

A RANDOMIZED COMPARATIVE STUDY BETWEEN NEEDLE ASPIRATIONS VERSUS SURGICAL DRAINAGE IN LIVER ABSCESS

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ABSTRACT

Aim: To compare the therapeutic effectiveness of ultrasound guided needle aspiration versus open surgical drainage in treatment of liver abscess.

Patient and Methods: Between March 2003 and May 2006, 60 consecutive patients with liver abscesses were treated with intravenous antibiotics and randomized in two groups: ultrasound guided intermittent needle aspiration (18G disposable trocar needle); and open surgical drainage. There was no statistically significant difference between the two groups regarding patient demographics, abscess size and number, the presenting clinical symptoms and laboratory findings.

Results: the success rate was 80% in needle aspiration group versus 100% of open surgical group, the number of aspirations required varied from one aspiration (10 patients) up to 3 aspirations in 10 patients. The average time needed for clinical relief and the mean hospital stay for the successful treated patients were similar in both groups

Conclusions: Although both needle aspiration and open surgical drainage are safe methods for treatment of liver abscesses, open surgical drainage is more effective.

Key words: Acute abdomen - surgical emergencies - minimally invasive surgery

INTRODUCTION

Liver abscess continues to pose significant diagnosis and management challenges. The mortality associated with this condition has not been dramatically reduced despite improvement in treatment strategies, mainly because of changes in the patient population and the underlying etiology (Giorgio et al., 2003).

Techniques of treating hepatic abscess have evolved in the past decade. For many years, the traditional treatment was surgical drainage. The development of modern imaging modalities, such as ultrasound and computed tomography has not only made the diagnosis more certain, but has also introduced variety of percutaneous treatment options (Milier et al., 2000).

The management of liver abscess suspected on the basis of clinical and radiological findings is radically different depending on its amoebic or pyogenic etiology (Baudat et al., 2005).

Intraperitoneal rupture of pyogenic liver abscess is rare but potentially fatal disease, often involving the elderly, who are commonly of poor surgical risk with background of significant medical illness (Justin et al., 2003).

Needle aspirations combined with medical treatment is more effective than drug treatment alone in the management of liver abscess (Cluing et al 2007). "

Hepatic abscess is now accepted as a medical/radiological disease requiring surgical intervention only for correctable offending causes or for failed radiological evacuations (Milier et al 2000).

Aim of the work:

To study the possible therapeutic efficacy, safety and outcome of ultrasound guided needle aspiration versus open surgical drainage in treatment of liver abscess.

PATIENTS AND METHODS

Sixty patients with liver abscess (es) referred to Assiut University Hospital were included in this study from March 2003 to May 2006. Diagnosis was made on the basis of clinical and imaging findings with ultrasound or computed tomography. This study was approved by the local ethics committee and informed consent was obtained from all participating patients. Patients included into (he

study were randomly categorized into two groups according to the method of management either aspiration under sonographic guide or open surgical drainage.

1-The first group, included 30 patients where the percutaneous treatment was performed under local anesthesia (2% lignocaine) with IV analgesia and sedation when required, the procedure was performed under continuous real time sonographic guidance using the free hand technique. The needle aspiration size was 18 gauge trocar canula advanced perpendicular into the abscess cavity and the contents were aspirated in an attempt to completely evacuate the abscess. The aspirated fluid was evaluated for amount, color, consistency, contents and microbial examination, either bacteriological or parasitological examination. The needle tip was inserted into the various locules of a multi loculated abscess for complete pus removal. Sonography was performed every 3 days and the size of the abscess (es) was recorded. Aspiration was repeated if there was either no clinical improvement or no reduction in size of the abscess cavity / cavities. Percutaneous needle aspiration was attempted to a maximum of three times. Lack of response to the third aspiration was considered failure of treatment (Zerem and Hadzic, 2007).

2-Open surgical group: under general anesthesia, Kocher incision was done and complete evacuation was done using suction. Appropriate sized neleton catheters were introduced into the abscess cavity. In patients with multiple abscesses, each abscess was drained with a separate catheter (for patients).

Aspiration was then performed with the catheter until no more pus could be removed. When catheter out put had stopped for 24 hours, a follow-up sonography was performed. If an abscess cavity was absent, the catheter was removed. If a residual cavity was present, the catheter was flushed with saline and aspirated until the return was clear. Further sonography was performed 3 days later and the catheter was removed if the catheter had remained unproductive. Otherwise, the catheter was left in situ until catheter output had stopped. A final

sonogram was performed 2 weeks later to exclude recurrence.

All patients had received Antibiotics therapy in form of intravenous cefuroxime and metronidazole, the antibiotics therapy was adjusted according to the results of culture and sensitivity test of pus aspirated at the time of the drainage procedure.

The patient's outcomes, including the duration of hospital stay, procedure related complications and treatment fail lire were recorded. Criteria of failure include: persistence of clinical presentation (fever, pain, tenderness), leucocytosis ,reaccumulation of pus by sonography . The patients were discharged from hospital when the infection had subsided clinically and there was sonographic evidence of abscess resolution such as disappearance of abscess cavity or static or decrease in size of abscess cavity. After wards, the patients were followed up in the out patients clinic every 2 weeks until complete resolution (disappearance of abscess on imaging without evidence of recurrence) (Zerem and Hadzic, 2007).

RESULTS

Between March 2003 and May 2006. 60 patients were diagnosed to have liver abscess (es), were randomized in two groups according to the method of management either aspiration under ultrasonic guide or open surgical drainage. Bach group contained 30 patients: the age of patients ranged from 14-65 years for both groups with the mean age was 35.6 years. 49 patients were males and 1 1 were females .

The clinical characteristics and laboratory results of the 60 patients were recorded. Features such as incidence of fever, chills and rigors, incidence of right upper quadrant abdominal pain or epigastric pain, incidence of leucocytosis, hyper bilirubinaemia. serum le\el of alkaline phosphates Prothrombin lime and concentration. There was no statistically significant difference between the two groups identified in any of these items table (1).

There was no statistical difference in abscess characteristics in both groups including

the size of abscess, the number of abscesses in each patient, the morphology or loculation of abscess. Table (1).

In both groups 21 patients were diagnosed as having amebic, 20 patients were pyogenic and 19 could not be diagnosed definitely (Intermediate group) table (3)

The number of aspirations required in the needle aspiration group was once in 12 patients (40%), twice in 10 patients (33%) and three times in 8 patients (27%). The second aspiration was done 2-5 days later due to persistence of fever and leucocytosis or reaccumulation of the abscess as shown by the follow up sonography., Percutaneous aspiration was considered unsuccessful in 6 patients (20%) because they failed to improve clinically (persistence of fever and local signs and symptoms) or radiologically on imaging even after a third aspiration, needle aspiration failed to completely evacuate the abscess cavity because of the thick nature of pus and rapid reaccumulation in the abscess cavity

was seen in all 6 patients 3-5 days after the third aspiration.

Subsequently all of these 6 patients were successfully treated with open surgical drainage. Table (2).

Open surgical drainage was successful (the patients improved clinically , elevated leukocyte counts were normalized and follow up imaging showed reduction of the abscess size) in all 30 patients (100%), in most patients, duration of catheter drainage varied from 3 to 12 days (average 5 days). The duration was prolonged 21 days in only one patient where cavito-gram revealed biliary communication table (2), the average time needed for clinical relief and mean hospital stay for the successfully treated patients was similar in the two treated groups.

No major complications were encountered, 5 patients (4 in the open surgical group and 1 in the aspiration group) had minor complications as pain, pericatheter leakage and wound infection.

Table (1): Clinical, laboratory, and sonographic data

	No. of patients	
	Aspiration group	Open drainage group
Clinical presentation		
Fever	27	26
Chills & rigors,	21	19
Epigastric & upper abdominal, pain	16	17
Laboratory data		
Leucocytosis > 11 x 10 ⁹ /L	27	24
Bilirubin level > 17 Umol/l	7	9
Alkaline phosphatase > 129 U/L	3	>1
Prothrombin time > 12 seconds	6	8
Sonographic findings		
Number of abscesses	38	47
Solitary	24	21
Multiple	6	9
Site of abscesses		
Right lobe	21	22
Left lobe	4	4
Both lobes	5	4
Size of abscesses	6 + 201 cm	7 ± 201 cm(SD)

DISCUSSION

In recent years, imaging-guided percutaneous treatment (needle aspiration or catheter drainage) has replaced surgical intervention as the primary treatment for liver abscesses (Giorgio et al., 2006). The main advantages of needle aspiration over open surgical drainage include the following. Needle aspiration is less invasive and less expensive, it avoids problems related to follow up catheter care and wound care, so less medical or nursing care is required, and multiple cavities can be aspirated in the same session (Gerzof et al., 1995).

This study was a prospective randomized trial comparing intermittent needle aspiration and open surgical drainage in the treatment outcome of liver abscess. There was no statistically significant difference between the two groups in patient demographics, abscess characteristics, clinical presentation and laboratory tests, indicating that the extent of abscess and the severity of infection at the time of admission were similar in both groups.

However as our study shows, needle aspiration if limited to three attempts has a significantly lower success rate than open surgical drainage (80% versus 100%). The success rate of percutaneous needle aspiration in the various series reported in literature varies from 79% to 100% (Chung et al., 2007; Zerem and Hadzic, 2007),

A higher success rate would likely have been achieved if multiple repeated aspirations were attempted. However subjecting the patients to multiple needle aspiration over a short period varying from 5 to 14 days is a traumatic and unpleasant experience for the patients and may not be acceptable to many. Moreover, even multiple attempts do not guarantee a 100% cure rate. Giorgio et al., (2006). For these reasons we preferred to subject the patients to open surgical drainage after failure of the third aspiration, which occurred in 6 patients.

The large abscesses are more difficult to evacuate completely in one attempt, necessitating repeated aspirations. The average volume of abscesses in the 6 patients in whom percutaneous needle aspiration was unsuccessful was significantly larger than the average volume of the abscesses in the other patients who responded to aspirations.

One important reason for failure of needle aspiration is the inability to completely evacuate the thick viscous pus that may be present in some of the abscesses (Giorgio et al., 2003). This pus was seen in 6 of our patients. Rapid reaccumulation of the abscess after needle aspiration is another problem, as described by Dietrick, 2000 and was seen in 18 of our patients after first aspiration and 8 patients after second aspiration and in 6 patients after the third one with no obvious predisposing factor and the continuing inflammatory process itself probably contributed to the reaccumulation of fluid.

On the other hand, open surgical drainage and placement of an indwelling catheter provides continuous drainage, hence, the problems of incomplete evacuation and reaccumulation are not associated with open surgical drainage, accounting for the high success rates of catheter drainage reported in most studies (Bertel et al., 2000 and also reported in our study where no recurrence was observed in any case during the follow up period.

In our study there was no significant difference in either the time taken for improvement or the duration of hospitalization among the patients successfully treated with either technique. This is in keeping with the findings of Bertel et al., (2000) and both treatment techniques resulted in rapid clinical relief, with most patients showing resolution of fever, local symptoms, and leucocytosis within 3 days of the procedure.

The time required for complete sonographic resolution of abscess cavities after percutaneous treatment ranged from 2 weeks to

9 months in the study of Singh and Kashyap, (1999) In fact, total resolution may not occur, and small residual cavities may persist for years. Such cavities are usually indistinguishable from simple hepatic cysts (Rails et al., 2003). Singh and Kashyap (1999) noted much faster and more complete resolution of abscess cavity after percutaneous catheter drainage than after percutaneous needle aspiration. However, the results of this study suggest that initial collapse of the abscess cavity is achieved earlier in patients undergoing open surgical drainage than in those undergoing needle aspirations (2-10 days versus 2-18 days), the time needed for total resolution of the abscesses was similar in the two groups. (3-11 weeks versus 3-10 weeks)

Minor complications have been reported with both groups (4 patients (13%)) in open drainage group and 2 patients (6.5%) in needle aspiration group.

Giorgio et al., (2003) described the much lower incidence of complications with percutaneous needle aspiration than with open surgical drainage as one of the major advantages of needle aspiration. However, our study and some recent reports suggest that both procedures, if properly performed, are essentially safe procedures with minimal complications (Baek et al., 2001).

In Conclusion: Although both percutaneous needle aspiration and open surgical drainage are safe methods for treatment of liver abscesses, open surgical drainage is more effective than needle aspiration, as if limited to two attempts, is associated with a high failure rate especially in large abscesses and in abscesses with thick pus. However, the results also indicate that needle aspiration with appropriate antimicrobial therapy will, in many patients, result in a cure. Among the successfully treated patients no significant difference exists in the time required for clinical improvement, the hospital stay, and the time needed for resolution of the abscess cavity in the two treatment groups.

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ما يزال خراج الكبد يشكل تحدياً في التشخيص والعلاج بالرغم من تقدم وسائل التشخيص والعلاج وقد أجريت هذه الدراسة بمقارنة استخدام الشفط تحت توجيه الأشعة التلفزيونية مقابل الفتح الجراحي في علاج مرضى خراج الكبد وأجريت هذه الدراسة على (٦٠) مريض بقسم الجراحة العامة بالمستشفى الجامعي بأسبوط (٤٩ ذكور ، ١١١ إناث) في مجموعتين : المجموعة الأولى شملت ثلاثين مريضاً تم علاجهم عن طريق الشفط تحت توجيه الأشعة التلفزيونية وكانت نسبة النجاح ٨٠% بعد إجراء الشفط ثلاث مرات ، المجموعة الثانية وشملت ٣٠ مريض وتم علاجهم عن طريق الفتح الجراحي وكانت نسبة النجاح ١٠٠% مما يثبت فاعلية الفتح الجراحي في علاج مرضى خراج الكبد.