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Comparative evaluation of interventional radiology modalities in treatment of liver abscess

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ABSTRACT

Background: Liver abscess (LA) is a superlative cavity in the liver resulting from the invasion and multiplication of microorganism. With progress of interventional radiology, alternative to surgery in form of percutaneous drainage (PD) have become popular. PD can be accomplished by either percutaneous catheter drainage (PCD) or percutaneous needle aspiration (PCNA). This study was conducted to assess the PD as a definitive treatment modality for LA and comparison of PCD and PCNA.

Methods: The study was conducted in the Radiodiagnosis Department. All patients of LA were evaluated for age, sex, duration of complaints, type of intervention performed, and outcome etc. After diagnosis, patients were managed by PCD or PCNA. Response to treatment, duration of stay, and overall success of both the modalities were evaluated. **Results:** The duration of this study was 34 months. During this period, 57 patients were evaluated. Of total, 29 underwent PCD and 28 PCNA. Male to female ratio was 2:1. Right lobe was involved in 48. Mean volume of abscess cavity was 356.44 ml. All patients who underwent PCD responded to the treatment; however, 8 patients who were treated by PCNA did not respond completely. Outcome was statistically related to type of treatment modality. PCD was statistically superior to PCNA (P <0.05).

Conclusions: PD may be regarded as first line of treatment for LA. It appears that PCD is better as compared to PCNA for successful outcome of patients.

Keywords: Aspiration, Liver abscess, Percutaneous catheter drainage, Percutaneous needle aspiration

INTRODUCTION

Liver abscess (LA) is a superlative cavity in the liver resulting from the invasion and multiplication of microorganism, entering directly through hematogenous route or of biliary ductal system. LA may be either pyogenic or amebic. Pyogenic LA (PLA) can be a potentially life-threatening infection with up to 19% mortality (AJS). Earlier, the treatment of this condition was surgical drainage; however, with progress of interventional radiology and alternative to surgery in

form of percutaneous drainage (PD) have become popular.²

With good imaging modalities, there has been a decline in mortality as early and improved diagnosis is possible. Besides, advances in intensive care and availability of expertise for percutaneous drainage have also evolved.³

In case of PD, it can be accomplished by either by percutaneous catheter drainage (PCD) or percutaneous needle aspiration (PCNA). This study was conducted to

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assess the PD as a definitive treatment modality for LA and comparison of PCD and PCNA.

METHODS

The study was conducted in the Radiodiagnosis Department of Medical Institute. All patients of LA were evaluated for age, sex, duration of complaints, type of intervention performed, and outcome etc. The written and informed consent of patients was obtained before any intervention, and the procedure was explained to them in their language. The duration of this study was from July 2015 to December 2018. The diagnosis of LA was made on clinical evaluation, which was corroborated with radiological confirmation (ultrasound (USG) abdomen with or without contrast enhanced computed tomographic (CECT) scan).

Inclusion criteria included Abscess cavity of more than 3 cm on USG abdomen.

Exclusion criteria was multiple small abscesses, poor general condition of the patient, and prior attempt of PD at other centers.

Procedure

All patients of LA were initially put on intravenous (IV) antibiotics, which comprised Ceftriaxone (50-100 mg/kg 8 hourly), Amikacin (15 mg/kg 12 hourly), and Metronidazole (5 mg/kg 8 hourly). Supportive treatment in form on IV fluids, analgesics, and antipyretics were given as and when needed. After initial stabilization, USG abdomen was performed to confirm the clinical suspicion of LA. All included patients underwent either of the two procedures. Before the procedure, prothrombin time (PT) and prothrombin concentration (PC) were evaluated.

PCNA

In patients undergoing PCNA, 18G spinal needle was used for pus aspiration. The location of abscess was traced on USG abdomen. Thereafter, local anesthetic (5% Lignocaine) was infiltrated at the proposed site of needed insertion. Prior sensitivity testing was done to avoid any anaphylactic reaction. Under USG guidance, spinal needle was negotiated to the abscess cavity. Successful negotiation was confirmed on pus aspiration. The procedure was regarded completed when no further pus could be aspirated. USG abdomen was re-conducted to look for the residual abscess cavity.

PCD

The procedure was similar up to local anesthetic infiltration. Thereafter, under USG guidance, trocar was inserted up to the abscess cavity. After successful penetration of the cavity confirmed by pus aspiration, a guide wire was passed. The track was dilated over the

guide wire. Following this, 14 Fr pigtail catheter was passed over the guide wire. Its final position was checked with the USG. The catheter was fixed, and dressing was applied.

Outcome evaluation

The pus was sent for culture sensitivity. The clinical response was assessed in both groups. Decreasing fever, pain, and increase in appetite were considered positive factors. Improvement in blood counts and liver functions test was also assessed.

The abscess cavity was assessed two days after first intervention. In PCNA group, if there was persistence of abscess cavity of 3 cm or more even after a total of three aspiration attempts, along with persistence of clinical complaints, was considered failure. They were switched to either PCD or surgical drainage.

In PCD group, daily output measurement was undertaken. When the output decreased to less than 10 ml/day and abscess cavity was found to be obliterated, the catheter was removed.

All the data was entered into Microsoft Excel sheet. Results were analyzed using Statistical package for social sciences (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Fischer exact test was used to calculate odd ratio. Confidence limit was set to 95%; hence, p value <0.05 was taken as significant

RESULTS

The duration of this study was from June 2015 to April 2018 (34 months). During this period, 57 patients were evaluated. The mean duration of complaints was 13.45 days (range 7-19 days).

Table 1: Age groups of patients having liver abscess.

Age group	Frequency
20-30	12
30-40	14
40-50	18
50-65	13
Total	57

Forty patients had PLA and remaining 17 patients had ALA. Of total, 29 underwent PCD and 28 PCNA. When patients were divided on the basis of age groups, the highest number of patients (18) were in age group 40-50 years (Table 1).

Male to female ratio was 2:1. Right lobe was involved in 48 while remaining had left lobe involvement. Nineteen patients had volume less than 300 ml and rest 38 had abscess cavity of more than 300 ml. Mean volume of abscess cavity was 356.44 ml (range 150-670 ml).

Clinical features included pain in right hypochondrium in all (100%), fever 41 (71.9%), hepatomegaly 39 (68.4%), and jaundice 10 (17.5%). No patient had intraperitoneal rupture. All patients who underwent PCD responded to the treatment; however, 8 patients who were treated by

PCNA did not respond completely and alternative treatment modality (PCD) was used in them. This difference was statistically significant (p<0.05). Those patients who responded to treatment had a mean hospital stay of 13.26 days (range 10-18 days).

Table 2: Correlation of various factor to outcome of patients of liver abscess.

Variables	Outcome				
	Satisfactory	Unsatisfactory	Odds (ref to unsatisfactory results)	P value	
Age group					
20-30	11	1	1.0		
30-40	11	3	3.0	0.639 NS	
40-50	14	3	2.4		
50-65	13	1	0.9		
Sex	Sex				
Male	32	6	1.0	0.589 NS	
Female	17	2	0.6		
Lobe					
Left	7	2	1.0	0.441 NS	
Right	42	6	0.5		
Volume					
<300	17	2	1.0	0.589 NS	
>300	32	6	1.6		
Management					
PCD	29	1	1.0	0.014 S	
PCNA	20	7	10.1		

PCD: Percutaneous catheter drainage; PCNA: Percutaneous needle aspiration

On correlating different age groups to lobe of involvement of amount of pus, there was no statistical significance (Table 2). On correlating the outcome of patients to different age groups, sex, volume of pus, or lobe of involvement, there was no statistical significance; however, outcome was statistically related to type of treatment modality. PCD was statistically superior to PCNA (P <0.05).

DISCUSSION

The advent of interventional radiology has revolutionized the basic management protocol of LA. The condition, which had an initial surgical management, is now primarily treated by percutaneous route. Surgery is now considered in patients in whom radiological intervention has failed or if complication like rupture has occurred.⁴ Drainage of LA is important to decrease the bacterial load. Besides, antibiotics may not be able to reach the site of action.^{5,6} Moreover, since the load of infection is decreased by drainage of abscess, antibiotics may be more effective, and a shorter course may be possible.⁷

Male to female ratio in this study was 2:1. This is close to other studies.^{2,4} Clinical features noted by us have also been present in other studies.^{3,8} LA was more common in right lobe. It may be due to anatomic reasons. The right

lobe receives blood from both the superior mesenteric and portal veins. The left lobe receives drainage from inferior mesenteric and splenic vein. The right lobe also has a denser network of biliary canaliculi and more hepatic mass.⁹

There has been some apprehension that PD is not feasible for large LA. ^{6,10,11} In such situation, open drainage has been advocated. ^{12,13} However, a recent study has countered this view. ³ Likewise, we were also able to deal with abscess volume of up to 670 ml successfully. Hence, we also feel that size may not be regarded as a sole criterion for treatment modality.

In another very recent study, surgery has been advocated in failed cases of PD and not as a primary option.⁴ A classification system for intervention has also been suggested.¹⁴ According to it, Type 1 (abscess less than 3 cm); Type 2 (abscess more than 3 cm, unilocular, and without serious concomitant disease), and Type 3 (abscess more than 3 cm, complex multilocular, and serious underlying disease) have been described. As per this classification, systemic antibiotic is preferred for type 1 and PD with systemic antibiotic for type 2; for type 3 surgery drainage has been recommended. There are two types of interventional modality for PD- PCD and PCNA. We had used both of them in this study. While all patients in whom PCD was used responded, 8 out of 28 (28.57%)

patients who underwent PCNA did not respond. The cause for failure was thick pus, which could not be successfully aspirated. These patients were later switched to PCD, to which they responded. The finding of better results with PCD has also been noted by others. 1,15 There are certain advantages with PCD. These include single time skin puncture, placement of a catheter for further lavage of abscess cavity, monitoring of the cavity content etc. in contrast, PNA has its own advantages such as the possibility of single time drainage and no continuous placement of a catheter, which may be felt cumbersome by some patients. However, as noted by us and other workers, failure to drain is a distinct possibility when PCNA is used. These facts must be informed to the patients, so that they may choose as per their will.

CONCLUSION

To conclude, LA is an important health problem, which needs immediate attention of the treating physician. High index of suspicion, timely diagnosis and intervention may fetch good outcome in most of the patients. It appears that PCD is better as compared to PCNA for successful outcome of patients.

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Institutional Ethics Committee

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