

Acute respiratory distress syndrome after spontaneous rupture of a large pulmonary hydatid cyst in a 17-year-old male: a case report

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Abstract

We described a 17-year-old male with a large pulmonary hydatid cyst with a spontaneous rupture. He developed acute respiratory distress syndrome (ARDS) requiring mechanical ventilation. He was treated with albendazole, broad-spectrum antibiotics, and corticosteroids. He underwent surgery after discharge. ARDS after rupture of hydatid cyst was rarely reported.

Introduction

Acute respiratory distress syndrome (ARDS) is defined as a process of non-hydrostatic pulmonary edema and hypoxemia. Different etiologies and risk factors have been attributed to the development of ARDS including bacterial or viral pneumonia, sepsis, aspiration of gastrointestinal lumen contents, trauma, and blood transfusion. Bilateral chest opacities on chest X-ray or CT scan are characteristic of ARDS. Supportive therapy with mechanical ventilation and fluid management is the cornerstone of treatment. Corticosteroids have been known as an effective therapy [1, 2]. Pulmonary hydatid cysts caused by a parasitic tapeworm named *echinococcus granulosus* may cause cough, chest pain, hemoptysis, pneumothorax, pleural effusion, or empyema. Fever and hypersensitivity reactions including anaphylaxis may occur as a consequence of pulmonary hydatid cyst rupture [3].

In this case report, we described a young male who developed acute respiratory distress syndrome after the spontaneous rupture of a pulmonary hydatid cyst. Hydatid cyst-related ARDS is a rare and life-threatening complication that is not still well recognized.

Case presentation

A 17-year-old male presented to the emergency department of Imam Reza hospital of Kermanshah province of Iran. He complained of fever, repetitive cough, dyspnea, and chest pain initiated a few hours prior to hospital admission. He did not report any respiratory symptoms before this. His past medical history or drug history was unremarkable. He denied cigarette or alcohol abuse, and previous exposure to pets. He worked on a vegetable farm with his family. His familial history was unremarkable.

On general examination he was febrile (T=38.5 degrees Celcius), His pulse rate was 120 beats/minute, his respiratory rate was 24, and his blood pressure was 110/70 mmHg. His oxygen saturation was 91% on room air. He was not in respiratory distress and did not use respiratory accessory muscles. On respiratory system examination, respiratory sounds were decreased on the right hemithorax. The rest of the clinical examination including the cardiovascular system and abdomen were within normal limits.

The results of laboratory tests on admission day were as follows: hemoglobin of 15.6 mg/dl, white blood cell count (WBC) $12.7 \times 10^3/\text{mm}^3$ (differential count: neutrophils 90%, lymphocytes 7%, monocytes 3%), platelet

count $229 \times 10^3/\text{mm}^3$, creatinine 0.9 mg/dl, International normalized ratio (INR) 1, partial thromboplastin time (PTT) 28 seconds, lactate dehydrogenase (LDH) 622 IU/ml (normal:225-500 IU/ml), aspartate transaminase (AST) 62 IU/L (normal:5-40 IU/L), alanine transaminase (ALT) 97 IU/L (normal:5-40 IU/L), alkaline phosphatase (ALP) 123 U/L (normal:80-306 U/L), total bilirubin 0.7 mg/dL (normal:0.2-1.4 mg/dL), direct bilirubin 0.3 mg/dL (normal:0-0.4 mg/dL), erythrocyte sedimentation rate (ESR) 10 mm/hr, and C-reactive protein (CRP) was positive.

A chest computed tomography (CT) scan was performed and showed a large cavitory lesion on the middle lobe of the right lung which contained a large amount of air, and soft tissue resembling a membrane. The imaging findings were compatible with the hydatid cyst. Few ground glass opacities were observed in the lower lobe of the right lung suggesting rupture of hydatid cyst. The left lung had no pathologic lesion (Figure 1). Ultrasonography of the abdomen was normal.

He was hospitalized in the infectious disease ward for additional workup and treatment. Albendazole was administered 400mg twice a day. A high titer of IgM antibody against echinococcus granulosus was detected in his serum. A thoracic surgery consult was done and surgery for resection of the cyst was planned. On the third day of admission, his oxygen saturation decreased to 70%, and he developed severe respiratory distress. Body temperature was 41 degrees Celcius and blood pressure was 100/65 mmHg. He was intubated and transferred to the intensive care unit (ICU). A Chest CT scan was performed and revealed rupture of the cyst and diffuse ground glass opacities with centrilobular pattern in the field of both lungs (Figure 2).

Acute respiratory distress syndrome (ARDS) was suspected. Methylprednisolone 1gr daily was started for 3 days followed by dexamethasone 4mg three times a day intravenously. Broad-spectrum antibiotic therapy was started for suspected secondary bacterial infection. Oral albendazole was continued. Five days later his oxygen saturation decreased and pneumothorax was detected on the chest CT scan. Therefore, a chest tube was placed in the right pleural cavity (Figure 3). Two weeks later he was extubated, and his oxygen saturation remained within normal limits by receiving oxygen through a facial mask. The chest tube was removed. He was discharged in stable condition four weeks after hospital admission. Oral albendazole was continued, and he was referred to a thoracic surgeon. He underwent resection of the cyst and lobectomy of the right middle lobe two weeks after discharge with no complications.

Discussion

We reported a 17-year-old male presented with a large pulmonary hydatid cyst (PHC). Spontaneous rupture of the cyst led to acute respiratory distress syndrome requiring mechanical ventilation. Echinococcus granulosus, a parasitic tapeworm is the pathogenic organism of hydatid disease. This infectious disease is endemic in many parts of the world such as Iran and it is considered a health concern in these countries. While hydatid cysts could be produced in different organs, the liver and lungs are the most frequently affected sites. The definite hosts of the disease are carnivores such as dogs. Humans are defined as the incidental intermediate host who is infected by direct contact with dogs or ingestion of food contaminated by their feces. Echinococcal embryos are released in the gastrointestinal lumen and reach the blood vessels or lymphatics by penetrating the intestinal wall. Then they reach different organs including the liver and lungs through the bloodstream or lymphatics where they form hydatid cysts. As we mentioned in the case presentation section our patient was a vegetable farmer and he might have been infected by the ingestion of contaminated vegetables [3, 4].

Hydatid cyst remains asymptomatic during the first few years. Clinical presentation depends on the location and size of the cysts. The most frequently reported symptoms of pulmonary hydatid disease are cough, chest pain, dyspnea, and hemoptysis. Rupture of the cysts or secondary bacterial infection may occur. Rupture of the cysts either iatrogenic or spontaneous may cause cough, chest pain, hemoptysis, emesis, pneumothorax, pleural effusion, or empyema. Fever and hypersensitivity reactions including anaphylaxis may occur as a consequence of cyst rupture [3, 4].

Chest X-ray and chest CT scan are diagnostic tools for pulmonary hydatid cysts. Similar to our case, on chest CT scans, PHCs are smooth-walled cysts with variable thickness and contain soft tissue with the

density of water or near water. Leukocytosis, eosinophilia, and elevated ESR are nonspecific laboratory features. The coexistence of pulmonary and liver cysts is prevalent. Therefore, when PHC is diagnosed, additional imaging like ultrasonography should be done to investigate possible liver cysts. Surgery and medical treatment are two major therapeutic options. Surgery is the treatment of choice. Medical treatment includes benzimidazoles like mebendazole or albendazole which are administered orally and used for specific indications such as disseminated disease, contraindication for surgery, recurrent cysts, multiple cysts, or leakage of hydatid fluid during operation [5, 6].

Fanne et al reported a 21-year-old female presented with productive cough, dyspnea, and fever. Two cavitary lesions with air-fluid levels were found on the chest X-ray. Five days after hospitalization she developed eosinophilia, ARDS, and anaphylactic shock and was intubated. Albendazole, praziquantel, and high doses of intravenous steroids were administered. She improved after four weeks and underwent cyst resection and lobectomy after discharge [7].

In conclusion, acute respiratory distress syndrome could be a possible complication of a pulmonary hydatid cyst. Physicians should be aware of this life-threatening complication for appropriate diagnosis and treatment.

Ethics approval and consent to participate

Approval was not needed by the local Clinical Research Ethics Committee for case reports.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review of the Editor-in-Chief of this journal.

Conflict of interests

The authors declare that they have no competing interests.

Data availability statement

Data is available if requested

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Authors' contributions

MS conceived the idea to report the case. AK was responsible for data collection. DM and SA drafted the manuscript. MS commented on the manuscript. All authors read and approved the final manuscript.

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Figure legends:

Figure 1: Chest CT scan showing a large cavitory lesion on the middle lobe of the right lung which contains a large amount of air, and soft tissue resembling a membrane (Water Lily sign).

Figure 2: Chest CT scan showing rupture of the cyst and diffuse ground glass opacities with centrilobular pattern in the field of both lungs suggesting ARDS.

Figure 3: Chest CT scan showing pneumothorax on the right lung with mediastinum shifted to the left.



