

Exploring disease parameters and clinical outcomes in pyogenic liver abscess in a tertiary center in Chitwan

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ABSTRACT

Introduction: Pyogenic liver abscess (PLA) remains a clinically significant condition, despite advancements in imaging, microbiology, and minimally invasive interventions, challenges persist due to variable pathogens, rising antibiotic resistance, and various treatment modalities. The study was conducted to characterize disease parameters and treatment outcomes of PLA in patients presenting to a tertiary center in Chitwan, Nepal. **Methods:** A retrospective observational study was conducted at College of Medical Sciences Teaching Hospital, Bharatpur, Nepal, analyzing patients diagnosed with PLA from November 1, 2021 to October 31, 2024. Data were collected on demographics, clinical presentations, laboratory findings, microbiological isolates, radiological characteristics, and treatment modalities. **Results:** A total of 34 patients were included, with a mean age of 65.06±16 years and a male predominance 25(73.53%). The right hepatic lobe was involved in 23(67.6%) of cases, left-lobe in 7(20.6%) and both lobes in 4(11.8%). Microbiological cultures were positive in 21(55.9%) of cases, with *Klebsiella pneumoniae* 7(20.58%), followed by *Escherichia coli* 4(11.76%) and *Bacteroides* spp 2(2.94%), suggesting an enterobiliary source in select cases. Antibiotic therapy alone was successful in 6(17.6%) of cases. Percutaneous image-guided drainage was performed in 14(41.2%) of cases, while surgical intervention was required in 14(41.2%) laparoscopic drainage: 8(23.5%), open surgical drainage: 6(17.6%). **Conclusions:** Percutaneous drainage remains the preferred initial approach. However, a significant proportion of patients with multiloculated abscesses, high-viscosity pus, or failed radiological drainage required surgical intervention.

Keywords: Multiloculated liver abscesses, percutaneous drainage, pyogenic liver abscess.

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INTRODUCTION

Pyogenic liver abscess (PLA) is a serious infectious disease with the potential for severe complications and mortality, if left untreated. Despite advancements in medical and surgical management, it remains a significant health concern.

The pathogenesis of PLA is primarily attributed to bacterial seeding from a biliary tree, portal vein, and other sources, often resulting in polymicrobial infections. *Escherichia coli* and *Klebsiella pneumoniae* are commonly implicated.¹⁻³ Although surgical therapy and antibiotic treatments have significantly reduced disease morbidity, the rising prevalence of biliary diseases, diabetes, and other comorbid conditions presents ongoing challenges.⁴ Additionally, PLA remains a significant burden, due to diverse causative etiologies, rising rates of antibiotic-resistant organisms, and disease management strategies which might not always be resolute.⁵

This paper aimed to explore the current understanding of PLA

epidemiology, pathogenesis, microbiology, evaluating treatment outcomes in a tertiary care center in central part of Nepal.

METHODS

A retrospective observational cohort study was conducted at College of Medical Sciences Teaching hospital, Bharatpur, Nepal reviewing data from within past three years duration (November 1, 2021 to October 31, 2024). Data were collected following ethical approval from the Institutional Review Committee (Ref. No. COMSTH-IRC/2024-130). A total of 34 patients, aged ≥ 18 years, admitted to the Department of Gastrointestinal and General Surgery with a diagnosis of PLA during the study period were included. Purposive sampling was used to select cases that met the eligibility criteria. The diagnosis of PLA was confirmed with the help of radiological investigations (USG/CT/MRI), blood investigations and microbiological tests on blood and abscess specimen. All the collected blood and pus samples were processed as per standard hospital protocol.

To differentiate PLA from amoebic liver abscess (ALA), blood samples were tested for *Entamoeba histolytica* antibodies using the ELISA method, while pus samples underwent Gram staining, bacterial culture, and microscopic examination for trophozoites of *E. histolytica*. Patients with confirmed ALA were excluded from the study.

Data were collected from patient medical records using a pre-designed proforma, including patient characteristics, presenting symptoms, laboratory and radiological data, abscess number, size, and location, microbiological findings, antibiotic susceptibility tests, type of surgery, and surgical outcomes. Treatment modality was categorized based on the final successful intervention that led to clinical resolution at the time of discharge. Patients who initially received antibiotics or underwent percutaneous drainage but later required surgery were classified under the surgical intervention group. The data were checked for completeness and accuracy and the statistical analysis was expressed using proportions and percentages

RESULTS

A total of 34 patients diagnosed with liver abscess were included in the study. The mean age was 65.06 ± 16 years, with a male predominance 25(73.53%). The most common comorbidity was type 2 diabetes mellitus 20(58.8%). (Table 1)

Table 1: Demographic data

Parameters	Frequency n(%)
Sex	
Male	25(73.5%)
Female	9(26.5%)
Comorbidities	
DM type 2	20(58.8%)
Biliary disease	14(41.8%)
Cirrhosis/CKD	6(17.6%)
Cholangiocarcinoma	1(2.9%)
Lab investigation alteration	
WBC count	17(50%)
Bilirubin	18(52.9%)
Transaminases	22(64.7%)
Alkaline phosphatase	24(70.6%)
Hypoalbuminemia	13(38.2%)

Laboratory investigations showed leukocytosis in 17(50%) of cases, elevated bilirubin in 18(52.9%), transaminase elevation in 22(64.7%), and alkaline phosphatase elevation in 24(70.6%). Hypoalbuminemia was present in 13(38.2%). (Table 1)

The right hepatic lobe was the most commonly involved site 23(67.6%), while left-lobe involvement was observed in 7(20.6%) and bilateral abscesses in 4(11.8%). The size of the abscesses was also measured with the help of radiological investigations, 10(29.4%) were < 5 cm, 21(61.8%) measured 5 to 10 cm, and 3(8.8%) were > 10 cm. (Table 2)

Table 2: Abscess characters

Site	Frequency (n)	Percentage (%)
Right	23	67.6%
Left	7	20.6%
Bilateral	4	11.8%
Size(in cm)		
Lesion < 5 cm	10	29.4%
Lesion 5-10 cm	21	61.8%
Lesion > 10 cm	3	8.8%
Microbiological isolates		
Klebsiella pneumoniae	7	20.6%
E.coli	4	11.8%
Staphylococcus aureus	3	8.8%
Enterococcus spp	2	5.9%
Streptococcus spp.	2	5.9%
Bacteroides spp.	2	5.9%
Pseudomonas aeruginosa	1	2.9%

Microbiological data were also obtained from culture on samples taken from abscess during drainage and or from blood culture. These were positive in 55.9%, with *Klebsiella pneumoniae* 7(20.6%) being the most frequently isolated pathogen. Other isolates included *Escherichia coli* 4(11.8%), *Staphylococcus aureus* 3(8.8%), *Enterococcus* spp. 2(5.9%), *Streptococcus* spp. 2(5.9%), *Bacteroides* spp. 2(5.9%), and *Pseudomonas aeruginosa* 1(2.9%).

A total of six patients 6(17.6%) were managed with antibiotic therapy alone. Percutaneous image-guided drainage was performed in 14(41.2%) patients, while

surgical intervention was required in 14(41.2%) patients, including laparoscopic surgical drainage in 8(23.5%) patients (Figure 1) and open surgical drainage in 6(17.6%) patients. (Table 3)



Figure 1: Intra-operative laparoscopic view while performing laparoscopic drainage of liver abscess

Table 3: Treatment modalities

Treatment	n(%)
Antibiotic therapy only	6(17.6%)
Percutaneous image-guided drainage	14(41.2%)
Open Surgical drainage	6(17.6%)
Laparoscopic Surgical drainage	8(23.5%)

The mean hospital stay was 10.2±3.6 days for those who were treated with antibiotic only, 8.3±5.2 days for those undergoing radiological intervention, 14±4 days for open surgical drainage, 7.1±4 days for laparoscopic drainage. The overall mean hospital stay was 9.9±4.3 days.

DISCUSSION

Liver abscess remains a clinically significant entity with varied etiologies and management approaches. This study presents a comprehensive analysis of demographic patterns, abscess characteristics, microbiological trends, and treatment outcomes in a cohort of 34 patients.

The mean age (65.06±16 years) and male predominance (73.53%) observed in this study align with regions, Southeast Asia and Central Europe,^{6,7} where liver abscess predominantly affects middle-aged and elderly males due to higher exposure to risk factors such as alcohol use, hepatobiliary disease, and diabetes.

Type 2 diabetes mellitus, was present in 58.8% of our cohort, identifying as a major comorbidity, reinforcing its established role as a key predisposing factor, particularly for *Klebsiella pneumoniae*-associated liver abscesses. These findings are consistent with those reported by previous studies.⁷⁻⁹ The low incidence of cholangiocarcinoma in this study raises the possibility that patients with malignancy-associated liver abscesses were underrepresented. This may be due to the presence of a dedicated cancer hospital

in the region, which serves as a major referral center for oncologic cases, potentially diverting such patients away from our institution.

Klebsiella pneumoniae was the predominant isolate in our cohort study, which is consistent in Asian populations, where *Klebsiella*-associated liver abscesses are more prevalent than polymicrobial or enteric-origin abscesses.^{7,10,11} *Escherichia coli* was the second most common pathogen, among other microbiological isolates 2(5.9%) cases of *Bacteroides* spp. identified support for a strong polymicrobial entero-biliary origin in a significant subset of cases.

The right hepatic lobe was the most frequently involved site (67.6%), Left-lobe abscesses are traditionally associated with higher complication risks (rupture, pericardial spread) and are more likely to require aggressive intervention.¹⁰

In this study, only six out of 10(60%) small abscesses of size <5 cm, were successfully treated with antibiotics alone, while the remaining three required percutaneous drainage. These cases were symptomatic, refractory to antibiotics, and not amenable to conservative management, necessitating an interventional approach.

Tan et al.⁵ reported better success with pigtail catheter drainage for liver abscesses compared to other surgical approaches. In our experience, larger(>5 cm) and multiloculated abscesses, as well as those requiring more than two episodes of pigtail drainage, often necessitated surgical intervention. Exploratory laparotomy and drainage were required in 17.64% of cases, primarily in patients presenting with features of peritonitis and sepsis. Additionally, laparoscopic drainage was performed in eight cases, providing a minimally invasive alternative in select patients.

Despite advancements in minimally invasive drainage, their effectiveness remains variable, often necessitating surgical intervention. Surgery remains crucial, particularly in cases of failed percutaneous drainage or complex abscesses. Factors such as multiloculation hyperviscous pus, and patient factors comorbidities (diabetes, biliary disease) contribute to treatment failure. In such cases, repeat drainage or surgery is required. In our experience, laparoscopic drainage provides a viable minimally invasive alternative for refractory cases.

Since our findings suggested that, in our setting, surgical approaches played a crucial role in achieving successful treatment especially where percutaneous methods were

insufficient. Further research is needed to establish standardized protocols for managing refractory PLA cases and optimizing treatment outcomes.

The limitations of this study are the small sample size, and a single institute study cannot be generalized to a broader population. Absence of a long-term follow-up restricts our ability to evaluate delayed complications, and long-term efficacy of different treatment approaches. Patients with complex abscesses requiring surgery may be overrepresented because simpler cases may be treated at smaller hospitals.

CONCLUSIONS

This study highlights the epidemiological patterns, microbiological trends, and management outcomes of pyogenic liver abscess in a tertiary care setting. Diabetes mellitus and biliary disease remain the primary predisposing factors, with *Klebsiella pneumoniae* as the predominant pathogen, reinforcing the importance of early microbiological diagnosis and targeted antibiotic therapy. While percutaneous drainage remains the preferred initial approach; a significant proportion of patients with large size, multiloculated abscesses, high-viscosity pus, or failed radiological drainage required surgical intervention.

CONFLICTS OF INTEREST: None declared

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AUTHORS' CONTRIBUTIONS

SB conceived the study, designed the methodology, collected and analyzed the data, and prepared the initial draft of the manuscript. BT and SBP provided critical guidance throughout the study design and data interpretation, and contributed significantly to manuscript revision and intellectual content. All authors reviewed and approved the final version of the manuscript.

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