



**ORIGINAL RESEARCH PAPER**

**Surgery**

**CLINICAL, LABORATORY, AND MANAGEMENT PROFILE IN PATIENTS OF LIVER ABSCESS FROM SOUTHERN ODISHA.**

**KEY WORDS :**

**Iswar Chandra Muduli**

Associate Professor, Department of General Surgery, MKCG Medical College.

**Subhashis Patra\***

Post-Graduate student, final year, Department of General Surgery, MKCG Medical College.\*Corresponding Author

**Sworupa Nanda Mallick**

Assistant Professor, Department of General Surgery, MKCG Medical College.

**V.Rajesh**

Senior Resident, Department of General Surgery, MKCG Medical College.

**ABSTRACT**

To describe the clinical profile, microbiological aetiologies, and management outcomes in patients with liver abscess. A cross-sectional study was conducted from June 2016 to May 2018 at the Department of General Surgery, MKCG Medical College, Berhampur. History, examination & laboratory investigations were recorded. Ultrasound guided aspiration was done and samples were investigated. Chi-square test and multivariate regression analysis were performed to test association. Results. The mean age of patients was 42.13 years. Majority of them were from lower socioeconomic class (67.5%) and alcoholic (72%). The abscesses were predominantly in right lobe (71%) and solitary (65%). Etiology of abscess was 69% amoebic, 18% pyogenic, 7.5% tubercular, 4% mixed, and 1.5% fungal. Percutaneous needle aspiration was done in 79%, pigtail drainage in 17%, and surgical intervention for rupture in 4% patients. Mortality was 2.5%, all reported in surgical group. Solitary abscesses were amoebic and tubercular whereas multiple abscesses were pyogenic ( $p = 0.001$ ). Right lobe was predominantly involved in amoebic and pyogenic abscesses while in tubercular abscesses left lobe involvement was predominant ( $p = 0.001$ ). Conclusions. The commonest presentation was young male, alcoholic of low socioeconomic class having right lobe solitary amoebic liver abscess. Appropriate use of minimally invasive drainage techniques reduces mortality

**1. 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 aetiology and three-fourths of cases in developed countries are pyogenic [1]. Amoebiasis is presently the third most common cause of death from parasitic disease [2]. The condition is endemic in tropical countries like India due to poor sanitary condition and overcrowding. Amoebic liver abscess (ALA) accounts for 3–9% of all cases of amoebiasis [3]. However, pyogenic and tubercular aetiologies should always be entertained in the differentials. The incidence of tubercular liver abscess (TLA) has increased in recent past due to increased incidence of predisposing factors like alcoholism, immunodeficiency, irrational usage of antibiotics, and emergence of drug resistant bacilli.

Surgical management was the mainstay for treating LA earlier [1]. However, recent evidences from percutaneous drainage procedure have shown a favourable outcome with less average length of stay in hospital compared to conservative mode of treatment [4]. The concept of the present study was to evaluate the changing trends in clinical profile, microbiological aetiology, and management outcomes of patients diagnosed with LA.

**2. MATERIAL AND METHODS**

It was a cross-sectional observational study conducted at the Department of General Surgery, MKCG Medical College, Berhampur, a tertiary care centre. Study duration was from June 2016 to May 2018. 200 consecutive patients diagnosed as having liver abscess on ultrasound were included in the study after taking informed written consent. Inclusion criteria were all liver abscess patients needing intervention: left lobe abscess, abscess of size >5 cms, impending rupture (<1 cm liver tissue between abscess and liver margin), and not responding to conservative management at the end of 48 hours [5–7]. Patients with age less than 18 years, organised abscess, and abscess in close proximity to large vascular structures in liver and those having pregnancy were excluded.

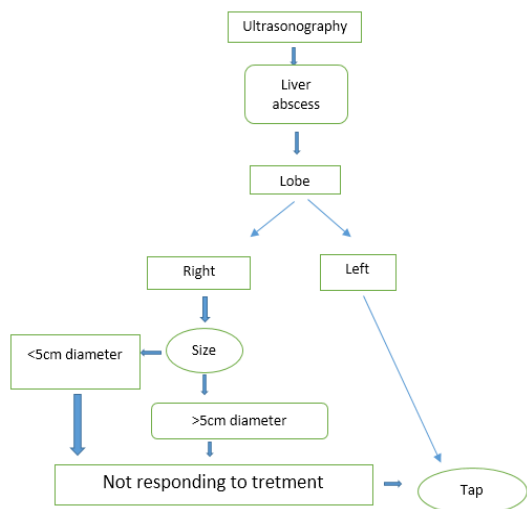
A detailed history, clinical examination, and laboratory profile of

the patients were recorded on a predesigned Proforma. "Alcoholism" was screened as per the CAGE questionnaire [8]. Depending on the frequency of alcohol intake, patients were divided into nondrinkers, occasional drinkers (alcohol intake < 3 times/week), and regular drinkers (alcohol intake  $\geq$  3 times/week) [8]. Using modified Kuppuswamy's Socioeconomic Status scale, patients were divided into three socioeconomic classes: upper, middle, and lower [9]. All patients were subjected to complete hemogram, liver function test, kidney function test, and coagulation profile (PT/INR). Reference ranges of these investigations were defined by the reference ranges of hospital laboratory. Blood and urine cultures were sent. Serologies for *Entamoeba histolytica*, HIV, and hepatitis B and hepatitis C viruses were also done. All patients were subjected to Mantoux test and chest radiogram. Patients with symptoms of cough with expectoration were subjected to sputum for acid fast bacilli (AFB) using ZN staining to rule out pulmonary Koch's.

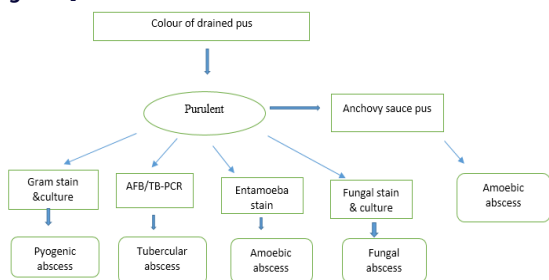
After taking informed consent, all patients were subjected to ultrasound guided aspiration of liver abscess either by percutaneous needle or pigtail catheter. Interventions were done after correction of INR below 1.4 to those who presented with coagulopathy. We preferred pigtail catheter in single, large (>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. All data were collected in MS-excel sheet and analysed using statistical software package SPSS version 19. Mean, median, and standard deviation were calculated for continuous variables. Chi-square test and multivariate regression analysis were used for test of association.

**3. RESULTS**

A total of 200 patients with liver abscess were studied and Analysed.



[Figure 1]



[Figure 2]

Figure[1]&[2] : Flowchart depicting protocol followed for percutaneous ultrasound guided drainage of liver abscess and its appropriate processing

Table 1: Clinical profile of patients: pain abdomen and fever were the two most common symptoms while hepatomegaly was the most frequent clinical finding.

	Parameters	Percentage (=n)
Symptoms	Pain abdomen	99% (198)
	Fever	94% (188)
	Anorexia	93% (186)
	Nausea/vomiting	54% (108)
	Diarrhea	23% (46)
	Cough	16% (32)
	Weight loss	40% (80)
	Risk factors	Alcoholic
Diabetic		9% (18)
Signs	Pallor	39% (78)
	Jaundice	26% (52)
	Hepatomegaly	89% (178)
	Splenomegaly	10% (20)
	Ascites	9% (18)
	Pleural effusion	30% (60)

The mean age of the patients was 42.13 years (range:18 to 78 years). Male to female ratio was 12.6 : 1. About two-thirds of the patients (67.5%; n = 135) were from lower socioeconomic class with regards to education, occupation, and per capita income and the rest were from the middle class families. Pain abdomen was the most common symptom (99%; = 198). Tender hepatomegaly was the most common per abdominal examination finding (Table 1). Pleural effusion was evident in 30% (n= 60) of the patients, predominantly on the right side (23%; n = 46); however, left-sided and bilateral effusions were also encountered in 3% and 4% of patients, respectively. HIV was reactive in only 2% of patients and viral markers (HBsAg and anti-HCV) were nonreactive in all

patients. The laboratory profile of the patients is mentioned in Table 2.

Involvement of right lobe in these cases was most predominant (71%). The same is true for solitary presentation (65%). The findings on ultrasonography of the abdomen are depicted in Table 3. About 6% of the patients also had evidence of typhlitis at presentation. For management (Table 4), 79% (n = 158) of the patients had percutaneous needle aspiration of their abscess content and 17% (n = 34) underwent pigtail drainage. Surgical intervention was done in 8 (4%) patients for managing rupture. Out of them, 5 died; thus, overall mortality was 2.5%. Etiological analysis of LA revealed that 69% were of amoebic origin (n = 138), 18% of pyogenic (n = 36), 4% of mixed amoebic and pyogenic process (n = 8), 7.5% of tubercular (n = 15), and 1.5% of fungal infections (n = 3) (Table 5). Amoebic serology was positive for IgM antibodies with significant titres in 72.5% (n = 145) patients. Pus culture gave positive results in 22% (n = 44) of the patients, which grew predominantly Gram negative flora. Blood and urine cultures were however positive in only 1.5% and 3% of the patients, respectively. According to culture reports from that of blood and pus, change in antibiotics was done in 25% (n = 50) of the patients. Solitary abscess was more of amoebic and tubercular in etiology whereas multiple abscesses were associated with pyogenic origin (n = 0.001). Amoebic and pyogenic liver abscesses were more frequent in the right lobe and tubercular in left lobe (n = 0.001). ALA patients were found to be more frequently alcoholic (n = 0.013) and had greater weight loss (n = 0.008). TLA was more commonly associated with ascites (n = 0.002). Using multivariate regression analysis, volume of abscess was found to be directly proportional to the levels of serum alkaline phosphatase (n = 0.041) and inversely to haemoglobin (n = 0.005) levels of the patient. Duration of hospitalisation as a morbidity indicator was proportional to duration of fever (n = 0.02), values of ESR (n = 0.021), and INR (n = 0.043). It was inversely related to serum albumin (n = 0.033). Mortality rates were found higher in female patients (n = 0.001), patients having longer duration of fever (n = 0.001), icterus (n = 0.001), ascites (n = 0.006), and pleural effusion (n = 0.028) (Table 6).

Table 2: Laboratory investigations: all parameters, particularly those related to liver were deranged in good percentage of patients. Sepsis indicators like raised TLC and low albumin were present in more than three-fourths of patients.

Parameters	Mean ±SD	Out of range cut off	Out of range percentage
ESR	44 ±28mm 1st hr	>20mm in 1st hour	72%
Hb %	11.2 ±1.9 gm/dL	<11 gm/dL	40.5%
TLC	19,100 ±9104/μL	>11000/μL	82%
INR	1.37 ±0.25	>1.2	75%
Bilirubin	1.55 ±2.18mg/dL	>1.2mg/dL	27%
SGOT	83 ±137 IU/L	>50 IU/L	47%
SGPT	62 ±67 IU/L	>50 IU/L	42%
Alkaline phosphatase	622 ±446 IU/L	>300 IU/L	79%
Albumin	3.0 ±0.56 g/dL	<3.5 g/dL	82%
Urea	40 ±36.8mg/dL	>45 mg/dL	27%
Calcium	8.21 ±0.8mg/dL	<8mg/dL	35%

Table 3: Ultrasonography abdomen findings for liver abscess: right lobe solitary abscess was the most common pattern. Segments 7 and 6 were the most common sites of abscess. Associated typhlitis, an uncommon finding with ALA, was present in only 6% patients.

	Parameters	Percentage (=n)
Lobe	Right	71% (142)
	Left	17.5% (35)
	Bilateral	11.5% (23)
Number	Solitary	65% (130)
	Few (≤3)	11% (22)
	Multiple (>3)	23.5% (47)
	Typhlitis	6% (12)
Mean abscess vol. ±SD		270 ±205 cc
Segments involved	VII	35% (70)
	VI	25% (50)
	VIII	10% (20)
	V	10% (20)
	IV	10% (20)
	Rest	10% (20)

Table 4: Management outcome: majority of patients were

managed by needle aspiration. Surgical intervention was done in 8 patients, all for rupture, out of which 5 died.

Parameters		Percentage (n=71)
Abscess drainage	Percutaneous needle aspiration	79% (158)
	Pigtail drainage	17% (34)
	Open surgical	4% (8)
Change of antimicrobials required		25% (50)
Mean duration of Hospitalisation Treatment		8 ± 5.36 days
		33 ± 42 days
Surgical intervention		4% (8)
Mortality		2.5% (5)

Table 5: Etiological analysis: amoebic serology was positive in 73% patients and, in accordance, aspirate was anchovy sauce in 71% of them. All cases of diagnosed tubercular abscess were AFB positive. In pyogenic liver abscess, Gram negative gut flora predominated etiologically.

Parameter		Percentage (n)
Appearance	Anchovy sauce	71% (142)
	Purulent	29% (58)
Amoebic serology positive		73% (146)
AFB positivity on pus		7.5% (15)
Fungal culture on pus	<i>Candida</i>	1.5% (3)
Positive cultures on pus		22% (44)
Etiological agents in Positive pus culture	<i>E. coli</i>	8.5% (17)
	<i>Klebsiella</i>	5.5% (11)
	<i>Pseudomonas</i>	2% (4)
	<i>Acinetobacter</i>	2% (4)
	<i>Staphylococcus</i>	2% (4)
	<i>Enterococcus</i>	1.5% (3)
	<i>Citrobacter</i>	0.5% (1)
Blood culture positive		1.5% (3)

4. 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 [12].

Table 6: Statistical analysis: results of statistical analysis of abscess size and duration of hospitalisation with various clinical and laboratory variables using multivariate analysis. Association of these variables with mortality was studied using Chi-square test, which has also been given (only data with significant associations has been given).

Parameter	Correlation coefficient	P value
Abscess volume	Anemia	-0.33
	Alkaline phosphatase	0.37
Duration of hospitalisation (morbidity indicators)	Duration of fever	0.02
	ESR	0.16
	INR	0.20
	Albumin	-0.28
Mortality	Females	0.001
	Duration of fever	0.001
	Icterus	0.001
	Ascites	0.006
	Pleural effusion	0.028

In our series also ALA accounted for about three fourths of cases. Most of them were typically right lobe solitary abscess. This pattern

of involvement has also been reported in previous series on ALA like by Sharma et al.[7] and Mukhopadhyay et al. [11]. Majority of patients were young alcoholic male (with mean age of 42.13 years) of lower socioeconomic class which is also in accordance with the previous studies [11]. The age predisposition and gender differences may be as a result of high alcohol intake by young male which predisposes to ALA. 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 [10]. Elderly individuals with underlying diseases and patients with compromised immunity due to malnutrition or corticosteroid therapy are also prone to invasion by amoeba. Moreover, Mukhopadhyay et al proposed that the female menstrual cycle prevents hepatic congestion and thus makes the organ less susceptible to abscess formation [11]. As amoebic liver abscesses are uncommon due to good hygiene in region with temperate climate, pyogenic liver abscesses (PLA) are etiologically more common in west. In a large series by Ochsner et al. [1], the disease was described as primarily affecting young male patients in the setting of intra-abdominal infections and reported high mortality with nonoperative treatment and multiple abscesses. Since then, with effective treatment of predisposing intra-abdominal conditions, there has been a decreasing trend in mortality in the young and a subsequent increased incidence in the elderly age group. Generally, PLA are associated with predisposing benign or malignant biliary tract or colonic disease: acute cholecystitis, choledocholithiasis, biliary-enteric bypass procedures, chronic pancreatitis, diverticulitis, [8]. In our series, PLA accounted for about quarter of cases, most of them were multiple and right lobe abscesses.

Average age in this group was not different from overall average (43.27 years compared to 41 years overall). Tubercular involvement of liver is uncommon as the low oxygen level in liver is unfavorable for TB bacilli to survive. Generally, it has a primary focus in lung or gastrointestinal tract (GIT), from where it spreads to the liver. In our patients with TLA, most of cases were solitary and in left lobe. They were commonly associated with ascites.

Our demographic data had some interesting trends. Mean age in our series was 41 years, which was in accordance with Indian studies like by Sharma et al. [7]. It is because ALA is the predominant aetiology in the Indian scenario, typically involving young alcoholics. As far as sex predisposition was concerned, even after recruiting 200 consecutive patients, only 13 patients were female. Indian data show predominant male involvement; Two-thirds of our patients were from lower socioeconomic class. All of them were alcoholic and thus predisposed to LA. [13]. Most common symptoms of LA are pain abdomen and fever which were present in 99% and 94% of our patients, respectively.[7, 13]. Diarrhoea in LA could be due to associated intestinal amoebiasis and could be part of colonic condition predisposing to LA. we reported it in 23% of patients. Previous studies report it variably from 4% to 33%[7, 8]. Another uncommon complain in LA is cough. It is generally due to associated pleural effusion and compression collapse of the underlying lung parenchyma. It was present in 16% of our patients. Pleural effusion was present in 30% of our patients; all patients with cough belong to this group.

Two uncommon signs of LA are jaundice and ascites. Jaundice was seen in 26% of our patients. In earlier studies from India, it was reported in 45–50% of patients. But after advent of good antimicrobial therapy, it has become less common. Sharma et al. reported it in only 12.7% of patients [7]. Ascites was present in 18 patients out of which 5 had TLA and 8 had associated decompensated chronic liver disease (CLD). Abdominal ultrasound is still the diagnostic modality of choice for hepatic pathologies including LA. Its sensitivity to detect the LA ranges from 92 to 97% [9, 11]. The predilection of LA in right lobe is because of streaming effect in portal circulation [8]. It receives most of blood draining from right colon, the primary site of intestinal amoebiasis. Management strategy of minimally invasive drainage techniques, percutaneous needle aspiration was used in most of patients

(79%) [8]. Appropriate antimicrobials were added according to the etiological outcome. However, 4% of the patients had to undergo surgical intervention as they got complicated by rupture. Other possible indications for surgical intervention could be inaccessible anatomical location, failure to respond to treatment after conservative therapy, and other associated complications like peritonitis, biliary-enteric fistulisation, and so forth. All mortality was reported in these patients with surgical intervention. Overall, it was 2.5%, which was similar to previous series where it has been recorded between 2 and 15% [7, 9]. Interestingly, average age in this group was 64.8 years (range: 45 to 78 years), which was quite less compared to overall average of 41 years.

## 5. CONCLUSIONS

Young alcoholic male from lower socioeconomic group with amoebic liver abscess presenting as solitary right lobe abscess was the most common pattern in our series. Liver abscess was uncommon in female patients. Apart from amoebic and pyogenic, tubercular liver abscesses were not so uncommon etiologically. Though average age of patients was in forties,

increased incidence of mortality was noted in patients in the seventh decade. Cough as a symptom points to associated significant pleural effusion. Presence of ascites should raise suspicion of TLA or associated CLD. 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.

## Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

## REFERENCES

- [1] A. Ochser, M. de Bakey, and S. Murray, "Pyogenic abscess of the liver. An analysis of forty-seven cases with review of the literature," *The American Journal of Surgery*, vol. 40, no. 1, pp. 292–319, 1938.
- [2] A. J. Greenstein, D. Lowenthal, G. S. Hammer, F. Schaffner, and A. H. Aufses Jr., "Continuing changing patterns of disease in pyogenic liver abscess: a study of 38 patients," *The American Journal of Gastroenterology*, vol. 79, no. 3, pp. 217–226, 1984.
- [3] A. Cuschieri, G. R. Giles, and A. R. Moosa, *Essential Surgical Practice*, Butterworth Heinemann, London, UK, 3rd edition, 1995.
- [4] S. C. H. Yu, S. S.M.Ho, W. Y. Lau et al., "Treatment of pyogenic liver abscess: prospective randomized comparison of catheter drainage and needle aspiration," *Hepatology*, vol. 39, no. 4, pp. 932–938, 2004.
- [5] K. T. Lee, S. R. Wong, and P. C. Sheen, "Pyogenic liver abscess: an audit of 10 years' experience and analysis of risk factors," *Digestive Surgery*, vol. 18, no. 6, pp. 459–465, 2001.
- [6] A. J. S. McFadzean, K. P. S. Chang, and C. C. Wong, "Solitary pyogenic abscess of the liver treated by closed aspiration and antibiotics: a report of 14 consecutive cases with recovery," *The British Journal of Surgery*, vol. 41, no. 166, pp. 141–152, 1953.
- [7] N. Sharma, A. Sharma, S. Varma, A. Lal, and V. Singh, "Amoebic liver abscess in the medical emergency of a North Indian hospital," *BMC Research Notes*, vol. 3, article 21, 2010.
- [8] H. Muthukumarasamy and R. Ramakrishnan, "Liver abscess— anatomical correlation," *Anatomica Karnataka*, vol. 5, no. 2, pp. 81–86, 2011.
- [9] S. L. Stanley Jr., "Amoebiasis: seminar," *The Lancet*, vol. 361, no. 9362, pp. 1025–1034, 2003.
- [10] R. P. Makkar, G. K. Sachdev, and V. Malhotra, "Alcohol consumption, hepatic iron load and the risk of amoebic liver abscess: a case control study," *Internal Medicine*, vol. 42, no. 8, pp. 644–649, 2003.
- [11] M. Mukhopadhyay, A. K. Saha, A. Sarkar, and S. Mukherjee, "Amoebic liver abscess: presentation and complications," *Indian Journal of Surgery*, vol. 72, no. 1, pp. 37–41, 2010.