

**Comparative Evaluation of Therapeutic Approaches for Liver Abscess Management: Catheter Drainage versus Needle Aspiration****Mritunjay Kumar<sup>1</sup>, Satyendra Kumar<sup>2</sup>, Rajesh Narayan<sup>3</sup>**<sup>1</sup>Senior Resident, Department of Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India<sup>2</sup>Senior Resident, Department of General Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India<sup>3</sup>Associate Professor, Department of General Surgery, Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India

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**Abstract****Aim:** The aim of the study was to evaluate the clinical presentation, and to investigate the effectiveness of continuous catheter drainage in comparison to needle aspiration in the treatment of liver abscesses.**Methods:** This was a single-center prospective comparative study conducted at Department of General Surgery for the duration of two years. A total of 70 patients were included in the study, divided into two groups, percutaneous needle aspiration (n=35) and pigtail catheter drainage (n=35).**Results:** In presenting study the age group of the patients ranged from the 20-68 years. Highest incidence (60%) was found in 30-39 years age group. In this study 62 patients were male and 8 patients were female. 63 patients were from rural and 7 were from urban population and the incidence of alcohol consumption was 74.28%. It was observed that fever was present in needle aspiration and catheter drainage 94% and 92% respectively. There was 100% anorexia, pain and tenderness in right upper quadrant and hypochondrium in needle aspiration and catheter drainage respectively. It was observed that leukocytosis was 80% and 100% in needle syringe and catheter drainage. The patients in PCD group showed earlier clinical improvement and 50% decrease in abscess cavity volume as compared to those who underwent PNA. However, there was no significant difference between the duration of hospital stay or the time required for total or near-total resolution of cavity.**Conclusion:** Percutaneous catheter drainage is considered a more favorable modality when compared to percutaneous needle aspiration, particularly in cases involving larger abscesses that exhibit partial liquefaction or contain thick pus.**Keywords:** Liver Abscess, Percutaneous Catheter Drainage(PCD), Percutaneous Needle Aspiration (PNA).This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

A liver abscess refers to the formation of a purulent cavity within the liver, which occurs when microorganisms invade and multiply within the liver tissue. This invasion can occur either through direct entry from an injury via the blood vessels or through the biliary ductal system. Liver abscesses typically arise from various types of infections, with the most prevalent being pyogenic, amebic, or mixed in nature. Fungal etiology is occasionally observed in these cases. [1] Hepatitis is the most prevalent infection that impacts the liver. The prevalence of visceral abscesses involving the liver is approximately 48%. [2] Based on the limited information provided, it is difficult to provide a comprehensive response. However, as the presence of a liver abscess is a significant contributor to mortality rates in developing countries. In the

context of India's status as a developing nation and the significant portion of the population living below the poverty line, it is important to acknowledge that there exists a notable predisposition to the occurrence of liver abscess among a substantial number of individuals. In India, there is a prevalent occurrence of this condition, which ranks second in terms of incidence. This can be attributed to factors such as suboptimal sanitation, overcrowding, and insufficient nutritional intake. [3] In the case of amoebic liver abscesses (ALAs), the primary approach to treatment typically involves medical intervention. However, it is worth noting that approximately 15% of amoebic abscesses may exhibit resistance to medical therapy. [4] Additionally, it is observed that around 20% of

ALAs may present complications due to secondary bacterial infection. [5,6]

In the past, surgical drainage was the traditional mode of treatment in such patients and in patients with pyogenic liver abscesses (PLAs). [7] Over the last two decades, outcomes in patients presenting with liver abscesses have improved as a result of advances in radiological diagnosis and percutaneous treatment options. [8,9,10] Currently, patients are treated with antibiotics along with percutaneous needle aspiration (PNA) or percutaneous catheter drainage (PCD), and surgical drainage is used only in patients who fail to respond to such treatment. [11,12]. Percutaneous catheter drainage, under USG guidance, is safe and effective mode of treatment of liver abscess with low morbidity and no mortality. It results in an early relief of symptoms and faster resolution of abscess cavity. [13] So Modern treatment has shifted the treatment of liver abscess toward IV broad-spectrum antibiotics and imaging-guided percutaneous needle aspiration (PNA) or percutaneous catheter drainage (PCD). [14,15]

Hence, the present study was planned to compare the above-mentioned treatment modalities and identify the better option for treating patients suffering from liver abscess.

### Materials and Methods

This was a single-center prospective comparative study conducted at Bhagwan Mahavir Institute of Medical Science, Pawapuri, Nalanda, Bihar, India for the duration of two years. A total of 70 patients were included in the study, divided into two groups, percutaneous needle aspiration (n=35) and pigtail catheter drainage (n=35).

The protocol was approved by institutional ethical committee. Written informed consent was obtained from all participants. All the patients who had liver abscess clinically and radio logically [USG/CT scan] were included in the study. The patients had prior intervention, ruptured liver abscess, biliary tract malignancy, uncorrectable coagulopathy were excluded from the study. In all patients complete blood count, liver function test, PT/INR, X-ray chest, abdominal sonography and

C.T. scan as & when required were performed and antibiotics were started, as soon as diagnosis was made. Abscess less than 5cm managed by needle aspiration. Abscess more than 5 cm managed by percutaneous catheter drainage.

**Percutaneous Needle Aspiration:** The patient was subjected to USG of the abdomen and the characteristics of the abscess cavities were recorded. Local anesthesia was infiltrated at the proposed puncture site using an 18 G needle. Under real-time USG guidance using 18/20 G spinal needle the abscess cavity was entered and pus was aspirated till no more pus could be aspirated further. A sample of pus was sent for culture and sensitivity. A dressing was applied.

**Percutaneous Catheter Drainage:** Seldinger technique used for catheter drainage. Abscess localised by USG, The site of drainage marked under all aseptic condition where minimum depth from skin noted. The site infiltrated with 2% xylocaine and 4 mm skin incision made and through which 18G guide wire introducer needle passed under USG guidance till it will reach the centre of cavity. A Guide wire introduced through the needle and position inside the cavity following which the needle removed keeping the guide wire in situ. Serial dilator then passed over the wire to dilate track up to 12 to 14 F sizes. A PCN MELECOTS catheter of size equal to the size of dilator passed over the wire and positioned in the center of cavity under USG guidance. The guide wire than withdrawn and PCN melecots catheter fixed to the skin with suture and connect with drainage bag and pus sent for cytology and bacteriology. Amount of pus drainage in 24 hours monitored and catheter flushed daily to prevent blockage with 10ml normal saline. The drainage catheter removed when drainage become less than 20ml to 30ml/24 hours. The effectiveness of treatment was measured in terms of parameters like duration of hospital stay, days to achieve clinical improvement, days to achieve 50% reduction in abscess cavity size and days to achieve total/near total resolution of abscess cavity. The data was measured in numbers (percentage) and mean±SD.

### Results

**Table 1: Demographic details**

Gender	N%
Male	62 (88.57)
Female	8 (11.43)
Age groups in years	
20-29	7 (10)
30-39	42 (60)
40-49	9 (12.85)
50-59	6 (8.57)
60-69	6 (8.57)
Area	

Rural	63 (90)
Urban	7 (10)
<b>Incidence of alcohol</b>	
Yes	52 (74.28)
No	18 (25.72)

In presenting study the age group of the patients ranged from the 20-68 years. Highest incidence (60%) was found in 30-39 years age group. In this study 62 patients were male and 8 patients were female. 63 patients were from rural and 7 were from urban population and the incidence of alcohol consumption was 74.28%.

**Table 2: Symptoms & signs of liver**

Characteristics	Percutaneous needle aspiration(n=35)	Percutaneous catheter drainage (n=35)
Right upper quadrant pain	100%	100%
Right hypochondrium tenderness	100%	100%
Anorexia	100%	100%
Fever	92%	90%
Nausea & vomiting	66%	56%
Hepatomegaly	52%	82%
Respiratory symptoms	16%	32%
Jaundice	12%	12%
Diarrhoea	0%	0%

It was observed that fever was present in needle aspiration and catheter drainage 94% and 92% respectively. There was 100% anorexia, pain and tenderness in right upper quadrant and hypochondrium in needle aspiration and catheter drainage respectively.

**Table 3: Laboratory Data**

Investigation	Percutaneous needle aspiration (n=35)	Percutaneous catheter drainage (n=35)
Leucocytosis (>11000)	80%	100%
Elevated S. Bilirubin Total	16%	24%
Elevated SGOT	64%	84%
Elevated SGPT	66%	100%
Hypoalbuminemia	56%	92%
Elevated Alkaline phosphatase	64%	91%
Elevated INR	67%	87%

It was observed that leukocytosis was 80% and 100% in needle syringe and catheter drainage.

**Table 4: Intervention**

Parameters	Percutaneous needle aspiration (n=35)	Percutaneous catheter drainage(n=35)	P value
	Mean ± SD	Mean ± SD	
Mean volume cavity (cc)	178.32 ± 46.94	355 ± 210.7	<0.005
Clinical improvement (Days)	5.6 ± 1.4	4.8 ± 1.72	<0.005
Time taken to reduce cavity up to 50%(Days)	7.5 ± 2.8	4.8 ± 1.4	<0.005
Time taken to total or near total resolution of abscess cavity (week)	10.8 ± 4.6	10.6 ± 4.4	>0.005
Average hospital stays (Days)	5.85 ± 1.24	6.88 ± 1.28	>0.005

The patients in PCD group showed earlier clinical improvement and 50% decrease in abscess cavity volume as compared to those who underwent PNA. However, there was no significant difference between the duration of hospital stay or the time required for total or near-total resolution of cavity.

**Discussion**

Liver abscesses, both amebic and pyogenic, continue to be an important cause of morbidity and mortality in tropical countries. The primary mode

of treatment of amebic liver abscess is medical; however, as many as 15% of amebic abscesses may be refractory to medical therapy. [16] Also, secondary bacterial infection may complicate 20% of amebic liver abscesses. [17] In such patients and in patients with pyogenic liver abscesses, surgical drainage has been the traditional mode of treatment. [18,19]

A liver abscess is a pus-filled cavity that occurs due to the incursion of microorganisms either from hematogenous spread or by way of the biliary

ductal system. The common etiology of a liver abscess includes amoebic or pyogenic and sometimes mixed infections. In the developed world, a polymicrobial pyogenic abscess is common while amoebic etiology is more prevalent in tropical countries. Despite the improvement in sanitation and the advancement of treatment modalities, amoebic and pyogenic liver abscesses are considered an important cause of morbidity or mortality in the tropical and subtropical areas of the world. [1] The major approach for the treatment of a liver abscess is antimicrobial therapy with or without radiology guided intervention. About one-fifth of patients with liver abscesses remain refractory to antimicrobial therapy. [20] Nowadays, the generous use of sonography and computerized tomography scanning of the abdomen led to the early diagnosis and treatment of liver abscesses.

In presenting study the age group of the patients ranged from the 20-68 years. Highest incidence (60%) was found in 30-39 years age group. In this study 62 patients were male and 8 patients were female. It was comparable with the study conducted by Singh et al. 63 patients were from rural and 7 were from urban population and the incidence of alcohol consumption was 74.28%. It was observed that fever was present in needle aspiration and catheter drainage 94% and 92% respectively. There was 100% anorexia, pain and tenderness in right upper quadrant and hypochondrium in needle aspiration and catheter drainage respectively. On examination hepatomegaly and Jaundice was seen which were similar to those described in previous studies. [21] It was observed that leukocytosis was 82% and 100% in needle syringe and catheter drainage. The patients in PCD group showed earlier clinical improvement and 50% decrease in abscess cavity volume as compared to those who underwent PNA. However, there was no significant difference between the duration of hospital stay or the time required for total or near-total resolution of cavity and similar finding was reported by Ghosh et al. [21]

Kulhari M et al. reported better clinical outcomes with PCD over PNA in the patients with approximately similar volumes of liver abscess ( $293.2 \pm 130.3$  mL in the PCD group and  $291.4 \pm 138.8$  mL in the PNA group,  $P = 0.925$ ). [22] Rajak et al. also showed that higher abscess volume was associated with PNA failure. [23] Various studies described the comparison between conservative treatment and the percutaneous aspiration approach. Most of these studies were conducted before the widespread use of PCD for the treatment of liver abscesses. Results of these studies showed that PNA was more useful in higher abscess volume. [24-26]

## Conclusion

Based on our study findings, it has been determined that percutaneous catheter drainage is a superior and efficacious percutaneous treatment modality when compared to percutaneous needle aspiration. This conclusion is based on the observation of a larger volume of pus being drained in the initial session, along with notable clinical improvement, cavity resolution, and overall success rate. It is important to note that neither procedure resulted in significant morbidity or mortality.

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