

Original Research Article

CLINICOPATHOLOGICAL STUDY AND MANAGEMENT OF PATIENTS WITH LIVER ABSCESS IN TERTIARY CARE CENTRE IN NORTH INDIA

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ABSTRACT

Background: Liver abscess is a growing problem in tropical nations with often lethal consequences and diagnostic/therapeutic challenges. We have studied the etiopathology, clinical, radiological, and bacteriological characteristics of liver abscess and its management strategies.

Materials and Methods: This prospective study was conducted at the Department of General Surgery of Pt B D Sharma PGIMS Rohtak. The period of the study was from April 2021 to May 2022 involving 60 patients admitted to the in-patient ward, their diagnosis was made on the basis of clinical features (such as right upper abdomen pain, and fever), laboratory investigations and radiological evidence of liver abscess.

Results: Amoebic liver abscess was the most common (61.7%) type of liver abscess. There was a strong correlation with the occurrence of liver abscesses with addiction to alcohol and low socioeconomic status. The most common etiology of pyogenic liver abscess was *Klebsiella*. Ultrasonography (USG) of the abdomen was accurate and cost-effective in diagnosis of liver abscesses.

Conclusion: Most patients in our study had liver abscess of amoebic origin and had temporal relationship with alcoholism and staggering socioeconomic status. We suggest early recognition of clinical features and prompt abdominal USG as cost-effective means for treatment initiation and reducing complications.

Keywords: Liver abscess(LA), alcoholism, ultrasonography(USG), pigtail catheter drainage (PCD), percutaneous needle aspiration (PNA).

INTRODUCTION

Liver abscess is defined as a pus-filled mass in the liver that can develop from injury to the liver or an intraabdominal infection disseminated from the portal circulation.^[1] Liver comprises 48% of all the visceral abscesses.^[2] Over the past 100 years, liver abscess has seen fairly dramatic changes in demographics, etiology, diagnosis and treatment. Although the mortality from liver abscess has decreased significantly since the early 20th century, the incidence appears to be increasing.^[3] In the early 1900s, the most common cause of liver abscesses was pyle-phlebitis secondary to appendicitis.⁴ In the

late 1900s, biliary tract disease emerged as the most frequent culprit and it remains the most common cause of liver abscess today.^[5,6] An association between liver disease and heavy alcohol consumption was recognized more than 200 years ago.^[7] Broadly LA has been divided into amoebic liver abscess (ALA) and pyogenic liver abscess (PLA) with majority of amoebic etiology in developing countries and pyogenic in developed countries. Liver abscesses can be classified in another way by location in the liver.^[8] Amebiasis is a parasitic infection caused by the protozoan, *Entamoeba histolytica*; transmitted through feco-oral route. The signs and symptoms of amoebic liver

abscess are right hypochondrium pain, fever, nausea, vomiting and abdominal discomfort, but usually they are non-specific.^[9] ALAs are solitary, large and located in the right lobe of liver.^[10] A pyogenic liver abscess is a disease characterized by solitary/multiple collections of pus within the liver. The infection is caused by bacteria and is usually polymicrobial, with *E.coli* and *K. pneumoniae* being the common causative organisms.^[11] Ultrasonography is usually the first diagnostic approach in cases of liver abscess. Abdominal ultrasound helps in finding the site and size of abscess. Computed tomography (CT) scan with intravenous contrast is done to find the exact size and to measure the exact volume of the abscess.^[9] Due to the rising incidence in alcoholism, diabetics & immunocompromised status, liver abscess becomes a matter of grave concern as complication rates are high especially in this sub-group, leading to increased morbidity and mortality. The present study focuses on the clinicopathological parameters and management of patients having liver abscess.

MATERIALS AND METHODS

This prospective study was conducted in the Department of General Surgery, Pt. B. D. Sharma Post Graduate Institute of Medical Sciences, Rohtak (a tertiary care institute in North India) in 60 patients from April 2021 to May 2022. All the patients admitted in with clinical/sonological/CT features of liver abscess were included. Detailed history of all the patients with liver abscess was taken including age, sex, history of diabetes, alcohol intake. Using modified Kuppaswamy's Socioeconomic Status scale, patients were divided into three socioeconomic classes: upper, middle and lower. Clinical features like abdominal pain, fever, jaundice, weight loss, diarrhea, anorexia, cough, right upper quadrant pain, hepatomegaly and jaundice were recorded. Laboratory investigations like Hb%, leukocytosis, bilirubin level, alkaline phosphatase level, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT) and serum albumin level were done. Differentiation between ALA and PLA done by the nature of aspirate (anchovy sauce pus in case of ALA). Radiological investigations like chest X-ray, abdominal X-ray, ultrasound abdomen (for nature of the abscess- single or multiple, the lobe involved and size of the abscess) were done. Management of abscesses was decided on the basis of age and location of liver abscess. Aspirate from the abscess sent for culture and sensitivity. Response to type of treatment recorded and all patients were examined daily for clinical improvement. Improvement in pain, fever, anorexia, and hepatomegaly, improved liver function tests, ultrasonographic evidence of decrease in size of

abscess cavity were considered as successful treatment.

RESULTS

A total number of sixty patients with age more than 18 years were included in present study. Maximum number of patients were in the age group of 41-50 years. The mean age of the patients was 42.45 years with the range of 18-85 years. The male to female ratio was 9:1. Eighty three percent patients were from rural areas and (16.7%) from urban areas. 95% were from low socio-economic class and (5%) from middle class. History of alcoholism was present in 76.7% cases.(Table 1)

A detailed clinical examination was done in all cases included in this study. The most common clinical symptom in patients with liver abscess was pain at right hypochondrium found in all the patients followed by fever (90%), anorexia (53.3%), malaise (40%), cough (26.7%). On general physical examination findings were pallor (48.43%), icterus (18.3%). On per abdomen examination tenderness at right hypochondrium (93.5%) and generalized guarding (1.7%). (Table 2)

In blood investigations, leukocytosis was found in 85% cases, hypoproteinemia (61.7%), raised AST (66.7%), raised ALT (58.3%), raised ALP (78.3%) and hyperbilirubinemia (61.7%). (Table 3). On chest radiography, right side pleural effusion found in 31.7%, raised right hemi-diaphragm (23.3%). The liver abscess were present in right lobe (85.0%), left lobe (5.0%) and both lobes affected (10.0%) cases. Single abscess cavity (73.3%) found more commonly than multiple abscesses (26.7%). In 50 cases (83.3%) there were no signs of rupture present, in 10% cases abscess was ruptured in peritoneal cavity while in 6.7% abscess was ruptured in pleural cavity. Out of 60 cases 61.7% had amoebic abscess and 38.3% had pyogenic abscess (Table 4). Aspirate from the abscess was sent for culture & found positive in 23.4% cases (fig. 1), in rest no growth was seen. *Klebsiella* was found in 11.6%, *E.coli* (5%), *pseudomonas* (1.7%), *Achromobacter* (1.7%), *Staphylococcus* (3.3%). Aspirate culture was sterile in 76.6% cases. (Table 5)

Out of 60 patients of liver abscess, 51%, 35%, 5%, 1.7%, 1.7% patients treated with percutaneous catheter drainage, percutaneous needle aspiration, intercostals chest drain, laparotomy and both percutaneous catheter drain and intercostals chest drain respectively and 5% were managed conservatively. There was no complication 96.7% patients, 1.7% had bronchopleural fistula which was managed conservatively and catheter dislodgement was there in 1.7% patients. Only one patient expired due to sepsis. This shows that management of liver abscess was successful in most cases.

Table 1: Showing Demographic Profile of Patients with Liver Abscess

Age group	Frequency
<20	4 (6.7%)
21-30	7 (11.75)
31-40	15 (25%)
41-50	21 (35%)
51-60	10 (16.7%)
61-70	2 (3.3%)
>70	1 (1.7%)
Mean $\pm$ SD	42.45 $\pm$ 13.62
Gender	
Male	54 (90%)
Female	6 (10%)
Socioeconomic status	
Low	57 (95%)
Middle	3 (5%)
Drinking water source	
Hand pump	7 (11.7%)
Ground water supply	52 (86.7%)
Well	1 (1.7%)
Alcohol intake	
Present	46 (76.7%)
Absent	14 (23.3%)
Residence	
Rural	50 (83.3%)
Urban	10 (16.7%)

Table 2: Depicting The Clinical Symptoms

Symptoms	Frequency
Pain abdomen	60 (100%)
Fever	54 (90%)
Anorexia	32 (53.3%)
Malaise	24 (40%)
Cough	16 (26.7%)
Weight loss	5 (8.3%)
Pallor	29 (48.43%)
Tenderness at right hypochondrium	56 (93.5%)
Generalized guarding	1 (1.7%)
Icterus	11 (18.3%)

Table 3: Showing Various Blood Investigations

	Frequency
Hemoglobin (<10g/dl)	29 (48.43%)
TLC (>11000/mm ³)	51 (85%)
Total protein (<6g/Dl)	37 (61.7%)
AST (>40 U/L)	40 (66.7%)
ALT (>40 U/L)	35 (58.3%)
ALP (>117U/L)	47 (78.3%)
Total bilirubin (>0.8 mg/dl)	37 (61.7%)

Table 4: Showing Ultrasonography Findings and Types of Abscess

Findings	Frequency
Diameter of abscess (in cm)	9.167 $\pm$ 2.681
Site of abscess	
Right lobe	51 (85.0%)
Left lobe	3 (5.0%)
Both lobes	6 (10.0%)
Number of abscesses	
Single	44(73.3%)
Multiple	16 (26.7%)
Evidence of Rupture	
Not ruptured	50 (83.3%)
Free fluid in peritoneal cavity	6 (10%)
Ruptured in pleural cavity	4 (6.7%)
Amoebic	37 (61.7%) Single 32 (86.5%) Multiple 5 (13.5%)
Pyogenic	23 (38.3%) Single 12 (52.1%) Multiple 11 (47.9%)

Table 5: Showing Isolated Organism from Aspirate

Organism	Frequency
Achromobacter	1 (1.7%)
E coli	3 (5.0%)
Klebsiella	7 (11.6%)
Pseudomonas	1 (1.7%)
Staphylococcus	2 (3.3%)
Sterile	46 (76.7%)
Total	60

**Figure 1: Showing Aspirate from Abscess Cavities (Anchovy Sauce/Purulent)****Figure 2: Showing Ruptured Liver Abscess in The Right Pleural Cavity****Figure 3: Showing Single Abscess Cavity in Right Lobe of Live**

DISCUSSION

Liver abscess is a common entity to encounter in the surgical and medical outpatient department and emergency, because of its wide range of presentation it poses a challenge to the treating doctor. In our study mean age of patients was 42.5 years & male to female ratio was 9:1. The age predisposition and male preponderance might be as a result of high alcohol intake by young male which

predisposed to liver abscess. Reddy and Thangavelu in their study proposed that female menstrual cycle prevents hepatic congestion and thus makes the organ less susceptible to abscess formation.^[12] Most of the patients (95%) were from lower socio-economic status. This shows liver abscesses are common in patients of poor socio-economic status due to poor dietary habit, poor hygiene and contaminated drinking water. Jha et al in their study suggested that liver abscesses are more common in people of lower socioeconomic status. The main reason for this was poor living conditions such as crowded home, poor hygiene, and drinking contaminated water.^[13] Alcohol intake was present in about 2/3rd of patients and these patients had history of regular alcohol consumption (>3 times per week). Alcohol suppresses function of Kupffer cells (specialized macrophage) in liver which has important role in clearing amoeba. Moreover, invasive amoebiasis appears to be dependent on the availability of free iron. A high content of iron in the diet, often obtained from the country liquor in habitual drinkers predisposes to invasive amoebiasis, as does a diet rich in carbohydrate.^[14] The cause of liver abscess in patients who used drinking water from ground water supply might be contamination of water. Groundwater conditions can be affected by chemical spills, pesticide and fertilizer application, and waste from animals. In their study, Jha et al described drinking water source as a cause of liver abscess.^[13] The cause of liver abscess in rural residents may be due to less access to basic and health facilities compared to urban residents. It has been suggested that patients from rural area consume alcohol which is prepared with no regard for asepsis has a large population of amoebae in it. Alam et al in their study reported 70% of the patients with liver abscess were residents of rural area and 30% from urban areas.^[15] The most common clinical symptom in patients with liver abscess was pain abdomen followed by fever. Pain at right hypochondrium is the most constant and most striking symptom which is produced due to distension of the liver capsule. Fever was associated with chills and rigors & found more commonly in patients with PLA. Simon et al described main presenting symptoms were abdominal pain (in all patients) and fever (77%).^[16] It is suggested that pallor might be due low dietary intake or RBC lysis in cases of amoebic liver abscess. The common causes of jaundice in LA are sepsis, co-existing alcoholic hepatitis, mechanical compression of intrahepatic bile ducts and biliovascular fistula.^[17]

Generalized guarding was due to peritonitis in cases of ruptured liver abscess. Mangunkiya et al in their study reported tenderness in right hypochondrium (RHC) was the predominant sign in 95% cases, followed by localized guarding (47%), pallor (14.5%), jaundice (11%).^[18] The increased leukocyte count was due to inflammation & raised liver enzymes and bilirubin levels due to injury to hepatocytes and cholestasis. Jha et al in their study reported leukocytosis (75%) and anemia (52%). The most marked liver function test (LFT) abnormality was raised alkaline phosphatase level (62% cases). Most marked LFT abnormality in patients with PLA was abnormal alkaline phosphatase (93%). Hypoproteinemia was found in 40% patients. Abnormally high alkaline phosphatase levels (seen in 60-80% cases) found to be the most reliable and consistent biochemical marker of ALA.^[13] Chest radiography helped a little with the diagnosis of liver abscess, except for raised right hemidiaphragm giving some indirect clue of hepatomegaly. Most importantly, they showed associated pleural effusion which was predominantly right-sided in most of our cases (fig. 2).

The effusion was generally attributed to reactive pathology as they spontaneously disappeared after treating the abscess. Nigam et al reported pleural effusion in 16 % cases, raised hemidiaphragm in 37 % cases. It occurs because the right posterior-superior surface of the liver is the most common site of liver abscess. It is always accompanied by right basal lung signs as a result of pleural effusion, empyema, or lung abscess.^[19] Typically the right lobe of liver is more commonly affected it may be because of streaming effect in portal circulation (fig. 3).

It receives most of blood from right colon, the primary site of intestinal amoebiasis. Also, the blood flow volume is more and biliary canaliculi are denser in right lobe thus leading to more congestion.^[20] Cosme et al reported out of 45 cases of PLA, 25 patients (55.6%) had single abscess, 20 patients (44.6%) had multiple abscesses. Out of 13 cases ALA, 10 patients (76.9%) had single abscess and three patients (23.1%) had multiple abscesses.^[21] In present study, pigtail catheter drainage and antibiotic therapy was done in patients with very large abscess (>10 cm), subcapsular location and high risk of rupture while patients with large (5–10 cm) abscess treated with needle aspiration and antibiotic therapy. Pigtail catheter was removed after the drain output was nil. In patients with peritoneal rupture of abscess, after exploratory laparotomy peritoneal lavage, drainage of abscess cavity was done and two drains were placed; one in subhepatic space and other in pelvis. All the patients were first started on intravenous antibiotics followed by oral antibiotics. Patients who had small abscess (<5 cm) were treated with drug therapy alone. The antibiotics prescribed were Amoxicillin+clavulanic acid and metronidazole which were changed according to pus culture and

sensitivity report. Among the treatment modality with the advancement in the radiology and easy availability of the ultrasound, guided aspiration and catheter drainage came out to be most favorable options mainly for pyogenic abscess and among them also catheter drainage is better than percutaneous aspiration.^[22] Mangunkiya et al in their study described 78.52% patients managed with percutaneous needle aspiration, percutaneous catheter drainage (8.88%), aspiration + intercostal drainage (5.18%), pleural tapping + laparotomy (2.22%), Laparotomy (5.18%).^[18] In our study the analysis of microbiological data showed that *Klebsiella* was the most common organism followed by *E.coli*. In our study the negative abscess cultures were found which might be due to poor culture technique in some cases or by the use of broad-spectrum antibiotics before cultures were obtained. Zerem et al reported Bacteria in the positive cultures were predominantly gram-negative, *Klebsiella pneumoniae* being the leading species.^[23] Out of 60 patients, 59 patients (98.3%) were discharged under satisfactory conditions. Only one patient expired due to sepsis. This shows that management of liver abscess was successful in most of the cases. Mangunkiya et al reported mortality in 1.5% cases and 98.5% cases discharged after successful treatment.^[18]

CONCLUSION

From this study we conclude that both amoebic and pyogenic liver abscesses are more common among lower and middle socio-economic class males in the fourth and fifth decade of life and there is strong relationship with alcohol. The most common presenting symptom is pain in abdomen. Amoebic liver abscess is found more commonly and mostly involve the right lobe of liver. Small abscesses can be managed conservatively and for larger abscesses medical management and intervention such as catheter drainage/needle aspiration has high cure rates and laparotomy reserved for liver abscess with peritonitis. However, comorbid conditions of patients and size of liver abscess influence the outcome and prognosis. All the results of our study may not be statistically conclusive but this study opens up an idea about importance of early diagnosis and early management of patients with liver abscess.

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