

A comparative study to evaluate needle aspiration and surgical drainage in treatment of liver abscess

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Abstract

Aim: The aim of the study was to evaluate the clinical presentation, and to investigate the effectiveness of surgical drainage in comparison to needle aspiration in the treatment of liver abscesses. **Methods:** This is a comparative study of 121 patients, presented in outpatient and emergency department at the hospital, randomized double blind trial was done and divide into two groups about which surgeon did not knew about the division it was marked by evaluator. The effectiveness of either treatment was measured in terms of duration of hospital stay, days to achieve clinical improvement, reduction in abscess cavity size and total/near total resolution of abscess cavity. **Results:** The success rate was significantly better in needle aspiration group. The patients in needle aspiration group showed earlier clinical improvement and decrease in abscess cavity volume as compared to those who underwent surgical drainage. **Conclusion:** Ultrasound guided needle aspiration is a better modality as compared to Surgical drainage especially in larger abscesses which are partially liquefied or with thick pus.

Keywords: Liver abscess, Surgical drainage, Needle aspiration.

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Introduction

Liver is a significant and essential organ of the body. This organ is exposed to various foundational diseases viral, bacterial and parasitic and lies at the distal finish of the entry circulation[1]. Liver cancer has been perceived since Hippocrates (around 400 B.C.) who conjectured that the visualizations of the patients were identified with the sort of liquid inside the sore cavity [2]. Liver abscesses are irresistible, space-possessing abscess in the liver; the two most regular abscesses being pyogenic and amoebic. Pyogenic Liver Abscess (PLA) is an uncommon yet possibly deadly condition; its seriousness relies upon the source of the disease and the fundamental state of the patient. Amoebic Liver Abscesses (ALA) are common in tropical districts predominantly where 'Entamoeba histolytica' is

endemic and is more pervasive in people (generally young males) with stifled cell mediated immunity[3]. Right lobe of the liver is the most probable site of disease in both sort of liver abscesses. The clinical presentation of both the sorts might be tricky with mix of fever, right upper quadrant agony and hepatomegaly with or without jaundice. Liver abscesses keep on being a significant reason for morbidity and mortality in tropical nations. Not withstanding, late advances in interventional radiology, serious consideration, progress in antibiotic therapy, and utilization of sonography and modernized tomography scanning of the abdomen have prompted early determination and treatment of patients with liver abscess, in this manner improving the patient result. Before hand liver abscess was viewed as a high morbidity disease requiring surgical drainage, with death rates somewhere in the range of 9% and 80%. On the off chance that untreated, it was consistently fatal[1]. In the last quarter of a century we have seen a significant change in outlook in the administration of pyogenic hepatic abscesses/ amoebic liver abscesses, with an associative

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lessening in mortality to 5-30%[4]. Percutaneous drainage of liver abscess has been a significant progression and is generally use in the treatment of both sort of liver abscesses. Therefore, a study was conducted to compare needle aspiration and surgical drainage in treatment of liver abscess.

Methods

This was a prospective, randomized, comparative study, conducted in the department of surgery at ANMMCH, Gaya from December 2015 to December 2019. The study was approved by the institutional research and ethical committee. After taking informed and written consent the prospective and observational study was undertaken. A total of 121 subjects for liver abscess drainage were studied, these subjects were randomly divided into two groups.

Group (I) was assigned for ultrasound guided needle aspiration (n=69) and Group (II) was assigned for Surgical drainage (n=52).

Inclusion criteria

- 1.The patients were selected from outpatient department and emergency department of our hospital.
- 2.The age of the patient varied from 20-60 years.
- 3.All the patients were diagnosed to have liver abscess by clinically and ultrasonography (USG).

Exclusion criteria

- 1.The patients having abscess cavity smaller than 5 cm in greatest dimension.
- 2.Prior intervention.
- 3.Ruptured liver abscess,
- 4.Uncertain diagnosis
- 5.Concomitant biliary tract malignancy and
- 6.Uncorrectable coagulopathy were excluded from the study.

All cases were carefully worked up for detailed history and clinical examination.

This included complete blood count, liver function test, prothrombin time, International Normalized Ratio (INR), blood culture, amebic serology, chest X-ray, abdomen USG were done for all subject fulfilling the inclusion criteria and after procedure all investigation done including pus culture. All the patients empirically received injectable Metronidazole 750 mg IV 08 hourly; injection Ceftriaxone sodium 1 gm IV 12 hourly; and Injection Amikacin 500 mg IV 12 hourly. This was administered for a period of 10 to 14 days.

USG guided needle aspiration: The patient was subjected to ultrasonography of the abdomen and the characteristics of the abscess cavity was recorded. The

proposed puncture site was infiltrated by Local Anesthesia (Lidocaine 2%) using 23 gauge needle. A 18 gauge spinal needle was used to aspirate the pus under ultrasound guidance. The pus was aspirated till no more pus could be aspirated further. A sample of pus was sent for gram staining, culture and sensitivity and wet mount for Entamoeba histolytica trophozoites.

Surgical drainage

The patient was subjected to laprotomy. Both lobe of liver inspected abscess localized and drained surgically. Pus along with necrotic debris suctioned and abscess cavity was washed with normal saline followed by metronidazole solution. Peritoneal cavity was washed with adequate amount of normal saline to remove any spillage. Two ADK drain was given each in right Subhepatic Space and pelvis. Abdomen was closed in layers and dressing was applied.

Evaluation of response to intervention

In patients who underwent Ultrasonography guided Needle aspiration clinical response (pain abdomen and liver abscess temperature) and laboratory parameters (total Leukocyte count and Liver function test) were recorded on daily basis.

Ultrasonography was repeated after a gap of two weeks and aspiration repeated if the cavity size was still found to be greater than 5 cm. The same procedure was repeated after a gap of another two weeks and aspiration repeated if needed. Failure of clinical improvement in terms of abdominal pain and tenderness, fever, leucocytosis & size of abscess cavity more than 5 cm after third attempt of aspiration was taken as failure of Ultrasonography guided Needle aspiration. In patient who underwent surgical drainage besides recording the clinical and laboratory parameters of the patients everyday; daily output of the ADK drain was measured and drain was flushed with 20 cc of normal saline. A decision to remove the drain was made when the total drainage from drain decreased to less than 10 ml /24 hours for two consecutive days. The patient was administered Tab. Diloxanide Furoate 500 mg bid , metron 400 mg tds and ciproflox 500 mg bd for 10 days at the time of discharge. Failure of clinical improvement in 10 days and failure of 50% reduction in size of abscess cavity even after 12 days was taken as failure of surgical drainage.

Follow up: The patients were followed up monthly for 3 months and at the end of six months, for clinical evaluation and Ultrasonography assessment of abscess cavity until complete resolution of abscess was

achieved. Data was collected and recorded in the printed proforma by the investigator.

Statistical analysis

The effectiveness of treatment was measured in terms of: duration of hospital stay; days to achieve clinical improvement; days to achieve 50% reduction in abscess cavity size; and days to achieve total/near total resolution of abscess cavity. Independent t- test was used to analyze these parameters.

The level of significance was set at $P < 0.05$. Volume of abscess cavity and duration of drainage were also analyzed and range and mean values were calculated for both the parameters.

Results

A total of 121 patients randomized into two groups participated in this study. 52 subjects were treated with surgical drainage and 69 for Ultrasound guided needle

aspiration were included in the study. The following observations were made:

Age and sex: The age of the patients varied from 20 years to 60 years with most of the patients falling within the age range from 31-40 years (96 patients). The second most common age group was 21-30 years (25 patients) and the number of patients was less in extremes of age. There were 110 male and 11 female patients with liver abscess involved in the study. The male to female ratio was 10:1.

Symptoms and signs: It was observed that out of 121 patients 117 (97%) patients have fever, 113 (93%) anorexia; nausea/vomiting 108 (89%), pain in the right upper quadrant of the abdomen was found in 102 (84%) cases. Weakness 99 (82%), 69 (57%) weight loss 29 (58%), night sweats 58 (48%), dyspnea 52 (43%), diarrhea 48 (40%), rigors 30 (25%), cough 24 (20%) and pain in the right shoulder region was observed in 21 (17%) cases (Table 1).

Table 1: Symptoms in order of decreasing frequency

Symptom	No. of patients	Percentage
Fever	117	97
Anorexia	113	93
Nausea/vomiting	108	89
Right upper quadrant pain	102	84
Weakness	99	82
Weight loss	69	57
Night sweats	58	48
Dyspnea	52	43
Diarrhea	48	40
Rigors	30	25
Cough	24	20
Right shoulder pain	21	17

Type of abscess: Mixed type of liver abscesses 103 (85%) were predominant over amebic 12 (10%) and indeterminate 6 (5%). All pyogenic was found in association with amebic etiology (Table 2).

Table 2: Type of abscess accordance with amebic serology and pus culture.

Etiology	Amoebic serology result	Pus culture result
Amebic	+	-
Pyogenic	-	+
Amoebic with secondary infection	+	+

Number of abscess: Out of 121 subject we found that 86 having the single abscess and remaining 35 having the multiple abscess.

Location of abscess: In total 121 patients, 99 (82%) patients have abscess in right lobe, 15 (12%) patients have abscess in left lobe and remaining 7 (6%) having abscess in both lobes.

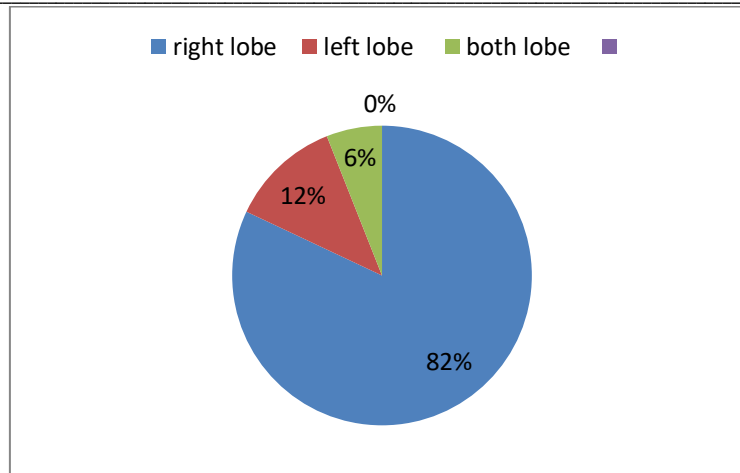


Fig 1:Location of abscess

Interventions and their results: A total of 121 patients underwent either of the two procedures randomly and their response to treatment was recorded and analyzed (Table 3). USG guided needle aspiration was successful in all the cases (69). On the other hand, Surgical drainage was successful only in 40 of 52 patients ($P < 0.005$). In the Surgical drainage group, on comparing the cavity volumes the mean cavity volume in those who were successfully treated was 358 ± 136 cc which was significantly less than those failing treatment; the mean volume being 405 ± 11 cc ($P < 0.005$). The patients in USG group showed earlier clinical improvement 4.2 ± 1.7 days and 50% decrease in abscess cavity volume 5.0 ± 1.3 days as compared to Surgical drainage group. However, there was no significant difference between the duration of hospital stay or the time required for total or near-total resolution of cavity.

Table 3: Intervention and their results

Parameter	Surgical Drainage		USG Drainage		P value
	No. of patients	Mean \pm SD	No. of patients	Mean \pm SD	
Volume of the largest cavity (c.c.)	52	358 ± 136	69	405 ± 118	<0.005
Duration of drainage (days)	52	NA	69	9.8 ± 3.5	NA
Clinical improvement (days)	52	5.5 ± 2.2	69	4.2 ± 1.7	<0.005
Time for 50% reduction in cavity size (days)	52	7.5 ± 2.4	69	5.0 ± 1.3	<0.005
Time for total or near total resolution of cavity (weeks)	52	10.6 ± 3.5	69	10.1 ± 4.2	>0.005
Hospital stay (days)	52	9.6 ± 4.5	69	10.8 ± 3.5	>0.005
Success	52	77%	69	98%	<0.005

Discussion

In gastrointestinal system liver abscess is a major tropical disease[5]. The liver abscess is mainly classified into amebic and pyogenic. Pyogenic liver abscess which used to be mainly tropical in location is now more common due to increased biliary interventions, stenting, cholecystitis, cholangitis etc. Liver abscess is 3 to 10 times more common in men[6]. In our study we found the male to female ratio to be 10:1. The most frequently affected age group was in the 30 to 40 year the male female ratio was 7:1 and the

most frequently affected age group was 30-40 year have been mentioned by Sukhjeet Singh et al[7]. The clinical presentation of the patients studied in our series was similar to the descriptions in previous reports. The common sign and symptom in our study were anorexia (93%), right upper quadrant pain and tenderness (84%), weakness (82%), and fever in 97% cases, similar report were made by previous studies[7-9]. In our study we found 10% of the abscesses to be amebic in etiology, 5% to be indeterminate and 85% to be amebic with secondary bacterial infection (or mixed liver abscess, MLA), all pyogenic was found in association with

amebic infection, no any cases were found to be infected with only pyogenic, this was controversy to Sukhjeet Singh et al. who reported 58% of the abscesses to be amebic in etiology, 23% to be pyogenic, 12% to be indeterminate and 7% to be amebic with secondary bacterial infection,7 and Khan et al. reported 68% amebic, 21% pyogenic, 8% indeterminate, and 3% MLA[10]. The use of serological testing for diagnosis of amebic liver abscesses can occasionally lead to either false negative results early in the course of the disease, due to delay in rise of antibody titer, or to false positives due to background subclinical amebic infections. Consideration of high titers for diagnosis may help exclude these false positives[11]. The pus cultures were negative in 35 of 121 patients. Aerobic cultures were declared negative after 48 h of incubation. There were 4 patients(3%) in whom the amebic serology as well as pus cultures were negative. As several of our patients prior to reporting to our hospital had been given antibiotics as well as antiamoebic drugs, this might explain the finding of 5% cases with indeterminate etiology. Similar data have been reported by Khan R et al[10]. In our study, 82% of the abscesses were located in the right lobe of liver, 12% in left lobes and 6% in both lobes which was similar to previous studies[7,8,12]. We performed drainage of liver abscess in 121 patients with uncomplicated liver abscess. There was no mortality and no any major complication requiring any treatment. In our study we treated 52 patients with surgical drainage along with systemic antibiotics. Out of 52 patients 40 patients were successfully treated. In these the mean volume of largest cavity was 358 ± 136 c.c., clinical improvement were seen within mean time of 5.5 ± 2.2 days, mean time taken to reduce the cavity size up to 50% was 7.5 ± 2.4 days, time taken to resolution of total cavity size was 10.6 ± 3.5 days, the average hospital stay time was 9.6 ± 4.5 days. Unsuccessful of cases may be due to use of alcohol. A study done by Sukhjeet Singh et al. showed approximate same result the reported success rate of 77%, the mean volume of largest cavity was 249 ± 121 c.c., clinical improvement were seen within mean time of 5.5 ± 1.9 days, mean time taken to reduce the cavity size up to 50% was 7.1 ± 2.3 days, time taken to resolution of total cavity size was 10.1 ± 4.2 weeks, the average hospital stay time was 10.5 ± 5.2 days[7]. Several studies documented that patients can be managed with a combination of systemic antibiotics and needle drainage with excellent results[13,14]. In our study we treated 69 patients with ultrasound guided needle aspiration along with systemic antibiotics. Out of 69 cases 67 patients were successfully treated and 2

cases not completely reduce the size of cavity due to alcohol addiction. In these the mean volume of largest cavity was 405 ± 118 c.c., Clinical improvement were seen within mean time of 4.2 ± 1.7 days, mean time taken to reduce the cavity size up to 50% was 5.0 ± 1.3 days, time taken to resolution of total cavity size was 10.1 ± 4.2 days, the average hospital stay time was 10.8 ± 3.5 weeks, same result was reported by Sukhjeet Singh et al[7]. The time required for 50% reduction in the cavity size was significantly less in the USG group compared to surgical group (5 days and 7.5 days respectively, $P < 0.000$). However, time required for total or near-total resolution of the abscess cavity did not show any significant difference in the two groups (surgical group=10.6 weeks, USG group=10.1 weeks, $P > 0.005$). Thus the result showed that the relapse of cavity was better in Surgical drainage group than the USG group, similar result were recorded by other researcher as Rajak CL et al[15]. Giorgio A et al. have reported reasonably good results with needle aspiration along with systemic antibiotics, performed on an average 2.2 aspirations in 115 patients and reported resolution of symptoms and hepatic lesions in 98% of the patients. The mean duration of time taken for clinical improvement was 5.5 ± 1.9 days in this modality of treatment[16]. Rajak et al. reported a success rate of 60% with needle aspiration. However, in their study only two attempts of aspiration were made and failure to attain clinical, hematological and radiological improvement was taken as failure of therapy[15]. The major advantages of needle aspiration over surgical technique are: 1) it is less invasive and less expensive; 2) avoids problems related to catheter care; and 3) multiple abscess cavities can be aspirated easier in the same setting[17,18]. However, in our study we had a good success rate with surgical drainage which was significantly lower than with USG group (76% versus 100%, $P < 0.005$). There are some problems with catheter drainage like nuisance to the patient, pain, cellulites at the insertion site and sometimes catheter dislodgement. The success rate of needle aspiration in the literature varies from 79-100%[19]. Another important reason for failure of needle aspiration is the inability to completely evacuate the thick viscous pus that may be present in some of the abscesses. Rapid re-accumulation of pus in the abscess is another reason described for failure of needle aspiration[20]. Placement of an indwelling drainage catheter addresses all three of these issues as it provides continuous drainage, drains thick pus because of wider caliber catheter, and prevents re-accumulation. This explains the higher success rates observed in our study and several previous

studies[21].The only reasons for failure of catheter drainage as reported in some of the earlier series have been either thick pus not amenable to percutaneous drainage (this can be overcome by placement of a wider bore catheter) or premature removal of drainage catheter. No recurrence occurred in any of our cases during the follow up period. However,both treatment modalities resulted in rapid clinical relief with most patients showing resolution of signs and symptoms within the first 3 days of the procedure[22].

Conclusion

Our study concludes that the ultrasound guided drainage is less invasive, less expensive, simple and highly effective mode of liver abscess treatment as compared to surgical drainage particularly in multiple abscess cavity in respect to clinical improvement, resolution of cavity, success rate but there was no significant difference in hospital stay time. There was no major complication occur during both the procedure.Surgical drainage is more effective in complicated, multilocular thick walled abscess with viscous pus. It is better to say that, treatment of liver abscess should be individualized.

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