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Case Report

Traumatic rupture of liver hydatid cysts into the peritoneal cavity of an 11-year-old boy: a case report from Iran

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Abstract

This is the first published case report of an 11-year-old patient with a rupture of a liver hydatid cyst (HC) into the peritoneal cavity after an abdominal trauma in Iran. The disease was diagnosed using focused abdominal sonography for trauma. To date, no cases of traumatic ruptures of liver HCs in children have been reported in Iran. In the endemic regions of the world, where patients suffer from a history of trauma and constant abdominal symptoms or anaphylactic shock, early diagnosis of HC is crucial as it may disseminate to other organs. The condition needs conservative surgery and follow-up.

Keywords: Hydatid cyst. Trauma. *Echinococcus granulosus*.

INTRODUCTION

Hydatid cyst (HC) disease, a zoonotic parasitic infection, occurs during the larval stage of a cestode named *Echinococcus granulosus* (*E. granulosus*)[1]. The disease is endemic and hyper-endemic in pastoral regions of the world[2,3]. Although HC may develop in any organ, it generally occurs in the liver (50-75%) and lungs (18-30%), and is characterized by a cystic form of lesions[4]. Hydatid cysts (HCs) develop slowly, making the viscera, and especially the abdominal cavity, highly susceptible to traumatic ruptures. Complications of HC ruptures vary from constant abdominal symptoms (abdominal pain, tenderness, and vomiting) to peritonitis and shock with allergy symptoms (cutaneous rash, urticaria, and anaphylactic shock)[2,5]. While there have been a few reports of HC ruptures after trauma in adults in Iran[5], to date, no reports have been published describing this condition in children. Here, we present the first documented report from Iran of an 11-year-old male patient with traumatic rupture of liver HCs into the peritoneal cavity.

CASE REPORT

An 11-year-old boy was admitted to the emergency department of Imam Ali Hospital, North Khorasan University of Medical Science. He had intractable pain in the abdomen, nausea, and vomiting from trauma sustained after falling down a few steps. On physical examination, his abdomen was not distended and he was not pale. His situation was stable and normal, except for generalized rebound tenderness and involuntary guarding during abdominal palpation. He presented with fever, itching, and a generalized rash. All his preliminary laboratory parameters, such as results of a liver function test, showed normal values (**Table 1**). The patient had no history of trauma, surgery, or systemic disease. Owing to the trauma, focused abdominal sonography in trauma (FAST) and conventional ultrasonography were performed. These revealed free fluid in Morison's pouch and multiple cystic masses in the right hepatic lobe. A spiral computed tomography scan (CT) showed multiple hepatic HCs with small daughter cysts in segments II, III, VI, and VII, as well as intraperitoneal free fluid (**Figure 1**). A diagnosis of liver HCs with severe ruptures was made, and emergency surgery was performed. After a total cystectomy and excision, the cyst pouch was washed with hypertonic saline (5%), and the peritoneal spaces were irrigated with isotonic saline for 10 minutes. Moreover, the abdominal spaces and cyst pouches were irrigated with povidone iodine in order to kill the viable protoscoleces. The histopathology of biopsies taken from the cyst content confirmed an infection of *Echinococcus granulosus*. Based on the radiological and histopathological findings, hydatid disease (cysts) was diagnosed. Post-surgery, to prevent recurrence of the infection, the patient was started immediately on a course of albendazole (10mg/kg/day) for four months. On the follow-up visit, six months post infection, the physical examination, medical laboratory investigations, and CT were repeated. The patient was found to be well and normal (**Figure 2**). Written informed consent was provided by the patient's father.

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TABLE 1: Laboratory indicators of the patient with traumatic rupture of liver hydatid cysts into the peritoneal cavity.

Test	Result	Unit	Normal	Test	Result	Unit	Normal
WBC	14,300	10^3/µl	4-10	K	4.3	mEq/L	3.6-5
Neutrophils	73	%	37-72	BS	130	mg/dl	80-150
Lymphocytes	20	%	20-50	Cr	0.8	mg/dl	0.6-1.2
Monocytes	6	%	0-14	Urea	36	mg/dl	17-43
Eosinophil	1	%	0-6	AST	30	U/L	Up to 40
Platelets	450	10^3/µl	150-450	ALT	30	U/L	Up to 40
Hb	14.2	mg/dl	13-17.5	ALP	351	U/L	98-280
Na	145	mEq/L	135-146				

WBC: white blood cell; **Hb:** hemoglobin; **Na:** sodium; **K:** potassium; **BS:** blood Sugar; **Cr:** creatinine; **AST:** aspartate aminotransferase; **ALT:** alanine aminotransferase; **ALP:** alkaline phosphatase; **mEq/L:** milliequivalents per litre; **mg/dl:** milligrams per deciliter.

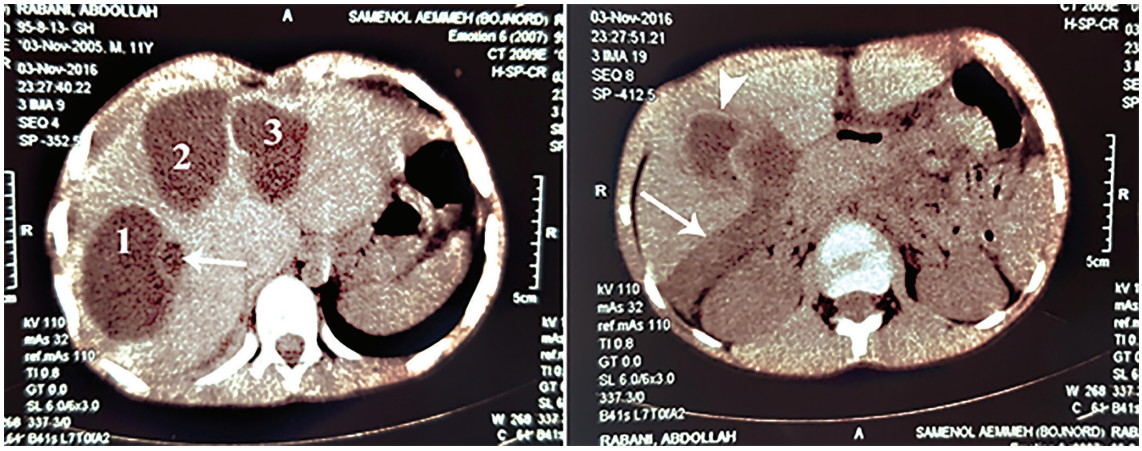

FIGURE 1 - A computed tomography scan of the abdomen showing three liver hydatid cysts (1, 2, and 3) with a small daughter cyst (arrow) (left) and a ruptured liver cyst (arrow head) causing pleural effusion (arrow) (right) in the abdominal space of the patient before surgery.

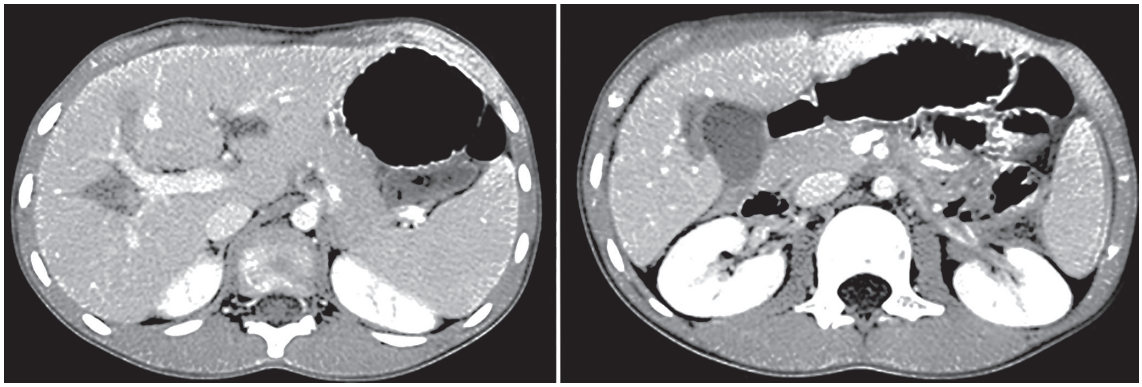

FIGURE 2 - A computed tomography scan of the abdomen showing no liver hydatid cysts (left) with no pleural effusion (right) in the abdominal space of the patient after successful surgery.

DISCUSSION

Echinococcus granulosus, the causative agent of HC disease, is a small tapeworm that lives in the bowel of dogs. This tapeworm sheds it eggs in the feces of infected dogs, and these eggs can be accidentally ingested by intermediate hosts such as grazing animals (sheep, cattle) as well as by humans. Hydatidosis is an endemic disease found in many sheep- and cattle-rearing countries such as Iran. The liver and the lungs are the most common organs where hydatid disease is seen[6-9].

Liver HC rupture into the peritoneum cavity is very rare (1-8%) and may result in a spontaneous rupture due to increased pressure of the cystic fluid or trauma[10]. These uncommon conditions are mostly seen in young children, particularly children with large cysts and a superficial localization in the organs. True cysts have two layers: the pericyst and the endocyst. When both these layers are torn apart, the cyst contents spill into the peritoneal cavity. This is called a direct rupture. Here, the hydatid fluid and sands, brood capsules, and protoscoleces are released into the spaces of the peritoneum. A long-term outcome of direct rupture into the peritoneal spaces is the implantation of protoscoleces, which leads to a metastatic form of the disease[11]. Direct ruptures of HCs into the peritoneal spaces take two main clinical forms with different manifestations: small fissures and large ruptures. The former is very common and is caused by an ordinary trauma that is unrecognized, while the latter is rare and is caused by sudden and severe blunt trauma[10]. HC ruptures cause severe clinical presentations that are accompanied by abdominal pain, urticarial rash, anaphylaxis, and sometimes sudden death[5,11]. In this situation, as there may be allergic reactions or anaphylactic shock, the rupture requires emergency medical care[10].

The preoperative diagnosis of ruptured HCs must be confirmed immediately as emergency intervention is essential[11]. This diagnosis requires a complex workup, such as ultrasonography and a CT scan. Ultrasonography is a non-invasive technology that is very helpful in identifying intra-abdominal free fluids and cysts with detached membranes. The CT scan is the main diagnostic tool for this condition as it has high sensitivity (100%). It is used to determine the exact site of HC ruptures and HC features such as the presence of daughter cysts in the abdominal cavity[10,11]. A histopathological examination is the final confirmatory diagnosis tool for the identification of the causative agents of the HCs. In the present case, the causative species of HC was *E. granulosus*, which is an endemic species in Iran.

Although the disease is common and endemic in Iran, reports of HC ruptures after trauma in the country are rare[5,12]. This case is one of the first-documented official reports of HC rupture caused by trauma in a child in Iran. Upon initial examination, our patient suffered from abdominal pain, itching, and rash. The itching and rash, in this case, may have been a direct result of the ruptured HC. After HC was suspected, the patient was immediately sent for emergency surgery in order to prevent allergic reactions or anaphylactic shock, and, more importantly, because of potential metastasis to other parts of the abdominal cavity.

Despite developments in chemical therapy, surgery is still the best choice for treatment of this disease[10]. In the case of ruptured HCs, the initial focus must be on medical treatment of the allergic reaction, followed promptly by immediate emergency surgery. The key steps to effective and successful surgical management of the ruptured cysts are a complete wash of the peritoneal cavity using scolicidal agents such as hypertonic saline and thorough removal of all cystic content — especially protoscoleces of the cysts. In the current case, the patient's peritoneal cavity was washed with hypertonic saline and isotonic saline for 10 minutes. To prevent recurrence, treatment with albendazole is initiated immediately after surgery, for a course of approximately four months[10]. In our case, the patient received a prolonged course of albendazole, which contributed to a good clinical follow-up evaluation and no recurrence. Albendazole is the drug of choice for HC disease and is very effective in sterilizing the cysts, reducing the risk of anaphylaxis, and decreasing the recurrence rate in infected patients.

In conclusion, although HC ruptures into the abdominal cavity are rare, especially in children, they present serious challenges for clinicians and surgeons who work in emergency wards. Early diagnosis of HC cases by using simple techniques — such as a combination of routine clinical history and a CT scan — is vital to preventing severe and deadly complications of the disease.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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