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Case Report

Anaphylactic Shock Following Spontaneous Rupture of Pulmonary Hydatid Cyst: A Case Report

Hamideh Feiz Disfani, *Maryam Panahi

Department of Emergency Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

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***Correspondence**
Email:
PanahiM@mums.ac.ir

Abstract

We present a case of a 31-year-old rural Iranian man with no prior medical history who developed sudden-onset dyspnea, generalized urticaria, and hypotension. Based on clinical findings and unstable vital signs, anaphylactic shock was suspected and immediate treatment with oxygen, intravenous fluids, and intramuscular epinephrine was initiated. Following stabilization, a spiral chest CT scan revealed a large hydatid cyst with lower lobe collapse, inner membrane detachment near the pericardium, pericardial effusion, and hydropneumothorax. The patient was referred for thoracic surgery, which was successfully performed. He was discharged in stable condition with albendazole therapy and follow-up. Although rare, anaphylactic shock due to hydatid cyst rupture should be considered in endemic regions. In the emergency setting, prompt differentiation from other acute conditions such as asthma, angioedema, or pulmonary embolism is essential to avoid delays in life-saving interventions. Prompt administration of epinephrine and surgical management are essential for favorable outcomes.

Introduction

Hydatid cyst disease is a parasitic infection primarily caused by the parasite *Echinococcus granulosus*. This disease poses a significant health concern, especially in countries where agriculture and livestock breeding are prevalent, which is highlighted by its widespread presence in such regions (1). Notably, Iran is identified as being hyperendemic for hydatid cyst disease, reflecting the substantial impact of this infection within the country (2).

The manifestation of hydatid cyst disease leads to the formation of cysts in various organs, predominantly affecting the liver and lungs, but occasionally involving other organs as well (3). One of the characteristic features

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of hydatid cysts is that they are typically asymptomatic. As a result, many individuals are often unaware of their condition until these cysts are discovered during routine medical check-ups conducted for unrelated health issues (4).

In cases where the disease remains untreated, the hydatid cysts can progressively enlarge over time. This enlargement can eventually result in the rupture of the cysts, which presents serious health risks. Lung hydatid cyst rupture is categorized as a serious complication associated with hydatid cyst disease, potentially leading to significant health challenges (5). When cyst rupture occurs, it can result in the expulsion of cystic fluid into the respiratory tract, manifested as cystic fluid sputum. Additionally, this rupture can cause empyema and abscess formations. While allergic reactions and anaphylaxis are infrequent consequences of such ruptures, they are nonetheless important to acknowledge.

Immunopathogenetically, the release of cyst antigens, mainly Antigen B (AgB) and Antigen 5 (Ag5), during hydatid cyst rupture can trigger IgE-mediated type I hypersensitivity reactions, leading to mast cell and basophil activation and systemic anaphylaxis (6). The frequency of systemic anaphylactic reactions following an intrapleural rupture of a hydatid cyst has been documented to be approximately 1% (7). The potential occlusive or infectious complications arising from anaphylaxis linked to ruptured cysts can lead to severe outcomes, including irreversible health issues and even death (8, 9).

Case Presentation

A 31-year-old male patient with no significant medical history was transported to the emergency room by the emergency medical service (EMS) due to the onset of dyspnea, which had occurred one hour prior to his arrival. The patient resided in the village of Rabat Sefid, near Mashhad, center of Khorasan Razavi Province, Northeast, Iran. Informed consent for participate was obtained from the patient.

Upon arrival at the scene, he was found to have unstable vital signs: blood pressure (BP) of 100/65 mm Hg, pulse rate (PR) of 130/min, respiratory rate (RR) of 28/min, and an oxygen saturation (SpO2) of 88% on room air. During transport, normal saline and oxygen were administered. Despite these interventions, the patient's dyspnea, BP, and SpO2 worsened, and he developed generalized urticaria. He was subsequently transferred to the emergency department of Imam Reza Hospital in Mashhad. In the emergency department, the patient exhibited severe respiratory distress and generalized pruritic urticarial lesions, along with poor vital signs: BP of 90/60 mm Hg, SpO_2 of 82%, PR of 148/min, RR of 30/min, and a temperature of 37.2 °C. Lung auscultation revealed decreased bronchial sounds in the left lung. Given the possibility of anaphylactic shock, oxygen therapy and hydration were continued, and the first dose of intramuscular epinephrine was administered.

Following a Rapid Ultrasound for Shock and Hypotension (RUSH) exam, other causes of shock were ruled out. Overall, three doses of intramuscular epinephrine and 3 liters of normal saline were administered due to persistent symptoms and lack of improvement. Additional treatments, including corticosteroids and antihistamines, were also prescribed. Routine laboratory test results were normal. After approximately 4 h of medical care, the patient's skin lesions, oxygen levels, and blood pressure improved, and he stabilized. Due to severe respiratory distress on arrival and abnormal lung auscultation findings, a portable chest radiography was conducted, followed by a spiral lung CT scan (Fig. 1).

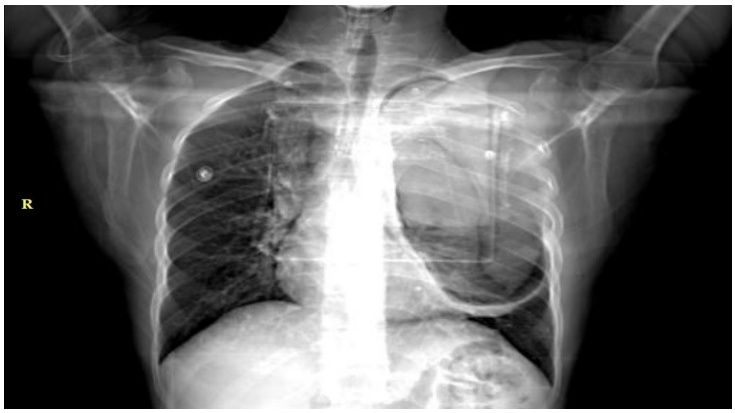

Fig. 1: Chest CT scan illustrating a ruptured hydatid cyst. The image reveals a large, cystic lesion in the left lung, with surrounding pleural effusion.

The scans revealed massive cystic foci measuring 145 mm (anterior-posterior), 100 mm (craniocaudal), and 173 mm (transverse), respectively. Lower lung collapse was also noted, along with detachment of the inner layer close to a pericardial effusion (180 x 110 mm), presenting with an air-fluid level and a "water lily" sign (Fig. 2A and B). Based on the findings from the lung high-resolution CT (HRCT), the diagnosis was established as anaphylactic shock following the rupture of a hydatid cyst in the left lung. After further tests and complete management of the anaphylactic reaction, the patient was transferred to the thoracic surgery center, where a wedge resection of the left lung was performed, and a chest tube was inserted. Six days post-surgery, the patient was discharged in good condition with instructions to take albendazole and schedule follow-up appointments.

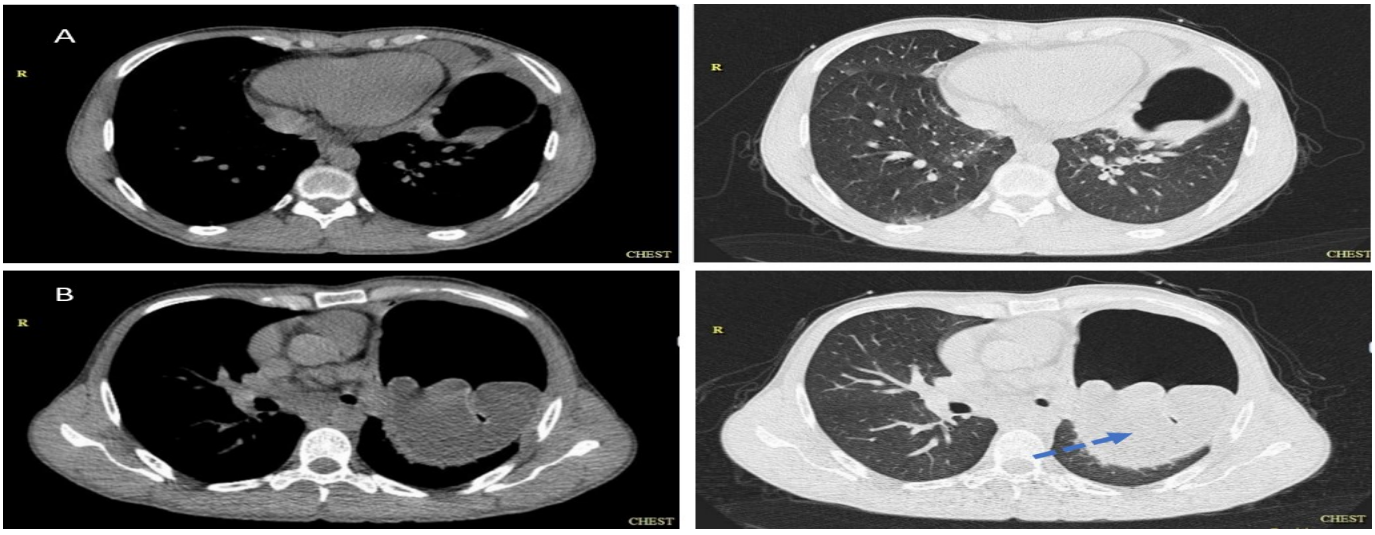

Fig. 2: Imaging findings associated with the patient's condition. (A) High-resolution CT scan demonstrating lower lung collapse and detachment of the inner layer adjacent to a pericardial effusion (180 x 110 mm) with a visible air-fluid level. (B) The "water lily" sign is indicative of a ruptured hydatid cyst in the left lung

Discussion

Hydatidosis is a global health problem and is endemic in areas such as Mediterranean countries, Australia, New Zealand, the Americas, and Asia. Lungs are the second most common location where hydatid cysts occur, after liver (10,11). Hydatidosis has a wide range of clinical symptoms depending on the location and size of the cyst and the effects of cyst pressure. The symptoms of lung hydatid cysts appear earlier due to their proximity to bronchial and cardiovascular systems; the clinical symptoms may include coughing, respiratory distress, fever, hemoptysis, chest pain, skin rashes, and anaphylactic shock (12,13).

We described a rare case of spontaneous rupture of lung hydatid cyst followed by severe respiratory distress, hives, and anaphylactic shock. In the emergency setting, careful differential diagnosis is essential to distinguish hydatid cyst rupture from other causes of shock or respiratory distress, such as asthma, anaphylaxis from other triggers, or pulmonary embolism. This can be aided by RUSH ultrasound, absence of relevant risk factors, and the patient's clinical response (14). Spontaneous rupture of lung hydatid cysts can lead to systemic anaphylaxis via the release of cyst antigens (e.g., AgB and Ag5) into the pleural space and systemic circulation, triggering IgE-mediated type I hypersensitivity reactions (15). In a similar study, Phan et al. report lung hydatid cyst rupture leading to respiratory distress and anaphylactic shock in a 21-year-old female patient (16). In a study, a young Iranian woman suffered a ruptured cyst and severe coughing, with subsequent anaphylactic shock and death due to hemodynamic disorders and heart and respiratory failure (17). Abdi et al. reported the case of a 30-year-old man suffering anaphylactic shock after a car accident due to a ruptured hydatid cyst (18).

Imaging modalities such as simple X-ray and CT scan with 95% sensitivity are the most important diagnostic tools for lung hydatidosis (19, 20). In chest radiography, undisturbed cysts have a rounded or oval appearance with homogeneous density and sharp edges, while menisci, water lily sign, cavities with or without air or fluid, pneumonia, and pulmonary atelectasis mark ruptured cysts. In patients with complex cysts, air fluid level is the most common radiological finding (21, 22). In our patient's CT scan, a large mass with abnormal air fluid levels was found in the lower left lobe of the lung. In addition, adjacent parenchymal infiltration, pleural thickening, and mild pleural effusion were observed in the left hemi thorax.

The main treatment for anaphylactic shock is epinephrine, followed by corticosteroids, antihistamines, and fluid replacement (23), all of which were administered to the patient immediately. Hydatid cysts are treated with surgery due to the potential incomplete evacuation of the cyst and its contents following rupture. Additionally, some amount of parasite tissues often remains in the pericystic cavity and the cyst could open to pleural and pericardial cavities. Therefore, hydatid cysts must be surgically removed (24, 25). Daily albendazole at a dose of 10 mg/kg for 12 months should be started immediately after surgery to prevent recurrence (26). This regimen was prescribed to the patients and he was discharged in good general condition following recovery from surgery.

Conclusion

Anaphylactic shock due to hydatid cyst rupture is not rare but potentially fatal and must be considered in endemic regions. Early recognition and prompt management by trained emergency physicians, particularly in rural settings, are critical. Immediate epinephrine administration can be lifesaving, while surgical removal of the ruptured cyst remains the definitive treatment to prevent complications. Postoperative anti-parasitic therapy, such as albendazole, and careful follow-up are

essential to minimize recurrence and ensure long-term recovery. In this case, diagnosis was established based on imaging and intraoperative findings, as serological testing was not performed.

Conflicts of interest

The authors declare no conflicts of interest.

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