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Case Report

Ruptured Lung Hydatid Cyst Masquerading as a Transudative Parapneumonic Effusion: A Case Report

Brahmansh Singh, *Kundan Nikit Mehta

Department of Respiratory Medicine, Dr D Y Patil Medical College, Hospital & Research Centre, Pune, India

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***Correspondence Email:**
drkundanmehta@gmail.com

Abstract
Hydatid disease can virtually involve any organs, liver being the most common followed by lungs. Pleural effusion as a complication of pulmonary hydatid cyst is exceptionally rare and its diagnosis and treatment pose significant challenges. We present an intriguing case managed in Dr D Y Patil medical college and Hospital in west India in June 2023 involving a 70-year-old female who presented with symptoms of right-sided chest pain and acute-onset dyspnoea. Referred from a local hospital, a chest radiograph revealed the presence of right pleural effusion. Subsequent radiological investigations including a contrast enhanced CT at our centre exposed two large, well-defined hypodense lesions with fluid density, encased by thick enhancing walls, along with right-sided pleural effusion and hence a diagnosis of lung abscess with right pleural effusion (right parapneumonic effusion) was established. Despite ongoing care, clinical improvement eluded us. Thoracocentesis yielded a surprising revelation – the pleural fluid was transudative with visible hooklets and protoscolices, indicating a ruptured pulmonary hydatid cyst. The patient began albendazole treatment and received a CVTS consultation. They recommended a right lower lobe lobectomy, now scheduled for the near future.

Introduction

Parapneumonic effusion is defined as any pleural effusion that accompanies consolidation, lung abscess, or bronchiectasis (1). At least 40-60% of patients with bacterial pneumonia will develop a pleural effusion of varying severity. Pleural effusion resulting from a ruptured pulmonary hydatid cyst represents an exceedingly rare and intri-

cate clinical challenge. Hydatid disease, primarily caused by the dog tapeworm *Echinococcus granulosus*, is endemic in Mediterranean countries (2). This parasitic infection predominantly affects the liver (60-70%) and lungs (30%)(2).

Pulmonary hydatid cysts typically remain asymptomatic until they rupture. When rupture occurs, patients may present with severe chest pain, anaphylactic reactions, persistent cough, profound dyspnea, cyanosis, shock and acute-onset symptoms. Alternatively, the presence of pleural effusion may be the initial indicator (3-5).

In this report, we present a case of a pulmonary hydatid cyst mimicking lung abscesses rupturing into the pleural space, resulting in a transudative parapneumonic effusion.

Case Report

In June 2023 a 70-year-old female farmer sought medical attention at Dr D Y Patil Medical College and Hospital due to the sudden onset of acute breathlessness, chest pain and fever that had persisted for three days. On examination, she presented with tachypnea, tachycardia and maintained blood pressures. Her oxygen saturation, with supplemental oxygen at a FiO2 of 34%, was 96%. Respiratory assessment revealed diminished breath sounds and coarse crackles in the right lung. Given the severity of her clinical condition, the patient was promptly admitted to the intensive care unit (ICU). In the ICU, she received immediate medical attention in the form of intravenous antibiotics and comprehensive supportive care, a treatment strategy tailored to address her urgent medical needs.

The authors confirm that all necessary consent forms have been obtained from the patient. The provided explicit consent for the publication of clinical images and relevant radiological information in the journal.

Laboratory assessments encompassed a comprehensive evaluation, including a complete blood count (Hemoglobin-13.0, Total Leukocyte Count-6,600, Platelet Count-1.67 L) and liver function tests (Total Bilirubin-0.33, Serum Glutamic Oxaloacetic Transaminase (SGOT)-10, Serum Glutamic Pyruvic Transaminase (SGPT)-06, Alkaline Phosphatase (ALP)-108). Furthermore, electrolyte analysis unveiled a sodium concentration of 134 and a potassium concentration of 4.63, while renal function parameters were within the normal range (Urea-18, Creatinine-0.60).

A chest radiograph indicated a prominent and homogeneous opacity in the right lower lung zone, strongly suggestive of a right-sided pleural effusion (Fig.1). To further elucidate the nature of this effusion, a contrast-enhanced computed tomography (CT) scan was conducted.

The CT scan disclosed a moderate pleural effusion and revealed two substantial, well-defined hypodense lesions with fluid contents and thick, enhancing walls. The first lesion, measuring 38 x 33 x 34 mm (CC × AP × XT), was located in the superior segment of the right lower lobe and exhibited septations. The second, larger lesion measured 70 x 71 x 64 mm (AP × XT × CC) and was situated in the posterior segment of the right lower lobe. Notably, it was accompanied by extensive consolidation of the adjacent lung tissue, indicative of lung abscesses (Fig.2).

As the patient's response to broad-spectrum antibiotic therapy remained minimal and her clinical condition showed limited improvement, we decided to proceed with an ultrasound-guided thoracocentesis. This procedure yielded a substantial 600 ml of pleural fluid, which was subjected to meticulous analysis.

The pleural fluid's macroscopic characteristics were particularly distinctive, displaying a notable yellowish hue while devoid of cobwebs or coagulum and remarkably, it revealed no deposits. In the realm of biochemistry, the analysis disclosed a protein concentration of 1.80 gm%, complemented by a glucose level of 146 mg/dl. Further scrutiny of the fluid unveiled a moderate presence of red blood cells, accompanied by a total leukocyte count of 500 per cubic millimeter. The differential

leukocyte analysis was quite telling, with a paucity of neutrophils (5%) contrasting the notable prevalence of lymphocytes (80%) and a significant proportion of macrophages (15%). Conspicuously, pleomorphic cells were entirely absent from this intriguing clinical puzzle.

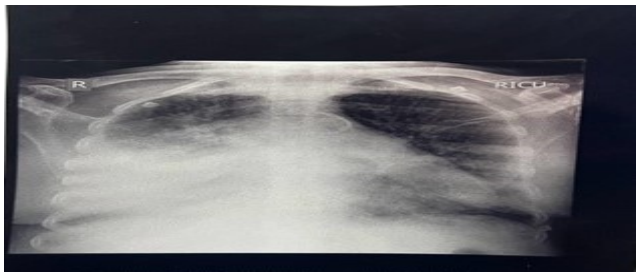

Fig. 1: Chest radiograph showing homogeneous opacity in the right lower lung zone

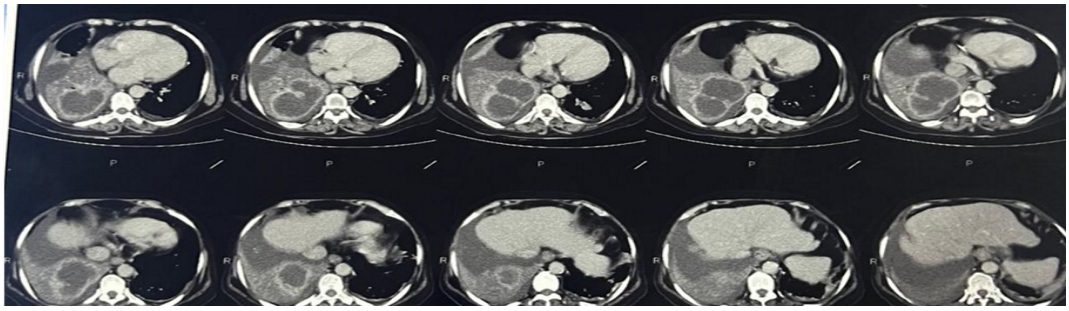

Fig. 2: CECT scan showing two large hypodense lesions in right lower lobe

Applying Light's criteria, the pleural fluid was classified as transudative, complemented by an adenosine deaminase (ADA) level of 5.58 IU/L

Subsequently, we proceeded with a repeat thoracocentesis and the obtained pleural fluid was once again subjected to thorough microbiological evaluation. This analysis revealed the presence of free hooklets and protoscolices, unmistakably reminiscent of those commonly found in *Echinococcus* hydatid cysts.

With these compelling findings at our disposal, we were able to confidently confirm the diagnosis of a ruptured hydatid-associated pleural effusion. The presence of *Echinococcus* hydatid cyst elements within the pleural fluid provided a definitive link to the underlying cause of this complex clinical condition.

The patient's case warranted a consultation with the Cardiothoracic and Vascular Surgery (CVTS) team, who recommended a right lower lobectomy. The patient received corticosteroids and albendazole to address the parasitic infection. Subsequent follow-up assessments have indicated a favourable clinical progression and the patient is scheduled for a right lower lobe lobectomy in the near future.

Discussion

Parapneumonic effusions, which occur as common complications of pneumonia, are primarily attributed to pyogenic bacteria. These bacteria include *Streptococcus pneumoniae*, *Staphylococcus aureus* and various Gram-negative anaerobes and aerobes, such as *Klebsiella pneumoniae*, *E. coli* and *Pseudomonas aeruginosa*. (6)

Pleural effusion in the context of pulmonary hydatid cyst is an exceedingly rare complication. Hydatid disease, one of the most significant helminthic disorders, is caused by *Echinococcus* parasites (7). Human infection can occur

through exposure to contaminated water and food or due to inadequate hygiene in areas where the definitive host's faeces have contaminated the environment. Other risk factors include herdsman occupation, unsanitary living conditions, close contact with dogs, ingestion of unwashed vegetables.

Hydatid cysts, predominantly affecting the liver and lungs, occasionally manifest in other organs. Lung involvement occurs in 10-30% of cases, often alongside concurrent liver cysts in 20-40% of patients (7). Notably, the right lung is affected in 60% of cases, with approximately 30% of patients exhibiting multiple pulmonary cysts (7). Humans inadvertently serve as hosts for this parasite (6*). Echinococcus* cysts consist of three layers, with the innermost layer, the endocyst, acting as the germinative layer that produces brood capsules (8). These capsules yield protoscolices, a process that takes approximately one year after the initial infection.

In our case, pleural fluid analysis revealed the presence of free hooklets and protoscolices, characteristic of hydatid cysts.

Clinical manifestations of pleural effusion stemming from ruptured pulmonary hydatid cysts can range from asymptomatic cases to systemic anaphylaxis and septic shock (9). Symptoms typically include severe dyspnea, tachycardia, chest pain and fever. In contrast, unruptured cysts may present with symptoms such as coughing, hemoptysis, or chest pain.

Diagnostic imaging, notably chest radiography, serves as the initial modality for assessing lung conditions. Rupture of the cyst may be indicated by the presence of air around the cyst or the presence of an air-fluid level on chest radiograph. Supplementary imaging modalities like ultrasonography, CT scans and magnetic resonance imaging offer the capability to identify lesions that may not be apparent on standard chest radiographs. Moreover, these techniques provide detailed and specific characteristics of the identified lesions (9).

In our case, a contrast-enhanced computed tomography of the thorax unveiled two distinct hypodense lesions with pronounced mass effect, resulting in the compression of the right lung and inducing a subtle right-sided mediastinal shift, implying a mild reduction in right lung volume. Interestingly, there were no classical radiological indicators that would typically suggest or hint at the presence of a pulmonary hydatid cyst. It was only by integrating the insights derived from pleural fluid analysis that we were able to confidently arrive at the diagnosis of a ruptured pulmonary hydatid cyst. This underlines the paramount importance of comprehensive diagnostic evaluation in a transudative pleural effusion with associated thick walled pulmonary cavities.

Similar cases were previously reported in India. The first case involved a 40-year-old male with a history of exposure to dogs and cats presenting with abdominal pain and fever. Chest radiography revealed cystic lesions in the liver and left lung, which were surgically managed. Analysis of cyst fluid confirmed the presence of *E. granulosus*, further confirmed by histopathological examination. The patient experienced a successful recovery post-surgery (10).

In the second case, a 7-year-old boy complained of pleuritic chest pain, linked to exposure to a pet dog. Initial chest radiograph indicated bilateral paramediastinal well-defined soft tissue opacities. Subsequent contrast-enhanced computed tomography uncovered bilateral well-capsulated symmetrical cystic masses in the posterior mediastinum. Surgical intervention involved bilateral thoracotomy, partial cystectomy and drainage. Analysis of the cystic fluid and histopathological examination confirmed the diagnosis of a hydatid cyst caused by *Echinococcus granulosus*. Post-surgery, the patient received a course of albendazole therapy and was discharged in a stable condition after a week of observation (11).

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The gold standard treatment for hydatid cysts is surgical removal. However, in cases of disseminated infection or when patients are poor candidates for surgery, this approach may not be feasible (7). Surgical intervention aims to address bronchipericyst pathology and to remove the lesion effectively. To ensure complete eradication of the condition, scolicidal medications must be administered during and after surgical treatment (9).

Conclusion

In the context of pleural effusions presenting as complex clinical challenges, it is essential to consider ruptured pulmonary hydatid cysts as a significant differential diagnosis. This is especially relevant when there is evidence of transudative pleural effusion, concomitant thick-walled lung cavities and an absence of bacterial evidence in pleural fluid analysis.

In endemic regions, prompt surgical intervention is crucial, especially in cases of primary pleural effusion linked to hydatid cysts to avoid complications that may occur secondary to rupture of the cyst within the pleural space and causing severe allergic reactions or anaphylaxis due to the release of cyst contents. The postoperative administration of albendazole for a defined period emerges as a crucial measure in averting the recurrence of this intricate and rarely encountered condition.

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Conflict of Interest

Non-declared

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