USG GUIDED PERCUTANEOUS NEEDLE ASPIRATION VERSUS USG GUIDED PIGTAIL CATHETER DRAINAGE IN THE MANAGEMENT OF LIVER ABSCESS - A PROSPECTIVE RANDOMISED CONTROLLED STUDY

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ABSTRACT **BACKGROUND:** The aim of this study was to determine and compare the therapeutic effectiveness and safety of USG guided percutaneous continuous catheter drainage and USG guided percutaneous needle aspiration in the treatment of liver abscess in Trichy. **METHODS:** This is a prospective randomised comparative study of 50 patients, presented in outpatient and emergency department at the hospital, randomised equally into two groups, percutaneous needle aspiration and pigtail catheter drainage. The effectiveness of their treatment was measured in terms of duration of hospital stay, time taken for improvement of clinical symptoms, time taken for 50% reduction in cavity size and total or near total reduction of abscess cavity. Independent t-test was used to analyse these parameters. **RESULTS:** The success rate was significantly better in catheter drainage group. Patients in pigtail catheter drainage group showed earlier clinical improvement (p 0.000) and 50% reduction in abscess cavity volume (p 0.000) and near total reduction of abscess cavity was earlier (p 0.019) as compared to those who underwent percutaneous needle aspiration. **CONCLUSION:** Our study concludes that percutaneous catheter drainage is a better modality as compared to percutaneous needle aspiration in respect to clinical improvement, reduction of cavity and success rate.

KEYWORDS : Liver Abscess, Catheter Drainage, Needle Aspiration.

INTRODUCTION

A liver abscess is defined as a pus-filled mass in the liver that can develop from injury to the liver or an intra abdominal infection disseminated from the portal circulation. The majority of these abscesses are categorized into pyogenic or amoebic, although a minority is caused by parasites and fungi. Most amoebic infections are caused by *Entamoeba histolytica*. The pyogenic abscesses are usually polymicrobial, but some organisms are seen more commonly in them, such as *E.coli*, *Klebsiella*, *Streptococcus*, *Staphylococcus*, and anaerobes.(1)

Both amoebic and pyogenic were major cause for morbidity and mortality.

Even with the advent of good diagnostic investigations like USG, the diagnosis is still delayed because of the non-specific manifestations of the disease and therefore high suspicion of diagnosis is important.

In the recent years advances in CT and USG have not only lead to accurate localisation of liver abscess but also have set up a way for safe aspiration of abscess.

Even though the primary mode of treatment of abscess is medical management, around 15 to 20% of abscess are refractory to treatment and needs drainage.

Liver abscess is a quite common disease in patients admitted in MGMGH, Trichy and hence the early diagnosis and timely and correct intervention will reduce the morbidity and mortality of the disease.

AIM

To determine and compare the therapeutic effectiveness and safety of USG guided percutaneous continuous catheter drainage and USG guided percutaneous needle aspiration.

OBJECTIVES

1. To study the incidence of liver abscess in patients admitted to MGMGH, Trichy.
2. To study the etiological factors and the presenting complaints in patients with liver abscess.

3. To study the different organisms cultured from the pus aspirated.
4. To study the course of the disease with the above said interventional procedures.

MATERIALS AND METHODS

Study design

Randomised controlled study conducted by department of surgery. Total number of 50 patients were included in the study, randomised into two groups- percutaneous needle aspiration and percutaneous catheter drainage.

The patients were studied from June 2018 to July 2019.

The protocol was approved by the Ethical Review Board of the institute.

Inclusion criteria

1. More than 5 cm of abscess in at least one dimension identified by USG or CT
2. All liver abscess- pyogenic / amoebic / mixed were included.

Exclusion criteria

1. Patients presenting with ruptured liver abscess before the treatment
2. Patients presenting with intermittent surgical pathology requiring urgent surgical exploration
3. Abscess near the porta hepatitis.

METHODS

All the subjects satisfy the inclusion criteria were carefully worked up in terms of detailed history and clinical examination. Lab and imaging investigation included complete haemogram, liver function test, prothrombin time, INR, activated partial thromboplastin time, blood culture, amoebic serology, HIV, Hepatitis B, chest x ray, abdominal USG with or without CT scan of the abdomen and other investigations as per specific indications in different patients.

The study was conducted on 50 patients consisting of 25 patients in each group viz needle aspiration group and pigtail catheter group.

The aspiration procedure include IV line and empirically received injection metronidazole 500 milligram IV TDS, injection gentamicin 1 mg/kg IV BD, injection ampicillin 1 gram IV BD for 5 days. The empirical treatment was revised based on culture and sensitivity report. These patients had elevated INR, hence 2 units of FFP transfused.

An informed consent was obtained from the participating patients.

All procedures were done under strict aseptic precaution.

Technique

PNA- Percutaneous Needle Aspiration

Patient positioned, painted and draped. The abscess cavity was located using the USG probe and shortest and appropriate route was used to avoid injury to other structures. Also with USG, the depth of abscess, appropriate angle of approach and exact site of puncture was determined. After infiltrating with 2% lignocaine, 18 gauge spinal needle introduced into abscess cavity under USG guidance and aspiration of pus done until the cavity collapsed and the aspirated pus collected in sterile container and sent for culture and sensitivity. Sterile compressive dressing applied.

Pigtail catheter drainage

After local anaesthesia infiltration, a nick is made at the site marked using ultrasound.

Trocar introduced into the outer sheet. Pigtail kit was introduced into the abscess cavity along with guidewire with the help of USG till it reached the abscess cavity using Seldinger technique.

The guidewire removed and pigtail catheter was kept in abscess cavity.

The catheter fixed with skin using 2_0 silk. Pigtail catheter connected to collecting system and Betadine gauze applied to catheter fixed site to prevent secondary infection.

Follow up ultrasound done after 3 days and done every third day and patients were observed for improvement of clinical symptoms.

Reaspiration done if symptoms are not improving or the size of the cavity is not reducing or the size of abscess remains static or if the size increases following needle aspiration.

Even after second aspiration, if there is neither clinical improvement nor reduction in size of the abscess, then it is considered as failure of the procedure and pigtail catheter is inserted under ultrasound guidance.

After clinical improvement and after 50% reduction in size of the abscess, patient is discharged.

Patients with pigtail catheter discharged with the catheter in situ and advised to attend the outpatient department every alternate day till the catheter was removed.

Pigtail drainage removed when the pus is drained less than 10 ml for two consecutive days.

After discharge, patient is followed up with USG abdomen and pelvis weekly in the first month and every month for the next five months. Follow up of the patient is for a total of 6 months.

The time taken to achieve near total less than 2 cm size of abscess or total resolution of abscess cavity is noted.

DISCUSSION

The annual incidence rate is about 2.3 cases per 100,000 people. Males are more frequently affected than females.(1)

Amoebic abscesses have a lower mortality rate than pyogenic abscesses. Amebic and pyogenic abscesses can be distinguished on the basis of epidemiologic, clinical, and laboratory studies.(2)

Drainage is needed and can be done under the US or CT. Needle aspiration (at times repeatedly) might be all that is required for abscesses less than 5 cm, but a catheter placement might be warranted if the diameter is more significant than that(1)

Liver abscess is a rare but potentially fatal disease with mortality rates of 2–12%. The spectrum of causative microorganisms varies across the world and is changing due to increasing worldwide travel activity. As a result, previously less frequent pathogens must increasingly be considered in the differential diagnosis. The most common pathogens of liver abscess are so-called abscess streptococci, anaerobes and Gram-negative bacteria such as *Escherichia coli* and *Klebsiella pneumoniae*. Certain clones among the Gram-negatives, typically among *Klebsiella* spp., harbour specific virulence factors and are therefore referred to as hypervirulent clones which spread worldwide. In any case, the causative agent should be identified before anti-infective treatment is initiated. Several pathogens such as *Candida* spp., *Pseudomonas aeruginosa* or *Staphylococcus aureus* are uncommon and only detected in a specific context. Various therapeutic regimens are available for anti-infective therapy. Usually an empirical therapy is started, combining mostly β -lactam antibiotics or quinolones with anaerobically active substances.(3)

Pyogenic liver abscess (PLA) was reported in the writings of Hippocrates, who based prognosis on the type of fluid recovered from the abscess(4)

In 1938, Ochsner and DeBakey described the treatment and mortality of patients with PLA and recommended surgical treatment as the primary treatment modality (5)

Surgery remained the therapy of choice until the mid 1980s, when percutaneous drainage was shown to be a safer alternative in many cases(6,7)

The two most common varieties of liver abscess are pyogenic and amoebic(8)

Amoebic liver abscess is an important cause of space-occupying lesions of the liver; mainly in developing countries accounted for 3-9% of all cases of amoebiasis(9)

The two most common varieties of liver abscess (pyogenic and amoebic) are usually indistinguishable clinically and further investigations and/or invasive procedures are usually needed to establish the diagnosis as they have different lines of treatment(10)

A pyogenic liver abscess was defined as a hepatic lesion demonstrated at Ultrasound (US) and/or computed tomography (CT) in a patient with a compatible clinical picture (various combinations of features of sepsis, right upper quadrant pain, and abnormal liver function), plus one or more of the following: (a) a positive culture result from aspiration of the lesion, (b) a positive blood culture result, or (c) clinical response to antibiotic treatment. On the other hand, amoebic liver abscess was defined as a hepatic lesion demonstrated at US and/or CT-scan in a patient with a compatible clinical picture (various combinations of features of sepsis, right upper quadrant pain, and abnormal liver function), plus one or more of the following: (a) recovery of amoebas from the aspirate, (b) recovery of hematophagous trophozoites of *Entamoeba histolytica* from the stool, or (c) a positive amoebic serology of more than 1:256 by indirect hemagglutination test according to our laboratory reference, with clinical response to antiamoebic treatment.(10)

Pyogenic abscesses must be excluded by pus aspiration and culture and sensitivity(11)

Chen et al recently have reported an intensive care unit mortality rate of 28%(12)

Elderly patients tend to have a more atypical presentation in PLA, for which clinicians should be on high alert. We found older age to be associated with a higher recurrence of PLA and a higher mortality rate.(13)

Although it has been suggested that cryptogenic liver abscess is a sign of occult gastrointestinal malignancy(14).

RESULTS

In our study, it is observed that

Commonest age group for occurrence of liver abscess was between 30 to 50 years which was equally distributed in both the studies.

Liver abscess occurs more commonly in males than females(92% in males)

Commonest symptom in both the groups was fever (88% of the patients had fever)

Solitary abscesses more common than multiple abscesses.

Right lobe abscesses were more common (seen in around 36 patients) than left lobe abscesses and mixed abscesses.

The duration of hospital stay was not significant (p 0.052) between both groups. Time taken for improvement of clinical symptoms (p 0.000) is statistically significant between both the groups.

Time taken for 50% reduction in the cavity size was significant (p 0.000) between both the groups.

Time taken for near total or total resolution of abscess cavity was significant (p 0.019) between both the groups.

However in our study we had a success rate which was significantly lower than 64% when compared with pigtail catheter which was 100%.

Both the groups are comparable during the start of the study. After analysing the results we can find that 36% of the fine needle aspiration group were not successful and has to be converted to pigtail catheter. The patients who underwent pigtail catheter procedure had a less hospital stay (not statistically significant), lesser time for clinical improvement, 50% reduction in abscess size and near total reduction of abscess (all were statistically significant).

CONCLUSION

Our study concludes that percutaneous catheter drainage is a better modality as compared to percutaneous needle aspiration in respect to clinical improvement, reduction of cavity and success rate.

Table 1. Distribution of study population according to duration of stay

	Needle aspiration group		Pigtail catheter drainage group		Fischer exact value	Significance
	No.	%	No.	%		
< 5 days	1	4	0	0	6.98	0.07
5-10 day	6	24	16	64		
11-15 day	15	60	8	32		
16-20 days	3	12	1	4		

Table 2. Distribution of study population according to weeks to achieve total or near total resolution in abscess size

Weeks	Needle aspiration group		Pigtail catheter drainage group		Chi square value	Significance
	No.	%	No.	%		
6-10	6	24	10	40	13.178	0.153
11-15	9	36	11	44		
16-20	10	40	4	16		

Table 3. Comparison of mean differences between both groups with respect to improvement parameters

Variables	Group	Mean	Standard Deviation	Mean difference	t-value	p-value
Duration of stay (days)	Needle aspiration group	11.84	3.29	1.44	1.993	0.052
	Pigtail catheter drainage group	10.4	1.5			
Time taken for clinical improvement (days)	Needle aspiration group	5.84	2.61	2.52	4.516	0.000
	Pigtail catheter drainage group	3.32	0.98			
Days to achieve 50% reduction in abscess cavity (days)	Needle aspiration group	13.26	3.43	3.46	4.425	0.000
	Pigtail catheter drainage group	9.8	1.91			

Week to achieve total or near total resolution in abscess size (weeks)	Needle aspiration group	14.28	3.86	2.52	2.418	0.019
	Pigtail catheter drainage group	11.76	3.49			

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