

Original research paper

# Comparative study between pigtail catheter drainage and needle aspiration in management of liver abscesses

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## Abstract

Liver abscess is a disease of frequent occurrence. Treatment modalities include both medical and surgical. However surgical drainage is the mainstay of treatment. With advent of ultrasound, percutaneous aspiration is becoming popular. Subjects from hospitals were grouped into those who underwent percutaneous aspiration and those who underwent pigtail catheter insertion. Both the groups are compared with the parameters like duration of hospital stay, duration to achieve symptomatic relief, duration of IV antibiotics required. A total of 106 subjects were studied. 52 of them underwent repeated percutaneous aspiration. 54 of them underwent pigtail catheter insertion. It is observed that pigtail catheter insertion is a better modality for larger abscess when compared to percutaneous aspiration in terms of duration of hospital stay, need for iv antibiotics and duration to achieve symptomatic relief.

**Keywords:** Liver abscess, percutaneous aspiration, pigtail, ultrasound

## Introduction

The differential diagnosis of cystic lesions of the liver includes bilomas, liver abscesses, parasitic disease, simple cysts, polycystic liver disease, biliary cyst adenoma, and cyst adenocarcinoma. An abscess is a collection of pus and contains white blood cells, dead tissue, bacteria. Liver abscess is a disease of frequent occurrence which has high mortality if not recognized early and treated. In India it's a common clinical problem.

The first description of a liver abscess is done by Hippocrates in the year 4000 BC. Ochsner's classic 1938 paper described this disease as one that occurred in young males with Pyle phlebitis, usually due to appendicitis, and resulting in liver abscess. During that time, open surgical drainage remained the treatment of choice for many years and pyogenic liver abscesses carried a case-fatality rate of 75% [1]. Recently, the predominant etiology of pyogenic liver abscess has changed to a biliary origin from Pyle phlebitis which was predominant earlier. Current reports from Asia and the United States have noted an increase in incidence of cryptogenic liver abscesses.

Amoebic liver abscess cause two third of liver abscess in developing countries [2]. The World Health Organisation reported that Entamoeba Histolytica causes approximately 50 million cases and 100,000 deaths annually [3].

The liver is probably exposed to bacterial loads from portal venous circulation on a regular basis and usually clears this load without problems. The liver abscess develops when an

inoculum of bacteria, regardless of the route of exposure, exceeds the liver's ability to clear it. The treatment for liver abscesses not only requires treatment of the abscess itself but also concomitant treatment of the source. Abscess drainage is essential for treatment in most cases. Even though only antibiotics may be curative, these patients have a higher risk of treatment failure and can lead to abscess rupture. Percutaneous aspiration carries low-risk and accurate treatment method for both K pneumonia liver abscesses and poly microbial liver abscesses. Protocols in management include confirmation by US or CT, antibiotic administration, and abscess drainage. In case of multiple small abscesses or miliary fungal abscesses this protocol need not be followed and are treated with intravenous antibiotics or anti fungals respectively [4].

Closed aspiration was advocated by McFadzean and his associates as early as in 1953, for treating solitary hepatic abscess, but this method was not popularised till radiological advancements occurred early in the 1980s which allowed for precise localization and a percutaneous approach to treatment.

Fortunately, advanced imaging techniques and improved therapeutic modalities have decreased the case-fatality rate for this disease to 6% to 26%.

With the advent of ultrasound and computed tomography diagnosis and treatment of liver abscess has become easier and effective. Ultrasound can differentiate between solid and cystic lesions and is cost-effective. Ultrasound (USG) is 80% to 95% sensitive. Computed tomography (CT) is more sensitive (95%-100%) than US in detecting hepatic abscesses [5]. On CT examination, an abscess is a hypodense lesion than the surrounding liver, and the wall of the abscess has peripheral ring enhancement with intravenous contrast administration. Smaller lesions are also detectable with CT. CT and USG may be used to evaluate and potentially treat the source of infection by percutaneous drainage.

Solitary abscess of size <5cm and multiple abscesses of size <1.5cm can be treated with antibiotics alone and do not require any surgical procedure. Abscesses more than 5cm cavity require drainage either extraperitoneal, transperitoneal or through percutaneous drainage [6].

However, till date the debate is still on regarding the most effective treatment modality for such large abscesses. This study attempts at comparing the two most commonly used treatment modalities for liver abscesses i.e., pigtail catheter drainage and repeated percutaneous aspirations.

## Methodology

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria will be enrolled for the study after obtaining informed consent. Case record form with follow up chart. All cases had undergone thorough history and detailed clinical examination at the time of admission. Total and differential leukocyte counts was measured with an auto-analyzer.

As ultrasound is operator dependent, only those who were examined by consultants were included in the study to exclude observer bias. The operator is blinded to results of clinical examination and blood reports.

Patients fulfilling the inclusion criteria are divided into two groups by randomization. Both the groups are empirically started with 3rd generation cephalosporins and metronidazole and later antibiotics adjusted according to culture and sensitivity.

For one group abscess is drained by using Pigtail catheter No.16. And for other group aspiration is done by using spinal needle and 50ml syringe for a maximum of 3 times on alternate days first time being on the admission day. Both the groups are compared with the duration of hospital stay, duration of antibiotic usage, duration of achieving symptomatic relief.

**Assessment tools**

1. Review USG scan.
2. Repeat CBC, LFT.

**Outcome measures**

1. Duration of hospital stay.
2. Duration of antibiotic usage.
3. Symptomatic relief as measured by VAS pain scale.

**Results****Table 1:** Laboratory Parameters

	N	Minimum	Maximum	Mean	S.D
CBC(TLC)	106	11200	167500	18122.00	14879.33
CBC(N)	106	45	92	78.52	7.52
LFT(TB)	106	.80	4.70	2.1226	0.90
DB	106	.40	7.00	1.2962	0.82
SGOT	106	28	485	108.91	104.14
SGPT	106	30	550	120.00	113.14
ALP	106	2	850	174.61	140.03
INR	106	0.0	1.9	1.130	0.33

**INFERENCE:** In this study it is found that raised leucocyte counts, neutrophil counts and deranged liver function test is significantly present in patients with liver abscess.

**Table 2:** Comparison of the Number of Days to Achieve Symptomatic Relief between the Groups using Independent Sample T Test

surgical procedure	N	Minimum	Maximum	Mean	S.D	Mean diff	p value
PA	52	4	10	6.33	1.677	1.53	0.00*
pigtail	54	2	8	4.80	1.641		

\*Significant

**INFERENCE:** In this study it is found that among the subjects who underwent pigtail catheter drainage had earlier symptomatic relief than those who underwent percutaneous aspiration.

**Table 3:** Comparison of the Duration of Hospital Stay between the Groups using Independent Sample T Test

surgical procedure	N	Minimum	Maximum	Mean	S.D	Mean diff	p value
PA	52	7	16	10.42	2.428	1.60	0.00*
Pigtail	54	6	14	8.81	2.047		

\*Significant

**INFERENCE:** In this study it is found that subjects who underwent pigtail catheter drainage had lesser duration of hospital stay than those who underwent per cutaneous aspiration.

**Table 4:** Comparison of the Number of Days iv Antibiotics used Between the Groups using Independent Sample T Test

Surgical procedure	N	Minimum	Maximum	Mean	S.D	Mean diff	p value
PA	52	5	14	8.75	2.504	1.009	0.027*
pigtail	54	5	14	7.74	2.121		

\*Significant

**INFERENCE:** In this study it is found that requirement of IV antibiotics was lesser among the subjects who underwent pigtail catheter drainage.

## Discussion

A total of 54 patients were subjected to pigtail catheter insertion procedure. Pigtail no16F was used for all the 54 patients. Under the ultrasound guidance and aseptic measures, using injection lignocaine 2% (after test dose) as local anaesthetic, Pigatil was inserted into the abscess cavity.

All the patients were relieved of the symptoms, abscess cavity collapsed below 50cc. one of the patient had bleeding as a complication while pigtail insertion which was eventually controlled. It was observed that INR was elevated in that patient. Another patient has severe pain at the catheter insertion site for a week, which was managed with analgesics. Another patient had a complication related to pigtail positioning which was managed by re-inserting the pigtail.

Total of 52 patients were subjected to percutaneous aspiration method of drainage of liver abscess. All the 52 patients were subjected to repeated aspirations for three times. First aspiration being done on the day of admission or the next day, second aspiration after 2 days of first aspiration and the third aspiration was done after 2 days of second aspiration.

All the 52 patients were relieved of their symptoms. Abscess size noted to have decreased to below 50cc after the third aspirations in all the 52 patients. It is observed that most of the patients were not relieved symptomatically and the abscess cavity size was not significantly reduced after the first aspiration alone. Thick viscous abscess and presence of predominantly solid component of abscess are found to be the cause for failure of symptomatic relief after first aspiration [7, 8].

Percutaneous aspiration is a cost effective method but a time consuming method and requires ultrasound assistance for each aspiration procedure.

In this study mean duration required to achieve symptomatic relief was found to be 4.8 days with standard deviation of 1.64 in pigtail group and 6.33 days with standard deviation of 1.67 in percutaneous aspiration group. It is statistically significant. Our findings differ with that of S Singh *et al.*

In this study mean duration of hospital stay is 8.8 days with standard deviation of 2.04 in pigtail group where as mean of 10.4 days with standard deviation of 2.4 is noted in percutaneous aspiration group which is statistically significant. Our findings are consistent with Yu *et al.* 2004.

In this study mean duration of IV antibiotics used is 8.75 days with standard deviation of 2.5 in pigtail group where as mean of 7.7 days with standard deviation of 2.1 is noted in percutaneous aspiration group which is statistically significant.

In this study, no complications were met with PNA group while 3 patients in the PCD group has complications related to catheter placement. There is no statistically significant difference between the two groups [9, 10]. Baek *et al.* and Giorgio *et al.* described the much lower incidence of complications with PNA than with PCD. However, in our study and some recent studies, both the procedures were found to be safe if performed properly with minimal complications. There was no mortality in either of the study groups.

## Conclusion

Percutaneous catheter drainage (Pigtail) is a better modality as compared to percutaneous needle aspiration in terms of overall duration required to achieve symptomatic relief, duration of antibiotics required and duration of overall hospital stay, especially in larger abscesses. Percutaneous needle aspiration is a cheaper method with its use limited to smaller abscesses. There is no statistically significant difference in terms of complications associated with PCD and PNA of liver abscess.

We the authors conclude percutaneous pigtail catheter drainage as first-line treatment option but consider PNA as an alternative in small abscesses.

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