

## **Safety and efficacy of ultrasound guided percutaneous needle aspiration of liver abscess**

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### **Abstract**

**Background:** Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in tropical country. Traditionally for many years they were treated with antimicrobial alone, blind percutaneous aspiration or surgical exploration. This conception gradually changes into guided percutaneous aspiration or drainage with development of advanced diagnostic imaging modality.

**Objectives:** To evaluate the safety and efficacy of management of liver abscess by Ultrasound (US) guided percutaneous needle aspiration.

**Methods:** From August 2009 to July 2018 a total 380 patients with liver abscess were referred to the department of radiology and imaging for US guided percutaneous aspiration. All patients were evaluated clinically and by USG. Aspiration of the abscess was carried out under strict aseptic precaution.

**Results:** A total of 380 patients with liver abscess were successfully treated, consisting of 338 males and 42 females, male female ratio 8:1. The age ranges from 11 to 80 years. Majority (78%) had single abscess and 22% had two or more. Most of the abscess are located in the right lobe of liver (79%). Single needle aspiration were needed in 30% of patient, second aspiration were needed in 38% of patients and third aspiration in 32% of patients. Average aspiration per patient was 2.02. The amount of aspirated pus ranged from 250 to 2450 ml.

**Conclusion:** Ultrasound guided percutaneous needle aspiration of liver abscess is a safe and successful therapeutic approach in the treatment of liver abscess whether pyogenic or amoebic.

**Keyword:** Ultrasound guide, Liver abscess, Percutaneous aspiration.

### **Introduction**

Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in tropical countries.<sup>1</sup> The management has improved significantly over the years with the advent of potent antimicrobial agents and advances in diagnostic imaging. In the past 3 decades, image guided percutaneous needle aspiration or catheter drainage has become the therapy of choice for liver abscess.<sup>2</sup>

Prevalence of liver abscess in Bangladesh is no longer less than other tropical country. Besides this, Bangladesh is a developing country so prevalence and its morbidity and mortality are high. In most of the government and private hospital liver abscess were treated either by antimicrobial alone, blind percutaneous aspiration after surface marking or straight surgical exploration. Following few years US guided percutaneous needle aspiration become popular.

Majority of liver abscess were treated by medical management. Indication of percutaneous drainage are size 5.5 cm or more, lesion who appear to be superinfected, large abscess impending to rupture, thin rim of liver tissue surrounding the abscess (less than 10mm) and failure of medical management following noninvasive treatment for 4 to 5 days.

In US guided percutaneous needle aspiration, an interventional radiologist uses US guidance to place a wide bore needle in to the abscess cavity and aspirate the pus as much as possible & send a sample of pus for microbiological examination. Follow-up ultrasonography (USG) were done and considered for further aspiration if required.

The use of ultrasound for diagnosis and guiding the aspiration needles has reduced the incidence of patient requiring laparotomy.

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CT guidance of aspiration may be used. The advantage of sonographic guidance over CT is that sonography is real time imaging technique that allows monitoring of the course of the needles and catheter as they traverse tissues.<sup>3</sup>

To our knowledge, in our environment, not much data are available on large series of patient with liver abscess managed solely with percutaneous needle aspiration under ultrasound guidance in combination with long term antibiotic treatment. The objective was to evaluate the safety and efficacy of management of liver abscess by US guided percutaneous needle aspiration in Khulna Medical College Hospital.

### Materials and Methods

From August 2009 to July 2018. 380 patients with liver abscess were referred to the Department of Radiology and Imaging, Khulna Medical College Hospital for US guided percutaneous needle aspiration. All patients had been started with antiamebic and antibiotics, 3 to 7 days before referral and were still being continued during and after aspiration for another 3 to 4 weeks by the referring physician. The patients had been diagnosed for liver abscess previously using either ultrasound or CT scan. Informed consent was obtained from the patients. Inclusion criteria: Patient with diagnosed liver abscess referred to radiology department for therapeutic aspiration. Exclusion criteria: Liver abscess volume less than 20ml.

All the aspiration procedures were performed under sonographic guidance using a free hand technique. USG machine used having abdominal probe with frequency 3.5 MHz. Local anesthesia was induced with 10 ml of lidocaine hydrochloride 2%. Then continuous real time sonographic imaging was used to localize the abscess and to guide insertion of the needle.

18G Spinocan needle was used as it is available in Khulna [Figure 4] In case of multiple abscesses, the same needle was reinserted to aspirate them. After successful puncture, a sample of fluid was send for bacterial culture and sensitivity. Then aspiration of pus was done as much as possible. All the procedure was done under complete aseptic precaution.

All patients were seen 3 to 4 days interval after 1st aspiration for follow up sonography. If needed second and 3rd aspiration were done. The percutaneous needle aspiration was considered successful when the cavity collapses or was reduced to below 20 ml with no relapse of abscess. [Figure III] The patients were then being managed by their respective doctors until stability of all the clinical indices before discharge.

### Results

A total of 380 patients with liver abscess were treated, consisting 338 males and 42 female. Male female ratio is 8:1. The age ranged from 11 to 80 years with highest incidence (29.3%) was in the age group of 61-70 years.

**Table I**

Distribution of the patients by their age-group

Age Group (in year)	Number of patients	%
11-20	2	0.52
21-30	10	2.63
31-40	60	15.78
41-50	98	25.78
51-60	81	21.31
61-70	113	29.73
71-80	16	4.21
Total	380	100

The common symptoms and signs of liver abscess were fever (86%), right upper quadrant pain and tenderness (96%) and hepatomegaly (73%).

A total of 78% patients had single abscess (Figure 2) and 12% had two or more cavity. The majority (79%) of the abscesses were located in the right lobe of liver, 14% in the left and 7% in both lobes (Figure 1).

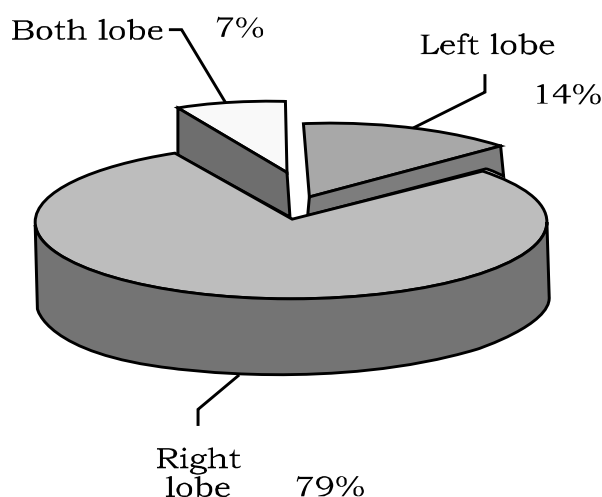


Figure 1. Location of lesion in the liver.

Single needle aspiration was needed in 30% of the patient, second aspiration in 38% and third aspiration in 32% of patient. Average aspiration per patient was 2.02. Colour of the aspirated pus was typical anchovy sauce fluid in 30% of patient whitish to yellowish fluid in 20% of patient and in 50% patient mixed fluid were aspirated. Pus

culture was negative in 66% of patient. The amount of aspirated pus ranged from 250 to 2450 ml with a mean 570ml.



Figure 2. Single abscess cavity with septation in the right lobe of liver with mild reactive pleural effusion



Figure 3. Collapse of abscess cavity after aspiration.



Figure 4. 18G spinocan needle, 50ml disposable syringe and aspirated pus in a container.

Percutaneous needle aspiration were successful in most of the patients (96%). No major complications were seen. Minor complications included mild pain at the hypochondrium and mild bleeding during needle insertion. Thirteen patients were not improved in spite of repeated aspiration and referred for catheter drainage or surgical exploration. Two patients died during the course of management.

## Discussion

Controversies still exist in the management of liver abscess.<sup>4</sup> Percutaneous drainage (either needle aspiration or catheter drainage) coupled with systemic antibiotics has become the preferred treatment for the management of pyogenic abscess.<sup>2,5</sup> In contrast, for amoebic abscesses, the primary mode of treatment is medical; however, as many as 15% may be refractory to medical therapy. Also secondary bacterial infection may complicate 20% of amoebic liver abscess.<sup>2</sup>

We found percutaneous needle aspiration of liver abscess an easy and effective method of treatment. It has replaced surgical exploration which now has very limited indications. Needle aspiration is less expensive, avoids problems related to catheter care and long term hospital care. Multiple abscesses can be aspirated through different tracts in the same sitting. Our method involved percutaneous needle aspiration of pus from the abscess cavity as much as possible coupled with combined antiamebic and antibiotic treatment. Follow up USG were done at 3 to 4 days interval and if necessary second and third aspiration were done.

Age group (61-70) has the highest incidence in our study consisting of 29.78% which was nearly similar to a study consisting of 25.0%, but not correlate with a study of similar works done by Mukhopadhyay et al, where the highest incidence was in the age group (31-40).<sup>6,7</sup> Similarly our study did not correlate with some other studies.<sup>8,9</sup>

In our study we found male to female ratio 8:1 which was similar to others.<sup>6,9</sup> Most of the patient are economically poor and lives in rural area. Male predominance may be attributed to the lifestyle with men going out to work and consuming contaminated water and unhygienic food while the women are largely confined to their homes.

The common symptoms and signs of liver abscess in our study were fever (86%), right upper quadrant pain and tenderness (96%) and hepatomegaly (73%). These clinical manifestations are similar to those described in previous studies.<sup>6</sup>

In our study, 79% of the abscesses were located in the right lobe of liver, similar to previous studies.<sup>6,9,10</sup> and 78% of our patients had solitary

abscesses, similar to a previous report.<sup>6</sup> We encountered multiple liver abscesses in 22% of the patients, similar to the 18-25% incidence of multiple liver abscesses.<sup>9,11</sup>

Still many centers are not involved in the percutaneous drainage of liver abscess possibly due to unavailability of suitable percutaneous drainage sets, unavailability of USG machine at treatment site and absence of experienced hand. Previous studies have seen the use of Foley's catheter as drainage tubes.<sup>12</sup> In our study, we adapted a percutaneous needle aspiration by 18G spinocan needle and 50ml disposable syringe which is readily available.

The type of abscess was determined on the basis of amebic serology and pus culture reports.<sup>13</sup> A study showing 58% of the abscesses to be amebic in etiology, 23% to be pyogenic, 12% to be indeterminate and 7% to be amebic with secondary bacterial infection (mixed liver abscess).<sup>6</sup>

The main limitation of our study is the inability to determine the lesion either amoebic or pyogenic because of unavailability of serological test for amoebiasis, and most of the patient had been treated with combined antiamebic and antibiotic before referring to our department. In our study pus culture were negative in 66% of patient, but previous study showed 70% was negative.<sup>6,8</sup>

The major advantages of percutaneous needle aspiration are: 1) it is less invasive and less expensive; 2) avoids problems related to catheter care; and 3) multiple abscess cavities can be aspirated easier in the same setting.<sup>14</sup> The success rate of percutaneous needle aspiration in the literature varies from 77-100%.<sup>15</sup> The success rate in our study was 96%.

Several groups have reported reasonably good results of percutaneous needle aspiration along with systemic antibiotics.<sup>14</sup> Giorgio et al performed on an average 2.2 aspirations in 115 patients and reported resolution of symptoms and hepatic lesions in 98% of the patients.

Another study showed 23 of 30 patients were successfully treated with aspiration and required an average of 1.8 aspirations.<sup>6</sup> One study showed 5 patients died out of 86 patient.<sup>9</sup>

We required single aspiration in 30%, second aspiration in 38% and third aspiration in 32%. Average aspiration per patient was 2.02. Needle aspiration is a much simpler but the success rate was not 100%. Therefore, those patients who failed after a third aspiration, we advised catheter drainage or surgical exploration. We referred 3.4% of patient and 2 patient died during the course of treatment.

## Conclusion

This study represents our preliminary work on liver abscess drainage. We found that needle aspiration combined with antiamebic and antibiotic represents a successful therapeutic approach in the treatment of liver abscess whether it is pyogenic or amoebic.

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