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Rapid Growth of a Hepatic Hydatid Cyst in a Pediatric Patient: A Case Report From Iran and Its Clinical Significance

Shirin Sayyahfar[1] | Faham Khamesipour[1,2] | Elham Zarei[3] | Javad Nasiri[4]

[1]Research Center of Pediatric Infectious Diseases, Institute of Immunology and Infectious Diseases, School of Medicine, Iran University of Medical Sciences, Tehran, Iran | [2]Halal Research Center of the Islamic Republic of Iran (IRI), Iran Food and Drug Administration, Ministry of Health and Medical Education, Tehran, Iran | [3]Department of Radiology, Ali Asghar Children Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran | [4]Department of Pediatric Surgery, Ali Asghar Children Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Correspondence: Shirin Sayyahfar (sayyahfar.sh@iums.ac.ir)

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ABSTRACT

Hepatic hydatid cysts in pediatric patients present unique diagnostic and therapeutic challenges due to their rapid growth and potential to mimic other pathologies. This case highlights the importance of considering hydatid disease in the differential diagnosis of hepatic cysts, especially in children from endemic regions. The unusual rapid growth rate observed in pediatric cases, influenced by age-related immune and tissue dynamics, underscores the need for heightened vigilance even when prior imaging appears normal. Timely recognition and intervention are crucial to preventing complications such as cyst rupture, secondary infection, and compression of adjacent organs. This case also illustrates the utility of serological and radiological tools in confirming the diagnosis and the role of surgical and pharmacological therapies in ensuring favorable outcomes. Clinicians must remain alert to atypical presentations, ensuring comprehensive evaluation and prompt treatment to improve prognosis and reduce the burden of complications associated with hydatid disease.

1 | Introduction

Echinococcus granulosus, the causative agent of hydatid disease, is endemic in many parts of the world, including Iran [1, 2]. While hydatid disease can affect individuals of all ages, its presentation and progression exhibit notable differences between children and adults [3]. Hydatid disease can be difficult to diagnose in children, particularly when the cyst is large, as clinicians may not consider hydatid disease high on the differential diagnosis list. Pediatric patients often experience faster cyst growth compared to adults. In children, the growth rate of hepatic hydatid cysts can reach 4–5 cm per year, much faster than the typical 1–2 cm per year seen in adults. The reasons for this faster growth may be due to immune or anatomical differences between children and adults, although further studies are needed to fully elucidate these mechanisms [3]. In addition, this is attributed to various factors such as smaller organ size, increased tissue elasticity, and differences in immune responses [3]. Here, we report a case of a rapidly growing 9 cm hepatic hydatid cyst in a child, presenting a clinical challenge due to its size and the patient's age.

Abbreviations: CT, Computed tomography; EIA, Echinococcus IgG antibody.

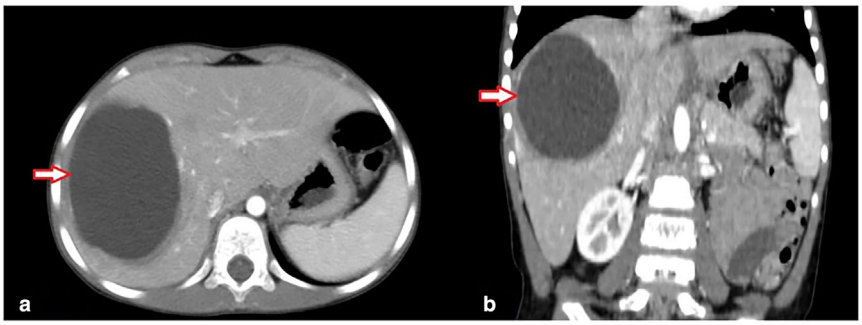

FIGURE 1 | Axial (a) and coronal (b) view of Contrast-enhanced CT scan show a non-enhancing hepatic cyst in the right liver lobe. No evidence of biliary duct dilation and ascites, and right pleural effusion are observed.

2 | Case History/Examination

A previously healthy 6-year-old girl was admitted to the emergency ward with sudden abdominal pain, recurrent vomiting, and fever. An abdominal ultrasound was performed revealing a 9-cm cyst containing approximately 250 cc of fluid in her liver as well as an incidental finding of an accessory spleen. Her primary lab data showed leukocytosis (white blood cell count of $16.8 \times 1000/mm^3$, neutrophil: 29%, lymphocyte: 45%, monocyte: 5%, eosinophil: 18%, and variable lymphocyte: 3%), hemoglobin of 11.5 g/dL, hematocrit of 37.1%, MCV of 83 fL, MCH of 25.7 Pgm, MCHC of 31 g/dL, platelet count of $790 \times 1000/mm^3$, and elevated inflammatory markers (C-reactive protein of 4 mg/L, ESR of 70 mm/h) and procalcitonin of 0.32 mg/dL. Chest radiography was normal. The echinococcus IgG antibody (EIA) test was positive (18.6 DU; positive if > 11 DU). In this case, the EIA test was utilized for serological confirmation of hydatid disease. Given the strong clinical, serological (positive echinococcus IgG), and imaging evidence, the hemagglutination test was not deemed necessary for this specific case.

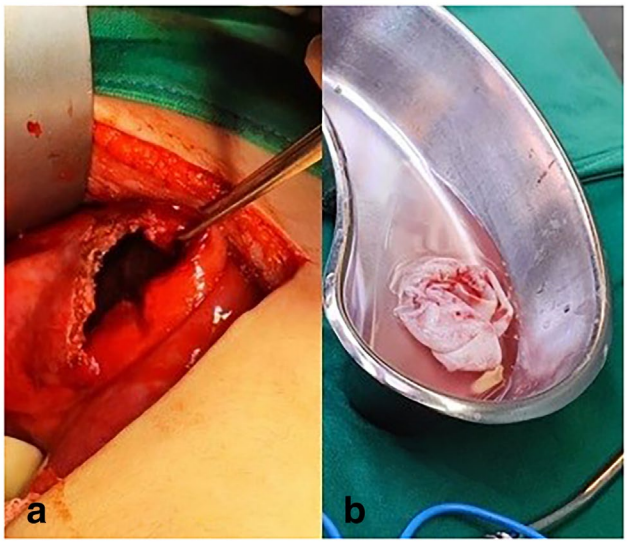

FIGURE 2 | Hepatic hydatid cyst was opened and the contents suctioned. (a) Shows the cyst, decompressed and suctioned. (b) Reveals the internal layer of the hepatic hydatid cyst.

3 | Differential Diagnosis, Investigations, and Treatment

She was admitted to the infectious ward with a primary diagnosis of a hepatic hydatid cyst. However, this diagnosis was called into question during the first consultation with the pediatric infectious disease specialist due to concerns about the size of the cyst, the patient's age, and a previous normal abdominal ultrasound at the age of 3. The surgery service was consulted, and the patient underwent an abdominopelvic CT scan before surgery. The contrast-enhanced CT scan (axial and coronal view, Figure 1a,b) revealed a large hepatic simple cyst measuring approximately $90 \times 75 \times 60$ mm (anteroposterior × craniocaudal × transverse diameter) in the right liver lobe (segments V and VII). There was no evidence of cyst rupture. The result of the EIA test was 18.6 DU, which is considered positive if greater than 11Du. During surgery, the abdomen was opened with a right subcostal incision. A cystic mass in the 5th and 7th liver segments was discovered. After injecting hypertonic saline into the cyst, the contents were suctioned out. Following decompression, the cyst was opened, and the internal capsule and contents were removed and then filled with the omentum (Figure 2). Omentum filling was performed to prevent recurrence, a technique that helps promote healing and reduces the risk of complications. The diagnosis of hydatid disease was confirmed by histopathology.

Albendazole therapy was started preoperatively and continued for 1 month postoperatively, which is generally considered the minimum duration. This approach aimed to reduce the risk of recurrence and secondary infection. Although 1 month is often sufficient for uncomplicated cysts, a longer treatment duration may have been considered, depending on the cyst's size, surgical outcomes, and clinical condition. The initiation of albendazole before surgery was important due to the cyst's large size, the patient's acute symptoms, and the potential risk of complications such as rupture or infection, which could have necessitated urgent medical intervention. The patient's postoperative course was uneventful, and she is scheduled for follow-up in 6 months.

4 | Conclusion and Results

Hydatid cysts can grow rapidly in children, necessitating careful consideration in the differential diagnosis of large cysts.

This case underscores the importance of early diagnosis and timely intervention to prevent complications. The patient's outcome was favorable, and she remains asymptomatic postoperatively. Long-term follow-up is essential to monitor for potential recurrence.

5 | Discussion

The growth rate of hepatic hydatid cysts in children is variable but can be significantly faster than in adults. Regarding the documents, the annual growth rate of a hepatic hydatid cyst may be around 1–2 cm per year; rapid growth up to 4–5 cm per year has been documented in children, likely due to factors such as immune status and the elasticity of surrounding tissues [4, 5]. However, this growth rate is influenced by the type of organ involved, the texture and softness of the organ, and the elasticity and compliance of the surrounding tissues that allow the cyst to expand [6]. For example, lung tissue allows the parasite to grow faster resulting in a larger final size of the hydatid cyst in the lungs compared to the liver over the same period of time [6]. Additionally, the negative pleural pressure can aid in accelerating the growth of the cyst [6].

A robust immune system can restrict cyst expansion through granuloma formation and localized inflammation, whereas compromised immunity may allow faster cyst growth. In children, the immune system is still maturing, which may partially explain the rapid growth observed in this case. Additionally, the elasticity of pediatric tissues may facilitate cyst expansion [4–6].

In the presented case, the patient's laboratory findings, including leukocytosis and eosinophilia, were consistent with an active immune response to the parasitic infection. However, no underlying immunodeficiency or additional pathology affecting immunity, such as congenital or acquired immunological disorders, was identified. The absence of such conditions suggests that the rapid cyst growth was primarily due to age-related factors and host–parasite dynamics rather than a secondary immunological issue.

In our case, the cyst reached 9 cm within a span of 3 years, which aligns with the higher end of the growth spectrum reported in pediatric patients. This rapid enlargement can mislead clinicians, causing hydatid disease to be overlooked in the differential diagnosis, especially when a previous ultrasound was normal. The differential diagnosis of large hepatic cysts in children includes simple cysts, biliary cystadenoma, and abscesses. In this case, the positive serology for Echinococcus and typical radiological findings supported the diagnosis. Omentum filling during surgery was essential to promote healing and prevent recurrence.

The compact structure of the liver compared to the lung prevents the rapid growth of the hepatic hydatid cyst. It is estimated that the speed of growth for a hepatic hydatid cyst is usually 1–2.5 mm per month [6]. On the other hand, a growth rate of 4–5 cm per year has also been reported for hepatic hydatid cysts in children [6]. It appears that host immunity and the resistance of surrounding tissue are important factors influencing the rate of growth as the growth rate is reported to be 1 cm per month for the first 6 months of the disease [5, 6] and 2–3 cm per year thereafter [5]. It should be mentioned that *E. canadensis* among *Echinococcus* species has a slow speed of growth.

Since our patient had a normal abdominopelvic ultrasound 3 years prior to this current admission, it appears that the cyst had been growing to about 9 cm over the course of a maximum of 3 years. There are a few case reports from Iran showing rapid growth of cysts in children resulting in large hydatid cysts that may mislead clinicians [7–9].

Although uncomplicated hydatid cysts are usually asymptomatic, sudden abdominal pain, vomiting, and fever suggest complications such as increased intracystic pressure, secondary infection, organ compression, immune response to leaked antigens, or microleakage causing localized inflammation and systemic symptoms, despite no overt rupture noted in imaging or surgery [7–9].

This case emphasizes the need for vigilance in diagnosing hydatid disease in endemic areas, especially in pediatric patients where rapid cyst growth can lead to delayed or incorrect diagnoses. The postoperative prognosis is typically favorable if managed appropriately, as in this case.

This case highlights the rapid growth potential of hydatid cysts in children, underscoring the challenges of timely diagnosis and management. Clinicians should maintain a high index of suspicion for hydatid disease when evaluating pure cystic lesions, regardless of location, especially in endemic regions. Early diagnosis and appropriate intervention are critical to preventing complications and achieving favorable outcomes [10].

Author Contributions

Shirin Sayyahfar: conceptualization, investigation, supervision, validation, writing – review and editing. **Faham Khamesipour:** conceptualization, writing – original draft, writing – review and editing. **Elham Zarei:** investigation, methodology, visualization. **Javad Nasiri:** investigation, methodology, validation.

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The authors have nothing to report.

Ethics Statement

The authors confirm that the approval of an institutional review board was not required for this work. Written informed consent was obtained from the patient. The authors confirm that we have read the Journal's position on issues involved in ethical publication and affirm that this work is consistent with those guidelines.

Consent

Written informed consent was obtained from the patient's parents/legal guardian for publication and any accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal on request.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data supporting the conclusions of this article are included within the article.

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