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Traumatic Intraperitoneal Rupture of a Liver Hydatid Cyst: A Case Report

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Abstract **Case Report**

Traumatic rupture of an *Echinococcus granulosus* hydatid cyst in the liver is a rare event. We present the case of an 11-year-old male who sustained a motor vehicle accident and was diagnosed with an intraperitoneal ruptured liver hydatid cyst, identified via CT scan and excised during exploratory laparotomy. Echinococcosis, or hydatid disease, is a parasitic infestation caused by the ingestion of *Echinococcus* eggs, primarily transmitted through dog feces. This infection leads to cystic lesions, known as hydatids, most frequently involving the liver (50–77 %) and lungs (15–47 %) [1, 2]. *Echinococcus granulosus* is particularly endemic in cattle-rearing regions of the Middle East. Infected patients often present with vague abdominal pain due to mass effect or spontaneous cyst rupture. However, traumatic rupture of hydatid cysts remains exceptionally rare. This case illustrates the traumatic rupture of a large liver hydatid cyst in an 11-year-old following a motor vehicle crash, managed according to the Advanced Trauma Life Support (ATLS) protocol. Intraperitoneal rupture of hydatid cysts is a rare but potentially life-threatening complication, accounting for 1–16% of cases [3, 4]. Diagnosis is made through ultrasonography and contrast-enhanced abdominal CT. Treatment involves patient stabilization, surgical cyst evacuation, and scolicidal irrigation. Postoperative albendazole therapy, along with regular follow-up, is crucial to prevent recurrence [5].

Keywords: liver hydatic cyst, rupture, trauma, intraperitoneal.

INTRODUCTION

Hydatic disease is a zoonotic disease caused by the echinococcus parasite, which is a member of the Taeniidae family. Most common echinococcus species that cause hydatid disease in humans are Echinococcus granulosus (cystic echinococcosis) and Echinococcus multilocularis (alveolar echinococcosis). Cystic echinococcosis, also known as hydatid cysts, constitute 95% of all hydatid diseases [3, 4]. Hydatid diseases can develop in almost all organs and tissues of the human body, but the most frequently involved organs are the liver (50%-77%), lungs (15%-47%), spleen (0.5%-8%), and kidneys (2%-4%) [1, 2].

The most frequently reported complications are rupture, bacterial infection, anaphylactic reaction, compression of the vascular and biliary structures, and compression of the neighboring organs [5, 6].

Hydatid cyst rupture can be internal (cysto-biliary fistula, rupture into the hollow viscus, broncho-biliary fistula, bronchopleural fistula, intrapericardial rupture, intrapleural rupture, intraperitoneal rupture) or more rarely, it can be external (cysto-cutaneous fistula). It can be spontaneous or traumatic [7, 8].

We aim to describe a case of traumatic intraperitoneal hydatic liver cyst rupture in a 11-year-old patient.

CASE PRESENTATION

An 11-year-old male presented to the emergency department 1 day after being involved in a motor vehicle collision. The patient appeared well, was hemodynamically stable, and was alert, with a Glasgow Coma Scale score of 15. On physical examination, the patient had abdominal distension, right upper quadrant tenderness, and bilateral flank pain. There were no signs of rebound tenderness, peritoneal irritation, or left shoulder pain. An intravenous contrast-enhanced computed tomography (CT) scan of the abdomen and pelvis revealed a 9x7 cm cystic lesion in the left hepatic lobe, involving segments II and III, with internal floating membranes. Additionally, gross ascites was noted, suggesting a ruptured hydatid cyst. Shortly after the CT scans were completed, the patient became hypotensive and was promptly treated with 2 L of lactated Ringer's

(LR) fluid, which he responded to. This was the only instance when the patient's condition became unstable. An exploratory laparotomy was performed urgently and confirmed the presence of gross ascites and a large ruptured liver cyst containing internal structures resembling hydatid cyst membranes. No other injuries were noted. The intracystic fluid was aspirated, the cyst was completely evacuated, and both the cyst and peritoneal cavities were washed with 20% warm hypertonic saline. Two abdominal drains were placed: one in the cystic cavity and the other in the pelvic cavity. Omentopexy was also performed. The patient was then transferred to the intensive care unit for further monitoring. Postoperatively, albendazole at 15 mg/kg was started in two divided doses (400 mg twice daily). The abdominal drains were removed on the 10th postoperative day (POD), and the patient was discharged on the 14th POD. Albendazole (400 mg) was prescribed for 3 months following discharge.

After surgery, the patient's recovery was gradual. However, he expressed concerns about recurrence, which were addressed during follow-up visits. At the 1-month, 3-month, and 6-month follow-ups, the patient showed no signs of recurrence on radiological evaluation.

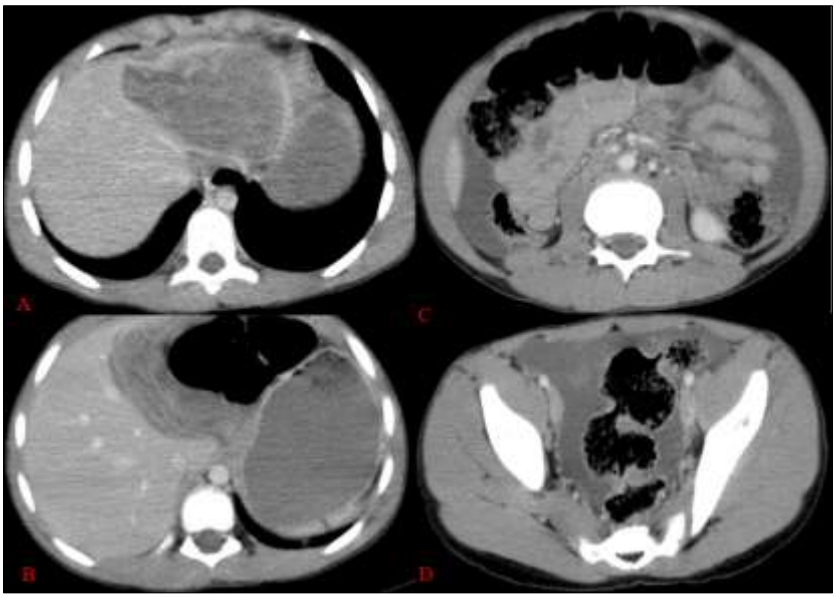

Figure 1: Contrast enhanced CT in portal phase axial sections showing cystic lesion in the left lobe of the liver with a flattened margins (A) containing internal membranes (B) and associated with gross ascites

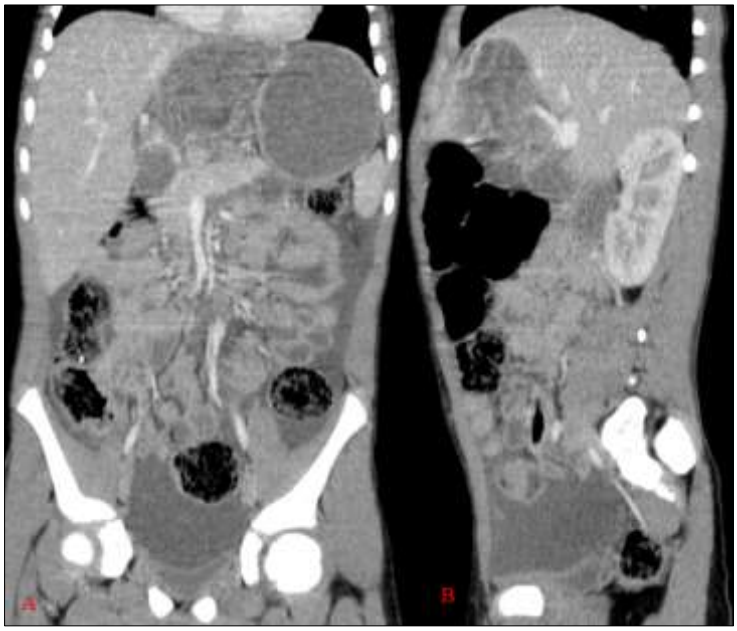

Figure 2: Contrast enhanced CT in portal phase Coronal (A) and Sagittal (B) section showing ruptured hydatid cyst of the liver with diffuse peritoneal fluid. No other

DISCUSSION

Hydatid disease, caused by the larval stage of *Echinococcus* species (commonly *Echinococcus granulosus* and *Echinococcus multilocularis*), most frequently involves the liver, accounting for approximately 70% 60–75 % of cases, with 80 % located in the right lobe [1].

The majority of them are asymptomatic and are diagnosed incidentally during routine checkups [2]. Trauma can serve as a significant risk factor for rupture, leading to potentially life-threatening complications such as anaphylaxis, peritonitis, and bile leakage [3].

Three types of rupture have been described to date: contained, communicating, and direct rupture. Contained rupture occurs when a ruptured cyst remains contained by the adjacent hepatic parenchyma.

Communicating rupture occurs when the bile ducts are eroded by the expanding cyst, leading to communication with the cyst cavity and leakage of bile into the cyst. It is reported in about 26–34 % of cases, with most involving the right lobe [2-4]. Intraperitoneal rupture is an uncommon yet critical complication that poses significant diagnostic and therapeutic challenges. It is found in 1–16 % of the reported cases. It may result from trauma or may occur spontaneously from increased pressure of the cystic fluid (traumatic rupture in our case). [5, 6].

The predisposing factors for rupture include young age, cyst diameter >10 cm, presence of cysto-biliary communication (CBC), and superficial cyst location [7].

Traumatic intraperitoneal rupture of a hydatid cyst is a rare but serious complication that can present in various ways, depending on the extent of the rupture and the cyst contents. Trauma can lead to either an immediate or delayed rupture due to changes in intra-cystic pressure. Patients with intraperitoneal rupture typically experience acute abdominal pain, distension, nausea, vomiting, and fever. Symptoms of peritonitis, including hypotension, tenderness, and guarding, may also be present. However, these signs are nonspecific and can mimic other acute abdominal conditions. In this case, the patient exhibited abdominal distension, right upper quadrant tenderness, and bilateral flank pain, which raised suspicion of a ruptured cyst, a diagnosis confirmed by imaging [8].

Imaging is essential in the diagnosis and management of ruptured hydatid cysts. Ultrasound (US) is the most commonly used radiologic tool for initial diagnosis, while contrast-enhanced computed tomography (CT) may be employed when patients are hemodynamically stable. The sensitivity of US and CT is 85% and 100%, respectively [9]. In this case, an intravenous contrast-enhanced CT scan of the abdomen and pelvis was pivotal in identifying the cystic lesion in the left hepatic lobe, with internal membranes suggestive of hydatid disease. The CT scan also revealed the presence of diffuse hypodense peritoneal fluid and gross ascites, which indicated a ruptured cyst and guided the decision for urgent surgical intervention. By providing detailed anatomical information, CT imaging is crucial in assessing the extent of the rupture, identifying complications, and planning the surgical approach [10].

Medical treatment should be initiated promptly in the emergency unit following the confirmation of an intraperitoneal rupture diagnosis. It should continue throughout the surgical procedure. To minimize morbidity and mortality, patients must be hemodynamically stabilized prior to surgery, and surgery should be performed as soon as possible. The primary goals of medical treatment are to stabilize hemodynamic status through fluid resuscitation and manage anaphylactic reactions using corticosteroids, antihistamines, and vasopressor drugs [11].

The optimal surgical approach for intraperitoneal cyst rupture remains controversial, with no consensus in the literature regarding the best treatment options. In brief, hemodynamically stable patients should undergo either laparoscopic or open surgery at the earliest opportunity, while hemodynamically unstable patients should undergo open surgery. Cyst contents that could trigger anaphylactic reactions should be removed from the abdominal cavity promptly. The peritoneal cavity should be irrigated with scolicidal solutions such as formaldehyde, hypertonic saline (3%-30%), silver nitrate (0.5%), cetrimide, chlorhexidine, a combination of cetrimide and chlorhexidine (1.5%/0.15%), hydrogen peroxide (1.5%-3%), povidone-iodine (10%-50%), or ethyl alcohol (70%-95%) [12]. The effectiveness of each solution varies depending on the contact time and concentration. In our practice, we prefer hypertonic saline or cetrimide combined with chlorhexidine, using each solution to wash the peritoneal cavity at least twice within 10 minutes, with each wash lasting 10-15 minutes. This approach effectively removes allergens that could cause anaphylaxis [13].

Perforated cystic cavities should be thoroughly assessed. Any remaining cystic contents should be evacuated, and the free edges of the cystic cavity should be widely excised. For liver-based perforated cysts, a leakage test should be conducted, involving the injection of saline into the common bile duct or cystic duct to evaluate the relationship between the cyst and the biliary tract. If bile leakage is detected from bile duct orifices, repair should be performed using appropriate suture materials. For high-output bile fistulas, common bile duct repair and T-tube placement can be performed simultaneously. In certain cases, endoscopic retrograde cholangiopancreatography (ERCP) can be used instead

of T-tube placement to expedite the procedure. Spleen-preserving surgical interventions should be prioritized whenever possible. Prior to completing the surgery, abdominal drains should be placed both in the cystic cavity and within the abdomen to prevent complications. [14, 15].

Anthelmintic treatment should be started immediately in patients diagnosed with intraperitoneal hydatid cyst rupture to prevent recurrence of disease due to missed cystic contents during surgery. Albendazole, at a dose of 10-15 mg/kg per day, is the most commonly used anthelmintic agent. According to the literature, the duration of treatment typically ranges from 1 to 12 months. Patients with intraperitoneal hydatid cyst rupture require more frequent follow-up compared to those without complications. Morbidity and mortality rates following intraperitoneal rupture are reported to be between 10-35.3% and 0-23.5%, respectively [17].

Clinical follow-up should occur monthly, especially in the early postoperative period, and annually in the long term. Imaging modalities such as ultrasound, and CT scans can be used during follow-up. Echinococcus IgG.

ELISA or indirect hemagglutination (IHA) can also be performed. If no recurrence is observed after five years, clinical follow-up may be discontinued. The recurrence rate following intraperitoneal hydatid cyst rupture is reported to range from 0-28.6% [16, 17].

This case highlights the life-threatening nature of traumatic intraperitoneal rupture in our patient, emphasizing the critical role of imaging, particularly contrast-enhanced CT, in diagnosing and assessing the extent of the cyst rupture. It aids in guiding therapeutic decisions and planning surgical intervention. Early surgical intervention, followed by postoperative albendazole therapy, is crucial in preventing complications such as secondary cyst formation, biliary fistulas, and peritonitis.

In conclusion, traumatic intraperitoneal hydatid cyst rupture is a life-threatening complication that can lead to significant hemodynamic instability and allergic reactions that requires prompt diagnosis and intervention. Imaging plays a vital role in confirming the diagnosis, assessing the rupture's extent, and guiding therapeutic management. With early recognition, appropriate surgical treatment, and post-operative therapy, the prognosis for patients can be significantly improved.

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