ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 03 | March - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

DETERMINING THE OPTIMAL CUTOFF VOLUME OF PUS FOR PIGTAIL CATHETER INSERTION FOR LIVER ABSCESS DRAINAGE: A RETROSPECTIVE COHORT STUDY

General Surgery

Dr Anushka Pariya	PG JR3, FH Medical College, Department- General Surgery
Dr A. K. Saxena*	Professor And HOD, FH Medical College, Department- General Surgery *Corresponding Author
Dr Vivek Sharma	Assistant Professor, FH Medical College, Department- General Surgery
Dr Suhail Akhtar	PG JR3, FH Medical College, Department- General Surgery
Dr Vayalapalli Syama Chinmayi	PG JR2, FH Medical College, Department- General Surgery

ABSTRACT

Background & Aim: Liver abscesses, especially those brought on by pyogenic bacteria, represent a serious clinical risk. Bigger abscesses frequently need to be drained, with pigtail catheter drainage being the recommended minimally invasive technique. While tiny abscesses can be treated with antibiotics and amebicide, bigger ones frequently need to be. It is yet unknown, nevertheless, what the ideal abscess volume is for inserting a catheter. The aim of this study was to identify the ideal cutoff volume for pigtail catheter placement in the treatment of liver abscesses in order to enhance patient outcomes and to avoid umnecessary invasive procedure. **Methodology:** This retrospective study analyzed data from 112 patients with liver abscess treated between May 2022 and June 2024. Three groups (Group A: conservative care, Group B: needle aspiration, and Group C: pigtail catheter drainage) were created from the patients. Data on clinical presentation, abscess volume, treatment outcomes, and hospital stay were collected and analyzed using ANOVA and regression analysis. **Results:** Group C had the largest abscess volumes at admission (310.7±210.4 mL) and required longer hospital stays (20.5±9.1 days), but showed effective reduction in abscess size by discharge. Hemoglobin levels were highest in Group A, while inflammatory markers were elevated in Group C. **Conclusion:** Pigtail catheter drainage was most effective for larger abscesses, supporting its use in managing severe cases. A standardized antibiotic regimen was effective across all groups.

KEYWORDS

Liver abscess; Pigtail catheter drainage; Abscess volume; Conservative management.

INTRODUCTION

Liver abscesses, defined as encapsulated collections of pus within the liver, represent a significant clinical concern, especially when caused by pyogenic bacteria.[1,2] Pyogenic bacterial infections, Mycobacterium tuberculosis, and amoebic Entamoeba histolytica are the main causes of liver abscesses. Amoebic liver abscesses are particularly prevalent in tropical regions, with over 50 million cases and 100,000 deaths reported annually.[3] Since liver abscesses are more prevalent in younger people, it is important to treat them quickly and effectively in order to lower morbidity and death in this productive age group. The most common symptoms are fever, appetite loss, weight loss, and stomach discomfort. The diagnosis of liver abscesses has become simpler due to the widespread use of ultrasonography; nonetheless, choosing the best antibiotic medication and maintaining prompt source control remain challenging. The advent of interventional radiology has shifted the management of liver abscesses towards percutaneous treatments, such as percutaneous needle aspiration (PNA) or pigtail catheter drainage (PCD), which are now preferred methods.[4,5] Among the available management strategies, pigtail catheter drainage has become a preferred minimally invasive technique, particularly for abscesses larger than 5 cm. However, the decision on when to insert a pigtail catheter based on the volume of the abscess remains a critical and somewhat ambiguous aspect of treatment.[6,7]

Antibiotics alone are frequently a successful treatment for smaller abscesses, those that are usually less than 3 to 4 cm in size, with a high success rate. However, larger abscesses, particularly those exceeding 5 cm, generally require drainage to prevent complications such as rupture or sepsis.[8-11] Pigtail catheter drainage has been demonstrated to be more successful than single-shot needle aspiration in allowing continuous abscess evacuation, resulting in a faster abscess clearance, shorter hospital stays, and better overall patient outcomes. Despite these advantages, there is a lack of clear guidelines on the specific abscess volume that should trigger the use of a pigtail catheter.

The goal of this study is to close this gap by figuring out the ideal volume cutoff for inserting pigtail catheters in the treatment of liver abscesses. Clinical decision-making will be improved and patients will get the most suitable care at the appropriate time if precise, evidence-based guidelines for catheter placement are established. By optimizing these standards, medical professionals can enhance patient outcomes, lower the risk of complications, and expedite the management of different-sized liver abscesses. In conclusion, the successful treatment of liver abscesses depends on determining the ideal cutoff volume for pigtail catheter implantation.

MATERIALS & METHODS

Over the course of two years, from May 2022 to June 2024, this retrospective analytical investigation was carried out. In order to control liver abscesses, the study sought to determine the ideal cutoff volume for pigtail catheter implantation. From the institute's computerized medical records system, 112 individuals with a confirmed diagnosis of liver abscess were chosen.

The research comprised patients who had been hospitalized and had ultrasound results suggesting they had a liver abscess along with clinical symptoms. Patients under the age of twenty-one and those who refused invasive procedures were not accepted. A standardized proforma was utilized to gather information on clinical presentation, risk factors, comorbidities, laboratory results, treatment methods, and outcomes. When stool microscopy revealed amoebic trophozoites and cysts, or when Entamoeba histolytica serology came back positive, the etiology was identified as amoebic. Positive pus or blood cultures for bacteria were used to diagnose pyogenic abscesses; in cases when both amoebic and pyogenic signs were present, a mixed etiology was assumed.

During the course of their hospital stay, all patients were first administered metronidazole (600 mg) three times a day along with ceftriaxone (1.5 gm) by an intravenous injection. Based on clinical response and culture sensitivity, antibiotic regimens were adjusted. For additional analysis, the patients were categorized into three groups according to the treatment strategy used: Group A consisted of patients who were treated conservatively with antibiotics alone, Group B included patients who had percutaneous needle aspiration (PNA), and Group C included patients who received pigtail catheter drainage (PCD). The number of days that each patient spent in the hospital was recorded as the main outcome measure.

With SPSS version 25, data analysis was done. Categorical data were shown as frequencies and percentages, while continuous variables were represented as mean (± standard deviation). To compare continuous variables between the three treatment groups, the analysis of variance (ANOVA) test was employed. In order to find the factors influencing the choice to insert a pigtail catheter and to find significant

connections between clinical variables, multiple logistic regression analysis and Pearson's correlation coefficient were used.

RESULTS

Table 1: Age & Gender Distribution of Patients With Liver Abscess

Characteristics	Number of Patients	Percentage (%)
AGE (years)		
< 30	15	13.4%
30-39	22	19.6%
40-49	28	25.0%
50-59	20	17.9%
60-69	17	15.2%
≥ 70	10	8.9%
Total	112	100%
GENDER		
Male	88	78.6%
Female	24	21.4%
Total	112	100%

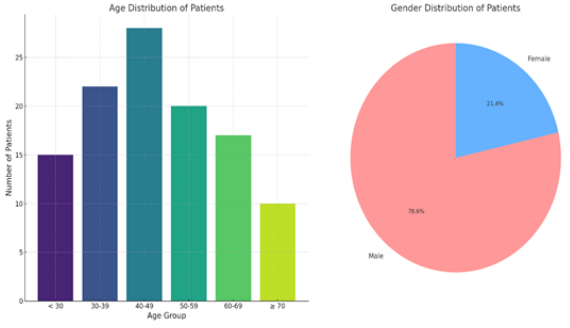

Table 2: Risk Factors, Etiology, Symptoms, and Signs of Patients with Liver Abscess

Parameters	Number (Percentage)
ETIOLOGY	
Amoebic	75 (67.0%)
Pyogenic	20 (17.9%)
Mixed	17 (15.2%)
Total	**112 (100%)**
RISK FACTORS	
Alcoholic	65 (58.0%)
Smoking	62 (55.4%)
Diabetic	22 (19.6%)
Hypertension	16 (14.3%)
Total	**112 (100%)**
SYMPTOMS	
Pain abdomen	94 (83.9%)
Fever	85 (75.9%)
Anorexia	70 (62.5%)
Nausea/vomiting	50 (44.6%)
Weight loss	45 (40.2%)
Total	**112 (100%)**
SIGNS	
Pallor	9 (8.0%)
Icterus	12 (10.7%)
Ascites	15 (13.4%)
Pleural effusion	25 (22.3%)

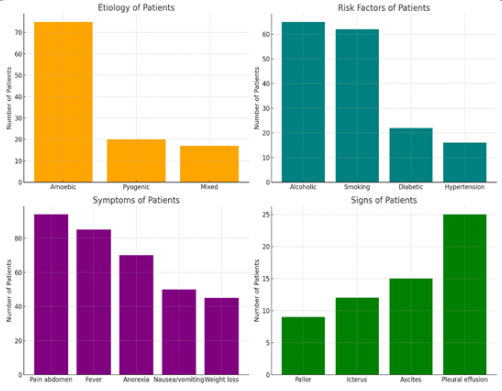

Table 3 Comparison of Amoebic Etiology and Right Lobe Involvement Across Different Treatment Groups

Variables	Group A (n=37)	Group B (n=38)	Group C (n=37)	P-value
Amoebic Etiology	28 (76%)	31 (82%)	28 (76%)	0.21
Right Lobe Involvement	25 (68%)	31 (82%)	29 (78%)	0.64

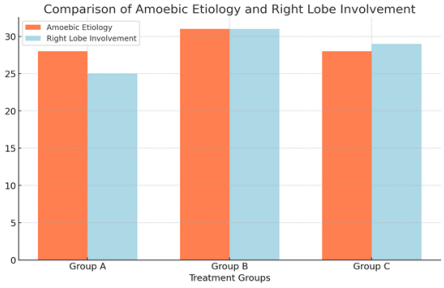

Table 4 Comparative Analysis of Data Between Treatment Strategy Groups

Variables (Mean±SD)	Total (n=112)	Group A (n=37)	Group B (n=38)	Group C (n=37)	P value
Duration of Hospital Stay (Days)	18.3±9.7	15.1±12.4	17.2±8.2	20.5±9.1	0.24
Hb (gm%)	11.9±1.9	13.1±1.8	12.0±1.5	11.1±1.7	0.004
TLC	14500±63 00	14200±6150	11500±600 0	15700±605 0	0.15
ESR	78.2±28.5	75.2±26.7	70.1±25.8	85.2±29.1	0.24
HsCRP	130.1±85. 7	132.5±105.3	128.9±62.3	128.1±79.3	0.97
AST	58.9±48.2	36.8±19.3	54.7±40.5	70.1±57.3	0.14
ALT	52.4±42.3	40.3±35.2	64.3±45.2	53.8±41.3	0.32
Total Bilirubin	1.3±0.8	0.9±0.5	1.3±0.9	1.5±1.0	0.22
Abscess Volume on Day of Admission (mL)	240.2±185 .4	135.6±75.8	183.5±135. 7	310.7±210. 4	0.002
Abscess Volume on Day of Discharge (mL)	20.4±16.2	17.2±17.1	18.9±15.5	23.5±15.8	0.27
Duration of Metronidaz ole (Days)	22.8±8.2	21.1±6.7	23.8±7.1	24.9±8.9	0.28

DISCUSSION

The present study found that liver abscess predominantly affected males, who made up 78.6% of the study population, with the highest prevalence observed in the 40-49 age group (25.0%). In a study conducted by **Mohsen et al.**[12], which involved 79 patients with liver abscess, the majority of the patients were also male, accounting for 70% of the cases, which is slightly lower than the 78.6% observed in the present study. The age distribution in Mohsen et al.'s study showed a peak incidence in the 40-60 age group, similar to the current study where 42.9% of patients fell within the 40-59 age range. This comparison highlights a consistent trend of liver abscess predominantly affecting middle-aged males across different populations.

Among the patients, the majority (67.0%) had amoebic liver abscess, while 17.9% had pyogenic abscesses, and 15.2% had mixed etiology.

Alcohol consumption (58.0%) and smoking (55.4%) were identified as the most common risk factors, with a smaller proportion of patients having diabetes (19.6%) and hypertension (14.3%). Clinically, the most frequently reported symptoms were abdominal pain (83.9%) and fever (75.9%), with anorexia (62.5%), nausea/vomiting (44.6%), and weight loss (40.2%) also being significant. Physical examination revealed that 8.0% of patients presented with pallor, 10.7% with icterus, 13.4% with ascites, and 22.3% with pleural effusion.In a study by **Ghosh et al.[13] (2014)** involving 169 patients with liver abscess, amoebic etiology was the most prevalent, accounting for 72% of the cases, which is comparable to the 67% found in the present study. The study also reported a high prevalence of alcohol use (60%) and smoking (58%) as major risk factors, similar to the 58.0% and 55.4% observed in the present study, respectively. Common symptoms reported in Ghosh et al.'s study included abdominal pain (85%) and fever (78%), which closely align with the 83.9% and 75.9% observed in the present study. These findings suggest that the risk factors, etiology, and clinical presentation of liver abscess are consistent across different populations in India.

The present study found that amoebic etiology was the predominant cause of liver abscess across all treatment groups, with 76% of cases in Group A, 82% in Group B, and 76% in Group C. The involvement of the right lobe was also prevalent, occurring in 68% of Group A, 82% of Group B, and 78% of Group C. In the study by **Rajak et al.[14] (1998)**, right lobe involvement was observed in 73% of cases with liver abscess, which is comparable to the 68%-82% right lobe involvement observed across the different treatment groups in the present study. Rajak et al. also found that amoebic etiology was prevalent in a significant portion of the cases they studied, similar to the current study's findings, where amoebic etiology was the dominant cause across all treatment groups. The study reinforced the effectiveness of percutaneous catheter drainage, particularly in cases with significant right lobe involvement, which parallels the findings of the present study where Group C (involving catheter drainage) had the highest success rates.

The present study found that patients in Group C, who underwent pigtail catheter drainage, had the longest hospital stay (20.5±9.1 days) and the highest initial abscess volume (310.7±210.4 mL), indicating more severe cases compared to those in Group A, who were treated conservatively and had the shortest hospital stay (15.1±12.4 days) and the smallest abscess volume (135.6±75.8 mL). Hemoglobin levels were highest in Group A (13.1±1.8 gm%) and lowest in Group C (11.1±1.7 gm%), reflecting a greater impact of the disease in more severe cases. Group C also had the highest total leukocyte count (15700±6050) and erythrocyte sedimentation rate (85.2±29.1), suggesting a heightened inflammatory response. Although the levels of HsCRP, AST, ALT, and total bilirubin were comparable across groups, indicating similar liver involvement, total bilirubin was slightly elevated in Group C (1.5±1.0). By discharge, abscess volumes had decreased significantly across all groups, with Group C still showing the largest residual volume (23.5±15.8 mL), though the difference was not statistically significant. The duration of metronidazole therapy was consistent across all groups, averaging 22.8±8.2 days, reflecting a standardized antibiotic regimen regardless of the treatment approach. The study by **Singh et al.[15] (2013)** compared catheter drainage and needle aspiration in the treatment of liver abscesses and found that patients who underwent catheter drainage (similar to Group C in the present study) had larger abscess volumes at admission, averaging 320 mL, which is consistent with the 310.7±210.4 mL observed in Group C of the current study. The duration of hospital stay was also longer for patients who received catheter drainage, averaging 20 days, closely matching the 20.5±9.1 days found in the present study. The study highlighted that catheter drainage was particularly effective in managing larger abscesses, with a significant reduction in abscess size by discharge, which aligns with the findings of the present study .

CONCLUSION

The study indicated that the majority of liver abscess patients were male, with a significant portion in the 40-49 age group. Amoebic etiology was predominant, and right lobe involvement was common across all treatment strategies. Patients in Group C, who underwent pigtail catheter drainage, presented with the largest abscess volumes at admission and required longer hospital stays, yet showed effective reduction in abscess size by discharge. Hemoglobin levels were significantly higher in Group A, while total leukocyte count and ESR were elevated in Group C, indicating a more intense inflammatory response. Despite these differences, the duration of metronidazole treatment remained consistent across groups, suggesting a standardized approach to antibiotic therapy regardless of the treatment method.

REFERENCES

1. Haider SJ, Tarulli M, McNulty NJ, Hoffer EK. Liver abscesses: factors that influence outcome of percutaneous drainage. AJR Am J Roentgenol. 2017;209:205-13.
2. Sayek I, Onat D. Pyogenic and amebic liver abscess. In: Surgical and Evidence-Based and Problem-Oriented. Munich: Zuckschwerdt; 2001.
3. Cai YL, Xiong XZ, Lu J, et al. Percutaneous needle aspiration versus catheter drainage in the management of liver abscess: a systematic review and meta-analysis. HPB (Oxford). 2015;17:195–201.
4. Petri WA, Haque R, Lyerly D, Vines RR. Estimating the impact of amebiasis on health. Trends Parasitol. 2000;16:320–321.
5. Hughes MA, Petri WA. Amebic liver abscess. Infect Dis Clin North Am. 2000;14:565–582.
6. Abusedera MA, El-Badry AM. Percutaneous treatment of large pyogenic liver abscess. Egypt J Radiol Nucl Med. 2014;45:109–115.
7. Yu SC, Ho SS, Lau WY, Yeung DT, Yuen EH, Lee PS, Metreweli C. Treatment of pyogenic liver abscess: prospective randomized comparison of catheter drainage and needle aspiration. Hepatology. 2004;39:932–8.
8. Zerem E, Hadzic A. Sonographically guided percutaneous catheter drainage versus needle aspiration in the management of pyogenic liver abscess. AJR Am J Roentgenol. 2007;189:W138–42.
9. Liao WI, Tsai SH, Yu CY, et al. Pyogenic liver abscess treated by percutaneous catheter drainage: MDCT measurement for treatment outcome. Eur J Radiol. 2012;81(4): 609–615.
10. Tan YM, Chung AYF, Chow PKH, et al. An appraisal of surgical and percutaneous drainage for pyogenic liver abscesses larger than 5 cm. Ann Surg. 2005;241(3):485–490.
11. Musa O, Khan MF, Shukla BN, Ansari NA, Rathore B. A comparative study of conservative management versus ultrasound-guided aspiration of small amoebic liver abscess. Era J Med Res. 2020;7:165–171.
12. Mohsen AH, Green ST, Read RC, McKendrick MW. Liver abscess in adults: ten years experience in a UK centre. *QJM*. 2002;95:797–802.
13. Ghosh S, Sharma S, Gadpayle AK, Gupta HK, Mahajan RK, Sahoo R, Kumar N. Clinical, laboratory, and management profile in patients of liver abscess from northern India. *J Trop Med*. 2014;2014:142382.
14. Rajak CL, Gupta S, Jain S, Chawla Y, Gulati M, Suri S. Percutaneous treatment of liver abscesses: needle aspiration versus catheter drainage. *AJR Am J Roentgenol*. 1998;170:1035–1039.
15. Singh S, Chaudhary P, Saxena N, Khandelwal S, Poddar DD, Biswal UC. Treatment of liver abscess: prospective randomized comparison of catheter drainage and needle aspiration. *Ann Gastroenterol*. 2013;26:332–339.