



## Original Article

### PIGTAIL CATHETER IN THE MANAGEMENT OF LIVER ABSCESS

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#### Abstract

**Background:** Liver abscess is a common condition in the rural population of our country due to overcrowding and poor hygiene. Though conservative treatment plays a major role, refractory patients can be successfully treated with minimally invasive approach.

**Objectives:** To evaluate the prospect of sono-guided percutaneous catheter drainage for liver abscess patients not responding to conservative treatment.

**Methods:** It is a prospective study carried out at Dhaka Medical College and Hospital during the period January 2005 to June 2006 among patients with liver abscess that were admitted in different surgery and medicine units. A total of 35 patients concluded the sample. Evaluation of the patients was based on history, physical examination and relevant investigations. Sono-guided percutaneous catheter was introduced and patients were followed up for two weeks.

**Results:** In our study 35 patients underwent pigtail catheter drainage that were refractory to conservative treatment or needle aspiration. During the time of the procedure, 22 patients were having high fever; rest 13 patients were in an afebrile state. Many of the patients had history of weight loss, anorexia, nausea, vomiting and upper abdominal pain. Following insertion of catheter patients who were pyrexia, fever subsided in two to three days and never back during the postoperative period and follow up. Antimicrobials were changed according to the report of the culture and sensitivity of the aspirate that was done routinely. Out of the rest 13 patients, who were in an afebrile state and their abscess cavity did not reduce in size despite drug treatment and needle aspiration, improved significantly following catheterization. Follow up Ultrasonography showed reduction of the size of the abscess cavity with no or little collection, the abscess was in the resolving state and the patient began to feel better.

**Conclusions:** With a very low morbidity and zero mortality rate, minimum treatment costs and early return to regular life style proved this minimally invasive procedure to be a rational treatment option for liver abscess (>5 cm).

**Key words:** Pig tail catheter, Liver abscess, Entamoeba histolytica.

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#### Introduction

Both amoebic and pyogenic liver abscesses continue to be an important cause of morbidity and mortality in the tropics. The WHO estimates that *Entamoeba histolytica* causes 50 million cases and 100,000 deaths annually, making this disease the second leading cause of death from protozoal diseases<sup>1-4</sup>.



Although infection with *Entamoeba histolytica* occurs world-wide, yet, liver abscess is the most common extraintestinal complication in 3% to 9% of patients<sup>1-8</sup>. Diagnosis of amoebic liver abscess is usually straightforward on the basis of the clinical, epidemiological, serological and ultrasonographic findings.

Although the primary mode of treatment of liver abscesses is medical, 15% of abscesses may be refractory to medical therapy<sup>9,10</sup>. Also, polymicrobial etiology may complicate up to 20% of liver abscesses; and hence conservative therapy may not be adequate for many patients with liver abscesses<sup>11</sup>. Image guided percutaneous drainage is now considered the treatment of choice for most intra-abdominal abscesses.



**Fig.-1:** Tip of a pig tail catheter

It is a self retaining 'J' ended catheter of different caliber (12 FG, 14 FG or 16 FG). It is commercially available in a complete set and sterile pack. Single use and sterile precautions assure its asepsis. Continuous drainage of the abscess is imperative for its wide acceptance. Patients can perform their activities of daily living with the catheter in situ. Drainage of the abscess cavity and subsequent clinical improvement can be followed regularly.

The aim of our study was to evaluate the prospect of image-guided percutaneous catheter drainage for liver abscess patients not responding to conservative treatment in our context.

### Methods

This observational study was carried out in DMCH between January 2005 to June 2006 where purposive sampling technique was done. Patients with liver abscess of more than 5cm refractory to conservative treatment were included. Pregnancy, presence of multiple abscesses and abscess in left lobe were the

exclusion criteria. LFTs with other baseline investigations were done to evaluate the general condition of the patients. Computed tomography of the upper abdomen was done in one case only because of difficulty in identifying the origin of the mass lesion.

The procedure was performed at the department of radiology in the intervention room under Ultrasonographic guidance. A consultant sonologist was always consulted before the day of the procedure for sonographic guidance. The sonologist was there for locating the abscess cavity, measurements (size of the cavity and distance of the cavity from the skin from the safest point), number of abscess cavity and direction of the puncture.

The skin puncture site was marked initially with a marker pen. Skin was then prepared with antiseptic solutions (Chlorhexidine, Povidone iodine). Sterile drapping sheet was placed around the operation field; the puncture site was then infiltrated with 2% Lignocaine injection up to the parietal peritoneum (if possible). Adequate time for anaesthesia was given. Instruments were already displayed in a sterile bowl by the assistant. Abscess was localized by Ultrasonography and a safe drainage route planned to avoid the bowels, costophrenic recess, major vessels and vital organs. Catheter drainage was performed using the Seldinger technique as a joint effort between the surgeon and the radiologist. A 4mm stab incision was made with a no.11 BP blade through



**Fig.-2:** The guide wire is being withdrawn keeping the catheter in situ

which an 18G guide wire introducer needle (with concentric trocar and canula inside, both of 20G) was passed under sonographic guidance till it reached the centre of the abscess cavity. A J-tip guide wire (Cordis 0.038, Johnson and Johnson) was then introduced



through the needle and positioned inside the cavity following which the needle was removed keeping the guide wire in situ. Serial concentric dilators (Devon Ltd.) were then passed over the wire to dilate the tract. The tract was dilated adequately depending upon the viscosity of the pus and the caliber of the pigtail catheter. A pigtail catheter of size smaller than the last dilator was passed over the guide wire and positioned in the centre of the abscess cavity under sonographic guidance.

The guide wire was then withdrawn and the pigtail catheter was connected to a closed drainage bag and fixed to the skin with a silk suture. Sterile dressing was applied. The pus was sent for aerobic culture.

The daily output was monitored. The catheter was flushed daily with 10ml of normal saline to prevent its blockage with debris. Metronidazole and Ciprofloxacin were given in therapeutic doses for a period of 2-4 weeks. Weekly ultrasonography studies were done to monitor the cavity size and volume and to confirm the position of tip of the catheter. Clinical improvement of the patients' condition was noted.



**Fig.-3:** Pus is being aspirated by way of a tri-channel connector

The pigtail catheter was removed when drainage become serous and it either ceased or was minimal (<10ml in 24 hours) and ultrasonography was suggestive of reduced size / collapsed cavity without any residual pus. On removal of the catheter, sterile dressings were applied. All patients were called for monthly follow up and assessed clinically and ultrasonographically.

## Results

**Table-I**  
*Demographic data; n(%)*

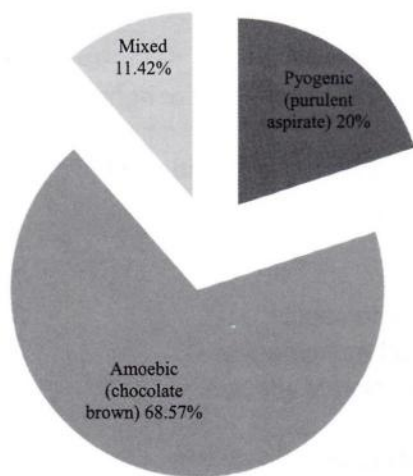
Age (years)	40±3.3
Male	31/(88.57)
Female	4/(11.42)
<b>Residence</b>	
Rural	28/(80.0)
Urban	7/(20.0)
<b>Socio economic status</b>	
Upper class	1/(2.85)
Middle class	9/(25.71)
Lower class	25/(71.42)

**Table-II**  
*Clinical features*

Clinical features	n (%)
<b>Symptoms</b>	
Fever, history of fever	29/(82.85)
Pain or discomfort in the upper abdomen	27/(77.14)
Loss of appetite	16/(45.71)
Weight loss	26/(74.28)
Nausea	6/(17.140)
Vomiting	5/(14.28)
Loose motion, history of loose motion	3/(8.57)
Cough	2/(5.71)
Malaise	9/(25.71)
Weakness	15/(42.85)
Rigor	2/(5.71)
Respiratory distress	1/(2.85)
Pain in the right lower chest or right shoulder	6/(17.14)
Yellow colouration of skin and urine	3/(8.57)
Leg swelling	9/(25.71)
<b>Signs</b>	
Pyrexia	22/(62.85)
Tender hepatomegaly	27/(77.14)
Non-tender hepatomegaly	1/(2.85)
Right sided pleural effusion	10/(28.57)
Jaundice	5/(14.28)
Intercostal bulging	4/(11.42)
Ascites	2/(5.71)
Anaemia	15/(42.85)

**Table-III**  
*Laboratory findings*

Baseline investigations	n(%)
Haemoglobin	
>13	3/(8.57)
8 – 13	26/(74.28)
<8	6/(17.14)
ESR (mm in first hour)	
>100 mm	26/(74.28)
<100 mm	9/(25.71)
Serum bilirubin (mg/dl)	
< 2	23/(65.71)
2 – 5	9/(25.71)
>5	3/(8.57)
Serum albumin (gm/L)	
>35	14/(40.0)
<35	21/(60.0)
Liverfunction tests	
Within normal range	18/(51.42)
Slightly raised	13/(37.14)
Moderately raised	4/(11.42)
Raised right dome of diaphragm	27/(77.14)
Elevated left dome of diaphragm	3/(8.75)
Right sided pleural effusion	10/(28.57)
Bilateral pleural effusion	2/(5.71)
Normal findings	3/(8.57)
Single cavity in the right lobe	26/(74.28)
Single cavity in the left lobe	2/(5.71)
More than one cavity in the right lobe	3/(8.57)
Cavity in both lobes	3/(8.57)
Size of the abscess cavity	
<5 cm	0/(0)
5 – 10 cm	14/(40.0)
>10 cm	18/(51.42)

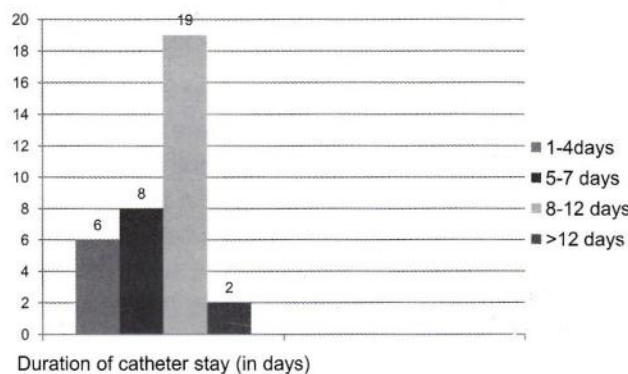


**Fig. I:** *Distribution of liver abscesses according to aspirate characteristics.*

**Table IV**  
*Post drainage variable*

Total Amount of pus drained (ml)	n(%)
100 – 500	18(51.42)
501 – 1000	13(37.24)
>1000	4(11.42)

Maximum total (4300 ml) amount of pus was drained in a patient with a huge sized liver abscess situated posteriorly in the right lobe. Average duration of catheter drainage in our series was 8 days.



**Fig-II:** *Duration of catheter stay (in days)*

**Table V**  
*Complications following catheter drainage*

Complications	n(%)
Pain	35/(100)
Bile mixed pus	6/(17.14)
Fresh blood in the drainage catheter	1/(2.85)
Vasovagal shock	1/(2.85)
Peritoneal spillage of abscess contents	1/(2.85)
Minor wound infection	1/(2.85)
Recurrent fever	1/(2.85)

(Value in the parentheses represents % of samples affected in the study)

**Discussion**

Amoebic liver abscess arises from the hematogenous spread of the trophozoites of *Entameba histolytica* from the intestinal mucosa to the liver through the portal vein. The disease is suspected in endemic areas in persons presenting with fever, pain abdomen and liver tenderness<sup>7, 12, 13</sup>. Compared to pyogenic liver abscesses, patients with amoebic abscesses are often younger, more acutely ill with fever and right



upper quadrant pain, and are usually from high prevalence areas<sup>12,13</sup>. The mean age of our patients with amoebic liver abscess was 40 years and was comparable to other studies<sup>12</sup>. The frequency of fever and pain abdomen is 67-87% and 62-94% of patients with amoebic liver abscess respectively in different series<sup>14</sup>. In our study, these two symptoms of fever and pain abdomen occurred in 82.85% and 77.14% respectively. From India, Sharma et al.<sup>8</sup> in a study of 70 cases of amoebic liver abscess found hepatomegaly in 84%, pleural effusion in 10% and ascites in 4% cases. Accordingly, hepatomegaly (77.14%) was a predominant feature of amoebic liver abscess in our study. In our study, pleural effusion was seen in 28.57% and ascites in 5.71% cases respectively.

From India, earlier series showed jaundice in 45%-50% of cases of amoebic liver abscess, but, after the advent of invasive catheter drainage, coupled with effective anti-amoebic therapy, it has become less common<sup>12,13</sup>. Jaundice occurred in 14.28% cases in our study. The pathophysiology of jaundice remains controversial and various explanations of jaundice are; pressure of abscess cavity on hepatic ducts<sup>15-18</sup> and cholestasis<sup>19-21</sup>. Recently, in 12 cases of amoebic liver abscess with jaundice, the formation of a bilio-vascular fistula was seen<sup>22</sup>. Duration of symptoms longer than 2 weeks is seen in 14% - 41% in different series<sup>12</sup>. In this study, 84% presented within 2 weeks and mild elevations of serum transaminases was seen in 19.8% cases. In our study, duration of symptoms less than 2 weeks was evident in 48% cases and raised liver enzymes more than 3 times the normal occurred in 37.14% cases. In our study, diarrhea occurred in 8.57% and cough in 5.71% cases whereas in other studies, these 2 symptoms occur in 14-40% and 8-24% cases respectively<sup>12</sup>.

Abdominal Ultrasound is the gold standard for diagnosing liver abscesses. Sonographically, in amoebic liver abscess, 4%-42% cases have multiple abscesses, 20%-35% have an abscess in the left lobe, and the remaining 49%-80% have a solitary abscess in the right lobe<sup>23,24</sup>. Our study showed multiple abscesses in 8.57% cases, a solitary left lobe abscess in 5.71% cases and a single right lobe abscess in 74.28% of cases.

Atelectasis and pleural effusions are common complications of amoebic liver abscess. Pleural effusions occur mostly frequently in the right lobe and

cause cough and chest pain. Respiratory distress can follow as a sequel to amoebic liver abscess rupturing through the diaphragm. Such a course has been shown to unravel in 7% - 20% of cases and in this study accounted for none of cases<sup>12-15,24</sup>. Of all our patients, none required a chest tube insertion for pleural drainage. In 2-7% of cases of amoebic liver abscess, a peritoneal rupture can cause shock and peritonitis<sup>25-27</sup>. A peritoneal rupture occurred in none of the cases. In recent years, with the advent of pigtail catheter drainage, the role of surgical exploration in amoebic liver abscess ruptured into the peritoneal cavity has been mainly confined to haemodynamically unstable patients<sup>28</sup>. None of our patients underwent surgical exploration.

Moreover there were complications related to catheter removal, such as retention of the catheter, pain during removal, blind withdrawal of the catheter. Pain was controlled with moderate analgesics as Inj. Ketorolac. Fortunately not a single case of injury to the gall bladder or portal vein took place. No patient developed granuloma cutis. There was no mortality.

The overall mortality rate seen in amoebic liver abscess from various series ranges from 2-15%<sup>12</sup>. In our study, the mortality rate was 0% this fact is of particular concern and awaits further confirmation across a larger study.

## Conclusion

Conservative management for uncomplicated amoebic liver abscess and insertion of single percutaneous pigtail catheter drainage for refractory amoebic liver abscess are both efficacious as treatment modalities. A very low morbidity and zero mortality (in this study), minimum treatment cost and early return to regular life style proved this procedure to be a rational choice of treatment in liquefied medium to large sized liver abscesses. Multicenter comparative study can be done to evaluate the safety and effectiveness of this treatment modality.

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