



A PROSPECTIVE STUDY OF LIVER ABSCESS, THEIR COMPLICATIONS AND MANAGEMENT

Dr. Mayur Kumar Pargi*	Senior Resident, Department of Surgery, Dr. S.N. Medical College, Jodhpur. *Corresponding Author
Dr. M. L. Maida	Professor, Department of Surgery, RNT Medical College, Udaipur.
Dr. Arjun Lal Kharadi	Senior Resident, Department of Surgery, RNT Medical College, Udaipur.
Dr. Sohan Lal Meghwal	Senior Resident, Department of Surgery, SN Medical College, Jodhpur.

ABSTRACT

Introduction: A liver abscess is a suppurative cavity in the liver resulting from the invasion and multiplication of microorganisms, by the way of the biliary ductal system and entering directly from an injury through the blood vessels. Liver abscesses are commonly due to pyogenic, amoebic or mixed infections.

Aims And Objectives: To study of various types and its etiological risk factors, serological and radiological evaluation and to study effectiveness of different modes of management.

Material And Methods: This prospective observational study was conducted in the Department of Surgery, RNT Medical College and attached M.B Govt. hospital Udaipur, Rajasthan during July 2019 to Jan 2021. Since adequate number of cases are admitted in our hospital, all patients admitted with symptoms and signs of liver abscess were included.

Observations: Mean age of patient was 40.1 year (range 22-80). The male : female ratio was 7:1.35. 76% consumed >100 ml alcohol daily for >10 years. SGOT, SGPT and Serum bilirubin was found increased. All patients were subjected to screening of chest with chest x-ray including upper abdomen. 6 (13%) patients had elevated right dome diaphragm. 10 (21%) patients had pleural effusion. Right basal lobe consolidation was seen in 4 (8%) patients. CT scan of liver abscess showed a sensitivity of 100% in our study. CT scan was performed in 35 (76%) information of patients. 44 patients (96%) recovered and discharged without complication.

Conclusion: Ultrasound and CT scan abdomen plays an important role in diagnosing most of the liver abscess patients. Emergency laparotomy with open drainage is the line of treatment for complicated cases of ruptured liver abscess. Low mortality and morbidity was observed in non-complicated liver abscess. Further early recognition, institution of appropriate therapy and drainage/ aspiration can reduce morbidity and mortality.

KEYWORDS : Liver Abscess, Elevated SGOT/SGPT, USG, Liver CT Scan

INTRODUCTION

Liver abscess was described early in 460-377 B.C. by Hippocrates,¹ still it remains a challenging situation (especially in tropical countries due to contributing factor like poor hygiene & sanitation, alcoholism and other pre-existing comorbidity). Liver abscess disease highly variable presentation, causing diagnostic difficulties.

A liver abscess is a suppurative cavity in the liver resulting from the invasion and multiplication of microorganisms, by the way of the biliary ductal system and entering directly from an injury through the blood vessels. Liver abscesses are commonly due to pyogenic, amoebic or mixed infections².

A pyogenic abscess is defined as a collection of pus consisting of numerous inflammatory cells, notably neutrophils and tissue debris³. Infection is associated with necrosis from inflammation of surrounding tissue⁴.

Liver abscesses can be broadly divided into two categories: amoebic and pyogenic. The pathogenesis of amoebic liver abscess (ALA) is different from pyogenic liver abscess (PLA)⁵.

Pyogenic Liver Abscess- Pyogenic liver abscess is a highly lethal problem. The etiology has changed from pylephlebitis to biliary tract obstruction over the years. Pyogenic liver abscess have a global distribution, although incidence varies significantly between different countries. In the US, the incidence of PLA is 2.3 per 100 000, predominantly in older men and diabetes and cancer are considered risk factors to the development of PLA⁴. The most common pathogen isolated in this setting was *Streptococcus milleri* followed by *Klebsiella*

pneumoniae. This differs from South Korea and Taiwan, where *K. pneumoniae* is the most common pathogen found in PLA.

Amoebic Liver Abscess: *Entamoeba histolytica* is a protozoan that causes amoebiasis (gastrointestinal infection) and the most common cause of intestinal parasite infection in returned travelers⁶. *Entamoeba histolytica* is globally distributed with higher rates of infection in tropical and developing countries. The most common extra-intestinal manifestation is liver abscess, with parasite being carried to the liver via the portal vein.

CLINICAL PRESENTATION-

The clinical presentation of both amoebic and PLA is indistinguishable. Patients usually present with fever and right upper quadrant tenderness. Although laboratory tests, such as leukocytosis (predominantly neutrophils), raised inflammatory markers (e.g. C- reactive protein), increased alkaline phosphatase and abnormal liver function tests are often present they have no real value in differentiating amoebic versus Pyogenic liver abscess⁵.

MANAGEMENT OF LIVER ABSCESS:

After diagnosed, liver abscess should initially be treated with broad spectrum antibiotics and antiamoebicidals. However if no clinical improvement occurs in 48 to 72 hours, then there should be no delay in aspirating abscess.

Surgical Treatment Modalities:

1) Medical management; 2) Percutaneous drainage, either with ultrasound, performed to evacuate pus; 3) Open drainage by exploratory laparotomy.

Intravenous antibiotics are the first line and main stay of treatment. Drainage is necessary for large abscess, equal to larger than 5 cm in size, to facilitate resolution. While percutaneous needle/catheter drainage is appropriate as first live surgical treatment in most cases, open surgical drainage is prudent in cases of rupture, multilocation, associated biliary or intra-abdominal pathology. Laparoscopic drainage is a feasible surgical option with promising results in the future. Liver resection is reserved for concomitant localized intrahepatic disease and tumour, after control sepsis.

AIMS AND OBJECTIVES

1. To study clinical presentation of liver abscess i.e., Distribution with respect to age and sex, mode of presentations in our area.
2. To study various types and its etiological risk factors.
3. Its serological and radiological evaluation.
4. To study effectiveness of different modes of management.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of Surgery, RNT Medical College and attached M.B Govt. hospital Udaipur, Rajasthan during July 2019 to Jan 2021. Since adequate number of cases are admitted in our hospital, all patients admitted with symptoms and signs of liver abscess were included.

INCLUSION CRITERIA:

All cases of liver abscess diagnosed clinically and/or radiologically with bacterial and parasitic liver abscess. Cases in evolving, liquefied & ruptured stage with or without peritonitis.

EXCLUSION CRITERIA: Patients of traumatic liver abscess, past history of liver abscess, immunocompromised patients with liver abscess, pregnancy and of age below 12 years were excluded from the study.

METHOD

Patients underwent blood tests like complete haemogram, LFT, RFT, Prothrombin time, serum electrolyte. X-RAY- of chest and flat plane abdomen was done in all patients. Any pulmonary complication due to liver abscess (rupture abscess in pleural cavity) was noted. Abdominal radiographs were evaluated for any other pathology of abdomen mimicking liver abscess.

On the same day of presentation ultrasound of abdomen and pelvis was done. Careful scanning of liver was done in all plane. Patient were scanned in different position. Decubitus positions for scanning of posterior surface of liver abscess was done to pick up small abscess situated posteriorly. On USG examination all liver lesion suggestive of liver abscess were examined (other abdominal organ were also scanned for any abnormalities).

CT Scan Abdomen and Pelvis-

CT scan was not feasible to perform in all patient – due to economic factors and deranged renal function. CT scan was specially done in those patients where they were either not responding to treatment or where precise location, size of abscess was required and there was difficulty and/or limitation to conduct USG. CT scan was used as an advanced diagnostic modality in a situation of diagnostic dilemma (Hydatid cyst, malignancy, metastases). An additional indication was when open drainage was planned. Precise size, location and relations to other viscera or structure or communications were more accurately diagnosed.

TREATMENT GIVEN:

Medical:

In all the patients antibiotics was started empirically without

waiting for pus culture and sensitivity reports. Invariably Metronidazole 500mg intravenously three times daily for three days followed by Tab. Metronidazole 750 mg three times daily for seven days and antimicrobials like piperacillin tozabactam, amoxicillin clavulonate are given for all the patients without waiting for culture reports. Duration of therapy was ten days. After collecting the reports the appropriate antibiotics were given.

Cases with abscess cavity <5 cm were treated by drug therapy alone. Liver cavity abscess upto 5 cm symptomatic, who did not respond to medical therapy were treated by USG guided needle aspiration. After ten days repeat ultrasound was taken and the abscess size was identified and if the abscess size is not reducing or increasing, drainage procedure was done and the antibiotics were continued.

Ultrasound Guided Needle Aspiration:

This drainage procedure was done for the patients in whom abscess size was >5 cm followed by inj. metronidazole and antibiotics. Bilateral abscess cavities that were small and multiple were managed by medical therapy and when anyone of the cavity is >5 cm, it was managed by USG guided percutaneous needle aspiration.

Open Drainage:

Those abscess cavities that were >10 cm or with chances of impending rupture in segment III, IV, V, VI were managed by laparotomy drainage. This method is used in the following situations: Emergency situations like rupture of the abscess into peritoneal cavity; Multiple abscesses; Loculated abscesses; Abscesses with viscous contents obstructing the drainage catheter; Underlying disease requiring primary surgical management; Inadequate response to percutaneous drainage within seven days.

Statistical tools

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta. Using this software range, frequencies, percentages, means were observed and compare with other studies.

RESULTS

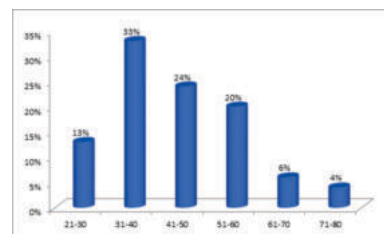


Chart-1: Age wise distribution

Maximum number of cases were observe in the age group of 31-40 years. The youngest patient was a 22 years old male and oldest was 80 years old male patient. In this study, liver abscesses were comparatively uncommon in extremes age out of 46 patients included. Mean age of study groups patient was 40 year (range 22-80).

Forty patients were male and 6 patients were female. The male : female patients was 7:1.35 patient (76%) consumed more than 100 ml alcohol daily for > 10 years.

LABORATORY DATA (Include Biochemistry & pathological)

Leukocytosis with predominantly neutrophil count elevation was found in 34 (74%) patients. Anemia was noted in 59% patient. Raised blood urea nitrogen was found in 11 patient (23%).

Table 1- Biochemical parameter of liver abscess

Investigations	No. of Patients	Percentage
Blood Parameters		
Leucocytosis (>12000/mm ³)	34	74%
Anemia (Hb<10gm%)	27	59%
Raised urea (>45mg/dl)	11	23%
Raised Creatinine (>1.5 mg/dl)	9	19%
Liver Function Tests		
Serum Bilirubin >2 mg/dl	10	21%
SGOT>40 IU/L	15	33%
SGPT>40 IU/L	18	39%
Alkaline Phosphatase> 300 IU/L	22	48%
INR>1	30	65%
Hypoalbuminemia<2.5gm/dl	39	85%

Increase Serum Bilirubin was 10 (21%) patients. Raised Alkaline phosphatase was show in 22 (48%) patients, similar trend was observed with increased SGOT (AST) 33% and increased SGPT (ALT) 39% as well.

RADIOLOGICAL INVESTIGATIONS

Chest X ray Finding

All patients were subjected to screening of chest with chest x-ray including upper abdomen. 6 (13%) patients had elevated right dome diaphragm. 10 (21%) patients had pleural effusion. Right basal lobe consolidation was seen in 4 (8%) patients.

Table 2 - Frequency of abnormal chest X-ray finding in the present study

	No. of patients	Percentage
Normal	26	56%
Abnormal	20	43%
Pleural Effusion	10	21%
Elevated dome of diaphragm	6	13%
Rt. Basilar Infiltrate	4	9%

Ultrasonographic Finding-

Table 3- Ultrasonographic findings of liver abscess observes in the study

Lobe Involved	No. of patients	Percentage
Right	38	82%
Left	3	7%
Both	5	11%
Axis		
Solitary	32	70%
Multiple	14	30%
Size of abscess		
>5 cm	40	87%
<5 cm	6	13%

All patients were evaluate by ultrasound examination, in the present study, isolated right lobe abscess were seen in 82% and isolated left lobe abscess was seen in only 3 patients. Both lobes were involved in 5 (11%) patients and fourteen patients (30%) showed multiple abscesses and 32(70%) patient had solitary abscess. In multiple abscess larger than 5 cm were noted in 40 (87%) patients. The long axis measurement of abscesses varied from 2 to 20 cm with a mean of 8.3 cm. The smallest abscess was 350 and the largest measured 2100cc.

CT SCAN-

CT scan of liver abscess showed a sensitivity of 100% in our study. CT scan was performed in 35 (76%) information of Patients. Solitary abscesses were observed in 14 patients while multiple abscesses were noted in 21 patient. Isolated right lobe were observed in 22 patients and isolated left lobe abscess was noted in 4 patient. Both lobe involvement was noted in 9 patients. Abscesses larger than 5 cm were noted in

40 (87%) patients whereas abscesses smaller than 5 cm were noted in six (13%) patient.

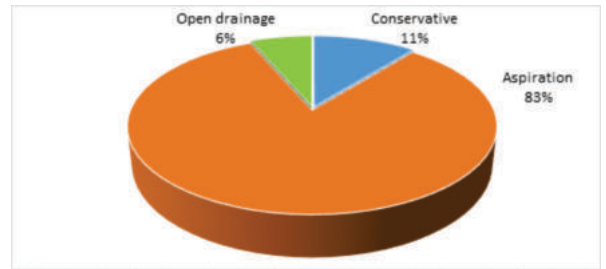


Chart-2: Modalities of treatment

Out of the 38 patients who underwent invasive procedure in either form none of them had any procedure related complications like pneumothorax, hemobilia, aspiration site hemorrhage, biliary fistula and lung injury.

COMPLICATIONS:

Various complications in 46 patients of liver abscess were analyzed. Intra abdominal rupture with peritonitis was seen in 2 (4%) patients. Pleural effusion was noticed in 9 (20%) patients. One (2%) out of 46 patients was died due to liver abscess complication & MODS.

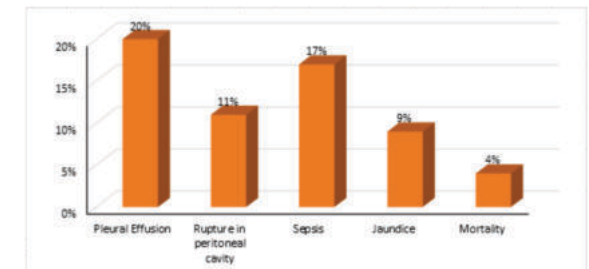


Chart-3: Complications observed liver abscess patients study group

OUTCOME DATA:

44 patients (96%) recovered and discharged without complication. Two patients did not survive included in this study. The causes of death in that patients was MODS and septicemia.

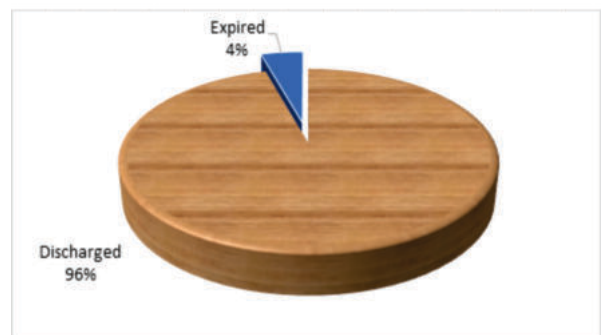


Chart-4: Outcome of treatment among patients included in the study

DISCUSSION

The age of the liver abscess patients varied from 22 years to 80 year. The lowest incidence was noted in the age groups of 71-80 (4%) year. Liver abscesses were found to affect most the patients in age group 31-50 years. The highest incidence was noted in the age group 31-40 (33%) years. Maximum patients in this study were between 3rd – 6th decades of age.

This study data compared with other publish liver abscess study data.

Similar findings were observed by Dr. Jayka⁵ (2018), they reported mean age of 45.56 years, range being 22-80 years.

In the present study, age >65 years, alcohol consumption, jaundice, anemia, cough, pleural effusion, Hypoalbuminemia were associated with longer duration of time of resolution of symptoms and longer duration of hospital stay. These factors were also associated with higher incidence of morbidity and associated mortality. Hence these factors should be considered to be associated with worse prognosis.

The presentation of liver abscess follows a defined pattern in the present study. Most patients presented with symptoms of pain in Right hypochondrium abdomen followed by fever.

Table 4 -Clinical presentation of liver abscess compared to other studies

STUDY	FEVER	Nausea Vomiting	Abdominal Pain	Jaundice	Weight loss
Ajaj Malik (2010) ⁷	91%	28.4%	70%	22.5%	42.7%
Jain (2017) ⁸	94%	20%	96%	18%	50%
Jaykar (2018) ⁵	94%	36%	100%	-	-
In Present study	87%	30%	95%	21%	35%

Table 5 -Clinical signs of liver abscess compared to other studies

STUDY	Hepatomegaly	Abdominal Tenderness	Respiratory	Tachycardia
Ajaj Malik (2010) ⁷	65%	70%	31%	41.2%
Jaykar (2018) ⁵	74%	-	-	36.5%
Jain (2017) ⁸	80%	-	-	24%
In our study	76%	83%	35%	43%

Leucocytosis was found in 74% of patients in our study. Our findings were similar to study by Cristina Serraino (2018)⁹ 77%.

According to Jha⁸ (2015) study anemia (Hb<10gm/dl) was present in 57% of patients. Cristina Serraino, (2018)⁹ study 61.5% and Azaz Malik (2010)⁷ to 59% of patients. 59% were found to be anemic (Hb<10gm/dl) in our study.

Serum bilirubin level >2 mg/dl was seen in 21% of the patients of liver abscess. Jaykar⁵ reported 45% population had jaundice.

Alkaline phosphatase levels were raised in 48% of patients in our study. This incidence was same as that of Jain⁸ study. Jaykar⁵ reported raised APL in 49.09% of patients.

Hypoalbuminemia was noted in 85% of patients in the present study. According to Cristina¹⁰, 96.3% of patients and Jain⁸ reported 88% of patients had hypoalbuminemia. In our study hypoalbuminemia showed a poor prognostic factor.

SGOT (AST) and SGPT (ALT) were elevated in 33% and 39% patients. Thus raised liver enzyme was the most common derangement in liver function in our study. According to Jaykar⁵ study elevated SGOT/SGPT was present in 20% and 21.8%. Elevation of liver enzyme is to be expected in liver abscess patients considering the destruction of liver parenchyma involved in pathogenesis of liver abscess. Jain showed elevated SGOT/SGPT as 66%/68% and Cristina showed SGOT/SGPT as 45%/67% of patients.

Chest X-ray finding

In our study chest x-ray finding in liver abscess patients show normal in 26 (56%) and abnormal in 20 (43%) of the patients. They were abnormal in 20 (43%) of the patients 10 (21%) patients had right sided pleural effusion. Elevated right hemi

diaphragm was seen in 6 out of 46 (13%) of patients. 4 (9%) patients showed basal consolidation on the right side.

According to Jaykar⁵, 40% of the patient had at least one respiratory finding on examination.

Table 6 - USG Finding of Liver Abscess

STUDY	RT LOBE ABSCESS %	LT LOBE ABSCESS %	BOTH LOBE ABSCESS %	SINGLE ABSCESS %	MULTIPLE ABSCESS %
Jain (2017) ⁸	76%	14%	10%	66%	34%
Jaykar (2018) ⁵	84%	3.3%	11.7%	64%	36%
Our study	82%	7%	11%	70%	30%

CT Findings of Liver abscess

It was not feasible to perform CT scan in all patients- due to economic factors in some patients and deranged renal function in others. CT scan was specially done in those patients where they were either not responding to treatment or where precise location and size could not be obtained from USG. An additional indication was when open drainage was planned.

CT scanning have greatly enhanced our ability to establish the diagnosis of hepatic abscess and have increased our understanding of the natural history of this process. CT offers several advantages over ultrasonography, it has a sensitivity of 95% and can detect abscesses as small as 0.5 cm. CT can also delineate small abscess near the diaphragm and in fatty livers. CT also helps in detecting ant associated intra-abdominal pathology including pancreatic masses, colonic cancers, diverticulitis, appendicitis and intraperitoneal abscesses. Liver abscess on CT appears as a low density lobulated lesion with poorly defined edges.

Out of the 46 patient, 5 patient (11%) were managed conservatively. 36 patients (83%) were subjected to invasive treatment and aspirate was sent for cytology, culture and sensitivity immediately.

Aspirate culture was positive in 14 of the patients. E. coli was isolated in 10 (21%) of patients and klebsiella was isolated in 4(9%) patients.

Chang found positive culture from pus in 73% cases and negative culture in 17%. The most common organism isolate in their study was klebsiella was detected in 63% of these patients.

Management of liver abscess has dramatically evolved over the past few decades due to advance in diagnostic and interventional radiology. Minimal invasive procedure along with targeted antimicrobial therapy, is the mainstay of therapy but complicated and non responsive case to minimal invasive procedure are further manage to lap & open drainage.

No randomized controlled trials have been performed to evaluate empiric antimicrobial regimen or optimal duration of therapy. Empiric regimens should be formulated based on suspected etiology and local antibiotic susceptibility patterns, and modified based on culture results. Recommendation include parenteral therapy for 2-3 weeks or oral regimen for 2-6 week or until clinical, laboratory and radiographic studies demonstrate liver abscess resolution.

USG guided Aspiration and percutaneous drainage include > 5 cm, ongoing pyrexia despite 48-72 hour of appropriate empirical therapy and clinically, lab data and imaging feature concerning for symptomatic liver abscess. The

procedure undertook USG guidance with aseptic precaution with LA infiltration of the site, depth and direction. Aspirated pus or fluid was taken for culture sensitivity than therapeutic procedure done.

In our study, most of the patients were initially treated empiric antimicrobial regimen than basis of pus culture sensitivity report with cephalosporin group and aminoglycosides group and metronidazole with parenteral route about 2-3 weeks.

In our study, 38 (83%) patients underwent USG guided needle aspiration. NO complications were noted due to this procedure apart from local pain which subsided after analgesics.

The study of Aligarh Muslim University (2008) for conservative treatment in from of metronidazole (200-100-200 tds) or tinidazole and sometimes combining it with cephalosporine 3rd generation IV antibiotics in management of around 80% of amoebic liver abscess.

Laparotomy was performed in 3(6%) patients of liver abscess. In our study patient presented with acute abdomen and peritonitis on radiologically and laboratory investigation. Peritonitis was found to be due to complication of liver abscess (ruptured liver abscess).

Indication for surgical drainage include abscess rupture, uncorrected primary pathology, incomplete percutaneous drainage, inadequate clinical response after 4-7 days of percutaneous drainage and multiloculated abscesses.

Surgical treatment continues to give the best chance of survival in patient with liver abscess. The surgical mortality of 11.24% is a marked improvement over the previous mortality rate of 69% reported by Ochsner, De Bakey and Murray from 1928-1937. Surgical intervention has the advantage of thorough exploration of the abdomen and extirpation of known or unsuspected primary foci of infection that might not have been detected in imaging.

Majority of patients responded excellently to USG guided needle aspiration and medical treatment. Patients who had smaller abscesses or multiple small abscesses were successfully managed with medical treatment alone.

Various complication were noted in patients with liver abscesses in this study included, intra-abdominal rupture with peritonitis in 2% (4%), death in 2 (4%). complication rate of liver abscess has been reported to range from 3% to 45 % and includes intra-abdominal rupture 2.3 to 14%

In our study 2 patient (4%) died due to septicemia and MODS after rupture of liver abscess. In contrast Chang found that rupture of liver abscess was associated with higher mortality (44%). Overall, mortality among patients with liver abscess can be expected to be low. Patients who succumb usually have poor prognostic factor, mainly owing to delayed presentation or late institution of appropriate treatment.

We recommend transperitoneal surgical drainage to allow abdominal exploration and thorough exploration of the liver for multiple hepatic abscess. In majority of patients in this study, liver abscess management by USG guided needle aspiration or foley/malecot catheter drainage was the main form of surgical therapy.

In our study period, covid-19 pandemic happened, so sample size and result was affected due to decreased number of patient and follow up.

CONCLUSION

Ultrasound and CT scan abdomen plays an important role in

diagnosing most of the liver abscess patients. Emergency laparotomy with open drainage is the line of treatment for complicated cases of ruptured liver abscess. Low mortality and morbidity was observed in non-complicated liver abscess. Further early recognition, institution of appropriate therapy and drainage/ aspiration can reduce morbidity and mortality.

REFERENCES

1. Henry L. Bockus, Jack Edward Berk, Bockus Gastroenterology 1985, volume 5th.
2. Trivedi M, Anis M, Patel S. International Journal of Surgery Science 2019;3(1):145-148
3. De Souza Andrade-Filho J. Revista do Instituto de Medicina Tropical de São Paulo. 2012.
4. Gaetan Khim, Sokhom Em, Satdin Mo and Nicola Townell British Medical Bulletin 2019; 132; 45-52
5. Sifri CD, Madoff LC. Infections of the liver and biliary system (liver abscess, cholangitis, cholecystitis). In: Bennett JE, Dolin R, Blaser MJ (eds.). Principles and Practice of Infectious Diseases, 8th edn. Philadelphia: Elsevier Saunders, 2015;1270-9
6. Jaykar SR, Nichkaode PB. Liver abscess, management strategies, and outcome. International Surgery Journal 2018; 5(9): 3093-3101.
7. Malik AA, Shams-ul-Bari, Rouf KA, Wann KA. World J Gastroscopy 2010;2(12):395-401.
8. Jain V, Manjavkar S, Kapur P, Durfishan, Rajput D, Mir T. Int J Res Med Sci 2017; (6):2596-2600.
9. Serrino C, Elia C, Bracco C, Rinaldi G, Pomerio F, Melchio R, et al. Medicine 2018; 97;19.
10. Lonngworth S, Han J. Clinical Liver Disease 2015; 6(2).