Research Article

Clinical, laboratory and management profile in patients of liver abscess in central India

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ABSTRACT

Background: Abscess of the liver has been recognized since the time of Hippocrates. Even today, it remains a surgical problem with considerable morbidity and mortality. Advances in diagnostic and interventional radiology over the last three decades have facilitated a minimally invasive approach to management of this condition. We have reviewed our experience in managing liver abscess over the last 2 years, to illustrate the current etiology, management and outcomes of this disease. We also reviewed the literatures in this field, and present a summary of current practice patterns which may serve as a useful guide, thereby, defining optimum management of the Liver abscess and assessing new trends in treatment.

Methods: Patients were selected from Hospital attached to Sri Aurobindo Medical College and Post graduate Institute, Indore, MP, India. Study was conducted during the period from December 2012 to September 2014. 160 patients of liver abscess were included in the study. All patients in our study were subjected to detailed history taking, clinical examination, routine investigations and various specialized investigations.

Results: Amoebic liver abscess was the most common (53.12%) type; most liver abscess among the study group had strong correlation with alcoholism, poor hygiene and low socioeconomic status. Percutaneous catheter drainage under Ultrasonography guidance was the most effective method of treatment.

Conclusions: Early recognition of septicaemia or organ failure and appropriate transfer to critical care unit. Consider repeat imaging to confirm correct drain placement and to determine response to treatment and final resolution of the abscess. Open surgical or laparoscopic intervention should be considered for patients with large, complex, septated or multiple abscesses, underlying disease or in whom percutaneous drainage has failed.

Keywords: Amoebic liver abscess, Pyogenic liver abscess, Ultrasonography

INTRODUCTION

Liver abscess is still a serious illness and a diagnostic challenge. This is reflected in significant mortality rates and is a result of the lack of specificity of clinical signs and laboratory results. Despite the recommended aggressive approach to treatment, mortality rates throughout the mid twentieth century remained high at 60-80%. New Advances in diagnostic and therapeutic radiology, coupled with improvements in microbiological identification and therapy, have recently decreased

mortality rates to <5-30%. In our series of 160 patients, there was no mortality.^{1,2}

The majority of liver abscesses have an underlying source that must be controlled before successful treatment of the abscess is possible. Most patients with hepatic abscesses can be cured with aggressive surgical and antibiotic therapy if the origin of the abscess is removed. Open surgical drainage has been the traditional treatment, although percutaneous drainage is available because of newer radiologic techniques. Historically, liver abscesses

developed in otherwise healthy patients with an intra-abdominal infection.

Liver abscesses are rare in children and adolescents, and are usually associated with an underlying immune deficiency state or trauma. Malik AA et al presented study on 160 patients, in whom average age was 42 years, 102 were females and 58 males. Heneghan et al presented study on 11 patients with a mean age of 60.27 years 6 males and 5 females; Present study showed and majority of patients were in their fourth decade with male dominance being 81.90 % (131) female 18.10% (29) cases.^{1,4} Clinical presentation of pyogenic liver abscess is non-specific and similar to that of other hepatobiliary inflammatory or infectious process. A combination of nonspecific systemic symptoms is the most common presentation; including fever and rigors, nausea and vomiting, right upper quadrant pain, Tender hepatomegaly, anorexia, weight loss, weakness and malaise. Less frequently reported symptoms include cough or hiccups due to diaphragmatic irritation, with referred pain to the right shoulder. Patients with small solitary lesions usually have a more insidious course with associated weight loss, fatigue and anemia of chronic disease. With such symptoms, malignancy is often the initial concern.

ALA is emerging as the commonest extra-intestinal manifestation of amoebiasis particularly in endemic areas. The disease has its acute (benign and aggressive) or chronic (benign and accelerated) course as far as the duration and severity is concerned. Patients who present with fever, right upper quadrant pain, and are immigrants from an endemic area, have a history of alcohol intake and diabetes mellitus; warrant a high degree of vigilance. Many investigators have tried to find a unifying pathogenesis for all cryptogenic hepatic abscesses but multiple causes appear to be involved. Study presented by Malik AA et al showed hemoglobin level of the less than 10 gm.% was found in 59% of patients, total leucocyte count more than 10000/cu mm in 68% of patients, serum transaminases and alkaline phosphatase levels were elevated in 84% of patients, present study shows about 55.60% patients had Hb<10gms/dl, polymorph nuclear leukocytosis in 139 patients, raised SGPT in 136 patients and SGOT in 124 patients and enzymes (raised alkaline phosphatase in 17 patients), In Heneghan et al study 7 (64%) patients were anemic ↑ White cell count in 91% (10) cases and deranged liver function test in 10 cases (91%).^{3,4}

Newer radiological techniques such as ultrasound and 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. Ultrasonography is the preferred initial tool for the diagnosis of liver abscess with a sensitivity of 85% to 95%. Ultrasound can identify lesions more than 2 cm in diameter. On the other hand, 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 any associated intra-abdominal pathology including pancreatic masses, colonic cancers, diverticulitis, appendicitis and intraperitoneal abscesses. All our patients were subjected to ultrasound examination and a sensitivity of 96% in diagnosis was achieved. 18 patients in our series were subjected to CT scan examination with a sensitivity of 100%. Ultrasound is also cost effective as compared to CT scan. Ultrasound was found to be useful in the percutaneous drainage group and in the group treated with antibiotics alone. It has proved a very useful technique for documentation of the course of the hepatic abscess in our series. On ultrasound scans the liver abscess appears as a hypoechoic lesion with irregular margin. Within the lesion there may be irregular areas of increased echogenicity. On the other hand liver abscess on CT appears as a low density lobulated lesion with poorly defined edges.⁵

Hepatic scans utilizing radioisotopes are obsolete for definition of hepatic abscess while magnetic resonance imaging does not provide information of greater usefulness than ultrasound or CT scanning. Surgical treatment continues to give the best chance of survival in patients with Liver abscess. 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.⁶⁻⁸

We recommend Trans peritoneal surgical drainage to allow abdominal exploration and thorough exploration of the liver for multiple hepatic abscesses, although laparoscopic drainage has shown excellent result in some patients. From our series it is difficult to evaluate which type of drain is best. However, dependent drainage with multiple drains consisting of large tube drains and soft rubber drains is recommended. The tube drains in particular allow for diagnostic contrast studies and even irrigation treatment after surgery. Medical treatment alone without any drainage procedure in abscess cavity more than 6 cm has shown poor results in our series but 36 cases with small abscess cavities has shown excellent result on medical treatment alone. 160 patients were subjected to this modality of treatment in our series and 10 of these patients (5.62%) subsequently needed open surgical drainage and 7 patients (4.38%) underwent Laparoscopic drainage because of poor response to antibiotic treatment alone. Although some continue to encourage the use of antibiotics alone to treat the Liver abscess, this approach seems risky and we, therefore, recommend that all liver abscesses of any origin should be drained to provide optimum treatment.⁹ Percutaneous treatment of hepatic abscesses has been praised for its simplicity and excellent results.^{5,6} Although of considerable benefit, percutaneous drainage is not necessarily the best treatment for all patients and is associated with a significantly higher failure rate than surgical drainage.^{10,11}

This is also evident from our series where 97 patients (60.63%) had USG guided aspiration and 31 patients (19.38%) had Pigtail catheter drainage and were subjected to this mode of treatment, In Malik AA et al case study open surgical drainage was done in 127 cases, Percutaneous drainage 26 cases and 16 cases were managed on iv antibiotics only with mortality in 19 patients, In Heneghan et al initially all patients were started with antibiotic therapy followed by USG guided percutaneous drainage in all patients out of which and only 2 patients required surgical intervention with no mortality.^{3,4} Patients among them subsequently needed open surgical drainage because of inadequate response to percutaneous drainage. It is recommended that several factors be considered in choosing between surgical and percutaneous drainage. These include the anesthetic risk posed to the patient, the presence or absence of a coexisting primary intra-abdominal pathology requiring surgery, the relatively limited size of the drains that can be introduced percutaneous, the complication and failure rates of the two procedures and also the local expertise. Percutaneous drainage of liver abscesses does hold promise for definitive therapy or to delay surgery in high risk patients who may not tolerate general anesthesia. However, a prospective randomized trial comparing patients drained surgically or percutaneous is needed to evaluate differences in cost and morbidity.

Bari et al compared the results of percutaneous aspiration of liver abscess with open drainage in children. They concluded that open surgical drainage is the best modality of management for liver abscess. We conclude with the message that although percutaneous drainage is safe and effective the open surgical and laparoscopic procedure are most reliable and effective means of management because we can deal not only with liver abscess, but also with associated intra-abdominal pathology.⁵

METHODS

In the present study, patients were selected from Hospital attached to Sri Aurobindo Medical College and Post graduate Institute, Indore, MP, India. Study was conducted during the period from December 2012 to September 2014.

160 patients of liver abscess were included in the study. These patients were from both surgical and medical wards.

Our hospital has large number of patients with symptoms of liver abscess, Patients presented with following symptoms and signs selected for screening of liver abscess.

Other symptoms like loss of weight, hiccoughs, right shoulder pain, right basal pleural and pulmonary pathology, diarrhoea, nausea/vomiting and distention of abdomen with any of the above signs and symptoms were subjected to ultrasound abdomen examination.

All 160 patients in our study were subjected to detailed history taking, clinical examination, routine investigations and various specialized investigations. These comprised ultrasonography in all the 160 patients with 96% sensitivity and CT in 18 patients with 100% sensitivity. Final diagnosis of liver abscess was confirmed later microbiologically and/or pathologically.

Pathogenesis, signs and symptoms, laboratory data, diagnostic tests, treatment, pathology, bacteriology, complications, and outcome were analyzed. The pathogenesis was considered to be extra hepatic biliary disease if obstruction of the common bile duct was present or if cholangitis was documented concurrently with the liver abscess.

The portal vein was implicated as the route of bacterial spread in all intra-abdominal infections within the portal system but remote from the liver abscess. The source of the liver abscess was considered to be generalized septicemia with bacterial entry via the hepatic artery, if the primary infection arose outside the portal system. No source of infection could be positively identified in the cryptogenic abscess.

After patients were thoroughly investigated, they underwent various modalities of treatment

Non- surgical treatment

- Conservative management with antibiotics alone.
- Percutaneous drainage under USG guidance (Pigtail/aspiration).

Laparoscopic or open surgical drainage

Initially all uncomplicated patients were put on intravenous antibiotics. In those where the response was seen within 48-72 hours, antibiotics were continued for 2 weeks followed by oral antibiotics for 4 weeks. Response was monitored by clinical examination and ultrasonography.

Patients with the following criteria were taken for percutaneous drainage

- Patients who continued to be febrile even after 48-72 hours of adequate medical treatment.
- Liver abscess more than 6 cm in size.
- Clinical or ultrasonography features suggest impending perforation.¹⁹

Laparoscopic or Open drainage was carried out in patients falling in the Kapoor's criteria which are as follows

- Thick pus which could not be aspirated.
- Patients with multiple liver abscesses.
- Patients with ongoing sepsis even after antibiotic therapy and percutaneous drainage.

- Multiloculated abscess.
- Abscess in the left lobe.
- Ruptured abscesses.²⁰

The length of illness was defined as time from the first symptom attributable to the liver abscess to the time of definitive treatment. The delay in diagnosis was from the first visit to a physician to the time of definitive treatment. Bacterial data was compiled from the initial culture results only. The abscess was considered microscopic if it was less than 2 cm in greatest dimension. Mortality was defined as death within 30 days of treatment or before discharge from the hospital.

Treatment was considered successful if the following criteria were met

- The patient improved clinically with subsidence of pain, fever and other symptoms.
- The imaging of liver showed resolution of the abscess.

RESULTS

A total number of 160 patients of liver abscess were studied with reference to Clinical, radiological and ultrasound features at Sri Aurobindo Medical College and Post graduate Institute, Indore, MP, India.

Incidence of age and sex

The age group in this study ranges from the 18 years-85 years. Highest incidence of age is found between 3rd-4th decades. Other studies showed incidence of 75-90% in 2-5th decades. Our study shows 71.30% in the age group ranging from 35-85 year old. Youngest one is 18 years old male and oldest 85, 131 male and 29 cases were female. Male predominance is reported always in literatures.

Sex incidence ratio: Male: Female - 4.51: 1

General physical examination

Out of 160 cases, 55.60% of cases were anaemic showed dyspnea seen in 8% of cases, 15.60% cases had jaundice, pedal edema in 36.2% of cases, Hepatomegaly in 75% cases.

Clinical manifestation

Symptoms

In our study of 160 cases of liver abscess, 155 cases gave history of pain in abdomen. Fever in 142 cases, 1 case gave history of bloody diarrhoea that was expired on the same day of admission. Very few were known cases of COPD has cough with expectoration.

Table 1: Distribution of patients according to clinical presentation.

Clinical presentation	Number of patients	Percentage
Pain abdomen	155	96.90
Fever	142	88.80
Bloody stools	1	0.60
Jaundice	25	15.60
Pallor	89	55.60
Icterus	28	17.50
Oedema	45	28.10
Tachycardia	141	88.10
Hepatomegaly	120	75.00
Colonic tenderness	85	53.10
Encephalopathy	1	0.60

Signs

On examination: 89(55.60%) patients have variable degrees of anaemia (Hb<10 gm/dl), Jaundice in 25 patients (15.60%), Tachycardia in 88.10% of the cases. Hepatomegaly is a significant finding seen in 75% (120 patients) of cases along with the 53.10% (85) of cases had colonic tenderness. In 17.50% of cases icterus was present. 28.10 % (45) cases presented with pedal edema and 1 patient presented with encephalopathy who was in severe septicemia due to ruptured liver abscess with MODS and expired within few hours of admission in spite of revival. In the present study, in 9 cases liver abscess had ruptured into the peritoneum, with signs of peritonitis and were managed with exploratory laparotomy.

Aspiration of pyogenic abscess with subsequent microscopic examination shows presence of neutrophils. On laboratory culture, the abscess may yield bacterial flora. Amoebic liver abscess does not show neutrophils, as there is no pus, and amoebae are rarely isolated from the abscess. Patients with pyogenic abscess are typically older and have a history of underlying bowel disease or recent surgery. Amoebic serology is helpful, but aspiration of the abscess, with gram's staining and culture of the material may be required for differentiation of the two diseases

In our study out of 160 cases 53.12 % (85) cases were diagnosed with amoebic liver abscess and 46.88% (75) had pyogenic abscess.

Investigations

Routine-hematological most of our patients showed anemia, about 55.60% patients had Hb<10 gm/dl, polymorph nuclear leukocytosis in 139 patients, neutrophils were predominantly increased in these patients.

Bleeding time and clotting time were normal in all the patients, liver function tests were normal in 30% of cases. Abnormal values with respect to raised bilirubin in 30 patients (18.75%) raised SGPT in 136 patients and SGOT in 124 patients and enzymes (raised alkaline phosphatase in 17 patients) and one important significant finding was low albumin level in 28.10% of cases.

Treatment modalities and outcome

Antibiotics were used in all patients regardless of the mode of management. 15 (9.37%) cases with small abscess cavities responded well and recovered on antibiotics alone. Laparoscopic drainage was done in 7 cases (4.38%) and Open surgical drainage comprising (10) 6.25% of patients had hepatotomy and drainage of the abscess with an accompanying liver biopsy.

Drains were placed in all these patients but the type of drain did not appear to affect the outcome. Percutaneous drainage (Figure 1) of the hepatic abscess was performed in 80.00% (128) of patients in which 97 underwent USG guided aspiration and 31 cases were managed on Pigtail catheter (Table 2 and Figure 2).

Figure 1: USG guided needle aspiration of liver abscess.

Figure 2: Percutaneous catheter drainage of liver abscess.

Complications

124 patients in our series developed complications followed either surgical or nonsurgical therapy (percutaneous aspiration drainage or intravenous antibiotics).

Septicemia was the most common complication others being intra-abdominal abscess, recurrent liver abscess, renal failure, hepatic Failure, free peritonitis, pleural perforation of ALA.

Table 2: Treatment modalities.

Treatment modalities	Number of patients	Percentage
I/V antibiotics only	15	9.37
USG guided aspiration	97	60.63
Pigtail drainage	31	19.38
Surgery	10	6.25
Laparoscopic surgery	7	4.38
Total	160	100.00

Outcome

There was only one patient mortality in this series. Rest all patients made full recovery and demonstrated evidence of complete abscess resolution after a minimum of 6-12 months of follow up. Patients developed severe sepsis with organ dysfunction over the course of their admission. Some patients required intensive care for long duration. 46.90% (75) cases had hospital stay for 11-15 days and 36.30% (58).

It was considerably longer for those patients who underwent surgical intervention (35 days, on average). All patients were followed up for minimum of 8 months following hospital discharge, repeat liver biochemistry and abdominal imaging (USG or CT) confirmed abscess resolution in all cases.

Patients with Small abscesses showed excellent result on i/v antibiotics therapy alone. Open surgical drainage still stands to be the gold standard treatment for complicated liver abscess, having Laparoscopic drainage as a good alternative ($P = 0.000$ significant). Malik AA et al presented study on 160 patients for the management of the pyogenic liver abscess, who underwent different modes of management.³

Open surgical drainage was done in 127 cases, percutaneous drainage 26 cases and 16 cases were managed on IV antibiotics only with mortality in 19 patients. Heneghan et al presented a case series on 11 patients over a period of 5 years to study the Modern management of pyogenic hepatic abscess.⁴

Initially all patients were started with antibiotic therapy followed by USG guided percutaneous drainage in all patients out of which and only 2 patients required surgical intervention, including one 16-year old female who underwent hemi-hepatectomy for a complex and rare Actinomycotic abscess. There were no mortalities after minimum follow-up of one year.

Table 3: Distribution of patient's outcome in relation to treatment modality (N=160).

Treatment Modality	None	Satisfactory	Good	Excellent	Total
I/V Antibiotics	0	0	1	14	15
Pigtail drainage	0	23	5	3	31
Surgery	0	3	4	3	10
Laparoscopic surgery	0	1	0	6	7
USG guided aspiration	0	49	32	16	97

DISCUSSION

Liver abscess is still a serious illness and a diagnostic challenge. This is reflected in significant mortality rates and is a result of the lack of specificity of clinical signs and laboratory results. Despite the recommended aggressive approach to treatment, mortality rates throughout the mid twentieth century remained high at 60-80%. New advances in diagnostic and therapeutic radiology, coupled with improvements in microbiological identification and therapy, have recently decreased mortality rates to <5-30%. In our series of 160 patients, there was no mortality.⁹⁻¹²

The majority of liver abscesses have an underlying source that must be controlled before successful treatment of the abscess is possible. Most patients with hepatic abscesses can be cured with aggressive surgical and antibiotic therapy if the origin of the abscess is removed. Open surgical drainage has been the traditional treatment, although percutaneous drainage is available because of newer radiologic techniques. Historically, liver abscesses developed in otherwise healthy patients with an intra-abdominal infection. Ochsner reported a peak incidence in the fourth decade, as has been found in our series.

Liver abscesses are rare in children and adolescents, and are usually associated with an underlying immune deficiency state or trauma. Malik AA et al presented study on 169 patients, in whom average age was 42 years, 102 were females and 67 males. Heneghan et al presented study on 11 patients with a mean age of 60.27 years 6 males and 5 females, present study showed and majority of patients were in their fourth decade with male dominance being 81.90% (131) female 18.10% (29) cases.^{3,4} Clinical presentation of Pyogenic liver abscess is non-specific and similar to that of other hepatobiliary inflammatory or infectious process. A combination of nonspecific systemic symptoms is the most common presentation, including fever and rigors, nausea and vomiting, right upper quadrant pain, Tender hepatomegaly, anorexia, weight loss, weakness and malaise. Less frequently reported symptoms include cough or hiccups due to diaphragmatic irritation, with referred pain to the right shoulder. Patients with small solitary lesions usually have a more insidious course with associated weight loss, fatigue and anaemia of chronic disease. With such symptoms, malignancy is often the initial concern.

ALA is emerging as the commonest extra-intestinal manifestation of amoebiasis particularly in endemic areas. The disease has its acute (benign and aggressive) or chronic (benign and accelerated) course as far as the duration and severity is concerned. Patients who present with fever, right upper quadrant pain, and are immigrants from an endemic area, have a history of alcohol intake and diabetes mellitus; warrant a high degree of vigilance. Many investigators have tried to find a unifying pathogenesis for all cryptogenic hepatic abscesses but multiple causes appear to be involved. Study presented by Malik AA et al showed Hemoglobin level of the less than 10 g/dl was found in 59% of patients, total leucocyte count more than 10 000/ cumm in 68% of patients, serum transaminases and alkaline phosphatase levels were elevated in 84% of patients, present study shows about 45.63% patients had Hb<10gms/dl, polymorph nuclear leukocytosis in 139 patients, raised SGPT in 136 patients and SGOT in 133 patients and enzymes (raised alkaline phosphatase in 17 patients), In Heneghan et al study 7(64%) patients were anaemic ↑ White cell count in 91% (10) cases and deranged liver function test in 10 cases(91%).^{3,4}

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abscess appears as a hypo echoic lesion with irregular margin. Within the lesion these may be irregular areas of increased echogenicity. On the other hand liver abscess on CT appears as a low density lobulated lesion with poorly defined edges.⁵

Hepatic scans utilizing radioisotopes are obsolete for definition of hepatic abscess while magnetic resonance imaging does not provide information of greater usefulness than ultrasound or CT scanning. Surgical treatment continues to give the best chance of survival in patients with Liver abscess. 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.¹³⁻¹⁵

We recommend trans peritoneal surgical drainage to allow abdominal exploration and thorough exploration of the liver for multiple hepatic abscesses, although laparoscopic drainage has shown excellent result in some patients. From our series it is difficult to evaluate which type of drain is best. However, dependent drainage with multiple drains consisting of large tube drains and soft rubber drains is recommended. The tube drains in particular allow for diagnostic contrast studies and even irrigation treatment after surgery. Medical treatment alone without any drainage procedure in abscess cavity more than 6 cm has shown poor results in our series but 36 cases with small abscess cavities has shown excellent result on Medical treatment alone. 160 patients were subjected to this modality of treatment in our series and 10 of these patients (5.62%) subsequently needed open surgical drainage and 7 patients (4.38%) underwent Laparoscopic drainage because of poor response to antibiotic treatment alone. Although some continue to encourage the use of antibiotics alone to treat the Liver abscess, this approach seems risky and we, therefore, recommend that all liver abscesses of any origin should be drained to provide optimum treatment. Percutaneous treatment of hepatic abscesses has been praised for its simplicity and excellent results. Although of considerable benefit, percutaneous drainage is not necessarily the best treatment for all patients and is associated with a significantly higher failure rate than surgical drainage.^{5,16-18}

This is also evident from our series where 97 patients (60.63%) had USG guided aspiration and 31 patients (19.38%) had pigtail catheter drainage and were subjected to this mode of treatment, In Malik AA et al case study open surgical drainage was done in 127 cases, percutaneous drainage 26 cases and 16 cases were managed on iv antibiotics only with mortality in 19 patients, In Heneghan et al initially all patients were started with antibiotic therapy followed by USG guided percutaneous drainage in all patients out of which and only 2 patients required surgical intervention with no mortality.^{3,4} Patients among them subsequently needed open surgical drainage because of inadequate response to

percutaneous drainage. It is recommended that several factors be considered in choosing between surgical and percutaneous drainage. These include the anesthetic risk posed to the patient, the presence or absence of a coexisting primary intra-abdominal pathology requiring surgery, the relatively limited size of the drains that can be introduced percutaneous, the complication and failure rates of the two procedures and also the local expertise. Percutaneous drainage of liver abscesses does hold promise for definitive therapy or to delay surgery in high risk patients who may not tolerate general anesthesia. However, a prospective randomized trial comparing patients drained surgically or percutaneous is needed to evaluate differences in cost and morbidity.

Bari et al compared the results of percutaneous aspiration of liver abscess with open drainage in children. They concluded that open surgical drainage is the best modality of management for liver abscess.⁵ We conclude with the message that although percutaneous drainage is safe and effective the open surgical and laparoscopic procedure are most reliable and effective means of management because we can deal not only with liver abscess, but also with associated intra-abdominal pathology.

CONCLUSION

Liver abscess is commonly seen in middle-aged with male preponderance and in low socio economic group with poor sanitation, there are few reports in recent years of outcomes with modern management techniques and thus our experience may provide valuable information.

Based on our review of existing literature and our experience to date, we propose the following summary to guide the management of hepatic abscess:

- Prompt administration of empiric broad spectrum parenteral antibiotics.
- Ultrasound and/or CT scan to confirm diagnosis, with simultaneous radiological guided aspiration of all abscesses >6 cm, +/- drain placement.
- Microbiological analysis of abscess aspirates and blood cultures: antibiotic regimen should be adjusted according to culture results and sensitivities.
- Early recognition of septicemia or organ failure and appropriate transfer to critical care unit. Consider repeat imaging to confirm correct drain placement and to determine response to treatment and final resolution of the abscess.
- Open surgical or laparoscopic intervention should be considered for patients with large, complex, septated or multiple abscesses, underlying disease or in whom percutaneous drainage has failed.

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