

ULTRASONOGRAPHIC EVALUATION OF AMOEBIC LIVER ABSCESS

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ABSTRACT

AIMS

To study the role of ultrasonography in the diagnosis, followup, resolution and percutaneous interventions of amoebic liver abscesses.

METHODOLOGY

25 patients with 38 amoebic liver abscesses were included in this study. The diagnostic criteria being compatible history, tender and enlarged liver, radiological and ultrasound findings and response to metronidazole therapy. Confirmed cases of amoebic liver abscesses were followed up by ultrasonography till complete resolution.

RESULTS

The highest incidence of age was seen between 3rd and 5th decades (84%) with a male sex incidence of 92%, disease preponderance in people belonging to low socioeconomic group and a high incidence among alcoholics. The radiological findings were: Elevation of right dome of diaphragm (56%), restricted diaphragmatic movements (88%), right basal lung changes (48%), right pleural effusion (12%), and indistinct hazy diaphragmatic contour (40%). The ultrasonographic findings were: 87% of the abscesses were located in right lobe, 11% in left lobe and 2% in both lobes. Among the 25 patients, 76% showed solitary and 24% showed multiple abscesses. Of the 38 amoebic abscesses, 79% were hypoechoic, 13% were hyperechoic and 8% were anechoic. 11 patients were subjected for ultrasound-guided aspiration.

CONCLUSION

Ultrasound is a safe, reliable and non-invasive imaging modality for the diagnosis, followup and percutaneous interventions of amoebic liver abscesses. The sonographic resolution time of amoebic liver abscesses varies from 28 to 286 days.

KEYWORDS

Ultrasonography, Amoebic liver abscess, Abscess resolution.

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INTRODUCTION: Amoebiasis denotes all the conditions that are produced in the human body by the infection of pathogen *Entamoeba histolytica*. It is the 3rd most lethal parasitic infection in the world.^[1] This organism primarily infects colon causing amoebic dysentery. Amoebic liver abscess (ALA) is an extraintestinal manifestation being the most common and dreaded complication of intestinal amoebiasis, and is known to cause significant morbidity and mortality. ALA results when *E. histolytica* trophozoites penetrate intestinal mucosa and reach liver through circulation.

Amoebic infection is an endemic disease in the developing world.^[2] Ultrasonography (USG) is the most reliable, noninvasive, easily available imaging modality and will detect almost 100% hepatic abscesses. When sonographic features are combined with clinical and

laboratory data, correct diagnosis of ALA can be made. Ultrasonography has a diagnostic accuracy of 95%.^[3] Metronidazole the drug of choice in ALA has ushered a new era in the management of ALA and still remains as an effective antiamoebic drug.

AIMS AND OBJECTIVES: The aims and objectives are: To study the role of ultrasonography in the diagnosis and followup of ALA, to assess the sonographic resolution time of ALA and to know the usefulness of ultrasound in percutaneous interventions.

MATERIAL & METHODS: This prospective cross-sectional study was conducted over a period of two and a half years in our hospital. Patients suspected to have signs and symptoms of liver abscesses, who were referred to Radiology Department for investigations were selected for the study. All the patients suspected to have liver abscesses i.e., right upper quadrant pain, fever, tender hepatomegaly, jaundice, right basal pleural and pulmonary pathology were examined with a detailed history and findings were recorded and they were subjected for ultrasonographic examination on the day of arrival.

Real time grey scale ultrasound system with 3.5 MHz curvilinear probe was used to carry out sonographic

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examination. Liver was screened in transverse, subcostal and intercostal planes. All the abscesses were examined for number, size, shape, location, volume, echogenicity, contiguity to liver capsule, distal sonic enhancement, halo, echo levels, internal septations, etc. Neighbouring structures were screened for any other findings like pleural effusion, ascites, subhepatic, subphrenic collections, etc. The right diaphragmatic contour, its movement with respiration, any disruption in diaphragm was also examined.

Routine laboratory examinations and radiographs of chest including upper abdomen was done. Fluoroscopy was done to assess right diaphragmatic movements. With clinical, radiological and ultrasound examinations, a provisional diagnosis of ALA was made. All the selected patients were started on oral or parenteral metronidazole therapy and the clinical response was assessed. Patients responding to treatment like improvement in general condition, decrease in severity of the abdominal pain, control of fever, etc. are considered that their abscesses were amoebic in nature. Further, a certain number of cases were subjected for ultrasound-guided aspirations and characteristic anchovy sauce pus confirmed the diagnosis. The main indications for ultrasound-guided aspiration are to differentiate from pyogenic abscesses, patients with multiple abscesses, large solitary abscesses, and abscesses with imminent rupture. Culture and sensitivity and Gram-stain of the pus was also done to rule out pyogenic abscesses. Patients with abscesses which are not responding to metronidazole therapy were deleted from the study. Culture and Gram-stain positive cases were also deleted from the study.

The initial ultrasound examination on the day of arrival was designated as day 1 and subsequent days were identified accordingly. Confirmed cases of ALA were continued with metronidazole therapy for 10 days. From day 1 to disappearance of clinical symptoms after the initiation of therapy, the time interval was referred as clinical resolution time. During this period, patients were free from clinical signs and symptoms, but ultrasonographic abnormality was still persisting. The patients were discharged and followed up at regular intervals till complete resolution.

During followup scans, all cases were assessed for presence or absence of clinical signs and symptoms. The changes in echopattern of the abscesses, changes in size, shape and volume of the abscesses, disappearance of halo, clearing of echo-levels, filling up of echoes in to the abscess cavity, disappearance of fluids and collections, persistence of lesions, restoration of normal hepatic texture, etc., were studied in detail. The complete absence of ultrasonic abnormality and returning of normal liver echoes was the criteria to release the patients from followup. The time interval from day 1 and to complete absence of the ultrasonic abnormality was referred as sonographic resolution time.

RESULTS AND ANALYSIS: A total 25 patients with 38 amoebic liver abscesses were studied with reference to clinical, radiological and ultrasound features.

- 1. Age & Sex Incidence:** The age group in this study ranged from 23 to 65 years with a mean age of 43 years. The highest age incidence of 72% was seen between 3rd and 5th decades. This study showed a male sex incidence of 92%. Out of 25 patients, 23 were males and 2 were females.
- 2. Socio-Economic Status and Alcoholism:** The disease is commonly seen in low socioeconomic groups. In the present study, all patients were from lower socioeconomic strata. The incidence of the disease is high among alcoholics, probably alcoholic damage of liver predisposes for amoebic invasion. Out of 25 patients, 21(84%) patients gave history of chronic alcoholism, and only 4(16%) patients were nonalcoholics which include 2 female patients.
- 3. Past History of Amoebiasis:** It is said that in most of the cases of amoebic liver abscesses, previous history of intestinal amoebiasis is a common feature. In this study among 25 patients, only 3(12%) patients gave past history of intestinal amoebiasis in the past 5 years. Out of remaining 22 patients, 7(28%) patients were having loose motions with or without blood & mucus was preceding amoebic liver disease. A previous attack of amoebic dysentery as a rule ante-dates the onset of ALA by days, weeks, months or years. There are cases in which history of amoebiasis may not even be traced and the subject may be a carrier.
- 4. Symptoms & signs:** In this study, the most predominant presenting symptoms were fever (84%) and right upper quadrant pain (76%). The commonest physical signs was tender hepatomegaly (96%) and intercostal tenderness. (76%).
- 5. Radiological features:** The earliest radiological sign was an elevated right hemidiaphragm (56%) and restricted movements (88%). Basal lung signs accounts for 48% and an indistinct hazy right diaphragmatic contour was also commonly seen (40%). The other radiological findings seen in ALA are right-sided pleural effusion, pleural encystments and lung abscesses as a result of ruptured amoebic liver abscesses.

Sonographic Features:

- 1. Number of Abscesses:** Most of the ALA are solitary; however, multiple abscesses are not unusual. Out of 25 patients with 38 amoebic liver abscesses, 19(76%) patients were having solitary and 6(24%) patients were having multiple (2 to 5) abscesses.

2. Site of Abscesses: The commonest site of an ALA is superior segments of the right lobe of liver. 33(87%) abscesses were seen in right lobe, 4(11%) in left lobe and 1(2%) in both lobes [Table 1]. Studies have shown each amoebic abscess will involve at least 2 segments of the liver. Most of the abscesses were seen in at least two adjacent segments. In the present study, most of the abscesses were located in posterosuperior segments of the right lobe.

Location	Present study	S. Singh et al	K. Shamsi et al
Right lobe	87%	80%	85%
Left lobe	11%	15%	15%
Both lobes	02%	05%	-

Table 1: Distribution of amoebic abscesses

3. Shape of Abscesses: Most of the ALAs are either round or oval in shape and some may be irregular. Fusion of one or more abscesses gives a lobulated appearance. Present study showed 74% of the abscesses were either round or oval. Remaining 26% were irregular in shape. [Table 2].

Abscess shape	Present study	K. Shamsi et al
Round	45%	54%
Oval	29%	40%
Irregular	26%	06%

Table 2: Shape of amoebic abscesses

4. Size of the Abscesses- The long axis measurement of the 38 abscesses varied from 2.0 cm to 16.9 cm with a mean of 8.3 cm. The smallest abscess measured 2.0 x 1.5 cm and largest abscess measured 16.9 x 14.3 cm. [Table 3].

Present study	Abul-Khair et al	K. Shamsi et al	K. C. Lee et al
2 to 17 cm	3 to 17 cm	1.5 to 9.5cm	5 to 16 cm

Table 3: Size of amoebic abscesses

5. Contiguity to Liver Capsule: ALA are peripheral in locations usually subcapsular, a feature which is commonly seen with ALA. This study showed 26(68%) abscesses were contiguous to liver capsule.

6. Volume of The Abscesses: Of the 38 amoebic liver abscesses, sonographically estimated abscess volume varied from 31 cc to 1301 cc with a mean volume of 475 cc.

7. Echopattern of the Abscesses: The echopattern of the abscesses depends on the contents as well as the stage of abscess evolution. Various authors have described the echopattern as hyperechoic, hypoechoic anechoic and mixed types. In this study, we grouped them into three categories – hypoechoic-(79%), hyperechoic-(13%) and anechoic abscesses-(8%) [Table 4].

Echopattern	Present study	K. Shamsi et al
Hyperechoic	13%	*
Hypoechoic	79%	29%
Anechoic	08%	08%

Table 4: Echopattern of amoebic abscesses

*Remaining 63% were grouped under mixed type of echopattern.

8. Distal Sonic Enhancement (DSE): Enhancement of echoes posterior to the lesion is a feature in most of the hypoechoic and anechoic amoebic abscesses. In this study 23(61%) abscesses showed mild to moderate distal sonic enhancement.

9. Abscess Wall: All ALA do not have a well-defined wall unless they are chronic, when there is formation of wall. On ultrasonography an abrupt change over from normal to abnormal liver echopattern is seen. Abscesses may have smooth or irregular margins. In our study 20(53%) abscesses showed definable abscess wall, and 18(47%) showed ill-defined margins.

DISCUSSION: Amoebiasis is primarily a colonic disease, amoebic abscess is its extra intestinal manifestation. ALA is a disease of lower socio-economic group, which is evident in our study. It is commonly seen in the age group of 2nd to 5th decade with a male preponderance. It has a predilection for alcoholics. In our study the highest age incidence of 72% was seen between 3rd and 5th decades which is consistent with studies by other workers.^[1,3,4] Our study showed a male predominance of 92% which is in agreement with other studies.^[1,3,4] Out of 25 patients in our study 21(84%) gave history of chronic alcoholism which is also consistent with other studies.^[1] In our series only 12% cases had past history of amoebiasis which is in agreement with study done by K. C. Lee et al.^[4]

ALA patients will present with fever, right upper quadrant or right lower thoracic pain, jaundice, right pleural or pulmonary pathology, tender hepatomegaly etc. In this study the most predominant presenting symptoms were fever (84%) and right upper quadrant pain (76%). Tender hepatomegaly (96%) was the most common physical sign and intercostal tenderness (76%) is also another frequently observed sign in ALA.

Radiologically the earliest sign in ALA is elevated right hemi diaphragm (56%) with restricted diaphragmatic movements. (88%) [Fig. 1] Basal lung signs accounts for 48% and an indistinct hazy diaphragmatic contour is also commonly seen (40%). These findings are also consistent with previous studies. Enlarged hepatic shadow with downward displacement of transverse colon can be seen on x ray in case of large right lobe abscesses [Fig. 2]. Abscess bulging into right dome of diaphragm is also seen in cases of ALA with imminent rupture.



Fig. 1: Chest radiograph showing elevated right hemidiaphragm with minimal pleural effusion in a case of ALA

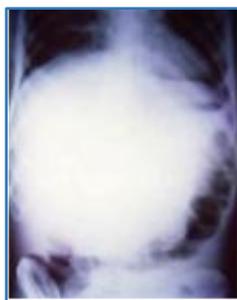


Fig. 2: Radiograph of abdomen showing enlarged liver shadow in a case of liver abscess

Basal lung signs, right pleural effusion, pleural encystments and lung abscesses due to ruptured liver abscesses are also seen on plain radiographs. These significant radiologic findings noted in this study were seen in other studies also.^[3,5,6]

Sonographically, ALAs are usually solitary, large, round or oval, hypoechoic lesions, which are commonly seen in superior segments of right lobe of liver in a subcapsular location. These lesions are diagnostic of amoebic abscesses, but are not pathognomonic. The size of the abscess in this study varied from 2 to 17 cm, is consistent with other studies.^[2,3,4] In this study, 76% of the abscesses were solitary and 24% were multiple (2 to 5). This finding is in perfect agreement with other two studies.^[1,7] Multiple ALAs are not unusual in cases of amoebic abscesses. We noticed 74% of the abscesses were either round or oval and remaining 26% were irregular in shape; however, this feature differs from other studies.

Most of the ALAs are commonly seen in superior segments of right lobe. If small abscesses occupy one segment, bigger abscesses are seen occupying two or more adjacent segments. In this study, right lobe abscesses accounted for 87% and left lobe abscesses for 11% which is in agreement with two other studies.^[2,7] Most of the amoebic abscesses of this study were seen in posterosuperior segments of right lobe of liver. 92% of the abscesses were seen in 1 or 2 segments.^[1] In this study, we noticed 68% of the abscesses were in subcapsular location which is a feature commonly seen with ALA. This feature is consistent with other studies.^[2]

ALAs do not demonstrate a well-defined wall on ultrasonography. Chronic abscesses may show smooth and irregular margins. Sonographically, in early stage of abscess

evolution, abscesses show hyperechoic pattern. After the lysis and liquefaction of liver tissue, they appear hypoechoic. Later during the process of healing most of them become anechoic and demonstrate distal sonic enhancement on USG. In this study, we noticed 13% hyperechoic, 79% hypoechoic and 08% anechoic abscesses. However, this finding is variable compared to other studies.^[2] Distal sonic enhancement is a feature of most of the ALA. In this study, 61% of the abscesses showed DSE compared to 84% as reported in a previous study.^[8]

Halo is a feature seen in ALA and appears as an anechoic rim surrounding the lesion which is seen sometimes [Fig. 3]. In this study, 3 patients showed this feature. The halo gradually gets incorporated into the abscess during healing process. Echo levels are due to separation of solid and fluid contents of the abscess with a horizontal straight line interface due to gravitational effect which is another feature seen in ALA [Figure-4]. In this study, 2 patients presented with such echo levels.



Fig. 3: Ultrasound image of liver showing an abscess with a halo



Fig. 4: Ultrasound image showing a liver abscess with an echo level

Pleural effusion is commonly seen on right side in ALA and can be appreciated both on radiographs and on ultrasound. In the present study, 3 cases (12%) showed evidence of pleural effusion on fluoroscopy and radiographs. Ultrasound detected pleural effusion in 6 cases (24%), hence it is more sensitive.^[1,2] The right dome contour was intact in 23 patients. 2 patients showed a bulge protruding into the right basal lung region, which is due to large underlying abscess. [Fig. 5] Out of these two, in one patient, the abscess ruptured into right pleural cavity producing multiple pleural encystments. [Fig. 6] Whereas in another patient, abscess ruptured into right lung producing multiple lung abscesses. The disruption in the diaphragm in these patients was clearly demonstrated on ultrasound [Fig. 7]. K. Shamsi et al reported 1 case of disruption of diaphragm (out of 33 patients) in their study.



Fig. 5: Right lateral chest radiograph showing a bulge in diaphragm in a case of large liver abscess with imminent rupture



Fig. 6: Chest radiograph showing multiple right pleural encystments due to rupture of right lobe liver abscess into pleural cavity



Fig. 7: Ultrasound image of ruptured liver abscess demonstrating disruption of diaphragm

Out of 25 patients, 11 patients were subjected for ultrasound-guided aspiration for both diagnostic as well as therapeutic reasons. About 50 to 1000 mL of pus was aspirated depending upon the size of the abscess. 3 patients were aspirated twice and in one patient who developed secondary infection and re-accumulation was put on open drainage [Fig. 8]. All patients showed good response and proceeded towards resolution. There was a quicker relief of signs and symptoms in aspirated group. The consistency of the pus was very thick and paste like. The colour varied from reddish or chocolate brown to brownish yellow. Microscopy did not reveal any *Entamoeba histolytica* trophozoites. All the specimens showed no growth on culture & sensitivity and were negative for Gram-stain.



Fig. 8: USG image showing an abscess in right lobe of liver with drainage catheter in situ

All the patients with 38 abscesses were followed up to complete resolution. 11 patients (44%) were subjected for ultrasound-guided aspirations. Both groups were on medical treatment. In all the patients, initial clinical recovery was observed in first 5 to 10 days from the initiation of therapy. After the clinical recovery, all the patients were completely asymptomatic throughout the followup period. The ultrasound abnormality was persisting even beyond the clinical resolution. The disappearance of sonographic abnormality in all 25 patients varied from 28 to 286 days. [In the aspirated group, it was 29 to 184 days and in non-aspirated group it was 28 to 286 days].

Normally, ALA takes 2 to 4 months for resolution and even up to 1 year in certain cases.^[9] In the present study, all the lesions healed between 28 to 286 days which is in agreement with other previous studies.^[10,11,12] The healing pattern was the reduction in the sizes of the abscesses with absorption of contents. Serial ultrasound scans depicted the reduction in sizes very well. The process of healing starts at the periphery with the regeneration of liver tissue. During the healing process, most of the lesions became uniformly hypochoic, and few lesions anechoic, finally replaced by normal liver tissue. The associated findings like halo, echo-levels, septa, etc., disappeared gradually leaving normal liver texture.

CONCLUSIONS: Ultrasound is an ideal, safe, sensitive, non-invasive and easily available imaging modality for the diagnosis, followup and percutaneous procedures of ALA. Abscesses which are solitary, hypochoic, round or oval, situated in right lobe of liver in a subcapsular position are diagnostic of ALA but are not pathognomonic. Ultrasound is an excellent imaging modality for identification and location of the ALA, for estimation of size and volume, and for evaluation of complications. Ultrasound is an excellent aid to carry out percutaneous interventions. When aspiration is combined with medical management, it is very effective and appears to shorten the duration of resolution. Sonographic resolution time of an ALA varies 28 to 286 days.

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REFERENCES:

1. Cernichiaro-Espinosa Linda A, Segura-ortega Jorge E, Arturo Panduro, et al. Amoebic liver abscess: a new perspective on the prognosis of patients in an endemic area regional referral centre. *J Liver* 2014;3(1):1-6.
2. Shamsi K, De Schepper A, Deckers F, et al. Role of ultrasound in the diagnosis and treatment follow up of Amoebic liver abscess. *Eur Radiol* 1993;3(5):434-438.
3. Abul-Khair MH, Kenawi MM, Korashy EE, et al. Ultrasonography and Amoebic liver abscesses. *Ann Surg* 1981;193(2):221-226.

4. Kwang Choon Lee, Osamu Yama Zaki, Hiroyuki Hamba, et al. Analysis of 69 patients with Amoebic Liver abscess. *J Gastroenterol* 1996;31(1):40-45.
5. Lamont NM, Pooler NR. Hepatic Amoebiasis, a study of 250 cases. *Q J Med* 1958;27(107):389-412.
6. DeBakey ME, Ochsner A. Hepatic Amoebiasis, A 20 year Experience and analysis of 263 cases. *Int Abstr Surg* 1957;92:209-231.
7. Sukhjeeth singh, Poras Chaudhary, Neeraj Saxena, et al. Treatment of liver abscess:Prospective randomised comparison of catheter drainage and needle aspiration: *Annals of Gastroenterology* 2013;26:1-8.
8. Philip W Ralls, Peter F Barnes, Randall Radin D, et al. Sonographic features of Amoebic and pyogenic liver abscesses: a blinded comparison. *AJR* 1987;149(3): 499-501.
9. Sheedy TW, Parmley LF, Johnson GS, et al. Resolution time of an amoebic liver abscess. *Gastroenterology* 1968;55(1):26-34.
10. Simjee AE, Patel A, Gathiram V, et al. Serial ultrasound in amebic liver abscess. *Clinical Radiology* 1985;36(1):61-68.
11. Freeman O, Akamaguna A, Jarikre LN. Amebic liver abscess-The effect of aspiration on resolution or healing time. *Ann. Trop Med Parasitol* 1990;84(3):281-287.
12. Chaturvedi AK. Sonographic evaluation of amoebic liver abscess. *IJRI* 1989;43(4):373-377.