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### Liver Abscess; Its Etiopathogenesis and Management

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#### Abstract

**Background:** The world distribution of amoebic liver abscess should parallel that of amoebic infection. Unfortunately, its incidence of amoebic liver abscess varies throughout the world and large number of cases in developing countries. Pyogenic liver abscess constitute major bulk of hepatic abscess in western countries, they result from ascending biliary tract infection, hematogenous spread via portal venous system, generalized septicemia direct spread from intra-peritoneal infection. Pyogenic liver abscess constitute major bulk of hepatic abscess and they result from ascending biliary tract infection, hematogenous spread via portal venous system, generalized septicemia with involvement of liver by way of hepatic arterial circulation, direct spread from intra-peritoneal infection, other causes. Escherichia coli, klebsiella and streptococcus are most common organism followed by staphylococcus and pseudomonas. The mainstay of pharmacologic agent being metronidazole, which has been started since the time of diagnosis of liver abscess. Broad spectrum IV antibiotic was added in case of pyogenic liver abscess as an adjunct drug.

#### Introduction

Liver abscess, a disease troubling mankind from ancient times, has earliest documentation in the works of Bhrigu Samhita (3000 B.C.), <sup>1</sup> wherein there is mention of blood and mucus in diarrhea with right upper abdominal pain. They have potentially lethal consequences, if prompt diagnosis and treatment are not accomplished. Liver abscess can be of various types depending on etiology. However two major types are amoebic and pyogenic in nature.<sup>1</sup>

No distinct clinical criteria exist for distinguishing the two types, the diagnosis of amoebic and pyogenic abscess can be made by - younger age, resident or recent travel to areas of endemic amoebiasis, diarrhea and marked abdominal pain raise clinical suspicion of amoebic liver abscess. The diagnosis is confirmed by ultrasonography, serological tests like indirect hemagglutination test, reddish brown (anchovy-paste like material) aspirate from abscess, with negative gram stain, rapid resolution after metronidazole treatment. The diagnosis of pyogenic liver abscess is made by symptoms of picket fence configuration of temperature chart, nausea, vomiting and anorexia. Pain is late symptom and is more common with large solitary abscesses. Investigations reveal leucocytosis, anemia and positive blood culture for bacteria.

The diagnosis, treatment and prognosis of liver abscess have evolved remarkably over past years. Radiological imaging has improved diagnostic competence and has altered therapeutic strategy by allowing the possibility of percutaneous drainage. Rapid diagnosis, effective antimicrobial therapy, treatment of underlying disease, and orderly approach to therapeutic interventions directed towards the abscess remain the mainstay of care for the patient with hepatic abscesses. The concept of minimally invasive drainage has been and continues to be of paramount importance in treatment of hepatic abscesses.

### **Materials and Method**

The present study had taken in the Dept. of General Surgery & Department of Radiology, VSS Institute of Medical Science & Research, Burla, Odisha. 50 nos. of Patient admitted in different ward of Department of Surgery during November 2015 to October 2017 had included in this study. The patients divided into two groups: Group 1- with abscess cavity <5 cm (500 cc) they received only medical management. Group 2with abscess cavity >5cm (>500 cc) or smaller abscess which failed to respond to drug therapy alone, left lobe abscess they in addition treated with USG guided -percutaneous needle aspiration or catheter drainage. On USG and laboratory work up(raised alkaline phosphatase, and other liver function test). The patients in the study group subjected to a complete physical were examination including thorough examination of abdomen and chest following proper history. Specific Investigations including complete haemogram, liver function test, prothrombin time, blood for HBSAg, HIV,HCV, fasting and post prandial blood sugar, ultrasound of abdomen, chest X ray, microscopic examination and culture of aspirated pus, blood culture.

On the basis of size of abscess on USG the patient were divided into two treatment group. Group 1with abscess cavity <5 cm (500 cc) - theyreceived only medical management. Group 2with abscess cavity  $\geq 5 \text{ cm} (\geq 500 \text{ cc})$  or smaller abscess which failed to respond to drug therapy alone, left lobe abscess they in addition treated with USG guided –percutaneous needle aspiration or catheter drainage. All patients with diagnosis of amoebic liver abscess of size < 5cm were treated with metronidazole 2-2.4 gms/day in divided dose. All patient with PLA of size <5cm (<500 cc) were treated initially with broad spectrum antibiotics till the culture and sensitivity report were available then treatment was guided as per sensitivity report.

The patients with abscess size  $\geq 5$  cm or smaller abscess those who failed to improve clinically, left lobe abscess were subjected to image guided aspiration or catheter drainage. These patients were randomly selected for percutaneous needle aspiration and percutaneous pigtail catheter drainage. Informed consent were taken from the patients explaining the complications of the procedures for which open surgical intervention might be needed. The patients were examined daily for clinical improvement. Improvement in fever, chill and rigor, right hypochondriac pain, anorexia, malaise, nausea and vomiting before and after institution of therapy were noted.

### Result

In the present study of etiology of liver abscess and its different ways of management observation were made regarding age ,sex, religion, socioeconomic status, alcohol addiction and different clinical parameters like fever, chill and rigor, nausea, anorexia, right upper quadrant pain, intercostals tenderness, icterus and hepatomegaly. Among the laboratory investigations included complete haemogram, liver function test, HIV, HCV, HBSAg, culture and staining from the aspirate, blood culture. Among the imaging included chest X-ray ultrasonography of upper abdomen and CT scan in two cases where utrasound was inconclusive. Ultrasonography findings include site, size and number of abscess.

Treatment modalities include medical management, USG guided percutaneous and pig tail catheter drainage. Open surgical method was excluded from the study.

We divided our study population in two group one with liver abscess size less than 5cm who received

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only medical management and another group of size more than 5cm who received guided aspiration percutaneous needle aspiration or pigtail catheter drainage and CT guided drainage in two patients where USG was inconclusive CT was done in same sitting therapeutic aspiration done.

#### Discussion

We try to find out etiology on the basis of clinical features, imaging by USG, Gram stain of aspirate from liver abscess, aspirate culture and blood culture. Patients with typical clinical features, USG finding along with aspirate staining positive considered to have pyogenic liver abscess which was further confirmed by aspirate culture, and blood culture. Amoebic serology by ELISA not included in our study as this test was not available in our hospital. For other rare etiology where liver abscess is due to HBSAg, immuno compromised people due to HIV, and HCV was seen each patient to look for any rare association or as an etiological agent none of our patient in study group was positive for these three.

l.		TYPE OF	Tatal		
1		Amoebic Liver Abscess Pyogenic Liver Abscess			
	21.20	5	3	8	
	21-30	11.9%	37.5%	16.0%	
	21.40	18	2	20	
AGE	51-40	42.8%	25.0%	40.0%	
	41-50	15	2	17	
		35.7%	25.0%	34.0%	
	51-60	3	0	3	
		7.1%	.0%	6.0%	
	61-70	1	0	1	
		2.4%	.0%	2.0%	
	71.00	0	1	1	
	/1-80	.0%	12.5%	2.0%	
Т	otol	42	8	50	
10181		100.0%	100.0%	100.0%	

All of our study subjects were from Western Odisha. Majority of my study subjects were in occupation with low income most common being the labourer, farmer. Most of the patients were between the age group 30-40 years (38%) and mean age of the study subjects was 40.56 years. ALA can affect at any age however it is more frequent in adult life with the highest incidence in the  $3^{rd}$  and  $4^{th}$  decade .The maximum age incidence is seen in 30-40 years of age group. In our study male to female ratio was 9.1:1. For ALA it is 9.5:1 and for PLA 7:1.

Majority of our study population was suffering from fever (86%) at the time of presentation and 68% of the study subjects got associated chill and rigor. 92% of the patients had abdominal pain (Right hypochondriac). Only 10% patients of our study presented with jaundice. Jaundice is not that common in hepatic abscesses. It occurs following intrahepatic obstruction or associated hepatitis and is usually seen in large or multiple abscesses and also in abscesses situated at porta hepatis due to extrahepatic biliary obstruction<sup>2</sup>. Our result showed 24% of the study population got their bilirubin level >1.2 gm/dl.

Majority of our study subjects (58%) had nausea or vomiting and had four and more clinical features and only 3% had only one clinical feature. Most common symptom was pain right upper quadrant. Among the patients who had only one clinical feature most of them presented with right hypochondriac pain.

This study revealed that most of the patients (61%) of ALA and (75%) of PLA were alcoholic.

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Excessive alcohol intake makes the liver more prone to developing liver abscess and is also responsible for the larger size of the abscess, greater frequency of complications and higher mortality<sup>50</sup>. However, there is no major study that has quantified the alcohol intake or reported the duration of alcohol consumption and so the incidence of alcohol consumption seen in cases of liver abscess differs in different studies, according to the environment, tradition and socioeconomic status of the patients under study. 11.9 % of ALA and 37.5% Of PLA in our study subjects were suffering from diabetes mellitus. Association of diabetes with liver abscess is seen more commonly with pyogenic than amoebic liver abscess. In our study the association of diabetes with PLA was higher than the standard literature most probably as burden of diabetes in tropical countries and north and eastern India increasing at epidemic form.

ment, tradition and socioeconomic epidemic form.							
TYPE C ABSCESS	DF TREATMI	ENT	TLC AT 3RD DAY	DECREASE IN TLC			
	USG Guided	Mean	6995.24	4421.43			
	Percutaneous Needle Aspiration	Std. Deviation	1305.173	3710.477			
s	USG Guided Pig Tail	Mean	7248.33	4151.67			
pscea	Catheter Drainage	Std. Deviation	1019.999	2785.227			
er Al	CT Guidad Aspiration	Mean	7000.00	.00			
Liv	CT Oulded Aspiration	Std. Deviation	•				
oebic	Total	Mean	7084.71	4196.18			
Amo	Total	Std. Deviation	1180.786	3390.640			
P Value	·		0.845	0.457			
	USG Guided	Mean	7080.00	5000.00			
	Percutaneous Needle Aspiration	Std. Deviation	925.743	2210.204			
SS	USG Guided Pig Tail	Mean	9500.00	7600.00			
pscei	Catheter Drainage	Std. Deviation	848.528	1555.635			
er A]	CT Guided Aspiration	Mean	5300.00	4300.00			
: Liv	CT Oulded Aspiration	Std. Deviation					
genic	Total	Mean	7462.50	5562.50			
Pyo	Total	Std. Deviation	1597.263	2185.627			
P Value			0.026	0.350			

This study showed that most of the cases (60%) had leucocytes count ranging from 10001 to 15000 cells/mm<sup>3</sup> with mean value of 11,500. In our study mean decrease in TLC after 72 hrs of treatment was maximum with PCD as compared to PNA and CT guided aspiration. Aspirate from liver abscess shows gram staining positive for gram negative bacilli in seven cases and gram positive cocci in one case and after culture of the aspirate shows growth in seven cases most frequent microorganism was E.coli in 57% of

PLA and next common was klebsiella (26%) and pseudomonas least common (14%).

Blood culture was positive in 3 cases (37.5%) and E. coli was found to be most frequent in 25% of PLA. In our study subjects (88%) had solitary liver abscess (78% of ALA and 10% of PLA) and 78% had their right lobe involved (85.7% of ALA and 37.5% of PLA). In this study 84% of patients were found to have amoebic liver abscess and 16% of patients were found to have pyogenic liver abscess.

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		TYPE OF .			
		Amoebic Liver Abscess	Pyogenic Liver Abscess	Total	P value
REDUCTION IN SIZE OF ABSCESS	>50% Reduction in	37	5	42	
	Size	88.1%	62.5%	84.0%	<0.001
	<50% Reduction in Size	5	3	8	<0.001
		11.9%	37.5%	16.0%	
Total		42	8	50	
		100.0%	100.0%	100.0%	

Irrespective of the procedure done it has been seen in our study that 84% of the subjects attained  $\geq$ 50% reduction in abscess cavity size following therapy. But no further study regarding this issue is available. Percutaneous pigtail catheter drainage was successful in terms of  $\geq 50\%$  reduction in abscess cavity size in 85.72% patients as compared to percutaneous needle aspiration which was successful in 80.76% patient.

		TREATMENT					
		Medical & Conser- vative	USG Guided Percuta-neous Needle Aspiration	USG Guided pig Tail Catheter Drainage	CT Guided Aspiration	Total	P value
	>50% Reduction In Size <50% Reduction	7	21	12	2	42	0.876
REDUCTION IN		87.5%	80.8%	85.7%	100.0%	84.0%	
SIZE OF ABSCESS		1	5	2	0	8	
	In Size	12.5%	19.2%	14.3%	.0%	16.0%	
Tot	1	8	26	14	2	50	
100	11	100.0%	100.0%	100.0%	100.0%	100.0%	

Our study revealed that PCD was more successful in terms of recurrence of abscess, relief of symptoms and decreases in size of abscess cavity and TLC. Decrease in TLC at third day was found to be significant. Only 14.3% of patients who underwent PCD required readmission in hospital as compared to PNA in which only 15.8.8% patients were re admitted for recurrence.

		TREATMENT					
		Medical & Conservative	USG Guided Percuta-neous Needle Aspiration	USG Guided Pig Tail Catheter Drainage	CT Guided Aspiration	Total	P Value
	No recurrence	6	21	12	2	41	
OUTCOME		75.0%	80.7%	85.7%	100.0%	82%	
	Recurrence	2	5	2	0	9	0.834
		25.0%	19.3%	14.3%	.0%	18%	
Total		8	26	14	2	50	

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		TREATMENT					
		Medical & Conservative	USG Guided Percuta-neous Needle Aspiration	USG Guided Pig Tail Catheter Drainage	CT Guided Aspiration	Total	P Value
	nce	6	21	12	2	41	
	No recurre	75.0%	80.7%	85.7%	100.0%	82%	
OUTCOME	Recurrence	2	5	2	0	9	0.834
		25.0%	19.3%	14.3%	.0%	18%	
Total		8	26	14	2	50	
		100.0%	100.0%	100.0%	100.0%	100.0 %	

100% of CT guided and 92.3% patient of PCD had their symptoms relieved within three days however in USG PNA also shows almost equivalent result. CT guided aspiration showed excellent result however this was not included in our routine objective it was only done where USG was inconclusive. Only two patient underwent CT guided aspiration so it will not be prudent to comment on this procedure however further studies are required for this intervention in our setting where cost of treatment is most important factor as most of the patient belong to low socioeconomic strata.

### Summary

In our study fifty cases were evaluated with the objective to find etiological basis of liver abscess in study subjects by history and clinical features, imaging, culture and gram staining of aspirate from abscess cavity and comparison among different treatment option. Additional features studied were age, sex parameters, history of diabetes, addiction to alcohol and socioeconomic status. Liver abscess formation is a common condition in developing countries including India. In our study majority of patient (84%) were of amoebic liver abscess this indicate the high prevalence of ALA in tropical country like ours. Gram staining of aspirated material was done from abscess cavity which shows gram negative bacilli as more frequent. Aspirate culture and blood culture shows E coli growth in majority of cases and second most common was klebsiella these results were similar to standard literature values. 75% cases with PLA were alcoholic in comparison to 64% of ALA. In this series the affected individuals are 88% male. Alcohol intake is an important risk factor and in our study and more common in PLA. The incidence of diabetes was more(37%) prevalent in PLA however diabetes in both type of liver abscess is about 10% higher than standard literature this may be due to increasing number of diabetic patient in India and routine blood sugar estimation.

In this study, it has been seen that people between age group 30-50 yrs are more commonly affected and it shows a more preponderance of amoebic abscess is commoner in this geographic area. Most of the patients presented with abdominal pain, fever, nausea and vomiting. Regarding management of liver abscess, the crucial role in diagnosis index of clinical suspicion, is Laboratory investigations, and anatomic location with the help of USG or CT scan. The mainstay of pharmacologic agent being metronidazole, which has been started since the time of diagnosis of liver abscess. Broad spectrum IV antibiotic was

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added in case of pyogenic liver abscess as an adjunct drug. The effect of these was followed. Among these patients, who did not show any improvement or the diameter of the abscess cavity was more than 5cm (>500cc), were selected for therapeutic image guided aspiration or placement of pigtail catheter in the abscess cavity. This study showed a promising result with catheter drainage as compared with percutaneous aspiration. This is as a result of faster improvement in clinical features, less incidences of recurrence and fast reduction of size of abscess cavity. However CT guided aspiration shows excellent result but the number of patient was only two so it will not be prudent to comment on this so further study is required in future.

### Conclusion

In this study we found that more than 80% patient were of amoebic liver abscess and among pyogenic liver abscess most common pathogen was E coli followed by klebsiella. There is increasing association of diabetes with both type of abscess and alcoholism remains important risk factor. Image guided drainage is the best modality of treatment for liver abscess size >5cm in both pyogenic and amoebic liver abscess however in small size abscess medical management is equally good. In case of larger abscess (>5cm) Ultrasound guided percutaneous pigtail catheter drainage is a superior therapeutic approach than percutaneous needle aspiration. Patients treated with ultrasound guided percutaneous catheter drainage improved rapidly than those treated with needle aspiration. Abscess cavity resolves better in case of catheter drainage than needle aspiration. Recurrence rate is less in case of percutaneous catheter drainage than percutaneous needle aspiration.

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