

A Study of Etiopathogenesis, Clinical Presentation and Various Modalities of Management of Liver Abscess at Krishnarajendra Hospital, Mysuru

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Abstract

Background: A pyogenic liver abscess (PLA) may be defined as solitary or multiple collections of pus within the liver, as a result of bacterial infection. Amoebic liver abscess is caused due to *Entamoeba histolytica*.

Objectives: To study etiopathogenesis, clinical presentations of patients presenting with features of liver abscess. To study various treatment modalities (like conservative, USG guided aspiration, percutaneous and open surgical drainage).

Materials and Methods: This was a descriptive study conducted from January 2019 to June 2020 among 40 cases who were admitted to K.R Hospital Mysuru, attached to Mysore Medical College and Research Institute, Mysuru. During this period cases admitted to various surgical units, selected at random were studied in detail.

Results: This study found alcohol as the single most consistent etiological factor in all patients with liver abscesses. 57.5% of cases consumed alcohol. Laboratory investigations revealed leucocytosis in 47.5% of cases, anaemia in 25% of cases, and 42.5% of cases were found to be diabetic. 27.5% of cases showed raised urea levels. Hypoalbuminemia was found in 15% of cases and raised SGOT in 7.5% and SGPT in 7.5% of cases. Recurrences were noted in 5/40 (12.5%) cases. Recurrence (12.5%) was the most common complication associated with liver abscess. Mortality in our study was 2.5%.

Conclusion: All cases of liver abscesses do not require invasive management. Ultrasound-guided percutaneous aspiration and pigtail catheter drainage procedures are safe and effective methods, particularly percutaneous aspiration had less recurrence than pigtail drainage in our study. Laparotomy and drainage is the standard of care for ruptured liver abscess in the peritoneal cavity. Recurrence was the most common complication associated with liver abscess.

Keywords: Amoebic liver abscess; Aspartate Aminotransferase; Computed Tomography; Escherichia coli; Magnetic Resonance Imaging; Staphylococcus aureus.

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Introduction

A pyogenic liver abscess (PLA) may be defined as solitary or multiple collections of pus within the liver, as a result of bacterial infection (Blumgart, pyogenic liver abscess (1005-1015). Amoebic liver abscess is caused due to *Entamoeba histolytica*. The amoebic abscess is usually about the size of an orange. The most frequent site is in the right lobe, often superoanteriorly, just below the diaphragm. The centre consists of a large necrotic area which has liquefied into thick, reddish-brown pus. This has been likened to anchovy or chocolate sauce. (Sheila Sherlock, Hepatic amoebiasis, pp498-501).

A high incidence of liver abscess is seen in the low-income strata population group due to ineffective sanitation and personal habits of eating raw unclean food. Alcohol consumption also adds up to the risk. Decreased immunity secondary to intake of cytotoxic drugs, diabetes mellitus, HIV infection etc. further increases susceptibility to liver abscess.

Despite continuous improvement in imaging modalities, availability of potent antibiotics and advancement in the knowledge and treatment of liver abscess, mortality and morbidity remain high. Various complications can arise from secondary liver abscesses such as liver failure, systemic sepsis, lung abscess, pulmonary embolism, etc.

Prompt, early and appropriate treatment is necessary to avoid various complications of liver abscess.

Hence this study was undertaken to determine and confirm various etiological aspects of liver abscess, also to study the various modes of presentations, relative incidence, diagnostic procedures and management modalities for liver abscess.

The changing scenario in incidence, diagnostic methods, treatment and complications associated with liver abscess, due to the increasing percentage of alcoholics and immunocompromised population; the current serious problem in our country, has inspired me in doing an in-depth study regarding liver abscess, which assumes more importance in our country, where rural population constitutes approximately 70% and therefore it mandates appropriate and realistic guidelines to be drawn up, for early diagnosis and change in management strategies, to reduce the morbidity and mortality associated with it.

Objectives

To study the spectrum of clinical presentations.

To evaluate the aetiology and the laboratory investigations profile.

To study bacteriological characteristics.

To evaluate the efficacy, recurrence rate, complications, morbidity and mortality associated with management strategies (Antibiotics alone/Sonographic guided percutaneous drainage/Percutaneous Aspiration or Percutaneous Pigtail Catheter Drainage) + Antibiotics Coverage/ In ruptured liver abscess - Open Surgical drainage)

Materials and Methods

This was a descriptive study conducted from January 2019 to June 2020 among 40 cases who were admitted to K.R Hospital Mysuru, attached to Mysore Medical College and Research Institute, Mysuru. During this period, cases admitted to various surgical units, selected at random were studied in detail. Before the commencement of this study – the Institutional Ethics Committee had approved the thesis protocol.

Inclusion Criteria

Patients above 18 years of age with features of liver abscess.

Exclusion Criteria

Liver diseases like cirrhosis of the liver, portal hypertension, and malignancies of the liver. Patients not willing for specific investigations like CT and aspiration of abscess.

Sample Size Estimation

The sample size calculated is 40 with the level of confidence as 5% and allowable error as 5% with the prevalence of liver abscess being 2.3% using the estimation setup technique for proportion.

$$\text{Sample Size} = 4pq/d^2 = (4) (2.3)(97.3)/25 = 35.95$$

$$p = 2.3 \quad d = 5 \quad q = 100 - p$$

The calculated sample size is 36. The inflated sample size is 40.

Data Analysis

Data analysis was done both manually and by using the computer. Calculated data were arranged systemically, presented in various tables and figures and statistical analysis was made to evaluate the objectives of this study with the help of the Statistical Package for Social Science (SPSS). 'P-value (Asymp. Signi) <0.05 was considered significant. The chi-square test was used to find the significance of study parameters on a categorical scale between two or more groups.

Results

The age of the patients included in this study varied from 25-90 years. The mean age was 50 years. The highest incidence was noted in the age group of 51-60 years (32.5%) followed by 41-50 years (30%). 85% of patients were males and 15% were females.

Abdominal pain was present in all cases (100%). Fever was the most consistent symptom occurring in 36 (90%). Vomiting occurred in 5/40 (12.5%), and jaundice was present in 7/40 (17.5%) of patients.

Table 1: Alcoholism in cases of liver abscess

Alcoholism	Number of patients (n=40)	Percentage
Alcoholic	23	57.5
Non-alcoholic	17	42.5
Total	z	100.0
Chi-Square		0.900
Asymp. Sig.		0.343

57.5% of the patients were alcoholics.

Table 2: Laboratory investigations

Laboratory Investigations	Number of patients (n=40)		Percentage		
WBC	4-11000	21	52.5		
	>11000	19	47.5		
RBS	70-140	23	57.5		
	>140	17	42.5		
Haemoglobin	<10 gm/dl	10	25.0		
	>10 gm/dl	30	75.0		
Urea	10-45	29	72.5		
	>45	11	27.5		
Serum creatinine	0.4-1.4	29	72.5		
	≥ 1.4 mg/dl	11	27.5		
	Hb	Urea	Creat	TLC	RBS
Chi-Square	10.0	8.1	8.1	.100	.900
Asymp. Sig.	.002	.004	.004	.752	.343

Anaemia (Hb < 10 gm/dl) was found in (10/40) 25% of the cases. The mean Hb in this study group was 11.48 gm/dl. The Hb% of the patients ranged from 7.3-15 gm%. Leucocytosis (> 11,000 c/cumm) was found in (19/40) 47.5% of cases. Mean WBC count was 12,012 c/cumm and it ranged from 4600-25,300 c/cumm. 17/40 (42.5%) were found to be diabetic with RBS> 140 mg/dl. The mean RBS was 144 mg/dl and it ranged from 88-232 mg/dl, raised urea (> 45 mg/dl) was found in 11/40 (27.5%) of the cases. Mean urea level was 37.2 mg/dl and it ranged from 11-96 mg/dl and Serum Creatinine (>1.4g/dl) was seen in 11/40 (27.5%) cases.

Table 3: Liver function test analysis

Liver function tests		Number of patients (n=40)		Percentage		
S. albumin	<3.2 mg/dl	6		15.0		
	>3.2-5.5 mg/dl	34		85.0		
ALP	40-129 IU/L	22		55.0		
	>130 IU/L	18		45.0		
AST	5-40 IU	37		92.5		
	>40 IU	3		7.5		
ALT	<40 IU	37		92.5		
	>40 IU	3		7.5		
S. bilirubin	0.2-1.2 mg/dl	31		77.5		
	>1.2 mg/dl	9		22.5		
	Tb	ALP	AST	ALT	TLC	Alb
Chi-Square	12.100	.400	28.900	28.900	.100	19.600
Asymp.Sig.	.001	.527	.000	.000	.752	.000

15% of the patients had S. albumin < 3.2 mg/dl and 45% had ALP >130 IU/L. Liver function tests were done in all 40 patients included in this study.

Hyperbilirubinemia with serum bilirubin >1.2 gm/dl was found in 9/40 (22.5%) cases in this study.

Alkaline phosphatase was found to be raised in 18/40 (45%) cases in this study. Hypoalbuminaemia (< 3 gm/dl) was observed in 6/40 (15%) of the cases.

Increased SGOT and SGPT were seen in 7.5% of the cases in this study.

Table 4: Pus culture analysis

PUS culture	Number of patients (n=40)	Percentage
Enterococcus	11	32.35
Klebsiella pneumoniae	6	17.65
E. coli	4	11.77
Staphylococcus aureus	2	5.88
Nil (Anchovy Sauce)	11	32.35
Total	34	100
	PUSC	
Chi-Square	9.824	
Asymp. Sig.	.044	

Enterococcus was the most common organism cultured in our study (32.4%). *E. coli* and *Klebsiella pneumoniae* were other organisms cultured (11.8% and 17.6% respectively). Six patients were conservatively managed.

Staphylococcus aureus was found in two patients (5.9%). 32.4% of the cultures showed no growth.

Table 5: Analysis of lobar involvement

		Lobe	Numbers	Percentage
Location		Right	35	87.5
		Left	2	5.0
		Both	3	7.5
	Total		40	100
			LOBE	
Chi-Square			52.850	
Asymp. Sig.			.000	

USG abdomen was done in all cases.

Right lobe abscess was seen in 35/40 (87.5%) of cases and left lobe abscess was seen in 2/40 (05%) of cases. Both lobe involvements were seen in 03/40 (07.5%) of cases. A ruptured liver abscess was found in 2/40 (5%) of patients.

Of the 40 cases of liver abscesses included in this study, 6 cases (15.0%) that had abscesses with less than 200 cc were managed conservatively. 34/40 (85%) cases that had abscesses > 200 cc or left lobe abscesses were subjected to intervention. Out of 34 cases, 24 cases underwent percutaneous aspiration under antibiotic coverage. Eight cases underwent pigtail catheter drainage under USG guidance as the abscess cavity was big and not completely liquefied. Two cases underwent a laparotomy procedure for ruptured liver abscess (5%).

Table 6: Recurrence

Recurrence	Number of patients (n=40)	Percentage
Yes	5	12.5
No	35	87.5
Total	40	100
		RECURRENCE
Chi-Square		22.500
Asymp. Sig.		.000

There was no recurrence in 87.5% of patients.

Table 7: Correlation of incidence of recurrence with management

Recurrence	Procedure				Total
	PCA	Cons	Pigtail	Open	
Yes	3	0	2	0	5
	12.5%	0.0%	25.0%	0.0%	12.5%
No	21	6	6	2	35
	87.5%	100.0%	75.0%	100.0%	87.5%
Total	24	6	8	2	40
	100.0%	100.0%	100.0%	100.0%	100.0%

There was a 12.5% recurrence noted in percutaneous aspiration and 25% in pigtail catheter drainage.

Table 8: Complications

Complications	Number of patients (n=40)			Percentage
Intraabdominal rupture and peritonitis	2			5.0
Shock	1			2.5
Recurrence	5			12.5
Death	1			2.5
	RUPTURE	DEATH	SHOCK	RECURRENCE
Chi-Square	32.400	36.100	36.100	22.500
Asymp. Sig.	.000	.000	.000	.000

Various complications were analysed in 40 cases of liver abscess. Intraabdominal rupture and peritonitis were seen in 2/40 (5%) cases, features of shock in 1(2.5%) case and 1 (2.5%) death were recorded.

Recurrence was seen in 5 (12.5%) cases.

Discussion

This descriptive and observational study was carried out to determine the clinicopathology of liver abscesses, including the various modalities of treatment and their efficacy.

Age and Sex Incidence

The age of 40 patients ranged from 21-90 years. The patients were predominantly of the age group of more than 40 yrs. There was not much involvement in extremes of age group. The mean age was 50 years, similar to studies conducted by Antonio Gorgia: 16-78 years (45.3 years)[1]. The present study shows a very high incidence of liver abscess in males (85.0%) as seen in other Indian studies like

Shyam Mathur (90.0%) [2] and the Indian Journal of Surgery (96.0%) [3].

Clinical Features

Most of the patients who presented in this series had complaints of pain in right hypochondrium and epigastrium (100%) and fever (90.0%) which were more significant as compared to studies conducted by Greenstein *et al* which showed 84% pain in the abdomen and 95% fever [4,5].

Alcoholism in Cases of Liver Abscess

An analysis of the pus culture and sensitivity showed the presence of enterococcus (27.5%) which was the most common organism in our study as compared to other studies like Hyo Min Yoo *et al* where *E. coli* (63.0%) was the most common and Khee Siang, Chin Ming *et al*, [6] (82.3%) and Hiroshi Okana *et al* [7] (62.0%) where *Klebsiella pneumoniae* was the most common organism.

Association of Diabetes with Pyogenic Liver Abscess

The association of diabetes with a pyogenic liver abscess in our series (42.5%) was nearly comparable to other recent studies like World J Gastroenterol (April 2008) 7 (83.0%) [8].

Ultrasound abdomen was done on all patients in this study and various findings were analysed. Right lobe involvement (87.5%) was comparable to other studies listed above but isolated left lobe involvement was 05% in our study as compared to other studies Hyo Min Yoo *et al.* and World J Gastroenterol (April 2008).

Surgical drainage of liver abscesses has been an accepted therapy for decades. Regarding the procedures performed, the majority of the patients, (60%) underwent ultrasonogram guided percutaneous aspiration.

Out of 34 cases, 60% of cases underwent percutaneous aspiration under antibiotic coverage as compared to Hyo Min Yo *et al* study where 79.0% of patients underwent percutaneous aspiration.

20% of cases underwent pigtail catheter drainage under USG guidance as the abscess cavity was big and not completely liquefied.

Laparotomy was performed in 2/40 ruptured liver abscess cases as compared to Hyo Min Yo *et al* study where 21.0% of patients underwent surgical intervention whereas in our study it was 5%.

Thus, in the majority of cases, percutaneous aspiration was the main form of treatment. All patients were started on antibiotics which were continued for 10-14 days depending on improvement. The majority of patients responded excellently to percutaneous aspiration and antimicrobials. While patients who had smaller abscesses or multiple small abscesses were successfully managed with antimicrobial therapy alone.

Complications

Complications like an intraabdominal rupture with peritonitis (5%), shock (2.5%), recurrence (12.5%) and death (2.5%) were

much less compared to the study by Hyo Min Yoo *et al* (59%) which is significant.

Recurrence and Mortality

In our series, a 12.5% recurrence rate with 2.5% mortality was reported as compared to other studies like Hyo Min Yoo *et al* where the recurrence rate was 9.0% and the mortality rate was 11.0% which was very high and Khee-Siang Chin Mint *et al* where mortality was 6.5%.

Correlation of Incidence of Recurrence with Management

In our study, a recurrence rate of 12.5% was seen in percutaneous aspiration and 25% in pigtail catheter drainage.

Conclusions

The common age group was between 40 and 60 years. Incidence was more in males than females. The most common symptom was pain abdomen present in all 40 cases. The most consistently occurring symptom was fever. The single most important etiological factor for the causation of liver abscesses was alcohol consumption. Diabetes mellitus was a more frequently associated condition in cases of liver abscess. The common presentation was a solitary abscess most commonly in the right lobe of the liver. The most common organism isolated in pyogenic liver abscess was enterococcus. All cases of liver abscesses do not require invasive management. Ultrasound-guided percutaneous aspiration and pigtail catheter drainage procedures are safe and effective methods, particularly percutaneous aspiration had less recurrence than pigtail drainage in our study. Laparotomy and drainage is the standard of care for ruptured liver abscess in the peritoneal cavity. Recurrence was the most common complication associated with liver abscess.

References

1. Giorgio A, Torantrno L, Maemiello N, Francica G, Scala E, Amoroso P, *et al.*

- Pyogenic liver abscess: 13 years of experience in percutaneous needle aspiration with USG guidance. *Radiology* 1995;195(1):122-4.
2. Mattur S, Gehlot RS, Mehta A. Liver abscess. *Journal of Indian Academy of Clinical Medicine* 2002;3(4):78-9.
 3. Kapadia S, Dattaroy D. Liver abscess. *Indian Journal of Surgery* 2002; 6:511-9.
 4. Greenstein AJ, Lowenthal D, Hammer GS, Schaffner F, Aufses AH. Continuing changing patterns of disease in pyogenic liver abscess: a study of 38 patients. *Am J Gastroenterol* 1984;79(3):217-26.
 5. Yeah HM, Kim WH, Shin SK, Chun WH, Kong JK. The changing patterns of liver abscess during the past 20 years – a study of 482 cases. *Yonsei Med J* 1993;34(4):340-51.
 6. Sian K, Ming C. Liver Abscess – a retrospective study of 107 patients during 3 years. 2005;58(6):366-8.
 7. Okano H, Suya K, Shikari. Clinicopathological analysis of liver abscess in Japan. *International Journal of Molecular Medicine* 2002;10(5):627-30.
 8. Khan R, Hamid S, Abid S. Predictive factors for early aspiration in liver abscess. *World J Gastroenterol* 2008; 14(13):2089-93.