International Surgery Journal
Christopher S et al. Int Surg J. 2016 Nov;3(4):1868-1874
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20162826

Original Research Article

Liver abscess-various modalities of treatment and its clinical outcome

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Received: 21 July 2016
Accepted: 08 August 2016

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ABSTRACT

Background: Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in tropical countries. The primary mode of treatment of amoebic abscess is medical; however many cases may be refractory to medical therapy. In such patients with pyogenic liver abscesses, aspiration has been the traditional mode of treatment. In the present study of liver abscess of different etiology the following treatment modalities such as medical management, aspiration and percutaneous catheter drainage have been studied.
Methods: The Present study was conducted in Bangalore Baptist hospital during the period from August 2010 to December 2012. All 70 patients with the diagnosis of liver abscess were included in the study. Detailed morphology of liver by radiology and ultrasound abdominal scan for abscess was examined. Routine blood and serological examinations to detect anti-amoebic antibodies by IHA were performed. After thorough examination patients were hospitalized and underwent with antibiotic therapy. Patients not responding to parenteral antibiotics therapy within 48-72 hours, were subjected to ultrasound guided aspiration if the abscess cavity was less than 5 cm in diameter and percutaneous catheter drainage for cavity more than 5 cm.
Results: The age group of the study patients ranged from the 2-78 years and the incidence of sex ratio male:female was 10.6: 1. The incidence of alcohol consumption was 74% and it was more common in age group between 31 - 40 years. Solitary abscess was found in 59% and 41% of patients had multiple abscess. Serology for *Entamoeba histolytica* was positive in 88.6%. Commonest presentation was right upper quadrant pain and fever. Raised alkaline phosphatase was noted in 84.3 % of patients. Initially all patients were managed with antibiotics (ciprofloxacin and metronidazole). Patients who are not responding to antibiotics, aspiration was done in 15 patients with volume of pus 100 cc-200 cc and percutaneous catheter drainage was done in 27 patients with volume of pus >200 cc by using 18Fr Malecot's catheter which found to have less incidence of blockage.
Conclusions: In the present study abscess containing volume of pus 100-200 cc was treated with either conservative antibiotic treatment alone or aspiration of pus with antibiotics. Abscess containing volume of pus >200 cc was treated with percutaneous catheter drainage along with antibiotics. From the study, it was concluded that percutaneous needle aspiration and percutaneous catheter drainage are more effective than conservative medical management in treatment of liver abscess; however co-morbid conditions of patients and size of liver abscess also influence the outcome.

Keywords: Ultrasound guided aspiration, Percutaneous catheter drainage, Malecot's catheter, IHA titre

INTRODUCTION

Both amoebic and pyogenic liver abscesses are among the important causes of morbidity and mortality in tropical countries.[1] The advances in radiology like ultrasonography and CT scan since last 30 years with interventional techniques has resulted in introduction of radiological guided aspiration and drainage of most of the intra-abdominal abscesses.[2]

The primary mode of treatment of amoebic abscess is medical; however many cases may be refractory to

medical therapy. Also secondary bacterial infection may complicate 20% of amoebic liver abscess. In such patients and in patients with pyogenic liver abscesses, aspiration has been the traditional mode of treatment. Operative drainage is associated with significant (10 to 47%) mortality and morbidity.[2] In recent years, imaging guided percutaneous drainage has been increasingly used to treat liver abscess with reported success rates ranging from 70 to 100%, surgical intervention is typically unnecessary.[2]

Percutaneous placement of an indwelling catheter is the method most widely preferred to drain the large liver abscesses.[3] Also few studies have shown therapeutic needle aspiration to be a simpler and less costly mode of treatment, but needs repeated aspiration, with more failure rates.

In the present study the authors were interested to study the effectiveness of various treatment modalities for liver abscess, Malecot's catheter in continuous percutaneous drainage of liver abscess, aspiration as a treatment for liver abscess and also aimed at the study of usefulness of percutaneous catheter drainage procedure in morbid patients not fit for open surgical drainage, those not responding to medical line of management, recurrent abscesses following needle aspiration and multiple abscesses.

METHODS

The Present study was conducted in Bangalore Baptist hospital during the period from August 2010 to December 2012. All 70 patients with the diagnosis of liver abscess were included in the study. Patients with ruptured abscess and liver abscess associated with suspected malignancy were excluded from the study.

Patients with following symptoms and signs were selected for screening of liver abscess. Pain abdomen (upper - RUQ), fever with chills, history of chronic alcoholism and smoking, tender hepatomegaly, right basal pleural and pulmonary pathology, jaundice and patients with other signs and symptoms like loss of weight, hiccoughs, right shoulder pain, diarrhea, nausea/vomiting and distention of abdomen were subjected to complete ultrasound abdomen examination to visualize almost all part of liver. Intercostal and sub costal planes were used. All the liver lesions suggestive of liver abscess were examined in detail (other abdominal organs were also scanned for any abnormalities).

Detailed morphology of liver for abscess was examined with special attention to size of liver assessed for hepatomegaly, identification of number of abscess and their locations in relation to lobes/segmental anatomy of liver, contiguity of abscess to the liver capsule, size and volume of abscess and echogenecity of the abscess (hyperechoic, hypoechoic, anechoic).

Routine blood examinations like haemoglobin, random blood sugar, blood urea, serum creatinine, total leukocyte count, leukocyte differential counts were done. Urine, stool, liver function tests and chest X-ray including upper abdomen radiographs was done. Pus if aspirated was sent for aerobic culture and antibiotic sensitivity and also for microscopy to see for *Entamoeba histolytica*

Serology examination was done to detect anti-amoebic antibodies by IHA, in which the IHA titre was measured and the type of abscess was diagnosed as per the titre values. The IHA titre values >256 were considered to be positive for amoebic and <256 were pyogenic abscess.

After history, clinical examination, radiological and ultrasound abdomen investigations, with the help of diagnostic criteria a provisional diagnosis of liver abscess was made. All patients were hospitalized and depending upon hydration status they were hydrated and started on parenteral ciprofloxacin/third generation cephalosporin and metronidazole therapy. Patients not responding to parenteral antibiotics therapy within 48-72 hours were subjected to ultrasound guided aspiration if the abscess cavity was less than 5 cm in diameter and percutaneous catheter drainage for cavity more than 5 cm.

Procedure of percutaneous catheter drainage

The selected area was in filtered with xylocaine with strict asepsis. Infiltration should include diaphragm and tissues up to capsule of liver. Patient was instructed to breathe slowly during the procedure to minimize the liver trauma. For guiding the aspiration needle a right angle approach can be used. By preliminary scans after choosing the site of lesion and finalizing course of the needle, the transducer is placed exactly at right angles along the course of the needle. This allows clear visualization of the needle along its path into the abscess cavity. Under ultrasound guidance the needle tip is followed into the abscess cavity with uniform guarded pressure. Once the needle enters the cavity, pus often rushes out under pressure. Then the stylette is removed and catheter was introduced well in to the cavity which is confirmed by ultrasound. Catheter is fixed to the skin and connected to a drainage bag. The patient should be watched for vital signs for a period of 24 hours. During the hospital stay all patients who had undergone percutaneous drainage, the volume of pus drained each day was measured. Patients who showed improvement following percutaneous drainage were discharged with the drain in situ.

Catheter care and follow up

Daily estimation of volume, colour and consistency of the drainage fluid was recorded. Catheter was kept in situ till the drain became less than 20 ml. The duration varied in individual cases depending on the quantity of pus, or presence of biliary fistula. Follow up was done using ultrasonography to note the shrinkage in size of the cavity

every 7th day. Removal of catheter was decided based on the amount of pus drained (<20 ml for three consecutive days), relief of symptoms and sonological evidence of collapsing cavity or decrease in the size of cavity. Patients were followed up weekly for 1 month and monthly for next 3 months with repeat ultrasonography. Treatment was considered successful if the patient improved clinically with relief of pain, fever and other symptoms and the imaging of liver showed resolution of the abscess.

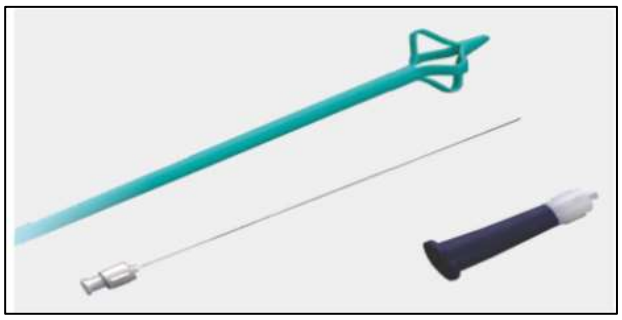

Figure 1: Malecot's catheter used for percutaneous drainage.

RESULTS

Incidence of age

The age group of the study patients ranged from the 2-78 years. Highest incidence of age was found between 3rd - 6th decades with 65.71%. Youngest was 2 years old female and oldest 78 years male. In this study group 64 cases were male and 6 cases are female and sex incidence, ratio being, male:female was 10.6:1.

Table 1: Age incidence.

Age	Frequency	Percent
<20 years	4	5.7
20-29 years	8	11.4
30-39 years	13	18.6
40-49 years	18	25.7
50-59 years	14	20.0
>=60 years	13	18.6
Total	**70**	**100.0**

Table 2: Sex distribution of liver abscess.

	Frequency	Percent
Male	64	91.4
Female	6	8.6
Total	**70**	**100.0**

History of alcoholism

In this study the incidence of alcohol consumption was 74% and it was more common in age group between 31 to 40 years.

Table 3: Incidence of liver abscess in alcoholics in this study.

Group	No. of patients	Percentage
Alcoholics	52	74.3%
Non Alcoholics	18	25.7%

Clinical manifestations

Symptoms and signs

In our study of 70 cases of liver abscess, 67 cases gave history of right upper quadrant dull aching pain associated with fever in 59 patients and chills in 29 patients. Vomiting was noted in 18 patients, loose stools in 3 patients and anorexia in 13 patients. On examination 7 (10%) patients have variable degrees of anaemia (Hb<10 gm/dl), jaundice in 25 cases, tender hepatomegaly n in 34 (48.57%) cases along with the 67 (94.28%) cases had right upper quadrant tenderness and 43 patients had fever >102°F.

Table 4: Symptoms of liver abscess.

Symptoms	No. of patients	Percentage
Pain right upper quadrant	67	95.71%
Fever	59	84.28%
Chills	29	41.42%
Vomiting	18	25.71%
Loose stools	3	4.28%
Anoxeria	13	18.57%

Table 5: Signs of liver abscess.

Signs	No. of patients	Percentage
Pallor	7	10%
Icterus	25	35.71%
Tenderness	66	94.28%
Hepatomegaly	34	48.57%

Comorbidities

In our study, of 70 cases of liver abscess, 6 (8.6%) cases were diabetic (DM), 5 (7.1%) were hypertensive (HTN), 2 patients associated with ischemic heart disease, 1 patient with renal failure and 1 patient had past history of cerebro vascular accident (CVA).

Table 6: Comorbidities associated with liver abscess.

Comorbidities	Total (N = 70)	
DM	6	8.6%
HTN	5	7.1%
Heart disease	2	2.9%
Renal failure	1	1.4%
CVA	1	1.4%

Investigations

Routine blood examinations and liver function tests were presented in Table 7 and Table 8.

Table 7: Routine blood examinations according to the treatment.

Investigations	No. of patients	Percentage
Anemia	6	8.57%
Leucocytosis	63	90%
Neutrophilia	49	70%
High Creatinine	9	12.85%
Hyponatremia	44	62.85%
ESR	70	100%

Table 8: Liver function tests.

Investigations	No. of patients	Percentage
Hypoalbuminemia	58	82.85%
Elevated total Bilirubin	51	72.85%
Elevated direct Bilirubin	47	67.14%
Elevated alkaline phosphatase	59	84.28%
Elevated SGOT(AST)	43	61.42%
Elevated SGPT(ALT)	55	78.57%

Table 9 and 10 describes culture sensitivity in liver abscess and IHA titres.

Table 9: Culture sensitivity in liver abscess.

	Pus c/s			Total
	Negative	Positive	Not done	
Aspiration	14	0	1	15
Pigtail	22	5	0	27
Total	**36**	**5**	**1**	**42**
	85.7%	**11.9%**	**2.4%**	**100.0%**

Table 10: IHA titres and diagnosis of amoebic abscess with titres >256.

Mode of treatment	IHA titre		Total
	Amoebic abscess (>256)	Pyogenic abscess (<256)	
Conservative	25	3	28
Aspiration	15	0	15
Pigtail	22	5	27
Total	**62**	**8**	**70**
	88.6%	**11.4%**	**100.0%**

Radiological

Chest X ray

All patients were subjected to screening of chest with chest x-ray including upper abdomen. 34 (48.57%) cases had elevated or right dome of the diaphragm with restricted movements. The elevated right dome of the diaphragm was due to upper enlargement of liver, which occurs, in liver abscess as shown in Figure 2. 33 (47.14%) cases had right sided pleural effusion. Cardiomegaly and involvement of pericardium was not seen in any of the cases.

Figure 2: Chest X-ray raised dome of right side of diaphragm.

Figure 3: Ultrasound liver abscess.

Ultrasound abdomen

USG is a very important tool, both in diagnosis and therapeutic management of liver abscess.

Size, volume and number of abscesses

In the present study, the size of abscess was determined by long axis measurement and varied from 3×2 to 11×9 cms. Volume of abscess was also measured, the smallest was 9 cc and the largest was 1092 cc.

In the present study, 41 cases (58.6%) had solitary abscess and 29 (41.4%) cases showed multiple abscesses. involving both lobes and also many abscesses in same lobe. Out of 29 cases of multiple abscesses, both lobe involment was in 6 cases and 2 abscesses found in same lobe either right or left in 22 cases and 3 abscesses in one lobe seen in 1 case.

Table 11: The site and number of abscesses.

	Site			Total	Number of abscess		Total
	Right	**Left**	**Both**		**Solitary**	**Multiple**	
Conservative	21	3	4	28	16	12	28
Aspiration	13	1	1	15	9	6	15
Pigtail	24	2	1	27	16	11	27
Total	**58**	**6**	**6**	**70**	**41**	**29**	**70**
	82.9%	**8.6%**	**8.6%**	**100.0%**	**58.6%**	**41.4%**	**100.0%**

Table 12: The volume of abscess and the mode of treatment.

Lab parameters	Normal range	Conservative (N = 28)		Aspiration (N = 15)		Pigtail (N = 27)		Total (N = 70)	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Volume	<100	20	71.4%	3	20.0%	4	14.8%	27	38.6%
	100-200	8	28.6%	7	46.7%	5	18.5%	20	28.6%
	>200	0	0.0%	5	33.3%	18	66.7%	23	32.9%

Mean volume drained after insertion of pigtail equal to 243.19 cc. Mean volume draining during the hospital stay on the 1st day is 173.54 cc, 2nd day is 86.63 cc, 3rd day 54.11 cc and 4th day 42.45 cc as shown in Figure 4.

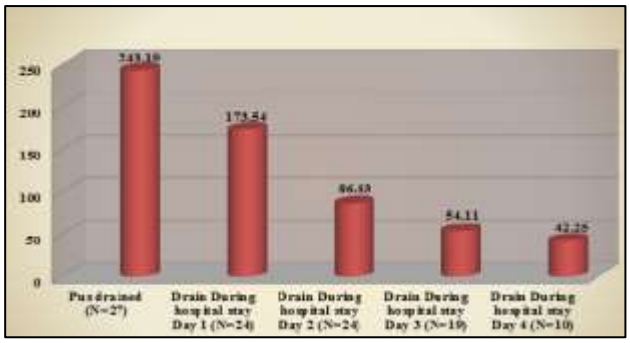

Figure 4: Pus drained by percutaneous drainage.

Management

70 cases of liver abscess were directed with conservative management, aspiration and pigtail insertion. Out of which 28 (40%) cases were treated with antibiotics alone, 15 (21.42%) cases were treated with antibiotics and aspiration, 27 (38.57%) cases were subjected to catheter drainage yielding varying quantities of pus from 200 ml to 1000cc, depending on the size of the abscess. All patients showed good response and proceeded towards resolution. There were no major complications noted either due to aspiration or due to catheter drainage.

DISCUSSION

The management of liver abscess has drastically changed with significant reduction in mortality and morbidity after the advent of imaging modalities and antibiotics. Percutaneous placement of indwelling catheter provides continuous drainage, hence the problem of incomplete evacuation and re-accumulation are not associated with catheter drainage and this method achieved good success rate as reported in earlier studies. In the present study, the participation of patients with different sex ratio are similar to the previous studies indicating males are more prone to liver abscesses compared to females.[2,4-7]

Pain in abdominal associated with fever were the most common symptom observed in our study and is comparable with the study of Rajak et al.[2] The common signs in most of the patients observed was right upper quadrant tenderness in 67 (94.28%) cases and fever >102^{o}F in 43 patients. In our study the major comorbidity associated with liver disease was diabetes found in 6 patients followed by hypertension, ischemic heart disease, renal failure and cerebrovascular damage. The abscess characteristics like site of abscess, location of abscess, no of abscesses was comparable with the same study and other standard studies.

Table 13: Sex incidence in other series.

Study group	Our study (n* = 58)	Tiwari et al (n = 58)	Rajak et al (n = 25)	Wong K. P. et al (n = 21)	Sonnenberg et al (n = 18)	Gerzof et al (n = 12)
Male	64	54	19	13	14	10
Female	6	4	6	8	4	2

In this study the incidence of alcohol is 74% and it is more common in age group between 31 to 40 years particularly in males. Similar findings was observed by Ochsner and De Bakey and attributed higher incidence of alcoholism in males, which predisposes hepatitis and trauma.[8] Very few workers have tried to confirm actual relationship of alcohol to liver abscess but exact pathology is not known.

On routine blood investigations it was observed that all 70 (100%) patients had shown elevated ESR, hyponatremia in 44 (62.65%), right sided pleural effusion in 33, polymorphonuclear leucocytosis in 63 (90%) and neutrophilia in 49 (70%) patients. Bleeding time and clotting time were normal in all the patients. Prothrombin time and INR deranged in 14 (20%) patients. Patients with deranged INR were treated with a stat dose of vitamin K 30 mg i.v. and then transfusion of fresh frozen plasma.

Liver function tests were performed in the present study to estimate the levels of liver enzymes that acts as indicators of liver function. Results revealed that the levels of alkaline phosphatase was raised in 59 patients, total bilirubin in 51 (72.85%) showing and lowered albumin in 58 (82.85%) of patients.

Table 14: Comparision of patient and abscess characteristics in two studies.

Characteristics	Our study		Tiwari et al		Rajak et al	
	No of patients	Percentage	No of patients	Percentage	No of patients	Percentage
Fever	59	84.3%	47	81%	23	92%
Pain	67	95.7%	57	98.3%	25	100%
Jaundice	25	35.7%	22	38%	3	12%
Leukocytosis	63	90.0%	41	70.7%	20	80%
No of abscesses						
Solitary	41	58.6%	39	67.2%	20	80%
Multiple	29	41.4%	19	32.8%	5	20%
Location of abscess						
Right lobe	42	72.4%	42	72.4%	17	68%
Right lobe	58	82.9%	7	12%	4	16%
Left lobe	6	8.6%	9	15.5%	4	16%
Both lobes	6	8.6%	-	-	-	-
Causes						
Amoebic	18	31	44	75.9%	9	36
Amoebic	62	88.6%	14	24.1%	20	80%
Pyogenic	8	11.4%	-	-	5	20%

Serology for antibodies to E. histolytica is a useful adjunctive test for invasive amoebiasis. ELISA for the demonstration of anti-amoebic antibody in titres greater than 1:400 is considered strong evidence of amoebic liver abscess. But for diagnostic purposes titres >250 are considered positive. In our study there were 62 (88.6%) patients whose titre were >250 was diagnosed as amoebic liver abscess and the remaining 8 (11.4%) patients the titres were negative and were considered as pyogenic liver abscess.

In the present study, 41 cases (58.6%) had solitary abscess and 29 (41.4%) cases showed multiple abscesses in comparison with other studies of Tiwari et al (67.2% solitary and 32.8% multiple), Sharma et al (79% solitary and 21% multiple liver abscesses).[4,9] In our study the symptoms, number, location and causes of abscesses were evaluated and they are comparable with the studies of Rajak et al and Tiwari et al.[2,4]

The mean duration of drainage in our study was 16 days, as compared to Rajak, et al (7 days), Wong (25 days), Sonnenberg (4 days).[2,5,6] Jaipal Singh et al showed an average duration of 4.5 days and Gerzof showed a mean drainage period of 18 days.[10,6] The studies of Jaipal Singh and Sonnenberg were on amoebic abscesses and Wong and Gerz of studied only on pyogenic abscesses with other comorbid conditions such as malignancy and biliary stents, which prolonged the duration of drainage.[10,5-7]

Table 15: Duration of catheter after percutaneous drainage.

Study group	Our study	Tiwari et al	Rajak et al	Wong K.P. et al	Sonnenberg et al	Gerzof et al	Singh J. et al
No. of days	16	13	7	25	4	18	4.5

In our study there were no complications noted during in both aspiration and percutaneous drainage. Only in percutaneous drainage group, local wound infection was noted in 3 cases which were treated with daily dressings with betadine and saline.

CONCLUSION

Liver abscess is a very common condition in India. India has 2nd highest incidence of liver abscess in world. Liver abscesses occurred most commonly between 30-60 years. Males were affected more than females. Most of the cases had an acute presentation, and right lobe is most commonly affected. Out of 70, 67 cases had pain in abdomen as the most common symptom. It was found that alcohol consumption was one of the most important etiological factors for causation of liver abscesses. Alkaline phosphatase is the enzyme most consistently elevated among all liver function. Elevated WBC count, alkaline phosphatase level, presence of diabetes, hypoalbuminemia, prolonged prothrombin time were considered as the prognostic factors of complicated abscess in this study. Diabetes mellitus was more frequently associated condition in cases of liver abscess and especially in case of pyogenic liver abscess. Percutaneous needle aspiration and percutaneous catheter drainage are more effective than conservative medical management in treatment of liver abscess; however co-morbid conditions of patients and size of liver abscess also influence the outcome.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Christopher S, Kumar A, Achar S. Liver abscess-various modalities of treatment and its clinical outcome. Int Surg J 2016;3:1868-74.