



General Surgery

A PROSPECTIVE CLINICAL STUDY OF VARIOUS TREATMENT MODALITIES IN MANAGEMENT OF LIVER ABSCESS- A SINGLE TERTIARY CARE CENTRE EXPERIENCE

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ABSTRACT Liver abscesses are localized collections of pus within the liver parenchyma, caused by bacterial, parasitic, or fungal infections. They present a significant diagnostic and therapeutic challenge due to their variable etiology and clinical manifestations. This paper reviews the types of liver abscesses, underlying etiologies, diagnostic approaches, and current management strategies including medical therapy, percutaneous drainage, and surgical interventions. Emphasis is placed on the choice of treatment based on abscess characteristics and patient response.

KEYWORDS : Liver abscess, Pyogenic liver abscess, Amoebic liver abscess, Drainage, Management

INTRODUCTION

A liver abscess is a localized collection of pus within the liver parenchyma caused by infection. Relatively common, it represents a serious and potentially life-threatening condition that requires prompt diagnosis and treatment. The condition was first described in ancient times, but its understanding and management have significantly evolved with advancements in imaging, microbiology, and minimally invasive therapies.

Liver abscesses are broadly categorized into three main types based on etiology: pyogenic liver abscess (PLA), amoebic liver abscess (ALA), and fungal liver abscess, with PLA being the most prevalent in developed countries and ALA more common in developing nations, particularly in tropical and subtropical regions. According to Harrison's Principles of Internal Medicine, the global incidence of PLA ranges from 1.1 to 2.3 cases per 100,000 population per year, while the prevalence of ALA can be as high as 10% in endemic regions due to poor sanitation and high rates of *Entamoeba histolytica* infection. Among the developing countries worldwide, India has 2nd highest incidence of liver abscess. Of all the visceral abscesses, the liver accounts for 48%. It is prevalent in India, accounting for 2nd largest prevalence owing to insufficient sanitation, overcrowding, and malnutrition. Each year 40-50 million people worldwide get amoebic abscesses. In endemic places, infection prevalence is more than 5%-10%.

The pathogenesis of liver abscesses involves the invasion of pathogens into the liver via the biliary tract, portal vein, hepatic artery, or by direct extension from adjacent structures. In pyogenic cases, the most common route is ascending infection from the biliary tree, particularly in the presence of biliary obstruction, stones, or malignancy. Conversely, ALA typically results from hematogenous dissemination of trophozoites from the intestinal lumen via the portal venous system.

Clinically, patients may present with nonspecific symptoms such as fever, malaise, and right upper quadrant abdominal pain, which often leads to delays in diagnosis. As emphasized in Bailey & Love's Short Practice of Surgery, early recognition is essential, as untreated liver abscesses may rupture into surrounding structures or result in systemic sepsis, both of which carry high mortality risks.

Recent years have witnessed a shift in management paradigms from traditional open surgical drainage to image-guided percutaneous techniques and targeted antimicrobial therapy. These modern modalities have significantly improved patient outcomes, reduced morbidity, and shortened hospital stays.

This paper aims to review the current understanding of liver abscesses, explore their various etiologies, and discuss the different management modalities with a focus on their indications, effectiveness, and outcomes.

Etiology And Pathogenesis

Liver abscesses are commonly classified into pyogenic, amoebic, and fungal types based on their causative organisms.

Pyogenic liver abscesses (PLA) are typically caused by bacterial pathogens such as *Escherichia coli*, *Klebsiella pneumoniae*, *Streptococcus* species, and anaerobes. These organisms may enter the liver via the biliary tract, the portal vein from gastrointestinal infections, or the systemic circulation. Risk factors include biliary tract diseases, diabetes mellitus, malignancies, and immunosuppression.

Amoebic liver abscesses (ALA), caused by *Entamoeba histolytica*, are more prevalent in developing countries. Infection is acquired through ingestion of cysts in contaminated food or water, which leads to intestinal colonization and subsequent hematogenous spread to the liver via the portal circulation.

Fungal liver abscesses are relatively rare and typically seen in immunocompromised individuals, such as those with neutropenia or undergoing chemotherapy. *Candida* species are the most commonly implicated fungi in these cases.

Clinical Presentation

Patients with liver abscesses commonly present with nonspecific symptoms that can delay diagnosis. The most frequent symptoms include fever, chills, right upper quadrant abdominal pain, nausea, vomiting, malaise, anorexia, and weight loss. In severe cases, jaundice or septic shock may occur.

Physical examination may reveal hepatomegaly, tenderness over the liver area, and signs of systemic infection. Laboratory findings typically show leukocytosis, elevated inflammatory markers (ESR, CRP), and abnormal liver function tests. Blood cultures may be positive in PLA, while serological tests such as the indirect hemagglutination assay are valuable in diagnosing ALA.

Diagnosis

Imaging studies are essential for diagnosing liver abscesses. Ultrasonography is typically the initial imaging modality due to its availability and non-invasive nature. It can identify the size, number, and location of abscesses. However, contrast-enhanced computed tomography (CT) offers greater sensitivity and provides more detailed anatomical information, which is critical for planning interventions.

Aspiration of the abscess under imaging guidance allows for microbiological analysis and culture, which aids in identifying the causative organisms and tailoring antibiotic therapy. In ALA, stool microscopy and serological tests for *E. histolytica* antibodies are also informative.

Management Modalities

The management of liver abscesses involves a combination of antimicrobial therapy, percutaneous drainage, and surgical intervention, depending on the type, size, number of abscesses, and the patient's clinical status.

Medical Therapy

Empiric broad-spectrum antibiotics are initiated in PLA and later adjusted based on culture results. Common regimens include a third-

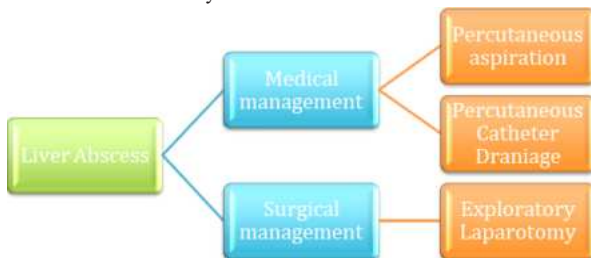
generation cephalosporin with metronidazole or piperacillin-tazobactam. For ALA, metronidazole is the treatment of choice, usually followed by a luminal agent such as paromomycin to eradicate intestinal colonization.

Percutaneous Drainage

Image-guided percutaneous drainage is effective for abscesses larger than 5 cm or those not responding to medical therapy. Techniques include needle aspiration and pigtail catheter drainage, with the latter preferred for large or multiloculated abscesses.

Surgical Intervention

Surgical drainage is indicated for abscesses that fail to respond to conservative measures or in the presence of complications such as rupture, peritonitis, or associated intra-abdominal pathology. Laparoscopic approaches are increasingly favored over open surgery due to reduced morbidity.



AIMS AND OBJECTIVES-

- To study the demographic profile of patients.
- To study the risk factors associated with liver abscess.
- To study the microbiota diversity in liver abscess.
- To study etio-pathogenesis & predisposing factors of liver abscess.
- To study the spectrum of clinical presentation.
- To evaluate efficacy of ultrasonographic studies in determining the etiology which may change the treatment outcome.
- To study the effectiveness of different modalities of management.
- To compare various treatment modalities of liver abscess; and to find out the outcome & effectiveness.
- To improve awareness for early diagnosis of this disease.

Methods Of Collection Of Data-

- Study Design- Prospective Clinical Study.
- Place of study- L.N. Medical College & JK hospital Bhopal (M.P.)
- Study sample size- 50 patients
- Study period of - 1 year (February 2024 to February 2025)
- Selection criteria- First 50 Patients admitted with liver abscess during the period of study.

F. Source of Study

All Patients of liver abscess presenting to the surgery OPD or Casualty of JK Hospital & referred from medical wards of JK hospital or referred from outside diagnosed as case of liver abscess clinical /Sonological/CECT features of liver abscess.

Inclusion Criteria-

- All cases of liver abscess diagnosed clinically and/ Ultra sonographically/ CECT abdomen finding.

Exclusion Criteria

Patients with abdominal or biliary surgery, abdominal neoplasms, other cystic swelling of the liver, Traumatic Liver Abscess and patient lost in follow-up were excluded.

After getting clearance from the Ethical Committee and informed written consent in the native language of the patient, details of the patients who are diagnosed with liver abscess and managed with different treatment modalities like conservative, ultrasonographic needle aspiration and pigtail catheterization and exploratory laparotomy.

Statistical analysis was done with SPSS 21 software and data analysis was done with Student t test, P value less than 0.05 was significant.

MEDICAL MANAGEMENT-

Cases with abscess cavity <5 cm were treated by drug therapy alone/ Percutaneous aspiration.

Drugs given-Empirical coverage provided until causative organism has been found or amoebic serology testing is negative.

Commonly Used Antibiotic Regimens Include-

- intravenous ceftriaxone plus sulbactam 1.5g 12hrly & i.v. metronidazole 500 mg 8hourly
- intravenous piperacillin and tazobactam (4.5 gram every 6 h) plus i.v. metronidazole 500 mg 8hourly

Indication for intervention-

Failures to relieve symptoms within 3 to 4 Days were treated by percutaneous aspiration.

- Abscess cavity <5 cm- medical management/percutaneous Aspiration.
- Abscess cavity >5 cm, were treated by percutaneous catheter drainage.
- Bilateral abscess cavities that were small and multiple were managed by medical treatment and when any one of the cavity is >5 cm, it was managed by percutaneous catheter drainage.
- Abscess cavities restricted to left lobe were treated by drug therapy if they were multiple and <5cm; if >5cm and single were managed either by percutaneous aspiration or by percutaneous drainage.

POST PER CUTANEOUS CATHETER DRAINAGE-

Patients were on i.v. metronidazole for three days initially or till the fever subsided. Later oral metronidazole is given and continued if patient had persisting symptoms after 3 to 4 days of aspiration.

criteria adopted for removal of PCD-

- If the quantity is <30ml in 24hrs.
- If the drain content is not purulent.
- USG whole abdomen was repeated to look for decrease in cavity size.

It is observed that treatment failure is more common in patients undergoing percutaneous drainage than surgery incases with abscesses > 5cm.

Exploratory laparotomy was performed in following clinical scenarios

- In cases with multiple or multiloculated abscesses, the considering the number, size, and accessibility of abscesses.
- In cases with peritonitis.
- Abscess rupture.
- Large abscess at a difficult anatomical site,
- If the patient requires surgery for some other indication.
- Various studies have shown that large multi loculated abscesses of more than 5 cm have better outcomes with surgical drainage than percutaneous drainage.



Anchovy Sauce Pus drained from Amoebic Liver Abscess

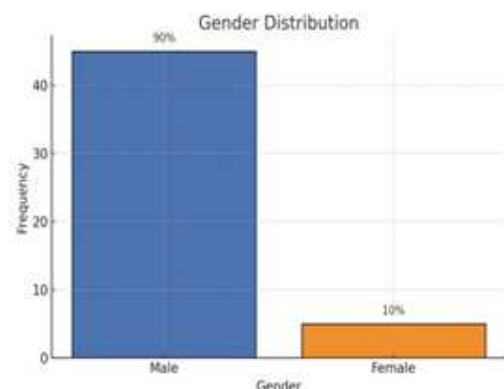


Figure 1- Graph showing Gender Distribution in study sample.



Figure 2- USG findings of Liver Abscess patients

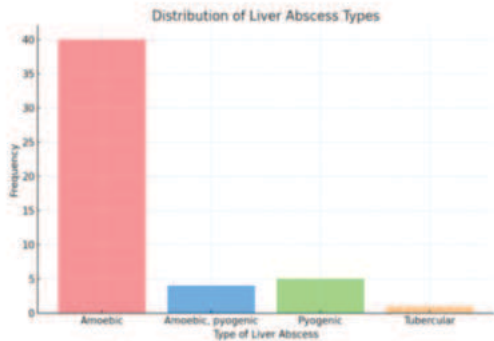


Figure 3- Graph showing distribution of types of Liver abscess

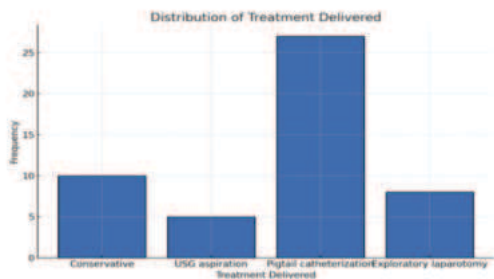


Figure 4 - Bar diagram showing type of treatment modalities used in management of liver abscess.

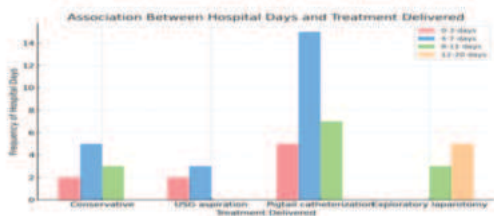


Figure 5 - Graph showing association between type of treatment modality used and number of days of stay in hospital

DISCUSSION

Liver abscesses represent a significant clinical entity with potentially life-threatening consequences if not promptly managed. The present study provides insight into the demographic profile, clinical spectrum, microbiological diversity, and treatment outcomes of liver abscess cases managed at a tertiary care center in India.

Consistent with global literature, this study reaffirms that pyogenic and amoebic liver abscesses remain the most common types, with pyogenic abscesses often associated with comorbid conditions such as diabetes and biliary pathology (Harrison *et al.*, 2022). Amoebic liver abscesses showed a higher prevalence in the study population, reflective of the endemic nature of *Entamoeba histolytica* infections in India, due to suboptimal sanitation, overcrowding, and limited access to clean drinking water (Sharma & Ahuja, 2006).

The clinical presentations were consistent with established literature—fever, right upper quadrant pain, and hepatomegaly were the dominant features (Williams *et al.*, 2022). Imaging, particularly ultrasonography and CECT, played a pivotal role in both diagnosis and

treatment planning. Ultrasonography was effective in identifying the size and location of abscesses, with CECT providing detailed anatomic delineation when necessary.

Management strategies were individualized based on abscess size and patient response. Medical management alone was successful for smaller abscesses (<5 cm), while larger or unresponsive abscesses warranted image-guided percutaneous interventions. The findings support prior studies advocating percutaneous catheter drainage for abscesses >5 cm (Cheng *et al.*, 2000). Notably, treatment failures were more common in patients managed with percutaneous drainage for large or multiloculated abscesses. In such cases, surgical intervention, including exploratory laparotomy, was necessary—highlighting the importance of considering abscess complexity and accessibility in planning the appropriate intervention (Ochsner *et al.* 1938).

This study emphasizes the need for early diagnosis, especially in endemic regions, and supports a tailored approach to management based on imaging and clinical response. The correlation between abscess size and treatment outcomes reinforces existing clinical guidelines and encourages more aggressive intervention in non-resolving cases.

CONCLUSION

Liver abscess remains a prevalent and serious health concern in tropical countries like India, where amoebic etiology is dominant. Prompt diagnosis using ultrasonography and/or CECT, followed by appropriate management—ranging from medical therapy to percutaneous or surgical drainage—can significantly reduce morbidity and mortality. This prospective study demonstrated that individualized treatment protocols based on abscess size, location, and response to therapy yield favorable outcomes. However, cases involving large, multiloculated, or complex abscesses often necessitate surgical intervention. Strengthening diagnostic capabilities and enhancing awareness about early symptoms are key to improving outcomes. Further large-scale, multicenter studies are recommended to standardize treatment protocols and reduce regional disparities in liver abscess management.

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