



A RANDOMIZED COMPARATIVE STUDY OF CONSERVATIVE VS PERCUTANEOUS NEEDLE ASPIRATION OF LIVER ABSCESS BASED ON PERCENTAGE OF ITS LIQUEFACTION.

Dr. S. Jawad Hussain

Postgraduate, Dept. of General Surgery, Narayana Medical College, Nellore, AP

Dr. K. Srinivasa Rao*

Associate Professor, Dept. of General Surgery, Narayana Medical College, Nellore, AP *Corresponding Author

ABSTRACT

Introduction:- Liver abscess is one of the common acute abdominal condition. Conservative management and percutaneous needle aspiration are the commonly used methods of management. But there is no common consensus between the physicians regarding best option out of these two. **Aim:-** To compare and to identify the better treatment modality among these two options for the treatment of liver abscess based on the percentage of liquefaction. **Patients and Methods:-** A total of 140 patients with liver abscess were included in the study. They were grouped in to Group A and B, based on percentage of liquefaction, they were further subdivided into conservative and aspiration subgroups and randomized. The outcomes of the two procedures were studied with respect to reduction in abscess cavity size, reduction in leukocyte count and patient's satisfaction. **Results:-** There was a significant reduction in the abscess size and leukocyte count in conservative subgroup of group-A, than conservative sub group of group B. Whereas there was significant reduction abscess size and leucocyte count noted in aspiration sub group of Group B than aspiration sub group of Group A. Significantly more number of the patients in conservative subgroup of group-A expressed their satisfaction, than conservative sub group of group B. Whereas significantly more number of patients in aspiration sub group of the group B expressed their satisfaction than aspiration sub group of group A. **Conclusion:-** present study concludes that conservative treatment is also better option for liver abscess with 30-50% liquefaction, and aspiration is ideal for 50-70% liquefaction.

KEYWORDS : Liver abscess, conservative, percutaneous needle aspiration, liquefaction, satisfaction.

INTRODUCTION:

Liver abscess is one of the common acute abdominal condition encountered in the surgical practice. There are many causes for acute abdominal conditions, amongst them liver abscess is one of the common, it has varied presentation and thereby posing difficulty in making early diagnosis and treatment. These abscess are infectious, space occupying lesions in the liver. The two most common causes for liver abscess are 1) bacterial and 2) amoebic (as a result of entamoeba histolytica infection from large intestine).

Pyogenic liver abscess is collections of pus within the liver, as a result of bacterial infection. Incidence of pyogenic liver abscess varies from country to country. In general, the average incidence of pyogenic liver abscess is 2.3/1,00,000 [1,2]. It may be solitary or multiple. Infective focus may be appendicitis, colitis, cholangitis etc. Clinical features of pyogenic liver abscess are fever with chills and rigors, right upper abdominal pain, malaise, intercostal tenderness, jaundice [3].

Approximately one tenth of the world population is believed to be infected with *E. histolytica*, with 1,00,000 deaths world wide each year due to invasive amoebiasis [4,5,6,7]. It has both extra and intraintestinal forms. Most common extraintestinal form of invasive amoebiasis is hepatic amoebiasis. 30% of cases of amoebiasis in general are symptomatic. 1/10th of affected people have concomitant liver abscess [8]. Clinical features of amoebic liver abscess are fever with chills, anorexia, right upper abdomen pain, features of amoebic colitis like tenesmus and mucoid diarrhoea.

In the earlier days clinicians used to depend only on clinical examination for diagnosis of liver abscess. It was difficult to differentiate the liver abscess from other acute upper abdominal conditions based only on clinical examination at an early stage leading to high morbidity and mortality. With the advent of advanced imaging modalities like ultrasound and computed tomography and development of high potency antibiotics active against suspected organism, it has become possible to diagnose and treat the liver abscess at an earlier stage thereby reducing morbidity and mortality. But still there

is considerable amount of morbidity and mortality persisting due to non responsiveness of the liver abscess to the treatment.

It has been found that various factors may be influencing the outcome of the patients with liver abscess like patient's general condition, associated comorbidities, pre-abscess condition of the liver, persistent source of infection, percentage of liquefaction necrosis etc. out of which percentage of liquefaction plays a major role in the response of the patient to various modalities of treatment [9].

The commonly practiced treatment modalities are 1) conservative and 2) percutaneous aspiration. But there is no common consensus between clinicians in selecting an ideal treatment option for the management of liver abscess [10]. Hence, we planned to study the responsiveness of liver abscess to various modalities of treatment (conservative and percutaneous needle aspiration) based on percentage of liquefaction of liver abscess.

4) AIMS AND OBJECTIVES:

To assess the responsiveness and to evaluate the ideal therapeutic approach for liver abscess based on percentage of liquefaction.

5) Patients And Methods:

Present study was conducted in department of general surgery, Narayana Medical College, Nellore, Andhra Pradesh, India from august 2016 to July 2022.

Total of 140 patients of liver abscess were included in the present study.

5-1) Inclusion criteria:

All patients presenting to the General Surgery outpatient department or Emergency department with prediagnosed liver abscess or diagnosed after their presentation to this hospital irrespective of sex, age, comorbidities.

5-2) Exclusion criteria:

- 1) Liquefaction necrosis <30% and >70%.
- 2) Ruptured liver abscess.

- 3) Already treated conservatively elsewhere.
- 4) Abscess size lesser than 5cm and multiloculated abscess.
- 5) Allergic to metronidazole.
- 6) Secondaries in liver.
- 7) Multiple liver abscess less than 5cm in size.
- 8) Patients of liver abscess with coagulation abnormalities.

5-3) Sample size calculation:

Sample size calculation was done on basis of primary outcomes. The power of precision will be 90% with 10% either side. Systemic review of literature showed 52% of patients responded to conservative treatment and 84% of patients responded to percutaneous needle aspiration [11]. Average of them (82.5%) was taken for sample size calculation. The following formula was used

$$N = z_{\alpha} * \frac{P*Q*(1+1)}{2k} + z_{\beta} * \frac{[p1*q1 + (p2+q2/k)]}{D2}$$

Calculated total sample size was 110 for both groups which is 55 patients in each group.

5-4) Randomization:

A total of 140 patients were selected for the study and they were divided in two broad groups A & B based on percentage of liquefaction. Group A (30-50% liquefaction) consisted of 72 patients. Group B (50-70% liquefaction) consisted of 68 patients. Patients in each group were randomized by chits system into A1, B1 who underwent conservative treatment and A2,B2 who underwent percutaneous needle aspiration. Each patient has been explained about the study in detail and informed consent was taken for their willingness to participate in the study.

5-5) Blinding:

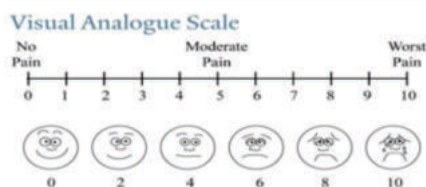
Admitting doctor knew about the broad grouping of the patients into group A and group B, but did not know the subgrouping. Treating doctor knew about the subgrouping but did not know about the broad grouping. Patients did not know broad grouping they belonged to. Doctor following up the patients in OPD did not know about the grouping or subgrouping.

5-6) Patient evaluation:-

All patients were thoroughly evaluated by clinical, imageological (Ultrasonology) studies. Routine biochemical investigations like Complete blood picture, Differential leukocyte count, Absolute Eosinophil Count, Liver Function Test, Coagulation profile, Renal Function Test were done. Comorbidities like Diabetes mellitus, Renal failure, Cardiac disease etc. were noted. Ultrasound was used as a diagnostic tool and for follow-up after treatment. Ultrasound features like – percentage of liquefaction, no. of abscess, uni/multiloculated, size of abscess, capsulated or noncapsulated, were noted.

5-7) Procedure:

Initial pain scoring was done according to the visual analog scale Vitals- pulse and temperature were recorded.



Mild	1-3
Moderate	4-6
Severe	7-10

Conservative treatment :

Intravenous 3rd generation cephalosporins CEFOTAXIM (1gm BD) and metronidazole (500 mg TID) along with analgesics

(NSAIDs- ACECLOFENAC) and antacids (RANITIDINE) were given for 1 week.

Percutaneous needle aspiration :

done under ultrasound guidance using 16 G needle under local anesthesia with free hand needle technique. Analgesics in the form of NSAIDs- ACECLOFENAC were given. Patients undergoing percutaneous needle aspiration were not given antibiotics.

Tramadol was used whenever NSAIDs were contraindicated in both groups.

Primary outcomes-

- 1) Reduction in size of abscess cavity upto 70%.
- 2) Decrease in raised leucocyte count of upto 80%
- 3) Patient's satisfaction.

Repeat ultrasound abdomen and leucocyte count was done 1 week after the treatment has started. Size of abscess and leucocyte count was compared with that of pretreatment readings, and the difference was tabulated and analyzed statistically. Severity of pain was assessed in pre & post procedure (one week and 3 months after starting treatment) by using Visual Analog Scale, it was tabulated and analyzed statistically.

For the study purpose, patients satisfaction level was graded into not satisfied, no response, and satisfied. Patient's satisfaction was assessed 3 months after the treatment being started and was tabulated and compared.

5-8)Follow-up:

Patients were followed in general surgery OPD for a period of 3 months and their condition was assessed clinically, imageologically and biochemically when and where indicated with CT scan. Pain score was noted and tabulated at the end of follow up period. Number of patients who completed follow-up period of 3 months were included in the study. Data of patients who lost follow-up or died was collected but not utilized in statistical analysis.

5-9) Statistical Analysis:

The results of the study were analyzed using SPSS software v 25.0. P-value was calculated using chi-square test. P-value <0.05 was considered significant.

6) RESULT:

Total 4 patients lost follow-up in group B, 1 patient due to death and 3 patients due to unknown reason. 12 patients lost follow-up in group A, 5 patients due to deaths and 7 patients due to unknown reasons. Causes of deaths were renal failure and cardiac disease rather than liver abscess perse.

Table 1 – Demographic representation of the patients

Treatment modalities	Group A (n=60)	Group B (n=64)
Conservative	34 (56.67%)	30 (46.87%)
Percutaneous needle aspiration	26 (43.33%)	34 (53.12%)

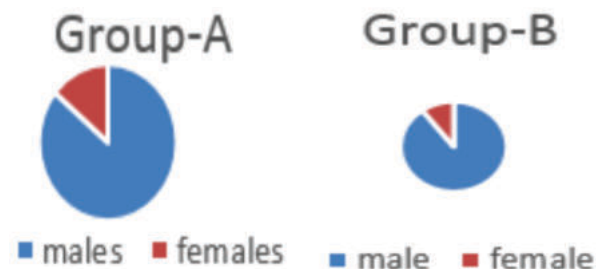


Figure 1: Gender distribution

Males were more commonly affected than females in both groups.

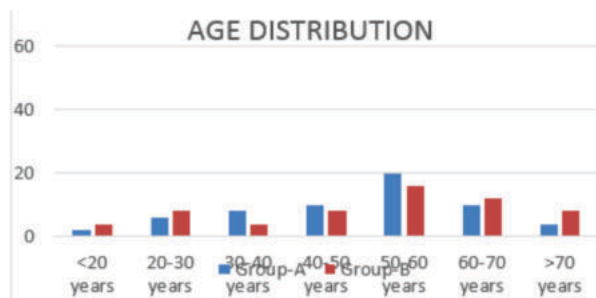


Figure 2: Age distribution

Liver abscess was common in age group 50-60 years followed by 60-70 years.

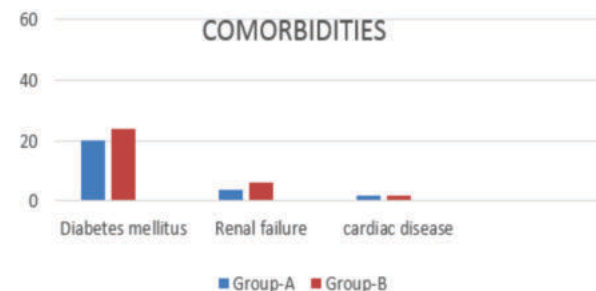


Figure 3: Comorbidity

The most common associated co-morbidity was diabetes mellitus.

Table 2: No. of patients responded to treatment

	Group A (n=60)	Group B (n=64)	P value
Conservative	30 (88.23%)	5 (16.66%)	0.01
Percutaneous needle aspiration	10 (38.46%)	34 (100%)	0.03

4 patients in conservative subgroup of Group-A who did not respond to treatment had higher liquefaction (45%-50%) and they underwent percutaneous needle aspiration after which they responded clinically and biochemically.

16 patients in aspiration subgroup of group-A who did not respond to aspiration alone were managed conservatively after which they responded clinically and biochemically.

25 patients in conservative subgroup of group-B who did not respond were managed with percutaneous needle aspiration after which their symptoms subsided.

Table 3: Mean size of abscess in centimeters before and after treatment:

	Conservative			Percutaneous needle aspiration		
	Before treatment	After treatment	Difference	Before treatment	After treatment	Difference
Group-A (n=60)	6.46 +/- 2.98	1.55 +/- 0.9	4.91 +/- 2.09	7.28 +/- 2.22	5.49 +/- 1.14	1.79 +/- 0.99
Group-B (n=60)	12.32 +/- 1.96	10.61 +/- 0.3	1.71 +/- 1.66	13.86 +/- 2.22	2.1 +/- 1.7	11.76 +/- 1.58
P-value			0.03			0.01

Conservative treatment showed significant reduction in size in group-A when compared to group-B.

Percutaneous needle aspiration treatment showed significant reduction in size in group-B when compared to group-A.

Table 4: Pain score;

Treatment modality	VAS score	Group-A (n=60)			Group-B (n=64)			P-value
		Pre treatment	After 7 days	After 3 months	Pre treatment	After 7 days	After 3 months	
Conservative	No pain	0	18	30	0	2	6	0.01
	Mild	13	10	4	1	4	6	0.04
	Moderate	18	6	0	14	12	8	0.03
	Severe	3	0	0	15	12	10	0.02
Percutaneous needle aspiration	No pain	0	5	10	0	12	32	0.01
	Mild	6	3	4	2	13	2	0.03
	Moderate	13	12	6	15	7	0	0.03
	severe	7	6	6	17	2	0	0.02

In group-A, more patients undergoing conservative treatment had decreased pain profile than those undergoing percutaneous need aspirations.

In group-B, more patients undergoing percutaneous needle aspiration had decreased pain profiles than those undergoing conservative management.

Table 5: Difference in leukocyte count

	Conservative			Percutaneous needle aspiration		
	Before treatment	After treatment	Difference	Before treatment	After treatment	Difference
Group-A	16483 +/- 3486	9669 +/- 1208	6814 +/- 2278	16279 +/- 2569	14606 +/- 1329	1673 +/- 1240
Group-B	17826 +/- 2387	16284 +/- 391	1542 +/- 1996	18643 +/- 3972	9389 +/- 1946	9254 +/- 2026
P-value			-0.03			-0.02

Table 6 : Patients satisfaction:

	Satisfaction grade	Group- A (n=60)	Group-B (n=64)	P-Value
Conservative	Not satisfied	4	25	0.02
	No response	3	1	0.07
	Satisfied	27	4	0.01
Percutaneous needle aspiration	Not satisfied	16	0	0.01
	No response	2	0	0.02
	satisfied	8	34	0.01

7)DISCUSSION:

Liver abscess is one of the common acute abdominal condition encountered in surgical practice. Irrespective of their etiology and presentation, they were treated by various approaches which varies from conservative, percutaneous needle aspiration, percutaneous catheter drainage and surgical management. Out of them conservative treatment and percutaneous needle aspiration are the most commonly practiced procedures.

The present study showed that liver abscess is common in males. Similar findings were shown by other authors [12,13,14,15]. People most affected belonged to the age group 50-60 years. Other studies have shown similar results [16,17,18]. Diabetes was the most commonly associated comorbidity among the patients. Similar findings were reported by other authors [19,20].

7-1) Reduction in size of abscess:

The reduction in size of abscess cavity after the treatment will be one of the main factor which determines the response of the condition to the treatment modality and outcome of the patient. In the present study, out of 34 patients (56.66%) in conservative subgroup of group-A, there is significant reduction in mean size (cm) of abscess cavity from 6.46 +/-2.98 to 1.55 +/-0.9, but out of 26 patients (43.33%) in percutaneous needle aspiration subgroup of group-A, reduction in the mean size of abscess cavity (cm) was from 7.28 +/- 2.22 to 5.49 +/- 1.14 which was not significant. The reason for lesser reduction in mean size of abscess in percutaneous needle aspiration group is because of lesser liquefaction necrosis giving low yield even on multiple aspirations and continuing infection and inflammation. Inflammatory and infective process responded well to antibiotics in conservative subgroup, hence significant reduction of abscess size in this category. Out of 30 patients (46.87%) in conservative treatment subgroup of group-B, mean abscess size (cm) was reduced from 12.32 +/- 1.96 to 10.61 +/-0.3 which was not significant, whereas out of 34 patients (53.12%) in percutaneous needle aspiration subgroup of group-B, mean abscess size (cm) was significantly reduced from 13.86 +/- 2.22 to 2.1 +/- 1.7. Higher reduction in size of abscess in percutaneous needle aspiration subgroup patients was due to higher liquefaction with lower inflammatory process which gave higher yield for aspiration and which also lead to faster recovery of the patient. Similar findings were reported by other authors with respect to size of abscess in their studies [21].

7-2) Reduction in leukocyte count:

Raise in the leukocyte count is one of the earliest indicator of infection and inflammatory process in the body. Reduction in leukocyte count is also the earliest indicator of resolution of infection to the treatment. In the present study, out of 34 patients (56.66%) in conservative treatment subgroup of group-A, mean leukocyte count (cells/cumm) significantly reduced from 16,483 +/-3,486 to 9,669 +/- 1,208 whereas out of 26 patients (43.33%) in percutaneous needle aspiration subgroup of group-A, mean leukocyte count (cells/cumm) reduced from 16,279 +/- 2569 to 14,606 +/- 1329 which was not significant. Maximum drop in the leukocyte count in conservative subgroup of group-A appears to be because the lesions are in inflammatory stage which responded well to antibiotics whereas in aspiration subgroup of group-A drop in leukocyte count is not significant because of less liquefaction resulting in less yield and continuing infection and inflammation leading to poor response for aspiration. Out of 30 patients (46.87%) in conservative treatment subgroup of group-B, mean leukocyte count (cells/cumm) was reduced from 17,826 +/- 2,387 to 16,284 +/- 391 which was not significant, whereas out of 34 patients (53.12%) in percutaneous needle aspiration subgroup of group-B, mean leukocyte count was significantly reduced from 18,643 +/- 3972 to 9,389 +/- 1,946. Since there was collection of liquefied pus in the abscess cavity and not much inflammatory component it did not respond to antibiotics alone as seen in same subgroup of group-A patients. As a dictum, once pus is present, it has to be removed which is evident in the aspiration subgroup of group-B where aspirating pus showed much faster and significant drop in leukocyte count which also resulted in faster symptomatic recovery of the patient. Other authors in their studies showed reduction in leukocyte count with both conservative and needle aspiration irrespective of liquefaction [22].

7-3) Patient's satisfaction:

Patient's satisfaction towards the treatment they received is the main goal of any treatment modality. This is one of the important end point and success to treatment for that particular condition. Dissatisfaction of the patient towards the treatment he received is not only frustrating to the patient but

also to the treating doctor. Significantly more number of the patients 27 (79.41%) in conservative subgroup of group-A expressed their satisfaction towards the treatment they received, whereas significantly less number of patients 3 (8.8%) and 4 (11.76%) expressed no response and dissatisfaction respectively. Significantly less number of patients 8 (30.76%) in aspiration subgroup of group-A expressed their satisfaction whereas significantly more number of patients 16 (61.5%) expressed dissatisfaction due to more discomfort and pain because of repeated aspiration which induces pain in addition to pain caused by disease process and also continuation of inflammation after aspiration in this group. Significantly more number of the patients 25 (83.3%) in conservative subgroup of Group-B expressed their dissatisfaction towards the treatment they received and significantly more number of patients 34 (100%) in percutaneous subgroup of group-B expressed their satisfaction. The difference in satisfaction expressed by patients of both subgroups is due to evacuation of pus in percutaneous subgroup causing decrease in pain and retention of pus in conservative subgroup resulting in persistent pain. No previous studies have been focused on this aspect and literature for comparison is not available.

8) CONCLUSION:

In Group A, more patients responded to treatment in conservative subgroup when compared to percutaneous needle aspiration subgroup as shown by reduction in abscess cavity size and leukocyte count indicating better response rate in patients who underwent conservative treatment with antibiotics. Patients were largely dissatisfied in the percutaneous needle aspiration subgroup, because of more pain due to repeated multiple attempts of aspirations.

In group B, very few patients responded to treatment in conservative subgroup whereas all patients in percutaneous needle aspiration subgroup responded well and showed faster relief from the symptoms after aspiration. Even though, there was post procedure pain in percutaneous needle aspiration subgroup, it was less when compared to aspiration subgroup of group-A. Hence, more no. of patients felt satisfied with percutaneous needle aspiration in group -B.

The present study concludes that conservative treatment is also a better option for abscess of lesser liquefaction. Percutaneous needle aspiration is a better option for higher percentage of liquefaction.

9) Conflict of interest disclosure:

There are no conflicts of interest between the authors in the publication of this article.

10) Acknowledgement:

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