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Original Research Article

A prospective study of the clinical tapestry and strategic management of liver abscess

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ABSTRACT

Background: Liver abscess is a common condition in India, which has 2nd highest incidence of liver abscess in the world. This study had tried to delineate clinical profile, distribution, mode of presentation, risk factors and effective management of liver abscess.
Methods: Data for this prospective study was obtained from 158 patients with liver abscess and undergoing treatment in a tertiary care center in Central India (Government Medical College and Hospital, Nagpur), from June 2019 to November 2021.
Results: In this study, highest incidence occurred in 31-40 years age group. Abdominal pain was present in all cases. Fever was the most consistent symptom, cryptogenic was the most common etiology, leucocytosis with deranged LFT was seen in majority of cases. Pleural effusion was seen with most common involvement of right side. 12.6% cases (<100 cc) were managed conservatively. 23.5% cases (100-200 cc) were managed with antibiotics along with either aspiration or pigtail drainage. 61.4% cases (>200 cc) were managed with PCD. 2.5% cases showed ruptured liver abscess and were managed surgically. *E. coli* was the most common organism grown. Incidence of recurrence was 8.2%.
Conclusions: Liver abscess is a common condition in India. All cases don't require invasive management. Small abscesses can be managed with conservative antimicrobial therapy alone but recurrence rate was seen. Ultrasound guided pigtail catheter drainage is an effective method in majority cases, whereas laparotomy and drainage remain the standard management in complicated ruptured liver abscess into the peritoneal cavity.

Keywords: Liver abscess, Pigtail, Central India

INTRODUCTION

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.[1] Pyogenic abscesses account for three quarters of hepatic abscess in developed countries. While amoebic liver abscess cause two third of liver abscess in developing countries.[2] The WHO reported that *Entamoeba histolytica* causes approximately 50 million cases and 100,000 deaths annually.[3] 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. This study had tried to delineate clinical profile, risk factors and management strategies of liver abscesses. 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. Advances in radiological techniques, treatment modalities also have changed from open surgical drainage to minimally invasive radiological drainage procedures, open surgical drainage is rarely required today, amoebicidal and appropriate antibiotics have improved the management of liver abscess. The options of management are, medical management, percutaneous aspiration, percutaneous catheter drainage, open or laparoscopic surgical drainage.

This study was designed to find out which mode was helpful and ideal for a particular patient with reference to severity of the disease and time of presentation and response to other modes of management, several other factors were also analysed in detail. Effective management of the disease will help in decreasing morbidity and mortality associated with the disease and will also help in finding the ways of decreasing the incidence of disease.

Aims and objectives

The aims and objectives were to study clinical presentation of liver abscess i.e., distribution with respect to age, sex and mode of presentation, risk factors associated and effective different modes of treatment. Conservative (antibiotics alone) (in uncomplicated abscess measuring 5 cm (maximum diameter) or 100 cc). In ruptured liver abscess: open surgical drainage; laparoscopic surgical drainage (extraperitoneal and transperitoneal).

METHODS

The data for this prospective study was obtained from 158 patients diagnosed to have liver abscess and undergoing treatment in Government Medical College and Hospital Nagpur, from June 2019 to November 2021, inclusive of follow up period of 6 months after ethical approval from the hospital ethics committee. Sample size was determined considering property of morbidity as the main outcome of the surgeries. Consecutive sample of 158 subjects fulfilling eligibility criteria were selected by convenience sampling method.

Sample size estimation

Sample size was determined considering property of morbidity as the main outcome of the surgeries. The following assumptions were made from the study by Hori et al (2018).

Assumption

Expected proportion=28%,

Precision=7%,

Desired confidence level=1- alpha=95%,

Required sample size,

N=158.

Sampling method

$$N=\frac{z^2\ (1-\alpha)/2p\ (1-p)}{d^2},$$

Z=1.96,

p=0.28 (expected proportion),

d=7 (absolute deviation),

N=1.962×28×72/72.

Sampling

Hospital based prospective study where consecutive sample of 158 subjects by fulfilling eligibility criteria was selected by convenience sampling method.

Data was entered in MS Excel, coded and analyzed in a statistical software STATA version 10.1, 2011.

Data analysis included both descriptive and inferential statistics.

Descriptive statistics was used to summarize quantitative variables with mean and standard deviation while frequency and percentages were used to summarize categorical (qualitative) variables.

Inferential statistics included tests of significance for assessing difference in parameters in sub groups of baseline characteristics

Two independent samples t test with equal variances was used to assess the differences in measurement of two sub groups.

Pearson Chi square tests was used to assess the difference in proportion in two sub groups.

A p value <0.05 was considered statistically significant for all comparisons.

Inclusion criteria

All cases of liver abscess diagnosed clinically and/or by ultrasonography in evolving, liquefied and ruptured stage with or without peritonitis were included. All cases of clinical liver abscess with elevated total leucocyte count (TLC), LFT, increased prothrombin time and/or serologically amoebic antigen positive were included. All

cases of diagnosed liver abscess patients being referred to tertiary care centre were also included.

Exclusion criteria

All liver abscess cases treated outside or partially treated liver abscess cases; patients not giving consent; all liver abscess patients with lost follow up were excluded.

Patient data collection and evaluation

Patient data was collected from all patients attending Government Medical College and Hospital general surgery OPD, casualty and inpatient department, irrespective of their age/gender/background /socio economic status. The patients were evaluated and followed up according to the protocol.

Detailed history of patient was entered in proforma.

Complete haemogram, LFT, prothrombin time, serology for amoebic antigen was sent immediately on presentation.

Preliminary ultrasound of abdomen and pelvis was done on the same day of presentation. Patient was put on conservative line of management

Patient was followed up daily clinically and LFT and USG abdomen was repeated on the 3rd day if patient symptomatically not relieved.

Repeat ultrasound/CT/MRI abdomen and pelvis was done immediately if patient condition does not improve/worsen or after 3-4 days as a routine.

If the patient developed any of the complications like ruptured liver abscess into any of the serosal cavity, patient was immediately taken up for surgery (laparotomy drainage or laparoscopic drainage).

Pus was sent for gram's stain and culture and sensitivity.

Anaerobic cultures were not done as the facility was not available in our hospital.

Blood culture was not routinely performed in all cases.

Patient was informed about any surgical procedure and consent taken.

Patient data collected regarding

Age, gender, complaints, past-surgical history, past history of liver abscess, history of alcoholism, diabetes, any immunodeficiency states, any history of biliary tract disorder, history of amoebic dysentery, jaundice was taken. Patient was examined in detail. If the patient was referred from elsewhere the details of the same was considered at the time of admission. Blood investigations and X ray and and other radiological modalities performed and was added. Complications if developed was assessed in detail and management of the same and the further complications will be followed up.

Management

Conservative antibiotic treatment given for patients who had abscess <200 CC solid or semisolid and no fever.

Percutaneous needle aspiration was done on patients who had abscesses >200 CC with a 16G/18G spinal needle. The site, depth, direction of aspiration was marked by ultrasonography. All patients were administered antibiotics intravenously initially upon admission. All patients were started with metronidazole at a dose of 40 mg/kg/day was divided doses for 14 days. If upon aspiration, pus revealed growth of organisms than appropriate antibiotics were instituted in full course (3rd generation cephalosporin+aminoglycoside).

Percutaneous pigtail catheterization done for abscess >200 CC with fever with liquified abscess with active flush and aspiration done with normal saline and metronidazole through pig tail catheter with administration of intravenous antibiotics. Exploratory laparotomy done in case of ruptured liver abscess with sepsis and necessary intercostal drainage tube (ICD) insertion done for pleural effusion.

Patients were examined daily for clinical improvement. Improvement of pain, fever, anorexia, and hepatomegaly were considered as a criterion for successful treatment.

Mean hospital stay was recorded. Laparotomy was considered in cases of suspected rupture of liver abscess with peritonitis.

Ultrasonography was done as indicated. Relapses were noted and repeat aspirations were performed when necessary.

Cure was defined as improvement clinically with subsidence of fever, and local signs, symptoms, decrease in WBC count and follow-up ultrasonography showed reduction in size <3 cm in diameter and no evidence of relapses.

Follow up of patients

Patients were followed up for a minimum period of 6 months. Monthly for first 3 months with USG scanning, then once after 6 months with USG scanning for recurrent attacks or development of complications and to monitor the efficacy of the treatment given.

Cure was defined as improvement clinically with subsidence of fever, and local signs, symptoms, decrease in WBC count and follow-up ultrasonography showed

reduction in size <3 cm in diameter and no evidence of recurrence.

RESULTS

The major epidemiological findings were as follows: Age of patients included in this study varied from 19-75 years. The mean age was 45 years. The highest incidence was noted in the age group of 41-50 years.

Table 1: Comparison of data according to age groups.

Age (in years)	Frequency	Percentage
19-20	6	3.8
21-30	17	10.8
31-40	38	24.1
41-50	45	28.5
51-60	39	24.7
>60	13	8.2
Total	158	100.0

Table 2: Symptoms in liver abscess.

Symptoms	Frequency	Percentage
Pain in upper abdomen	158	100
Fever	146	92.4
Cough	44	27.8
Diarrhoea/dysentry	20	12.7
Altered sensorium	7	4.4

Table 3: Signs in liver abscess.

Signs	Frequency	Percentage
Fever	146	92.4
Hepatomegaly (>12 cm)	69	43.7
Pallor	42	26.6
GURD	84	53.2
Icterus	31	19.7
Pleural effusion	93	58.9
Ascites	33	20.8

Table 4: Etiology of liver abscess.

Cause	Frequency	Percentage
Cryptogenic	75	47.4
Alcoholic	54	34.2
Biliary	24	15.2
Colitis	3	1.8
HIV	1	0.6
TB	1	0.6

Abdominal pain was present in all cases (100%) of patients. Fever was the most consistent symptom occurring in 92.4% of patients. Diarrhoea occurring in 12.7% of patients, altered sensorium in 4.4% of patients. 27.8% of patients presented with respiratory symptoms like cough.

Table 5: Associated risk factors.

Risk factors	Frequency	Percentage
No associated risk factor	100	63.3
Amoebic	1	0.6
Colitis	2	1.3
DM	27	17.1
HBsAg +	1	0.6
HIV	1	0.6
HTN	14	8.9
Pulmonary TB	1	0.6
Ruptured	4	2.5
S.typhi	4	2.5
Extrapulmonary TB	2	1.3
Thrombocytopenia	1	0.6

Table 6: Blood investigations.

Normal range		Frequency	Percentage
Hb (>9)	Normal	125	79.1
	Abnormal	33	20.9
WBC (<10000)	Normal	31	19.6
	Abnormal	127	80.4
RBS (<200)	Normal	126	79.7
	Abnormal	32	20.3
Urea (<45)	Normal	151	95.6
	Abnormal	7	4.4
Creatinine (<1)	Normal	145	91.8
	Abnormal	13	8.2
Sr. albumin (>2.5)	Normal	69	43.6
	Abnormal	89	56.4
Sr. bilirubin (>1.2)	Normal	104	64.7
	Abnormal	54	35.5
ALP (<300 mg/dl)	Normal	134	84.8
	Abnormal	24	15.2
SGOT (<40)	Normal	54	34.2
	Abnormal	104	65.8
SGPT (<40)	Normal	62	39.2
	Abnormal	96	60.8
PT (<20)	Normal	129	81.6
	Abnormal	29	18.4

Table 7: Chest X-ray findings.

Findings	Frequency	Percentage
Normal	75	47.5
RPEF	71	44.9
B/L PE	9	5.7
Koch's lesion	1	0.6
LPEF	1	0.6
Old granuloma	1	0.6
Total	158	100.0

Fever was defined as temperature >38.5 ºC was present in 92.4% of the cases.

Hepatomegaly with liver span of >14 cm was seen in 43.7% of cases. Hepatomegaly was tender, smooth, soft to firm. Icterus was observed in 19.7% of cases. Pallor was seen in 26.6% of cases. Respiratory finding with pleural effusion, basal crepitus was seen in 58.9% of cases.

Cryptogenic was the most common etiology in Liver abscess which showed 47.4% of cases. Alcoholism was second most common etiology showing 34.17% of cases. Biliary cause was present in 15.18% of cases and colitis was seen in 1.8% of cases. Alcoholism was significant predisposing factor as personal habits in liver abscess patients.

Diabetes mellitus was found to be a significant associated risk factor.

Leucocytosis with raised WBC in 80.4% of cases was seen in liver abscess patients due to collection of pus, serum albumin was deranged in 56.4% of patients showing liver function was not normal in liver abscess patients. Anemia, diabetes mellitus are associated with the infection in this cases.

Liver abscess patients presented with deranged liver function tests in the form of raised. Bilirubin in 35.44% of cases, raised ALP in 15.18% of cases, raised SGOT and SGPT 65.83% and 60.76% cases respectively, also this case showed raised prothombin time in 18.36% of cases.

Pleural effusion was seen as a respiratory abnormality in 48.5% of cases with most common involvement of right side 44.9% cases.

Pleural effusion was the most common respiratory abnormality seen in liver abscess cases showing most common involvement of right side of 91.1%.

Anchovy pus was seen in 34.17% of cases which were suggestive of amoebic liver abscess and treated.

Table 8: Culture of pus.

Culture	Frequency	Percentage
Anchovy pus (Amoebic pus)	54	34.2
Abscess (no growth on culture)	41	25.9
E. coli	28	17.7
Enterococcus	20	12.7
K. pneumoniae	14	8.9
Staph. aureus	1	0.6
Total	158	100.0

25.9% cases showed no growth of organism suggestive of the sterile abscess collection. *E. coli* (gram negative, anaerobic) was the most common organism grown in culture and *Enterococci* (gram positive cocci) was the second most common organism grown.

Table 9: Volume distribution on USG.

Volume (cc)	Frequency	Percentage
<100	20	12.6
100-200	37	23.5
>200	97	61.4
Rupture	4	2.5
Total	158	100.0

USG was very important diagnostic method in liver abscess cases with shows the volume of liver abscess collection, 12.6% cases showed. 23.5% cases showed abscess between 100-200 cc which were managed with antibiotics along with either aspiration of liquefied collection or pigtail catheter drainage of the abscess. 61.4% cases showed >200 cc of abscess collection which were managed with PCD 2.5% cases showed ruptured liver abscess which were managed surgically.

Table 10: Management.

Management	Frequency	Percentage
PCD	95	60.2
CONS	39	24.6
ASP	20	12.7
Exploratory laparotomy	4	2.5
Total	158	100

Conservative management with antibiotics alone was done in 24.6% of cases where abscess was <100 cc or 100-200 cc. Aspiration of abscess under USG guidance in sterile conditions in done in 12.7% of cases with antibiotics coverage. PCD was done in 60.2% of cases with abscess volume of >200 cc under USG guidance in sterile condition with active flush and aspiration in wards with normal saline and antibiotic coverage was done. Exploratory laparotomy with drainage of abscess was done in 2.5% of cases due ruptured liver abscess with signs of peritonitis. Incidence of recurrence was 8.2%.

DISCUSSION

Liver abscess is relatively common in developing countries, 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.

The rising incidence in alcoholics and immune-compromised individual has become a matter of grave concern as complications rate are high especially in this subgroup leading to increased morbidity and mortality. The changing scenario in incidence, diagnostic methods, treatment and 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 and 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.

The age of patients varied from 19-75 years. The mean age was 44.83 years. The highest incidence in middle age with patients in third to sixth decade accounting for 71.0% of the cases in this study. The mean age was comparable to other studies. According to Ming mean age was 47.6 years with age distribution between 19-60 years.[4] Grorgia study showed mean age of 45.3 years with age distribution between 16-78 years.[5] Gopi et al showed mean age 43 years with age between 19-60 years, Chennana et al study showed mean age of 43 years with age distribution 19-60 years, this shows liver abscess was more common in middle age group population.[6,7]

Present study showed a very high incidence of liver abscess in males (88.6%), which was comparable to, as seen in other Indian studies like Mathur with male incidence (90.0%), Gopi with male incidence of (88%), Chennanna et al with male incidence of (93.3%), Dattaroy with male incidence (96.0%).[6-9] Suggestive of male preponderance due to increased alcohol intake. As in Indian population almost alcoholics were male.

Most of the patients who presented in this study presented with pain in upper abdomen with (100%) incidence and fever (92.4%) which was more significant as compared to other studies listed below showing similar results. RUQ tenderness (100.0%), fever (92.4%), being the common presentation in this study and was comparable to the studies listed below with most common presentation being tenderness in RUQ and fever being most common presentation in all the listed studies below, in this study diarrheoa with (12.7%) incidence compared to (13%) incidence in Yoo et study, (7%) incidence in Mathur study, (2%) in Stein et al.[8,10,11] In our study hepatomegaly was present in (43.67%) cases which was comparable to (41%) incidence in Yoo et al study, (40%) in Ming study (30%) in Mathur study, (34%) in Stein et al study.[4,8] In our study jaundice (19.7%) was more common clinical presentation comparable to study done by Yoo et al (7.0%), (10%) in Ming and (15%) in Mathur study, (22%) in Stein et al study.[4] This stated that liver abscess was an infective disease of upper abdomen affecting liver.

Alcoholism was found to be the most consistent etiological factor in this study of liver abscess. 67.7% of the cases of this study were found to be alcoholics as compared to other study by Mathur et al where 70% of the cases were alcoholic, Gopi where 85% of cases were alcoholic, Chennanna et al study with alcohol incidence of 83%, Stein et al with alcohol incidence in (75%) cases, which concluded alcoholism had a strong association with liver abscess patients.[3,6] It can explain highest incidence in male population in various studies carried out.

In this study (80.4%) cases had increased WBC counts (leucocytosis) more than 10000 counts which was comparable to Yoo et al study with (78%) Okana et al with (75%), Stein et al with (68%), Chennanna et al with 86.6% cases showing leucocytosis suggesting liver abscess is a infective disease.[11,12] (15.8%) cases showed raised alkaline phosphatase (>300 IU/l) in this study which was comparable to Yoo et al study with (25%), Okana et al (25%) Stein et al (33%), Chennanna et al with (36.6%) cases showing raised alkaline phosphatase.[3,4] (56.4%) cases showed decreased albumin (20 sec) in this study comparable to Yoo et al study showing (14%) cases, Okana et al (21%), Stein et al (15%), Chennanna et al showing (16.6%) cases. suggestive of liver abscess infective disease affecting the liver metabolism.[3,4]

Chest X-ray findings were normal in (47.5%) of the cases and abnormal in (52.5%) of the cases with pleural effusion comparable to other study Jensen et al (54.0%), Hamid et al showed (41.09%) and Chennanna et al showed (50%).[13,14]

Abnormal chest X-ray findings with pleural effusion. All listed series showed right side pleural effusion comparable to this study with right sided pleural effusion (44.9%) with elevation of hemidiaphragm on right side due to common involvement of right lobe of liver. One case had a ruptured liver abscess into pleural cavity with ICD insertion done.

Ultrasound abdomen was done for all patients in this study and various findings were analysed. Solitary abscess was seen in (96.8%) of cases and both lobe abscesses were seen in (3.2%) cases comparable to other studies. Right lobe involvement (91.1%) was comparable to other studies listed above with (69%) right lobe involvement in Yoo et al study, (72%) right lobe involvement in study by Rajak et al (74.12%) in Hamid et al but isolated left lobe involvement was (5.7%) in our study as compared to other study Yoo et al (11.0%) and Rajak et al (20.0%) Hamid et al (23.7%), suggestive of right lobe involvement was more common in all studies due to rich blood supply to right lobe of liver.[13-15] In this study (36.1%) cases had 5 cm diameter, compared to above listed studies Yoo et al (45%) 5 cm diameter, Hamid et al (34.16%) 5 cm which was helpful in

management of liver abscess cases with correct intervention in respective cases.

E. coli (17.7%) was the most common organism in this study comparable to other study like Yoo et al where *E. coli* (23.0%) was most common and Ming et al (32.5%) Okana et al (23.0%) *Klebsiella pneumoniae* and *Enterococcus* were other common organisms involved. In all studies showed gram -ve non fermenting organisms were most common E coli organism was involved.

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 158 cases in this study, 39 patients who had multiple small abscess involving both lobes and solitary abscess with volume <100 cc or <5 cm size were treated conservatively. 95/158 (60.2%) who had abscess between 100-200 cc or >200 cc or left lobe abscesses were subjected to intervention as compared to Yo et al study where (21%), Chennanna et al (20.6%), Hamid et al (14%) patients underwent surgical exploration.

Out of 158 cases (60.2%) cases underwent percutaneous catheter drainage and (12.7%) underwent percutaneous needle aspiration under antibiotic coverage as compared to Yo et al study where (79.0%) patients underwent percutaneous aspiration. With no PCD, Chennanna et al study with (30%) aspiration and (15%) PCD, Hamid et al study with aspiration in (40%) and , PCD in (15%) cases.

Laparotomy as initial line of treatment was performed in 4/158 ruptured liver abscess cases (2.5%) as compared to Yo et al study where 21.0% patients, Chennanna et al (20.6%), Hamid et al (14%) underwent surgical intervention.

In our study intercostal drainage was required in one case with ruptured liver abscess into right side pleural cavity, Patients survived. Thus, in majority of cases percutaneous catheter drainage was the main form of minimal invasive treatment. All patients were started on antibiotics which were continued for 10-14 days depending on improvement. Majority of patients responded excellently to percutaneous catheter drainage and antimicrobials. While patients who had small liquefied liver abscesses were managed with percutaneous needle aspiration and other smaller abscesses or multiple small abscesses were successfully managed with antimicrobial therapy alone but relapse rates were low with 8.2%. Thus, pigtail catheter drainage is minimally invasive and effective treatment for >5 cm liver abscess cases with early recovery with no complications.

Present study showed that hospital stay was up to 7 days in 24% patients, 8-14 days in 57% patients and >14 days in 19% patients. Maximum number of patients were requiring Hospital stay duration of 8-14 days. This data was comparable to the above-mentioned studies which suggested maximum number of patients needed hospital stay duration of 7-14 days with gradual improvement to normal liver parenchyma with parenteral antimicrobial therapy and drainage of abscess.

In our series 8.2% recurrence rate with no mortality and were managed with conservative methods of antibiotics prophylaxis as compared to other studies like Sajjad Ahmed et al with (10%) recurrence and (18%) mortality, Yoo et al where recurrence rate was (9.0%) and mortality rate (11.0%) which was very high and Mint et al where mortality was (6.5%).[16] There was no mortality in this study due to early presentation and minimally invasive approach was initial line of management.

In our series 8.2% recurrence rate with no mortality and were managed with conservative methods of antibiotics prophylaxis as compared to other studies like Sajjad Ahmed et al with (10%) recurrence and (18%) mortality, Yoo et al where recurrence rate was (9.0%) and mortality rate (11.0%) which was very high and Mint et al where mortality was (6.5%).[16] There was no mortality in this study due to early presentation and minimally invasive approach was initial line of management.

Limitations

Long follow up period which can lead to loss of subjects to follow up and requirement of larger sample size were the limitations of this study to be noted.

CONCLUSION

Liver abscess is a very common condition in India. India has 2nd highest incidence of liver abscess in the world. Liver abscesses occurred most commonly between 30-60 years. Males were affected more than females. Pain in upper abdomen was the most common symptom present in all cases. Fever which is of continuous type low to start (37.5-37.9 Celsius) and then higher (38-40 Celsius) being the most consistently occurring symptom. Cryptogenic was the most common etiology in liver abscess. Alcohol consumption was an important contributory factor for causation of liver abscesses. Alkaline phosphatase is the most consistently elevated among all Liver Function Tests. Raised WBC count, alkaline phosphatase level, diabetes, hypoalbuminemia, prolonged prothrombin time were considered as the predictive factors of complicated (ruptured) liver abscess in this study. Diabetes mellitus was more frequently associated condition in cases of liver abscess cases. Liver abscess most commonly involves right lobe of liver. Anchovy sauce pus was seen indicative of amoebic liver abscess. *E. coli* was the most common organism isolated followed by *K. pneumoniae* and *Enterococcus* in pyogenic liver abscess.

Recommendations

All cases of liver abscesses do not require invasive management. Small abscesses with solid consistency can be managed with conservative antimicrobial therapy (ciprofloxacin and metronidazole) alone but recurrence rate was seen. And liquefied abscesses were considered for percutaneous needle aspiration along with antimicrobial therapy. Ultrasound guided pig tail catheter drainage procedure is a safe and effective method in majority of liver abscess cases. Laparotomy and drainage remains the standard management in complicated ruptured liver abscess into the peritoneal cavity in this study, as we had no recurrence and mortality associated with it. Liver abscess with intraperitoneal rupture was the most common associated complication. There was no Mortality in this study. Modification in lifestyle, abstinence from alcohol and proper follow up after detection could be very beneficial to eliminate this widespread disease.

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