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## Original Research Article

## Study of liver abscess in pediatrics patients in tertiary health care institute

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## ABSTRACT

**Background:** liver abscess is mostly occurring due to the infection of bacteria, parasite like amoeba. The incidence of amoebic liver abscess varies all over the world and most of cases found in developing countries remain unreported.

**Aim:** study of liver abscess in pediatric patients in tertiary health care institute.

**Materials and Methods:** This was a prospective study, carried out in 64 at our tertiary care center, J K Lon Hospital, SMS Medical College, Jaipur from May 2022 to April 2023. We collect all data related to patients like demography, clinical features, laboratory finding, and imaging records and recorded on a pre-decided proforma.

**Results:** There were 64 patients (36 male, 56.25% and 28 females, 43.75%), The male to female ratio was 1.25:1. The mean age of presentation was 7.5 years. The common presenting symptom was anorexia in 55 (85.93%) cases. Most common symptom was abdominal pain in 60 (93.75%) cases, fever 58 (90.625%), and vomiting in 40 (62.5%) cases. Diarrhoea was present in 5 patients. Anemia was most common clinical sign in present in 40 (62.5%) patients, weight loss 38 (59.37%). Respiratory distress was present in 4 (6.25%) due to pleural effusion and peritonitis cases. Jaundice was present in 5 (7.81%) . 5 case [7.81%] of patients had raised bilirubin and 28 patients [43.75%] had raised alkaline phosphatase levels. Raised SGOT and SGPT was 43.75 %. 34 patients of Amoebic liver abscess and 30 of Pyogenic liver abscess. 53.12% (34 cases) patients had amoebic liver abscess in the right lobe. less than 50 cc size of abscess was present in 24 patients (37.5%) cases. Most of the patients have cavity size 50-150cc. more than 200cc cavity found only in 10 cases. Average cavity size is 166cc. peritoneal ruptured liver abscess in 2 cases [3.12%] had features of peritonitis, pleural effusion in 2 cases with complain of respiratory difficulties. Conservative medical management was done in 2 patients, USG guided needle aspiration 20 patients and 40 patients underwent pigtail catheter insertion. 12 fr pigtail catheter insertion was done in 30 patients and 10 patients underwent double pigtail catheter insertion. Exploration and drainage of liver abscess was done in 2 patients. In present study, mean hospital stay was 10.28 days. Hospital stays ranges from 5 to 17 days. Most of the patients stays 5 to 10 days [56.25%]. all amoebic liver abscesses were sterile. Most commonly found organism on pus culture was Staphylococcus in 25% cases followed by E. coli in 21.87% cases in pyogenic liver abscesses.

**Conclusion:** from this study we found that ultrasonography is the standard modality for diagnostic and therapeutic management as well as for drainage and follow up. We also found that USG guided pigtail catheter drainage is a superior therapeutic approach than needle aspiration for large liver abscess, and abscess cavity resolves better in case of pigtail catheter drainage. We also concluded that ruptured liver abscess can also be managed with two pig tail catheter insertion.

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## 1. Introduction

A liver abscess is a pocket of pus that forms in the liver, mostly occurs due to the infection from germs like bacteria, amoeba [parasites]. This infection may be spread from gallbladder, bile duct, bowel and from appendix. 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.<sup>1</sup> The classic signs and symptoms of fever, abdominal pain, jaundice, and liver enlargement occur infrequently, this is main cause behind that this diagnosis is often missed.<sup>1</sup>

If not recognized early and managed promptly, it can lead to septicemia and rupture of liver abscess which could be a major cause. 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.<sup>2,3</sup>

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. In children staphylococcus aureus is most common cause of pyogenic liver abscess. Most liver abscesses tend to be polymicrobial with gram-positive cocci and gram-negative rods including *E. coli*, *Klebsiella*, *Enterobacter*, and *Pseudomonas*.<sup>4</sup>

The diagnosis of amoebic liver abscess was confirmed by ultrasound (USG) abdomen, on aspiration (reddish brown anchovy-paste like material, 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.<sup>4</sup>

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.<sup>5</sup> 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.<sup>6,7</sup>

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, and the different modes of invasive management.

## 2. Materials and Methods

This prospective study done in 64 patients at our tertiary care center, J K Lon Hospital, SMS Medical College, Jaipur from May 2022 to April 2023. We collect all data like demography, clinical features, laboratory finding, and imaging records. 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.

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.

### 2.1. Factors that were are also 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.

### 2.2. 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 and ruptured liver abscess with pelvic collection.

Group 4: Open Drainage: Abscesses which were ruptured in peritoneal cavity and with septic shock and frank peritonitis.

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### 3. Medical Treatment

All liver abscess after diagnosis confirmation, 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.<sup>6</sup> When the culture and sensitivity report were available then treatment was guided as per sensitivity report.

Patients with abscess which were aspirable or smaller and resistant to medical treatment were subjected to USG guided needle aspiration. Repeat USG and CBC were done on 3rd day.

The pigtail drainage catheter of 12Fr to 14Fr size having multiple holes and with a trocar and cannula, drain was introduced in the abscess cavity under USG guided. Drain fixed with suture and daily quantity measured. 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.

The pigtail catheter of 12Fr to 14 Fr size were also used for ruptured liver abscess with pelvic collection, one pigtail catheter inserted in the liver abscess cavity and other in to the pelvic collection.

### 4. Aims and Objective

The main aim of this study is 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.

### 5. Results

There were 64 patients (36 male, 56.25% and 28 females, 43.75%) of liver abscess in this study. The male to female ratio was 1.25:1 in our study.

**Table 1:** Sex distribution

Sex	Number	Percentages
Male	36	56.25
Female	28	43.75
Total	64	100

The mean age of presentation was 7.5 years. The youngest patient was of the age 2 month 8 days and the oldest was of 15 years (Table no.2).

There is 78% Hindu and 21.87% Muslim patients are affected, but incident wise Muslim population more affected.

The common presenting symptom was anorexia in 55 (85.93%) cases. Most common symptom was abdominal pain in 60 (93.75%) cases, fever 58 patients (90.625%), and

**Table 2:** Age distribution

Age	Numbers	Percentages
0-2 Y	6	9.4
2-5 Y	20	31.2
5-10 Y	22	34.3
≥10 Y	16	25
TOTAL	64	100

**Table 3:** Religion distribution

Religion	Number	Percentages
Hindu	50	78.125
Muslim	14	21.875
Total	64	100

vomiting in 40 (62.5%) cases in this study. Diarrhoea was present in 5 patients.

**Table 4:** Symptoms

Symptoms	Number	Percentages
Abdominal pain	60	93.75
Fever	58	90.625
Vomiting	40	62.5
Anorexia	55	85.93
Diarrhoea	5	7.8

Anemia was most common clinical sign in this study present in 40 (62.5%) patients. Next common sign was weight loss present in 38 (59.37%) patients. Respiratory distress was present in 4 (6.25%) due to pleural effusion and peritonitis cases. Jaundice was present in 5 (7.81%) patients in our study.

**Table 5:** Level of hemoglobin

Hemoglobin	Numbers	Percentages
≤7 GM/DL	4	6.25
7-9 GM/DL	36	56.25
≥9 GM/DL	24	37.5

In our study, 5 case [7.81%] of patients had raised bilirubin and 28 patients [43.75%] of patients had raised alkaline phosphatase levels. Percentage of patients with raised SGOT and SGPT was 43.75 %.

**Table 6:** SGOT/SGPT level

SGOT/SGPT	Number	Percentages
DERRANGED	28	43.75
NORMAL	36	56.25

There were 34 patients of Amoebic liver abscess and 30 of Pyogenic liver abscess. In our study, 53.12% (34cases) patients had amoebic liver abscess in the right lobe. In two cases both lobe of liver was involved by amoebic liver abscess.

**Table 7:** Types of abscesses

Types of abscesses	Number	Percentages
Amoebic	34	53.12
Pyogenic	30	46.87

In this study less than 50 cc size of abscess was present in 24 patients (37.5%) cases. Most of the patients have cavity size 50-150cc. More than 200cc cavity found only in 10 cases. Average cavity size is 166cc.

**Table 8:** Cavity size

Size Of Abscess	Number	Percentage
≤50 CC	24	37.5
50-100 CC	14	21.87
100-150 CC	14	21.87
150-200 CC	12	18.75
≥200 CC	10	15.6

We found peritoneal ruptured liver abscess in 2 cases [3.12%] had features of peritonitis.

**Table 9:**

Peritonitis	Number	Percentages
YES	2	3.12
NO	62	96.87
Total	64	100

We found pleural effusion was present in 2 cases with complain of respiratory difficulties.

9 ruptured liver abscesses

**Table 10:** Pleural effusions

Pleural effusion	Number	Percentage
Yes	2	3.12
No	62	96.87

Conservative medical management was done in 2 patients. USG guided needle aspiration was done in 20 patients and 40 patients underwent pigtail catheter insertion. 12 fr pigtail catheter insertion was done in 30 patients and 10 patients underwent double pigtail catheter insertion. Exploration and drainage of liver abscess was done in 2 patients.

In present study, mean hospital stay was 10.28 days. Hospital stays ranges from 5 to 17 days. Most of the patients stays 5 to 10 days [56.25%].

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 25% cases followed by E. coli in 21.87% cases in pyogenic liver abscesses.

**Table 11:** Management

Management	Number	Percentages
Conservative	2	3.125
Usg guided aspiration	20	31.25
12fr pigtail catheter	30	46.87
Double pigtail catheter	10	15.62
Exploratory laparotomy	2	3.125
Total	64	100

**Table 12:** Hospital stay

Hospital Stay	Number	Percentage
≤5 DAYS	26	40.62
5-10 Days	36	56.25
≥15 Days	6	9.37

## 6. Discussion

This was a prospective study, carried out in 64 patients at our tertiary care center, J K Lon Hospital, SMS Medical College, Jaipur from May 2022 to April 2023. The present study includes 64 patients (36 male, 56.25% and 28 females, 43.75%) of liver abscess, the male to female ratio was 1.25:1. The mean age of presentation was 7.5 years, ranges from 2 month 8 days to 15 years. In a study done by Yeh et al., in Taiwan, the mean age of presentation was 9.6±6.2 years.<sup>8</sup> The mean age of diagnosis reported in other studies is in the range of 7-10 years. 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.<sup>9-11</sup> Another study done by Jayankar SR. et al. 2018 in India, which show male: female ratio was 4:1.<sup>12</sup>

The common presenting symptom was anorexia in 55 (85.93%) cases. Most common symptom was abdominal pain in 60 (93.75%) cases, fever 58 patients (90.625%), and vomiting in 40 (62.5%) cases in this study. Diarrhoea was present in 5 patients. A study carried out by Jayankar SR. et al. show that most presenting symptom is fever, present in 94.7% cases.

In our study, 5 case [7.81%] of patients had raised bilirubin and 28 patients [43.75%] of patients had raised alkaline phosphatase levels. Percentage of patients with raised SGOT and SGPT was 43.75%. followed by abdominal pain present in 88.6% cases.<sup>12</sup> Study by Yeh et al. showed fever in 94.7% cases and abdominal pain in 42.1% cases.<sup>8</sup> Above studies had not included anorexia as a symptom.

Anemia was most common clinical sign in this study present in 40 (62.5%) patients. Next common sign was weight loss present in 38 (59.37%) patients. Respiratory distress was present in 4 (6.25%) due to pleural effusion and peritonitis cases. Jaundice was present in 5 (7.81%) patients in our study. Jayankar SR et al. has reported that clinical

**Table 13:** Pyogenic liver abscess

Pyogenic Liver Abscess	Number	Percentages
STAPH. AUREUS	16	25
E. COLI	14	21.87

jaundice in 45% of the cases<sup>12</sup> whereas in a study by Yeh et al. clinical jaundice was reported in 5.3% of the cases.<sup>8</sup>

There were 34 patients of Amoebic liver abscess and 30 of Pyogenic liver abscess, in which 53.12% (34 cases) patients had amoebic liver abscess in the right lobe and in two cases both lobe of liver was involved. A study done by Khan et al. 2017 found that single cavity abscess was 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.<sup>13</sup>

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 25% cases followed by E. coli in 21.87% cases in pyogenic liver abscesses. A study by Jayankar SR et al. show the most common organism found on culture was staphylococcus, found in 39% of pyogenic liver abscess.<sup>12</sup>

Conservative medical management was done in 2 patients. USG guided needle aspiration was done in 20 patients and 40 patients underwent pigtail catheter insertion. 12 fr pigtail catheter insertion was done in 30 patients and 10 patients underwent double pigtail catheter insertion. Exploration and drainage of liver abscess was done in 2 patients.

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.<sup>14,15</sup> 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.<sup>16</sup> 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.<sup>17</sup> No recurrence occurred in any of present cases during the follow up period.

In our study we also used double pigtail catheter insertion for ruptured liver abscess with pelvic collection (n=10, 15.6%) with no post operative complications.

## 7. Conclusion

Male children are more commonly affected than females. The most common age group of children affected by Liver abscess was 5 -10 years of life. In this study, we found that

incidence of amoebic liver abscess was more as compared to pyogenic liver abscess. Multiple cavity abscesses were 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 resolves better in case of pigtail catheter drainage than needle aspiration. We also conclude that double pigtail catheter insertion is also a good treatment modality of ruptured liver abscess with pelvic collection.

## 8. Source of Funding

None.

## 9. Conflict of Interest

None.


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