

## Original Article

# Comparative Analysis of Amoebic Liver Abscess versus Pyogenic Liver Abscess on Clinical and Investigative Consequences

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An attempt was made to compare the analysis of investigative parameters to distinguish Amoebic Liver Abscess (ALA) from Pyogenic Liver Abscess (PLA). This study was carried out at Calcutta National Medical College & Hospital, Kolkata 700014. Patients were included with signs and symptoms suggestive of Liver Abscesses. The investigations of Serological, Hematological, Biochemical, Radiological and CT scan were done. Antimicrobial Therapy, Image Guided Percutaneous Aspirations/Drainage or Open surgical Drainage was performed and checked in follow-up visits up to 3 months. The highest incidences of Liver Abscess (53.3%) were encountered in alcoholic male. Fever and Abdominal Pain were common in both ALA and PLA. Hepatomegaly was significantly high ( $p < 0.05$ ) in PLA (64.2%) than ALA (37.5%), but jaundice was only noted in PLA (22.2%). *E coli*, *K pneumonia* and *S aureus* were confirmed in PLA. Alkaline Phosphatase was significantly high ( $p < 0.05$ ) in PLA. Right sided pleural effusion was noted in Chest X-ray of 50% cases. USG studies measured 70% Solitary Abscesses with 5-10 cm in the Right Lobe. Partial resolution occurred in 28.6% of PLA and 31.2% of ALA. USG and Serological Tests are recommended and Conservative Management should be followed for ALA and invasive treatment for PLA patients.

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**Key words :** Liver Abscess, USG, Microbes, Surgical drainage

Liver Abscess remains an important clinical problem since the time period of Hippocrates (circa 400 BC)<sup>1,2</sup>. Based on etiology, there are three major varieties of Liver Abscess - Pyogenic, Amoebic and Fungal. Amoebic Liver Abscess (ALA) is most familiar extra intestinal site of infection in under developed Countries, like South-East Asia, Africa, Mexico, Venezuela, Colombia etc. The highest incident of Liver Abscess observed in Asia, where rates can be as high as 21 per 100000 inhabitants per year<sup>3,4</sup>. However, Pyogenic Liver Abscess (PLA) is relatively common in developed Countries, including United States. Biliary Tract Disease (Cholelithiasis, Obstructing tumors, Congenital Biliary Tree Anomalies etc), Portal Vein seeding (Appendicitis, Diverticulitis) or Inflammatory Intestinal Diseases are the most common etiology of PLA<sup>5</sup>. PLA may also be caused by a variety of organisms, including *Escherichia coli*, *K pneumoniae*, *Enterococcus* and *Streptococcus* species, while, *Entamoeba histolytica* is solely responsible for ALA.

### Editor's Comment :

- All symptomatic Liver Abscesses patients should be examined USG and serological tests for *E histolytica*, *E coli*, *K pneumoniae* and *S aureus* before starting the treatment.
- Conservative management should be followed for ALA and invasive treatment including percutaneous aspiration, pigtail catheter insertion, Laparotomy for PLA patients as early as possible.

*K pneumoniae* is also associated with Colorectal Carcinoma<sup>6</sup>. It has been reported that ALA occurred in 3-9% of all patients with Amoebiasis, mainly in areas with poor sanitation and hygiene. In India, it affects more than 15% of the population. The mortality rate has been estimated to be around 0.2-2% in adults and up to 26% in children<sup>7</sup>. The major Risk Factors for ALA are Diabetes, Alcohol Consumption, Malignancies, Malnutrition and HIV infection<sup>8,9</sup>. Eventually during invasion, Amoeba penetrates portal vein and Transported through portal circulation to Liver, where Trophozoites (growing and feeding stage of the parasite) not only Accelerate Thrombosis and Infarction to Hepatic Tissues, but also lead to Cytolysis<sup>10</sup>. The most of the ALA are solitary lesions and more often found in the Right Lobe than the left, whereas, 18%-66% of PLA are Cryptogenic, with no underlying cause identified<sup>11</sup>. The clinical diagnosis is difficult to perform since the symptoms are usually vague and nonspecific. Leukocytosis, elevated inflammatory markers, increased Alkaline Phosphatase and abnormal Liver Function Tests are frequently observed in both ALA

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and PLA. Blood culture, Antigen test, Ultrasonography (USG) and Computed Tomography (CT) scanning are usually used to confirm Liver Abscess<sup>12</sup>. Even though metronidazole, tinidazole, ornidazole, nitazoxanide, chloroquine are the choice of medicine to treat ALA, but image guided Percutaneous Drainage along with Targeted Antimicrobial Therapy is helpful treat PLA<sup>13,14</sup>. In spite of considerable attempts to differentiate, but till no reliable clinical characteristics identified for ALA versus PLA. The common clinical symptoms of liver abscess are Fever, Jaundice and Right upper quadrant pain and Tenderness<sup>4</sup>. Therefore, the objective of the present study was to find out the probable differentiating clinical and microbiological features between ALA and PLA in hospital set up.

#### MATERIALS AND METHODS

This prospective longitudinal study was conducted in the Department of General Surgery, Calcutta National Medical College and Hospital (CNMC&H), Kolkata, India in the time period of January, 2014 to December, 2014 after receiving the approval from Institutional Ethical Committee (IEC/CNMC/58 date 3/1/2014). Adult patients of either sex with Liver Abscess diagnosed clinically and/or Radiologically (USG/CT) were screened thoroughly before included in the study. The exclusion criteria of the present study were (i) Traumatic liver abscess, (ii) Past history of liver abscess, (iii) Liver abscess in paediatric age group, (iv) Abscess coexisting with malignancy of Liver and (v) Indeterminate and Mixed Etiology Liver Abscess.

ALA was confirmed by positive ELISA test for *Entamoeba histolytica* trophozoites and in blood and aspirated pus, while PLA was confirmed by positive cultures of blood and pus. The selected patients were divided into two groups: ALA and PLA. The Clinical Symptoms (Fever, Pain in abdomen, Abdominal swelling, Jaundice etc) were recorded. Routine Hematological (Hb%, TC, DC, ESR, PT) and Biochemical (Glucose, LFT, Urea, Creatinine) investigations were conducted. The Culture and Sensitivity test were done in blood and aspirated pus. X-ray (Chest, Abdomen), USG (Abdomen) and CT scan (Abdomen if required) were also done. Once the diagnosis of Liver Abscess was confirmed, broad spectrum parenteral antibiotics along with a nitroimidazole compound were started. If condition did not improve, then drainage of the Abscess Cavity was done on first attempt. Image guided Percutaneous Aspiration or Pig Tail Catheter Drainage or open surgical drainage was conducted as per patient's health condition. Laparotomy was indicated for Ruptured Amoebic Abscesses or Abscess with an underlying

or associated Abdominal Pathology. The parametric and on parametric results were presented as descriptive statistics and analysed using software based statistical package (SPSS v.20, IBM, USA).

#### RESULTS

Table 1 represented demographic details of selected patients in the study. Among 30 cases of Liver Abscess, 53.3% was of ALA group and 46.7% was of PLA group. Overall, there was 23 males (76.7%) and 7 females (23.3%). Prior history of Alcohol intake was reported in 56.7% of total study population. Maximum patients were coming from the age group of 20-40 years, similar to ALA group (62.5%). Among PLA the maximum duration of symptoms was 11-20 days (42.9%) but of ALA it was prolonged ( $\geq 21$  days). Although, the duration of symptoms of PLA and ALA was slightly differed from each other but these changes was not statistically significant.

The most common clinical feature encountered among Liver Abscess was Fever (76.7%) followed by Pain in Abdomen (73.3%). Fever was present in 85.8% cases of PLA and 68.8% cases of ALA; while, Pain in abdomen was present in 85.8% cases of PLA and 62.5% cases of ALA. Abdominal Swelling or Hepatomegaly was present in 64.2% cases of PLA and 37.5% cases of ALA. Jaundice was present in 22.2% cases of PLA and none in ALA (Table 1).

Laboratory investigations exhibited 20% patients were anaemic (Hb% <10 gm/dl), 13.3% Diabetic (Fasting Blood Glucose >200 mg/dl), 13.3% detected jaundice (bilirubin <2gm/dl) and 33.3% leukocytosis (WBC >11,000 cells/cc). Alkaline phosphatase (AKP <300 IU) was elevated in 53.3% and Prothrombin time (PT >20 sec) in 10.0% of the cases (Fig 1).

Table 1 — Demographic details of selected patients

	Total	ALA	PLA
Number of Patients	30	16	14
Male	23	10	12
Female	7	6	2
Age group:			
20-40 years	16	10	6
41-60 years	12	6	6
$\geq 60$ yrs	2	0	2
<b>Duration of symptoms :</b>			
$\leq 5$ days	3	1	2
6-10 days	7	3	4
11-20 days	12	6	6
$\geq 21$ days	8	6	2
<b>Clinical symptoms :</b>			
Pain in abdomen	22	10	12
Fever	23	11	12
Abdominal swelling	15	6	9
Jaundice	4	0	4
Alcohol addiction	17	9	8

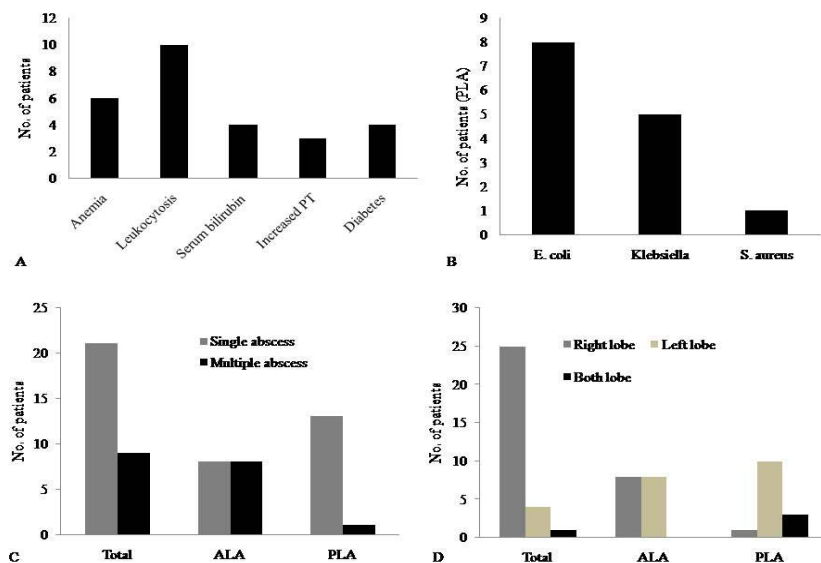


Fig 1 — Laboratory investigations of liver abscess patients [A] Incidences of comorbidity; [B] Incidences of bacterial invasion; [C] Number of abscess; [D] Area of infected hepatic lobe

Microbial investigations (blood culture) showed negative results for all patients of ALA group, but 42.9% were positive of PLA group (Fig 1). Most common organism present in Blood Cultured of PLA was *E coli* (50.0%), followed by *Klebsiella* (28.5%) and *S aureus* (7.1%). In pus culture of PLA group, 14.2% cases were polymicrobial (*E coli* and *Klebsiella*).

Pleural effusions with obliteration of costophrenic

angle were noted in chest X-ray of 50% patients (Fig 2). USG studies revealed that the right lobe of liver was mostly affected in both ALA (100%) and PLA (64.2%) patients (Fig 2). However, single abscess were noticed in 92.9% of PLA and 50% of ALA. Moreover, maximum diameter (in greatest dimension) of Liver Abscess was measured 5-10 cm in PLA, while 50% of ALA cases showed <5cm.

Among 30 cases of Liver Abscess, 33.3% cases were managed by Medical Therapy alone. Percutaneous drainage was performed in 57.2% cases of PLA and 42.8% cases of PLA required Open Surgical Drainage (Fig 2). None of the PLA was adequately treated by Conservative approach. However in case of ALA conservative management was most commonly performed. In the follow up period of 3 months, partial resolution of Liver Abscess was occurred in 28.6% cases of PLA and 31.2% cases of ALA, while the rates of complete resolution were 71.4% and 68.8% in PLA group and ALA group respectively.

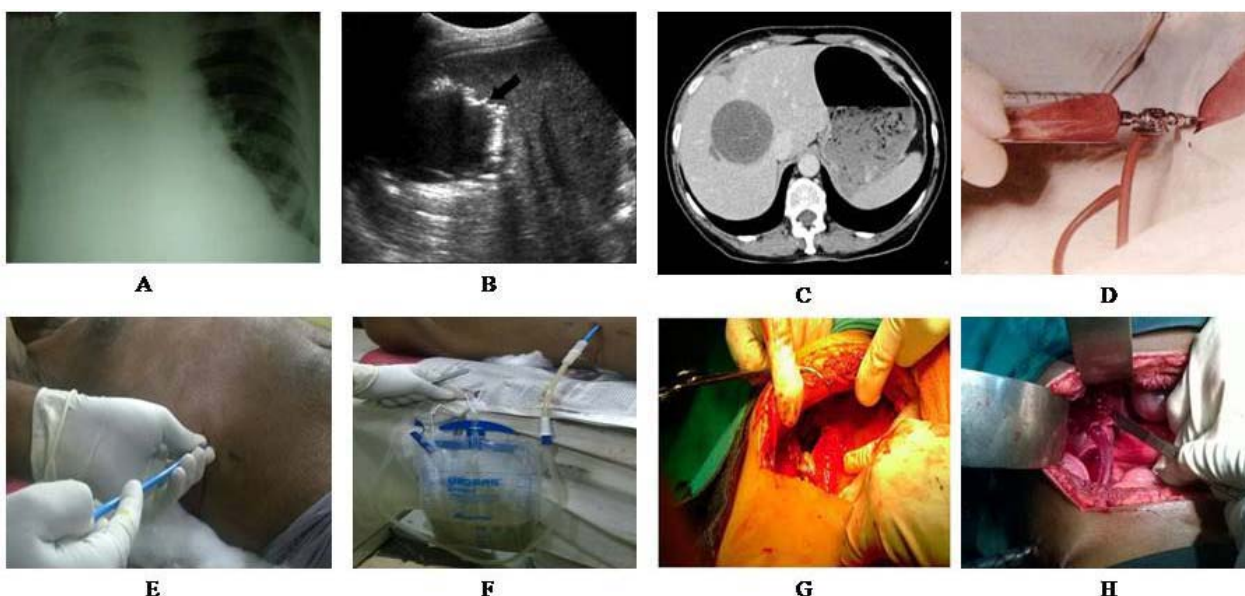


Fig 2 — Findings of liver abscess and invasive treatment management [A] Chest X-Ray showing elevated right hemidiaphragm with pleural effusion; [B] Abdominal USG showing single abscess cavity; [C] Abdominal CT scan showing single abscess cavity; [D] Image guided percutaneous aspiration; [E] Image guided Pigtail drainage; [F] Image guided pigtail catheter drainage; [G] Open surgical drainage: showing abscess cavity; [H] Open surgical drainage: drain in abscess cavity

## DISCUSSION

Liver abscesses, both Amoebic and Pyogenic continue to be an important reason of mortality in the Tropical Countries. Most of the Liver Abscess complications include Sepsis, Emphysema and Peritonitis. The clinical diagnosis is difficult to perform since the symptoms are usually vague and nonspecific. In this study patients of both Amoebic (53.3%) and Pyogenic (46.7%) Liver Abscess were examined and evaluated for etiological and predisposing features, signs and symptoms, laboratory test results, radiological findings and various treatment modalities. Tubercular and Fungal Liver Abscess not incorporated in this study. The age groups of the patients were varied from 26-66 years. The highest incidence was noted in the age group of 20-40 years (53.3%) followed by age group of 41-60 years (40.0%). Mean age in this study was observed 41.6 years. Other studies in Indian population also supported this findings<sup>15,16</sup>. Present study exhibited male predominance between ALA and PLA, which may be attributed due to the different lifestyles of Men and Women of this country. Besides male predominance, alcoholic patients were also noted in both ALA (64.2%) and PLA (57.1%) which clearly indicated Alcoholism is one of the major predisposing risks in Liver Abscess. In other study, alcoholism was found in 70% of liver abscess<sup>17</sup>. In fact, the onset of liver abscess is not only subjected to dissimilarities depending upon type, location and quantity of abscess, but it may be acute and clinically undetectable. In this study, the maximum duration of symptoms was noted 11-20 days in cases of PLA and  $\geq 21$  days in cases of ALA, similar to other reports<sup>18</sup>. Most common presenting complaints were Fever and Abdominal Pain. Abdominal swelling or Hepatomegaly was exhibited in 64.2% cases of PLA and 37.5% cases of ALA. This findings correlate with other studies, where clinically Hepatomegaly had noted in 72% cases<sup>18</sup>. Clinically jaundice was observed in only 22.2% cases of PLA but none in ALA. Furthermore, 20% patients were anaemic, 33.3% Leukocytosis and 10% Diabetic. Neutrophilic Pleocytosis was also noted in both types of Liver Abscesses. Hyperbilirubinemia (Serum Bilirubin  $>2$  mg/dl) were observed in 13.3% of cases, similar to earlier findings<sup>19</sup>. No other Liver enzymes, but only Alkaline Phosphatase (ALP) were raised in 53.3% of Liver Abscess patients. In another study, Sharma and Ahuja (2003) have been reported elevated ALP (2-4 times) in 60-80% of cases of Liver Abscess<sup>15</sup>. Hence, it might suggest that the elevated level of ALP is one of the common prognostic indicators in any type of Liver Abscess. Anaemia and Jaundice

were more marked in Pyogenic Liver Abscess Cases.

In the present study, out of the 30 cases of Liver Abscesses, 20 cases had subjected to invasive treatment; while pus culture has shown positive in 12 cases. Most common organisms present in cultured was *E coli* (50.0%) followed by *Klebsiella* (28.5%) and *S aureus* (7.1%). Although, Blood Culture Test exhibited sensitivity in 42% of PLA patients, while *E coli* marked most familiar pathogen. Chung *et al* (2007) reported *E coli* and *Klebsiella* to be the most common organisms present in PLA pus and blood cultured<sup>20</sup>.

Present study demonstrated that PA views of Chest X-ray were significantly abnormal (50%) in both ALA and PLA with Right Sided Pleural Effusion (43.3%) and Elevated Right Hemi Diaphragm. Furthermore, USG in abdomen exhibited 70% Solitary Abscess in exclusively on Right Lobe. Most common size of Abscess in PLA was noted 5-10 cm, while in ALA it was less than 5 cm. In other studies, Solitary Abscesses were found in 72-80% and right lobe association was noted in 65-72% of cases<sup>21,22</sup>. Abdominal USG is still the diagnostic modality of choice for hepatic pathologies including liver abscess, although CT scanning has now showed better sensitivity (97% sensitive) than USG (85% sensitive) in Liver Abscess detection. Because, sagittal plane of scan precisely defined the segments involved and accurately localize the Abscess in Liver<sup>23</sup>. Present observation reported the involvement of 6th and 7th segments in Right Lobe. The predilection of liver abscess in Right Lobe is because of streaming effect in portal circulation, which receives most of blood draining from right colon, the primary site of Intestinal Amoebiasis<sup>24</sup>.

Surgical drainage of Liver Abscesses has been an accepted therapy for decades. The diagnosis and treatment management of Liver Abscess has changed due to advances in imaging techniques. In the present study, the conservative management was done on 33% cases. All the cases of ALA were treated conservatively. None of the PLA was treated by conservative management alone. Any form of invasive treatment was needed in all PLA. Therefore, it may assumed that conservative medical management of uncomplicated ALA is safe but patients who fail to respond to Medical Therapy should be considered for USG guided Percutaneous Aspiration. Percutaneous Needle Aspiration is safe, rapid, effective method of treating Liver Abscess<sup>25,26</sup>. In this study, percutaneous needle aspiration was used in 46.7% of patients. Majority of patients showed drastic improvements in their symptoms and signs within 72 h of the Aspiration.

Laparotomy was performed in 20% of Liver Abscess. Peritonitis and Cholelithesis were reported in PLA. Image Guided Percutaneous Aspiration/Catheter Drainage was the main form of Surgical Therapy, although most of them were under coverage with antibiotics and responded to Percutaneous Aspiration/Catheter Drainage and Antimicrobials. Partial resolution occurred in 28.6% cases of PLA and 31.2% cases of ALA within 3 months. On the other hand the rates of complete resolution had 71.4% and 68.8% in PLA and ALA respectively. Success rate of complete resolution depends on early detection, complete distinction and confirmation of types of Liver Abscess present.

### CONCLUSION

From the above discussion, it may conclude that ALA is more common than PLA. Abdominal USG and Serological Tests of Pus and/or blood can clearly distinguish PLA from ALA. Furthermore, conservative management is safe for ALA but sort of invasive treatment including Percutaneous Aspiration, Pigtail Catheter Insertion, or Laparotomy should be followed for PLA patients.

**Limitations:** The study was conducted in a single centre and small number of population. Sample size is too small to draw any conclusion. Therefore, a detailed study is recommended.

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