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Review Article

An Update on Current Management of Liver Abscess: Review Article

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Abstract: Liver abscess is a rare condition that can be divided into amoebic liver abscess and pyogenic liver abscess. The diagnosis is confirmed by performing an ultrasound or computerized tomography. The management of liver abscesses has seen a trend toward minimally invasive procedures like percutaneous drainage and intravenous antibiotics. Percutaneous drainage can be divided into percutaneous catheter drainage and percutaneous aspiration. Surgical drainage can be divided into open and laparoscopic drainage. In this chapter, we will look at the management of liver abscesses, especially the role of percutaneous drainage, which includes percutaneous catheter drainage, percutaneous aspiration, and surgical drainage.

Keywords: "Amoebic liver abscess"," Liver abscess"," Laparoscopic drainage" Pyogenic liver abscess", "Percutaneous catheter drainage"," Percutaneous aspiration", and "Open drainage".

INTRODUCTION

Liver abscess is a rare but potentially dangerous condition that is associated with significant morbidity and mortality. The liver abscess can be divided into pyogenic liver abscess and amoebic liver abscess. Pyogenic liver abscess is commonly seen in older patients and the most common causative organisms are Escherichia coli, klebsiella, and Enterococcus species. Klebsiella pneumoniae has now emerged as the most common organism that causes liver abscesses in Asia with Escherichia coli being more common in western countries. Amoebic liver abscesses are caused by entamoeba histolytica and are seen in younger patients. The typical clinical presentation is fever with chills and rigor, associated with pain over the right hypochondrium and jaundice (Lübbert *et al*., 2014). The risk factors for developing liver abscesses include increasing age, male gender, and the presence of co-morbidities like diabetes mellitus, hypertension, malignancy and cirrhosis of the liver. The diagnosis is confirmed by imaging modalities like ultrasound and computerized tomography (Bläckberg *et al*., 2023; Longworth & Han, 2015; Mavilia *et al*., 2016; Nie *et al*., 2023; Serraino *et al*., 2018).

Managing liver abscesses involves using intravenous antibiotics for two weeks and oral antibiotics for a further four weeks. The antibiotics prescribed include those that are sensitive to the more common organisms and include third-generation cephalosporins like ceftriaxone, amoxicillin/clavulanic acid, and quinolones. Metronidazole is added to protect against anaerobes and entamoeba. For abscesses that are larger than 5cm, percutaneous drainage of the abscess is considered the gold standard treatment. Percutaneous drainage can be performed by percutaneous aspiration or percutaneous catheter drainage. Surgical drainage of liver abscess is indicated if there is failure of percutaneous therapy (Kurland & Brann, 2004; Mangukiya *et al*., 2012; Wadhera *et al*., 2022).

In this article, we reviewed the role of percutaneous aspiration, percutaneous catheter drainage of liver abscess, and the role of surgical drainage of liver abscess. We conducted a literature review using PUBMED, the Cochrane database of systemic reviews, Google Scholar, and Semantic Scholar looking for randomized control trials, non-randomized trials, observational and cohort studies, clinical reviews, systemic reviews, and meta-analyses from 1990 to 2025. The following keywords were used, "liver abscess",

"pyogenic liver abscess", "amoebic liver abscess", "percutaneous catheter drainage "," Percutaneous aspiration"," open drainage" and "laparoscopic drainage". All articles were in English and were assessed by manual cross-referencing of the literature. Commentaries and case reports were excluded from this review. Adult patients were included in this study and pregnant patients and pediatric patients were excluded.

DISCUSSION

Percutaneous drainage of liver abscess

Percutaneous drainage of liver abscess is the first-line interventional procedure that is performed for patients with liver abscesses. It is associated with reduced morbidity and mortality, as well as the ability to provide a sample of pus for antibiotic culture and sensitivity. Surgical drainage is often indicated if there is a failure of percutaneous drainage (Petri *et al*., 2002; Rismiller *et al*., 2017; Sahu *et al*., 2022). Percutaneous drainage of liver abscess can be performed as percutaneous catheter drainage or as percutaneous aspiration. The size of the liver abscess is a determining factor. Abscesses larger than 5cm usually will undergo percutaneous catheter drainage, with percutaneous aspiration being reserved for absences smaller than 5cm (Malik, 2010; McNeil *et al*., 2020; Zhang *et al*., 2024).

A percutaneous randomized comparative study of percutaneous catheter drainage and percutaneous needle aspiration in the treatment of liver abscess was conducted by Ahmed *et al*., and Kulhari *et al*., Percutaneous catheter drainage had a better success rate and abscess reduction rate when compared to percutaneous needle aspiration (Ahmed *et al*., 2021; Kulhari & Mandia, 2019).A systemic review and meta-analysis of randomized control trials comparing percutaneous catheter drainage versus needle aspiration was conducted by Mahmoud *et al*., 15 studies with 1,626 patients were included in this study. Percutaneous catheter drainage was associated with a better success rate and, a 50% reduction of the abscess size and recurrence rate, The duration of hospitalization was similar between both groups (Mahmoud *et al*., 2023).

Another systemic review and meta-analysis comparing percutaneous catheter drainage versus percutaneous needle aspiration was conducted by Lin *et al*., 10 studies with 1287 patients were included in this study. This study concluded that percutaneous catheter drainage was associated with a better success rate, improved clinical outcome, and reduced duration of intravenous antibiotics (Lin *et al*., 2023). An updated systemic review and meta-analysis comparing percutaneous needle aspiration versus catheter drainage in the management of liver abscess also reported that percutaneous catheter drainage had a better success rate and 50% reduction of abscess size and clinical improvement (Al-Sayaghi *et al*., 2023). A systemic review and meta-analysis by Cai *et al*., comparing percutaneous catheter drainage versus needle aspiration also demonstrated the superiority of percutaneous catheter drainage (Cai *et al*., 2015).

One of the complications of percutaneous catheter drainage is blockage of the tube, this would require irrigation of the tube with saline, and this can be done up to three times a day. Other complications include perforation, bleeding, and subphrenic abscess formation, but overall percutaneous catheter drainage is a safe procedure (Trillos-Almanza & Restrepo Gutierrez, 2021; Webb *et al*., 2014). Some of the factors that can affect the success of percutaneous catheter drainage include the size of the abscess, a large abscess will require frequent catheter placement as catheter dislodgement is a common problem. Abscess recurrence is also associated when the output from the catheter is more than 15mls per day (Haider *et al*., 2017).

A retrospective study was conducted by Ferraioli *et al*., looking at the role of percutaneous and surgical treatment of pyogenic liver abscess. 104 patients had undergone percutaneous therapy and 44 had undergone surgical drainage. The morbidity rate was reduced in the percutaneous drainage group, and the surgical drainage group was associated with an increased length of hospital stay and cost (Ferraioli *et al*., 2008).

Patients who are present with amoebic liver abscesses usually respond to antimicrobial therapy, with the most common agent being metronidazole or tinidazole. Drainage of these types of abscesses is only indicated in less than 15% of cases and they are usually performed via percutaneous catheter drainage or percutaneous aspiration. It is commonly performed for large obsessions or those that are at risk of rupture (Usuda *et al*., 2022; Wells & Arguedas, 2004).

A systemic review and meta-analysis on the management of uncomplicated amoebic liver abscess was conducted by Kumar R *et al*., Ten studies with 570 patients were included in this study and percutaneous aspiration was associated with better results in medium to large abscesses. There was no significant difference concerning the resolution of fever and length of hospital stay. Percutaneous catheter drainage was associated with better outcomes for large amoebic liver abscesses when compared to percutaneous aspiration (Kumar *et al*., 2019).

Study	Study type	Year	N=numbers	Percutaneous catheter drainage success rate (%)	Percutaneous aspiration success rate (%)
Cai *et al*.,	Systemic review & meta-Analysis	2014	306	96.1%	77.8%
Mahmud *et al*.,	Systemic review & meta-analysis	2022	1626	96.7%	74.8%

Table showing the success rates of percutaneous catheter drainage and percutaneous aspiration for liver abscess

Surgical management of liver abscess

Surgical drainage of liver abscesses is rarely done nowadays, and it is reserved for patients who have failed percutaneous catheter drainage and intravenous antibiotics. Surgical drainage can be performed as an open or laparoscopic procedure (O'Farrell *et al*., 2010). Some of the factors that would favor surgical drainage of a liver abscess are the underlying presence of biliary disease and intra-abdominal tumor. The duration of symptoms of more than 10 days from the onset of antibiotic therapy and percutaneous drainage with no signs of improvement are indications for surgical drainage (Justo *et al*., 2023).

A systemic review of the clinical outcomes of surgical management of liver abscesses was conducted by Brnawi *et al*., Nine studies with 632 patients were included in this study. Open or laparoscopic surgical drainage was performed for patients who had a failure in percutaneous drainage of abscesses and had developed generalized peritonitis. This study showed that there was reduced mortality and length of stay in the hospital in those patients who had undergone surgical therapy (I Brnawi *et al*., 2023).

A systemic review and meta-analysis on the efficacy of laparoscopic surgery in the treatment of hepatic abscesses was conducted by Ndong *et al*., Seventeen studies with 608 patients with liver abscess underwent surgical drainage, of which 299 underwent laparoscopic drainage. The main indications were for patients who had a failure of percutaneous drainage. The abscess recurrence rate was 4.22% and there was no mortality in those patients who had undergone laparoscopic drainage of hepatic abscess. This study highlighted the feasibility of laparoscopic drainage of hepatic abscess (Ndong *et al*., 2022).

Emphysematous liver abscess

Emphysematous liver abscess is also known as a gas-forming pyogenic liver abscess, and it is predominantly seen in diabetic patients. The most common organism that causes this condition is Klebsiella pneumonia and it is seen in 30% of cases of pyogenic liver abscess. Clinical presentation is like conventional cases of liver abscess but the presence of gas in the liver can lead to pneumoperitoneum and the differential diagnosis of bowel perforation. The presence of pneumoperitoneum can mask the diagnosis of liver abscess and may lead to a laparotomy being performed. The mortality from this condition is high, and the treatment of this condition is to perform percutaneous drainage of the abscess urgently. Surgical drainage is seldom required unless there is a rupture of the abscess (Sudhakara *et al*., 2024; Thng *et al*., 2018).

CONCLUSION

The management of liver abscesses has seen a trend towards interventional surgical procedures like percutaneous catheter drainage and percutaneous aspiration. Open surgical drainage is rarely performed now. The use of percutaneous catheter drainage and antibiotics has led to a 90% success rate. Klebsiella pneumonia is now the most common organism that causes liver abscesses in Asia, while Escherichia coli is the most common organism in Western countries. The early diagnosis of liver abscesses is important as the mortality is reduced if treatment is started earlier. Laparoscopic drainage of liver abscess is slowly replacing open drainage for cases of failed percutaneous abscess drainage. The management of liver abscesses is important for the general surgeon as the morbidity and mortality will depend on the prompt diagnosis of this condition.

Conflict of Interest: There is no conflict of interest.

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