



ORIGINAL RESEARCH PAPER

Radiology

EFFICACY OF ULTRASONOGRAPHY IN PATIENTS WITH LIVER ABSCESS AND VARIOUS THERAPEUTIC MEASURES IN THE MANAGEMENT OF LIVER ABSCESS: A STUDY IN WEST COST OF MAHARASHTRA

KEY WORDS: Abscess, Liver, USG

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ABSTRACT

**Introduction:** Liver abscess is common in India. This study is to describe the clinical profile, microbiological aetiologies, and management outcomes in patients with liver abscess.

**Aim:** The purpose of the study is to find out the application of ultrasonography in management of liver abscess and to determine the effectiveness of treatment and relapse in the size of abscess cavity.

**Materials and Methods:** We studied 45 cases of suspected liver abscesses admitted to our institute over 1 year (September 2016 to September 2017).

**Results:** The mean age of patients was 42 years. Majority of them were from lower socioeconomic class (65%) and alcoholic (77%). The abscesses were predominantly in right lobe (69%) and solitary (74%). Percutaneous needle aspiration was done in 74%, pigtail drainage in 24%.

**Conclusion:** The commonest presentation was male, alcoholic of low socioeconomic class having right lobe solitary liver abscess. Appropriate use of minimally invasive drainage techniques reduces mortality.

INTRODUCTION

Liver abscess (LA) is defined as collection of purulent material in liver parenchyma which can be due to bacterial, parasitic, fungal, or mixed infection. It is a common condition across the globe. Out of total incidence of LA, approximately two-thirds of cases in developing countries are of amoebic etiology and three-fourths of cases in developed countries are pyogenic.<sup>1</sup> Liver is a major organ with dual blood supply, which predisposes it to an increased risk of infection. The incidence of liver abscess has decreased in developed world, but still common in developing countries.<sup>2</sup>

Poor hygiene, contaminated drinking water, malnutrition, hepatic dysfunction, low host resistance, alcohol intake, delayed or inadequate treatment are all responsible for the disease in the lower socioeconomic group.

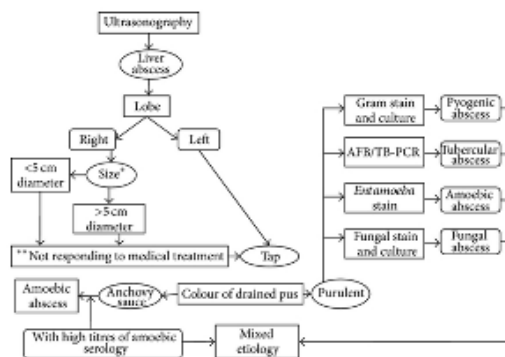
Surgical management was the mainstay for treating LA earlier.<sup>1</sup> However, recent evidences from percutaneous drainage procedure have shown a favorable outcome with less average length of stay in hospital compared to conservative mode of treatment.<sup>3</sup>

This prospective study was carried out on 45 consecutive patients of LA admitted to MGM Hospital referred from west coast of Maharashtra. Our experience is presented in this article.

MATERIALS AND METHODS

Total 45 consecutive patients suffering from LA admitted to MGM hospital from September 2016 to September 2017 were included in the study. All the patients were subjected to a thorough clinical examination after obtaining a detailed history. Patients were analyzed in terms of age, sex, presenting symptoms and predisposing factors. Diagnostic workup included hemogram, liver function tests, coagulation profile, and ultrasound findings (site, number and volume of LA). Treatment modality included IV antibiotics and USG guided needle aspiration or USG guided pigtail catheter drainage. Resolution of abscess was monitored by serial ultrasound examination.

Interventions were done after correction of INR below 1.4 to those who presented with coagulopathy. We preferred pigtail catheter in single, large (>10 cm), deep seated, and partially liquefied abscess. In multiple, small (5–10 cm), superficial, and fully liquefied abscesses, we tend to use percutaneous catheter. Aspirate was collected in sterile containers and sent immediately to Microbiology Department for microscopic examination of wet mount for trophozoites of Entamoeba histolytica, Gram's staining, and ZN staining for AFB. Samples were plated in aerobic, anaerobic, and fungal culture media. Till pus culture report was received, patients were empirically started on intravenous ceftriaxone and metronidazole. Protocol of management followed has been shown in Figure 1.



\*If multiple abscesses size is the largest of all.

\*\* Symptoms not improved within 48 hours of empirical antibiotics.

Figure 1: Flowchart depicting protocol followed for percutaneous ultrasound guided drainage of liver abscess and its appropriate processing. (4) (5)

RESULTS

The age of the patients varied from 18 to 65 years. The peak incidence was in the second and third decades of life accounting for 24 patients (51%) of total case studies. The mean age of the patients was 41.13 years (range: 19 to 78 years). Male to female ratio was 13.3 : 1. About two-thirds of the patients (65%) were from lower socioeconomic class with regards to education, occupation, and per capita income and the rest were from the middle class families.

Table 1: Age & sex distribution of patients with LA

Age (years)	Males	%	Females	%	Total	%
< 20	5	11.11	0	0	5	11.11
21-30	10	22.23	2	4.44	12	26.66
31-40	10	22.23	2	4.44	12	26.66
41-50	6	13.33	3	6.25	9	18.75
>50	5	11.11	1	2.22	7	15.55
<b>Total</b>	<b>36</b>		<b>9</b>		<b>45</b>	

Pain in the abdomen (80%) and fever (64%) were the most common symptoms at presentation and tender hepatomegaly (85.41%) and intercostals tenderness (72.91%) were the most signs (Table 2). Icterus was observed in 8 (16.66%) patients and 2 (04.16%) patients had signs of pneumonia or pleural effusion at presentation. 6(12.50%) patients and 4(08.33%) patients had signs of pneumonia or pleural effusion at presentation. 4 (9.8%) patients presented with features of acute abdomen with signs of localized peritonitis.

**Table 2: Presenting manifestations of Patients with LA**

Symptoms	Number of patients	%	Signs	Number of patients	%
Abdominal pain	36	80.00	Hepatomegaly	41	85.41
Fever	29	64.44	Intercostal tenderness	35	72.91
Anorexia	25	55.55	Icterus	8	16.66
Nausea	19	42.22	Respiratory signs	4	09.88
Jaundice	8	16.66	Acute abdomen	4	09.88
Diarrhea	6	14.44	Ascites	2	04.44
Cough with expectoration	2	04.44			

Laboratory studies showed a neutrophilic leukocytosis and elevated sedimentation rate in 24 and 30 patients respectively. A normocytic normochromic or microcytic anemia was seen in 18 (37.50%) patients. Though the transaminase level (ALT and AST) was elevated in only 16(33.33%) patients, the serum alkaline phosphatase level was elevated in 30(62.50%) patients.

**Table 3: Laboratory findings in patients with ALA**

	Number of Patients	Percentage %
Leukocytosis	24	53.33
Elevated ESR	30	66.66
Hb < 10gm%	19	42.22
S. bilirubin > 1.0 mg/dl	7	16.66
Elevated AST, ALT	16	34.88
Elevated Alkaline Phosphatase	30	66.66

An ultrasound scan was done in all patients and in 41(85.41%) patients an abscess was found in right lobe, whereas in 3 (06.25%) patients the left lobe was involved. In 4 (08.33%) patients both lobes were involved (Table 4). The abscesses varied in size from 2cm to 15cm in diameter. Five patients had abscess size more than 6cm in diameter.

**Table 4: Ultrasonographic findings in patients with LA**

Findings	Patients	Percentage
Hepatomegaly	43	89.58
Situation of abscess		
Right lobe	41	85.41
Left lobe	3	06.25
Both lobes	4	08.33
Number of Abscesses		
Single	43	89.58
Multiple	5	10.41
Size of abscess		
<6.0 cms	43	89.58
>6.0 cms	5	10.41

Anti-amoebic drug metronidazole alone was given to 41 (89.58%) patients, 35 (76.41%) patient underwent percutaneous ultrasound guided needle aspiration in addition to drugs, and 2 (4%) of patient required surgical drainage. Aspiration of the abscess was carried out under strict aseptic conditions. Aspiration was done in those with larger abscesses (>6cm diameter), high fever and toxemia, no response to drugs therapy.

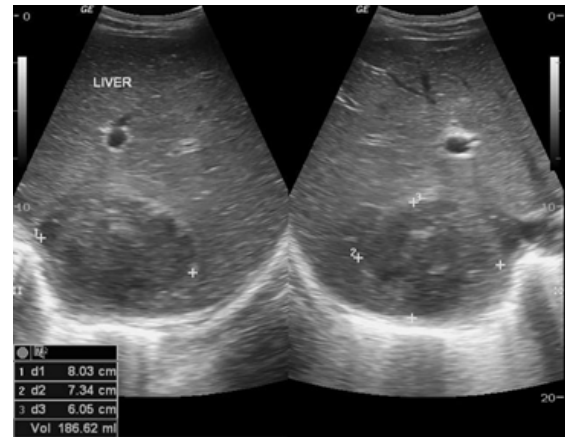
The patients were evaluated clinically and by ultrasound on admission, on the following 15th day and subsequently at one, three and six months. There was a rapid clinical response in aspirated group, especially in patients with an abscess more than 6cms in diameter. In two patients, the temperature settled to near normal levels after aspiration. Ultrasound after 15 days of initiation of treatment showed significant improvement in the group treated with aspiration but resolution of the abscess was similar after 6 months.

There were no complication in any of the 5 patients subjected to

aspiration and subsequently none needed surgical drainage. Although all the patients were asymptomatic after 6 months, ultrasound examination showed that 11(25.5%) patients still had a residual abscess cavity.

**Table 5: Management outcome of patients with LA**

	Parameters	Percentage
Abscess drainage	Percutaneous needle aspiration	76% (n= 34)
	Pigtail Drainage	22% (n=10)
Change of antimicrobials required		25%
Mean Duration of	Hospitalisation	8 ± 5 days
	Treatment	33 ± 42 days
Surgical intervention		4%



**Figure 2: Ultrasonography image of a large heteroechoic predominantly hypoechoic lesion involving the right lobe of liver.**



**Figure 3: CT scan image of the same patient showing thick walled hypoechoic lesion in right lobe of liver.**

**Discussion**

Liver abscess (LA) is common in the tropical region like the Indian subcontinent. The common etiological agents for LA are E. histolytica (amoebic), bacterial (pyogenic), Mycobacterium tuberculosis, and various fungi. Out of them, ALA is largely a disease of developing countries like India. They tend to affect younger population especially males. Common presenting complains are abdominal pain, fever, and weight loss. It is also an important cause of fever of unknown origin. Coexisting diarrhoea occurs in 30% of patients and it is extremely rare to find amoebic trophozoites in the stool examination.<sup>6</sup>

Majority of patients were young alcoholic male (with mean age of 41 years) of lower socioeconomic class which is also in accordance with the previous studies.<sup>7</sup> The age predisposition and gender differences may be as a result of high alcohol intake by young male which predisposes to LA. Elderly individuals with underlying diseases and patients with compromised immunity due to malnutrition or corticosteroid therapy are also prone to invasion by amoeba. Moreover, Reddy and Thangavelu proposed that the

female menstrual cycle prevents hepatic congestion and thus makes the organ less susceptible to abscess formation.<sup>8</sup>

Amoebic liver abscess is widely prevalent in the Indian subcontinent.<sup>9,10,11</sup> Alcohol is believed to be one of the predisposing factors in the pathogenesis with statistics showing a more than five-fold incidence of ALA among drinkers.<sup>12</sup>

With history of alcoholism in 85% of the patients with ALA, Joshi et al<sup>13</sup> found a high mortality rate in those consuming large quantities of alcohol.

We found that alcoholics had larger abscesses, greater frequency of complication and delayed resolution of abscesses. Alcohol acts in several ways:

- Hepatic damage by the alcohol predisposes to organ invasion. An amoebistatic substance produced by the normal liver is depressed in alcoholics.
- Habitual drinkers often neglect food which causes malnutrition resulting in lowering body resistance and suppression of liver function.
- Liquor prepared locally with no regard for asepsis has a large population of amoebae in it.
- Alcoholics have poor hygiene which fits with the mode of infection, i.e. faeco-oral.
- Immunity in chronic alcoholics is depressed.

The most common symptom was abdominal pain and hepatomegaly the most common sign as reported by other workers.<sup>13, 14,15</sup> We found intercostals tenderness in 72.91% of patients, a reliable sign, not as frequently reported in earlier.<sup>16,17</sup> It is a valuable clinical sign of ALA. Incidence of jaundice varied from 1% to 17% in different studies.<sup>14,15</sup>

We found icterus in 8(16.66%) patients. Liver transaminase (AST and ALT) levels were elevated in 16(33.33%) patients and serum alkaline phosphatase was elevated in 30(62.50%) patients. Elevated alkaline phosphatase levels have also been reported by several workers.<sup>18,19,20</sup>

Ultrasound provides valuable high precision information on location, size and number of ALA as well as detection of established and possible imminent complication. Majority of the abscesses 41/48(85.41%) were in right lobe. Majority of our patients had a single abscess except in five patients (10.41%) who had multiple abscesses as reported by others.<sup>21</sup>

We found that needle aspiration combined with chemotherapy represents a successful therapeutic approach in the treatment of ALA was required only in five patients (10.41%) who had abscess cavity size more than six centimeters, rest of the patients did not require it and does not seem to be necessary.<sup>18,19</sup> Serological tests, such as ELISA and IFAT, though highly reliable in the diagnosis of extra-intestinal amoebiasis, are not available in most hospital in India and needle aspiration provides an economic and safe alternative.

After following up even after six months 11(25.5%) patients had a residual abscess cavity on ultrasound examination. It has been shown that complete resolution of LA may take years.<sup>6,19</sup> This is important in the differential diagnosis of space occupying lesions in the liver, especially in those areas with a high incidence of LA and hepatocellular carcinoma.

Although a large amount of liver tissue appears of be destroyed, the resident liver damage is clinically, biochemically and microscopically minimal. The liver has a great power of near complete regeneration provided ALA is treated timely and adequately. There was no mortality in our patients due to early presentation and proper treatment which was started immediate after diagnosis, but generally a mortality of 10-20% had been reported in different series.<sup>10,16</sup>

#### Conclusion:

Young alcoholic male from lower socioeconomic group with liver abscess presenting as solitary right lobe abscess was the most

common pattern in our series. Liver abscess was uncommon in female patients. Mortality was high in patients undergoing surgical intervention for rupture. Overall mortality was low probably due to use of minimally invasive drainage techniques and aetiology specific antimicrobials in all patients. Prompt treatment results in improved survival and lower morbidity. Ultrasound is simple and cheap diagnostic test in the management of ALA

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