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A Study of Pus Culture Analysis, Ultrasonogram Findings and Treatment of Liver Abscess in 100 Patients in a Tertiary Care Institiute in Mysore

Dr.Bharath.G.R, Dr.Avinash.T.R
Senior resident, Deprtment of General Surgery, Mysore Medical College And Research Institute, Mysore-570001
Senior resident, Department of General Surgery, Mandya Medical College And Research Institute, Mandya-571404

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I. INTRODUCTION

Abscess of the liver is relatively rare. It has been described since the time of Hippocrates (400 BC), with the first published review by Bright appearing in 1936. In 1938, Ochsner's classic review heralded surgical drainage as the definitive therapy; however, despite the more aggressive approach to treatment, the mortality rate remained at 60-80%.1

The development of new radiologic techniques, the improvement in microbiologic identification, and the advancement of drainage techniques, as well as improved supportive care, have decreased mortality rates to 5-30%; yet, the prevalence of liver abscess has remained relatively unchanged. Untreated, this infection remains uniformly fatal.

India being a tropical country and home to 400 million people harboring E.histolytica, the causative organism of amoebic liver abscess , it assumes immense importance for thorough understanding of the same. The rising incidence in alcoholics & immunocompromised individual has become a matter of grave concern as complications rate are high especially in this sub-group leading to increased morbidity and mortality.

The changing scenario in incidence , diagnostic methods, treatment & complications associated with liver abscess due to 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 & realistic guidelines to be drawn up for early diagnosis and change in management strategies, in order to reduce the morbidity and mortality associated with it.

This study has tried to study the pus culture analysis, ultrasonogram findings and treatment options of liver abscess in 100 patients.

II. MATERIALS AND METHODS

Study Design: A Prospective Clinico-Pathological study with 100 patients diagnosed to have Liver Abscess and undergoing treatment in Mysore Medical College, Mysore between November 2017 to May 2019 inclusive of a follow up period of 3 months-2years is undertaken, to study the Clinical, Pathological and Management Strategies in Liver Abscess.

Statistical Methods:

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. 95% Confidence Interval has been computed to find the significant features. Confidence Interval with lower limit more than 50% is associated with statistical significance.

Inclusion criteria

1.All cases of liver abscess diagnosed clinically and/or ultrasonographically of Age group >15yrs of either sex.

2.All cases in evolving, liquified & ruptured stage with or without peritonitis.

Exclusion criteria

•Liver diseases like portal hypertension, cirrhosis of liver, hepatic malignancy.

•Patients with bleeding and clotting disorders.

•Patients who are not willing for specific

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investigations like USG, CT and aspiration of the abscess.
•Age <15yrs not included.
•Traumatic Liver Abscess.

Procedure

Patients for clinical study will be selected from the wards of K.R.Hospital with the following inclusion and exclusion criteria. A minimum of 30 cases of liver abscess will be studied.

All selected cases will be studied upto discharge regarding the type of liver abscess and treatment modalities and followed up in OPD for 1 year regarding post operative complications.

1.After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion/ exclusion criteria will be included in the study, after obtaining informed consent.

2.Patients with any 3 of the below criteria will be labeled as having liver abscess and will be taken up for the study.

- Enlarged tender liver presenting as mass per abdomen.
- Fever.
- Radiological investigations suggestive of liver abscess.
- Demonstration of characteristic pus by percutaneous needle aspiration, or open drainage from the liver.
-Unequivocal response to metronidazole and or other antibiotics, with or without aspiration or open drainage of liver abscess.

3. Detailed history of all patients is taken with thorough clinical examination and entered into a proforma during their stay and follow up.
4. Investigations are done.
5. After establishing diagnosis, medical treatment is initiated from day of admission.
- Intravenous cefotaxime 1 gm BD
- Intravenous metronidazole 100 ml TID
- supportive therapy
6. Seeing response to therapy, patients are selected for aspiration, Malecot's/ pigtail catheterization and open surgical drainage in addition to specific drugs.
7. The response to therapy is assessed.

Statistical analysis

The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables

III. RESULTS

TABLE 1: LIVER FUNCTION TEST ANALYSIS

LFT	Numberof patients (n=100)	%	95%CI
S. albumin(<3mg/dl)	83	83.0	75.58-89.90
ALP (>150 IU /L)	83	83.0	74.45-89.11
SGOT >40 IU	52	52.0	42.32-61.54
SGPT>40 IU	45	45.0	35.61-54.76
Prolonged PT (>20 seconds)	31	31.0	21.01-38.54
S. Bilirubin (>2.4 mg/dl)	25	25.0	15.84-32.15

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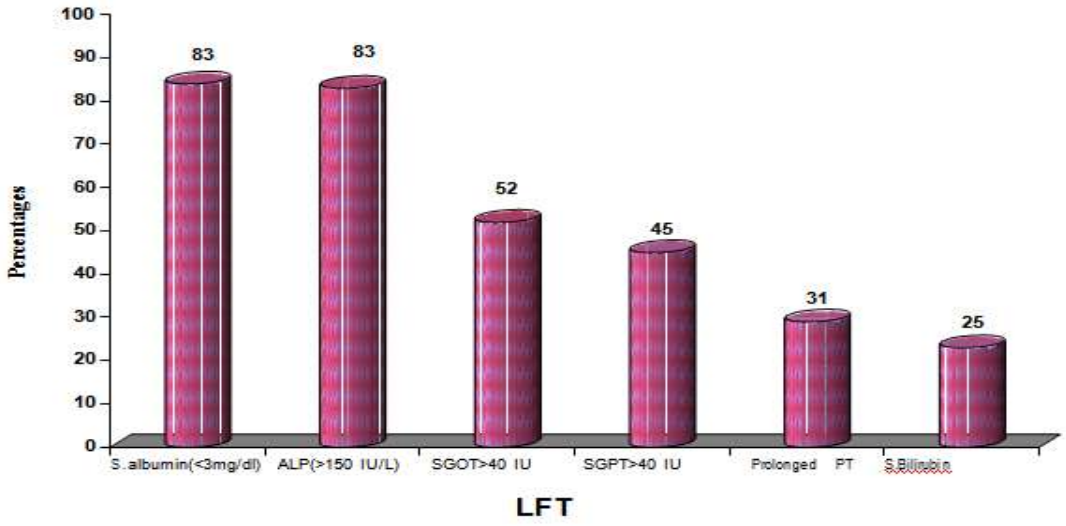

GRAPH 1 : LIVER FUNCTION TEST ANALYSIS

- 83% of the patients had S.albumin < 3mg/dl with 95%CI (75.58-89.90) and 83%had ALP >150 IU/L with 95%CI (74.45-89.11) which is statistically significant.
- Liver function tests were done in all 100 patients included in this study.
- Hyperbilirubinemia with serum bilirubin > 2.4 gm/dl was found in 25/100 (25%) of the cases in this study.
- The liver function test which was most consistently raised was alkaline phosphatase.
- Alkaline phosphatase was found to be raised in 83/100 (83.0%) of cases in this study. Hypoalbuminaemia (< 3 gm/dl) was observed in 83/100 (83%) of the cases.
- Increased prothrombin time > 20 sec was seen in 31/100 (31%) of cases.
- Increased SGOT and SGPT was seen in 52% and 45%of the cases in this study.

TABLE – 2 : PUS CULTURE ANALYSIS

PUS culture	Number of patients (n=74)	%	95%CI
• Enterococcus	13	34.2	10.58-27.77
• Klebsiella pneumoniae	9	17.56	6.53-21.53
• E. coli	7	9.45	4.66-18.26
• Staph aureus	1	1.35	0.2-7.27
• Nil (Anchovy Sauce)	44	59.45	48.1-69.91

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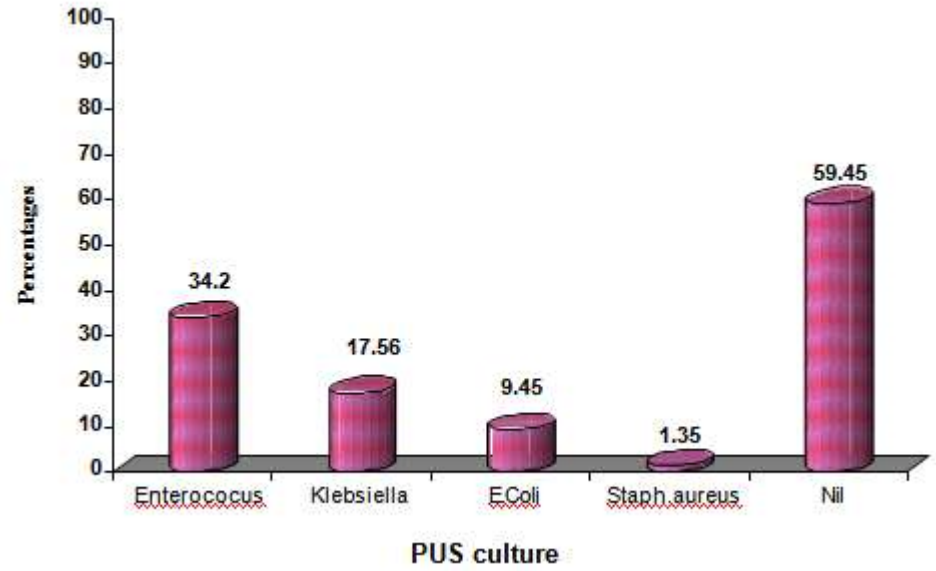
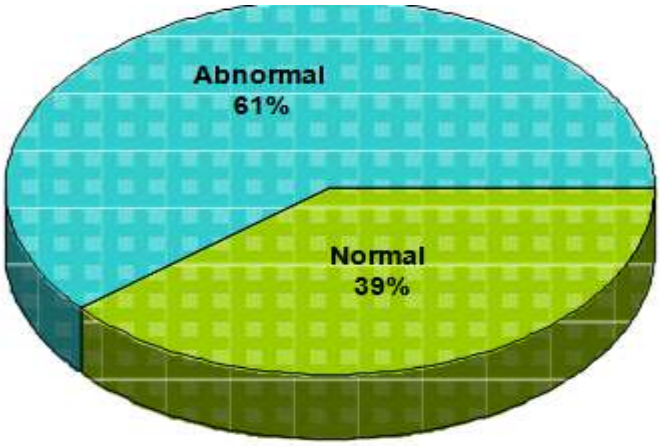


GRAPH 2: PUS CULTURE ANALYSIS

- Entercoccus was the most common organism cultured in our study. (34.2%)
- E.coli & Klebsiella pneumoniae were other organisms cultured (9.45% & 17.56% respectively). 26 pts were conservatively managed
- Staph. aureus was found only in 1 patient (1.35%)
- 59.45 % of the Cultures showed no growth.

TABLE 3 : CHEST X-RAY FINDINGS

Chest X-ray findings	Number of patients (n=100)	%	95%CI
Normal	39	39.0	30.02-48.80
Abnormal	61	61.0	51.20-69.98
• RPEF	52	52	42.32-61.54
• B/L PE	8	8	4.11-15.00
• KOCHS Lesion	1	1	0.18-5.46



Chest X-ray findings

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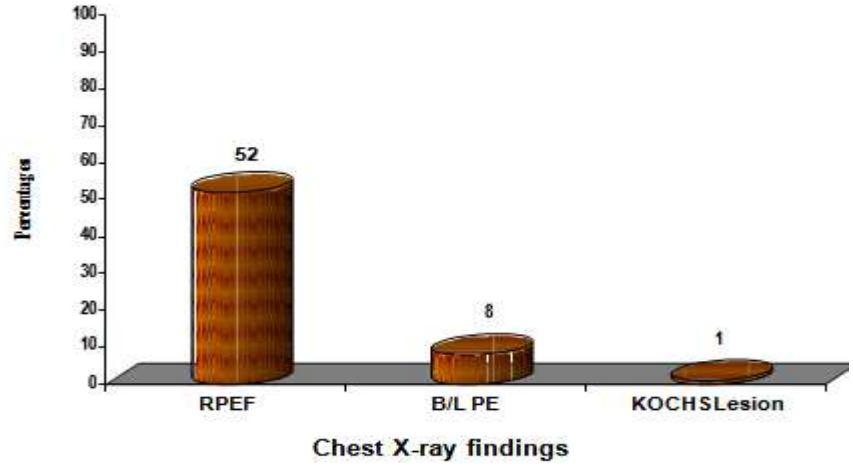
GRAPH 3.: CHEST X-RAY FINDINGS



GRAPH 3.: CHEST X-RAY FINDINGS

- Abnormal Chest X-ray Findings was present in 61% cases with 95% CI (51.20– 69.98) which is statistically significant.
- CxR findings were analysed in all patients. They were normal in 39/100 (39%) of the cases.
- Right sided pleural effusion was noted in 52/100 (52%) of the cases and 8 cases of bilateral pleural effusion and one case of Koch's lesion on treatment. Right dome of diaphragm was elevated in 30/100 (30%) of cases.

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TABLE 4 : USG FINDINGS

USG findings	Number of patients (n=100)	%	95% CI
Solitary abscess	**77**	**77.0**	**68.93-85.00**
• Right lobe abscess	73	73.0	64.53-81.60
• Left lobe abscess	4	4.0	1.57-9.84
Multiple abscess	**23**	**23.0**	**15.0-31.07**
• Both lobe abscess	04	4.0	1.57-9.84
• Right Lobe (Multiple liver abscess)	19	19.0	11.70-26.67
Volume of liver abscess (cc)/ Size (cms)	**100**	**100.0**	**-**
□ <200/ <5 cms	26	26.0	18.40-35.37
□ >200/ >5cms	74	74.0	64.63-81.60

GRAPH 4 : USG FINDINGS

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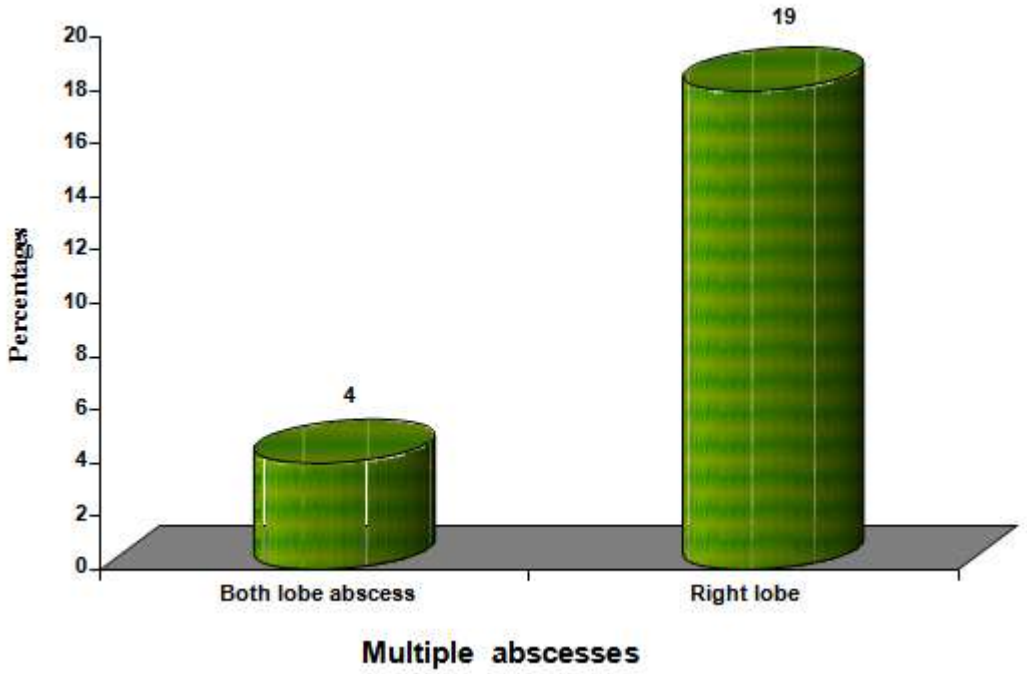
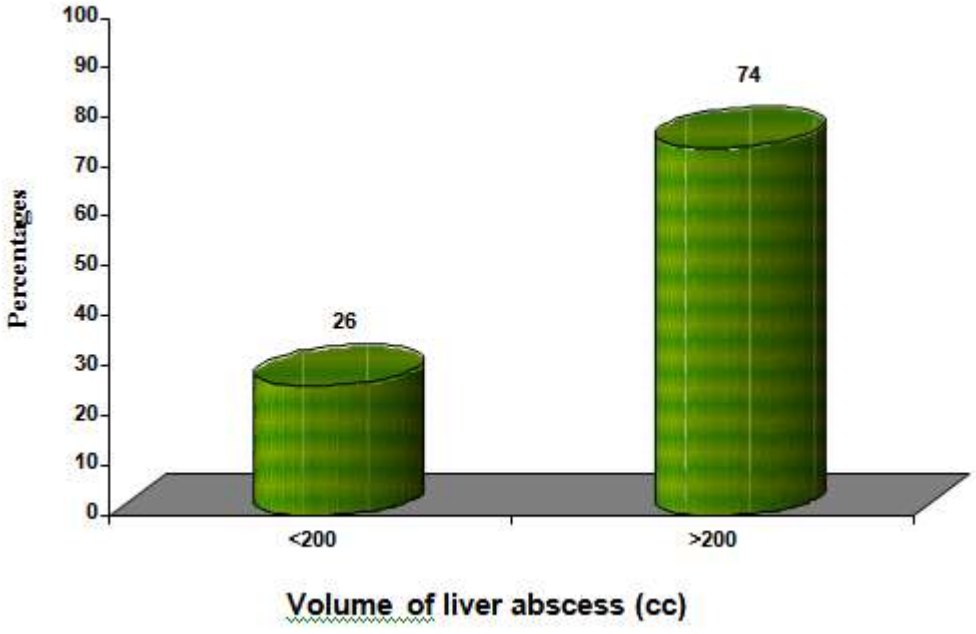


GRAPH 4: USG FINDINGS



GRAPH 4 : USG FINDINGS

- USG abdomen was done in all cases.
- Solitary abscess was observed in 77/100 (77.0%) of cases with 95% CI (68.93 – 85.00) which is statistically significant while multiple abscesses were noted in 23/100 (23.0%) of the cases.
- Isolated right lobe abscess were seen in 73/100 (73.0%) of cases with a 95% CI (64.53-81.60) which is statistically significant and left lobe abscesses were seen in 4/100 (04%) of cases. Both lobe involvement was seen in 04/100 (04.0%) of cases.

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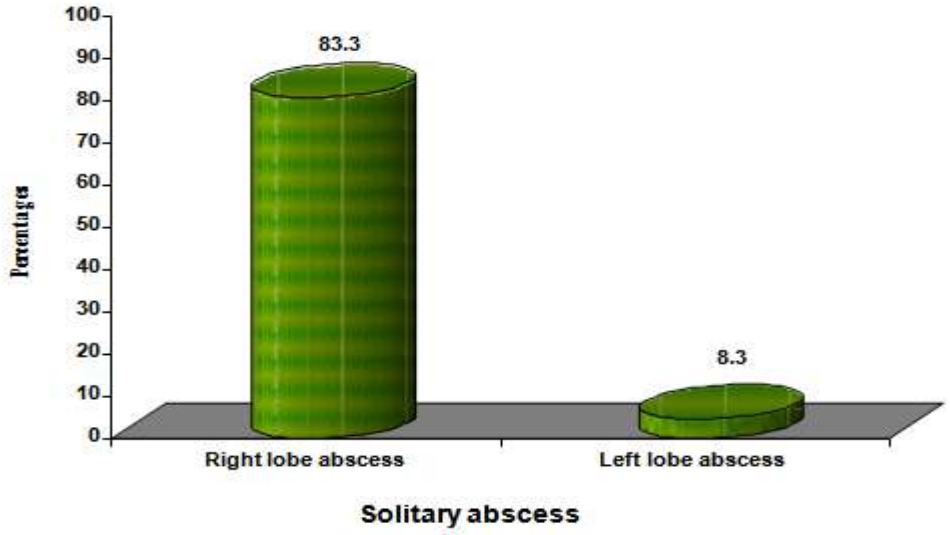
- Multiple right lobe liver abscess in 19 cases (19%).
- No. of cases with single abscess <200cc were 26/100 (26%) and > 200 cc were 74/100 (74%)

with 95% CI (64.63 – 81.60) which is statistically significant.

TABLE 5: USG FINDINGS IN RUPTURED LIVER ABSCESS

Treatment	Number of patients (n=13)	%	95%CI
Solitary abscess	12	91.7	65.36-95.02
• Right lobe abscess	11	83.3	60.00-92.33
• Left lobe abscess	1	8.3	2.65-28.91
Multiple abscess	1	8.3	2.65-28.91
• Both lobe abscess	0	0	
• Right Lobe (Multiple liver abscess)	1	8.3	2.65-28.91



GRAPH 5: USG FINDINGS IN RUPTURED LIVER ABSCESS

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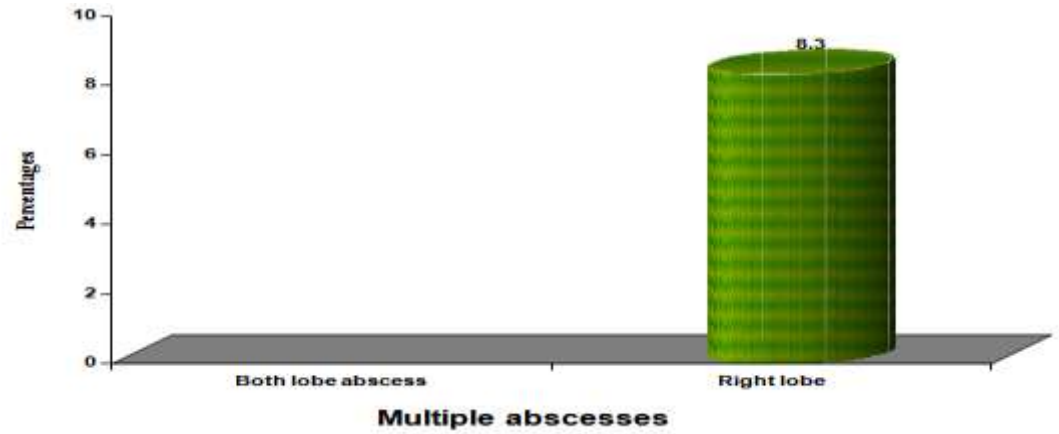

GRAPH 5: USG FINDINGS IN RUPTURED LIVER ABSCESS

- Ruptured liver abscess presenting in right lobe was found in 83.3% with a 95% CI (60.00-92.33) which is statistically significant.
- In cases of ruptured liver abscess 12 cases (91.7%) presented as Solitary abscess with a 95% CI (65.36 – 95.02) which is statistically significant and 1 case as multiple abscesses.

TABLE 6: TREATMENT

Treatment	**Number of patients (n=100)**	**%**	**95%CI**
Antibiotic coverage only (Conservative)	26	26.0	18.40-35.37
ASP (Percutaneus Aspiration under Antibiotic Coverage)	52	52.0	39.42-58.65
Laparoscopy Drainage	02	2.0	4.81-16.23
Laparotomy & Procedure	11	11.0	7.00-19.81
Pig Tail Catheter	10	10.0	1.57-9.84
ICD Iinsertion	3	3.0	1.03-8.45

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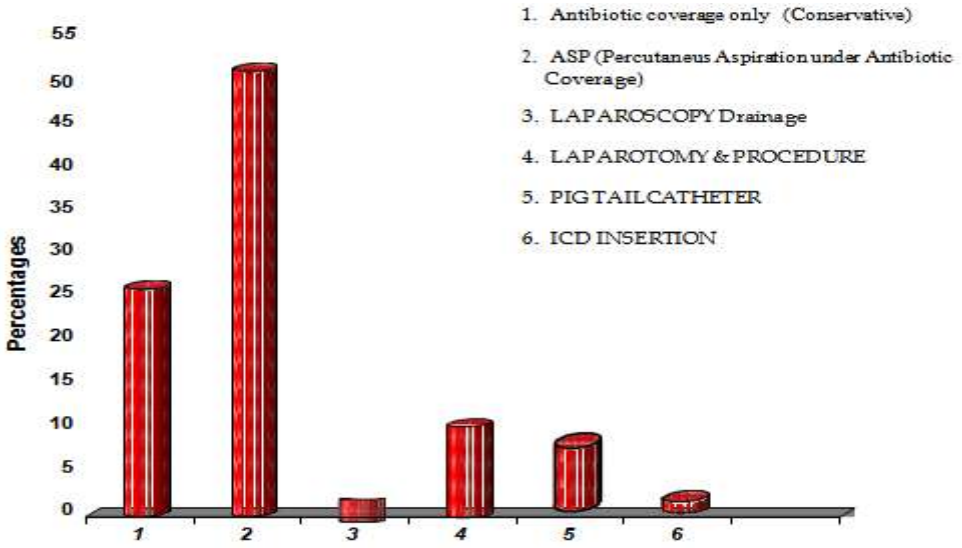

GRAPH 6: TREATMENT

- Of the 100 cases of liver abscesses included in this study, 26 cases(26.0%) who had abscess : less than 200 cc or multiple small abscess involving both lobes were managed conservatively.
- 74/100 (74%) who had abscess > 200 cc or left lobe abscesses were subjected to Intervention. Out of 74 cases 52 cases underwent Percutaneous aspiration under antibiotic coverage with a 95% CI (39.42 – 58.65) which is significant.
- 10 cases underwent Pigtail catheter drainage under USG guided as abscess cavity was big and not completely liquefied (In our study size of abscess cavity was >10cms)
- 11 Cases underwent Laparotomy procedure and 2 cases underwent laproscopic drainage for ruptured liver abscess cases (13.0%) and 3 patients required
- ICD insertion.

TABLE 7 : NUMBER OF ASPIRATIONS DONE

Number of aspirations done	Number of patients (n=52)	%	95%CI
Single aspiration	38	71.4	57.59-82.15
Two aspirations	10	20.4	11.48-33.64
Three aspirations	04	8.2	3.23-19.19

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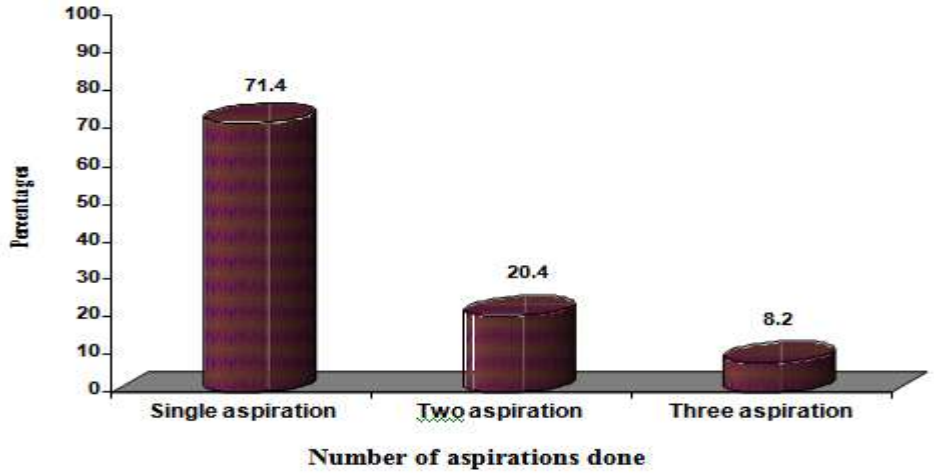

GRAPH 7 : NUMBER OF ASPIRATIONS DONE

- 71.4% of patients (95% CI between (57.59-82.15) required percutaneous aspiration only once for resolution of the abscess which is statistically significant.
- In 38/52 (71.4%) of the cases single aspiration was adequate. While 10/52 (20.4%) required 2 aspirations were required and 4/52 (9%) required 3 aspirations..

IV. DISCUSSION

 Liver abscess is a common condition in India. India has 2nd highest incidence of liver abscess in the world. Liver abscesses are caused by bacterial, parasitic or fungal infection.

 Pyogenic abscesses account for three quarters of hepatic abscess in developed countries and are caused due to diseases of the biliary tract, haematogenous spread and direct extension. While amoebic liver abscess cause two third of liver abscess in developing countries2. Cryptogenic abscess ,with unknown etiology still account for 20% of pyogenic liver abscess,

 Amoebiasis is presently the third most common cause of death from parasitic disease.

 The World Health Organization reported that Entamoeba Histolytica causes approximately 50 million cases and 100,000 deaths annually. The vast majority of these infections are acquired in the developing world. In a country like India where majority of population lives below poverty line, basic sanitary facilities are lacking. This coupled with overcrowding and urban slums and also outdoor unhygienic eating habits sets the stage for communicable diseases like amoebiasis.

 Liver abscess continues to be disease with considerable mortality in our country. Locally made alcoholic drinks like neera, arrack may be the routes of faeco-oral transmission of amoebic cysts.

 In the wake of HIV epidemic in our country, this study also tries to investigate the relation between liver abscess and immuno-compromised state of AIDS.

 Primary prevention by improving sanitation, health education, early diagnosis and prompt treatment may result in lowering mortality / morbidity associated with the disease.

ANALYSIS OF LABORATORY INVESTIGATIONS

Laboratory Investigations	**Hyo Min Yoo et al**	**Present Series**
Leukocytosis (>10 x 10^9 /L)	78.0%	76.0%
Alkaline Phosphatase (>115 IU/L)	55%	83.0%
Albumin (<3.0gm/dl)	68%	83.0%
Prothrombin Time (>20 sec)	14%	31.0%

The above table shows that following Lab. Investigations Leukocytosis, Raised Alkaline

Phosphatase, Hypoalbuminemia, Raised Prothrombin Time are the most important Laboratory Investigations in Diagnosing Liver Abscess.

Present series showed trends similar to those of other study listed above but Raised Alkaline Phosphatase Levels was the single most common Laboratory abnormality in our study for Diagnosis of Liver abscess.

PUS CULTURE ANALYSIS

Studies	**Pus Culture Analysis E.coli**	**Klebsiella pneumoniae**	**Enterococcus**
Khee Siang, Chin Ming et al	2.5%	82.3%	-
Hiroshi Okana et al[61]	-	62%	-
Hyo Min Yoo et al	63%	28%	9%
Present series	9.45%	17.56%	34.2%

Enterococcus (34.2%) 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 most common and Khee Siang, Chin Ming et al (82.3%) and Hiroshi Okana et al (62.0%) where Klebsiella pneumoniae was the most common organism

CxR FINDINGS

Chest X-ray Findings	**D. Lynche, William A. Jensen et al[64]**	**World J Gastroenterol 2008 April 7; 14(13): 2089-2093**	**Present Series**
Normal	46.0%	58.9%	39.0%
Abnormal	54.0%	41.09%	61.0%

Chest x-ray findings were normal in 39/100 (39%) of the cases and abnormal in 61/100 (61%) of the cases and was comparable to other study D. Lynche, William
A. Jensen et al (54.0%) listed above in the table but recent study i.e. **World J Gastroenterol 2008 April 7; 14(13): 2089-2093 showed 41.09%of abnormal cases.** In our series Most cases had right sided pleural effusion 52/100 (52%).
Three cases had a ruptured liver abscess into pleural cavity.

USG FINDINGS OF LIVER ABSCESS

Lobar Distribution	**Hyo Min Yoo et al**	**Chaturbhul Lal Rajak et al[65]**	**World J Gastroenterol 2008 April 7; 14(13): 2089-2093**	**Present Series**
Solitary abscess	**89.0%**	**84.0%**	**76.29%**	**77.0%**
• Right lobe abscess	69.0%	72.0%	74.12%	73.0%
• Left lobe abscess	20.0%	12.0%	14.28%	4.0%

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Multiple abscess	**11.0%**	**20.0%**	**23.7%**	**23.0%**
Size of liver abscess (cms)				
• <5cms	45.0%	-	34.16%	26.0%
• >5cms	55.0%	-	65.83%	74.0%

Ultrasound abdomen was done to all patients in this study and various findings were analyzed.

Solitary abscess was seen in 77/100 (77.0%) of cases & Multiple abscesses were seen in 23/100 (23.0%) cases comparable to other Studies .

Right lobe involvement (73.0%) was comparable to other studies listed above but isolated left lobe involvement was 04% in our study as compared to other study Hyo Min Yoo et al (11.0%) and Chaturbhul Lal Rajak et al (20.0%) & World J Gastroenterol 2008 April 7; 14(13): 2089-2093 (23.7%)

ANALYSIS OF TREATMENT

Treatment Modality	**Hyo Min Yoo et al**	**Present Series**
Surgical	21.0%	13.0%
Open Laparotomy	21.0%	11.0%
Laparoscopy Drainage	-	2.0%
Aspiration	79.0%	52.0%
Pigtail Catheter Drainage	-	10.0%
Conservative (Antibiotics Only)	-	26.0%

Controversies in the management of liver abscess still exist. Surgical drainage of liver abscess has been an accepted therapy for decades. The diagnosis and treatment of liver abscess has changed due to advances in imaging techniques.

Out of the 100 cases in this study, 26 patients who had multiple small abscess and solitary abscess with volume < 200 cc or < 5cms size were treated conservatively. 74/100 (74%) who had abscess > 200 cc or left lobe abscesses were subjected to Intervention as compared to Hyo Min Yo et al Study where 100.0% patients underwent intervention

Out of 74 cases 52% cases underwent Percutaneous aspiration under antibiotic coverage as compared to Hyo Min Yo et al Study where 79.0% patients underwent Percutaneous Aspiration

10 cases underwent Pigtail catheter drainage under USG guided as abscess cavity was big and not completely liquefied (In our study size of abscess cavity was >10cms)

Laparotomy as initial line of treatment was performed in 11/13 ruptured liver abscess cases and Laparoscopy drainage in 2/13 ruptured liver abscess as compared to Hyo Min Yo et al Study where 21.0% patients underwent surgical intervention in our study it was 13%.

In our Study Intercostal drainage was required in three cases in whom the abscess had ruptured into pleural cavity, Patients survived.

Thus, in 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. 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 but relapse rates were high.

ANALYSIS OF REPEAT ASPIRATIONS

Repeat Aspirations	Chaturbhuj Lal Rajak et al	Sajjad Ahmed et al[66]	Present Series

Single Aspiration	88.0%	84.0%	71.4%
Twice Aspiration	10.0%	16.0%	20.4%
Thrice Aspiration	2.0%		8.2%

In 38/52 (71.4%) of the cases single aspiration was adequate. While 10/52 (20.4%) required 2 aspirations were required and 4/52 (8.2%) required 3 aspirations was comparable to other studies mentioned above in the table.

Thick viscous pus was the main reason for repeat aspirations. Average volume of the abscesses was larger in patients who required repeat aspirations in our study.

DISCUSSION OF COMPLICATIONS

Study	**Complications**
Hyo Min Yoo et al	59.0%
Present Series	13.0%

The various complications that arose in the patients with liver abscesses in this study were analysed.

Complications like Intraabdominal rupture with peritonitis (13.0%), pleural rupture (4.0%), Pericardial rupture (0.0%) was much less as compared to Study by Hyo Min Yoo et al (59%) which is significant

V. CONCLUSION

Out of these 74 cases, 44/74 cases had 'Anchovy sauce' appearance (suggestive of Amoebic aetiology) of the pus which revealed no growth, giving this a percentage of 59.45%. While growths were obtained in 30/74 (40.54%) of these cases. E.coli was isolated in 7/74 (9.45%) of cases and Klebsiella pneumoniae was isolated in 9/74 (17.56%) of the cases, and Enterococcus in 13/74 (34.2%) patients and in one case Staphylococcus aureus. So Enterococcus was the most common organism isolated in pyogenic liver abscess and 59.45% patients had no growth (Amoebic liver abscess)

 Chest X-ray were normal in 39 % of cases and abnormal in 61% of cases. Right pleural effusion was noted in 52% of cases.

 Ultrasonography revealed solitary abscess in 77.0% and multiple abscesses in 23.0%. Isolated right lobe abscess was seen in 73.0% and left lobe abscess in 04%. Both lobe involvement was seen in 4.0% of cases. Number of cases with abscess volume < 200 cc or size <5cms was 26% and those > 200 cc or size >5cms was 74%.

 Out of the total 100 cases in this study, cases who had multiple small abscesses and solitary abscesses < 200 cc were managed conservatively. 26/100 (26.0%) were managed conservatively but recurrences noted.

 While 52/100 (52%) were subjected to percutaneous aspiration,10cases underwent PigTail Catheter Drainage, 11/100 (11.0%) required Laparotomy and Drainage and 2/100 (2%) underwent Laparoscopically drainage for ruptured liver abscess along with (3/100, 3%) required ICD insertion for rupture into pleural cavity.

 Out of 52 cases 38 cases underwent single aspiration, 10 cases underwent twice aspiration and 4 cases underwent thrice aspiration. 10 cases underwent Pigtail catheter drainage under USG guided as abscess cavity was big and not completely liquefied (In our study size of abscess cavity was >10cms)

 Cryptogenic was the most common aetiology in Amoebic liver abscess (97.1%) and Pyogenic liver abscess (73.3%)

 Peritoneal rupture (13.0%) was the most common complication associated with Liver abscess.

 There is no mortality in our study.

REFERENCES

[1]. McDermott VGM. Questions and Answers : What is the role of percutaneous drainage for treatment of Amebic abscess of liver.

American Journal of Roentgenology 1995; 165: 1005-1006.
[2]. Jain NK, Madan A, Sharma T. Hepatopulmonary amaebiasis. Journal of Association of Physicians of India 1990; 38: 269-271.
[3]. Thompson JE, Verma R. Amebic liver abscess – A therapeutic approach. Reviews of Infectious Disease 1985; 7: 171-179.
[4]. Guainer V. Treatment of Amoebiasis, Human parasitic Diseases. 1986; 12(6): 189-211.
[5]. Irusen EM, Jackson TG, Simjec AE. Asymptomatic Intestinal colonization by pathogenic Entamoeba is Amoebic liver abscess. Clinical Infectious Disease. 1992; 14: 889-893.
[6]. Bertel CK, Van Heuden JA. Treatment of pyogenic hepatic abscess, surgical Vs. percutaneous drainage. Archieves of Surgery 1986; 121: 554-558.
[7]. Wong KP. Percutaneous drainage of pyogenic liver abscess. World Journal of Surgery 1990; 14: 492-497.
[8]. Karatasas A, William JA. Review of pyogenic liver abscess at Royal Adelaide Hospital. Journal of Surgery 1990; 60: 893-897.
[9]. Rajak CL, Gupta S, Jain S. Percutaneous Treatment of liver abscess. Needle aspiration versus catheter drainage. American Journal of Roentgenology 1998; 170: 1035-1039.
[10]. Do H, Lambiase RE, Deyoe I, Cronan H. Percutaneous drainage of hepatic abscess. American Journal of Roentgenology 1991; 157: 1209-1212.
[11]. Capuccino H, Campunile F. Laparosocpy guided drainge of hepatic abscess. Surgical Laparoscopy and Endoscopy 1994; 4: 234-237.
[12]. Monga NK, Sood S, Kaushik S. Amoebic peritonitis. American Journal of Gastroenterology 1976; 66: 366-373.
[13]. Saida AK, Bal S, Sharma AK. Influence of geographic factors in distribution of Entamoeba. Transactions of Royal Society of Tropical Medicine and Hygiene 1984; 78: 96-101.
[14]. Shyam Mattur, Gehlot RS, Alok Mehta. Liver abscess. Journal of Indian Academy of Clinical Medicine 2002; 3(4): 78-79.
[15]. Khee Sian, Chin Ming. Liver Abscess – Aretro spective study of 107 patients during 3 years. 2005; 58: 366-368.
[16]. Sajjad Ahmed, Arshad Zafar. Liver abscess. Journal of Medical College, Ayub Medical College, Abbotabad 2002; 14(1): 10-12.
[17]. Rodin DR, Rall PW. CT of amebic liver abscess. American Journal of Roentgenology 1988; 150: 1297-1301.
[18]. Management of pyogenic liver abscesses – percutaneous or open drainage? Chung Y F A, Tan Y M, Lui H F, Tay K H, Lo R H G, Kurup A, Tan B H Singapore Med J P i c t o r i a l E s s a y 2007; 48(12) : 1158
[19]. Pyogenic liver abscess: demographic, clinical, radiological and bacteriological characteristics and management strategies Gomal Journal of Medical Sciences Jan–June, 2005, Vol. 3, No. 1
[20]. An Appraisal of Surgical and Percutaneous Drainage for Pyogenic Liver Abscesses Larger Than 5 cm From the Department of Surgery, Singapore General Hospital Department of Surgical Oncology, National Cancer Center, Singapore. ISSN: 0003-4932/05/24103-0485 Annals of Surgery Volume 241, Number 3, March 2005
[21]. Clinical outcome and prognostic factors of patients with pyogenic liver abscess requiring intensive care Crit Care Med 2008 Vol. 36, No. 4 134
[22]. Berry M Bazaz, Bhargava S. Amebic liver abscess : sonographic diagnosis and management. J Clin ultrasound 1986 ; 14: 239-42.