



A Prospective Study on Diagnosis and Management of Liver Abscess

Authors

Mohamed Fazal A¹, Anvar Ali A^{2*}, Ravi Sankar P³, Prema M⁴,
Prem Kumar T⁵, Brinda Maheswari M⁶

^{1,6}Post Graduate, Dept of General Surgery, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, India, 608002

²Professor, Dept of General Surgery, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, India, 608002

^{3,4}Associate Professor, Dept of General Surgery, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, India, 608002

⁵Assistant Professor, Dept of General Surgery, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, India, 608002

*Corresponding Author

Dr Anvar Ali A

Professor, Dept of General Surgery, Rajah Muthiah Medical College and Hospital, Annamalai Nagar, Chidambaram, India, 608002

Abstract

Background: *The abscess of liver is a life threatening disease with majority being amoebic liver abscess in tropical countries like India. The abscesses of liver can be broadly divided into two categories: amoebic and pyogenic. Amoebic liver abscesses (ALA) are the most common extraintestinal site of infection, and occur in fewer than 1% of E histolytica infections [1,2]. Treatment modalities grossly changes between abscesses of liver due to amoebic and pyogenic origin and hence the need to differentiate between them early arises. Indirect Haemagglutination test has been an important diagnostic tool in differentiating between liver abscesses of liver due to pyogenic and amoebic origin. Etiopathogenesis of liver abscess due to amoebic origin is different from that of liver abscess due to pyogenic origin (PLA). Confirmatory diagnosis is indeed important in resource limited settings, as it leads to appropriate management.*

Aim and Objectives:

- The main aim is to distinguish between liver abscess due to amoebic and pyogenic origin using Indirect Haemagglutination test.*
- To identify the contrast between clinical presentation of Amoebic and Pyogenic liver abscess with its complications.*

Materials and Methods: *A prospective study done during 2018 to 2020 in patients with Clinical/Radiological features of Liver Abscess presenting to RMMCH, Chidambaram with a sample size of 50. Serum obtained from all study subjects and sent for Indirect Haemagglutination test. Pus collected from the abscess cavity sent for culture and sensitivity and their results studied.*

Results: *From 50 samples studied 33 were diagnosed to have amoebic liver abscess by positive Indirect Haemagglutination with sterile culture report, 10 patients were diagnosed to have pyogenic liver abscess by isolating organism from pus aspirated from abscess cavity and 7 patients with sterile culture and negative indirect haemagglutination as indeterminate.*

Conclusion: *Indirect haemagglutination test of Entamoeba histolytica gives an accurate diagnosis of liver abscess due to amoebic origin. The clinical features and indirect hemagglutination test results helps in achieving accurate diagnosis of amoebic liver abscess. Rapid diagnosis with serology using indirect haemagglutination and initiation of prompt treatment can reduce the hospital stay in the management of amoebic liver abscess*

Keywords: *Indirect haemagglutination test, liver abscess of amoebic and pyogenic origin.*

Introduction

Liver abscess (LA) is defined as collection of pus in liver parenchyma due to bacteria, fungi, and/or parasites. Liver Abscess is a highly dreaded intra abdominal infection causing significant morbidity and mortality in tropical countries like India. Due to poor sanitation and low economic status liver abscess due to amoebic origin is a common occurrence. High incidence of liver abscess due to amoebic origin can be attributed to malnutrition, poor hygiene and inadequate access to health care facilities. Early identification of etiology of liver abscess helps in timely intervention and appropriate management due to overlap of symptoms. This study emphasises the use of Indirect Haemagglutination test as an important diagnostic tool in differentiating origin of liver abscess. The most reliable and traditional method for identification of amebiasis is the recovery of the etiological agent, *Entamoeba histolytica*. The serological diagnosis of intestinal amebiasis had limited use in earlier days. Commercially available IHA test kits provide reliable test results in this study.

Materials and Methods

Aims and Objectives of the Study

- To differentiate between liver abscess due to amoebic and pyogenic origin by using Indirect Haemagglutination test/Culture and sensitivity of the pus aspirated from abscess cavity
- To study about complications of liver abscess
- To study clinical presentation of liver abscess

Source of Data

All cases of Liver abscesses with Clinical/Radiological features of Liver Abscess presenting to RMMCH, Chidambaram over a period of two years from October 2018 to September 2020.

Method of Collection of Data

Inclusion Criteria

- All cases of symptomatic liver abscess with size 5 to 6 cm diagnosed clinically and /or radiologically

- Liver abscess in all stages

Exclusion Criteria

- Age < 15 years - > 60 years
- Pregnancy

Sample Size: 50 cases

Study Design: Prospective study

Duration of Study: 2 years.

This study was done from October 2018 to September 2020 on 50 patients. Case selection for the study will be done for 2 years.

Informed consent from study population and their detailed history, signs, symptoms, clinical features, lab parameters and radiological findings on admission and during their stay in the hospital are collected. Serum samples (5ml) were collected and subjected to indirect haemagglutination test. Pus aspirated from abscess cavity under ultrasound guidance was subjected to culture and sensitivity.

The criteria to diagnose amoebic liver abscess was defined by positive titres for *Entamoeba Histolytica* from serum sample and sterile bacterial culture. Pyogenic liver abscess was defined by positive bacterial culture isolated from pus collected from abscess cavity with negative serology for *Entamoeba Histolytica*. Those who do not fall under two groups were classified as indeterminate. Out of 50 patients included in this study, 33 were diagnosed as Amoebic liver abscess, 10 were diagnosed to have liver abscess due to bacterial origin and 7 were classified as indeterminate. The age range was 25 to 70 years and about 46(94%) were males.

Table-1: Age Distribution

Age Distribution	No. of Persons Affected
21-30 years	3
31-40 years	9
41-50 years	15
51-60 years	15
61-70 years	8

Graph-1: Age Distribution

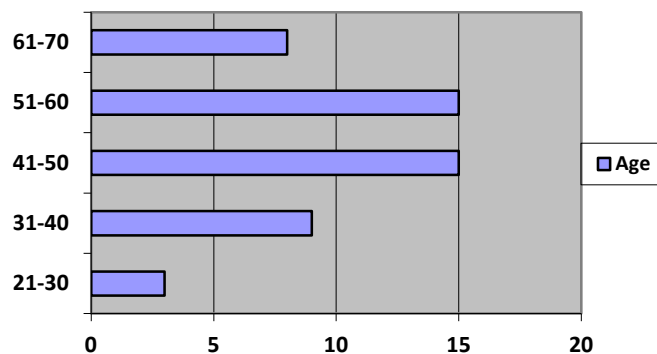


Table-2: Sex Distribution

Sex	Frequency	Percentage
Male	46	92%
Female	4	8%
Total	50	100%

Graph-2: Sex Distribution

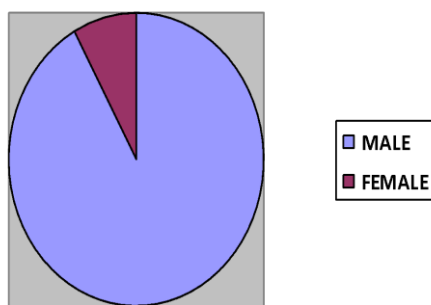
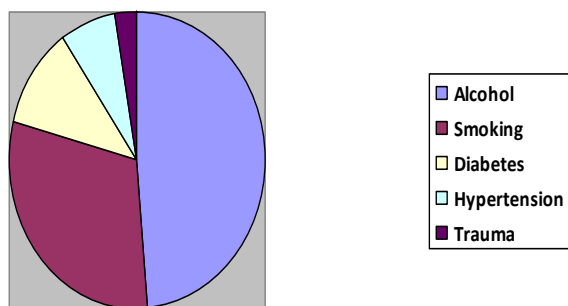


Table-3: Personal History of subjects revealed following

Factors	No. of cases
Alcohol	35
Smoking	22
Diabetes	8
Hypertension	5
Trauma	2

Graph-3: Factors



Other parameters like demographic details, behavioural characteristics along with clinical and USG findings, lab parameters were also studied to find out their association with etiology of a particular type of liver abscess. Alcohol intake seemed to have greater association with Amoebic liver Abscess as compared to pyogenic liver abscess.

Table-4: Parameters Analysed

Parameters Analysed	Amoebic liver abscess ⁽³³⁾	Pyogenic liver abscess ⁽¹⁰⁾
Age<50 yrs	21	2
Age>50 yrs	12	8
Alcohol	30	5
Smoking	18	4
Diabetes Mellitus	5	3

Graph-4: Parameters Analysed

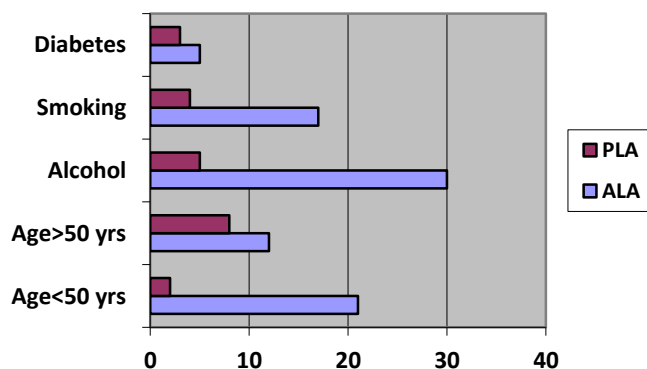


Table-5: Symptoms

Symptoms	Amoebic liver abscess (ALA)	Pyogenic liver abscess (PLA)
Fever	31	9
Abdominal pain	32	8
Jaundice	11	5
Vomiting	6	3
New onset diarrhoea	2	1

Graph-5: Symptoms

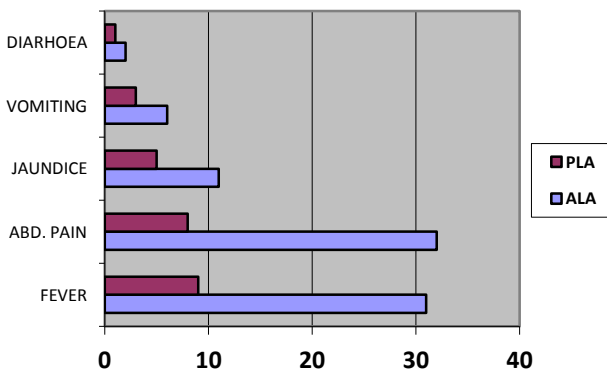


Table-6: Lab parameters

Lab parameters	Amoebic liver abscess (33)	Pyogenic liver abscess (10)
Leucocyte count >12000	28	9
Bilirubin >1mg	21	7
Raised ALT	17	6
Raised AST	23	9
Hypoalbuminemia	22	3

Graph-6: Lab parameters

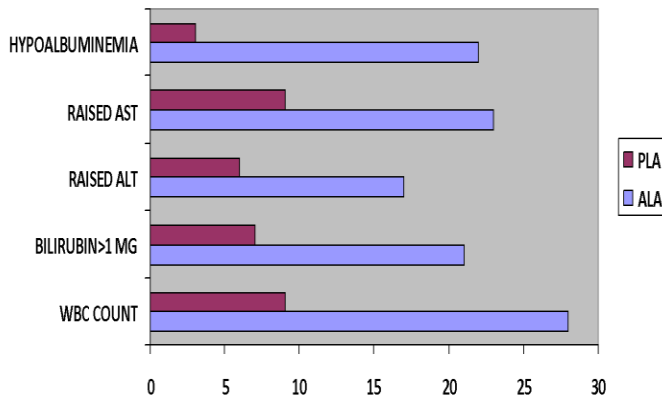
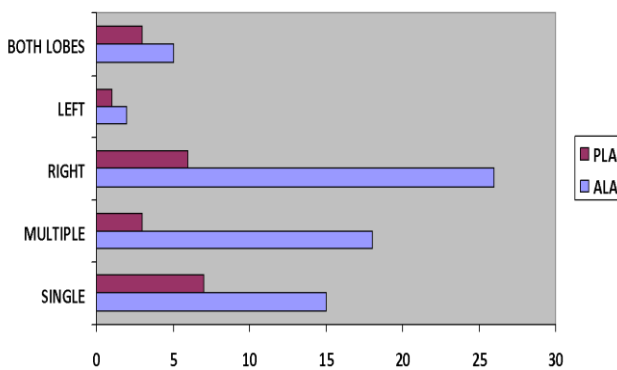


Table-7: Based on location

Based on location	Amoebic liver abscess (33)	Pyogenic liver abscess (10)
Single	15	7
Multiple	18	3
Right lobe	26	6
Left lobe	2	1
Both lobes	5	3

Graph-7: Based on location



The treatment of ALA consists of intra-luminal and systemic administration of amoebicides as soon as possible.^{[3],[4]} Percutaneous drainage has been a main modality of treatment as well as diagnostic tool in liver abscess. Amoebic liver abscess was treated with broad spectrum antibiotics like Ciprofloxacin and metronidazole

for a period of 10 days. When an interprofessional team approach is undertaken, the prognosis for most patients with an amoebic liver abscess is excellent.^[5] Unsterile aspiration of liver lesion of non pyogenic origin leads to unnecessary bacterial infection.^[6,7,8] Pyogenic liver abscess was treated with broad spectrum antibiotics followed by percutaneous drainage. Surgery with peritoneal lavage was advocated in case of ruptured liver abscess, a major complications of Liver abscess.

Table-8: Mode of Management

	Amoebic liver abscess (33)	Pyogenic liver abscess (10)
Medical	6	5
Surgical	8	3
Combined	19	2

Graph-8: Mode of Management

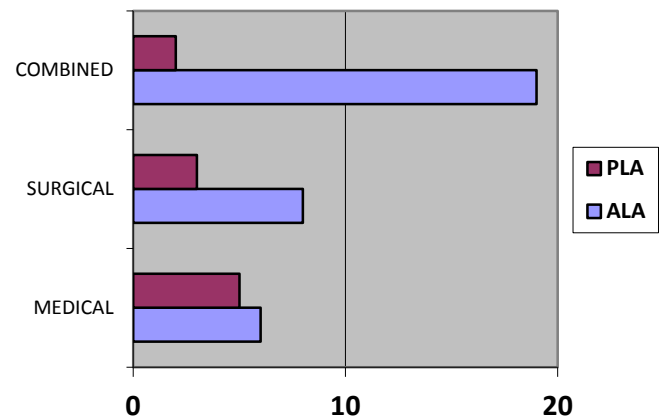


Table-9: Organism isolated from PUS C/S

Organism isolated from PUS C/S	No. of subjects
Klebsiella	3
E.Coli	2
Pseudomonas	2
Acenitobacter Baumani	2
Enterococcus fecalis	1

Discussion

The most common clinical presentation of extra-intestinal amoebiasis is Amoebic Liver Abscess which requires prompt recognition and appropriate treatment.^[9] Morbidity often occurs due to delay in diagnosis of this disease and early diagnosis leads to early initiation of treatment. PCR and RT PCR are confirmatory methods in diagnosis of liver abscess from amoebic origin. PCR and iso-enzyme analysis leads to accurate identification of species due to lack of resources

its use is limited in India. Hence Indirect Haemagglutination Test becomes the reliable and economic tool in the identification of liver abscess due to amoebic origin.

Serological diagnosis of *E. Histolytica* is important in acute stages of disease.^[10,11] As an additional parameter with other tests and often used for epidemiological studies of amoebiasis.^[12] In Amoebic liver abscess, it is helpful in making clinical decision so as to minimize the stay in the hospital and cost cutting.^[13] ELISA with high sensitivity and specificity will give a accurate diagnosis of amoebic liver abscess. In resource limited settings, high cost of ELISA will be a constraint in diagnosis of liver abscess. Simplicity in carrying out test without the need of a trained lab assistant makes indirect haemagglutination test an important tool in diagnosis of amoebic liver abscess. Hira et al., reported high sensitivity and specificity using commercial IHA test.^[14] The study conducted by Mohammed et al., 2009 reported similar sensitivity and specificity as compared to our study. Parija and Ananthkrishnan suggested modification in indirect haemagglutination by which sensitivity can be enhanced.^[15]

Table-10: Study Comparison

	Our study	Mohammed et al 2009	Hira et al
Sensitivity	69%	70%	99%
Specificity	86%	88.7%	99.8%

All patients diagnosed to have amoebic liver abscess do not progress to severe stage of disease. It involves entry of the organism and its adherence to the host leading to lysis of cell followed by phagocytosis of RBC, bacteria and epithelium. Male predominance in this study was also documented in other studies (Barbour & Juniper 1972; Balasegaram 1981; Abuabara et al. 1982; Katzenstein et al. 1982; Conter et al. 1986; Barnes et al. 1987). ALA is 10 times more common in adult males than females.^[16] Male predominance could reflect varying environmental exposures related to occupation, alcohol and behavioral characteristics. Pyogenic abscess is believed to

occur more frequently in the 6th and 7th decade of life. In this study Amoebic liver Abscess was present in 21 out of 33(63%) in patients aged below 50 years as compared to pyogenic liver Abscess more common in about 8 out of 10(80%) cases in patients aged above 50 years included in this study. Many investigators have noted patients with abscess of bacterial origin was found common in older patients as compared to amoebic abscess seen in young adults (Ogden et al. 1961; Levitt et al. 1979; Abuabara et al. 1982; Conter et al. 1986; Blessmann et al. 2002). Studies also reported high-grade fever with chills, abdominal pain and gastroenteritis in persons with abscess of amoebic origin (May et al.1967; Barbour & Juniper 1972; Conter et al. 1986; Barnes et al. 1987). Association between bacterial liver abscess and diabetes mellitus was confirmed with that of previous studies (McDonald 1984; Miedema & Dineen1984; Green-stein et al. 1984).

WBC counts was similar in patients with both abscess of amoebic and pyogenic origin (May et al. 1967; Barbour & Juniper 1972; Ribaud & Ochsner 1973; Conter et al. 1986), hypoalbuminaemia commonly noted in patients with amoebic liver abscess. Compared with pyogenic abscess, hypoalbuminemia is more common in ALA.^[17] Serum liver enzymes did not differ between two types of liver abscess, although previous studies showed bacterial abscesses commonly associated with marked elevation of serum alanine transferase and alkaline phosphatase (Barbour & Juniper 1972; Barnes et al. 1987).

In non-endemic areas, a positive amoebic serology indicate acute stage of disease progression. However, in regions where amoebiasis is endemic, serological diagnosis of *Entamoeba Histolytica* is of no diagnostic value as seropositivity may reflect previous intestinal infection. Titres of indirect haemagglutination may become negative in a short period of time, but remain in the serum after cure in some patients. Serological titres less than 1:256 IU were indicative of pyogenic liver abscess.

Solitary right lobe lesions is more common in amoebic liver abscess (Ribaud & Ochsner 1973; Levitt et al. 1979; Verlenden & Frey 1980; Juniper 1972). USG is useful in identifying bile duct inflammation, bile duct obstruction and cirrhosis of liver. Pus aspirated from abscess cavity grow bacteria, which may be aerobic or anaerobic in nature or Staph aureus which is a clear indication of bacterial liver abscess.

Aspiration of pus from all study subjects with suspicion of bacterial abscess to be done to determine the microorganisms. Liver abscess due to amoebic origin can be treated effectively with agents against protozoa alone (Abuabara et al. 1982; Katzenstein et al. 1982; Conter et al. 1986). Therapeutic drainage of abscess restricted for patients not recovering with antibiotics (Donovan et al. 1991), and for abscesses associated with left lobe that may lead to complications like rupture into pericardial space (Pitt 1990). In this study drainage by open method was required in only five subjects with amoebic abscess and in eight subjects with pyogenic abscess. Surgery was done in view of fever persisting for above 2 weeks inspite of performing percutaneous drainage and appropriate medical therapy. Empirical therapy for bacterial abscess with metronidazole or clindamycin plus a third generation cephalosporin, fluoroquinolone, or aminoglycoside should provide coverage against anaerobic cocci including streptococcus, and anaerobic bacilli like *Bacteroides fragilis*. It is frequently continued for 4 - 6 weeks.

Conclusion

In this study liver abscess of amoebic origin occupied a major proportion. Males were commonly affected because of their particular lifestyles as opposed to women who are largely house bound. Alcohol was found to have a higher association with Amoebic liver abscess than with Pyogenic liver abscess. As Amoebic liver abscess is a potentially life-threatening infection, rapid diagnosis is mandatory so that prompt treatment can follow, resulting in rapid recovery.

Serological diagnosis of *Entamoeba Histolytica* using Indirect Haem agglutination test is very valuable in diagnosing liver abscess of amoebic origin and hence differentiating between liver abscess of pyogenic and amoebic origin. In this study abscess cavity of size less than 5 cm was treated with either conservative antibiotic treatment alone or aspiration of pus with antibiotics. Abscess cavity of size more than 7 cm was treated with percutaneous catheter drainage along with antibiotics. From the study, it was concluded that invasive aspiration and drainage of pus from abscess cavity is more effective than conservative medical management in treatment of liver abscess; however co-morbidities in study population and size of abscess cavity may predict the outcome.

References

1. Haque R, Huston C, Hughes M, Houpt E, Petri W. Amebiasis. *N Eng J Med*. 2003; 348:1565–73. [PubMed] [Google Scholar]
2. Knobloch J, Manweiler E. Development and persistence of antibodies to *Entamoeba histolytica* in patients with amoebic liver abscess: Analysis of 216 cases. *Am J Trop Med Hyg*. 1983; 32:727–32. [PubMed] [Google Scholar]
3. Cosme A, Ojeda E, Zamarreño I, Bujanda L, Garmendia G, Echeverría MJ, et al. Pyogenic versus amoebic liver abscess. A comparative clinical study in a series of 58 patients. *Rev Esp Enferm Dig* 2010;102:90-9. Back to cited text no. 3
4. Sifri CP, Madoff LC. Infections of the liver and biliary system. In: Mandell GL, Bennett JE, Dolin R, editors. *Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases*. 7th ed. Edinburgh: Churchill Livingstone; 2010. p. 1035-44.
5. Kale S, Nanavati AJ, Borle N, Nagral S. Outcomes of a conservative approach to management in amoebic liver abscess. *J*

- Postgrad Med. 2017 Jan-Mar; 63(1):16-20. [PMC free article] [PubMed]
6. Akgün Y, Taçyıldız İ H, Çelik Y. Amebic liver abscess. Changing trends over 20 years. *World J Surg.* (1999);23:102–106. [PubMed]
 7. Donovan A J, Yellin A E, Ralls P W. Hepatic abscess. *World J Surg.* (1991);15:162–169. [PubMed]
 8. Pitt H A. Surgical management of hepatic abscesses. *World J Surg.* (1990);14:498–504. [PubMed]
 9. Saidin S, Yunus MH, Zakaria ND, Razak KA, Lim BH, Othman N, et al. Production of recombinant *E. histolytica* pyruvate phosphate dikinase and its application in a lateral flow dipstick test for amoebic liver abscess. *BMC Infectious disease.* 2014;14:182. [PMC free article] [PubMed] [Google Scholar]
 10. Bansal D, Sehgal R, Chawla Y, Malla N, Mahajan RC. Multidrug resistance in amoebiasis patients. *Indian J Med Res.* 2006;124:189–94. [PubMed] [Google Scholar]
 11. Healy GR, Cahill KM, et al. The serology of amoebiasis. *Bull NY Acad Med.* 1970;47:494–507. [Google Scholar]
 12. Knobloch, Mannwiler E. Development and persistence of antibodies at *E. histolytica* in patients with Amebic liver abscess. *Am J Trop Mod Hyg.* 1983;32:727–32. [PubMed] [Google Scholar]
 13. Arianpour N, Mohapatra TM. Study of Antiamoebic Antibody in Amoebiasis Using ELISA and RID Techniques. *Iranian J Publ Health.* 2003;32:13–18. [Google Scholar]
 14. Doorn RH, Hofwegen H, Koelewijn R, Gilis H, Rose R, Jose CFM, et al. Use of Rapid Dipstick and Latex Agglutination Tests and Enzyme-Linked Immunosorbent Assay for Serodiagnosis of Amebic Liver Abscess, Amebic Colitis, and *E. histolytica* Cyst Passage. *Journal of Clinical Microbiology.* 2005;43:4801–06. [PMC free article] [PubMed] [Google Scholar]
 15. Anjana S, Houpt E, Petri WA. Rapid Diagnosis of Intestinal Parasitic Protozoa, with a Focus on *E. histolytica*. *Interdisciplinary Perspectives on Infectious Diseases.* 2009:1–8. [PMC free article] [PubMed] [Google Scholar]
 16. Maltz G, Knauer CM. Amebic liver abscess: A 15 year experience. *Am J Gastroenterol.* 1991; 86:704. [PubMed] [Google Scholar]
 17. Lodhi S, Sarwari AR, Muzammil M, Salam A, Smego RA. Features distinguishing amoebic from pyogenic liver abscess: A review of 577 adult cases. *Trop Med Int Health.* 2004; 9:718–23. [PubMed] [Google Scholar].