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Original Research Article

Clinical study on the various therapeutic approaches towards the management of hepatic abscess in adults**Farman Ali***, Ravikar Jayaraj, Deepti N Rao, Mohammed Arafath Ali, Avinash K, Raksha L, Anagha P Rao, Rakshith M and Pooja P Jain*Bangalore Medical College and Research Institute, Fort, K.R. Road, Bengaluru, Karnataka 560002 India*

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Bangalore Medical College and Research Institute,
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Karnataka 560002 India***Article History:****Received:** 03/03/2017**Revised:** 02/06/2017**Accepted:** 02/06/2017**DOI:** <https://doi.org/10.7439/ijbar.v8i5.3997>**Abstract****Background and objectives:** Hepatic abscess is a very common and significant health condition in developing countries including India. Alcohol consumption is one of the most important predisposing factors in causation of hepatic abscess followed by uncontrolled diabetes and immunosuppression. The aim of this study was to devise a definitive protocol in the management of patients with liver abscess and to evaluate the different treatment option of liver abscess, amoebic or pyogenic in order to have some guidelines in our setting**Material and methods:** A hospital based prospective study was conducted between August 2014 to September 2016 in Bangalore medical and research institute (Victoria hospital and Bowring & Lady Curzon Hospital), Bangalore. The following study was done in a set of 50 patients diagnosed with liver abscess admitted in our hospital. After confirming the diagnosis, patients were exposed to different treatment modalities which consisted of medical management alone, USG guided Aspiration, Pigtail catheterization and exploratory laparotomy.**Results:** In our study majority of the patients (84%) were of amoebic liver abscess (ALA) and only 16% were of pyogenic liver abscess (PLA). Out of 50 patients 8 patients responded to drug therapy alone, 40 patients underwent ultrasound-guided aspiration and pigtail catheter placement and 2 patients were treated with CT guided aspiration. Open surgical method was excluded in our study.**Conclusion:** Image guided drainage is the best modality of treatment for liver abscess size >4cm in both pyogenic and amoebic liver abscess however in small size abscess medical management is equally good. Abscess cavity resolves better and has a lower recurrence rate in case of percutaneous catheter drainage than percutaneous needle aspiration.. Mortality was not observed in our series. Prompt diagnosis, aggressive medical treatment along with minimal intervention can keep the morbidity and mortality associated with this condition to a bare minimum.**Keywords:** Abscess, drainage, catheter, percutaneous, amoebic, pyogenic.**1. Introduction**

Liver abscess is a collection of purulent material in liver parenchyma resulting from the invasion and multiplication of microorganisms which can be due to pyogenic, amebic, fungal or mixed infection. It's a disease troubling mankind from ancient times, has earliest documentation in the works of Bhrigu Samhita (3000 B.C.) [1]. They have potentially lethal consequences, if prompt diagnosis and treatment are not accomplished.

Worldwide about 40-50 million people are infected with amoebic abscesses with majority in developing countries [2]. India has 2nd highest incidence of liver abscess in the world. Pyogenic abscesses account for three quarters of hepatic abscess in developed countries. While amoebic liver abscess cause two third of liver abscess in developing countries [3]. Based on etiology two major types of liver abscess are amoebic and pyogenic in nature.

Liver abscess is the most common extra-intestinal manifestation of amoebiasis. Hepatic amoebiasis is reported in 3% to 10% of afflicted patients. The incidence is high in tropical countries and it is attributed to lack of proper sanitation and personal hygiene due to low socio-economic conditions [4]. The world health organization reported that *Entamoeba histolytica* causes approximately 50 million cases and 100,000 deaths annually [5]. The disease is prevalent world over. In Indians it affects especially people from Northeastern regions of the country.

Pyogenic liver abscess constitute major bulk of hepatic abscess in western countries, they result from ascending biliary tract infection, hematogenous spread via portal venous system, generalized septicemia with involvement of liver by way of hepatic arterial circulation, direct spread from intra-peritoneal infection, other causes. *Escherichia coli*, *klebsiella* and *streptococcus* are most common organism followed by *staphylococcus* and *pseudomonas* [1].

Rapid diagnosis, effective antimicrobial therapy, treatment of underlying disease, and orderly approach to therapeutic interventions directed towards the abscess remain the mainstay of care for the patient with hepatic abscesses.

The objectives of the study are:

- a. To device a definitive protocol in the management of patients with liver abscess.
- b. To evaluate the different treatment option of liver abscess, amoebic or pyogenic in order to have some guidelines in our setting.

2. Materials and methods

A hospital based prospective, non randomized and comparative study was conducted between August 2014 to September 2016 in Bangalore medical and research institute (Victoria Hospital and Bowring & Lady Curzon Hospital), Bangalore. First 50 patients admitted in surgery ward with clinical, laboratory and radiological feature of liver abscess were included in the study. Institutional ethical clearance was taken and informed consent was obtained from the subjects in their own language.

All patients above 18 yrs of age suggestive of having liver abscess on the basis of history, clinical assessment were included in the study (confirmed by USG and laboratory work). Patients below the age group 18 and with recurrent liver abscess were excluded from the study.

The patients in the study group were subjected to

- A complete physical examination including thorough examination of abdomen and chest following proper history.

- Specific Investigations including complete haemogram, liver function test, prothrombin time, blood for HBSAg, HIV, HCV, fasting and post prandial blood sugar, ultrasound of abdomen, chest X ray, microscopic examination and culture of aspirated pus, blood culture.

On the basis of size of abscess on USG the patient were divided into three treatment group:

Group 1- with abscess cavity <4 cm (300 cc) – they received only medical management.

Group 2- with abscess cavity ≥ 4 cm (≥ 300 cc) or smaller abscess which failed to respond to drug therapy alone, left lobe abscess they in addition treated with USG guided – percutaneous needle aspiration or catheter drainage.

Group 3- with peritonitis due to ruptured liver abscess who underwent exploratory laparotomy.

2.1 Medical management

Amoebic liver abscess- All patients with diagnosis of amoebic liver abscess of size < 4cm were treated with metronidazole 2-2.4 gms/day in divided dose.

Pyogenic liver abscess- All patient with PLA of size <4cm (<300 cc) were treated initially with broad spectrum antibiotics till the culture and sensitivity report were available then treatment was guided as per sensitivity report.

2.2 Guided aspiration

The patients with abscess size ≥ 4 cm or smaller abscess those who failed to improve clinically, left lobe abscess were subjected to image guided aspiration or catheter drainage. These patients were randomly selected for percutaneous needle aspiration and percutaneous pigtail catheter drainage. Informed consent was taken from the patients explaining the complications of the procedures for which open surgical intervention might be needed. The patients were examined daily for clinical improvement. Improvement in fever, chill and rigor, right hypochondriac pain, anorexia, malaise, nausea and vomiting before and after institution of therapy were noted.

2.3 Technique of percutaneous needle aspiration (PNA)

Pus was aspirated under ultrasonographic guidance using a 16G disposable trocar needle and syringe. In multiloculated abscesses, the needle tip was inserted into various loculi for complete pus removal. Review ultrasound was done every third day, and the size of the residual cavity was noted. Aspiration was repeated if the abscess cavity did not show a 50% reduction in size, irrespective of clinical response. Failure of abscess size to decline below 50% and failure of improvement of clinical features after third day of therapy was taken as failure.



Figure 1: Percutaneous needle aspiration of a liver abscess

2.4 Technique of pigtail catheter drainage (PCD) of liver abscess

The standard pigtail external drainage catheter used in the present study was an angiographic type polyethylene tube, usually ranging in size from 8.5Fr to 10Fr having multiple side holes and tapered distal end accompanied with a trocar and canula.

The proper insertion was confirmed at the end of the procedure by ultrasound. The maximum amount of pus was aspirated on the day of catheter insertion using 20cc disposable syringe. The aspirate was sent for culture sensitivity and gram staining to know nature of organism. Chest X-ray was done after catheter drainage to rule out pleural effusion or pneumothorax. Catheter output charting was done daily and a chart was maintained. The first review ultrasound was done when drainage over last 24 hours had declined to < 10ml. If the abscess had resolved, the catheter was removed. If residual cavity was present, the catheter was flushed with saline and aspirated till no material was found. Further review ultrasound was done every third day and the catheter was removed if the catheter drainage had remained minimal. Otherwise, the catheter was left until catheter drainage had stopped. Ultrasound was repeated until the cavity had either decreased by 50% or more of its original size, or remains static with clinical recovery.



Figure 2: Percutaneous catheter drainage of a liver abscess

Outcome was assessed by:

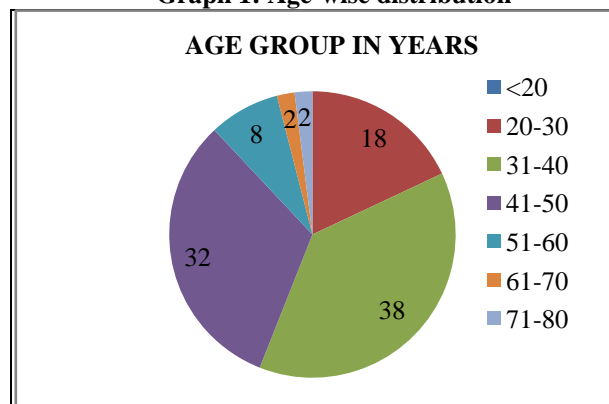
- Relief of right hypochondriac pain
- Relief of fever
- Decreased intercostal tenderness
- Resolution of liver abscess cavity ultrasonographically at third day after particular treatment started.
- Improvement of symptoms at third day of particular treatment and
- Decrease in total leucocyte count at third day after particular treatment started.
- Recurrence and readmission in hospital for recurrence of abscess.

Data was compiled and descriptive statistics were applied. SPSS software version 16 was used for the analysis.

3. Result

3.1 Age-wise distribution

Graph 1: Age-wise distribution



- Most of cases belong to age group of 30-40 yrs and second most common group was 41-50 yrs.
- Most common group in ALA is 31-40 yrs while in PLA was more frequent in younger age group i.e. 21-30 yrs.

3.2 Age and sex

- Most of the patients were male (88%) sex ratio **7.4:1** for amoebic liver abscess and **7:1** for pyogenic liver abscess.

3.3 Nature of abscess

- Total no of patients studied were 50. Out of which 42 (84%) had amoebic liver abscess and 8(16%) had pyogenic liver abscess.

3.4 Distribution of study subjects according to involvement of lobe

- In our study subject maximum of the patient had right lobe involvement both lobe involvement more common in pyogenic liver abscess.

3.5 Nature of microorganism in aspirate culture growth

- Out of total eight where gram staining of aspirate were positive seven cases shows aspirate culture positive. This value is significant.

- Most common organism (57.14 %) in aspirate culture growth was E.COLI and second most frequent was Klebsiella.

3.6 Number of abscess on USG single or multiple

- Out of eight aspirate gram staining positive (pyogenic liver abscess) six (75%) shows multiple liver abscess and among rest (amoebic liver abscess) 88.1% were single.

3.7 Treatment Procedures.

Table 1: Treatment Procedures

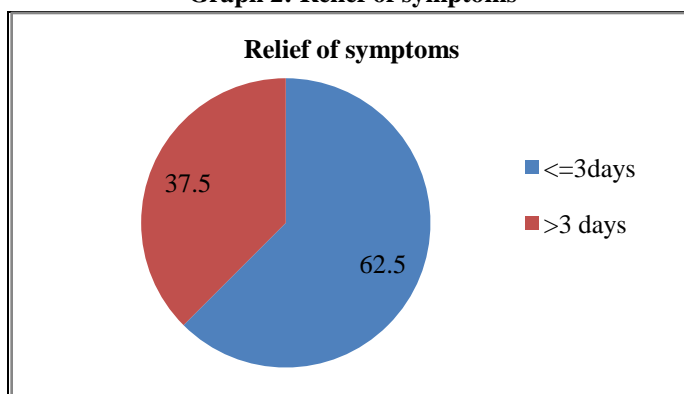
	Group 'A' Abscess Size <4CM(<300CC)	Group 'B' Abscess Size >=4CM(>300CC)			Total
	Medical management	Guided			
		USG guided aspiration	USG guided pig tail catheter drainage	CT guided aspiration	
Study subjects	8	26	14	2	50
Percentage	16	52	28	4	100

Those with less than 4cm abscess cavity on USG treated conservatively and those with larger abscess were randomly distributed among the guided drainage.

3.8 Relief of symptoms

Under medical management in about two third of patient symptoms were relieved symptomatically in less than three days.

Graph 2: Relief of symptoms



Over all out come taken together in terms of reduction in abscess size, decrease in TLC, hospital stay, and recurrence.

Table 2: Reduction in size

		Treatment				Total	P value
		Medical & Conservative	USG Guided Percutaneous Needle Aspiration	USG Guided pig Tail Catheter Drainage	CT Guided Aspiration		
Reduction in size of abscess	>50% Reduction In Size	7 87.5%	21 80.8%	12 85.7%	2 100.0%	42 84.0%	0.876
	<50% Reduction In Size	1 12.5%	5 19.2%	2 14.3%	0 .0%	8 16.0%	
Total		8 100.0%	26 100.0%	14 100.0%	2 100.0%	50 100.0%	

Overall view shows maximum resolution of abscess cavity is with medical and among guided pigtail catheter drainage, however CT shows 100% reduction but cases with this variety is just to difficult to comment.

Table 3: Total leucocyte count

Treatment		TLC at 3RD day	Decrease in TLC
Medical & Conservative	Mean	6725.00	4175.00
	Std. Deviation	1156.040	1440.982
USG Guided Percutaneous Needle Aspiration	Mean	7011.54	4532.69
	Std. Deviation	1225.178	3442.352
USG Guided Pig Tail Catheter Drainage	Mean	7570.00	4644.29
	Std. Deviation	1266.607	2884.134
CT Guided Aspiration	Mean	6150.00	2150.00
	Std. Deviation	1202.082	3040.559
Total	Mean	7087.60	4411.40
	Std. Deviation	1240.480	2996.523
P Value		0.261	0.737

Maximum decrease in TLC is with PCD with mean value of fall 4644.

Table 4: Hospital stay

		Treatment				Total	P Value
		Medical & Conservative	USG Guided Percutaneous Needle Aspiration	USG Guided Pig Tail Catheter Drainage	CT Guided Aspiration		
Hospital stay	< 5 Days	3 37.5%	3 11.5%	2 14.3%	1 50.0%	9 18.0%	0.229
	>=5 Days	5 62.5%	23 88.5%	12 85.7%	1 50.0%	41 82.0%	
	Total	8 100.0%	26 100.0%	14 100.0%	2 100.0%	50 100.0%	

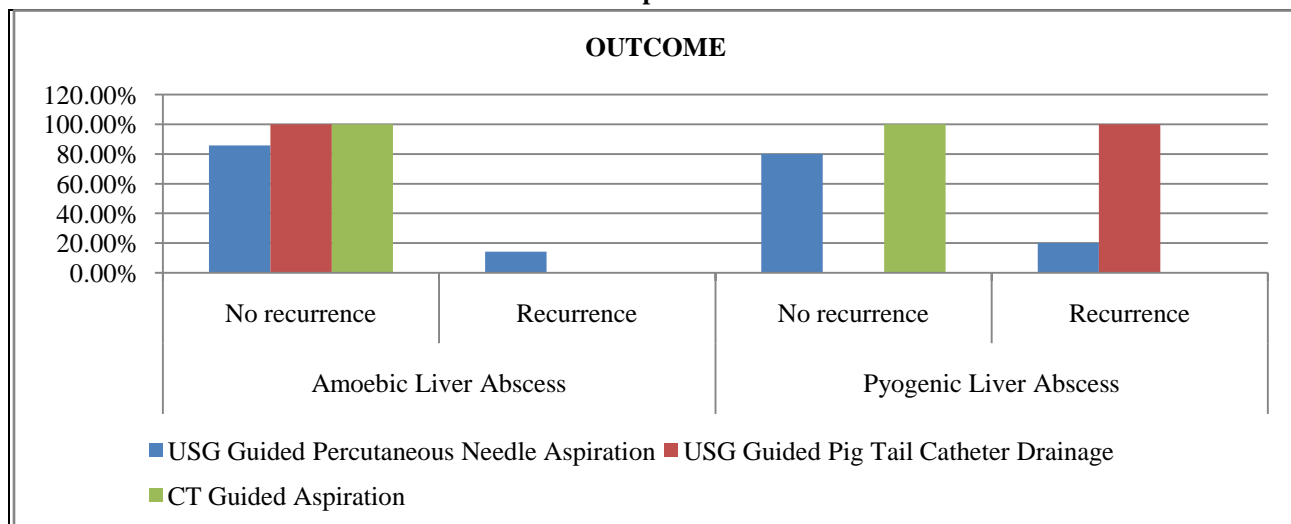
Most of the subjects in all type of treatment stayed for >5days with mean stay 6.36days.

Table 5: Recurrence

		Treatment				Total	P Value
		Medical & Conservative	USG Guided Percutaneous Needle Aspiration	USG Guided Pig Tail Catheter Drainage	CT Guided Aspiration		
Outcome	No recurrence	6 75.0%	22 84.6%	12 85.7%	2 100.0%	42 84.0%	0.825
	Recurrence	2 25.0%	4 15.4%	2 14.3%	0 .0%	8 16.0%	
	Total	8 100.0%	26 100.0%	14 100.0%	2 100.0%	50 100.0%	

In most of the cases there was no recurrence. Maximum recurrence was with medical management and USG-PNA among all types of treatment.

Graph 3: Outcome



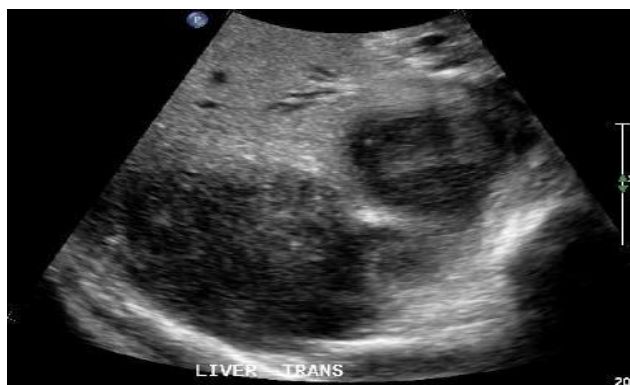


Figure 3: Two large pyogenic liver abscesses of right lobe of liver in a 48 yrs alcoholic male

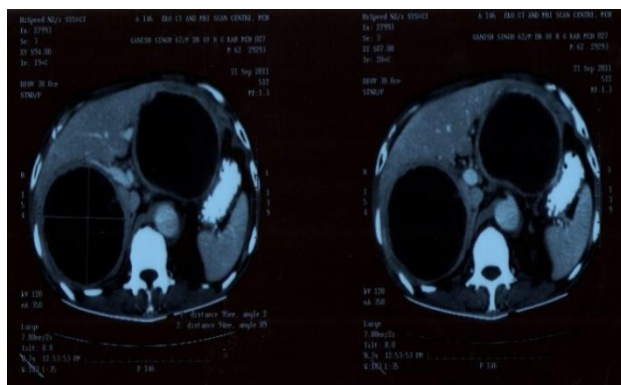


Figure 4: CECT shows two large liver abscesses involving both right and left lobe of liver in a 62 yrs old male patient



Figure 5: Typical Anchovy sauce

4. Discussion

Treatment modalities include medical management, USG guided percutaneous and pig tail catheter drainage. Open surgical method was excluded from the study. All of our study subjects were from Karnataka. Majority of our study subjects were in occupation with low income most common being the laborer, bus conductor and truck driver. In our study most of the patients were between the age group 30-40 years (38%) and mean age of the study subjects was 40.56 years. ALA can affect at any age however it is more frequent in adult life with the highest incidence in the 3rd and 4th decade. The maximum age incidence is seen 30-40 years of age group.

In one study of 263 cases Debakey and Ochsner et al, in 1951, found that the incidence was maximum in 31-40 years of age groups [6]. In another study in south India by Ramani et al, in 2005 in study of 200 cases found incidence maximum in 20-40 year of age group [7]. Earlier pyogenic liver abscess was disease affecting young age group 20-30 years with acute appendicitis as main cause. As development in management of acute appendicitis the disease now mainly affects patient 50-60 year primarily related to biliary tract disease or is cryptogenic [8]. In a study in Pakistan Bugti et al, in the yr 2005, in a study of 84 cases of PLA they observed that the mean age of occurrence of pyogenic liver abscess was 55 years [9].

In our study male to female ratio was 7.3:1. For ALA it is 7.6:1 and for PLA 7:1. Reports in the literature show there is a male preponderance in a ratio ranging from 10:1 to 17:1[10-12]. These studies reflect in the male to female ratio over the last 50 years. Our study also reflects high male preponderance. The increased ratio may be due to small sample size, high percentage of alcohol intake among males and less awareness among females to seek medical advice for illness.

In our study subjects (78%) had solitary liver abscess (88% of ALA and 25% of PLA) and 78% of our patients had their right lobe involved (87.55 of ALA and 37.5% of PLA). Earlier studies had reported right lobe abscesses in 55% cases of liver abscesses, multiple abscesses were 27.7% and isolated left lobe abscesses 16.6%[13]. Another study reported 73% cases of right lobe amoebic abscess, 17% cases of left lobe abscess and both lobe involvement in 10% cases [11]. Solitary liver abscess had been reported in 77% cases and multiple in 23 cases [11]. Thus the reported involvement of different lobes in our study is close to the earlier results.

In our study 84% of patients were found to have amoebic liver abscess and 16% of patients were found to have pyogenic liver abscess. Oschner and colleagues reported in 1938 that amoebic liver abscess is three times

more common than pyogenic liver abscesses [14]. Improvements in public sanitation and hygiene led to a decrease in cases of amoebiasis and amoebic liver abscess. Currently, pyogenic liver abscesses make up the majority of hepatic abscesses in western literature [15]. In developing countries including India though number of pyogenic abscesses is increasing due to predisposing hepatobiliary disorder, the amoebic type still constitutes the majority. The study carried out by Onkar Singh showed that 67% patients had amoebic subtype [16]. So our result corroborates with their result that amoebic liver abscess is more prevalent than pyogenic liver abscess.

Irrespective of the procedure done it has been seen in our study that 84% of the subjects attained $\geq 50\%$ reduction in abscess cavity size following therapy. But no further study regarding this issue is available. Percutaneous pigtail catheter drainage was successful in terms of $\geq 50\%$

5. Conclusion

- In our study we found that more than 80% patient were of amoebic liver abscess and among pyogenic liver abscess most common pathogen was *E coli* followed by *klebsiella*.
- There is increasing association of diabetes with both type of abscess and alcoholism remains important risk factor.
- Image guided drainage is the best modality of treatment for liver abscess size $>4\text{cm}$ in both pyogenic and amoebic liver abscess however in small size abscess medical management is equally good.
- In case of larger abscess ($>4\text{cm}$) Ultrasound guided percutaneous pigtail catheter drainage is a superior therapeutic approach than percutaneous needle aspiration.
- Though the initial cost of catheter posed a little burden to the patients, the overall expenditure, in terms of

reduction in abscess cavity size in 85.72% patients as compared to percutaneous needle aspiration which was successful in 80.76% patients.

Our study revealed that PCD was more successful in terms of recurrence of abscess, relief of symptoms and decreases in size of abscess cavity and TLC. Decrease in TLC at third day was found to be significant. Only 14.3% of patients who underwent PCD required readmission in hospital as compared to PNA in which only 15.8.8% patients were readmitted for recurrence.

In our study 100% of CT guided and 92.3% patient of PCD had their symptoms relieved within three days however in USG PNA also shows almost equivalent result.

Our study corroborates with the result of the study performed by Onkar Singh et al where they reported that clinical relief attained in PCD group was in shorter duration than in PNA where it took a longer time [16].

hospital stay and recurrence outweighed the initial cost of aspiration only.

- Patients treated with ultrasound guided percutaneous catheter drainage improved rapidly than those treated with needle aspiration.
- Abscess cavity resolves better in case of catheter drainage than needle aspiration.
- Recurrence rate is less in case of percutaneous catheter drainage than percutaneous needle aspiration.

CT guided aspiration showed excellent result however it was only done where USG was inconclusive and only two patient underwent CT guided aspiration so it will not be prudent to comment on this procedure however further studies are required for this intervention in our setting where cost of treatment is most important factor as most of the patient belong to low socioeconomic strata.

Our study results corroborate with the findings of previous studies.

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