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PYOGENIC LIVER ABSCESS: AN ANALYSIS OF 123 CASES

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Abstract: ***Background: Pyogenic hepatic abscesses are uncommon conditions that present diagnostic and therapeutic challenges to Surgeons. If left untreated, these lesions are invariably fatal. Pyogenic Liver Abscess (PLA) has lower mortality rate in recent year due to the modern management of liver abscesses, facilitated by advances in diagnostic and interventional radiology and improved intensive care services. Method: A prospective observational study was conducted from September 2011 to June 2014, in Second Hospital of Lanzhou University. We reviewed and summarized the clinical presentations, etiology, diagnostic modalities, and treatment programs of all liver abscesses, morbidity and mortality rate. Result: A total 123 patients, studies indicate that the Liver abscess was more common in male (80 males, 43 females), approximately M: F=2:1, occurring more frequently in right lobe of liver. Mostly, patients presented with non-specific constitutional symptoms and signs such as fever (94.8%) with chills & rigors (70.7%) and some were presented with jaundice and altered LFTs. The most common organism is the Klebsiella pneumonia with E. coli. All patients were treated with individual or combined therapies including antibiotics, USG-guided drainage 61(49.6%) patients with 1-3 times needle aspiration, surgical exploration 33(26.8%) patients with laparoscopic de-roofing 18(14..6%) patients. 1 patient was died due septic shock after operation and some due to massive bleeding during operative procedure. Conclusion: Liver abscess requires a high degree of suspicion for early diagnosis. When appropriate therapy in the form of antimicrobial therapy and radiological intervention in combination with percutaneous drainage or Surgical intervention should be considered for patients with large, complex, or multiple abscesses, underlying disease or in whom percutaneous drainage has failed and it is administered the mortality is very low. However, significant morbidity is still a problem in old debilitated persons with other core morbidities.***

Keywords: Pyogenic Liver Abscess (PLA), Klebsiella Pneumonia, Exploration, Intraventional, Antimicrobial

INTRODUCTION

Liver Abscesses have been recognized since the age of Hippocrates. In 1938, Ochsnar and Debakey *et al* [1] published the largest serious of pyogenic and amebic liver abscesses in the literature. Since the last 20th century, percutaneous drainage has becomes a useful therapeutic option, because of its minimal invasiveness and high cure rate [2]. The incidence of pyogenic liver abscess is estimated to be 8-15 cases per 100,000 persons. It has remained unchanged since just prior to the mid-20th century. This figure is considerably higher in countries where health care is not readily available. Studies indicate that the male-to-female ratio is approximately 2:1; the problem occurs most commonly in the forth to sixth decade of life. The etiology of these abscesses has changed over the last few decades, such as biliary disease, Infection via the portal system (portal pyemia), Hematogenous (via the hepatic artery), and Cryptogenic [3]. Most abscesses contain more than 1 organism and frequently are of biliary or enteric origin. Blood culture results are positive in 33-65% of cases, with positive results from abscess cultures reported in 73-100% of series. Etiologic agents responsible for most pyogenic liver abscesses are ***E. coli*** in western series, while ***Klebsiella pneumonia*** has recently emerged as a common isolate in patients in Asia and more can be found in younger patients as compared to European countries. Fever and right upper quadrant pain are the most common complaints. Fever occurs in 87-100% of patients and is usually associated with chills and malaise and Pain is reported in as many as 80% of patients and may be associated with pleuritic chest pain or right shoulder pain. Symptoms are often misdiagnosed as acute cholecystitis. Physical examination findings are most notable for right upper quadrant tenderness. Hepatomegaly, liver mass, and jaundice are also common. Rarely, patients are admitted with sepsis and peritonitis from intraperitoneal rupture of the abscess.

Recently, the advent of modern advanced diagnostic imaging techniques allow the precise location size and number of the abscess and development of imageand intravenous technology guidance for drainage of abscess and broad spectrum antibiotics, laparoscopic surgery and advance intensive care services which made mortality decrease to acceptable level.

Biliary disease

Biliary disease accounts for 21-30% of reported cases. Extra-hepatic biliary obstruction leading to ascending cholangitis and abscess formation is the most common cause and is usually associated with choledocholithiasis, benign and malignant tumors, or postsurgical strictures. Biliary-enteric anastomoses (choledochoduodenostomy or choledochojejunostomy) have also been associated with a

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high incidence of liver abscesses. Biliary complications (eg, stricture, bile leak) after liver transplantation are also recognized causes of pyogenic liver abscesses.

Infection via the portal system (portal pyemia)

The infectious process originates within the abdomen and reaches the liver by embolization or seeding of the portal vein. With the liberal use of antibiotics for intra-abdominal infections, portal pyemia is now a less frequent cause of pyogenic liver abscesses but still accounts for 20% of cases. Appendicitis and pylephlebitis are the predominant causes. However, any source of intra-abdominal abscess, such as acute diverticulitis, inflammatory bowel disease, and perforated hollow viscus, can lead to portal pyemia and hepatic abscesses.

Hematogenous (via the hepatic artery)

This infectious process results from seeding of bacteria into the liver in cases of systemic bacteremia from bacterial endocarditis, urinary sepsis, or following intravenous drug abuse. Blunt or penetrating trauma and liver necrosis from inadvertent vascular injury during laparoscopic cholecystectomy are recognized causes of liver abscess. In addition, trans-arterial embolization and cryoablation of liver masses are now recognized as new etiologies of pyogenic abscesses.

Cryptogenic

No cause is found in approximately half of the cases. However, the incidence is increased in patients with diabetes or metastatic cancer. Patients with repeated cryptogenic liver abscesses should undergo biliary and gastrointestinal evaluation.

MATERIALS AND METHODS

A total of 123 patients with pyogenic liver abscess were managed in the Department of Surgery unit I Lanzhou University of Second Hospital, Lanzhou, Gansu, China from September 2010 to June 2013. The cases and data were collected from combination of chart review, theatre records, Hospital surgical In-Patient Enquiry, surgical outdoor department of the hospital and Emergency unit. A review of these case was performed to document the clinical presentation, etiology, diagnostic investigations and imaging, treatment, morbidity and mortality. All patients were initially treated by conservative management. Broad spectrum antibiotics therapy had been initiated and was modified when sensitivity were demonstrated by bacterial cultures. Radiological-guided percutaneous aspiration with an 18-gauge needle and placement of a range of different sized drainage catheters (8-14Fr) by the Seldinger technique was performed under local anesthesia. Pus aspirated at the time of initial abscess drainage was routinely sent for microbial culture and sensitivity analysis. The patients who were unresponsive to conservative treatment or who have complications of rupture of abscess and peritonitis or difficulty in performing in percutaneous drainage were selected for operative drainage open or laparoscopic. Following completion of their treatment regimens, all patients were followed-up clinically and radiological for at least 1 year to verify abscess resolution.

RESULTS

A total of 123 consecutive patients [80 (58%) men and 43 (42%) women with approximately 2:1 ratio]of liver abscess included in this study from September 2010 to June 2013 in Lanzhou Second Hospital surgery department unit I, with the mean age 56years (age ranged between 32 to 84 years). Out of 123 patients, 94 patients presented with single number of abscess and 19 cases presented with multiple abscesses and there were 74 patients founded right hepatic abscess, 34 patients with left hepatic abscess and 15 patients with both. Several non-specific signs and symptoms were the common reasons for hospital admission. The most common clinical features were fever in 118 patients (95.5%) associated with chills in 87 patients (70.7%), followed by right upper abdominal pain in 58 patients (47.2%), abdominal distension in 24 patients, loss of appetite (19.5%), jaundice in 5 patients (4.1%, including 3 patients with extra-hepatic bile duct stones and 2 patients of infective jaundice) and 2 patients of altered consciousness. Physical examination, most of patients have RUQ tenderness. Table 1 provides the clinical features of the pyogenic liver abscess.

Table 1. Clinical features of the pyogenic liver abscess.

Symptom	N (%)	Sign	N (%)
Fever	118(95.5%)	Right Upper	58(47.2%)
Chills & Rigor	87 (70.7%)	Quadrant Pain Abdominal	24 (19.5%)
Loss of Appetite	24 (19.5%)	Distension	5 (4.1%)
Malaise		Jaundice	
Anorexia		Hepatomegaly	
Weight Loss		Splenomegaly	
Chest Pain		Abdominal Tenderness	
Vomiting		Epigastric pain	
Night Sweats		Peripheral Edema	
Cough		Diffuse Pain	
Diarrhea			

There were found some liver abscess with complications, such as 68 patients (55.3%) with DM, 43 patients with Cholilithiasis associated with Cholecystitis (40%, including 2 cases with choledochollithiasis and 1 case of intra-hepatic bile stones), 2 patients with polycystic liver diseases complicated with liver abscess, 4 patients with shock, 1 patients with pulmonary infarction, DM and CHD, 1 patient with Renal failure, and 2 patients of giant hepatic abscess with infective jaundice. Several laboratory work-ups were done to confirm the diagnosis of hepatic abscess, majority of which was complete blood count, culture & Sensitivity with blood typing with LFTs, biochemical and coagulation factors, tumor markers, CRP, serology and immunes, RFTs and routine B ultrasound of abdomen and CT in all cases, followed by chest radiograph , 12 leads ECG, and capillary

blood glucose. Out of 123 patients, we had found 52 positive blood culture and we found the etiological organism like 10 patients (19.2%) Klebsiella pneumonia, 3 cases of E. Coli, 1 case of Pseudomonas aeruginosa and 1 case of Enterococcus Faecalis. A total 112 of patients, there were 65 cases (58%) with positive pus culture showed E. Coli was the most common organism, including etiological others positive organism Klebsiella pneumonia, Enterococcus faecalis, Pseudomonas aeruginosa and 47 cases (42%) with negative.

TREATMENT AND OUTCOME

Out of 123 patients that had undergone routine B ultrasonography, it was revealed that 94 (84.15%) results showed solitary hepatic abscess whereas 19 (15%) showed multiple hepatic abscesses and 1 of patient showed small multiple diffused hepatic abscess. The incidences of right, left and bi-lobar abscesses were 74(60.16%), 34(27.6%) and 15(12.19%) respectively. Significance of the size of the abscess, there were 102 patients (82.9%) of >5cm abscess size and 21 patients (17.1%) with <5cm size. According to our study plan, we were divided into several group among 123 patients for close observation and different treatment mortalities. Out of 123 patients, there were 11 (7 males, 4 females) in Group A with simple antimicrobial treatment, 33 (21 males, 12 females) in Group B with surgical operation, 18 (10 males, 8 females) in Group C with laparoscopic operation drainage, and 61 (33 males, 28 females) in Group D with percutaneous needle aspiration (PNA) and drainage. Table 2 indicates the treatment mode of the pyogenic liver abscess.

Table 1. Mode of Treatment of Liver abscess

Group	Mode of treatment	No.	%
A	Antibiotic therapy alone	11	8.94
B	Surgical operation	33	26.83
C	Laparoscopic surgery	18	14.63
D	PNA and drainage	61	49.60
Total		123	

Group A: for early PLA, if there were no any obvious lesions liquefaction or found only small multiple liver abscesses (diameter less than 2 cm) during routine B ultrasound or CT Scan and before obtaining positive cultures from blood or pus, all of patients should be treated conservatively, mainly large dose of broad-spectrum antibiotics should be started immediately to cover Gram-negative and Gram-positive aerobes and anaerobes and nutritional support therapy. This was changed according to the sensitivities of organisms cultured from each patient's abscess aspirate pus or blood.

Group B: for the large single abscess, the patient's poor general condition and severe toxic clinical symptoms with ulcerated intra-abdominal primary lesions and >8 cm then performed operation on the basis of location as per preoperative routine B ultrasound or CT scan. If there were involvement of liver VI & V segment or left liver with large vessels, biliary tract and ulcerated intra-abdominal primary lesions then performed laparotomy operation. And those who have a poor general condition and could not tolerated general anesthesia for operation and abscess involved in liver VI & VII segments then performed the placement of drainage tube through right posteriorly 11^{th} and 12^{th} ICS under local anesthesia and B ultrasonography or CT guided.

Group C: this group of patients ware including the abscess on superficial but deeper location of the liver and fewer numbers of abscess which is not located near to the hilar and large vessels and difficult location to puncture, then preferred to laparoscopic operation and drainage and evaluate the morphology of the liver abscess. After conformation of the liver maturity, site, number, the puncture needle is initially placed the lower and thinner part of the abscess and confirmed abscess containing pus and matured then firstly open the cavity by hook cautery and gently open the whole cavity, sucked pus and flushed the abscess cavity then kept flushing drainage tube, and keep under prophylactic antibiotic therapy.

Group D: This group of patients included those who have a poor general condition as well as the patient those didn't tolerating general anesthesia for routine operation and difficult to approach posterior, and the abscess diameter less than 5 mm, preferred single or repeated B-ultrasound guided percutaneous trans-hepatic aspiration and drainage and aspirate abscess contents and kept flushing drainage catheter. Aspirated pus should be send to culture and sensitivity test for organism.

Table 3. Comparison of four group of patients

Group	N	Cure rate (%)	Monthly (%)	Hospital stay	Costs	Complication rate (%)
A	11	81.8*	100**	10.7±2.2*	0.8±0.3*	0
B	33	69.7*	78.8*	16.7±4.6**	2.7±0.6**	12.1**
C	18	83.3*	94.4**	9.8±2.3*	1.4±0.5*	5.6*
D	61	72.7*	81.8*	17.3±5.3**	0.9±0.3*	3.3*
P		>0.05	<0.05	<0.05	<0.01	<0.01

*/**: comparison of significance, N: Number of patient.

For the first time presentation, statically all four group outcome or cure rate were not significant varies **(P > 0.05).**

In January, the cure rate of antibiotics and laparoscopic groups were higher than that in the open surgical procedure and percutaneous aspiration and drainage group **(P > 0.05)** and the hospitalization time duration was much more longer than the antibiotics group and laparoscopic group **(P < 0.05)** as well as the open surgical operation group cost was higher that other rest of groups **(P < 0.05).** The complications rate was higher in open surgical procedure that the other three

groups. Table 3 provides detail summary of four groups' treatment and outcome significance.

DISCUSSIONS

With the development of the medical technology, updating newer broad spectrum antibiotics, laboratory technology progress as well as advanced surgical techniques and an improved supportive care have continuous fundamentally changed the treatment of PLA and significantly increased the survival rate of patients with PLA. The prognosis of the patients was improved obviously and its following mortality rate has dropped to 10% or less [4]. Recently, there are several way to treat PLA, including broad spectrum antibiotics, percutaneous incision and drainage under USG/CT/MRI guided, surgically and laparoscopic. Broad spectrum antibiotic therapy is the main and first line treatment of the PLA [5, 6]. Now a day, surgical method is mostly widely used of treatment of the PLA with broad spectrum antibiotics and antimicrobial and playing important role in the treatment of PLA and increase the survival rate.

In this retrospective study, according to the patients history for admission, imaging reports and the principle of individualizations treatment, among 123 cases, 121 cases were cured, 2 cases died, the cure rate is very high and treatment method selection was very effective. Bamberger et al [7] that there was no underlying disease and the single abscess with diameter < 5 cm was cured with only adequate broad spectrum antibiotic therapy. The patient started to treat with broad spectrum antibiotic and anti-inflammatory drugs according to target anti-inflammatory drugs sensitivity test, and patient's general condition improved markedly and size of the cavity become smaller and disappears and was not liquefied, and there were no any indication of further surgical intervention required. One of the patient have pulmonary infection, coronary heart disease and diabetes along with PLA, this patient cannot tolerating or not suitable for surgical intervention and puncture drainage procedure therapy, then started to treat with hemodialysis, immune therapy and broad anti-inflammatory drugs and patient condition improved and sepsis under controlled and abscess cavity disappear gradually. Surgical group of the patient ware not responding well and condition worse and looking more toxic, cavity become larger and developing complications. Study showed that if the abscess located VII segment of the live, the posterior approach of the drainage and irrigation of PLA was more effective than anterior approach. Especially, those patient have poor general condition and not suitable for surgical procedure under general anesthesia, preferred to repeated puncture drainage and irrigation under local anesthesia and treatment responding well and have satisfactory outcome. So far patient's general condition, abscess location, size and preoperative radiological data have playing vital role to choose surgical approach and its prognosis.

Laparoscopic surgical approach is the much relevant, safe, and feasible approach than the open surgical approach, because of many factors, such as operative time, blood loss, hospitalization time duration, minimal body trauma, low wound infection rate, rapid postoperative recovery, also able to operative in spite of biliary disease and total success rate of laparoscopic surgical drainage was 83.30 % and one of the major treatment choice for PLA [8]. In this study, there were 18 patients underwent laparoscopic surgical drainage procedure of abscess and 3 cases postoperative residual pus cavity healed by postoperative punctured. But the study showed that there were some difficulties and surgical risk in laparoscopic surgical incision and drainage approach and has limitation too in the case of special circumstances such as abscess close to large major blood vessels and bile ducts, involvement of caudate lobe of the liver, and multiple number of abscess. When the abscess located superficially, and not deep position, abscess number, not closed to the portal or other large major vessels and ducts or hilum of the liver, indicated for laparoscopic surgical incision and drainage approach.

For single liver abscess or single or multi-lobular liver abscess, puncture and drainage is not only suitable treatment option, it can be also treated with aspiration therapy, which makes operation procedure safest, faster, easier, easy to irrigate, faster postoperative recovery, shorter hospitalization time duration, low treatment costs, easily repeated operative procedure as required and maximum outcome [9, 10].

Alvarez perez' *et al* [11] that the treatment of PLA should choose according to the specific circumstances of patient, but most of the patients treated and cured with percutaneous catheter drainage under B-ultrasound guided approach and administration of broad spectrum antibiotics. In this study, included total 61 patients, all patient were cured and success rate was higher. During procedure, aspirated fluid sample was taken and sent for lab for culture and sensitivity of definite pathogen and further treatment plan. Study illustrated that fever is the main clinical presentation as we found 118 patients out of 123 (95.50%), and 87 patient with chills & rigors (70.70%) and correlate with B. Wenjun report. Therefore, the patients with ***fever of unknown origin*** **(PUO)** is the major clinical presentation of liver abscess diseases. Recently, the study found that the ***klebsiella pneumonia*** is the major pathogen of PLA, which has replaced the ***E. coli*** organism as the major pathogen in recent year [12-14]. This study showed that the blood culture as well as the aspirated purulent fluid culture pathogenic reports were positive in 5 cases of ***klebsiella pneumonia*** and 3 cases of ***E. Coli*** as well as 31 cases of ***Klebsiella pneumonia***, and 14 cases of ***E. Coli*** respectively, which showed the ***klebsiella pneumonia*** has become most dominant pathogen of PLA.

In this study, four group of cure rate for first time was not statically significant **($p > 0.05$)**. In January, the antibiotic group and laparoscopic group of treatment is significantly higher than that in surgical group and puncture group of treatment **($p < 0.05$)**. Hospitalization time duration of surgical drainage group and puncture group of treatment was longer than that in the antibiotic group and laparoscopic drainage group of treatment **($p < 0.05$)**. Surgical group of treatment was higher treatment costs that the others 3 group of treatment **($p < 0.05$)** and the incidence for developing complication in laparotomy group has higher than the others 3 group of treatment. And surgical treatment of this group of the patients was depend on the specific circumstances of PLA patents.

Therefore, the therapy for definite treatment of the PLA depend on the preoperative evaluations of the patient's general conditions and radiological data to developed rational therapeutic approaches and higher successive rate. Drainage and aspiration treatment approach should be selected according to the abscess location, size, and number, involved liver lobe, patient's general condition such as risk factor analysis, individualized treatment plan and constantly improved successive rate.

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