

How to Cite:

Gajera, D., Shah, M., Makwana, N., & Rathwa, A. (2022). Comparative study of percutaneous catheter drainage versus percutaneous needle aspiration for liver abscess. *International Journal of Health Sciences*, 6(S6), 282–288.
<https://doi.org/10.53730/ijhs.v6nS6.9700>

Comparative study of percutaneous catheter drainage versus percutaneous needle aspiration for liver abscess

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Abstract---Background: This study aimed to assess the effectiveness and safety of percutaneous needle aspiration (PERCUTANEOUS NEEDLE ASPIRATION) and percutaneous catheter drainage (PERCUTANEOUS DRAINAGE) in the treatment of liver abscess. Methods: A prospective randomized study was conducted in patients presenting to Department of Surgery, GMERS Medical College, Vadodara between July 2019 and May 2022. 50 patients with liver abscess were randomized into two groups A and B. Complete history, presenting symptoms, medications were noted. The effectiveness of either treatment was measured in terms of duration of intravenous antibiotic, clinical improvement, reduction in the size of cavity, treatment success rate, duration of hospital stay including long-term outcomes such as sonographic resolution of cavity and recurrence rate at 6 months post-treatment. Results: Per Cutaneous Drainage group had statistically significant rate of duration of antibiotics need, days for clinical improvement and time for 50% reduction in abscess cavity and treatment success rate with comparable long-term outcomes. Conclusion: Per Cutaneous Drainage is more efficient than Percutaneous Needle Aspiration and can be used primarily in the treatment of both amoebic and pyogenic liver abscesses along with systemic antibiotics. However, Percutaneous Needle Aspiration can serve as a safe alternative when Per Cutaneous Drainage is not available.

Keywords---percutaneous needle aspiration, per cutaneous drainage, pyogenic, liver abscesses.

Introduction

One of the differential for cystic lesions of the liver. Abscess occur when normal hepatic clearance mechanism is overwhelmed or when the system fails. Liver abscess are commonly due to amoebic followed by pyogenic, mixed and uncommonly fungal infections. The organism can reach the liver via three distinct routes namely via blood stream, biliary tree or by direct extension in case of pyogenic liver abscess. However, amoebic liver abscess occurs by faeco-oral transmission of one of the two species namely *Entamoeba histolytica* and *Entamoeba dispar*. Liver abscess mainly affects the right lobe (~65%) much more commonly than the left lobe (~10–15%) and can also be bilobar (~20–25%).²

When multiple abscesses are present, pyogenic or mixed infection needs to be suspected. Diagnosis of liver abscess is usually delayed due to non-specific and subacute symptoms. Classic triad of fever, jaundice and right upper quadrant pain is seen in less than 10% of cases. Diagnosis is made by combination of clinical symptoms, laboratory investigations and imaging. The treatment of pyogenic liver abscess has evolved over the past two decades with primary modality of treatment being antibiotics and surgery being reserved in resistant/complicated cases, multiple abscess, and inaccessible location or when a known abdominal source control is required. Percutaneous drainage under imaging guidance has significantly reduced the need for surgery and also improved the outcome with lower morbidity and mortality with a reported success rate of 70–100%.^{3–5} The primary mode of treatment of amoebic liver abscess is medical; however, as many as 15% of amoebic abscesses may be refractory to medical therapy.⁶ Also, secondary bacterial infection may complicate 20% of amoebic liver abscesses.⁷ Both percutaneous needle aspiration and percutaneous catheter drainage have been shown to be effective and safe. The lack of definitive evidence to guide us on the use of one percutaneous drainage method over the other prompted us to carry out this large prospective randomized study.

Methods

This was a prospective randomized comparative study conducted at the Department of Surgery, Department of Surgery, GMERS Medical College, Vadodara between July 2019 and May 2022. We included patients with liver abscess who were older than 16 years and were having largest cavity of more than 5 cm in size or more than 60 mL in volume. Patients with ruptured abscess, cavity smaller than 5 cm, un-correctable coagulopathy or concomitant malignancy were excluded from the study. The patients presenting with signs and symptoms of liver abscess were admitted and carefully worked up with detailed history and examinations. Laboratory investigations were sent which included – complete blood counts, renal function test, liver function test, prothrombin time and INR, viral markers, blood culture and amoebic serology. Chest X-ray was done to look for concomitant pulmonary pathology. Ultrasound of the abdomen was done to confirm abscess and in doubtful cases computed tomography of the

abdomen was also done. After confirming the diagnosis, all patients received empirical intravenous (IV) antibiotic in the form of ceftriaxone 1 g 12 hourly and metronidazole 500 mg 6 hourly, till the availability of pus culture sensitivity report. Group A included 25 patients of liver abscess in which Percutaneous Needle Aspiration was done. Group B had 25 patients of liver abscess treated with Per Cutaneous Drainage. The procedures were done after explaining it and taking informed consent from the patients.

Percutaneous needle aspiration

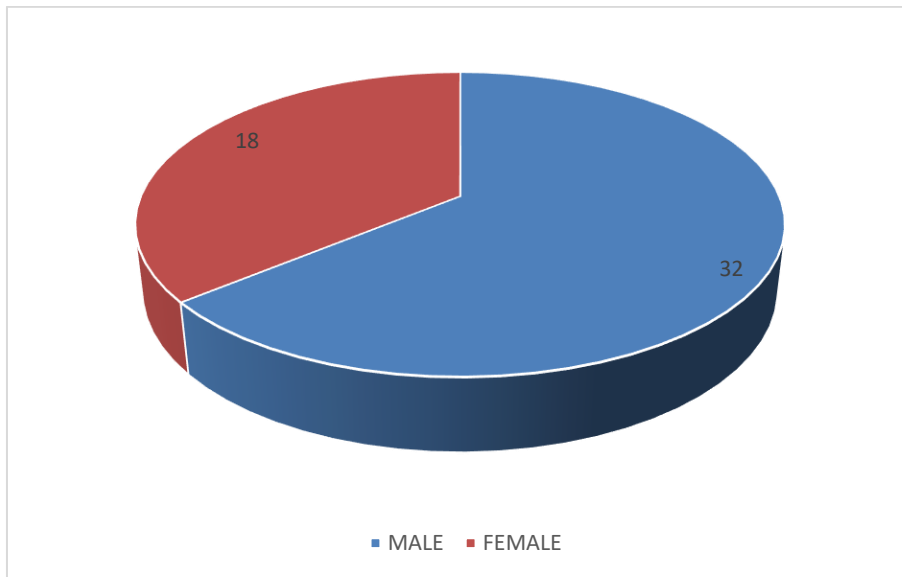
The procedure was done with full aseptic precaution. Local anaesthetic solution (lignocaine 2%) was infiltrated at the intended site of puncture and 16/18-gauge long needle was guided towards the cavity under real-time ultrasonography (USG) guidance. The pus was aspirated with the attached syringe. Colour and nature of the pus were noted and a sample was sent for culture and sensitivity. The cavity was aspirated to its maximum. The procedure was repeated for other cavities, if needed. A repeat USG was done on the third day to look for reduction in size of the cavity. If the cavity size remained 5 cm or more, then repeat aspiration was done. Inability to attain 50% reduction in the size of cavity and/or a clinical improvement after three aspirations was taken as treatment failure. These patients were then treated with Per Cutaneous Drainage or laparotomy.

Percutaneous catheter drainage

Here also, the procedure was done with full aseptic precaution. Local anaesthetic solution (lignocaine 2%) was infiltrated at the intended site of entry. A small stab was made in the skin at the site of entry. A 14-F pigtail catheter with sharp trocar was then inserted through the skin into the cavity under USG guidance. The entry was confirmed by aspirating the pus. Pus was sent for culture and sensitivity testing. A collection bag was attached and the catheter was fixed to the skin. Daily output of the catheter was measured and it was flushed regularly with normal saline to prevent blockage. Repeat USG was done on the third day to assess the size and residual content. Catheter was removed when it stopped to drain with clinical and sonographic improvement. Requirement of laparotomy was considered as treatment failure. Post-procedure assessment and follow-up Patients' clinical parameters were recorded daily. Patients were switched to oral antibiotics on improvement of clinical symptoms, that is, normalization of fever and leucocyte counts. Time to attain clinical improvement, 50% reduction in the size of cavity, number of days of IV antibiotics used, any complication of treatment, success rate of treatment and hospital stay were recorded. Patients were discharged after they improved clinically. A repeat USG was done at 2 weeks and then every month for 6 months.

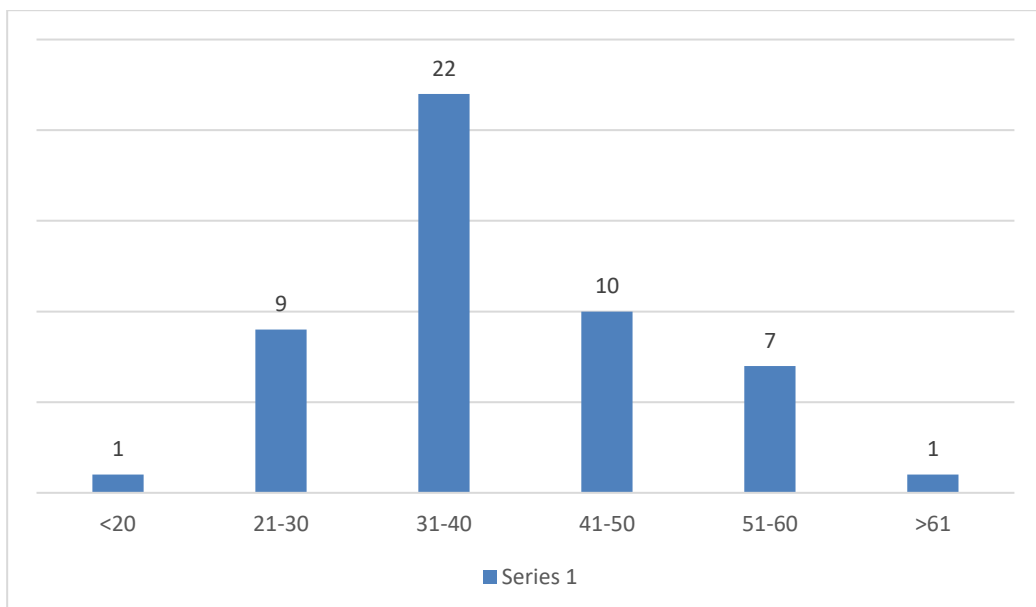
Results

Gender Distribution



In a total of 50 patients, male predominance was found

Age Distribution



The mean age of the study population was 39.5 years which ranged from 18 to 61 years.

Clinical Features

Fever	99%
Anorexia	93%
Right Upper quadrant pain	82%
Jaundice	12%
Diarrhoea	8%

Number of cavities

SINGLE CAVITY	MULTIPLE CAVITY
62%	38%

Lobe involvement

RIGHT LOBE	LEFT LOBE
88%	12%

Duration of Antibiotics

	PERCUTANEOUS NEEDLE ASPIRATION	PERCUTANEOUS DRAINAGE
MEAN DURATION	8.2 \pm 3.1	5.6 \pm 2.1

Hospital Stay

	PERCUTANEOUS NEEDLE ASPIRATION	PERCUTANEOUS DRAINAGE
Mean Hospital Stay	3.2	5.6

Recurrence

	PERCUTANEOUS NEEDLE ASPIRATION	PERCUTANEOUS DRAINAGE
Recurrence	13 (6.5%)	2(1%)

Discussion

Liver abscesses, both amoebic and pyogenic, continue to be an important cause of morbidity and mortality in the tropical countries like India. Percutaneous drainage (either needle aspiration or catheter drainage) with systemic antibiotics has become the preferred treatment for the management of liver abscesses.^{5,8-15} Liver abscess commonly affects adult males which was consistent with our study results where males were affected eight times more often than females with a mean age of 39 years. In our study, the most common symptom was fever, seen in 99% of cases, followed by anorexia and right upper quadrant pain. Recently, image-guided percutaneous treatment (needle aspiration or catheter drainage) has replaced surgical intervention as the primary treatment for pyogenic as well as amoebic liver abscesses.¹⁶⁻¹⁸ Although, many studies found Percutaneous Needle

Aspiration to be less invasive and cheaper alternative to catheter drainage with comparable outcomes, we found catheter drainage to be better than needle aspirations. Patients in the Per Cutaneous Drainage group had earlier clinical recovery and reduction in cavity size with lesser duration of need for systemic antibiotics all of which were statistically significant comparable to the results of Rajak et al.¹⁹ and Kulhari and Mandia.²⁰ We also found that patients in the Percutaneous Needle Aspiration group had higher recurrence rate (16.5%) as compared to the Per Cutaneous Drainage group (1%) requiring further treatment in the form of surgery or catheter drainage. The possible explanations for better outcomes in the Per Cutaneous Drainage group is that because of wider calibre catheter, it provides for a continuous drainage, drains thick pus and also prevents re-accumulation.

Conclusion

Per Cutaneous Drainage is more efficient than Percutaneous Needle Aspiration and can be used primarily in the treatment of both amoebic and pyogenic liver abscesses along with systemic antibiotics.

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