



Research Article

Safety And Efficacy of Ultrasound-Guided Drainage of Liver Abscess: An Observational Study

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ABSTRACT

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Background: Liver abscess is a serious intra-abdominal infection, most commonly of pyogenic or amoebic origin. Conventional management with intravenous antibiotics alone is often insufficient in large or complicated abscesses. Ultrasound (USG)-guided percutaneous drainage has emerged as a minimally invasive and effective alternative to surgical intervention. The objective of study was to evaluate the safety and efficacy of USG-guided drainage of liver abscess in terms of clinical improvement, radiological resolution, and complications.

Methods: A prospective observational study was conducted over 1 year at a tertiary care centre, including 53 patients diagnosed with liver abscess (pyogenic/amoebic) confirmed by ultrasonography. All patients underwent percutaneous USG-guided drainage with pigtail catheter in addition to standard antimicrobial therapy. Clinical parameters, abscess characteristics, time to defervescence, duration of catheterization, hospital stay, and complications were recorded.

Results: The study included 53 patients (38 males, 15 females; mean age 41.7 ± 12.4 years). Right lobe involvement was predominant (67.92%). Etiology was pyogenic in 21 (39.62%), Radiological resolution was achieved in 49 (92.45%) cases within 4 weeks. No major procedure-related morbidity or mortality was recorded.

Conclusion: USG-guided percutaneous drainage is a safe, effective, and minimally invasive modality for management of liver abscess.

Keywords: Liver abscess, Ultrasound-guided drainage, Percutaneous catheter drainage

INTRODUCTION:

Liver abscess is a potentially life-threatening condition with significant morbidity and mortality if untreated. It is commonly caused by pyogenic bacteria or *Entamoeba histolytica*, with an incidence varying across geographic regions.^{1,2}

Liver abscess is found more commonly in men between 20 and 40 years of age, but can occur at any age. Approximately 60% are solitary and mainly located in the right lobe of the liver.³ Patients usually present with a constant dull pain in the right upper quadrant of the abdomen which may be referred to the scapular region or the right shoulder. These patients usually have fever of between 38°C and 40°C.⁴

However, recent advances in interventional radiology, intensive care, progress in antibiotic therapy, and liberal use of sonography and computerized tomography scanning of the abdomen have led to early diagnosis and treatment of patients with liver abscess, thus improving the patient outcome. Percutaneous drainage of liver abscess has been an important advancement in the treatment of pyogenic liver abscesses.^{5,6}

Traditionally, management involved systemic antibiotics and, in selected cases, open surgical drainage. However, surgical drainage carries substantial risks, including wound infection, prolonged recovery, and increased hospital stay.⁷

Over the last few decades, percutaneous drainage techniques, especially ultrasound-guided catheter drainage, have revolutionized management. This minimally invasive technique allows direct evacuation of pus, reduction of bacterial load,

and improved penetration of antibiotics, leading to faster recovery. However, there remains variation in reported outcomes and complication rates across populations.

This study was undertaken to evaluate the safety, efficacy, and clinical outcomes of ultrasound-guided drainage of liver abscesses in a tertiary care setting.

OBJECTIVE:

- To evaluate the safety, efficacy, and clinical outcomes of ultrasound-guided drainage of liver abscesses

MATERIAL AND METHODS:

The present study was prospective observational study conducted at Departments of Radiology and Surgery from January 2024 to January 2025. This study was conducted over a period of 2 years with a sample size of 53 patients. The study population included patients diagnosed with liver abscess (pyogenic/amoebic) confirmed by ultrasonography. The sampling was done by simple random method.

Inclusion Criteria:

- Age ≥ 18 years
- Abscess size ≥ 5 cm in largest dimension
- Single or multiple liver abscesses accessible for percutaneous drainage

Exclusion Criteria:

- Abscesses < 5 cm treated with antibiotics alone
- Patients unfit for intervention (severe coagulopathy, unstable vitals)
- Patients refusing procedure

Permission from the Ethical Committee was taken prior to commencement of the study and informed written consent was taken from the participants of the study.

The diagnosis of the patients for inclusion into the study was based on a detailed clinical history taking, clinical examination and investigations especially USG findings. After informed consent, ultrasound guided percutaneous needle aspiration was done by free hand technique using a USG machine with 3.5 MHz frequency. To localize the abscess and the needle, a continuous real time sonographic imaging was used. A pigtail catheter (8–12 Fr) was placed into the abscess cavity using the Seldinger technique. Catheter left in situ until drainage < 10 ml/day with clinical and radiological improvement. All patients received appropriate intravenous antibiotics/anti-amoebic therapy. Data was entered into a unified computer database and analysed. The statistical analysis was done using SPSS 24.0.

RESULTS:

Table no 1: Demographic characteristics among study patients: (n=53)

Variables	Frequency (n=53)	Percentage
Age group (years)	21-30	01
	31-40	07
	41-50	18
	51-60	15
	>60	12
Gender	Males	38
	Females	15

The above table no. 1 shows, most of the patients 18 (33.96%) belonged to the age group of 41 to 50 years followed by age group of 51 to 60 years (28.30%). Mean age of the patients was 41.7 ± 12.4 years (range 19–68 years). The male predominates among patients with 71.7% while the remaining were females. (28.3%)

Table 2) Clinical features among study patients: (n=53)

Clinical features	No. of Patients (n=53)	Percentage
Abdominal pain	52	98.11
Fever	29	54.72
Anorexia	11	20.75
Weight loss	09	16.98
Anaemia	06	11.32
Jaundice	06	11.32
Diarrhoea	04	07.55
Hepatomegaly	04	07.55

(Multiple Response Present)

In the table above clinical features among patients with liver abscess had been described. It was observed that abdominal pain was present in 52 (98.11%) patients followed by fever. (54.72%) The other clinical signs were anemia (11.32%), weight loss (16.98%), jaundice (11.32%), diarrhoea (7.55%) and hepatomegaly (7.55%).

Table no 3: Abscess characteristics among study patients: (n=53)

Variables		Frequency (n=53)	Percentage
Location of abscess	Right	36	67.92
	Left	11	20.75
	Both	06	11.32
Cause	Amoebic	13	24.53
	Pyogenic	21	39.62
	Indeterminate	19	35.84

It was observed that, right side of liver was most affected location (67.92%) for liver abscess with majority of cause was pyogenic (39.62%).

Table no 4: Microorganisms Isolated in Pus in study patients: (n=53)

Microorganism	Number	Percentage
E. Coli	09	16.98
S. Aureus	06	11.32
Klebsiella pneumoniae	04	07.55
No Growth	28	64.15
Total	53	100

It was seen that E.Coli was the most common etiologic microorganism found to be present in 16.98% of the patients followed by S. Aureus (11.32%) and Klebsiella pneumoniae (7.55%) (Table no. 4)

Table no 5: Complications among study patients: (n=53)

Complications	Number (n=53)	Percentage
Pain at catheter site	37	68.81
Blockage of the catheter	09	16.98
Displacement of catheter tip	04	07.54

The complications were all minor with majority suffered from pain at catheter site (68.81%) followed by blockage (16.98%) and displacement (7.54%). (Table no. 5)

DISCUSSION:

The present observational study was conducted evaluate the safety and efficacy of USG-guided drainage of liver abscess in terms of clinical improvement, radiological resolution, and complications.

In the present study, most of the patients 18 (33.96%) belonged to the age group of 41 to 50 years with mean age of the patients was 41.7 ± 12.4 years (range 19–68 years). The male predominates among patients with 71.7% while the remaining were females. (28.3%) Similar findings were seen in study done by Sk. Sharmila⁸ were maximum number of patients i.e. 36% (n=18) belonged to 44-53 years and 86% were males.

In the study done by Sukhjeet Singh et al⁴ on liver abscess treatment found that majority of patients were in age group 41-50 years. (60%) with 88.33% males.

The clinical features among patients with liver abscess showed that abdominal pain was present in 52 (98.11%) patients followed by fever. (54.72%) (Table 2) The findings were in accordance with study done by Tejas N Hathila⁹ who observed that the most common clinical manifestations were right upper quadrant pain (95%) and fever (60%) followed by cough (10%) and diarrhea (9%). Similarly, in study done by Sk. Sharmila⁸ where fever was present in 80% patients, jaundice 15%, nausea and vomiting in 65% and breathlessness in 26%. These clinical manifestations are similar to those described in previous studies.^{10,11}

In the present study, it was observed that, right side of liver was most affected location (67.92%) for liver abscess with majority of abscesses were pyogenic (39.62%). Similarly, Anand Kumar et al¹² in a study showed right lobe was most commonly involved (88%), followed by the left lobe (12%) Malik SM et al.¹³ in a study found 52.3% of the abscesses to be amoebic in etiology, 14.28% to be pyogenic, 33.3% to be indeterminate Khan et al¹⁴ in their series reported 68% amoebic, 21% pyogenic, 8% indeterminate, and 3% MLA.

It was seen that *E. Coli* was the most common etiologic microorganism found to be present in 16.98% of the patients followed by *S. Aureus* (11.32%) and *Klebsiella pneumoniae* (7.55%) (Table no. 4). Similarly, Anand Kumar et al.¹² in a study showed no growth in 70% of cases, *E. coli* in 15%, *S. aureus* in 8%, and *Klebsiella pneumoniae* in 7%.

In the present study, the complications were all minor with majority suffered from pain at catheter site (68.81%) followed by blockage (16.98%) and displacement (7.54%). (Table no. 5). Similarly, Anand Kumar et al.¹² observed complications of the procedure included pain at the catheter site (93%), blockage of the catheter (18%), and displacement of the catheter tip (7%).

The treatment outcomes showed technical success among patients was 100%. The mean time to fever resolution was 3.6 ± 1.2 days with mean duration of catheterization was 9.8 ± 3.7 days. The mean hospital stay among patients was 12.1 ± 4.3 days with radiological resolution within 4 weeks occurred among 49 (92.4%) patients. The study confirms that ultrasound-guided percutaneous drainage is a safe and effective method for managing liver abscesses. The high technical success rate (100%) and favourable clinical outcomes are in line with previous reports. Similar studies by Rajak et al.¹⁵ and Zerem et al.¹⁶ have reported success rates >90%, supporting percutaneous drainage as the standard of care.

The mean duration of catheterization (9.8 days) and rapid clinical improvement highlight the effectiveness of the procedure. Importantly, complications were minor, transient, and manageable, with no mortality, further validating its safety. Compared with conventional open surgical drainage, which carries a complication rate up to 25% and longer recovery time, USG-guided drainage is less invasive, cost-effective, and associated with shorter hospital stay.

The limitation of the study was smaller sample size which may interfere with the inference and results derived from the study.

CONCLUSION:

USG-guided percutaneous drainage of liver abscess is a highly effective and safe intervention, offering rapid clinical improvement, high success rates, and minimal complications. It should be considered the first-line intervention in patients with abscesses ≥ 5 cm, thereby reducing the need for surgical drainage.

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