



ORIGINAL RESEARCH PAPER

Surgery

A CLINICAL STUDY TO EVALUATE THE TREATMENT MODALITIES OF LIVER ABSCESES

KEY WORDS: Amoebic liver abscess; Antibiotics; Open surgical drainage; Percutaneous drainage; Treatment modalities.

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ABSTRACT

Background : A liver abscess is a pus-filled mass inside the liver. There are three major forms of liver abscess, classified by etiology, viz., amoebic abscess due to Entamoeba histolytica being the most type in tropical countries like India, followed by pyogenic abscess, which is most often polymicrobial and the least common being fungal abscess, most often due to Candida species.

Aims and Objectives: This study aimed to assess the effectiveness of various modalities of treatment of liver abscesses viz., antibiotics alone, sonographic guided percutaneous drainage with antibiotics and open surgical drainage.

Materials and Methods: This was an interventional prospective clinical study carried out on inpatients admitted in Mahatma Gandhi Hospital, Jodhpur. Informed written consent was obtained from all the patients who participated in the study before starting protocol wise treatment. A pre designed proforma was used to collect relevant data from the patients included in the study. Patient were assigned into three groups, according to the treatment modality:

- Group 'A' - Patient given medical management only.
- Group 'B' - Patient given percutaneous drainage with medical management.
- Group 'C' – Patients treated by open surgical drainage.

Observations: The study was conducted on a total of 100 patients, diagnosed with liver abscess. In our study, medical management alone was successful in 31% cases, ultrasound guided percutaneous drainage was done in 62% of cases, while the rest 7% of them underwent open surgical drainage.

Discussion: Although the primary mode of treatment of amoebic liver abscess is medical, 15% of amoebic abscesses may be refractory to medical therapy. Also, secondary bacterial infection may complicate up to 20% of amoebic liver abscesses. And hence drainage may be required in many patients with amoebic liver abscesses. Abscesses smaller than 5cm size can be managed by parenteral antibiotic therapy alone while those above 5cm size are usually managed by ultrasound guided percutaneous aspiration/drainage. Very large ones (>10cm) and multi-loculated abscesses with exaggerated necrotic process need to be operated. Patients with advanced age, abscess size > 5 cm, involvement of both lobes of the liver and duration of symptoms more than 7 days are likely to undergo aspiration of the liver abscess, regardless of aetiology. In addition to abscess size, other criteria for percutaneous drainage include continued pyrexia after 48-72 hours of adequate medical treatment, and clinical or ultrasonographic features suggesting impending perforation.

Conclusion: Liver abscesses continue to be an important cause of morbidity and mortality in tropical countries. Percutaneous drainage is now considered the treatment of choice for most intra-abdominal abscesses and fluid collections.

INTRODUCTION

Liver abscess is one of the commonest infection affecting the organ. Based on the etiology, liver abscess can be classified into bacterial, amoebic and fungal. On a worldwide basis, amoebic liver abscess is the commonest.

Liver abscesses has been described from the times of Hippocrates (400 B.C). Liver abscess is a challenging situation even today in tropical countries. Moreover, due to its highly variable presentation, it causes diagnostic difficulties. Thus a lot of clinical material on amoebic liver abscesses from these regions goes unreported. The prevalence of amoebic infection is as high as 50% in developing countries. Low socioeconomic status, poor sanitation, contaminated water supply, travel to or immigration from an endemic country and homosexuality have been implicated as predisposing factors. Liver is the most common extra intestinal site of involvement in amoebiasis, with amoebic liver abscess occurring in 3% to 9% of patients with Entamoeba histolytica infection^(1,2).

Liver abscesses can be treated by multiple modalities. The smaller ones (multiple or single) can be treated conservatively. Larger ones with complications require drainage. In our country where rural population constitutes approximately 70% and therefore it mandates appropriate and realistic guidelines to be drawn up for early diagnosis and change in management strategies in order to reduce the morbidity and mortality associated with it.

AIMS AND OBJECTIVES

The main aim of this study is to assess the effectiveness of various modalities of treatment of liver abscesses viz., medical management alone, ultrasound guided percutaneous drainage plus medical management or open surgical drainage plus medical management.

MATERIALS AND METHODS

This was an interventional prospective clinical study, carried out on 100 patients admitted in surgical ward of Mahatma Gandhi Hospital, Jodhpur during September 2011 to November 2013. Informed written consent was obtained from all the patients who

participated in the study before starting protocol wise treatment and data collection. A pre designed proforma was used to collect relevant data from the patients included in the study.

The diagnosis of liver abscesses was based on history of anorexia, fever, and pain abdomen with or without a preceding history of diarrhoea and findings of tender hepatomegaly, leukocytosis and sonographic evidence of liver abscess. All relevant investigations were done as per protocol. Patients were assigned into three groups:

Group 1 (n=31): Medical management alone (in inspirable uncomplicated abscess).

Group 2 (n=62): Sonologic guided percutaneous drainage plus medical management (in unruptured aspirable abscess).

Group 3 (n=7): Open surgical drainage plus medical management (In ruptured abscesses).

Medical management included use of second generation cephalosporins (Inj. Ceftriaxone 1 gm iv BD) plus aminoglycosides (Inj. Amikacin 500mg iv BD) and Inj. Metronidazole 400mg iv 8 hourly for fourteen days. This was extended according to the response of the patient to the medical treatment. Patients who converted from medical management to percutaneous drainage plus medical management were included in Group 2. Patients who converted from percutaneous drainage plus medical management to open surgical drainage were included in Group 3.

Percutaneous drainage of abscess was considered when:
i. Patient had no clinical response to drug therapy after 48 to 72 hours and abscess was sonologically aspirable.

ii. Patient with high risk of abscess rupture as defined by largest dimension > 10 cm or an abscess volume > 400 ml, left lobe abscesses, or abscesses with signs of impending rupture (high grade fever, severe upper abdominal pain, signs of peritonitis with or without evidence of free peritoneal fluid or an exudate on aspiration and/or thin rim of tissue around abscess (<10mm) on ultrasound/CT scan.

Open surgical drainage of abscess was considered when:
i. Liver abscess ruptured into the peritoneal cavity
ii. Percutaneous drainage of abscess lead to rupture and development of pyoperitonium.

Statistical Analysis:

For quantitative data: To compare the mean between two groups, t-test for independent values was used while for paired values, paired t-test was used.

For qualitative data: Difference between two proportions was calculated by chi-square test for independent groups while for paired values, Mc Nemar test was applied.

OBSERVATIONS:

A total of 100 patients with clinical and radiological diagnosis of liver abscess were included in the study.

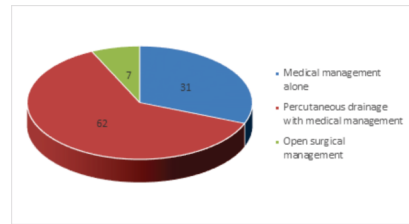
In our study (Table 1, Fig 1), 31% of the patients improved clinically with medical management alone; 62% required ultrasound guided percutaneous aspiration while rest 7% of the patients with ruptured liver abscesses were managed by open surgical drainage.

TABLE 1: DISTRIBUTION OF PATIENTS ACCORDING TO TYPE OF MANAGEMENT

Type of abscess	Type of management [No. of cases (%)]			
	Medical management alone (Group 1)	Percutaneous drainage with medical management (Group 2)	Open surgical management (Group 3)	Total (%)
Amoebic-	43 (69.35)	5 (7.143)	48 (69.57)	

Pyogenic-	19 (30.65)	2 (28.57)	21 (30.43)
Total	31 (100)	62 (100)	69 (100)

FIGURE 1: DISTRIBUTION OF PATIENTS ACCORDING TO TYPE OF MANAGEMENT

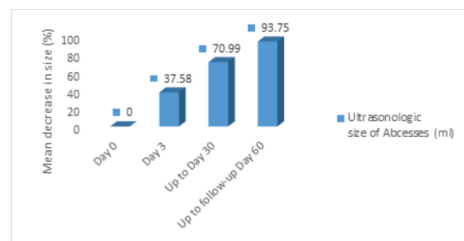


The efficacy of medical management was assessed by decrease in size of abscess cavity ultrasonologically. In group 1, the size of the abscess cavity gradually decreased by medical management which was 37.58% by 3rd day, 70.99% and 93.75% respectively on 30th and 60th days (Table 2, Fig 2).

TABLE:2 EFFICACY OF MEDICAL MANAGEMENT

Ultrasonologic Size of Abscess (in ml)	Day 0	Day 3	up to Day 30	Up-to Follow up Day 60
Mean Size	97.83	61.06	28.38	6.11
Mean decrease in size	-	36.77	69.45	91.72
Mean percentage decrease in size	-	37.58	70.99	93.75

FIGURE 2: EFFICACY OF MEDICAL MANAGEMENT

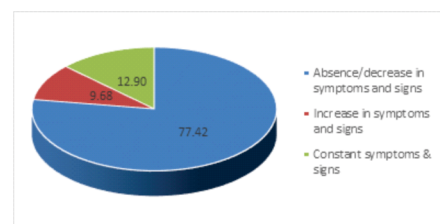


In group 1, 77.42% of patients were relieved of signs and symptoms by medical management alone but in 9.68% of the patients, the problem was aggravated during initial 3-5 days and in rest 12.90 % cases the symptoms and signs were constant (Table 3, Fig 3).

TABLE 3: EFFICACY OF MEDICAL MANAGEMENT

Changes in signs & symptoms	Number of Cases	Percentage
Absence/decrease in symptoms and signs	24	77.42
Increase in symptoms and signs	3	9.68
Constant symptoms & signs	4	12.90

FIGURE 3: EFFICACY OF MEDICAL MANAGEMENT

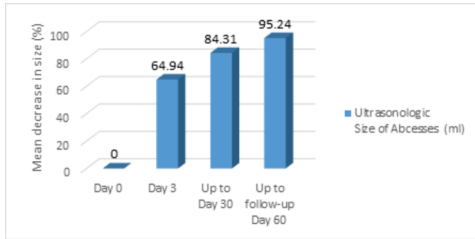


In group 2, the size of the abscess cavity gradually decreased by percutaneous drainage plus medical management which was 64.94% by 3rd day and up to 84.31% and 95.24% by 30th & 60th days respectively. The response to the treatment was almost similar in either varieties of abscesses (Table 4, Fig 4).

TABLE 4: EFFICACY OF PERCUTANEOUS DRAINAGE WITH MEDICAL MANAGEMENT

Ultrasonologic Size of Abscess (ml)	Day 0			Day 3			up to Day 30			Up-to Follow up Day 60		
	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total
Mean Size	468.09	545	491.66	160.88	198.42	172.38	78.97	73.05	77.16	19.44	31.76	23.39
Mean decrease in size	-	-	-	307.21	346.58	319.28	389.12	471.95	414.5	448.65	513.24	468.27
Mean percentage decrease in size	-	-	-	65.63	63.59	64.94	83.12	86.59	84.31	95.84	93.98	95.24

FIGURE 4: EFFICACY OF PERCUTANEOUS DRAINAGE WITH MEDICAL MANAGEMENT



In group 2, about 87% of patients were relieved of signs and symptoms following sonologic guided percutaneous drainage but 6.45% of the patients in this group had the problem aggravated during initial 3-5 days. Symptomatic response to this treatment modality was better amongst patients with amoebic liver abscesses (Table 5, Fig 5).

TABLE 5: EFFICACY OF PERCUTANEOUS DRAINAGE PLUS MEDICAL MANAGEMENT

Changes in signs & symptoms	Number of Cases (%)		
	Amoebic	Pyogenic	Total
Absence/decrease in symptoms and signs	39(90.70)	15 (78.95)	54(87.10)
Increase in symptoms and signs	3(6.98)	1(5.26)	4(6.45)
Constant symptoms & signs	1(2.33)	3(15.79)	4(6.45)
Total	43(100)	19(100)	62(100)

Absence/decrease in symptoms and signs	39(90.70)	15 (78.95)	54(87.10)
Increase in symptoms and signs	3(6.98)	1(5.26)	4(6.45)
Constant symptoms & signs	1(2.33)	3(15.79)	4(6.45)
Total	43(100)	19(100)	62(100)

FIGURE 5: EFFICACY OF PERCUTANEOUS DRAINAGE PLUS MEDICAL MANAGEMENT

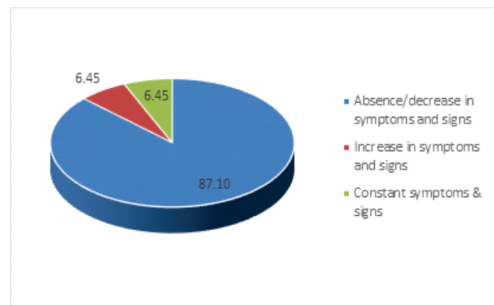
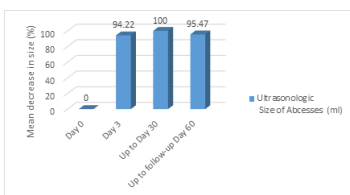


TABLE 6: EFFICACY OF OPEN SURGICAL DRAINAGE

Ultrasonologic Size of Abscess (ml)	Day 0			Day 3			up to Day 30			Up-to Follow up Day 60		
	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total	Amoebic	Pyogenic	Total
Mean Size	448	550	477.14	34.6	10	27.57	0	0	0	21	22.5	21.6
Mean decrease in size			-	413.4	540	449.57	448	550	477.14	427	527.5	455.54
Mean percentage decrease in size			-	92.27	98.18	94.22	100	100	100	95.31	95.90	95.47

In group 3, the size of the abscess cavity decreased abruptly in size (94.22%) by open surgical drainage plus medical management on 3rd day. By the 30th day 100% patients had their abscesses disappeared however on follow-up on the 60th day slight reaccumulation was noted (Table 6, Fig 6).

FIGURE 6: EFFICACY OF OPEN SURGICAL DRAINAGE

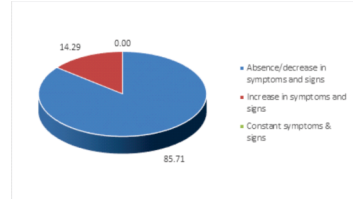


In group 3, 85.71% of patients were relieved of signs and symptoms by open surgical drainage plus medical management but in 14.29% of the patients, the problem increased during the initial 3-5 days. (Table 7, Fig 7)

TABLE 7: EFFICACY OF OPEN SURGICAL DRAINAGE

Changes in signs & symptoms	Number of Cases		
	Amoebic	Pyogenic	Total
Absence/decrease in symptoms and signs	4(80)	2(100)	6(85.71)
Increase in symptoms and signs	1(20)	0(0)	1(14.29)
Constant symptoms & signs	0(0)	0(0)	0(0)
Total	5(100)	2(100)	7(100)

FIGURE 7: EFFICACY OF OPEN SURGICAL DRAINAGE

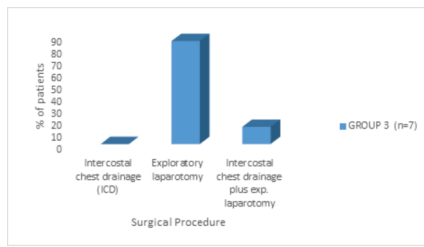


In group 3, open laparotomy, intercostal chest drainage or both the procedure were performed depending upon the need of the patients. About 85.71% of the patients required only exploratory laparotomy while 14.29% of the patients required both intercostal chest drainage plus exploratory laparotomy. The incidence of rupture in peritoneal cavity was five times higher in patients of amoebic liver abscesses where as rupture into pleural cavity was encountered exclusively amongst patients of pyogenic liver abscesses. (Table 8, Fig 8)

TABLE 8: SURGICAL MANAGEMENT IN GROUP 3 PATIENTS

S. No.	Surgical Procedure	No. of cases GROUP 3 (n=7)		
		Amoebic	Pyogenic	Total (%)
1	Intercostal chest drainage (ICD)	0 (0)	0 (0)	0 (0)
2	Exploratory laparotomy	5 (100)	1(50)	6 (85.71)
3	Intercostal chest drainage plus exp. Laparotomy	0 (0)	1(50)	1(14.29)
4	Total	5(100)	2(100)	7(100)

FIGURE 8: SURGICAL MANAGEMENT IN GROUP 3 PATIENT



In the present study, 57% patients had no side effects during management in all study groups. The most common side effect was nausea and vomiting in 20%, followed by headache in 13% all study groups.

Other complications included discomfort at aspiration/drain site and altered bowel habit. Nausea and vomiting were most common in patients treated by open surgical drainage plus antibiotic coverage (42.86%). Complications were more frequently encountered among patients of pyogenic abscesses in group 2.

Abscess was aspirated percutaneously, ultrasonologically guided, in 62 patients. The sample was found to be sterile in 36 patients (58.06%). Culture showed growth of *E.coli* in 12 (19.35%), *Klebsiella* in 11 (17.74%), *Streptococci* in 2(3.23%) and *Enterococci* in 1(1.61%) patient. About 20 % of amoebic abscesses had secondary bacterial infections.

DISCUSSION

The present study was conducted on a total of 100 patients of liver abscesses. Group 1 included patients sonologically diagnosed as having inaspirable liver abscesses. Patients who had abscesses which could be labelled as aspirable on ultrasound were named Group 2 and all those cases where the abscesses had ruptured into peritoneal and pleural cavities were included in Group 3.

Ultrasound was the mainstay of the diagnosis and management of amoebic liver abscess and was performed in all patients under study. Apart from its diagnostic utility, ultrasound was also utilised in the management of the patients. Drainage procedure (needle aspiration) was also performed under ultrasound guidance. This averted any associated complications or morbidity of the procedure besides assisting proper placement of the needle in the cavity. Follow-up USG was done in the patients where by the abscess cavity size was assessed.

Medical management for uncomplicated amoebic liver abscess is indicated if size of abscess is 5cm or less⁽³⁻⁶⁾ while therapeutic aspiration is indicated if the volume of abscess exceeds 200ml⁽⁷⁾. The therapeutic aspiration has been done in liver abscesses of size 7.5cm (standard deviation, 2.42cm), while abscesses of the size 8.5cm (standard deviation, 3.53cm) were treated successfully by medical management⁽⁵⁾. But therapeutic aspiration has also been done in abscess size of 5.4cm (standard deviation, 2.2cm) while abscesses size of 7.2cm (standard deviation, 2.0cm) has been treated by medical management alone. In more recent studies pigtail catheter insertion for management of liver abscess has been reported with resolution of liver abscess being reported to occur earlier^(8,9).

This study has reported that abscess of size >300cm² should be aspirated. Similar results has been reported by other studies also⁽¹⁰⁻¹²⁾. Although improvement of liver tenderness has been reported to be significantly faster in the aspiration group during the first 3 days (p-value <0.001), all other parameters showed no difference between the two groups. This minor benefit was obviously not sufficient to justify routine needle aspiration and the study advocated drug management alone for uncomplicated liver abscess with a diameter up to 10cm and located in right lobe⁽¹³⁾.

In the present study, patients of group 1 were managed by medical management and the decrease in mean size of abscesses on the 3rd day was 37.58% as compared to study group 2 where the cases

were managed by percutaneous aspiration plus medical management and the mean decrease in the size of the abscesses was 64.94%. In group 3, where the management was done by open surgical drainage, the mean size of abscesses on 3rd day decrease by 94.22%. These data showed that if abscess is aspirable by ultrasound guidance, it can be managed well by percutaneous aspiration and medical management and this modality of management had more efficacy and potency in the treatment of liver abscess. If the liver abscess is ruptured than the best modality of treatment is open surgical drainage plus medical management, since decrease in the mean size of the abscess by 3rd day is by far the best viz. a viz. other modalities.

In our study, resolution of the liver abscess was faster amongst group 1 patients as compared to study group 2 and group 3 cases. Resolution of the liver abscess was speedier amongst seen more in our studies in study group 3 patients as compared to study group 2. In group 1 the size of the abscess cavity gradually decreased by medical management which was 37.58% by 3rd day, 70.99% and 93.75% respectively on 30th and 60th days.

In group 2, the size of the abscess cavity gradually decreased by percutaneous drainage plus medical management which was 64.94% by 3rd day and up to 84.31% and 95.24% by 30th and 60th days respectively. The response to the treatment was almost similar in either varieties of abscesses. In group 3, the size of the abscess cavity decreased abruptly in size (94.22%) by open surgical drainage plus medical management on 3rd day. By the 30th day 100% patients had their abscesses disappeared however on follow-up on the 60th days slight reaccumulation was noted. The response to open drainage was marginally better amongst patients with pyogenic liver abscesses as compared to those with amoebic liver abscesses.

Efficacy of the three kinds of the treatment modalities were also evaluated by noting the decrease/absence and relief in the signs and symptoms amongst patients of the study groups. In group 1 - 77.42%, group 2 - 87.10% and group 3 - 85.71% patients were relieved of their signs and symptoms by initial 3rd to 5th day of treatment.

This indicates that percutaneous aspiration plus antibiotic coverage resulted in relief from the signs and symptoms with more efficacy and effectiveness as compared to group 1 and group 3 patients in whom medical management alone and open surgical drainage was done respectively. It also indicates that open surgical drainage was more effective in relieving signs and symptoms as compare to group 1 patients who were subjected to medical management alone.

Thus this study clearly proves that in term of relief from signs and symptoms and in decrease in the mean size of the abscess, results are better with open surgical drainage as in group 3 patients viz. a viz. group 2 and group 1 cases but complete resolution of the abscess was more effective and more efficacy was found in patients of group 1 as compared to group 2 and group 3 cases up to 60th day of treatment.

CONCLUSION

It could be concluded that liver abscess which are sonologically diagnosed as inaspirable irrespective of the aetiology can be successfully treated by medical management alone. All cases of sonologically aspirable abscesses, whether at presentation or during the course of the medical management can be managed with success by percutaneous aspiration in addition to the drug treatment irrespective of the size of abscess cavity and pigtail catheter insertion appears unnecessary. Ruptured cases of abscesses can be managed with success by open drainage viz. exploratory laprotomy, intercostal drainage or both, depending upon the site of rupture which could be in the peritoneal or pleural cavity or both.

ABBREVIATIONS:

- BC : Before Christ
- CT scan : Computed tomography Scan

USG : Ultrasound

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DECLARATION

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Conflict of interest: None declared

Ethical approval: Obtained from Ethical committee

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