

Pyogenic Liver Abscess - A Tropical Centre's Experience in Management with Review of Current Literature

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ABSTRACT

Aim of Study: To perform a retrospective study, with the help of literature review, of the management of patients with pyogenic liver abscess in a general hospital.

Method: A retrospective study of 73 consecutive patients treated at Tan Tock Seng Hospital between January 1994 and December 1997 was conducted to determine the demographic, clinical, laboratory, radiological and microbiological characteristics of these patients, as well as the management strategies employed.

Results: Liver abscess was more common in males, occurring more frequently in the right hepatic lobe. Most patients presented with non-specific clinical and biochemical features. A raised alkaline phosphatase level was the most common biochemical abnormality found in about two-thirds of patients. Ultrasonography was not as sensitive as computed tomographic scans in detecting abscesses. *Klebsiella pneumoniae* was the most common etiological agent detected in cultures of blood and abscess aspirates. All patients were treated with intravenous antibiotics. Twenty-two (30%) needed percutaneous catheter drainage and five (7%) required surgical management. There was no hospital mortality in our series. Prolonged hospitalisation was associated with advanced age, degree of loculation within the abscess, concomitant diabetes mellitus and *Klebsiella* septicaemia.

Conclusion: Pyogenic liver abscesses require a high index of suspicion for early diagnosis. When appropriate therapy in the form of antibiotics in combination with percutaneous drainage or surgery is administered, mortality is very low. However, significant morbidity is still a problem, particularly in the elderly, diabetic patient.

Keywords: Pyogenic liver abscess, *Klebsiella pneumoniae*, percutaneous catheter drainage

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INTRODUCTION

Changing trends have been evident in the management of pyogenic liver abscesses (PLA). Early studies by Oschner et al recommended open surgical drainage as the treatment of choice⁽¹⁾. The advent of highly accurate and sophisticated imaging techniques coupled with precise radiological-guided abscess aspiration and drainage procedures have dramatically changed the management of PLA over the last fifteen years.

The aims of our study were to:

1. Determine the demographic, clinical, laboratory, radiological and microbiological characteristics of patients with liver abscesses.
2. Review the management strategies applied and their results.
3. Analyse prognostic features and
4. Provide the basis for a review of the treatment strategies currently employed in our hospital.

MATERIALS AND METHODS

From January 1994 to December 1997, a total of 73 patients with liver abscesses were managed by the Department of Medicine, Tan Tock Seng Hospital, Singapore. The medical records of these patients were reviewed.

STATISTICAL ANALYSIS

An analysis of possible prognostic factors was carried out using univariate analysis. Statistical analysis was performed with the SPSS/PC + software package. Statistical significance was considered when $p < 0.05$.

RESULTS

Demographic, Clinical and Laboratory Characteristics

Fifty-one (71%) of 73 patients were male. The median age was 58 (range 14-87). Sixty nine percent were Chinese, 19% Indian and 12% Malay. The clinical features at presentation are shown in Table I. Concomitant medical problems included diabetes mellitus in 15 patients, ischaemic heart disease in 7, hypertension in 6 and chronic obstructive airway disease in 2. Laboratory abnormalities at presentation are shown in Table II.

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Table I. Clinical Features in 73 Patients with Pyogenic Liver Abscess.

Clinical Feature	No.(%)
Fever > 38 degrees Celsius	62 (85)
Upper Abdominal Pain	46 (63)
Nausea/Vomiting	36 (49)
Anorexia	25 (34)
Jaundice	18 (25)
Hepatomegaly	3 (4)
Shock	1 (1)
Ascites	1 (1)

Table II. Main Abnormalities in Laboratory Findings.

Laboratory Feature	No.(%)
White blood cell count >11 000/dl	57 (78)
Haemoglobin <12g/dl	14 (19)
Platelet count < 140 000/dl	2 (3)
Prolonged PT	2 (3)
Urea < 7.7 mmol/l	6 (8)
Creatinine > 140 umol/l	2 (3)
Alkaline phosphatase > 150 iu/l	48 (66)
GGT > 40 iu/l	40 (55)
ALT > 33 iu/l	39 (53)
Bilirubin > 34 iu/l	24 (33)
Albumin < 35 g/dl	4 (5)

Radiological characteristics

Ultrasonography was the first-line imaging modality for 50 patients and it detected liver abscesses in 41/50 (82%) patients. Computed tomography (CT) scanning, as first-line imaging, diagnosed liver abscesses in the remaining 9 patients. Some patients had both ultrasound and CT imaging. In all, CT was able to detect abscesses in 47/50 (94%). Fifty-two (71 %) patients had abscesses only in the right lobe of the liver. Sixty-three (86%) had a solitary abscess and 12 patients (16%) had multi-loculated abscesses.

Microbiological characteristics

Klebsiella pneumoniae was cultured from the blood in 15 out of 73 patients' blood (21%) and 14 out of 32 abscess aspirate cultures (44%). One patient had polymicrobial growth with *K. pneumoniae*, *E. coli* and a significant amoebic antibody titre of > 1/256.

Predisposing factors

Three patients (4%) had underlying ascending cholangitis from cholelithiasis. There were no predisposing factors detected in the remaining patients.

Treatment

All patients received intravenous antibiotics. The most commonly used antibiotic combination was a cephalosporin with an aminoglycoside and metronidazole. Forty-six patients (63%) recovered completely on antibiotic therapy alone. Twenty-three patients (32%) had both antibiotics and radiologically-guided percutaneous catheter drainage. All these patients had abscesses with diameters measuring 5 or more cm. Only five patients (7%) needed surgery; 2 because of failure of percutaneous drainage, 2 because of deterioration despite antibiotics and drainage and one because of intra-abdominal abscess rupture.

Patient Outcome

There was no mortality in this series of patients studied. All patients, after discharge were reviewed as outpatients to ensure both clinical and radiological resolution of the liver abscess.

Analysis of prognostic factors

As there was no hospital mortality in our series, the duration of hospitalisation was used as a surrogate index of disease severity. The following factors were evaluated as possible prognostic factors:

Age of patient, anaemia, leucocytosis, hyperbilirubinemia, hypoalbuminaemia, size of abscess, number of abscesses, loculation within the abscess, presence of diabetes mellitus and *Klebsiella* septicaemia. Of the factors studied, only loculation within the abscess was found to be a statistically significant prognostic factor by univariate analysis.

Patients with loculated abscesses stayed a mean of 28.7 days compared to a mean of 18.2 days for those without loculation ($p=0.008$). The elderly (age>65), diabetic patients and patients with *Klebsiella* septicaemia also tended to remain hospitalised longer although these factors did not reach statistical significance.

DISCUSSION

In our study, the clinical presentation of patients with pyogenic liver abscess (PLA) was non-specific. An early clinical diagnosis requires a high index of suspicion and is often based on a constellation of non-specific clinical features⁽¹⁻²⁾. Our patients' presenting symptoms did not differ from that reported in literature, with fever and upper abdominal pain being the two most commonly documented symptoms^(3,4). Jaundice was detected in only 25% of our patients. Male and right hepatic lobe predominance have been noted in several studies and the latter has been attributed to the relative sizes of the liver lobes⁽⁵⁻⁹⁾.

The median age of our patients at presentation was 58. It has been reported that the age of presentation has been progressively rising. This has been attributed to the

changing aetiology of PLA⁽¹⁰⁻¹¹⁾. Patients aged over 65 years tended to have longer hospitalisations although this did not reach statistical significance in our series. A recent comparative study between older and younger patients with PLA showed that elderly patients with PLA had subtle differences in clinical and laboratory presentations which did not affect the diagnosis, treatment or mortality⁽¹²⁾.

Non-specific biochemical features such as a mild anaemia and a polymorph-predominant leucocytosis were common. A raised alkaline phosphatase, without a rise in bilirubin, was also found in two-thirds of our patients. This typical but non-diagnostic feature has also been reported elsewhere⁽¹³⁾.

Portal pyaemia could not be demonstrated in the majority of our patients even though it had been well established as a major cause of PLA⁽¹⁾. Only 4% of our patients had features of ascending cholangitis. Most cases of PLA are in fact cryptogenic^(9,13-14). Although it has been recommended that a complete gastrointestinal evaluation be performed to seek a source of intra-abdominal sepsis⁽¹⁵⁾, none of our patients were keen for further evaluation and so far no recurrence has occurred. A previous study on a similar cohort of patients from Singapore found colonic cancer in one patient out of 41 (4%). Larger studies are needed to determine the benefit of colonoscopic examination in all patients diagnosed with PLA of unknown cause.

The most common organism isolated from blood and abscess aspirate cultures in our patients was *Klebsiella pneumoniae*. Only one patient had a poly-microbial aetiology with *Escherichia coli* and *Entamoeba histolytica*. Other studies have also reported *Klebsiella pneumoniae* as the most common pathogen^(9,13,16-20). Of interest is the reducing incidence of amoebic abscesses among Singapore patients. Our series only detected one patient. A falling rate was noted in two previous local studies reported about a decade apart^(16,18).

A range of medical conditions, in particular diabetes mellitus, has been reported to increase the risk of PLA⁽¹⁹⁻²¹⁾. In our study, there were only 15 patients with diabetes and although diabetics tended to stay longer in hospital, this did not reach statistical significance perhaps due to the small sample size of diabetic patients in our study.

The mortality rate for PLA has fallen considerably from about 40% to between 10 and 25% over the last few decades^(14,19,22-28). In our series, there was no mortality. This improvement in patient survival may, in part, be the result of earlier diagnosis using modern imaging methods. Newer, less invasive radiological percutaneous abscess aspiration and catheter drainage of liver abscess and the ready availability of more effective antimicrobial agents such as third generation cephalosporins have contributed to the decreasing mortality rate. These improvements have led to a re-appraisal of the role of open surgical drainage as

the primary treatment modality for this condition.

It would seem that ultrasonography by an experienced radiologist should be the first line imaging modality in patients with suspected liver abscesses. CT scanning may confirm the ultrasonographic diagnosis, or make it, if the ultrasound is normal in the face of a high level of clinical suspicion.

The role of more sophisticated imaging techniques remains undefined although recent literature suggests that magnetic resonance (MR) imaging using T-1 and T-2 weighted and serial gadolinium-enhanced gradient-echo images can help differentiate hepatic abscesses from other focal hepatic lesions⁽²⁹⁾.

The presence of loculation within an abscess significantly prolonged the duration of hospitalisation. This may be due to the lack of adequate antimicrobial penetration and/or the difficulty of radiological drainage. While other studies have reported that the presence of multiple liver abscesses could significantly predict increased mortality^(13,28), we did not find this to be the case in our study.

Based on the microbiological profile of liver abscesses in our region, we would recommend early, empirical institution of an antibiotic regime that gives adequate coverage for *Klebsiella pneumoniae* and other gram-negative *Enterobacteriaceae*. Literature suggests that antibiotics alone, when administered for a period for 4 to 6 weeks, can be curative in a solitary abscess measuring no more than 5 cm in diameter if a diagnostic aspirate was also employed in order to ascertain the diagnosis and determine antimicrobial sensitivity of the cultured micro-organisms⁽³⁰⁾.

Percutaneous drainage of liver abscesses was performed in 30% of our patients. These patients had abscesses that were usually larger than 5 cm in diameter and in locations accessible to percutaneous drainage. Whilst percutaneous needle aspiration has been rarely employed in the studied cohort in our centre, percutaneous catheter drainage remains to date the preferred radiological treatment for PLA. A survey of recent literature suggests that both methods have been shown to be effective and safe but it is still uncertain if one has an advantage over the other⁽³¹⁻³³⁾. Needle aspiration is reportedly less invasive, less costly and less labour-intensive as it obviates the need for meticulous catheter care. In addition, multiple cavities can be drained in the same session. However, one study showed a decreased success rate if needle aspiration was limited to two attempts⁽³³⁾. Be that as it may, imaging-guided percutaneous treatment has, in our centre, replaced open surgical drainage as the first-line treatment of uncomplicated PLA.

Open surgical management was still required in 5 (7%) of our patients. A recent study identified factors that predicted the failure of non-operative management. These were: unresolving jaundice, renal impairment secondary to clinical deterioration, multiloculation of the abscess, rupture

on presentation and biliary communication⁽³⁴⁾. While there appears to be a decreasing role for open surgical drainage in the treatment of the solitary, uniloculated PLA, studies suggest that surgical drainage may still be warranted in cases of multi-loculated abscesses, multiple abscesses, solitary abscesses inaccessible to radiological intervention and cases of abscess rupture^(98,35-36).

More recently the use of laparoscopic drainage for liver abscesses has been reported to be a safe and effective option in patients who have failed medical or percutaneous treatment. While attractive as a therapeutic option with comparative efficacy and morbidity rates to radiological procedures, with the added benefits of minimally invasive surgery, it remains to be seen if laparoscopic drainage will replace conventional open surgical drainage in the future as the surgical manoeuvre of choice⁽³⁷⁻³⁸⁾.

CONCLUSION

Patients with PLA continue to suffer from significant morbidity especially the elderly and those with diabetes mellitus. A high index of suspicion, rapid diagnosis and prompt institution of appropriate antibiotics and radiological drainage (where applicable) are cornerstones of effective management. A multidisciplinary approach involving a gastroenterologist, radiologist, surgeon, infectious disease physician and microbiologist provide optimal management. Such an approach over the past few years has kept the mortality rate low at our centre. New developments such as percutaneous abscess aspiration and laparoscopic drainage may in future afford additional advantages.

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