Original article:

Institutional study of liver abscess, treatment modalities and its outcome

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Abstract:

Background: Liver abscesses, amoebic and pyogenic, is 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 aetiology the following treatment modalities such as medical management, aspiration and percutaneous catheter drainage have been studied.

Methods: The Present study was conducted in D.V.V.P.F's Medical College & Hospital, Ahmadnagar, during the period from January 2015 to November 2016.

60 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. 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 10-70 years and the incidence of sex ratio male:female was 8.5:1. The incidence of alcohol consumption was 65% and it was more common in age group between 31 - 60 years. Solitary abscess was found in 59% and 41% of patients had multiple abscess. 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). In patients not responding to antibiotics, aspiration was done, i.e, in 9 patients with volume of pus 100 ml-200 ml and percutaneous catheter drainage was done in 24 patients with volume of pus >200 ml by using Pigtail Catheter.

Conclusions: In the present study abscess containing volume of pus 100-200 ml was treated with either conservative antibiotic treatment alone or aspiration of pus with antibiotics. Abscess containing volume of pus >200 ml was treated with percutaneous catheter drainage along with antibiotics. Hence, 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, and pigtail catheter.

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 & 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 most widely preferred method to drain the large liver abscesses [3]. 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.

The present study was targeted to study the effectiveness of various treatment modalities for liver abscess, pigtail catheter in continuous percutaneous drainage of liver abscess, aspiration as a treatment for liver abscess and also to study the 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 D.V.V.P.F's Medical College & Hospital, Ahmadnagar, during the period from Jan 2015 to July 2016. All 60 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, diarrhoea, 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 echogenicity 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.

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 stilette 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 after removal of drain.

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: Pigtail catheter used for percutaneous drainage.

Figure 2: Showing pus draining from pigtail catheter.

RESULTS

Incidence of age

The age group of the study patients ranged from the 10-78 years. Highest incidence of age was found between 4th - 6th decades with 68.3%. Youngest was 10 years old female and oldest 78 years male. In this study group 53 cases were male and 7 cases are female and sex incidence, ratio being, male: female was 8.5:1.

Table 1**: Age incidence**.

AGE	FREQUENCY	PERCENT (%)
<20 yrs	3	5
20-29 yrs	7	11.6
30-39 yrs	14	23.3
40-49 yrs	15	25
50-59 yrs	12	20
>60 yrs	9	15
Total	60	100

Table 2: **Sex distribution of liver abscess**.

	Frequency	Percent (%)
Male	53	88.4
Female	7	11.6
Total	60	100

History of alcoholism

In this study the incidence of alcohol consumption was 65% and it was more common in age group between 31to 60 years.

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

Group	No. of patients	Percentage (%)
Alcoholics	39	65
Non Alcoholics	21	35

Clinical manifestations

Symptoms and signs

In our study of 60 cases of liver abscess, 58 (96.6%) cases gave history of right upper quadrant dull aching pain associated with fever in 54(90%) patients and chills in 19(31.6) patients. Vomiting was noted in 15 (25.1) patients, loose stools in 2 (3.33) patients and anorexia in 16 (26.6%) patients. On examination 26(43.3%) patients have variable degrees of anaemia (Hb<10 gm/dl), jaundice in 5(8.3) cases, tender hepatomegaly in 33 (55%) cases along with the 57 (95%) cases had right upper quadrant tenderness.

Table 4**: Symptoms of liver abscess**

Symptoms	No. of patients	Percentage (%)
Pain in the right upper quadrant	58	96.6
Fever	54	90
Chills	19	31.6
Vomiting	15	25.1
Loose stools	2	3.33
Anorexia	16	26.6

Table 5: **Signs of liver abscess.**

Signs	No. of patients	Percentage (%)
Pallor	26	43.3
Icterus	5	8.3
Tenderness	57	95
Hepatomegaly	33	55

Comorbidities

In our study, of 60 cases of liver abscess, 7 (11.6%) cases were diabetic (DM), 4 (6.6%) were hypertensive (HTN), 2 (3.33) patients associated with ischemic heart disease, 0(0%) patient with renal failure and 1 (1.66%) patient had past history of cerebro-vascular accident (CVA).

Table 6: **Comorbidities associated with liver abscess**

Comorbidities	Total (N=60)	
DM	7	11.6%
HTN	4	6.6%
Heart disease	2	3.33%
Renal failure	0	0%
CVA	1	1.66%

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.**

Investigation	No. of patients	Percentage (%)
Anaemia	4	6.7
Leucocytosis	54	90
Neutrophilia	41	68.3
High Creatinine	2	3.4
Hyponatremia	38	63.4
ESR	60	100

Table 8: **Liver function tests.**

Investigation	No. of patients	Percentage
Hypoalbuminemia	46	76.7
Elevated total bilirubin	42	70
Elevated direct bilirubin	36	60
Elevated alkaline phosphatase	48	80
Elevated SGOT (AST)	31	51.7
Elevated SGPT (ALT)	49	81.7

Table 9**: Culture sensitivity in liver abscess.**

		Pus c/s	
	Negative	Positive	Total
Aspiration	8	1	9
Pigtail	20	4	24
Total	28 84.8%	5 15.2%	33 100%

Radiological Investigations

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 3 (47.14%) cases had right sided pleural effusion. Cardiomegaly and involvement of pericardium was not seen in any of the cases.

Figure 3: Chest X-ray.

Ultrasound abdomen:

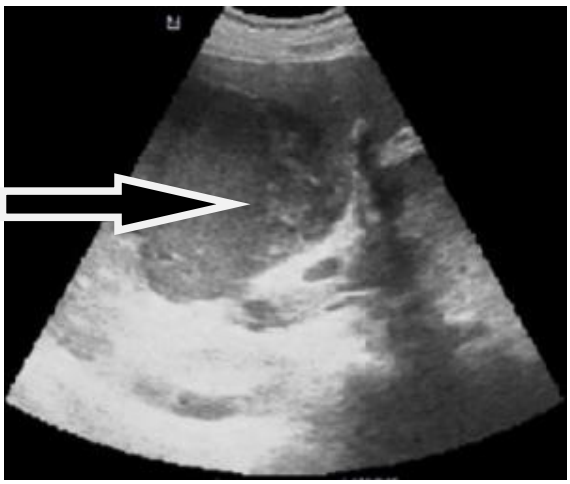


Figure 4: Ultrasound liver abscess.

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)cm to (11×9) cm. Volume of abscess was also measured, the smallest was 9 ml and the largest was 1092 ml.

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 involvement 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 10: **The site and number of abscesses.**

	Site				Number of abscess		
	Right	Left	Both	Total	Solitary	Mutiple	Total
Conservative	24	2	1	27	8	9	27
Aspiration	7	0	2	9	6	3	9
Pigtail	19	4	1	24	18	6	24
Total	50 83.3%	6 10%	4 6.6%	60 100%	42 70%	18 30%	60 100%

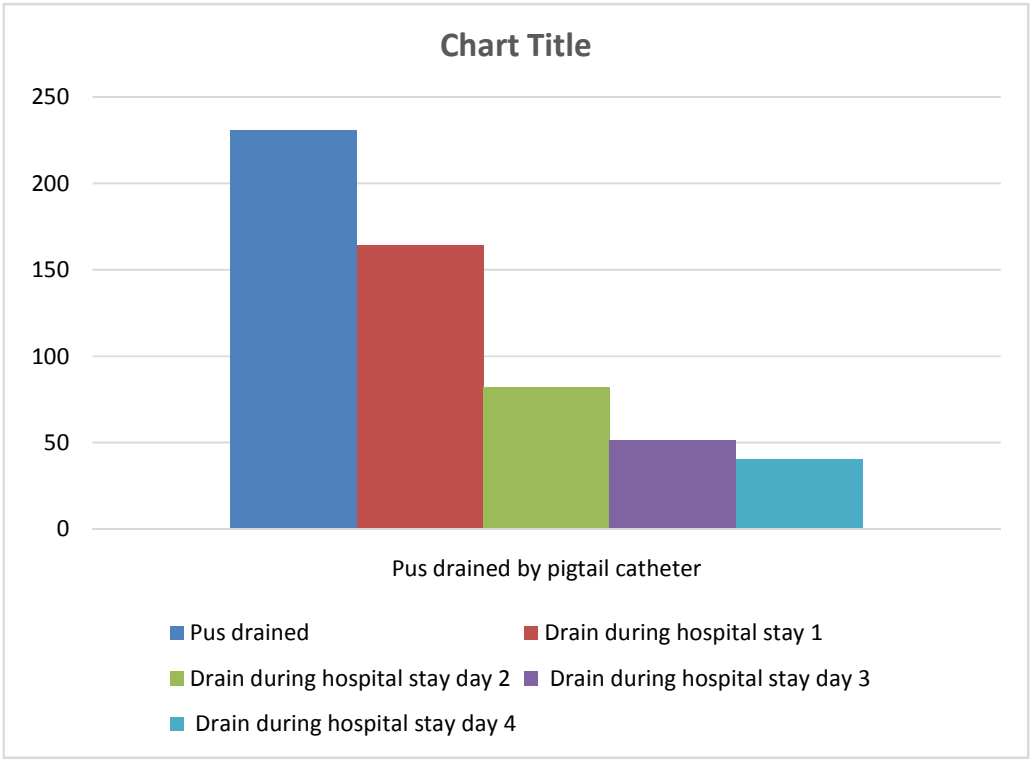
Table 11: **The volume of abscess and the mode of treatment**

Lab parameter	Normal range	Conservative (N=27)		Aspiration (N=9)		Pigtail (N=24)		Total (N=60)	
		n	%	n	%	n	%	n	%
Volume	<100	21	35	2	3.3%	10	16.6%	33	55%
	100-200	06	10	5	8.3%	8	13.3%	19	28.3%
	>200	00	00	2	3.3%	6	10%	8	13.3%

Mean volume drained after insertion of pigtail equal to 230.4 ml. Mean volume draining during the hospital stay on the 1st day is 164.23 ml, 2nd day is 81.6 ml, 3rd day 51.45 ml and 4th day 40.34 ml as shown in Figure 5.

Figure 5: Pus drained by percutaneous drainage.

Management



60 cases of liver abscess were directed with conservative management, aspiration and pigtail insertion. Out of which 27 (45%) cases were treated with antibiotics alone, 9 (15%) cases were treated with antibiotics and aspiration, 24 (40%) 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 with the help 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]

Abdominal pain 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 57 (95%) cases and fever >102^{o}F in 54(90%) patients. In our study the major comorbidity associated with liver disease was diabetes found in 7(11.6%) 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 12: **Sex incidence in other series.**

Study group	Our study (n= 60)	Christopher et al (n=70)	Tiwari et al (n=58)	Rajak et al (n=25)	Wong et al (n= 21)	Sonnenberg et al (n=18)	Gerzof et al (n= 12)
Male	53	64	54	19	13	14	10
Female	7	6	4	6	8	4	2

In this study the incidence of alcohol is 65% and it is more common in age group between 31 to 60 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 60 (100%) patients had shown elevated ESR, hyponatremia in 38 (63.4%), polymorphonuclear leucocytosis in 54 (90%) and neutrophilia in 41 (68.40%) patients. Bleeding time and clotting time were normal in all the patients. Prothrombin time and INR deranged in 40 (66.7%) 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 48(8%) patients, total bilirubin in 42 (70%) showing and lowered albumin in 46 (76%) of patients.

Table 13: **Comparison of patient and abscess characteristics in two studies**

Characteristics	Our study		Christopher et al		Tiwari et al		Rajak et al	
	No. Of pts	percentage	No. Of pts	Percentage	No. Pts	Percentage	No. Of pts	percentage
Fever	54	90%	59	84.3%	47	81%	23	92%
Pain	58	96.6%	67	95.7%	57	98.3%	25	100%
Jaundice	26	43.3%	25	35.7%	22	38%	3	12%
Leukocytosis	54	90%	63	90.0%	41	70.7%	20	80%
No. Of abscesses								
Solitary	42	70%	41	58.6%	39	67.2%	20	80%
Multiple	18	30%	29	41.4%	19	32.8%	5	20%
Location of abscess								
Right lobe	50	83.3%	58	82.9%	7	12%	17	68%
Left lobe	06	10%	6	8.6%	9	15.5%	4	16%
Both lobes	04	6.6%	6	8.6%	-		4	16%
Causes								
Amoebic	40	66.7%	62	88.6%	14	24.1%	20	80%
Pyogenic	20	33.3%	8	11.4%	-		5	20%

In the present study,42(70%) cases had solitary abscess and 18(30%) cases had multiple abscesses in comparison with other studies of Christopher et al (58.6% solitary abscess and 41.4% multiple abscesses), 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 12 days, as compared to Christopher et al (16 days), 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 14**: Duration of catheter after percutaneous drainage.**

Study Group	Our Study	Christopher	Tiwari et al	Rajak et al	Wong K.P. et al	Sonnenberg et al	Gerzof et al	Singh J. et al
No. of days	12	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. It occurs most commonly between 30-60 years. Males were affected more than females. It was seen that incidence of amoebic liver abscess is common in younger age group and that of pyogenic liver abscess is in older age group. Most of the cases have an acute presentation, and right lobe is most commonly affected. Out of 60, 58 cases had pain in abdomen as the most common symptom.

It was found that alcohol consumption was one of the most important etiological factor 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 comorbid conditions of patients and size of liver abscess also influence the outcome.

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