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## Amoebic liver abscess: Outcomes of percutaneous needle aspiration vs drain placement in paediatric population

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### Abstract

**Objective:** To compare the effectiveness of percutaneous catheter drain placement with percutaneous needle aspiration in terms of hospital stay, time to resolution of symptoms and cost of intervention performed.

**Methods:** The retrospective cohort study was conducted at Aga Khan University Hospital, Karachi, and comprised data of patients with amoebic liver abscess from, January 2006 to December 2016 which was collected using non-probability purposeful sampling. Primary outcome included length of hospital stay, time to resolution of symptoms and cost of intervention. Secondary outcomes included development of complications, need for re-intervention and abscess resolution. SPSS 22 was used for data analysis.

**Results:** Of the 62 patients, 36(58%) underwent percutaneous needle aspiration Group A, and 26(42%) were treated with percutaneous catheter drain placement Group B. Both groups were malnourished and anaemic at presentation. Overall, 56(90.3%) patients had single abscess and 44(71%) had it in the right lobe. Mean duration of symptoms was less in Group B compared to Group A ( $11.2 \pm 4.5$  versus  $16.4 \pm 3.2$  days). Mean abscess size was  $6.13 \text{cm} \pm 9.75 \text{cm}$  in Group A and  $7.40 \text{cm} \pm 8.40 \text{cm}$  in Group B. The mean length of hospital stay Group A was shorter than in Group B ( $p=0.047$ ) with earlier resolution of symptoms ( $p=0.027$ ).

**Conclusion:** Both methods were found to be effective in treating amoebic liver abscess in children, but percutaneous needle aspiration was more effective.

**Keywords:** Liver abscess, Amoebic, Paediatrics. (JPMA 69: S-29; 2019)

### Introduction

Liver abscess is frequently encountered in children from developing countries and is relatively less common in the developed world.<sup>1,2</sup> Pyogenic abscesses are more common in the developed world whereas amoebic abscesses are endemic in the developing and the underdeveloped countries secondary to poor sanitation.<sup>3</sup> Worldwide, approximately 40-50 million people are infected annually, with the majority of infections occurring in developing countries, and the highest prevalence being in Mexico, India, central and South America and tropical areas of Asia and Africa. In Pakistan, Amoebic liver abscess is endemic.<sup>4</sup> It develops in less than 1% of patients infected with *Entamoeba histolytica* and, unlike adults, no gender preponderance exist in

the paediatric age group.<sup>5</sup>

Lack of awareness and healthcare services along with poverty in the developing world often delays presentation when the abscess has become larger. This delay in part also occurs due to the fact that they have already been through a circuit of treatment.<sup>6</sup> Recent years have led to a paradigm shift in the management of amoebic liver abscess from open surgical drainage to more conservative radiological assisted percutaneous approaches (drainage versus aspiration) along with antimicrobial therapy.<sup>7</sup> Despite advancements in diagnostics modalities and therapeutic interventions, the overall management of amoebic liver abscess in the paediatric population is not yet standardised. A recent study suggested favourable outcomes of protocol-based management using ultrasound.<sup>8</sup>

The current study was planned to compare clinical outcomes of patients treated with therapeutic aspiration

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with those treated with drain placement.

### Patients and Methods

The retrospective cohort study was conducted at Aga Khan University Hospital (AKUH), Karachi, and comprised data of patients with amoebic liver abscess from, January 2006 to December 2016 which was collected using non-probability purposeful sampling. Those treated with percutaneous needle aspiration (PCA) were placed in Group A, while those who underwent percutaneous catheter drain placement (PCD) were in Group B. Approval was obtained from the institutional ethics review committee, and the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD9-CM)<sup>9</sup> codes 572.0 and K75.0 were used to identify patients with the diagnosis of amoebic liver abscess within the hospital's patient database. Both the interventions had been done by radiologists under sedation using Xario 2D (Toshiba) machine with paediatric probe. A spinal needle was used for aspiration (16-18 French) and non-locking pigtail drains (8-14 French) for drain placement. The size had been selected depending upon age and weight of the child.

Data included related to patients below 18 years of age, with the diagnosis of amoebic liver abscess on sonographic imaging with positive indirect haemagglutination (IHA) titre and with no growth on liver abscess pus culture. All patients were started on weight-based doses of ceftriaxone and metronidazole. Ceftriaxone was discontinued once IHA titres were reported positive, and metronidazole was continued for 21 days in total. Data excluded related to patients with pyogenic liver abscess, mixed liver abscess, patients treated on medical therapy alone, all patients with co-existing immunodeficiency and all patients with underlying hepatobiliary disorder. Also excluded were incomplete medical records and of those who were lost to follow-up.

Medical records accessed included both inpatient charts and outpatient clinical notes, along with radiological imaging, interventions and laboratory investigations performed during index admission with the diagnoses of amoebic liver abscess. A predesigned questionnaire was used as the data collection tool. Patients were then divided into the two PCA and PCD groups. Demographics, initial laboratory investigations, type of intervention, resolution of symptoms, length of hospital stay, cost of intervention and complications were analysed. Amount of purulent aspirate could not be retrieved given the retrospective

nature of the study. All patients were followed for need of re-aspiration, duration of drain placement and for any changes noted on repeat ultrasound, if performed. Resolution of symptoms included resolved pain with no further episode of fever, tolerating diet and ambulating freely.

SPSS 22 was used to analyse data. Demographic factors and clinical characteristic were summarised with frequencies and percentages for categorical variables and mean and standard deviation for continuous variables. Categorical variables were analysed using chi-square test, and student's t-test was used to analyse continuous variables.  $P < 0.05$  was considered statistically significant.

### Results

Of the 121 cases initially identified, 62(51%) made the final cut. Of them, 36(58%) had undergone PCA and were placed in Group A, while 26(42%) patients had PCD and were placed in Group B.

Mean age in Group A was lower than in Group B. Mean duration of symptoms was less in Group B compared to Group A ( $11.2 \pm 4.5$  versus  $16.4 \pm 3.2$  days). Patients in both groups suffered from anaemia and chronic malnutrition. (Table 1).

Overall, 56(90.3%) patients had single abscess and 44(71%) had it in the right lobe. Mean abscess size was  $6.13 \text{cm} \pm 9.75 \text{cm}$  in Group A and  $7.40 \text{cm} \pm 8.40 \text{cm}$  in Group B (Table 2).

**Table-1:** Demographics of patients presenting with amoebic liver abscess.

Patient characteristics	PCA (n=36)	PCD (n=26)
Age (years)	$7.8 \pm 4.5$	$11.2 \pm 4.9$
Height and weight percentile -5th to 50th (%)	$86.1 \pm 1.9$	$84.7 \pm 1.7$
Hb (g%)	$9.9 \pm 1.9$	$8.9 \pm 1.7$
Duration of symptoms at presentation (days)	$16.4 \pm 3.2$	$11.2 \pm 4.5$
Antimicrobial therapy at presentation (%)	69.4	59.7

PCA: Percutaneous needle aspiration

PCD: Percutaneous catheter drain

**Table-2:** Radiological characteristics of the amoebic liver abscess.

Abscess characteristics	PCA (n=36)		PCD (n=26)			
	Single	Multiple	Single	Multiple		
No. of Abscess (%)	86.1	13.9	96.2	3.8		
Lobe of Liver (%)	Right	Left	Both	Right	Left	Both
	75	19.4	5.6	65.4	26.9	7.7
Average Size of Abscess (cm)	$6.13 \text{cm} \pm 9.75 \text{cm}$		$7.40 \text{cm} \pm 8.40 \text{cm}$			

PCA: Percutaneous needle aspiration

PCD: Percutaneous catheter drain

**Table-3:** complications encountered in both groups of patients with amoebic liver abscess.

Mode of intervention	PCA (n=36)	PCD (n=26)	p-value
Type of complication	Intracavity haemorrhage 1 Re-aspiration 3 Failure of PCA 3 Empyema thoracis 1	Bleeding from drain site 1 Empyema thoracis 1 Intraperitoneal rupture 1	
Complication	8 (22.2%)	3 (11.1%)	0.424

PCA: Percutaneous needle aspiration  
PCD: Percutaneous catheter drain

The mean length of hospital stay Group A was shorter than in Group B ( $p=0.047$ ) with earlier resolution of symptoms ( $p=0.027$ ). In Group A, 8(22%) patients had post-aspiration complications or failed aspiration, while 3(11.5%) patients in Group B had post-drain placement ( $p>0.05$ ) (Table 3).

The mean length of duration of drain placement in Group B was  $9.42\pm 5.073$  days and 7(27%) patients required intermittent flushing of the drain. In Group A, 3(8.3%) patients required re-aspiration once or more. Follow-up ultrasounds were performed in 38(61%) patients, and all patients irrespective of group showed improvement and/or resolution of abscess cavity ( $p>0.05$ ).

Patients in Group A incurred less than half the procedure cost of Group B. Further analysis could not be carried out on this due to limitation of purged billing records.

## Discussion

Results suggest PCA was a more cost-effective modality of intervention with shorter length of hospital stay and quicker resolution of symptoms. Patients who underwent PCA incurred less than half the cost of PCD at our institution. Our results are comparable with those of Choudhury et al., that medical management alone and in combination with PCA was successful in majority of the patients.<sup>8</sup>

Amoebic liver abscess is almost non-existent in the developed world arising only in immigrants, those with underlying immunodeficiency and those affected by poor hygiene practices and unsanitary conditions. We found amoebic liver abscess to be more common in malnourished and anaemic children, both of which are risk factors for the development of liver abscess in those inflicted with intestinal amoebiasis. There were no significant age differences in between the groups. The duration of symptoms prior to presentation was way

beyond 10 days in both groups with more than 50% of the patients in both groups on antimicrobial therapy with no resolution of symptoms. As reiterated by our study, amoebic liver abscess is mostly solitary and more predominant in the right lobe of the liver due to the underlying vascular anatomy of the liver itself. Both groups had patients with liver abscess greater than 5cm in size, which is used as a predictive factor for surgical intervention.<sup>10</sup>

Although our patients suffered complications, these complications were not statistically significant when comparing the groups. It is, however, worthwhile to note that those who underwent PCD had longer hospital stay coupled with drain-site pain and discomfort, but this was only subjectively assessed. Choudhary et al. also preferred PCA as avoidance of an indwelling catheter was found to be more comfortable to the patient, reducing catheter-related complications such as blockage and dislodgment.<sup>8</sup> PCA can effectively be utilised for multi-septated collections as septations can be broken under ultrasound guidance and effective aspiration achieved without the need for drain placement.<sup>8</sup> It is important to note that an early repeat ultrasound is not required in all cases of amoebic liver abscess that have undergone any surgical intervention, as it may take a long time for radiological resolution even after clinical recovery.<sup>11</sup> The current study is the first to compare two currently practised interventional modalities solely in patients with amoebic liver abscess, and to compare cost-effectiveness of both the modalities.

However, since it is a single-institution study, generalisation of results is therefore not possible. A multicentric approach is required for a true representation. Besides, the sample size was too small to be meaningful, and we recommend a large randomised control trial comparing both types of intervention along with medical treatment. Another drawback of this study is that it does not account for any details of medical therapy received by the patients prior to presentation, as this could be a confounder.

## Conclusion

PCA and PCD are both effective in treating amoebic liver abscess in children. The study found PCA to be less expensive and more effective with earlier resolution of symptoms clinically and shorter lengths of hospital stay.

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