Research Paper

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A Comparative Study Between Needle Aspiration and Pigtail Drainage in 50 Cases of Liver Abscess

Medical Science

KEYWORDS :

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INTRODUCTION

Liver abscess is a life threatening disease. The classic presentation of fever, right upper quadrant pain and tender hepatomegaly is unusual. The frequency of any particular symptoms varies widely among reports. Management of liver abscess was exclusively surgical in past. Modern treatment has shifted toward iv broad spectrum antibiotics and imaging guided percutaneous needle aspiration or percutaneous catheter drainage. Percutaneous pigtail catheterization reduces chances of exploration by surgery for liver abscess. Surgical intervention is only indicated for ruptured liver abscess, multiple lesions that cannot be effectively managed percutaneously and abscesses that do not respond to less invasive methods.

The advantage of sonographic over CT guidance is that sonography is a real time imaging technique that allows monitoring of the course of the needles and catheters as they traverse tissues. CT usually is associated with longer procedure times because it is necessary to scan the region of interest every time for confirmation of catheter.

Continuous catheter drainage is widely accepted and in combination with antibiotics is considered a safe and effective method of management of liver abscess. Some authors prefer repeated needle aspiration, considering it as effective and safe as PCD (Percutaneous Catheter Drainage) but easy to perform, less complicated, less risky for post procedure septicaemia and less expensive. This approach requires careful follow-up and often repeated imaging procedures to monitor response to therapy.

A review of 50 patient with liver abscess treated at civil hospital of ahmedabad over a Two and half year(june2009-december2011) period was undertaken who were managed by percutaneous pigtail catheterization or percutaneous repeated needle aspiration along with others supportive measures.

METHODS & MATERIALS

METHODS:

- This is an observational study of patients with pigtail catheter drainage and needle aspiration in liver abscess treated during the period of June 2009 to december 2011 at Civil Hospital, Ahmedabad.
- Data was collected in a predesigned proforma .
- In my study, i have taken 50 cases of liver abscess. They were treated either by usg guided pigtail catheter drainage or by usg guided needle aspiration.

- **Inclusion criteria:**

1. Large sized liquefied or partially liquefied liver abscesses (> or = 5 cm diameter).
2. Single abscess or with multiple communicating abscesses.
3. Uniloculated abscess

Exclusion criteria:

1. Multiple abscesses and ascites.
2. A known intra-abdominal source that requires surgery.
3. Multiloculated or septate abscess.
4. Coagulopthy.

SUBJECTS*:*

All patients with liver abscess who were admitted to our hospital between June 2009 and December 2011 were considered candidates for the study. A patient was randomized for aspiration and pigtail drainage if he or she had symptoms and signs of liver abscess and if liver abscess was confirmed at Sonographic or CT examination. Patients had begun intravenous antibiotic treatment with amikacin 500 mg 12 hourly, ceftriaxone 1 gm iv 8 hourly, and metronidazole 500 mg 8 hourly.

Informed consent was obtained from all participating patients. Fifty patients fitting the inclusion criteria were randomly allocated to two percutaneous intervention groups, for either continuous catheter drainage or intermittent needle aspiration.

Antibiotics Policy:

At presentation all patients had been treated with intravenous ceftriaxone, amikacin and metronidazole. Percutaneous treatment was performed within 24 hours after admission in case of liquefied abscess. In case of partially liquefied abscess initially 3 day iv antibiotics given and reassess with follow up usg, if usg suggest that abscess is liquefied then percutaneous intervention done otherwise antibiotics continue and again reassess. Immediately after catheter or needle placement into the abscess cavity, pus was obtained from all 50 patients. The antibiotics therapy was adjusted according to the results of culture and sensitivity test of pus aspirated at the time of the drainage procedure. Patients with negative culture results were continuously treated with a combination of ceftriaxone, amikacin and metronidazole. The antibiotic regime was changed for patients with poor treatment response. Intravenous antibiotic therapy was continued for a minimum of 7 days and until fever had subsided for at least 48 hours. The patients were then put on the appropriate oral antibiotics for a total treatment period of 4 to 6 weeks.

Intervention:

All percutaneous interventions were performed under ultrasound guidance. A free-hand technique using 16G pilot needle or special liver abscess aspiration needle which has long length (15–20 cm) was employed for puncturing the abscesses. A sample of pus was routinely taken and sent for microbiological analysis including microscopy, culture, and antibiotic sensitivity tests.

Continuous Catheter Drainage*:*

In drainage technique, an 8-14 French multiple-sidehole pigtail catheter introduced into the abscess cavity by seldinger technique. The procedure was performed with local anaesthesia with the patient supine or left lateral position. Careful localization of the abscess and proper selection of the entry site were required. The optimal route of access traversed the least possi-

ble amount of liver tissue and avoided bowel and pleura. Aspiration was then performed with the catheter until no more pus could be removed. After that irrigation done with normal saline and again pus was aspirated, if no more pus could be drain then catheter was secured to the skin for continuous external drainage and the patient was sent back to the ward. When catheter output 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. Residual loculations of abscess were treated with catheter repositioning and aspiration. Further sonography was performed 3 days later and the catheter was removed if the catheter had remained unproductive or there is no residual collection. Otherwise, the catheter was left in situ until catheter output had stopped.

Sonography was repeated every 3 days initially in first week and then weekly for first month and then monthly until the cavity had either disappeared or had shown reduction or stasis in size with clinical recovery.

Intermittent Needle Aspiration:

Complete evacuation of pus from cavity was attempted with the 16G pilot needle. The needle tip was inserted into the various locules in case of a multiloculated abscess for complete pus removal. Sonography was performed every 3 days and the size of the abscess was recorded. Aspiration was repeated if there is a residual collection in follow up usg. Repeated aspiration was attempted a maximum of 3 times for each patient. If lack of response to a third aspiration attempt was considered failure of treatment. Sonography was repeated every 3 days initially in first week and the weekly for first month and then monthly until the cavity had either disappeared or had shown reduction or stasis in size with clinical recovery.

Patient Follow-up and Outcome:

All patients underwent clinical follow-up and monitoring during daily rounds until they were discharged from the hospital. Follow-up sonography was performed 24 hours after intervention and repeated every 3 days in first week and the size of the abscess was recorded. Criteria for successful treatment were clinical subsidence of infection and sonographic evidence of abscess resolution, such as disappearance or marked decrease in the abscess cavity (more than 50% reduction of longest diameter before treatment). After discharge from the hospital, patients underwent follow-up evaluations in the outpatient clinic at least once a week during treatment and biweekly until 6 months from the beginning of the treatment. Patients discharged with a catheter underwent follow up sonography until there was no catheter output for 24 hours, and then the catheter was removed. Patient outcome, including length of hospital stay, complications related to the procedure, and treatment failure and death were recorded.

MATERIALS:

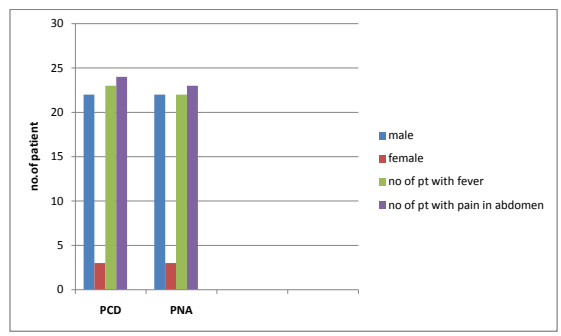
- A predesigned proforma [attached]
- Reference surgical textbooks.
- Journals and publications available in college library as well as on internet for comparisons and references.

OBSERVATIONS

Between June 2009 and December 2011, all patients of liver abscess assessed for eligibility for participation in the study. Out of this 50 patients to be randomized into the two percutaneous treatment groups. None was lost to follow-up or had their treatment discontinued. Some patients were diagnosed liver abscess with malignant disease of biliary tract and liver abscess with ascites which was excluded from study. The 50 patients included in the study were diagnosed to have liver abscess, commenced on ceftriaxone amikacin and metronidazole. Twenty five patients were randomized into each of the catheter drainage and needle aspiration groups.

Characteristic	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n=25)
Age (years)	48	47
Sex		
Male	22	22
Female	3	3

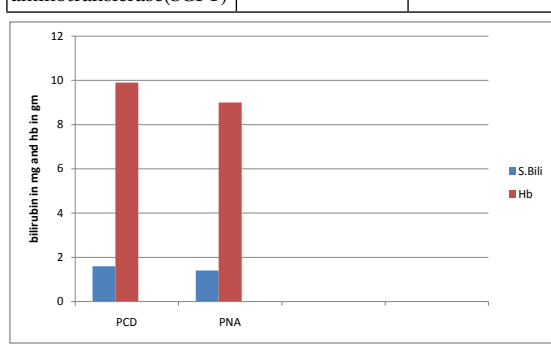
There was no statistically significant difference in patient demographics of the two groups. The clinical characteristics and laboratory results of the 50 patients were studied. Features such as incidence of fever, incidence of epigastric or right upper quadrant abdominal pain, and incidence of others symptoms were analysed. There was no statistically significant difference between the two groups identified in symptomatology.



DEMOGRAPHIC DATA

Symptomatology	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Fever	23	21
Abdominal pain	24	23
Malaise	13	10
Nausea/vomiting	10	8
Diarrhoea	9	7
Cough	5	3
Anorexia & weight loss	8	6

Investigations	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Haemoglobin(gm/dl)	9.9(7-13.7)	9(7.7-13)
WBC count	12670(7890-24000)	12345(7700-22000)
Totol bilirubin	1.6(0.4-7.7)	1.4(0.5-6.5)
S.alkaline phophatase	218(80-650)	200(88-560)
S.alanine aminotransferase(SGPT)	45.7(25-1020	45.6(25-110)



AVERAGE BILIRUBIN AND HB

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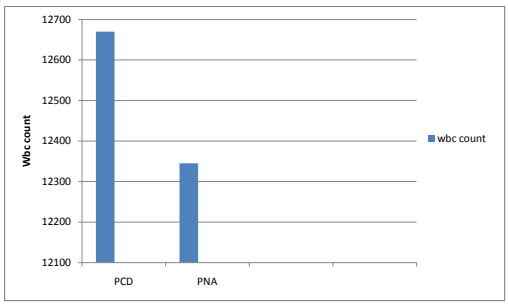
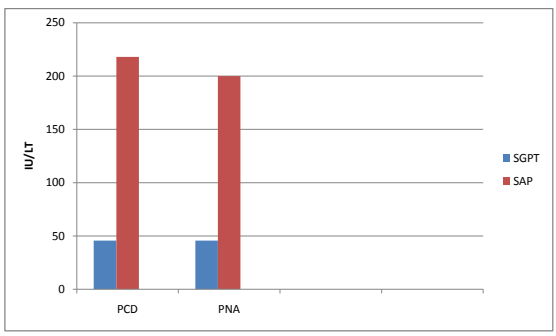
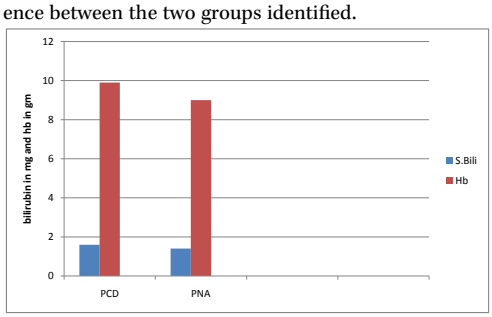


AVERAGE WBC COUNT

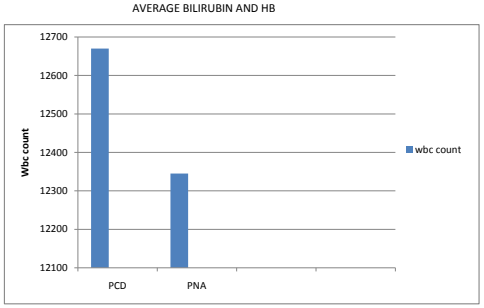


SGPT AND SAP

Incidence of leukocytosis, incidence of bilirubin level and serum level of alkaline phosphatase, which is commonly elevated in patients with liver abscess and prothrombin time and haemoglobin level were analyzed. There was no statistically significant difference between the two groups identified.



AVERAGE BILIRUBIN AND HB



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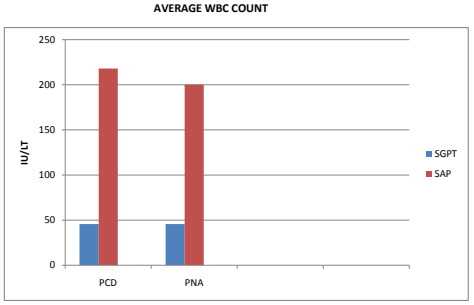


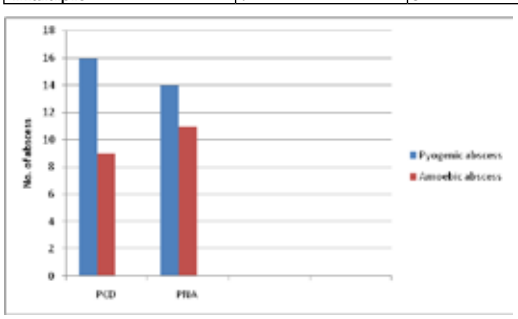
SGPT AND SAP

In both groups type of abscess are also comparable. In PCD group amoebic abscess is present in 9 patient and pyogenic in 16 patient. In PNA group amoebic abscess is present in 11 patient and pyogenic in 14 patient.

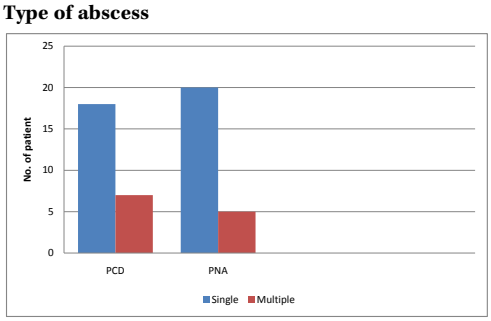
Type of liver abscess	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Pyogenic abscess	16	14
Amoebic abscess	9	11

Frank pus was yielded from the abscesses in all 50 patients. There was no statistical difference in abscess characteristics in the two groups, including the size of abscess, site of abscess, amount of pus drain and the number of abscess in each patient and the morphology of abscess.

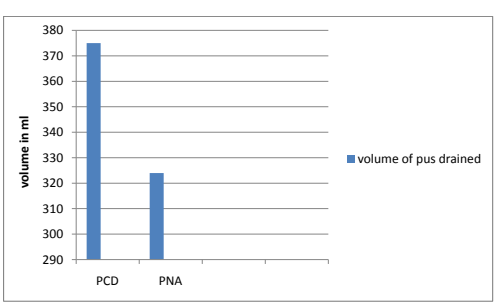
Characteristic	Percutaneous catheter drainage(n=25)	Percutaneous needle aspiration(n=25)
Average Diameter of abscess(mm)	97 x 82 mm	96 x 84 mm
Average Volume of pus drained	375ml(210-760)	324ml(150-750)
Site of abscess	25	25
Right lobe	18	18
Left lobe	2	3
Both	5	4
No of abscess	25	25
Single	18	20
Multiple	7	5



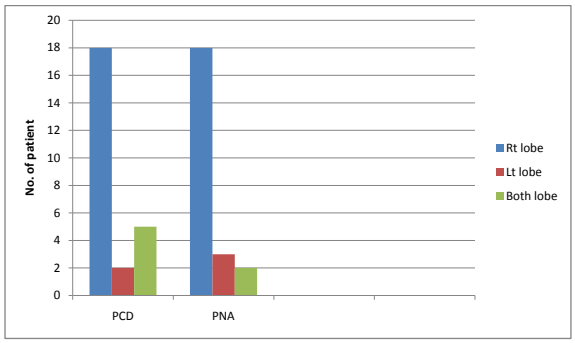
Type of abscess



NO. OF ABSCESS



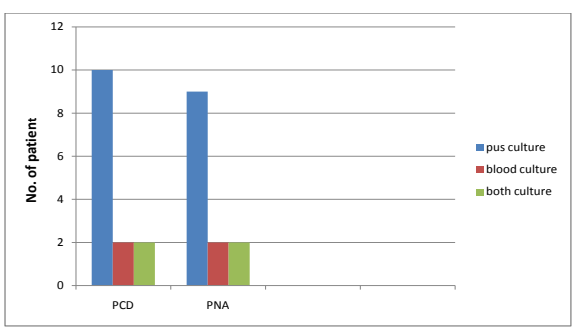
AVERAGE VOLUME OF PUS DRAIN



SITE OF ABSCESS IN LIVER

Number of pus culture and blood culture positive in both group is approximately same. No major procedure related complications were encountered. Two patient in PCD and four patient in PNA develop haemorrhage. Only in one patient catheter dislodgement seen in PCD group. A pericatheter leak developed in one patient because of blockage of the catheter with debris; the leak stopped after flushing of the catheter with sterile saline.

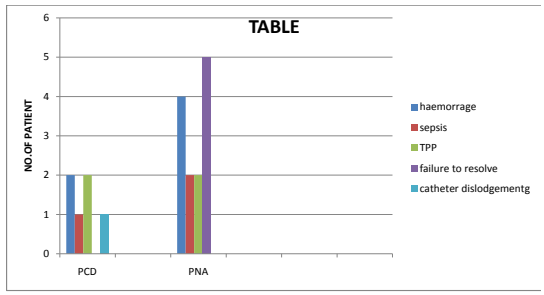
Microbiological data	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Pus culture positive	10	9
Blood culture positive	2	2
Both positive	2	2



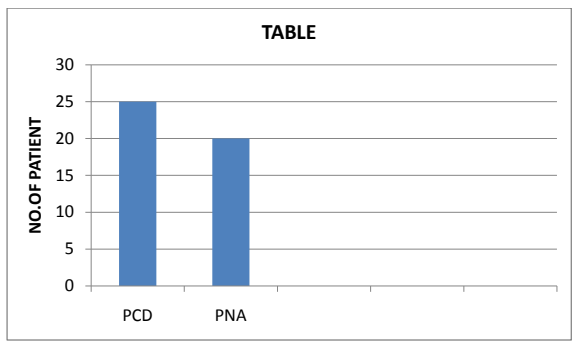
MICROBIOLOGICAL DATA

The number of aspirations required in the needle aspiration group was once in 6 patients (24%), twice in 7 patients (28%), and three times in 7 patients (28%) and more than three time in 5 patients. The number of pigtail insertion in PCD groups was once in 21 patients(84%) and twice in 4 patients(16%).

Complications of procedure	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Haemorrhage	2	4
Transpleural puncture	2	2
Sepsis	1	2
Failure to resolve	0	5
Catheter dislodgement	1	0



COMPLICATIONS



SUCESS RATE

Parameter	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Success rate	25/25	20/25
First procedure	21	6
Second procedure	4	7
Third procedure	0	7
More then three procedure	0	5
Time needed for >50% reduction in abscess cavity	5-14 day(7.32day)	3-14 day(6.76day)
Time need for total or near total reduction in abscess cavity	14-60 day(27.08day)	7-60 day(24.16day)

Among the successfully treated patients, the average time needed for clinical relief and mean hospital stays were similar in the two treatment. Although the time needed for reduction of the abscess cavity to 50% of its original size was similar in both group, in PCD (5-14day) and in PNA (3-14day). The average time taken for total or near total resolution of the abscess was in PCD is 14-60 day and in PNA is 7- 60day . So it is similar in both groups of the patients.

Number of patients treated successfully by PCD is 100 % (25/25) and by PNA is 80% (20/25). There were five treatment failure in aspiration group because pus is thick which cannot be adequately aspirable with needle so they failed to improve clinically or radiologically even after a third aspiration. This failure is more seen in amoebic group as pus in amoebic abscess is very thick so it is not easily aspirable by needle aspiration.

Parameter	Percutaneous Catheter Drainage (n = 25)	Percutaneous Neddle aspiration (n =25)
Total hospital stay(day)	7-20 day(14day)	5-28 day(13.44day)
Mortality	0	0
Recurrence	0	0

The total duration of hospital stay for each patient in the catheter drainage group ranged from 7–20 days, with an average of 13.5 days and the total duration of hospital stay in needle aspiration group is 5- 28 day, with average of 16.5 day No recurrence was documented on clinical and sonographic examination during follow-up.

Discussion

Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in the tropical countries. Patients usually present late when the liver abscess attains a large size. Percutaneous drainage (either needle aspiration or catheter drainage) with systemic antibiotics has become the preferred treatment for the management of liver abscesses. In contrast, for amoebic abscesses, the primary mode of treatment is medical; however, as many as 15% of these may be refractory to medical therapy, while 20% may be complicated by secondary bacterial infection. Such amoebic abscesses and those involving left lobe, or those with impending rupture also need to be drained.

Surgical drainage is now used only in cases which fail to respond to percutaneous drainage. Although, PCD is a preferred method most widely used to drain liver abscesses, recent studies have shown PNA to be simpler, less costly, and equally effective.

Usually needle aspiration is preferred for smaller abscesses and catheter drainage is done in larger ones. But no clear cut guidelines have been laid. Three previous prospective randomized studies have compared PNA with PCD. All these studies included abscesses of all sizes. Yu *et al,* included only pyogenic abscesses and showed no significant difference between the two techniques. Rajak *et al* found that catheter drainage was better terms of success rate, but they limited the number of aspirations to two which may be a reason for lower success rate of percutaneous aspiration. Zerem and Hadzic included 60 patients of PLA only, and found PCD to be more efficacious. They recommended PNA for simple abscesses of 5 cm or smaller in size. We compared these two treatment options, exclusively in liver abscesses.

Few reports suggest that the initial size of the abscess cavity does not affect the final outcome, while Rajak *et al* believed that large abscesses are more difficult to evacuate completely in a single attempt. This may be the reason, why many centers prefer PNA for abscesses <5 cm, and PCD for larger abscesses. In our study also PNA failed in larger abscess and also in amoebic abscess as pus in amoebic abscess is thick. Both these techniques have certain disadvantages. Multiple attempts of PNA needed for large abscesses may be uncomfortable and perceived as more traumatic by patient Also, during the period between two aspirations pus may get re-accumulated. For smaller abscesses, daily production of pus may be small, but a larger abscess cavity may produce larger quantity of pus, which needs to be drained continuously. PCD has this obvious advantage over PNA, which may have accounted for quicker clinical recovery, lesser duration of parenteral antibiotics and lesser failure rate among patients treated with PCD. On the other hand, placing a catheter needs more expertise followed by nursing care. At 6 months follow up, complete resolution of abscess cavity on USG occurred in all patients in both group. Singh and Kashyap also reported faster and more complete resolution of abscess cavities after PCD, while Rajak *et al* found that the time needed for total resolution is similar after PCD and PNA. Thus PCD and PNA are equally effective in the management of large liver abscesses.

Rajak et al. did randomize 50 patients with liver abscess into a needle aspiration group and a catheter drainage group and showed a significantly higher success rate in the catheter drainage group. Most previous reports have been retrospective analysis of data collected over 2–13 years and the sample sizes have typically ranged from 15-115. A sample size of 50 from two and half year of data collection would seem reasonable. There was no procedure related complication such as hemorrhage of any degree of severity, or septicemia, in either group of patients. No statistically significant difference was seen in the main procedure outcome measures in either group of patients. Different authors tended to have favored either continuous catheter drainage or intermittent needle aspiration, while others left the choice of drainage method to the radiologists who performed the procedure. Our institution and others have advocated the use of intermittent aspiration in combination with intravenous antibiotics as the first-line treatment for small liver abscesses, and catheter drainage in large liver abscess and catheter drainage in amoebic abscess those which are refractory to medical management. The current study adds further support to this management strategy. There was no statistically significant difference between the two groups. Theoretically speaking, it would of course be ideal to recruit a large enough population to detect small differences that may exist between the two technique. The result of the present study suggests that both techniques are probably equally effective and safe and further implies that it is justifiable to undertake a multicenter study on the subject to provide a definitive answer. The main disadvantage of the needle aspiration technique is that multiple sessions may be required, but even the use of continuous catheter drainage does not guarantee a single session successful outcome. The current study and our previous work have shown no significant increase in morbidity or mortality from the repeated aspiration sessions.

REFERENCE

- The current study represents an attempt to compare continuous catheter drainage and intermittent needle aspiration in the treatment of liver abscesses in a two and half year prospective randomized trial. | - No significant difference has been demonstrated between the two groups in terms of duration of hospital stay, morbidity, or mortality. | - Both procedures are probably equally effective and safe. | - Meanwhile, as the intermittent needle aspiration technique is easier, simpler, less time-consuming, and less expensive. | -Common symptoms of liver abscess is fever and abdominal pain. | - The main disadvantage of the needle aspiration technique is that multiple sessions may be required. | -Intermittent needle aspiration considered as first line management of small liver abscess. | -Percutaneous pigtail catheter drainage is more effective in large liver abscess. | -Pigtail catheter drainage is also more effective in amoebic liver abscess. | |