

Management of Liver Abscess in a Child

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Abstract

Liver is a vital organ with its multitude of functions, especially in children in whom it plays a crucial role in digestion. The portal circulation rich with nutrients absorbed from the small intestines is also a portal to infection from the outside world through contaminated food. The pediatric population suffers the most due to the complications of infection primarily, hepatic abscess. The outcomes depend on timely intervention and appropriate management. This article aims at highlighting some of the aspects of established and evidence based treatment strategies. The similar clinical presentation of the two types of liver abscess was a major hurdle in managing this curable yet perilous disease. The identification of the infectious etiology and

abscess morphology is the key in determining the appropriate therapy. Invasive intervention while having multiple risks become inevitable if the disease is not treated on time. Hence a targeted approach tangible by early clinical diminution of the severity of the disease is the mainstay of treating any kind of hepatic abscess. We validate the best approach while highlighting the diagnostic sequence and treatment algorithm from different settings. The efficacy of antibiotic therapy combined with invasive drainage had proved the most successful in larger liver abscess while monotherapy with antibiotics remained adequate for others. The outcome with respect to time was variable.

Introduction

The liver is a vital organ, especially for the children with its multitude of functions aiding in digestion and detoxification. The Liver is a major abdominal organ with dual blood supply, which predisposes it to an increased risk of infection. The hepatic portal vein supplies 75% of the blood to the liver while the hepatic arteries, the remaining 25%. As it lies at the distal end of the portal circulation it is bathed with portal blood containing viruses, bacteria, parasites, ova, products of digestion and other antigens. [1]

Hepatic or Liver abscesses (LA) are Important cause of morbidity in children. [2] The abscesses are space-occupying lesions in the liver, and are infectious. There are two most common types, pyogenic and amoebic. The pyogenic liver abscess (PLA) is a rare but potentially lethal condition, with a reported incidence of 20 per 1, 00,000 hospital admissions in a western population [3,4]. In the Southeast Asian population, pyogenic liver abscess (PLA) is an infrequent infection in

children. Despite this, most of the recorded pediatric hepatic abscesses are pyogenic (80%), followed by an amoebic liver abscess (ALA). [5] In a study from India, the incidence of PLA has been found to be 79/100000 pediatric admissions [3,6]. While being a significant cause of morbidity and mortality, for unknown reasons liver abscess affects male children more than female children [7]. The most likely site of abscess, irrespective of the type of hepatic abscess, is the right lobe of the liver. Both these types of hepatic abscesses may be difficult to distinguish with their clinical presentation, commonly pain in the right upper quadrant along with hepatomegaly (with or without jaundice) and fever. [8]

Clinical Presentation

A pyogenic or amoebic etiology, did not affect the clinical presentation of hepatic abscess. Fever often with chills, abdominal pain mostly in the right upper quadrant and tender hepatomegaly were the usual presenting signs and symptoms. [9] The mean age of

Microbiologic etiologies of pyogenic liver abscess
Gram-positive enterics <ul style="list-style-type: none"> •S.milleri •Enterococcus sp. •S. aureus/ S. epidermidis •Streptococci sp.
Gram-negative enterics <ul style="list-style-type: none"> •E.coli •K.pneumonia •Pseudomonas sp. •Proteus sp. •Others
Anaerobic organisms <ul style="list-style-type: none"> • Bacteroides Sp. •Anaerobic /Microaerophilic Streptococci •Fusobacterium •Other anaerobes
Miscellaneous <ul style="list-style-type: none"> •Actinomyces •C. albicans

presentation to clinician was 6.9 years. Average volume of abscess was 164 ml, nearly half of which (47.01%) which was present in children below 5 years of age. The most common presenting complaints were fever and abdominal pain in 97% of patients. [6,8] Almost all cases had tenderness in Right hypochondrium. Uncommonly they can present as sub acute intestinal obstruction. In three fourth of patients the abscess was reported to be located on the right side. In one study 80% of the lesion was single. Abscess can be multiple in 20 to 25% of cases. [6] Nausea and vomiting episodes, anorexia, unexplained anemia, and cough with breathing difficulty or simply fever are other common complaints. Whereas fever is the most common symptom in children, afebrile presentations of liver abscesses especially of amoebic etiology are well known in series of mixed age groups. [9] In one series of amoebic liver abscesses, majority (58%) of patients had subacute presentation with right upper quadrant dull ache, weight loss, fatigue, anemia and low

to moderate grade fever. [10] On the other hand liver abscesses may present as fulminant sepsis or acute abdomen. Clinical presentations do not distinguish amoebic from a bacterial etiology unless there is an obvious precipitating source for e.g. abdominal infections. It is uncommon to get a positive history of colitic diarrhea from patients of amoebic liver abscesses. The commonly implicated organism includes staphylococcus aureus followed by E.coli. Klebsiella sp., Enterobacter sp., Pseudomonas sp., has also caused infections in pediatric population. Salmonella typhi was an identifiable causative in cases presenting with recurrent pyogenic cholangitis. [11]

The most common Predisposing factors include a perforated appendicitis, sickle cell disease, chronic granulomatous disease, chronic malnourishment status, and immunocompromised status post chemotherapy. [10,11]

Investigation

Ultra-sonogram has been the mainstay of diagnosis of hepatic abscess. USG is the initial investigation of choice. It is a good tool to assess the site, size and number of abscess. The ultrasonogram of a typical liver abscess had the following distinguishable features like acoustic enhancement, abscess wall, peripheral halo, septation, and internal debris. [10,11] At times, it may be difficult to differentiate a liver abscess from other types of space occupying liver masses such as necrotic neoplasm, hematoma, and complicated (hemorrhagic or inflammatory) cyst and rarely a hepatoblastoma. Contrast enhanced computer tomography has got good sensitivity in identifying small abscess anywhere in the liver. CECT abdomen may be advantageous in distinguishing even small abscess from other liver masses. CECT also has the advantage of visualizing the posterior and superior aspects of the liver. [11,12] MRI can be done when CT is contraindicated.

Management

Liver abscesses management based on etiology can be broadly classified into Amoebic liver abscess (ALA) and pyogenic liver abscess (PLA). The treatment includes intravenous antibiotics as the first step. Antibiotics initiated should be a



An amoebic abscess (ALA) mimicking a unilocular pyogenic abscess. (white arrow) Presence of a "target" or "double-rim" appearance of its thick peripheral wall in an axial contrast-enhanced CT is evidence of pyogenic abscess with peripheral wall.

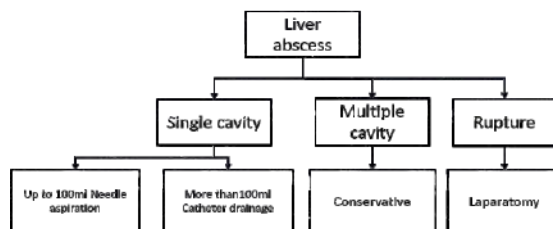
broad spectrum to cover gram positive, gram negative & anaerobic organisms. [14] In a recent retrospective, observational, cohort study conducted in a teaching Hospital in India, antibiotic treatment included ceftriaxone, vancomycin and metronidazole in specific doses. Depending on the size of the abscess the definitive intervention varies. Those with small abscesses not amenable to needle aspiration are treated with antibiotics only, while abscesses less than 100 ml can be treated by percutaneous needle aspiration



CT scan demonstrating multifocal pyogenic liver abscess (PLA) containing at least 10 locules. PLA usually forms multiple abscesses; 50% cases have multiple locules

under ultrasound guidance with wide bore needle (18 G needle). Bigger abscess with volume more than 100 ml and abscesses with a risk of spontaneous perforation (specially left lobe abscess) would need catheter drainage. [11,15] In the case of multiple abscesses, drainage is

usually not possible; hence, conservative treatment is needed. In case the abscess cavity appears as if it can respond to single aspiration, there is no need for a long-term drainage device such as pigtail catheter. However, in case of a larger abscess (volume >100 ml) repeated aspirations may incite more trauma in children; hence, the placement of a pigtail catheter is considered more suitable. It was established that the clinical presentation of amoebic and pyogenic might be difficult to distinguish during initial management many a times. But once the distinction was arrived upon, conservative anti-amoebic therapy was offered to ALA, while PLA was managed according to the response to initial therapy. The few challenges in confirming the diagnosis, was owing to limitations in resources. Hence all abscesses were treated at



par on admission. [11] In spite of the amoebic serology testing being ninety-five percent sensitive and specific, false positivity is an obstacle in India and other areas where there is high prevalence. [12]

Another Indian study had mentioned that percutaneous drainage combined with antibiotics has become the first line and mainstay of treatment for most PLAs. [1, 13] Their principle of treating PLA has remained pus drainage, instituting appropriate antibiotics and treating the underlying cause of infection. While waiting for culture reports from blood or pus, broad-spectrum antibiotics were started to cover Gram-negative and Gram-positive aerobes and anaerobes. The metronidazole antibiotic regimen generally had covered the causative organisms most commonly found, although this was varied according to geographic differences and antimicrobial treatment policies. They have also cited that, initially antibiotics should be administered parenteral, and after 2 weeks of

systemic therapy appropriate oral agents may be used for a further 4 weeks. [14] Percutaneous drainage (PD) is the main stay of management of liver abscess when more than medical management is needed. Percutaneous drainage was performed under USG or CT guidance. Aspiration of PLAs to have the diagnosis confirmed and obtaining pus for culture had been accompanied by complete aspiration of the pus or insertion of a drain at the same time. The question of when this was the primary treatment and when a drain had to be inserted has remained debatable, while evidence suggests that percutaneous needle aspiration (PNA) group had a high success rate and a shorter hospital stay, their report also mentioned that a large percentage required second or third aspirations to achieve complete success. When PNA had failed, catheter drainage had been performed. [14]

The only indication of primary surgical treatment of PLAs was in patients with an initial presentation with intraperitoneal rupture or in patients with multiple abscesses above an obstructed system that cannot be negotiated by non-operative means. An open operation had also been indicated when there is a failure of non-operative treatment and for complications of percutaneous drainages, such as bleeding or intraperitoneal leakage of pus. Surgery was required to treat any underlying causative disease if necessitated, particularly those pertaining to the hepatobiliary area. [16] It was certain that there was no single therapy that cures all cases. Antibiotics combined with percutaneous aspiration (which may need to be repeated) or PCD was successful in 90% of patients. [1]

The ALA was dealt with Drug therapy, USG guided aspiration, percutaneous catheter drainage, laparotomy separately or in a combination of these four modes of treatment. Reports suggest that medical therapy could be instituted using either a single agent or a combination of drugs for the extraluminal parasite with metronidazole, chloroquine, and tinidazole, while preferred luminal agents remained paromomycin, iodoquinol and diloxanide furoate. [11,17] Nitroimidazoles including metronidazole was effective in over 90% of cases. Relapses had been reported when the

regimen is given only for 10 days and so it would be advisable to administer for up to 3 weeks [18].

Routine aspiration of the liver abscess was not indicated for diagnostic or therapeutic purposes in cases of ALA. A combination of USG findings with a positive serology in the appropriate clinical setting was reportedly adequate to start drug therapy [16,19]. Percutaneous abscess drainage was warranted only when, any or all of the following would be present, in situations where there is a lack of clinical improvement in about forty eight to seventy two hours, abscess located in the left lobe, large abscess with risk of imminent rupture (usually USG sign of thin rim of liver tissue around the abscess which is less than 10 mm), signs of compression, seronegative abscesses and failure in the improvement following non-invasive treatment after 4 to 5 days. [19,20]

The stand-alone effectiveness of anti-amoebic therapy was at par with anti-amoebic therapy combined with routine needle aspiration while treating patients with uncomplicated liver abscess [21,22]. Open surgical drainage has been rarely indicated in ALA but may be required in the setting of a large abscess with a poor yield on needle aspiration or percutaneous drainage, worsening symptoms evident from clinical deterioration despite attempted needle aspiration. An open surgical drainage was done in moderately complicated ALA (like ruptured abscess in peritoneal cavity with features of peritonitis) and in severely complicated ALA (ruptured in the pleural cavity/pericardial cavity/adjacent viscera). [22,23] Surgical mortality was very high. Hence, in clinical practice, it was only used when the cavity had ruptured into adjacent viscera or body cavities [23].

Conclusion

PLA and ALA have many features in common and diagnosis is often delayed due to vague clinical symptoms resulting in adverse outcomes. Hence, in addition to administration of broad-spectrum antibiotics, anti-amebic therapy is commonly recommended irrespective of etiology, in the initial stage owing to the difficulty in distinguishing the two types of abscesses. In most cases of PLA, some form of intervention is usually needed while

with ALA, medical therapy has proven to be scrupulously effective. Abscesses are slow to resolve. A combined multi-disciplinary approach comprising of gastroenterologist, radiologist and surgeon with diligent laboratory investigations, along with early intervention have been indispensable for successful treatment of these curable infections.

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