CASE REPORT

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Tension Pneumothorax Secondary to Hydatid Cyst Rupture

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ABSTRACT

A patient, diagnosed with two hydatid cysts in the right lung via thoracic computed tomography (CT) at a healthcare facility due to complaints of cough and dyspnea, was initiated on albendazole treatment. Two weeks after starting treatment, the patient presented to our Emergency Department with complaints of general malaise, severe respiratory distress, and chest pain. Following physical examination and radiodiagnostic evaluations, a diagnosis of tension pneumothorax was established, and urgent intrapleural air drainage was performed. After stabilization of the patient's general condition, elective surgical treatment for the hydatid cyst was undertaken.

Keywords: Hydatid Cyst, Albendazole, Tension Pneumothorax

Introduction

Hydatid cyst disease, caused by Echinococcus granulosus, remains a significant health concern in endemic regions, including Turkey. The incidence of hydatid cysts in Turkey has been reported in various studies to range from 2/1,000,000 to 1/2,000 (1). The disease most commonly affects the liver and lungs, with other organs rarely involved.

Although there is some debate regarding the optimal treatment strategy for patients with pulmonary hydatid cysts, most researchers advocate surgery as the most effective approach. The objectives of surgical treatment include eradicating the parasite, preventing dissemination by avoiding intraoperative rupture, and eliminating the cyst cavity while preserving as much lung parenchyma as possible (2).

Albendazole is used in patients with pulmonary hydatid cysts either as a prophylactic agent before surgery to reduce recurrence or as a definitive medical treatment. Some clinicians employ this drug as the sole treatment for pulmonary hydatid cysts, particularly in patients who are not suitable candidates for surgery (3).

However, studies have reported that in soft tissues such as the lungs, albendazole use may lead to thinning of the cyst wall. In patients with irregular medication compliance, this can result in the rupture and dissemination of pulmonary hydatid cysts before they become non-infectious (3). Unlike solid organs such as the liver and spleen, where surrounding tissues tamponade the cyst even if the wall thins, the lungs lack a natural barrier to prevent dissemination. Ruptured cysts in the lungs may open into the bronchi, leading to the spread of daughter vesicles to new sites, or into the pleura, causing pneumothorax.

Complications of cyst rupture in the lungs may include hemoptysis, respiratory failure, anaphylactic shock, pneumothorax, empyema, and lung abscess. The most common complication is rupture into the bronchi (4). However, tension pneumothorax secondary to hydatid cyst rupture is an exceedingly rare complication.

Case Report

A 43-year-old female patient was initiated on albendazole treatment following the detection of two hydatid cysts in the right lung on thoracic computed tomography (CT) performed at an external healthcare facility (Figures 1, 2). Two weeks after starting treatment, the patient presented to our Emergency Department with complaints of general malaise, severe respiratory distress, and chest pain. Physical examination revealed hypotension (blood pressure: 70/50 mmHg), tachycardia (pulse rate: 130 beats/min), tachypnea (respiratory rate: 35 breaths/min), absence of breath sounds in the right lung, and

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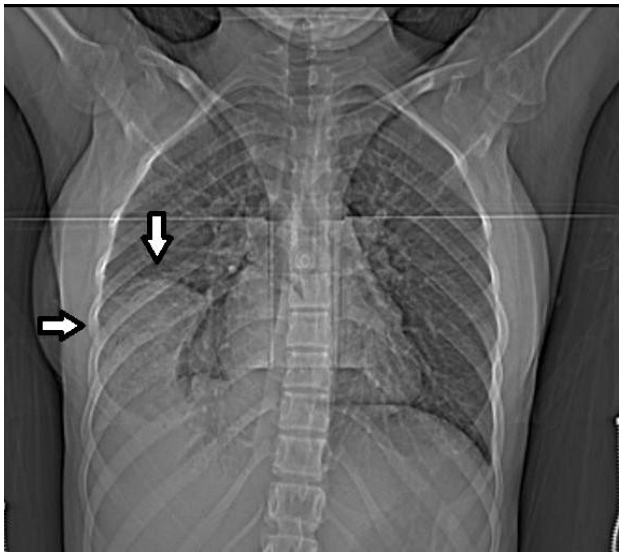

Fig. 1. Radiograph from an external healthcare facility showing a non-perforated hydatid cyst

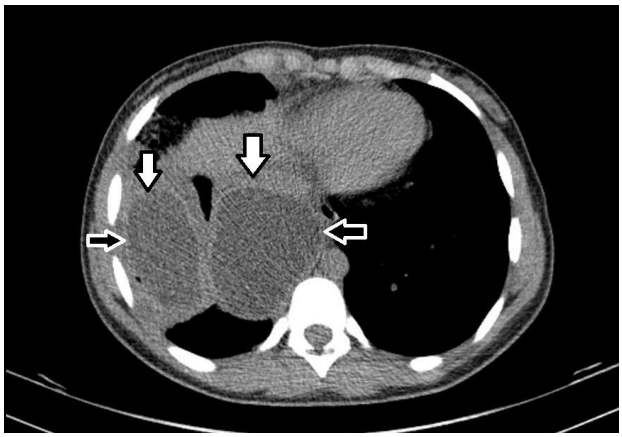

Fig. 2. Computed tomography (CT) from an external healthcare facility showing two intact hydatid cysts

low oxygen saturation (SpO2: 82%). Chest X-ray and thoracic CT demonstrated collapse of the right lung, increased right hemithorax diameter, widened intercostal spaces, leftward shift of the mediastinum and trachea, and right diaphragmatic inversion, leading to a diagnosis of tension pneumothorax (Figures 3, 4). Emergency tube thoracostomy was performed, and post-procedure imaging revealed perforation of one of the pulmonary hydatid cysts (Figure 5). Upon admission to the clinic, the patient had a fever of 38.5°C and leukocytosis (21,000/μL). The erythrocyte sedimentation rate was 95 mm/hour. No eosinophilia was observed on peripheral blood smear. Laboratory findings included LDH: 4,579 units and a positive Echinococcus indirect hemagglutination (IHA) test at a titer of 1/1,020.

Pulmonary function tests were consistent with a restrictive pattern: FVC: 1.26 L (36.4%), FEV1:

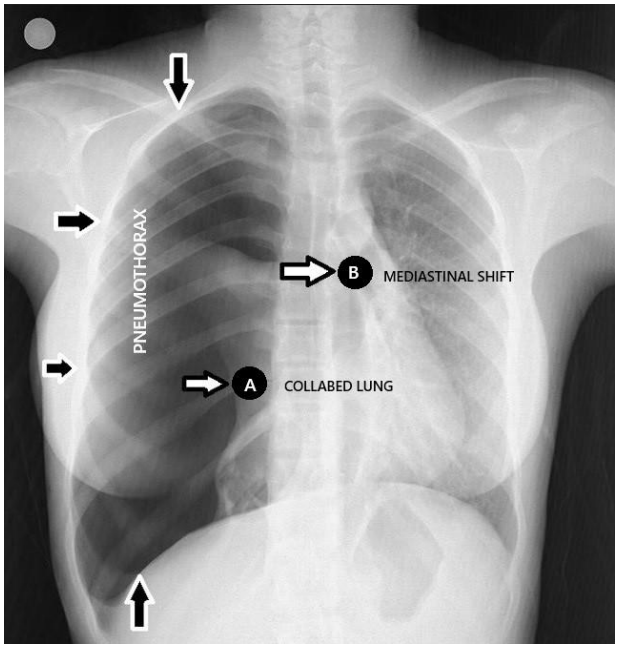

Fig. 3. Radiograph taken in our hospital's emergency department showing tension pneumothorax on the right

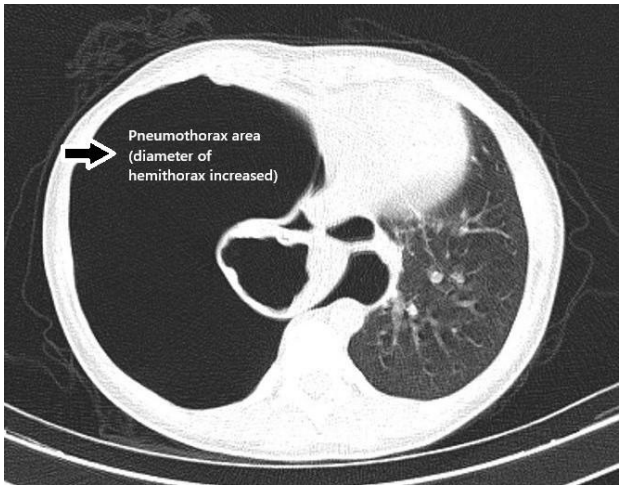

Fig. 4. CT scan taken in our hospital's emergency department confirming tension pneumothorax on the right

1.26 L (43.4%), FEV1/FVC: 118%. Arterial blood gas analysis showed pH: 7.45, PCO2: 36 mmHg, PaO2: 60 mmHg, HCO3: 25 mmHg, and oxygen saturation: 92%.

It was hypothesized that the cyst rupture was associated with the albendazole treatment initiated two weeks prior. Albendazole was continued, and under elective conditions, a right posterolateral thoracotomy was performed with cystotomy and capitonnage for both cysts. The patient was discharged one week later with a prescribed

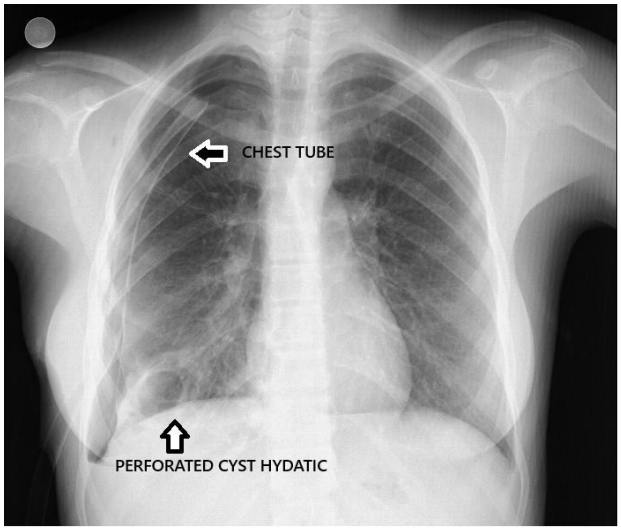

Fig. 5. Radiograph showing a perforated hydatid cyst in the expanded right lung following tube thoracostomy

Fig. 6. Postoperative radiograph following cystotomy and capitonnage operation

albendazole dose of 10 mg/kg/day to prevent potential secondary dissemination (Figure 6).

Discussion

Hydatid cyst disease, a significant parasitic infection, is prevalent in societies where agriculture and animal husbandry are widespread but environmental health and preventive medicine services are inadequate. Most cysts are initially asymptomatic, with symptoms emerging depending on the cyst's expansion and the affected organ. It has been reported that a cyst may increase in diameter by 1 to 2 cm per year (1, 5).

The prevalence, size, and presence of complications are the primary factors determining the choice of treatment for hydatid cysts (5).

The primary treatment for pulmonary hydatid cysts is surgical. The success of surgical intervention depends on the complete removal of the endocyst while preserving lung parenchyma and preventing contamination (6). It has been suggested that adjuvant chemotherapy before and after surgery minimizes the risk of cyst content dissemination, reduces anaphylactic reactions, inactivates protoscolices to lower recurrence risk, and facilitates cyst removal by reducing intracystic pressure. Its routine use is therefore recommended (6).

Indications for medical treatment in pulmonary hydatid cysts include patients unsuitable for surgery due to poor general condition or cyst location, the presence of multiple cysts, inadequate surgical interventions, and the prevention of secondary dissemination. Benzimidazoles, the most commonly used agents for the medical treatment of cystic echinococcosis in selected cases, inhibit tubulin accumulation in microtubules, impairing glucose absorption through the cyst wall. This leads to depletion of glycogen stores, degeneration of the endoplasmic reticulum and mitochondria in the germinal layer of the metacestode, and ultimately lysosomal proliferation and cell death (7).

Albendazole, administered at a dose of 10–15 mg/kg/day, is the most preferred drug in this group. Its favorable pharmacokinetic profile allows higher concentrations in serum and cyst fluid, and its hepatic metabolite, albendazole sulfoxide, is also an active antiparasitic agent (8).

Rupture of pulmonary hydatid cysts may occur due to any condition causing increased pulmonary or intra-abdominal pressure (9).

Pulmonary hydatid cysts may rupture into the pleural cavity and/or bronchus. Bronchial rupture can manifest as forceful coughing with the expectoration of large amounts of salty sputum containing mucus, hydatid fluid, and sometimes fragments of the laminated membrane. A severe hypersensitivity reaction may develop, accompanied by widespread rash, high fever, pulmonary congestion, and severe bronchospasm. In some cases, bronchial rupture can lead to sudden and severe dyspnea due to complete tracheal obstruction by hydatid membrane

fragments, potentially resulting in asphyxiation and death (10).

Another complication of pulmonary hydatid cysts is rupture into the pleural cavity, which may lead to pneumothorax, tension pneumothorax, pleural effusion, or empyema (10).

Although pleural complications in pulmonary hydatid cysts are reported at rates of 0.5–18% (11), Aribas et al. (4) have suggested that these complications occur at higher rates. In a study of 5,412 patients, Sayir et al. reported a complicated hydatid cyst rate of 43%, with 57% of these rupturing into the bronchial tree and 43% into the pleural cavity. In the same study, the incidence of tension pneumothorax in cases of pleural rupture was 1.5% (12). Similarly, Cernay et al. reported a tension pneumothorax rate of 1.3% in a study of 336 patients with ruptured hydatid cysts (13).

Tension pneumothorax, a rare complication of pulmonary hydatid cysts, may present with severe dyspnea, tachycardia, tachypnea, jugular venous distension, unilateral diminished breath sounds, hypotension, and tracheal-mediastinal shift to the contralateral side (9).

As previously noted, the general approach to the primary treatment of pulmonary hydatid cysts is surgical, with benzimidazole-group drugs used medically in patients unsuitable for surgery, those with multiple cysts, or to prevent secondary dissemination in surgically treated cases (7).

However, some groups opt for treatment with benzimidazole-group drugs alone, without referring patients to surgical clinics (14). Siddiqui et al. (15) reported treating bilateral pulmonary hydatid cysts, one measuring 6×6 cm and the other 8×7 cm, solely with albendazole. They noted a significant reduction in the size of the pulmonary cysts after three months, with complete resolution by the sixth month, suggesting that medical treatment should be prioritized over surgical intervention.

Despite the occurrence of cyst rupture associated with albendazole treatment, there are literature reports advocating persistence with medical therapy. Talwar et al. (16) reported a case where a patient developed cyst rupture during albendazole treatment but ultimately achieved resolution of the disease with repeated courses of albendazole. Similarly, Galankis et al. (17) described an 11-year-old male child with a bacterial superinfection who experienced cyst rupture. The child was treated with three courses of albendazole, resulting in complete recovery without recurrence. They concluded that conservative treatment with albendazole should be considered before surgical intervention, even in the presence of complications, and that continued albendazole therapy post-rupture rarely necessitates surgery.

In the case presented here, the patient initially sought care from a non-surgical physician and was diagnosed with two large hydatid cysts in the right lung. Despite this, the patient was not referred to a surgical clinic and was instead prescribed albendazole treatment. Two weeks after initiating this treatment, one of the cysts ruptured into the pleural cavity, leading to the patient presenting to our hospital with tension pneumothorax. We believe that the cyst rupture was caused by the albendazole treatment.

The therapeutic response of pulmonary hydatid cysts to albendazole is unpredictable and variable. In some patients, the cyst may regress and resolve following treatment, while in others, it may continue to grow (3). Furthermore, it has been observed that in patients with multiple pulmonary cysts, individual cysts may exhibit different therapeutic responses (18). Additionally, there are reports indicating an increased frequency of pulmonary hydatid cyst rupture and associated complications following albendazole treatment (19).The mechanism by which albendazole induces rupture is not fully understood, but possible explanations include its effect on the cyst wall or alterations in intracystic pressure (19). Usluer et al. (20) reported in experimental studies that albendazole administration reduces the tensile strength of the cuticular membrane of pulmonary hydatid cysts, which may lead to spontaneous cyst rupture.

In conclusion, the publication of cases in the literature reporting hydatid cyst rupture following albendazole use prompts discussion regarding whether the use of albendazole as a prophylactic measure in patients with pulmonary hydatid cysts is a valid strategy.

Although albendazole is employed prophylactically before surgery to reduce recurrence rates in patients with pulmonary hydatid cysts, this drug may cause spontaneous cyst rupture, leading to unpredictable complications. While cyst rupture can occur in patients not receiving albendazole, we believe that this drug may be a potential contributing factor, and further research is needed to clinically substantiate this association. Consequently, we advocate that early surgical intervention, even without albendazole prophylaxis, provides an acceptable strategy for treating these patients.

Moreover, as observed in our case, attempting to treat a patient with albendazole alone—despite a clear indication for surgical intervention and the absence of contraindications to surgery—is unacceptable. Increasingly, some clinics claim to treat pulmonary hydatid cysts solely with medical therapy, even in cases outside the established indications for medical treatment (i.e., patients unsuitable for surgery due to poor general condition or cyst location, multiple cysts, inadequate surgical interventions, or to prevent secondary dissemination). We firmly believe that such an approach is inappropriate. In our view, the most suitable application of albendazole in pulmonary hydatid cysts is in the postoperative period to prevent secondary dissemination.

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