



## **Clinico-pathological Profile of Pyogenic Liver Abscess: An Experience from Tertiary Care Hospital from Kashmir Valley**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author MDW guided the thesis project.*

*Author MC carried the operative procedures. All other authors designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Introduction:** Liver abscess is not an uncommon surgical problem seen in day to day clinical practice. It is an important and potentially curable disease entity. It is difficult to diagnose it clinically but is potentially curable, if treated well and reduces morbidity and mortality considerably. The formation of hepatic abscess is related to two distinct groups of pathogens - the pyogenic bacteria and the *Entamoeba histolytica*. Liver abscess is associated with mortality of up to 20%. Surgical drainage of pyogenic liver abscess was the commonest and best accepted modality of treatment in past. Now it is being replaced by minimal access surgical techniques like image guided percutaneous drainage and laparoscopic drainage procedures, but open surgical drainage is still applicable in cases, where the abscesses are secondary to biliary pathology, where percutaneous drainage fails and where abscess has ruptured.

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**Aims and Objectives:** The aim of our study was to evaluate, the various causes of pyogenic liver abscess, commonest micro-organism, various diagnostic modalities in diagnosing pyogenic liver abscess, to evaluate conservative treatment and surgical treatment, and to establish various guidelines for particular therapeutic procedure.

**Materials and Methods:** The present study entitled "Clinico-pathological profile of pyogenic liver abscess" was conducted in the Department of Surgery SMHS (Shri Maharaja Hari Singh) Hospital Srinagar Kashmir from April 2011 to April 2014. Our study was conducted on 100 patients and following observation was made.

**Results:** In our study, the maximum age was 67 years and minimum was 6 years. The most common presenting symptom was fever (98%) followed by abdominal pain (76%), and most common sign was fever (98%) followed by right upper quadrant pain (69%). 74% of patients have hemoglobin <10 gm. % and 36% had leucocyte count < 10, 000/ cumm. Blood culture was performed in 72 patients and only 51(70.83%) reports came with positive microbial report and pus culture was performed in 80 patients and 69 (86.25%) reports came with positive microbial report. The most common organism grown in blood culture was *E. coli (Escherchia coli)* 33.33%, *Klebseilla* 29.41% and in pus culture was *E. coli* 36.23%, followed by *Klebseilla* 27.53%. USG done in all patients showed right lobe abscess in 72%, left lobe in 21% and in both lobes 7%, single abscess cavity in 75% and multiple cavities in 25% of patients. CT Scan done in 57 patients showed Right lobe abscess in 64.91 %, left lobe abscess in 28.07 and in both lobes in 7.01%. The various modalities of treatment adopted in our study of 100 patients were open surgical drainage in 21, Percutaneous needle aspiration drainage in 17, percutaneous catheter drainage in 20 and Laparoscopic drainage in 20 and conservative management with intravenous antibiotics in 22 patients. The most common post-operative complications of open surgical procedure was thrombophlebitis in 66.66%, pleural effusion in 23.80%, and in non-surgical procedure complications were thrombophlebitis of superficial veins, repeated aspiration and pleural effusion, in 28.07%, 12.28%, 8.77%, 5.26% respectively.

**Conclusion:** Liver abscess is a fatal disease if early diagnosis and proper treatment is not initiated. Early recognition of clinical features and proper investigation including abdominal USG is very important. Our experience with patients of percutaneous needle aspiration under USG guidance is helpful, and cost-effective for multiple or solitary abscesses of less than 10 cm. Percutaneous needle aspiration under USG guidance is combined with administration of systemic antibiotics and metronidazole. Patients treated by this technique recover faster and duration of hospital stay is less.

**Keywords:** Liver; abscess; clinicopathology.

## 1. INTRODUCTION

Liver abscesses though not common, are very important as they are potentially curable, invariably fatal if untreated and often difficult to diagnose. Liver comprises 48% of all the visceral abscesses [1]. It is common in India with 2nd highest incidence due to poor sanitation, overcrowding and inadequate nutrition [2]. The formation of hepatic abscess is related to two distinct groups of pathogens- the Pyogenic bacteria and the *Entamoeba histolytica*. The commonest cause of liver abscess is Pyogenic infection throughout the world and here also, as amoebiasis is rare in Kashmir (Bourne, Juniper 1972). The commonest cause of organisms responsible for pyogenic liver abscess are *E. coli*, *Klebsiella pneumoniae*, *Streptococcus*, *Staphylococcus* and occasionally *salmonella typhi* and Anaerobic organisms such as bacteroids,

aero bacteria, actinomyces and anaerobic micro-aerophilic streptococcus. There is increased incidence of liver abscess in association with certain diseases like diabetes mellitus, Polycystic disease of liver, Multiple hepatic metastases, lymphoblastic leukemia, Pyelonephritis, and cirrhosis etc. Liver abscess presents as hectic temperature with rigors and chills, pain right upper abdomen, jaundice, rapid loss of weight and loss of appetite. Liver may be tender and enlarged and there may be presence of ascites. There may be chest signs with right sided basal collapse and pleural effusion. In majority of the cases, the underlying cause could not be identified. Biliary tract disease is reported to be the most frequent cause followed by portal circulation, arterial circulation, cryptogenic, and trauma [3]. It may be due to bacterial or parasitic invasion of liver [4]. Idiopathic etiology has been described in majority of abscesses. The invention

of modern imaging technique i.e USG and CT scan has revolutionized the diagnosis and management of liver abscess. The biochemical investigations are abnormal but nonspecific. Abnormal liver function tests point to liver as a source of infection. White blood cell count is highest with macro-abscess. Anemia, raised serum bilirubin, increased bilirubin almost entirely in patients with biliary tract obstructive disease. Alkaline phosphatase is raised highest with micro-abscesses related to biliary tract obstructive disease. Liver abscess are associated with mortality of up to 20% [5]. If diagnosed early and treated adequately morbidity and mortality are reduced considerably. The factors influencing mortality and morbidity are age, etiology, number of abscess, presence of complications, and presence of jaundice, hypoalbuminemia, polymicrobial infections, septicemia, delay in diagnosis and method of treatment. Percutaneous drainage is the commonest and best accepted modality of treatment in pyogenic liver abscess. Surgical drainage of pyogenic liver abscess was the commonest and best accepted modality of treatment in past. Now it is being replaced by many minimal access surgical technique which include percutaneous drainage, laparoscopic drainage but open surgical drainage is still applicable in cases where the abscesses are secondary to biliary pathology, where percutaneous drainage fails and where abscess has ruptured.

### 1.1 Aims and Objectives

The aim of our study was to evaluate, the various causes of pyogenic liver abscess, commonest microorganism, various diagnostic modalities in detecting pyogenic liver abscess, and to assess conservative treatment with surgical treatment, to establish various guidelines for each therapeutic procedure.

## 2. MATERIALS AND METHODS

The present prospective study entitled "Clinico-pathological profile of pyogenic liver abscess" was conducted in the Department of Surgery SMHS Hospital Srinagar Kashmir from April 2011 to April 2014. Medical records of all the patients were maintained. The cases were collected from the emergency unit and surgical outdoor Department of the hospital. The study was conducted on 100 patients of pyogenic liver abscess. The diagnosis of liver abscess was made based on history, clinical features, and

laboratory investigations. The various investigations performed on patients included, Complete blood count (HB, TLC, DLC), KFT (blood urea, serum creatinine), Electrolytes (Na, K), liver function tests: serum bilirubin, serum albumin, liver enzymes, serum alkaline phosphatase, serum Glutamic oxaloacetic transaminase and serum pyruvic transaminase were done. Coagulation profile which include prothrombin time, prothrombin time index, partial thromboplastin time, bleeding time and coagulation time., Plain X-ray chest and abdomen. USG was the mainstay of diagnosis, done in all patients. CT scan was done in selected patients. After the patients were fully investigated they were taken up for various treatment modalities included non-surgical drainage which included, conservative management on I/V antibiotics, Percutaneous needle aspiration drainage, percutaneous catheter drainage laparoscopic drainage and open surgical drainage. In open surgical drainage anterior trans-peritoneal subcostal approach was employed, upon opening peritoneal cavity. Complete laparotomy was done to find any etiological factor for pyogenic liver abscess. An incision was made directly over the abscess and pus was drained out, pus collected and sent for culture and sensitivity. A drain was then put in the abscess cavity, secured in place by catgut sutures. The tube drain was then removed after the cavitogram revealed collapsed cavity. In percutaneous drainage all the liver abscess were approached with USG guidance, either through the anterior abdominal wall or between the ribs anteriorly or laterally. Under USG guidance the 18 G chiba needle was inserted in to the center of abscess and pus aspirated as much as possible, pus sent for culture and sensitivity and the lavage of the cavity was performed. All patients underwent ultrasound and clinical examination every third day during the first week and the monthly for first six months and every 6 months thereafter if needed. For percutaneous catheter drainage, under US guidance 18 G needle was inserted in to the centre of abscess cavity to guide insertion of guide wire. Serial dilators were passed over the guide wire till tract is dilated so that 8 F to 12 F pigtail catheter until no more pus could be removed. The catheter was the secured to the skin for continuous external drainage and the patient was sent back to ward. When catheter output had stopped for 24 hours, a follow up ultrasonography was performed. If the abscess cavity was absent catheter was removed. The third group of patients were subjected to

laparoscopic technique and the drainage of abscess was performed giving all the benefits of minimal accesses surgery to the patient. The fourth groups of patients were managed on I /V antibiotics alone and include the patients with small abscess < 4 cm, small and multiple abscesses and without any complication or any treatable surgical pathology. The results of various diagnostic and therapeutic modalities were finally analyzed statistically using suitable clinical, etiological, diagnostic, bacteriological and therapeutic intervention.

### 3. RESULTS

The present study "Clinico-pathological profile of pyogenic liver abscess" conducted on the patients admitted in the department of surgery SMHS Hospital Srinagar, comprised of 100 patients and following observations were made. In our study age distribution of patients was shown in Table 1. The maximum age was 67 years and minimum was 6 years. There were 61 males and 39 females in our study.

**Table 1. Age distribution of patients**

Age in years	No. of patients	Percentage
1-10	04	04
11-20	21	21
21-30	17	17
31-40	30	30
41-50	19	19
51-60	07	07
>60	02	02

In our study the most common presenting symptom was fever (98%) followed by abdominal

pain (76%), and most common sign was fever (98%) followed by right upper quadrant pain (69%) as shown in Table 2.

Table 3 shows distribution of patients according to the grade of fever. Majority of patients 51 have 100-102<sup>o</sup>F and 27 shows high grade fever 102-104<sup>o</sup> F and 02 patients were afebrile.

In our study, 74% of patients have hemoglobin <10 gm % and 36% have leucocyte count < 10,000/ cumm, 20% have serum bilirubin >2 mgs % and 52% have serum albumin <2.5 gm. % and Table 4 shows various laboratory investigations of liver abscess patients.

In our study blood culture was performed in 72 patients and only 51(70.83%) reports came with positive microbial report and pus culture was performed in 80 patients and 69 (86.25%) reports came with positive microbial report. The most common organism grown in blood culture was *E. coli* 33.33%, *Klebseilla* 29.41% and in pus culture was *E. coli* 36.23%, followed by *Klebseilla* 27.53%, as shown in Table 5.

In our study the various diagnostic procedures that are done are Ultrasonography, CT scan, X-ray chest and x-ray abdomen. USG done in all patients and was positive in all cases. CT Scan done in 57 patients and was positive in all patients as shown in Table 6. In USG right lobe abscess was present in 72%, left lobe in 21% and in both lobes 7%, single abscess cavity in 75% and multiple cavity in 25% of patients. CT scan shows Right lobe abscess in 64.91%, left lobe abscess in 28.07 and in both lobes in 7.01%.

**Table 2. Symptoms and signs of patients**

S. no	Symptom	No. of patients	% age	S. no	Signs	No. of patients	% age
1	Fever	98	98	1	Fever	98	98
2	Abdominal pain	76	76	2	Right upper quadrant pain	69	69
3	Nausea and vomiting	30	30	3	Intercostals tenderness	67	67
4	Weight loss	29	29	4	Pallor	51	51
5	Upper abdominal swelling	19	19	5	Hepatomegaly	37	37
6	Cough	14	14	6	Jaundice	20	20
7	Jaundice	12	12	7	Chest signs	18	18
				8	Pedal edema	09	09
				9	Signs of peritonitis	05	05
				10	Splenomegaly	05	05
				11	Ascites	04	04

**Table 3. Distribution of patients according to the grade of fever**

No. of patients	Grade of fever
20	90-100 °F
51	100-102 °F
27	102-104 °F
02	Afebrile

The various modalities of treatment adopted in our study of 100 patients were open surgical drainage in 21, Percutaneous needle aspiration drainage in 17, percutaneous catheter drainage in 20 and laparoscopic in 20 and conservative

management with intravenous antibiotics in 22 patients. Table 7 shows response of 17 patients who underwent percutaneous needle aspiration. Single aspiration and antibiotics in 64.70% and multiple aspiration and antibiotics in 35.29%.

The most common post-operative complications of open surgical procedure was thrombophlebitis in 66.66%, pleural effusion in 23.80%, and in non-surgical procedure complications are thrombophlebitis of superficial veins, repeated aspiration and pleural effusion, in 28.07%, 12.28%, 8.77%, 5.26% respectively as shown Table 8.

**Table 4. Shows various laboratory investigations done**

Lab. investigations	No. of patients	% age	Lab. Investigations	No. of patients	% age
Hemogram			Serum bilirubin		
<10 gms percent	74	74	> 2mgs percent	20	20
>10 gms percent	26	26	<2 mgs percent	80	80
White blood cell count			Serum albumin		
<10,000/cumm	36	36	<2.5 mgs percent	52	52
>10,000/cumm	64	64	>2.5 mgs percent	48	48
Platelet count			Serum glutamic Oxaloacetic transaminase		
<1.75 lacs	6	6	SGOT>40 i.u	53	53
>1.75 lacs	94	94	SGOT<40 i.u	47	47
Prothrombin time			Serum glutamic pyruvic transaminase		
PT > 15 secs, control 12 secs	29	29	SGPT>40 i.u	48	48
Partial thromboplastin time			SGPT<40 i.u	52	52
Time>35 secs	16	16	Alkaline phosphatase		
			ALP >250 i.u	88	88
			ALP<250 i.u	12	12

**Table 5. Showing organisms grown in blood culture and pus culture**

1. Organisms grown in blood culture	No. patients positive	% age	2. Organisms grown in positive pus culture	No. of patient positive	% age
Gram negative aerobes			Gram negative aerobes		
<i>E. coli</i>	17/51	33.33	<i>E. coli</i>	25/69	36.23
Klebseilla	15/51	29.41	Klebsiella	19/69	27.53
Proteus	7/51	13.72	Proteus	10/69	14.49
Pseudomonas	6/51	11.76	Pseudomonas	7/69	10.14
Gram positive aerobes			Gram positive aerobes		
Staph aureus	4/51	7.84	Staph aureus	4/69	5.79
Staph epidermoids	2/51	3.92	Staph Epidermoidis	2/69	2.89
			Gram negative anaerobes		
			Bacteroidsfragilis	2/69	2.89

**Table 6. Diagnostic procedure and their results**

<b>1. USG location of abscess cavity</b>	<b>Total no of patients</b>	<b>Positive cases</b>	<b>% age</b>	<b>2. CT location of abscess cavity</b>	<b>Total no. of patients</b>	<b>Positive cases</b>	<b>% age</b>
Right lobe abscess	100	72	72	Right lobe abscess	57	37	64.91
Left lobe abscess	100	21	21	Left lobe abscess	57	16	28.07
Both lobe	100	07	07	Both lobe	57	04	7.01
Single abscess cavity	100	75	75	Single abscess cavity	57	14	75.43
Multiple abscess cavity	100	25	25	Multiple abscess cavities	57		24.56
Size of abscess cavity	100			Size of abscess cavity	57		
<4 cm		27	27	<4 cm		17	29.82
>4cm		73	73	>4 cm		40	70.17
Volume of abscess cavity				<b>3. Plain X-Rayabdomen findings</b>			
<500 ml		23	23				
>500 ml		77	77				
Size of abscess cavity	57			Right dome of diaphragm raised	100	30	30
<4 cm		17	29.82				
>4 cm		40	70.17	Enlarged liver shadow	100	20	20
<b>4. X – ray chest findings</b>				Abscess cavity seen as air fluid level.	100	06	06
Raised right dome of diaphragm	100	30	30				
Right pleural effusion	100	11	11				
Right basal atelectasis	100	09	09				

**Table 7. Showing response of patients to percutaneous needle aspiration**

<b>Treatment modality</b>	<b>No. of patients</b>	<b>Percentage</b>
Single aspiration and antibiotics	11/17	64.70
Multiple aspiration and antibiotics	06/17	35.29

**Table 8. Showing post- operative complications of open surgical and non surgical procedure**

<b>1. Open surgical procedures complications</b>	<b>No. of Patients (21)</b>	<b>Percentage</b>	<b>2. non- surgical procedure complications</b>	<b>No. of patients (57)</b>	<b>Percentage</b>
Thrombophlebitis	14/21	66.66	Thrombophlebitis of superficial veins	16/57	28.07
Pleural effusion	5/21	23.80	Repeated aspiration	7/57	12.28
Wound infection	3/21	14.28	Pleural effusion	5/57	8.77
Wound dehiscence	2/21	9.52	Recurrent sepsis	3/57	5.26
Recurrent abscess	1/21	4.76			

**Table 9. Shows various therapeutic modalities and outcome of 100 patients of pyogenic liver abscess**

<b>S. no</b>	<b>Initial therapy</b>	<b>No .of patients</b>	<b>Days of I/V antibiotics treatment</b>	<b>Days for fever to subside</b>	<b>Days of hospitalization</b>	<b>Mortality</b>	<b>Comments</b>
01	Medical treatment (I/V antibiotic only)	22	21	04	05-07	03	All the patients who died were terminally malignant abscess < 4 cm
02	Percutaneous needle aspiration	17	14	03	05-07	None	Abscess > 4cm <7 cm
03	Percutaneous catheter drainage	20	07	02	07-08	None	Abscess > 7 cm
04	Laparoscopic drainage	20	03	02	03-05	None	Abscess >7cm
05	Open surgical procedures	21	05	02	07-08	None	Abscesses which were complicated.

Table 9 shows various therapeutic modalities and outcome of 100 patients of pyogenic liver abscess. Thus in our study, non-surgical treatment (percutaneous catheter drainage) is the best modality of treatment as there is less risk of complication in addition to that there are no chances of complications like wound infection and wound dehiscence.

#### 4. DISCUSSION

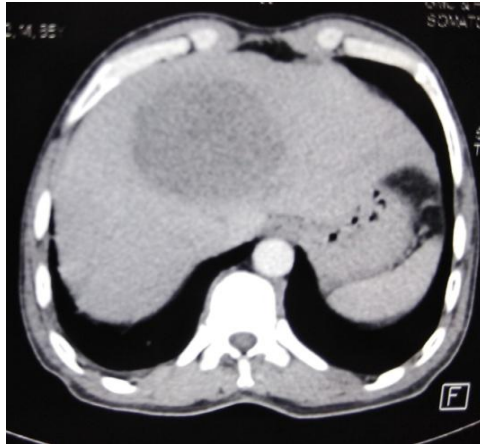
The present study entitled "clinic-pathological profile of pyogenic liver abscess" was conducted on 100 patients in the Department of Surgery SMHS hospital Srinagar. In our study the pyogenic liver abscess has been found in all most all age groups and both sexes, with a slightly higher incidence in older age group. The youngest patient in our study was 6 years old boy and oldest patient was 67 years old [6,7,8]. The highest incidence of the disease seen in our study was 31 to 41 years of life followed by 2<sup>nd</sup> and 5<sup>th</sup> decade of life [9]. Males predominate over females in our study with 61 males and 39 female's ratio 1.5:1 [10,11], on contrary, Mehta and Parija et al found the male and female ratio to be 15:1. The average length of time from the start of the disease process to admission was 27 days (range 1-3 months) [12]. Fever was the commonest symptom present in 98% patients associated with rigors and chills. Fever was high grade, continuous type. Right upper quadrant pain was the second most common symptom found in 76% of our patients, weight loss usually associated with nausea and vomiting was found in 29% of our patients. Nausea and vomiting was found in 30% of our patients [13,14,15], Miedema et al. found cough in 14% of their patients. Jaundice as presenting complaint was found in 12% [16] while Alvarez found it in 19.6% and Rahimian found jaundice in 21% of his patients. The commonest sign in our study was Fever found in 98%. Fever was continuous, high grade ranging from 99 °F to 104 °F, associated with rigors and chills in 93% while as it is found in 100% of patients in the study done by Ranson HC et al. [17]. Right upper quadrant tenderness, the 2<sup>nd</sup> most common sign in our study was found in 69% patients associated with tender hepatomegaly, but Alvarez found upper quadrant tenderness in 55% of his patients with multiple abscesses and 50% with single abscesses. Intercostal tenderness in our study was the 3<sup>rd</sup> commonest sign found in 67% patients, while Mehta Rb et al. found intercostal tenderness in 95.8% of his patients. Pallor in our study was found in 51% patients. On the contrary Tetz and

Reeves [18] found pallor only in 17% of their patients. Severe anemia is associated with higher morbidity and mortality. Hepatomegaly was the 5<sup>th</sup> commonest sign found in 37 % of our study patients and Alvarez found it in 21.6% and Wong W M found enlarged liver in 18% of his patients. Deep Jaundice associated with higher morbidity and mortality was found in 20% of patients. Chest pain including wheeze on right basal area, decreased breath sounds and dull percussion note were found in 18% patients in contrary with Wrong W M who found chest signs in 12% of his patients. Pedal edema was found in 9% patients. Pedal edema was due to severe hypoproteinemia. In our study signs of peritonitis were found in 5% patients while as Mehta et al found signs of peritonitis present in 10% of patients. Splenomegaly was found in 5% patients whereas Joseph and Arthur [19] found splenomegaly in only 1 % of his patients. Ascites was found in 4 % patients .in the present study various predisposing conditions for pyogenic liver abscess were found. The presence of diabetes mellitus was seen in 11% patients [20]. Complete hemogram was done in all the patients and a hemoglobin level of less than 10gm % was found in 74% patients. Low hemoglobin level have been found to be associated with increased morbidity and mortality whereas Ranson et al. found anemia in 57% of his patients. Total leucocyte in our study above 10,000/cu mm was found in 64% of the patients [21]. In our study before subjecting the patients to surgery or percutaneous drainage the coagulation parameters were monitored. Elevated prothrombin time which was due to decreased absorption of vitamin K from the gut. Improvement of prothrombin time within 48 hours of vitamin k administration is considered diagnostic of obstructive jaundice. In our study coagulation profile was done in 100 patients, prothrombin time was found to be elevated more than 15 secs in 29% of patients against a control of 12 secs, partial thromboplastin time with Kaolin was elevated more than 35 secs in 16% patients against a control of 30 seconds. Our findings were found in agreement with the findings of Ranson et al. Dhaval O, et al. found Serum bilirubin to be more than 2 mg % in 20% patients. On contrary other study found bilirubin levels elevated in 50% and 54% of patients [21]. The most important marker of abnormal liver function was found to be elevated serum alkaline phosphate in 88% patients [21]. Serum glutamic oxaloacetic transaminase (SGOT) was found raised more than 40 i.u in 53% patients and serum glutamic pyuric trans aminase (SGPT)



elevated more than 40 i.u in 48% patients [21] and on contrary Ranson found SGOT more than 40 i.u in 71% of patients and SGPT was to be raised only in 39% of his patients. Hypoalbuminemia is associated with decreased wound healing so increased morbidity and mortality. Serum albumin levels of less than 2.5 gm were found in 52% patients of our study, whereas Wong W M found serum albumin less than 2.5 gm in 33 % of patients. Blood culture in our study was performed in 72 patients and positive cultures were grown in 51% patients, whereas in the study by Seeto Rocky blood cultures were positive in 82% of his patients and cultures was positive in 69% of patients[22]. *E. coli* were the commonest organism grown in 17 patients (33.33%) followed by *Klebsiella* in 15 patients (29.41%) proteus in 7 patients (13.72%). *Pseudomonas* in 6 patients (11.76%), *Staph-aureus* in 4 patients (7.84%), *staph epidermoids* in 2 patients (3.92%). Pus cultures was performed in 80 patients and culture report was positive in 69 patients (86.25%). *E. coli* was the commonest micro organism grown in 25 patients (36.23%) *Klebsiella* 19 patients (27.53 %), proteus 10 patients (14.49%), *pseudomonas* 7 patients (10.14%) *staph aureus* 4 patients (5.79%), *Staph epidermoid* 2 patients (2.89%) and *bacteroid Fragilis* 2 patients (2.89%) Wong WM found similar results. Newer radiological techniques such as ultrasound and CT scan have enhanced our ability to establish the diagnosis of hepatic abscess and have increased our understanding of the natural history of the disease process. Ultra-Sonography of liver was the commonest investigation to done in 100% patients in our study and demonstrated liver abscess in 100 patients. Ultra-Sonographically the abscess was found to be located in the right lobe of liver in 72% patients, in left lobe 21 % of patients and in both lobes in 7% patients and the size of abscesses ranged from 1.5-18 cm. Single abscess cavity was seen in 75% patients and multiple abscess cavities were found in 25% patients similar results by Alvarez P J L et al and Rahimian J Wilson et al and was contrary to the bertel et al. [23] found multiple abscess in 57% of his patients and Wai Man Wong found single abscess cavity in 80% and multiple in 63%. CT scan in our study was done in 57 patients and was 100% positive. Right lobe of abscesses was found in 64.91%, left lobe abscesses in 28.07% and both lobes 7.01%. Single abscess cavity was seen in 75.43% and multiple abscess cavities were found in 24.56% patients. Plain X-ray chest was done in 100% patients, raised right dome of diaphragm was

found in 30% patients, pleural effusion right side was seen in 11% patients, basal atelectasis was seen in 9% whereasseeto Rocky found elevated dome of diaphragm in 20%, pleural effusion in 19% of patients basal atelectasis in 21% of his patients. Plain X –ray abdomen shows enlarged liver shadow was seen in 20% patients, abscess cavity seen as air fluid level was seen in 6% patients and elevated right dome of diaphragm in 30% Patients. Etiology of pyogenic liver abscess has been mainly diagnosed by ultra-sonographically. Biliary pathology was the most common cause (41%) followed by cryptogenic (30%) followed by portal vein sepsis (15%), general sepsis (11%) and others (3%). Our findings are contrary to seetoRocky cryptogenic (40%), biliary (37%), portal (11%) and others (12%). Intravenous antibiotics were used in all our patients and were the only treatment modality required in 22 patients in our study. The patients who were managed by intravenous antibiotics only were usually those with small abscesses less than 4 cm, multiple and small abscesses and patients with abscesses whose general condition were very poor and could not tolerate percutaneous or surgical drainage. The patients were managed by I / V antibiotics for three weeks followed by oral antibiotics for next three weeks. The antibiotics used were second to third generation cephalosporins with metronidazole. In the present study of pyogenic liver abscess, percutaneous drainage as the modality of treatment was done in 37% patients. The patients who were subjected to percutaneous drainage responded to this modality of treatment in the following ways, Percutaneous catheter drainage was done in 20 patients, percutaneous needle aspiration done in 17 patients in which, single aspiration in 11 and multiple aspiration 6 patients. The advantages of percutaneous drainage over open surgical drainage are as follows. Little discomfort to patients, minimal interferences with vital function, low cost, no significant peritoneal contamination, minimal contamination of wound. The criticism against percutaneous drainage is; drainage may be inadequate, inability to deal with source of infections, abscesses located anatomically at difficult locations, multiloculated abscess, and thick viscous pus. Laparoscopic drainage was instituted in 20 patients as a modality of treatment restricted to those patients whose CT scan shows single abscess cavity amenable to accessible segments of liver. Open drainage as a modality of treatment was done in 21 patients.



**Image 1. Cect scan showing liver abscess**



**Image 2. Percutaneous drainage set**



**Image 3. USG probe guided needle insertion**



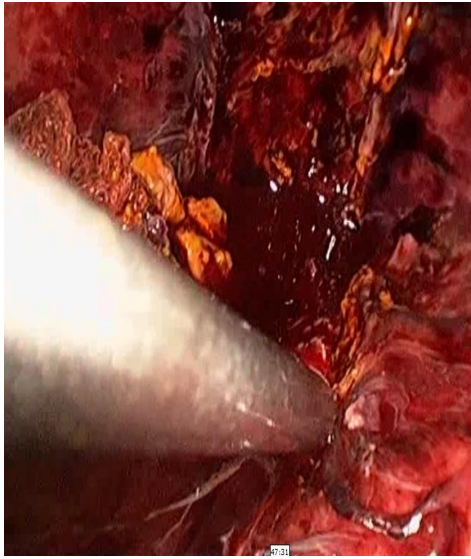
**Image 4. Dilatation of tract**



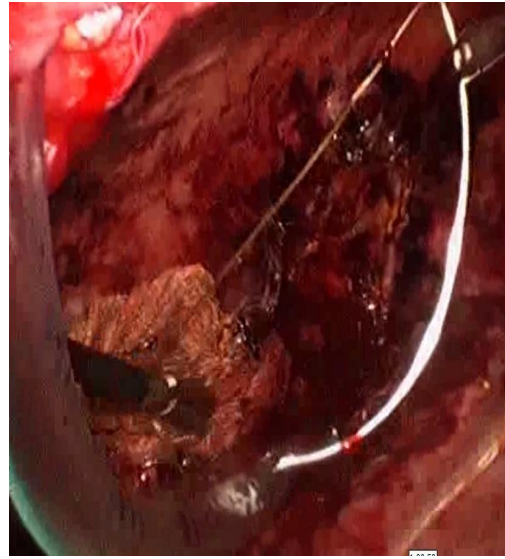
**Image 5. Pigtail catheter in liver abscess**



**Image 6. Liver abscess on diagnostic lap**



**Image 7. Aspiration of liver abscess**



**Image 8. Suture fixation of tube drain**

The various indications for open surgical drainage were as under; more than 500 cc of pus aspirate, no appreciable therapeutic response to nonsurgical means, complicated liver abscess, abscess not approached by percutaneous route, thick viscous abscess. Open surgical drainage of pyogenic liver abscess was previously the only method of diagnosis and treatment of pyogenic liver abscess. Open surgical drainage is almost completely replaced by percutaneous drainage. The approach to the pyogenic liver abscess has been trans-peritoneal through sub- costal, midline or right Para median incision. A total of 21 surgical procedures were performed in our study. Drainage of the abscess was done in 19 patients, drainage with peritoneal lavage in 3 patients [24]. The hospital stay for patients who underwent percutaneous drainage as the modality of treatment was 7 patients versus 18 days for patients being treated by surgical drainage [25]. The commonest complication in surgical drained group of patients in our study was thrombophlebitis of superficial veins in 66.66%, wound infection in 14.28%, recurrent sepsis in 4.76%, pleural effusion in 23.80%, wound dehiscence 14.28%. In the non-surgically treated group thrombophlebitis was seen in 20.25%, recurrent sepsis 3.79%, repeated aspiration 8.86%, pleural effusion 3.79% patients and our findings are contrary to Miedema and Dineen et al, they found in his study septicemia in 33% of his patients, intra-abdominal sepsis in 9% recurrent liver abscess in 7% liver failure and renal failure in 4% each massive upper gastrointestinal bleed in 3% each, myocardial

infarction and prolonged biliary drainage in 2% each. Free peritonitis, liver abscess and hemorrhage in 1% each and other complications in 13% of his patients. The overall mortality in our study was 3% all patients who died were from nonsurgical treated group. Two patients had concomitant advanced malignancies and had septic shock with multi-organ failure on presentation. Their pre-morbid conditions precluded the option of surgery. Gyorffy et al. found mortality rate of 11.5 5 on the contrary Mischenger et al. found mortality 17.4%. The factors predisposing high mortality in our study of patients were severe anemia, high leucocyte count of more than 10,000/ cu mm, hyper-bilirubinemia above 10 mg%, hypo-albuminemia, multi-microbial infection and delay in diagnosis. The mortality in our study has been less and has been seen to decrease steadily everywhere and here also due to earlier diagnosis mostly by ultrasonography, earlier institution of treatment and pre-operative and post-operative antibiotics. The limitation of the study is a short term follow up, however, it becomes imperative to state that surgeons need to be acquainted with and get skilled in the minimal access surgical procedures to treat such surgical disease like liver abscess.

## 5. CONCLUSION

Liver abscess is a fatal disease if early diagnosis and proper treatment is not initiated. Early recognition of clinical features and proper investigation including abdominal USG (which is relatively cheap and very sensitive) is very

important. However, for larger abscesses (>300cc) and left lobe abscesses medical management plus interventions such as Percutaneous needle aspiration, Percutaneous catheter drainage, laparoscopic drainage and open surgical procedures are different modalities of treatment. Our experience with patients of liver abscess handled with percutaneous needle aspiration under USG guidance is helpful, effective, and cost-effective for multiple or solitary abscesses of less than 10 cm. Percutaneous needle aspiration under USG guidance is combined with administration of systemic antibiotics and metronidazole. Patients treated by this technique recover faster and duration of hospital stay is less. Laparoscopic drainage is yet another minimal access modality with similar benefits.

## CONSENT

As per international standard or university standard written patient consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

As per international standard or university standard written ethical permission has been collected and preserved by the authors.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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