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LIVER DYSFUNCTION IN CHILDREN WITH LIVER ABSCESS- AN UNAPPANT COMPLICATION OR A CHANCE FINDING?

Paediatric Surgery

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ABSTRACT

A liver abscess is defined as a pus-filled mass in the liver that can develop from injury to the liver or from an intra-abdominal infection disseminated from the portal vein. The majority of these abscesses are categorized as pyogenic or amoebic, although a minority are caused by parasites and fungi. Although the incidence of liver abscess is low, it is essential to early detect and manage these lesions, since there is a significant mortality risk in untreated patients. This activity describes the pathophysiology, evaluation, and management of liver abscess and highlights the role of the interprofessional team in the management of this condition.

KEYWORDS

Liver abscess, Liver Dysfunction, Outcome, Amoebic liver abscess, pyogenic liver abscess

INTRODUCTION

A liver abscess (LA) is defined as a clinicopathological entity that can present with systemic manifestations of toxemia and clinical signs in the abdomen. It is often seen in children from developing countries and relatively uncommon in developed countries.[1] Children with LA constitute more than 79 per 100,000 pediatric admissions in tertiary care centers in India, thus signifying the increased burden of this disease. [2] Liver abscesses are of two types based on the causative organism. Most of the LA in children are pyogenic (PLA) which accounts for 70-80 % of cases, and amoebic liver abscesses (ALA) account for 21-30% of cases. [3,4]

The common organisms involved in PLA are staphylococcus, Klebsiella pneumonia, Enterobacter, and Escherichia coli.[5] In developing countries, most cases of PLA (around 80% of all liver abscesses) are caused by Staphylococcus. [6,7]

Open surgical or percutaneous drainage of the abscess and antimicrobial therapy remain the mainstay management. [8] Untreated liver abscess can develop complications such as empyema, sepsis, and rupture of liver abscess in the peritoneal or pleural cavity. [9,10] Rare complications include hepatic venous outflow tract obstruction and portal vein thrombosis.

Even rarer complications are gastrointestinal fistula formation, broncho-biliary fistula, inferior vena cava, right atrial thrombosis, Budd-Chiari syndrome, and dysphagia.[13]

Liver dysfunction due to LA and its significance remains an overlooked area. So, we proposed analyzing the liver function tests in patients with LA to see the changes and their correlation with severity and outcome.

MATERIALS AND METHODS

This prospective observational study was conducted in a major tertiary referral children's hospital from June 2023 till July 2024, after obtaining institutional ethical clearance. The study aimed to find out the association between liver dysfunction and its impact on the outcome of LA in children.

All children who were diagnosed to have LA on ultrasonic evaluation admitted to the hospital from the age group 1 year to 18 years were included. Patients of liver abscesses who had earlier intervention or surgery elsewhere were excluded.

After obtaining informed parental consent and assent (in cases more than 7 years). Clinical and laboratory data were recorded in a standard proforma. The primary outcome was the frequency of altered liver function found in pediatric patients with LA. The secondary outcome was the correlation of liver dysfunction with the severity i.e. need for surgical intervention and duration of hospital stay.

Serum hyperbilirubinemia was defined as serum bilirubin levels > 1.00mg/dl, elevated liver enzymes defined by SGPT levels > 70 IU/ml and SGPT>55 IU/ml, and deranged coagulation was defined as having an INR >1.2. Serum albumin, albumin-globulin ratio (A/G ratio), and ascites were also recorded. Liver dysfunction defined as presence of deranged liver function tests either alone or in combination.

The children were enrolled and baseline investigations were sent at the initial presentation. The patients who had deranged liver function tests were re-sampled at the interval of 4-5 days to see the progress of the disease.

A protocol-based management as adopted in our institution (18) was followed as described in the following fig 1. The end of the study was either death or discharge. Statistical analysis was done to correlate the association of liver dysfunction with the severity i.e. medical versus surgical treatment duration of hospital stay and outcome i.e. death or discharge.

RESULTS

The total number of cases included in this study was 70. Thirty-five cases (50%) belonged to 1 to 5 years, thirty-one cases (44.29%) belonged to 6 to 10 years and four cases (5.71%) belonged to 11 to 14 years. The mean ± SD age was 5.43 ± 2.9 years, Median (25th-75th percentile) age was 5.5 (3-7) years. Out of 70 cases in our study 31(44.29%) patients were female and 39(55.71%) patients were male and the ratio between male and female was 1.26:1. All 70 patients in our study group underwent USG of the abdomen and diagnosis is made based on USG findings. Out of 70 cases of LA, 6(8.57%) cases had multiple LA, 53(75.71%) had single LA and 11(15.71%) cases had ruptured LA. In our study population of 70 cases of LA, we did amoebic serology to determine the association of liver abscess with etiological profile which included amoebic (60 cases), amoebic with bacterial (8 cases), and bacterial (2 cases). The 2 bacterial cases were negative for amoebic serology and the rest 68 were positive for amoebic serology. The p-value of the association of amoebic serology with etiology was< 0.0001 which was significant. Our study defined hyperbilirubinemia as a serum bilirubin value > 1.00 mg/dl. In this study, 7 patients (10% of cases) had hyperbilirubinemia while 63 patients (90%) had normal serum bilirubin levels. Out of 70 cases of our study population, 14(20%) cases had elevated SGPT (>70 IU/ml) and SGOT (>55IU/ml) while 56(80%) had normal liver enzymes. Liver dysfunction has been defined as either raised bilirubin (7/70), raised liver enzymes (14/70), deranged INR (49/70), hypoalbuminemia (24/70), or a combination of any of the above (58/70).

Out of 70 cases, 55(78.57%) cases were managed with closed drainage while 15(21.43%) cases needed open surgical drainage as treatment.

32 (46%) required a hospital stay for <15 days while 38 patients (54%) needed to be admitted for >15 days. Out of 12 patients without liver dysfunction, one patient (8%) required surgery while 11 patients (92%) required medical management. Of the remaining 58 patients with liver dysfunction, 14 (24%) required surgery while 44 patients (76%) were managed medically. On performing statistical analysis, the p-value was found to be 0.154 (not significant). Out of 12 patients with normal liver functions, 9 patients (75%) were discharged within 15 days of admission while 3 patients (25%) required a longer duration of hospitalisation. Amongst 58 patients with liver dysfunction, 23 patients (39%) were discharged within 15 days of admission while 35 patients (61%) were discharged after 15 days. On performing Fischer's exact test, the p-value was found to be 0.025 which is < 0.05 (significant). Out of 70 patients, 11 patients (16%) presented to us with ruptured liver abscess. Out of these 11 patients, 3 (27%) had normal liver functions while 8 patients (73%) had liver dysfunction. Out of the remaining 59 patients who did not have a rupture of their liver abscess, 11 patients (19%) had normal liver functions while 48 patients (81%) had liver dysfunction. The p-value was found to be 0.051 which is more than 0.05 so this correlation was not significant statistically. Of the remaining 59 patients who had non -ruptured abscesses, 27 patients had single abscess while 32 patients had multiple abscesses on ultrasonography.

Out of these 27 patients with single abscess, 6 patients (22%) had normal liver functions while 21 patients (78%) had liver dysfunction. The remaining 32 patients with multiple abscesses, 4 patients (12.5%) had normal liver functions while 28 patients (87.5%) had liver dysfunction. This difference was not statistically significant. (p-value = 0.32).

Table 1: Distribution Of Hypoalbuminemia And Outcomes

Hypoalbuminemia	Surgical(n=15)	Non-surgical(n=55)	Total	P value
No	3 (20%)	43 (78.18%)	46 (65.71%)	<.05*
Yes	12 (80%)	12 (21.82%)	24 (34.29%)	
Total	15 (100%)	55 (100%)	70 (100%)	

DISCUSSION

Several studies have been conducted on the etiology, prognostication, newer markers, and complications of liver abscesses. However, no study to date has focused on liver dysfunction in these patients with particular reference to serum bilirubin levels, liver enzymes (SGOT and SGPT), hypoalbuminemia, and deranged INR. In this study, we focused specifically on these parameters to determine the extent of liver dysfunction in patients with liver abscesses. We also wanted to study the effect of these deranged liver parameters on the outcome i.e. medical management vs surgical intervention and also the duration of hospital stays. (<15 days vs >15 days). Comparing our patient's demography, we found the mean age of presentation was 5.43 ± 2.9 years, similar to the study done by Dhabe et al where the mean age of presentation was 5.5 ± 3.3 years.[12]

Our series showed slight male preponderance (1.26:1) which was similar to the study conducted at held in Lucknow [13] Chandigarh [14] and Andhra Pradesh [15] respectively which also showed male-to-female ratios of 2:1, 1.13:1, and 1.5:1, comparable to ours.

In our study, we did not find any correlation between age, gender and liver dysfunction. Contrary to most studies conducted worldwide which showed an increased preponderance of pyogenic liver abscess (21-30% of cases) [3,4] our study showed an overwhelming majority of amoebic liver abscesses with 60 patients showing positive amoebic serology 8 patients had positive serology with superimposed bacterial infection while only 2 patients were purely pyogenic (68/70- 97.14%). This was similar to a study conducted by Jain et al in Indore [17] where the prevalence of positive amoebic serology was 100%. The reasons for such a high prevalence rate of amoebic positive serology could be due to low socio-economic status, poor sanitation, lack of hygienic water supply and overcrowding.

Since the number of patients of purely pyogenic liver abscess was very small (2/70), we could not determine the correlation between ALA and PLA versus liver dysfunction. However, a future study design having a significant number of patients with both ALA and PLA could be used to find a correlation between it and liver dysfunction.

The probable explanation of deranged liver function tests in patients with LA was due to injury to liver cells which occurs in response to inflammation and infection in the liver parenchyma. With the early institution of antibiotic therapy, the inflammatory damage to the liver is reduced and healing of liver parenchyma starts which is evidenced by the return of these tests to normal values in 7-10 days.[20]

In our study, the incidence of liver dysfunction was 83%. This is similar to the study conducted by Manugu et al. from Andhra Pradesh [15], which found the incidence of liver dysfunction to be 77%. Such a high incidence of liver dysfunction shows that prompt treatment of the condition is important to prevent the progression of the disease into a decompensated state.

A study conducted by Waghmare et al (n = 34) described no abnormal liver function tests, and no one suffered from clinical icterus.[5]

In contrast, studies from Maharashtra [12] and Taiwan [16] showed a lower incidence of liver dysfunction in 50% and 40.5% of patients, respectively.

Although the presence of liver dysfunction seems to increase the need for surgical intervention, this difference was not statistically significant. This is similar to the study conducted in Taiwan as well [16] where although the incidence of liver dysfunction is lower, the proportion of patients requiring surgical intervention is similar to that seen in our study. (13% vs 21%)

Another parameter that we assessed was the duration of hospital stay. A stay >15 days is considered a long duration which means an increased burden of the disease. Patients with liver dysfunction had a longer duration of hospital stay while those without liver dysfunction were discharged sooner and this difference was statistically significant.

Our study showed an incidence of hyperbilirubinemia of 10% which was similar to the study by Choudhury et al [18] which showed an incidence of 18%. The pathogenic process proposed for jaundice in LA includes sepsis, hepatocellular dysfunction, intra-hepatic biliary obstruction by expanding abscess, and bilio-vascular fistula. [19,20]
On comparing the association between hypoalbuminemia and with outcome of treatment we found that 50% of patients with hypoalbuminemia required surgery for treatment, while only 6.5% of patients with normal albumin levels required surgery. This difference was statistically significant. We have not been able to find any study in the past which has produced similar results. This aspect needs further evaluation in a larger study.

However, despite the increased need for surgical intervention in these patients, there was no increased duration of hospital stay with 62.5% of patients being discharged within 15 days of admission compared to 37.5% requiring longer admission.

The incidence of deranged coagulation profile was 70% in our study as seen by determining the INR values. This incidence is similar to that seen in a study conducted by Choudhury et al from the same center where the incidence of coagulopathy in liver abscess patients was 78%. [18]

According to the protocol being followed at our institute [20] patients with deranged coagulation profiles were given IV Vitamin K or transfused fresh frozen plasma to correct the INR values. The increased INR values however have no bearing on the final treatment as only 20.5 % of patients with raised INR required surgical intervention compared to 19.5% of patients requiring surgery in patients with normal INR values.

There was also no significant correlation between deranged coagulation and increased duration of hospital stay signifying that with adequate treatment, the INR values also return to normal. This is similar to the results of the study by Srivastav et al [13].

Overall the outcomes of our patients were favorable as there was no mortality and all the 70 patients were discharged with normal liver function tests. This was similar to the study reported from Maharashtra with 100% survival [12] and from Lucknow with 97.43% survival. [13]

During the study, we found that the majority of patients who presented to us with ruptured liver abscess had liver dysfunction compared to those who presented with non-ruptured abscess. This difference,

however, did not reach statistical significance. However, in the future, a study with a greater number of participants may be conducted to confirm this observation. We did not find a single study that has found any correlation between liver dysfunction and rupture of abscess.

The study failed to find any correlation between single or multiple liver abscesses and liver dysfunction.

CONCLUSION

Although a study with a small sample size, this study has given us valuable insights into the extent of liver dysfunction in patients with liver abscess especially with regards to treatment outcome and duration of hospital stay. Liver dysfunction is a significant problem in liver abscess patients and this fact should be borne in mind while treating such patients.

Patients with liver dysfunction have a significantly greater duration of hospital stay compared to those without liver dysfunction. However, the final treatment i.e. medical management vs the need for surgery is independent of liver dysfunction.

Early institution of adequate treatment is essential to prevent the development of decompensated liver failure.

Elevated S. bilirubin and elevated liver enzymes (SGOT, SGPT) although seen in a significant proportion of patients with liver abscess, did not affect the final treatment required or the duration of hospital stay.

Whether this has any long-term effect on liver function is not known but a future study design evaluating patients after some years of recovery might throw some light on this.

REFERENCES

1. Muorah, M., Hinds, R., Verma, A., Yu, D., Samyn, M., Mieli-Vergani, G., & Hadžic, N. (2006). Liver abscesses in children: a single center experience in the developed world. Journal of pediatric gastroenterology and nutrition, 42(2), 201-206.
2. Kumar A, Srinivasan S, Sharma AK. Pyogenic liver abscess in children—South Indian experiences. Journal of pediatric surgery. 1998 Mar 1;33(3):417-21.
3. Hendricks, M. K., Moore, S. W., & Millar, A. J. W. (1997). Epidemiological aspects of liver abscesses in children in the Western Cape Province of South Africa. Journal of tropical pediatrics, 43(2), 103-105.
4. Moore, S. W., Millar, A. J. W., & Cywes, S. (1994). Conservative initial treatment for liver abscesses in children. Journal of British Surgery, 81(6), 872-874.
5. Waghmare, M., Shah, H., Tiwari, C., Khedkar, K., & Gandhi, S. (2017). Management of liver abscess in children: our experience. Euroasian journal of hepato-gastroenterology, 7(1), 23.
6. Khim, G., Em, S., Mo, S., & Townell, N. (2019). Liver abscess: diagnostic and management issues found in the low resource setting. British Medical Bulletin, 132(1), 45-52.
7. BARNES, P. F., DE COCK, K. M., REYNOLDS, T. N., & RALLS, P. W. (1987). A comparison of amebic and pyogenic abscess of the liver. Medicine, 66(6), 472-483.
8. Civardi, G., Filice, C., Caremani, M., & Giorgio, A. (1992). Hepatic abscesses in immunocompromised patients: ultrasonically guided percutaneous drainage. Gastrointestinal radiology, 17, 175-178.
9. Giorgio, A., Tarantino, L., Mariniello, N., Francica, G., Scala, E., Amoroso, P., ... & Rizzatto, G. (1995). Pyogenic liver abscesses: 13 years of experience in percutaneous needle aspiration with US guidance. Radiology, 195(1), 122-124.
10. Pérez, J. A. A., González, J. J., Baldonedo, R. F., Sanz, L., Carreño, G., Junco, A., ... & Jorge, J. I. (2001). Clinical course, treatment, and multivariate analysis of risk factors for pyogenic liver abscess. The American journal of surgery, 181(2), 177-186.
11. Ghritlaharey, R. K. (2019). Unusual complications of liver abscess in children. Medical Journal of Dr. DY Patil University, 12(4), 365-366.
12. Dhabe, H., Goyal, A., & Sanghai, S. (2021). Clinical Profile of Liver Abscess In Children. Pediatric Oncall Journal, 19(4), 118-121.
13. Srivastava, A., Yachha, S. K., Arora, V., Poddar, U., Lal, R., & Baijal, S. S. (2012). Identification of high-risk group and therapeutic options in children with liver abscess. European journal of pediatrics, 171, 33-41.
14. Lal, S. B., Venkatesh, V., Kumar, A., Anushree, N., Seetharaman, K., Aneja, A., ... & Sehgal, R. (2021). Liver abscess in children-experience from a single tertiary care center of North India: etiology, clinical profile and predictors of complications. The Pediatric Infectious Disease Journal, 40(5), e179-e184.
15. Manugu NS, Lunavath N, Pedada R, et al. Clinical, demographic, and aetiological profile of liver abscess in children admitted at tertiary care hospital - north India. J Evid Based Med Healthc 2021;8(40):3470-3476. DOI: 10.18410/jebmh/2021/629
16. Yeh, P. J., Chen, C. C., Lai, M. W., Yeh, H. Y., & Chao, H. C. (2020). Pediatric liver abscess: trends in the incidence, etiology, and outcomes based on 20-years of experience at a tertiary center. Frontiers in Pediatrics, 8, 111.
17. Jain, M., Jain, J., & Gupta, S. (2016). Amebic liver abscess in children—experience from Central India. Indian Journal of Gastroenterology, 35, 248-249.
18. Roy Choudhury, S., Khan, N. A., Saxena, R., Yadav, P. S., Patel, J. N., & Chadha, R. (2017). Protocol-based management of 154 cases of pediatric liver abscess. Pediatric surgery international, 33, 165-172.
19. Sarda, A. K., Kannan, R., Gupta, A., Mahajan, V., Jain, P. K., & Prasad, S. (1998). Amebic liver abscess with jaundice. Surgery today, 28, 305-307.
20. Singh, V., Bhalla, A., Sharma, N., Mahi, S. K., Lal, A., & Singh, P. (2008). Pathophysiology of jaundice in amoebic liver abscess. The American journal of tropical medicine and hygiene, 78(4), 556-559.