

ORIGINAL ARTICLE

Liver Abscess in Pediatric Patients - Our Institutional Experience

Mohan Lal Kajala¹, NeerajTuteja¹, Ajay Shrivastav¹, Ramesh Tanger¹,
Vinita Chaturvedi¹ and Dinesh Kumar Barolia²

¹Department of Paediatric Surgery, S.M.S. Medical College, Jaipur, Rajasthan- 302004, India.

²Department of Paediatric Surgery, J.L.N. Medical College, Ajmer, Rajasthan- 305001, India.

Abstract:

Background: A liver abscess most often occurs because of infection from germs such as bacteria or parasites (Amoebic). The classic signs and symptoms of fever, abdominal pain, jaundice, and liver enlargement occur infrequently, which is why the diagnosis is often missed. The incidence of amoebic liver abscess varies all over the world and large numbers of cases found in developing countries remain unreported. In pyogenic liver abscess, infection may spread to liver from other structures in abdomen, such as the gallbladder, bile ducts, bowels or appendix. Infection may travel from bloodstream to liver from more distant areas of the body. **Material and Methods:** This was a prospective study, carried out at our tertiary care center, from September 2018 to April 2020. Ninety patients (male: 50, female: 40) were enrolled in this study. **Results and Discussion:** We found male preponderance (55.56%) in this study. The most common presenting symptom was Anorexia (97.78%), followed by abdominal pain (93.33%) and fever (92.22%). Single cavity abscesses (85.55%) were more common than multiple cavity abscesses. Right lobe abscesses were more than left lobe abscesses. Amoebic liver abscesses were more common than pyogenic liver abscesses. Multiple cavity abscesses were more common in pyogenic abscesses than amoebic abscesses. The most common organism found on culture was Staphylococcus (42.80%) followed by E. coli (28.57%), Klebsiella (19%) and Enterococcus (9.5%). **Conclusion:** USG is the standard modality for diagnostic and therapeutic management as well as for drainage and follow up. According to our study USG guided pigtail catheter drainage is a superior therapeutic approach than needle aspiration for large liver abscess, because abscess cavity resolves better in case of pigtail catheter drainage.

Keywords: Amoebic abscess Liver abscess, Needle aspiration, Pigtail catheter drainage, Pyogenic abscess, USG.

Introduction:

A liver abscess is a pocket of pus that forms in the liver. It most often occurs because of infection from germs such as bacteria or parasite. The type of germ determines the type of liver abscess. The infection may spread to liver from other structures in abdomen, such as the gallbladder, bile ducts, bowels or appendix. Historically, the most frequent cause of hepatic abscess in children was perforated appendix. Infection may travel from bloodstream to liver from more distant areas of the body. Liver abscess may occur after surgery or an injury to liver. Trauma either penetrating or blunt, with liver injury is also associated with an increased incidence of hepatic abscess. Abscesses in such cases are presumed to be secondary to bacterial seeding of the devitalized liver parenchyma and are often associated with a hematoma [1]. A liver abscess may present with pain in right hypochondrium, or epigastric region or left upper quadrant of abdominal. The classic signs and symptoms of fever, abdominal pain, jaundice, and liver enlargement occur infrequently, which is why the diagnosis is often missed [1]. If not recognized early and managed promptly, it can lead to septicemia and rupture of liver abscess which could be a major cause. It is difficult to distinguish the two types of liver abscess on the basis of clinical criteria. The diagnosis of amoebic liver abscess (ALA) can be made by following criteria: - younger age, residential or recent travel history to amoebiasis endemic areas, or diarrhea and marked abdominal pain. The incidence of amoebic liver abscess varies all over the world and large number of cases found in developing countries (constituting major bulk of total cases) remain unreported [2,3]. Pyogenic liver abscesses (PLA) may be caused by ascending biliary

tract infection, hematogenous spread via portal venous system, by route of hepatic arterial circulation, and direct spread from intra-peritoneal infection. Most common causative agent of pyogenic liver abscess in children is *Staphylococcus aureus*. Most liver abscesses tend to be polymicrobial with gram-positive cocci and gram-negative rods including *E. coli*, *Klebsiella*, *Enterobacter*, and *Pseudomonas* [4].

The diagnosis of amoebic liver abscess was confirmed by ultrasound (USG) abdomen, on aspiration (reddish brown anchovy-paste like material, Figure 4), gram negative on staining, and resolved with metronidazole treatment. The pyogenic liver abscesses can be diagnosed by symptoms like fever, nausea, vomiting and anorexia. Pain occurs late and more common with large solitary abscesses [4]. Blood investigations show leukocytosis and anemia. Pus culture is positive for bacteria. The diagnosis, treatment and prognosis of liver abscess have been improved over last few years [5]. Imaging modality like USG and CT scan has improved diagnostic accuracy and has changed therapeutic strategy by facilitate guided percutaneous drainage. Management of liver abscess directed toward rapid diagnosis with imaging facility effective antimicrobial therapy, treatment of underlying disease and image guided minimal invasive therapeutic interventions [6,7].

With keeping these options in mind, this study was carried out to evaluate the current status of liver abscess in regard to the clinical presentation, laboratory finding, radiological findings (Figure 1 & 2), and the different modes of invasive management.

Material and Methods:

This was a prospective study. This study was carried out in 90 patients (male: 50, female: 40) at our tertiary care center, J K Lon Hospital, SMS Medical College, Jaipur from September 2018 to April 2020. We collect all data related to patients like demography, clinical features, laboratory finding, and imaging records and recorded on a pre-decided proforma. USG is easily available, less expensive, and has no exposure to radiation. It has 90% diagnostic accuracy. In chronic case, CT scan shows better rim enhancement with

contrast enhancement in pyogenic liver abscess and high density of the contents in necrotic liver abscess (Figure 2).

Factors that were studied: Age of presentation, gender distribution, socioeconomic status, source of water supply, complete hemogram, liver function test, USG abdomen, Culture of pus, types of management, and outcome.

A complete physical examination of abdomen and chest was done with proper history. Specific investigations including haemoglobin (Hb), total leucocyte count (TLC), differential leucocyte count (DLC), liver function test, prothrombin time (PT), international ratio (INR), Random blood sugar, ultrasound of abdomen, chest x-ray was get done. Examination like color, thickness and smell of aspirated pus was done and send it for culture and sensitivity.

The patients were divided into four management groups:

Group 1: Conservative Management: Patients with multiple small abscesses or abscesses which were non aspirable (thick/organized), multiple small abscess - they received only medical treatment.

Group 2: Percutaneous Needle Aspiration (PNA): Abscesses cavity which was aspirable under USG guidance or smaller abscess which failed to respond with medical treatment alone.

Group 3: Percutaneous Pigtail Catheter Drainage (PCD): Abscesses which were not amenable to needle aspiration, partially aspirable, or multiple aspirations required.

Group 4: Open Drainage: Abscesses which were ruptured in peritoneal cavity.

Medical Treatment: All liver abscess which were diagnosed by clinical and radiological examination, treated with parenteral broad-spectrum antibiotics. The routine first-line parenteral antibiotics for liver abscess were ampicillin or a third-generation cephalosporin plus amikacin and metronidazole. Second-line parenteral antibiotic regimens contained Imipenem or piperacillin - tazobactam which was used for advanced conditions [6]. When the culture and sensitivity report were available then treatment was guided as per

sensitivity report. USG Guided Needle Aspiration (Figure 3): Patients with abscess which were aspirable or smaller and who failed to improve clinically with medical treatment were subjected to USG guided needle aspiration. Informed and written consent was taken before procedure from the guardian and patients after explaining the procedure and its complication. We did daily temperature charting and clinical examination; repeat USG and CBC were done on 3rd day. Repeat CBC and USG were done on the basis of clinical condition of patient.

Pigtail Catheter Drainage (PCD) of Liver Abscess (Figure 5): The pigtail drainage catheter of 14Fr to 16Fr size having multiple holes and with a trocar and cannula, drain was introduced in the abscess cavity under USG guided. The draining catheter was secured in its place with silk suture and connected to a collecting bag. Drain output measurement was done daily.

When drain output was less than 10 ml/day repeat USG was done. If the abscess had resolved, the drain was removed. If residual cavity was persisting for longer time, further review ultrasound was done in OPD basis and follow up after discharge of the patients.

Aims and objective of present study was to evaluate the all patients of liver abscess in view of base line blood investigations, radiological evaluation (USG and CT abdomen) and do the comparative study of various mode of treatment for liver abscess. All Patients up to age of 16 years of liver abscess admitted in the hospital and with intact and ruptured liver abscess were included in the study. The patients more than 16 years of age and liver abscess associated with malignancy were excluded from the study.

Results:

There were 90 patients (50 male, 55.56% and 40 females, 44.44%) of liver abscess in this study. The male to female ratio was 1.25:1 in our study. There were 57 patients of Amoebic liver abscess and 33 of Pyogenic liver abscess. The mean age of presentation was 7.71 years. The youngest patient was of the age 2 month 14 days and the oldest was of 16 years (Table no.1). The most common presenting symptom was

anorexia in 88 (97.78%) cases. Next common symptom was abdominal pain in 84 (93.33%) cases, fever (83 patients), and abdominal pain in 83 (92.22%) cases in this study. Diarrhoea was present in 3 patients (Table no.2).

Anemia was most common clinical sign in this study present in 67 (74.44%) patients. Next common sign was weight loss present in 42 (46.67%) patients. Respiratory distress was present in 19 (21.11%) due to pleural effusion. Jaundice was present in 5 (5.55%) patients in our study (Table no.3). In our study, 5.55% of patients had raised bilirubin and 53.33% of patients had raised alkaline phosphatase levels. Percentage of patients with raised SGOT and SGPT was 30 % and 17.78 % respectively (Table no.4).

Our study showed that right lobe of liver was most commonly affected by abscess (65 cases, 72.22%). Left lobe abscess was present in 21(23.33%) cases (Table no.5). In our study, 96.49% (55cases, n=57) patients had amoebic liver abscess in the right lobe. In the case of amoebic liver abscess exclusively left lobe involvement not seen. In two cases both lobe of liver was involved by amoebic liver abscess (Table no.5).

We found that pyogenic liver abscess more commonly affects left lobe of the liver. Total 63.6% (21 cases, n=33) cases of pyogenic liver abscess affecting the left lobe of the liver. In 30.3% (10 cases, n=33) cases right lobe was involved. Both lobes were involved in two cases of pyogenic abscess (Table no.5).

In this study single abscess cavity was present in 77 (85.55%, n=90) cases. Multiple abscess cavity present in 13 (14.44%, n=90) cases. Single abscess cavity of amoebic liver abscess was present in 50 (87.7%, n=57) and multiple abscess cavity present in 7 (12.28%, n=57) cases. Pyogenic liver abscess with single abscess cavity was present in 27(81.1%, n=33) and multiple abscess cavity was present in 6 (18.18% n=33) cases (Table no.6). We found peritoneal ruptured liver abscess in 3 cases and pleural effusion was present in 23.3% (21, n=90) case (Table no.7).

Conservative medical management was done in 34 patients. USG guided needle aspiration was done in 25 patients and 29 patients underwent pigtail catheter insertion. Exploration and drainage of liver abscess was

done in 2 patients (Table no.8). Out of 34 patients who were conservatively managed, seven patients required pigtail catheter insertion and five cases of needle aspiration required pigtail insertion in the follow up period (Table no.8).

In present study, mean hospital stay was 11.29 days in the conservative management group, 9.24 days in the needle aspiration group, 9.79 days in the pigtail drainage group and 18 days in patients undergoing open surgery (Table no. 9).

No growth of organism was found in the culture of aspirated pus of ALA. PLA had growth of organism in 21(63.64%, n=33) cases, no growth was observed in 12(36.36%) PLA cases. The results suggest that all amoebic liver abscesses were sterile because none of them show any growth on the culture media. Most commonly found organism on pus culture was Staphylococcus in 42.8% cases followed by E. coli in 28.57% cases, Klebsiella in 19% and enterococcus in 9.5% (Table no. 10).

Table No. 1: Age distribution

Age Group	No. of patients	%(n=90)
0-5years	36	40
>5-10 years	42	46.67
>10-15years	10	11.11
>15years	2	2.22
Total	90	100

Table No. 2: Clinical symptoms

Symptoms	No. of patients	%(n=90)
Pain abdomen	84	93.33
Fever	83	92.22
Anorexia	88	97.78
Diarrhoea	3	3.33

Table No. 3: Clinical signs

Signs	No. of patients	%(n=90)
Anemia	67	74.44
Weight loss	42	46.57
Resp. distress	19	21.11
Jaundice	5	4.44

Table No. 4: Liver function tests of patients

LFT	No. of patients	%(n=90)
S. Bilirubin> 1.2	5	5.55
Raised ALP	48	53.33
Raised SGOT	27	30
Raised SGPT	16	17.78

Table No. 5: USG abdomen showing site of abscess cavity in liver

Site	ALA	PLA	Total	%(n=90)
Right lobe	55	10	65	72.22
Left lobe	0	21	21	23.33
Both lobe	2	2	4	4.44

Table No. 6: USG abdomen showing number of abscess cavity in liver

No. of Cavity	ALA	PLA	Total
Single	50 (55.55%)	27 (30%)	77 (85.55%)
Multiple	7 (7.77%)	6 (6.67%)	13 (14.44%)
Total	57 (63.33%)	33 (36.67%)	90 (100%)

Table No. 7: Complications

Complications	Right lobe	Left lobe	Caudate lobe	Total
1.Ruptured in Peritoneal cavity	1	1	1	3
	Right side	Left side	Both side	
2.Pleural effusion	16 (17.78%)	0	5 (5.55%)	21 (23.3%)

Table No. 8: Type of Managements

Management group	No. of patients	%(n=90)
Conservative	34	37.78
NAD	25	27.78
PCD	29	32.22
Open	2	2.22

Table No. 9: Hospital stay of patients

Group of management	Hospital Stay (mean in Days)
Conservative	11.29
NAD	9.24
PCD	9.79
OPEN	18

Table No.10: Pus culture of aspirated from liver abscess

Aspirate Culture	ALA	PLA	Total
Growth	0 (0%)	21 (63.64%)	21 (23.33%)
No Growth	57 (100%)	12 (36.36%)	69 (76.67%)
Total	N=57 (100%)	N=33 (100%)	N=90 (100%)

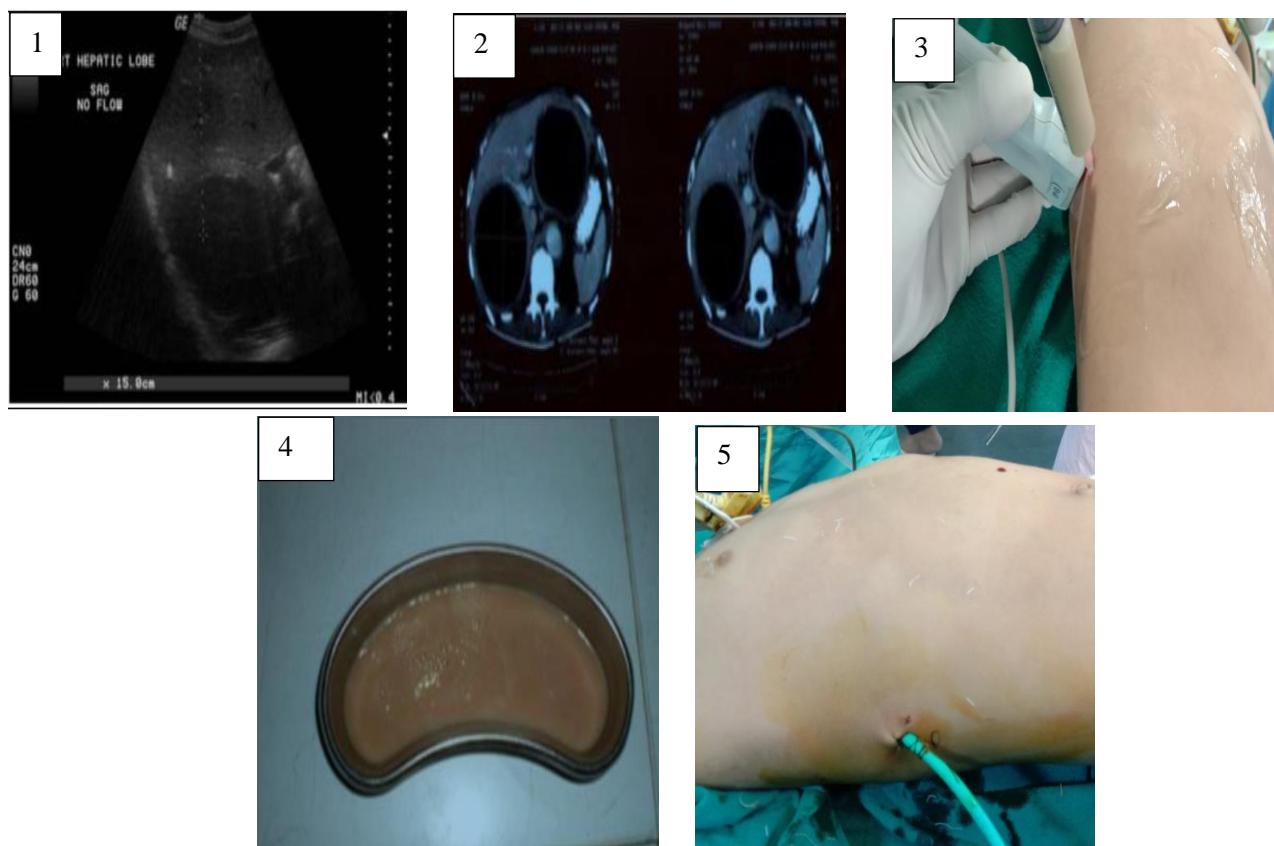


Figure 1: USG abdomen showing abscess cavity in right lobe of liver, **Figure 2:** CT scans of a patient with multiple liver abscess-involving both lobes, **Figure 3:** USG guided percutaneous Needle aspiration of liver abscess, **Figure 4:** Anchovy sauce appearance of pus-amoebic liver abscess, **Figure 5:** Large volume abscess cavity-pigtail catheter put in abscess cavity for continuous drainage-to obtain best possible outcomes

Discussion:

The present study includes 90 patients, mostly in the age group of 5-10 years. The mean age of presentation was 7.7 years. The youngest patient was of 2 month 14 days and the oldest was of 16 years. In a study done by Yeh et al, in Taiwan, the mean age of presentation was 9.6±6.2 years [8]. The mean age of diagnosis

reported in other studies is in the range of 7-10 years [9,10]. A few other studies conducted in the developing world disclosed a trend of a younger age at diagnosis, such as 6.3 years in west India and 8.1 years in Brazil [11,12,13]. Male preponderance was found in this study; male: female ratio was 1.25:1. Male preponderance is supported by a study done by

Jayankar SR. et al 2018 in India, which show male: female ratio was 4:1 [14]. Literature shows that male preponderance is present in a ratio ranging from 10:1 to 17:1 [15,16].

In the present study most common presenting symptom was anorexia (97.18% cases), followed by abdominal pain in 93.33% and fever present in (92.22%) study population. A study carried out by Jayankar SR. et al show that most presenting symptom is fever, present in 94.7% cases, followed by abdominal pain present in 88.6% cases [14]. Study by Yeh et al showed fever in 94.7% cases and abdominal pain in 42.1% cases [8]. Above studies had not included anorexia as a symptom.

Jayankar SR et al has reported that clinical jaundice in 45% of the cases [14] whereas in a study by Yeh et al clinical jaundice was reported in 5.3% of the cases [8]. In our study jaundice was present in 4.44% of the cases. A study done by Khan et al 2017 found that single cavity abscess were in 86.66% and multiple cavity abscess were in 13.13% cases. Right lobe abscess was in 86.66% and left lobe abscess in 3.73% cases. Both lobes involved in 13.33% cases. Amoebic liver abscess was in 63.33%, and Pyogenic liver abscess in 26.67% cases [17]. In our study findings are similar, single cavity abscess was (85.56%) more common than multiple cavity abscess (14.44%). Right lobe abscess (72.22%) was more than left lobe abscess (23.33%) and abscess in both lobes was 4.44%. Amoebic liver abscess was (63.33%) more common than pyogenic liver abscess (36.66%). Multiple cavity abscesses more in pyogenic abscess (18.18%) than amoebic abscesses (12.28%).

A study by Jayankar SR et al show the most common organism found on culture was staphylococcus, found in 39% of pyogenic liver abscess [14]. Similar our study, we also found staphylococcus was most common organism (42.85%) on culture. Second common organism was E. coli followed by Klebsiella and Enterococcus.

The success rate of treatment maximum with PCD was 100%. In PNA success rate was 92.59% and in conservative management it was 91.89%. The major advantages of PNA over PCD are: it is less invasive

and less expensive; it avoids catheter care related problems; and if multiple abscess cavities are present can be aspirated in the same setting [18,19]. However, in our study success rate of PNA, which was lower than with catheter drainage (92.59% versus 100%).

There are some problems with catheter drainage like discomfort to the patient, pain, leakage at the insertion site and sometimes catheter pulled out accidentally.

The success rate of PNA in the literature varies from 79-100% [19]. Another important reason for low success rate of needle aspiration is the difficulty in complete evacuate of the thick viscous pus that may be present in some of the abscesses. Pus can re-accumulate in same cavity after Needle aspiration is second cause of failure of PNA. Placement of an indwelling Pigtail drainage catheter solve, all of these three issues because it provides continuous drainage, can drains thick pus because of wider caliber of catheter, and prevents re-accumulation of pus in cavity. Bari S et al reported that percutaneous aspiration is safe but this required more expertise and experience. So, open drainage is the best modality for treatment [20]. But we observed that percutaneous drainage by pigtail catheter is the best modality for treatment.

This explains the higher success rates (100%) of PCD, observed in our study and several previous studies [21]. No recurrence occurred in any of present cases during the follow up period. However, both PNA and PCD treatment modalities resulted in rapid clinical relief in most patients showing resolution of signs and symptoms within the first few days of the procedure.

Conclusion:

The most common age group of children affected by Liver abscess was 5 -10 years of life. Male children are more commonly affected than females. In this study, we found that incidence of amoebic liver abscess was more as compared to pyogenic liver abscess. Multiple cavity abscesses was more common in pyogenic abscess than amoebic. Pyogenic liver Abscess was most commonly due to Staphylococcus followed by E coli. USG is the standard modality for diagnostic and therapeutic management as well as drainage and follow up. According to our study USG guided

pigtail catheter drainage is a superior therapeutic approach than needle aspiration for large liver abscess,

because abscess cavity resolve better in case of pigtail catheter drainage than needle aspiration.

Conflict of Interest - Nil

Sources of Support - Nil

References

1. Coran AG. Pediatric surgery. In: Pediatric surgery. Seventh ed. Elsevier Saunders, vol.2, p-1350.
2. Sherlock S, Dooly J, eds. Diseases of the Liver and Hepatobiliary system. 11th ed. Italy: Blackwell publishing; 2002:1-16.
3. Sutherland F, Harris J. Claude Couinaud: a passion for the liver. *Archives of Surgery* 2002; 137(11):1305-1310.
4. Scanlon VC, Sanders T, eds. Essential of anatomy and Physiology. 5th ed. Chapter 16. Philadelphia: F A Davis Company; 2007:367-389.
5. Akgatin Y, Tacylutiz IH, Celik Y. Liver abscess, changing trends over 20 years. *World Journal of Surgery* 1999; 23:102-106.
6. Napier LE. The Principles and Practice of Tropical Medicine. The Principles and Practice of Tropical Medicine. 1946:444.
7. Martinez Beez, M Proc. *International Conference on Amoebiasis* 1975;53:277-278.
8. Yeh P-J, Chen C-C, Lai M-W, Yeh H-Y, Chao H-C. Pediatric liver abscess: trends in the incidence, etiology, and outcomes based on 20-years of experience at a tertiary center. *Front. Pediatrics* 2020;8: 111
9. Muorah M, Hinds R, Verma A, Yu D, Samyn M, Mieli-Vergani G, et al. Liver abscesses in children: a single center experience in the developed world. *Journal of Pediatrics Gastroenterology and Nutrition* 2006; 42:201-206.
10. Salahi R, Dehghani SM, Salahi H, Bahador A, Abbasy HR, Salahi F. Liver abscess in children: a 10-year single centre experience. *Saudi Journal of Gastroenterology* 2011; 17:199-202.
11. Kouassi-Dria AS, Moh NE, Aké YL, Midekor-Gonebo K, Keita B, Bonny-Obro R, et al. Liver abscess of children in Côte-d'Ivoire. *Annals of Pediatric Surgery* 2018;14:51-55.
12. Ferreira MA, Pereira FE, Musso C, Dettogni RV. Pyogenic liver abscess in children: some observations in the Espirito Santo State, Brazil. *Arquivos de Gastroenterologia* 1997; 34:49-54.
13. Waghmare M, Shah H, Tiwari C, Khedkar K, Gandhi S. Management of liver abscess in children: our experience. *Euroasian Journal of Hepatogastroenterology* 2017;7:23-26.
14. Jayakar SR, Nichkaode PB. Liver abscess, management strategies, and outcome. *International Surgery Journal* 2018;5:3093-3101.
15. Mathur S, Gehlot RS, Mohta A, Bhargava N. Clinical profile of amoebic liver abscess. *Journal of Indian Academy of Clinical Medicine* 2002 Oct;3:367-373.
16. Alobaidi M, Shirkhoda A. Benign focal liver lesions: Discrimination from malignant mimickers. *Current Problems in Diagnostic Radiology* 2004;33:239-253.
17. Khan A, Tekam VK. Liver abscess drainage by needle aspiration versus pigtail catheter: a prospective study. *International Surgery Journal* 2018;5:62-68.
18. Giorgio A, Tarantino L, Mariniello N, Francica G, Scala E, Amoroso P, et al. Pyogenic liver abscesses: 13 years of experience in percutaneous needle aspiration with US guidance. *Radiology* 1995;195:122-124.
19. Saraswat VA, Agarwal DK, Baijal SS, Roy S, Choudhuri G, Dhiman RK, et al. Percutaneous catheter drainage of amoebic liver abscess. *Clinical Radiology* 1992; 45:187-189.
20. Bari S, Sheikh KA, Malik AA, Wani RA, Naqash SH. Percutaneous aspiration versus open drainage of liver abscess in children. *Pediatric Surgery International* 2007; 23:69-74.
21. Dietrick RB. Experience with liver abscess. *American Journal of Surgery* 1984;147:288-291.

Address for correspondence: Dr. Mohan Lal Kajala, Senior Resident, Department of Paediatric Surgery, S.M.S. Medical College, Jaipur, Rajasthan- 302004, India.
Email: mkajla75@yahoo.com, Mobile: +91 9461774890

How to cite this article: Mohan Lal Kajala, Neeraj Tuteja, Ajay Shrivastav, Ramesh Tanger, Vinita Chaturvedi and Dinesh Kumar Barolia. Liver Abscess in Pediatric Patients - Our Institutional Experience. *Walawalkar International Medical Journal* 2021; 8(1):70-76. <http://www.wimjournal.com>

Received date: 15/12/2020

Revised date: 08/07/2021

Accepted date: 08/07/2021