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Percutaneous Aspiration vs Pigtail Catheter Drainage for Liver Abscess: A Single Institutional Study

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Abstract

Introduction: Liver abscess is the accumulation of pus in the liver parenchyma. It is the most common cause of intraabdominal abscess. It is of two types: pyogenic liver abscess and amoebic liver abscess. Treatment of larger abscesses involves drainage, either by percutaneous aspiration or percutaneous drainage. This study was an attempt to compare the efficacy between the two methods.

Methods: The study included 50 patients with liver abscess of size more than 5 cm. Two compared modalities of percutaneous treatment of liver abscess were needle aspiration and pigtail catheter aspiration, performed under ultrasonographic guidance. Results were compared on the basis of clinical improvement, duration of hospital stay and time for reduction of abscess.

Results: Amoebic liver abscess (72%) was more common than pyogenic liver abscess (28%). Clinical recovery was faster in catheter group (average 2.56 days) than in aspiration group (average 5.2 days) (p-value <0.05). The mean reduction in total counts in the catheter group was 8193 while that in the aspiration group was 6208. The mean duration for the abscess size to reduce to 50% was 4.3 days in the aspiration group while that was 2.76 in the catheter group ($p = 0.018$). Patients who underwent aspiration needed repeated interventions as compared to the other group. The mean duration of hospital stay was 10.32 among the aspiration group while that was 5.72 among the catheter group ($p < 0.05$).

Conclusions: Our study concluded that catheter drainage of liver abscess had earlier improvement of symptoms, better control of infection, faster duration of resolution of the abscess and shorter hospital stay as compared to percutaneous aspiration.

Keywords: Liver abscess; Pigtail catheter; Aspiration; Faster recovery.

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Introduction

Liver abscess is the accumulation of pus in the liver parenchyma. It is the most common cause of intraabdominal abscess.[1] Traditionally, it has been described to be of two types: pyogenic liver abscess and amoebic liver abscess. Pyogenic liver abscess has been known to have been caused by a number of Gram negative and Gram positive aerobes and anaerobes, and currently accounts for 15 of 1,00,000 admissions;[2] whereas amoebic liver abscess is caused by the parasitic protozoan *Entamoeba histolytica* and has an overall prevalence of 4% per year.[2] The symptoms typically include right upper quadrant discomfort along with fever, malaise, anorexia in predisposed individuals such as elderly, diabetics and immunosuppressed.[3] These conditions are diagnosed by the presence

of multiloculated cystic mass as evidenced on ultrasonography or CT, and amoebic liver abscess by the demonstration of Ova/Cyst. Treatment of the condition has varied and been debated over time. Traditionally, the treatment consisted of antibiotics and metronidazole for pyogenic and amoebic liver abscesses respectively, with the drainage of the abscess by laparotomy.[1] However, with the advances like ultrasonography and CT, it is possible to localize the lesion and thus developed the era of minimally invasive techniques such as percutaneous aspiration and percutaneous catheter drainage. The efficacy of one of these techniques over the other has been debated. This study is an attempt to compare the outcomes of liver abscess after management with percutaneous drainage and percutaneous catheter placement.

Materials and Methods

This was a prospective randomized comparative study in which 50 patients presenting to Victoria hospital emergency diagnosed as having liver abscess were included in the study.

Place of Study: Victoria Hospital

Study Duration: April-June 2019

Sample Size: 50

Inclusion criteria: Patients diagnosed as having liver abscess with the following criteria were included in the study:

- Age between 18 and 60
- Patients with single liver abscess
- Patients with greatest dimension of abscess >5 cm
- Uncomplicated liver abscess
- Patients consenting for participation in the study and for percutaneous procedures

Exclusion criteria: The patients with the following characteristics were excluded from the study:

- Patients below the age of 18 and above the age of 60
- Patients with multiple liver abscesses
- Patients with ruptured liver abscess
- Patients not consenting for participation in the study or for percutaneous procedures
- Patients with greatest dimension of abscess <5 cm

Methodology

Patients presenting to Victoria hospital emergency department with clinical signs and symptoms suggestive of liver abscess were subjected to an ultrasonological evaluation to confirm the diagnosis of liver abscess and to determine the location, size and number of liver abscesses and to rule out the possibility of ruptured liver abscess. Once the diagnosis was made, the patients fulfilling the inclusion criteria were included in the study.

After obtaining valid consent, the patients included in the study were subjected to investigations such as complete blood counts, liver function test, renal function test, prothrombin time and calculation of international normalized ratio (INR). This data was noted down and tabulated. The patients were then randomly divided into two groups of 25 patients each, to be subjected to either percutaneous aspiration or percutaneous catheter drainage.

All the patients were treated with quinolone antibiotics along with metronidazole. They were given intramuscular injections of vitamin K to promote the synthesis of coagulation factors. After confirming the liquid nature of the abscess, the patients were subjected to either percutaneous aspiration or percutaneous catheter drainage. This division was random.

Percutaneous Aspiration

This was done under sonological guidance under local anesthesia. With the patient in supine position, an 18G lumbar puncture needle was used to enter into the abscess cavity and aspiration of the contents was done until the cavity was collapsed or until the aspiration was negative.

Pigtail Catheter Insertion

This was done under local anesthesia. An 18F pigtail catheter was used to enter into the abscess cavity under sonological guidance by Seldinger's technique. The tip of the pigtail catheter was placed deep into the abscess cavity and was allowed for dependant drainage (Fig. 1).

Post the procedure, the patients were observed for resolution or decrease in the symptoms. Two days after the procedure, complete blood count

Fig. 1: Insertion of percutaneous pigtail insertion.

was repeated to evaluate the changes in the blood picture. Repeat ultrasonological scans were done to monitor the size of the liver abscess. The duration for resolution of symptoms, and the duration for reduction in size of the abscess cavity to half of the intial size, and the duration of stay in the hospital were noted. Follow up of the patient was done until discharge.

Statistical Analysis

The data obtained was tabulated in Microsoft Excel and was analyzed in SPSS software. The variables were expressed in terms of descriptive statistics such as mean and standard deviation. The two groups were compared using unpaired *t*-test.

Results

Age distribution of patients in the study ranged from 31 to 60 years (45.64 ± 8.24 years). The patients who underwent aspiration had age ranging from 31 to 60 years (44.68 ± 1.8 years) while those who underwent percutaneous catheter drainage had age ranging from 35 to 60 years (46.6 ± 8.79 years).

Of the 50 patients, 34 (68%) were males and 16 (32%) were females. Among the patients who underwent aspiration, 19 (76%) were males and 6 (24%) were females; while among the patients who underwent percutaneous catheter drainage, 15 (60%) were males and 10 (40%) were females (Fig. 2).

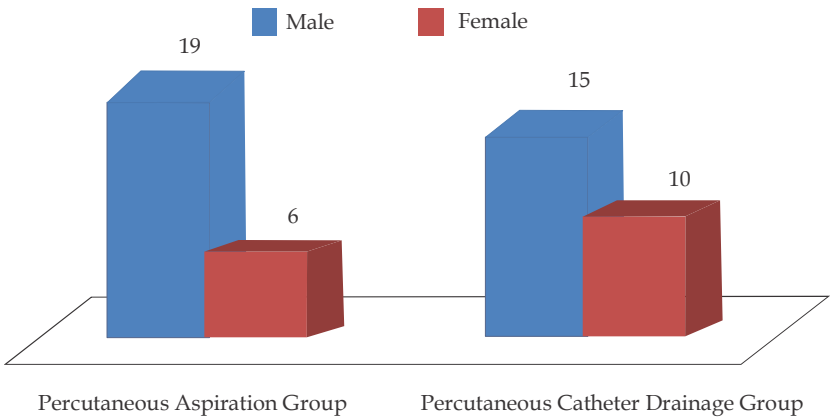

Fig. 2: Sex distribution of patients.

36 (72%) of the 50 patients had amoebic liver abscess and 14 (28%) had pyogenic liver abscess. Among the patients who underwent aspiration, 8 (32%) had pyogenic liver abscess and 17 (68%) had amoebic liver abscess as compared to 19 (78%) amoebic liver abscess and 6 (24%) pyogenic liver abscess among the patients undergoing pigtail catheter drainage (Fig. 3).

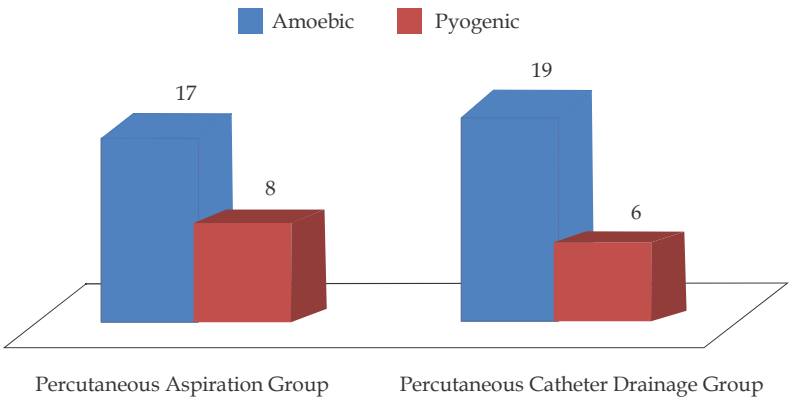

Fig. 3: Etiology of liver abscess.

The overall size of the liver abscess ranged from 5 to 10 cm with a mean of 6.9 ± 1.38 cm. The patients who underwent percutaneous aspiration had abscesses in the range of 5–9 cm (6.68 ± 1.19 cm) while those who underwent percutaneous catheter drainage had abscess size ranging from 5 to 10 cm (7.36 ± 1.16 cm).

The total counts at presentation of patients who underwent aspiration ranged from 13,800 to 28,700 cells/mm^3 (21,268 ± 4,485 cells/mm^3) while that of patients undergoing percutaneous catheter drainage ranged from 10,300 to 32,100 cells/mm^3 (21,985 ± 5,433 cells/mm^3).

The total counts were estimated 2 days after the intervention. This was in the range of 8,000–24,000 cells/mm^3 (15,060 ± 4,085 cells/mm^3) for patients who underwent aspiration and in the range of 6,500 cells/mm^3 (13,792 ± 4,501 cells/mm^3) for patients who underwent percutaneous catheter drainage. The mean reduction in total counts was 6,208 cells/mm^3 for patients who underwent aspiration while it was 8,193 cells/mm^3 for patients who underwent percutaneous catheter drainage (Table 1).

Table 1: Comparison of outcomes between the two groups

Parameter studied	Percutaneous aspiration group	Percutaneous pigtail insertion group
Mean reduction in total counts (cells/mm^3)	6,208	8,193
Clinical improvement (days)	5.2 ± 2.4	2.56 ± 1.2
Duration for 50% reduction in size (days)	4.32 ± 2.83	2.76 ± 1.3
Need for second procedure	68% of patients	16% of patients
Duration of hospital stay (days)	10.32 ± 4.8	5.72 ± 1.8

Patients who underwent aspiration showed clinical improvement in 1–11 days (5.2 ± 2.4 days) while those who underwent percutaneous catheter drainage showed clinical improvement in 1–5 days (2.56 ± 1.2 days). The mean difference in the number of days taken to show clinical improvement among the two groups was 2.64 days. This was found to be statistically significant ($p < 0.05$) (Table 1).

In patients who underwent aspiration, the duration taken for the abscess to reduce by 50% ranged from 1 to 11 days (4.32 ± 2.83 days) while the same in patients who underwent percutaneous catheter drainage ranged from 1 to 5 days (2.76 ± 1.3 days). The mean difference between the two groups in the number of days taken for the abscess size to reduce to half was 1.56 days. This was found to be statistically significant ($p = 0.018$) (Table 1).

Among the 25 patients who underwent aspiration, 17 (68%) needed further aspiration while only 4 (16%) of the patients who underwent percutaneous catheter drainage needed further intervention. 3 of these 4 needed repositioning of the catheter while one needed reinsertion. 21 (84%) of the patients who underwent percutaneous catheter drainage did not need any further intervention (Table 1).

The mean duration of hospital stay among patients who underwent aspiration ranged from 5 to 21 days (10.32 ± 4.8 days) while that among patients who underwent percutaneous catheter drainage ranged from 3 to 9 days (5.72 ± 1.8 days). The mean difference in duration of hospital stay among the two groups was 4.60. This was found to be statistically significant ($p < 0.05$) (Table 1).

Discussion

This study was an attempt to compare the efficacy of percutaneous needle aspiration vs percutaneous catheter drainage in the treatment of liver abscess, in terms of reduction in the total counts, time taken for clinical improvement, time taken for the abscess cavity to reduce to half its original size, need for second intervention and the duration of hospital stay.

In our study we included patients with abscess cavity size of more than 5 cm, and found that patients undergoing percutaneous catheter drainage showed rapid recovery, faster decrease in total counts and reduction in cavity size, and had lesser need for second intervention as compared to patients undergoing percutaneous needle aspiration.

In the study by Ershad et al.[4], they concluded that patients with abscess cavity less than 5 cm did not need any invasive intervention and could be managed on antibiotics alone; whereas the patients with abscess cavity more than 5 cm needed intervention and patients undergoing percutaneous needle aspiration had a faster recovery as compared to patients undergoing percutaneous catheter drainage, although patients undergoing percutaneous needle aspiration frequently needed further intervention. This difference in observation could be due to the continuous drainage, and thus, a faster clearance of the cavity in percutaneous catheter drainage as compared to percutaneous needle aspiration.

Sreeramulu et al.[5] concluded that small abscesses can be treated with antibiotics alone while medium abscesses can be treated with aspiration and follow up while large abscesses required percutaneous catheter drainage.

The findings of our study is consistent with the findings of Arshad Khan[6] et al. who reported faster recovery and shorter duration of hospital stay in patients in whom larger quantity of pus was drained in the first sitting; they concluded that continuous catheter drainage is a more effective percutaneous treatment modality than intermittent needle aspiration.

Sukhjeet Singh[7] et al. also reported earlier clinical improvement and reduction in size of abscess cavity among patients undergoing percutaneous catheter drainage as compared to patients undergoing percutaneous needle aspiration, with no significant change in the time needed for near total resolution or duration of hospital stay. They also concluded that percutaneous catheter drainage is a better modality than percutaneous needle aspiration in the treatment of liver abscess.

However, studies have to be conducted on a larger scale for better validation of results.

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