.1. Clinical features of diagnosis of liver abscess

Gender: 38 male patients (62.3%) and 23 female patients (37.7%). The male/female ratio is 1.65/1.

Age: The mean age in the study was 56.1 ± 12.3 years old, the youngest was 28 years old and the oldest was 82 years old.

Table 1. Age group (n = 61)

Age group	Number of patients	Ratio (%)
< 40 years old	8	13.1
40 - 65 years old	44	72.1
> 65 years old	9	14.8

Comment: The age group from 40 to 65 years old has 44 cases (72.1%), accounting for the majority

Prepayment:

Table 2. Medical history (n = 61)

Prepayment	Number of patients	Ratio (%)
Diabetes	20	32.8
Diseases of the biliary tract	15	24.6
Heart-related diseases	twelfth	19.7

Comment: There are 20 cases (32.8%) of diabetes with a higher rate

Origin of infection

Table 3. Source of infection (n = 61)

Origin of infection	Number of patients	Ratio (%)
Arterial line	35	57.3
Honey	twelfth	19.7
Portal vein	4	6.6
Source unknown	ten	16.4

Comment: The majority of infections originate from the arterial line (57.3%)

Clinical symptoms

Table 4. Clinical symptoms (n = 61)

Symptom	Number of patients	Ratio (%)
Fever	54	88.5
Right lower quadrant pain	52	85.2
Nausea – loss of appetite	36	59.0
Big liver	ten	16.4
Jaundice	5	8.2
Pleural effusion	6	9.8
Endophthalmitis	2	3.3

Comment: Fever, right lower quadrant pain and nausea - loss of appetite are common symptoms, accounting for 88.5%, 85.2 and 59.0%, respectively.

3.2. Paraclinical and microbiological features

Blood test results

Table 5. Blood tests results (n = 61)

Index	Mean	Smallest	Biggest
Hematology			
White blood cells (G/l)	15.2 ± 5.0	7	28
Biochemical			
Glucose (mmol/l)	154.3 ± 88.1	72	450
AST (U/L)	64.7 ± 49.5	16	170
ALT (U/L)	62.8 ± 48.6	11	180
Total Bilirubin (µmol/l)	15.2 ± 7.5	6	forty six

Comment : The average value of white blood cells is 15.2 ± 5.0 G/L, the lowest is 7 G/L, the highest is 28 G/L.

Ultrasound results of liver abscess:

Table 6. Ultrasound results

		Number of patients	Ratio (%)
Location of abscess drive	Right Lob	45	73.4
	Left lobe	11	18.0
	Two lobes	5	8.2
Features of the abscess drive	Single drive	48	78.7
	Multi-drive	13	21.3
Abscess volume (ml)	The smallest value		300
	The greatest value		490
	The average value		377.2 ± 50.4

Comment: The average volume of liver abscess on ultrasound was 377.2 ± 50.4 ml . Most of the liver abscesses are located in the right liver (45 patients accounted for 73.4%).

Microbiological results

Table 7. Results of blood culture and pus culture (n = 61)

		Number of patients	Ratio (%)
Blood culture	Negative	50	82
	Positive	11	18
pus culture	Negative	26	42.6
	Positive	35	57.4

Comment: Blood culture was positive in 11 (18%) cases. Culture of pus was positive in 35 (57.4%) cases.

Table 8. Microbiological characteristics in the study

	Number of patients	Ratio (%)
Pyogenic liver abscess	27	44.3
Liver abscess of unknown cause	22	36
Secondary infective amebic liver abscess	8	13.1
Amoebic liver abscess	4	6.6

Comments: There were 39 (64%) cases where the causative agent was identified and 22 (36%) the microorganism was not identified

Table 9. Culture results (n = 61)

Bacteria	Number of patients	Ratio (%)
<i>Klebsiella pneumonia</i>	26	42.6
<i>Escherichia coli</i>	6	9.8
<i>Viridans streptococci</i>	1	1.6
<i>Burkholderia pseudomallei</i>	2	3.2

Comments: *Klebsiella pneumonia* had 26 (42.6%) cases, accounting for the highest rate.

Table 10. Relationship between abscess characteristics and microbiological results

Microbiological results	Features of the abscess drive		Number of patients	Ratio (%)
	Single drive	Multi-drive		
<i>Klebsiella pneumoniae</i>	19	7	26	42.6
<i>Escherichia coli</i>	5	1	6	9.8
<i>Viridans streptococci</i>	0	1	1	1.6
<i>Burkholderia pseudomallei</i>	2	0	2	3.2
<i>Entamoeba histolytica</i>	9	3	12	19.7
Negative	19	4	23	37.7

Comment: In multifocal abscesses, *Klebsiella pneumoniae* was cultured in 7 cases (53.8%). In cases of single-focal liver abscess, *Klebsiella pneumoniae* was cultured in 19 cases (39.6%).

Antibiogram results (n = 35)

There were 30 cases (85.7%) sensitive to third-generation cephalosporins. There were 5 cases (14.3%) of multi-resistant bacteria secreting ESBL.

IV. DISCUSSION

4.1. Clinical features

Age and gender

Liver abscess is common in the elderly, especially in the age group of 50-60 years. The results of our study recorded that the

average age of the disease was 56.1 ± 12.3 years old, the lowest was 28 years old, the highest was 82 years old, and the most common in the middle age group was 40 - 65 years old. 72.1%). Meanwhile, the group older than 65 years old accounted for 14.8%, and the group under 40 years old had 13.1% cases (Table 1). Our research results are similar to those recorded by other authors such as Dalong Yin (2020): 58.5 ± 13.5 years old¹, Cristina Serraino (2018): 65.4 ± 14.3 years old², Shuangjun He (2020): 64.2 ± 13.3 years old³. In our study, the prevalence of liver abscess was predominant in men at 62.3%, the male/female ratio was 1.65:1. This result is similar to that recorded by Cristina Serraino et al. (2018) as 1.32:1². Dalong Yin et al. (2020) also commented that men have a higher rate of liver abscess than women with 62.6% of men, the male/female ratio is 1.67:1¹. This rate varies by geography and the living habits of the population. In places where the prevalence of the disease is still high, social life is still difficult, alcoholism and sanitation are low, and the prevalence of the disease is much higher among men. Sukhjeet Singh (2013) recorded this ratio as 7:1⁴. In areas with lower morbidity and better living conditions, the ratio is reported as 1.5:1³. The disease is more common in men due to a history of hepatobiliary disease, as well as exposure to environmental toxins, alcohol use is often higher than in women.

Prepayment

Most studies have confirmed that risk factors for liver abscess include uncontrolled diabetes and hepatopancreatic disease, and the incidence is also higher in immunocompromised and immunocompromised subjects who have had previous hepatobiliary procedures⁵.

Regarding the medical history, our study recorded diabetes as the most common comorbidity with 20 patients (32.8%), 15 cases (24.6%) having a history of biliary tract disease, 12 cases (19.7%) of cardiovascular disease (table 2). This result is similar to that of the authors Dalong Yin (2020): the most common underlying disease is diabetes (38.1%), history of biliary tract disease (24.3%) and cardiovascular disease (23.9%)¹, Shuangjun He (2018): 50% of patients had a history of diabetes, 30.7% of patients had biliary tract disease³. Compared with other patients, patients with pre-diabetes were more prone to liver abscess. Poor glycemic control reduces neutrophil activity and phagocytosis, favoring the growth of pathogens in the liver parenchyma. Therefore, we need to pay attention to control blood sugar during treatment.

Origin of infection

In the past, liver abscesses were commonly reported in patients with a history of pelvic disease. Currently, the early detection and treatment of these diseases, such as appendicitis and diverticulitis, have significantly reduced the incidence of liver abscesses of portal vein origin. There are increasing reports of hepatic abscesses due to arterial spread and sepsis, largely due to the use of immunosuppressive drugs, and interventional procedures such as arterial embolization and chemotherapy⁵. Our study recorded that the most common infectious source of liver abscess was from the arterial tract with 35 cases (57.3%), from the biliary tract with 12 cases (19.7%), finally portal vein has 4 cases (6.6%) and unknown origin has 10 cases (16.4%) (table 3). The above results are similar to those reported by Dalong Yin et al (2020): liver abscess originates from arteries accounted for 70.6%,

from the biliary tract 16%, from the portal vein is 3% and unknown origin has 10.4%¹.

Clinical symptoms

The common clinical presentation of liver abscess is fever and right upper quadrant pain. The classic triad of this entity is right upper quadrant pain, fever, and hepatomegaly which occurs in only about 30% of patients. Other symptoms include nausea-vomiting, loss of appetite, weight loss, and exhaustion. The clinical examination may show symptoms of right upper quadrant pain, jaundice, and hepatomegaly. The clinical manifestations also vary from patient to patient due to comorbidities, overuse of antibiotics with the emergence of drug-resistant bacteria increasing.

In terms of clinical features, our study noted that fever and right upper quadrant pain were the two most common symptoms. The proportion of patients with fever recorded 54 patients (88.5%), and pain in the right lower quadrant was 52 patients (85.2%). Nausea-anorexia was also a common symptom in 36 patients (59%) (Table 4). This result is similar to that recorded by Dalong Yin et al (2020) with 88.9% of patients having symptoms of fever, and right upper quadrant pain in 51.3% of patients¹. Cristina Serraino et al (2018) noted that fever and right upper quadrant pain were the two most common symptoms with 73% of patients with fever and 63.3% of patients with right upper quadrant². Our results and the above studies are different from that recorded by Sukhjeet Singh (2013), according to the author, the most common symptom of liver abscess is nausea - vomiting in 97% of cases, right upper quadrant pain has 93% of cases, asthenia has 90% of cases and fever has 88% of⁴. In our

study, there were 2 (3.2%) cases of liver abscess with endophthalmitis, this rate was published at about 0.84% - 6.9%⁶. Since diabetes is a risk factor for endophthalmitis, an ophthalmological examination is needed in these patients to help diagnose and treat this serious complication early.

4.2. Paraclinical and microbiological features

Hematology and biochemistry

A liver abscess is usually a systemic infection. Blood tests often show infection, with or without liver failure depending on the extent of the damage. About 60-70% of cases have white blood cells increased above 10 G/L, mainly neutrophils. If the white blood cell count rises above 20 G/L, it is a poor prognostic factor⁷. Increased bilirubin, liver enzymes AST and ALT are found in about 50-76% of cases⁷. In our study, the average white blood cell count was 15.2 ± 5 G/L (range 7 – 28 G/L). Subclinical abnormalities are common but the specificity is not high, so it is of little value in diagnosis but used to predict and monitor treatment. The risk factor for a liver abscess is uncontrolled diabetes. As a result, tests often indicate hyperglycemia. In our study, the average blood glucose value recorded was: 154.3 ± 88.1 mg/dl. This hyperglycemia has also been reported in studies: Shuangjun He (2020): 162 ± 90 mg/dl³. Uncontrolled diabetes aggravates liver abscess and can lead to complications. Therefore, it is necessary to control blood sugar well during treatment.

Image analyzation

Imaging tests play a major role in disease screening. Ultrasound is the first-line imaging in the diagnosis of liver abscess. The advantage of ultrasound is that it is readily available, non-invasive, and can be

performed multiple times for monitoring. Ultrasound is also used to perform the procedure to drain the abscess and to monitor the outcome of treatment. Our study noted that liver abscess often appeared in the right lobe with 45 (73.4%) cases, the left lobe had 11 (18%) cases and in both lobes, there were 5 (8.2%) cases. cases (table 6). Our results are similar to those presented in the study by Dalong Yin et al (2020): liver abscesses in the right lobe have 72.7% of cases, left lobes have 16.3% of cases and in both lobes, there are 10.9% cases¹. In the study of Shuangjun He et al. (2020), abscesses in the right lobe had 85.7% of cases, the left lobe had 11.9% of cases and two lobes had 2.4% of cases³. Regarding the abscess characteristics, the study recorded mainly liver abscesses in solitary form with 55 (90.2%) cases recorded, 6 (9.8%) cases with multiple abscesses (table 6). Other authors also recorded similar results to ours in terms of abscess characteristics: Dalong Yin (2020) recorded 77.5% of single-focal abscess cases and 22.5% of multifocal abscess¹. Shuangjun He (2020) reported that single-focal liver abscess was more predominant in 92.9% of cases and a multifocal abscess had 7.1% of cases³. Regarding the mean volume of the abscess cavity, the mean value in the study was 377.2 ± 50.4 ml (table 6). The mean volume of the abscess cavity recorded in the study of Arpit Bansal (2016) was 405 ± 118 ml⁸.

Microbiological characteristics

In our study, all 61 cases were microbiologically tested for pathogens. After being diagnosed with liver abscess, a blood sample will be taken for anti-amoeba sera and cultured before using antibiotics. Abscess purulent specimens were also sent afterward.

The study recorded 27 cases (44.3%) of bacterial liver abscess, 8 cases (13.1%) of secondary infective amoebic liver abscess, 4 cases (6.6%) of amoebic liver abscess. and 22 cases (36%) where no agent was found (table 8). Our results also differ from the study of Sukhjeet Singh et al. reported that 58% of liver abscesses were due to amoeba, 23% of liver abscesses were caused by bacteria, 12% of liver abscesses were of unknown cause. and 7% liver abscess caused by amoeba secondary infection⁴. There were 22 (36%) cases where pathogenic microorganisms could not be isolated. The explanation for this problem, in addition to the reason for idiopathic liver abscess, is also due to the use of antibiotics or anti-amoeba drugs before going to the hospital.

Regarding blood and pus culture results, positive pus culture was recorded in 35 cases (57.4%) and negative in 26 cases (42.7%). Blood cultures were positive in 11 cases (18%) and negative in 50 cases (82%) (table 7). Results of blood culture and pus culture in the study of Shuangjun He et al (2020): the rate of positive pus culture was 70.7%, and negative pus culture was 21.9%. The rate of positive blood culture was 26.8% and negative blood culture was 51.2%³. The rate of isolation of pathogenic microorganisms in our study was lower than that of Shuangjun He et al., but similar in characteristics: the rate of isolation of pathogenic microorganisms from latex samples. The abscess was significantly higher than the blood sample. More importantly, we did not record any case of negative pus culture but positive blood culture. Purulent culture is more sensitive and accurate than blood culture. Microbiological results in our study recorded 26 cases (42.6%) of *Klebsiella pneumoniae*, 6 cases (9.8%) of *Escherichia*

coli, 2 cases (3.2%) of *Burkholderia pseudomallei*, and 1 case (1.6%) *Viridans streptococci*. Our results are similar to those recorded in the study: Dalong Yin et al (2020): 36.6% of *Klebsiella pneumoniae* cases, 1.9% of *Escherichia coli* cases, 2.9% of other bacteria. other bacteria ¹. Cristina Serraino et al (2018) recorded 26.5% of *Escherichia coli* cases, while *Klebsiella pneumoniae* accounted for only 5.6% of cases ². Our results and Dalong Yin's are different from those reported by Cristina Serraino. The spectrum of pathogenic bacteria varies by geographical location. *Escherichia coli* is the most common cause in Western countries, while *Klebsiella pneumoniae* is the most common cause in Asian countries. We found *Klebsiella pneumoniae* to be the most common cause of liver abscess. *Escherichia coli* is the second most common and predominant cause of an infection from the biliary tract.

Regarding the results of the antibiogram, the study recorded 30 cases (85.7%) sensitive to third-generation cephalosporins, 5 cases (14.3%) of ESBL-secreting multi-resistant bacteria. In the study, the majority of cases responded to a combination of third-generation cephalosporins and metronidazole and were indicated for use soon after diagnosis. Regarding the relationship between abscess characteristics and microbiological results, our study noted that an amoebic liver abscess is usually a solitary abscess. In 12 cases of amoeba liver abscess, there are 9 isolated cases. Meanwhile, liver abscesses caused by bacteria, especially *Klebsiella pneumoniae*, often have a multilobed appearance. Of the 24 cases of multi-lobed liver abscess, 13 cases were due to *Klebsiella pneumoniae*, only 1 case was caused by *Escherichia coli*. One of the

reasons *Klebsiella pneumoniae* infection is often associated with multilobar liver abscess is a mutation that reduces or loses envelope synthesis of the pathogenic *Klebsiella pneumoniae* strain. This leads to the anti-phagocytosis of macrophages and neutrophils ⁶, resulting in bacteria invading and destroying the liver parenchyma quickly without enough time for the tissues to degrade and liquefy. at the same time ⁶.

V. CONCLUSION

Liver abscess is more common in the elderly, more in men than in women, with common symptoms including fever and lower flank pain. It is necessary to control blood sugar well during the treatment of liver abscess. *Klebsiella pneumoniae* became the most common cause of liver abscesses, especially multifocal liver abscesses.

REFERENCES

1. **Yin D, Ji C, Zhang S, et al.** Clinical characteristics and management of 1572 patients with pyogenic liver abscess: A 12-year retrospective study. *Liver international : official journal of the International Association for the Study of the Liver*. Apr 2021;41(4):810-818. doi:10.1111/liv.14760
2. **Serraino C, Elia C, Bracco C, et al.** Characteristics and management of pyogenic liver abscess: A European experience. 2018;97(19)
3. **He S, Yu J, Wang H, Chen X, He Z, Chen Y.** Percutaneous fine-needle aspiration for pyogenic liver abscess (3-6 cm): a two-center retrospective study. *BMC infectious diseases*. Jul 16 2020;20(1):516. doi:10.1186/s12879-020-05239-5
4. **Singh S, Chaudhary P, Saxena N, Khandelwal S, Poddar DD, Biswal UC.** Treatment of liver abscess: prospective randomized comparison of catheter drainage

- and needle aspiration. *Annals of gastroenterology*. 2013;26(4):332-339.
- 5. Meddings L, Myers RP, Hubbard J, et al.** A population-based study of pyogenic liver abscesses in the United States: incidence, mortality, and temporal trends. *The American journal of gastroenterology*. Jan 2010;105(1):117-24. doi:10.1038/ajg.2009.614
- 6. Van Keer J, Van Keer K, Van Calster J, Derdelinckx I.** More Than Meets the Eye: *Klebsiella pneumoniae* Invasive Liver Abscess Syndrome Presenting with Endophthalmitis. *The Journal of emergency medicine*. Jun 2017;52(6):e221-e223. doi:10.1016/j.jemermed.2017.01.043
- 7. Sanchez WM, Abaunza HO.** Hepatic Abscess: Current Concepts. 2009;
- 8. Bansal A, Bansal AK, Bansal V, Kumar A.** Liver abscess: catheter drainage v/s needle aspiration. *J International Surgery Journal*. 2016;2(1):20-25.