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Case Report

Spontaneous bronchial rupture of a large pulmonary cyst in a pediatric patient: a diagnostic review

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ABSTRACT

Pulmonary hydatid disease remains a significant clinical challenge in endemic areas, particularly in children, where the lungs are the predominant site of involvement. We report a rare case of a 10-year-old girl presenting with a large pulmonary hydatid cyst that underwent spontaneous rupture into the bronchial tree, initially misdiagnosed as a lung abscess. The clinical progression included persistent cough, high-grade fever, and vomiting of yellowish fluid, eventually leading to respiratory distress. Imaging revealed a cavitary lesion with irregular walls and fibrous capsule, suggestive of a ruptured cyst. Surgical management involved thoracotomy, careful extraction of cystic contents, closure of bronchial openings, and cavity padding using a platelet-rich hemostatic sponge. Postoperative recovery was uneventful, with long-term imaging showing partial lung remodeling and perfusion deficits. This case underscores the diagnostic pitfalls associated with ruptured pulmonary hydatid cysts in pediatric patients and highlights the importance of early radiological evaluation and tailored surgical intervention for optimal outcomes.

Keywords: Pulmonary hydatid cyst, Bronchial rupture, Pediatric surgery, Lung abscess mimic, Echinococcosis, Thoracotomy, Platelet-rich plasma, Diagnostic pitfall, Cyst rupture, Perfusion defect

INTRODUCTION

Hydatid disease, caused by larval stage of *Echinococcus granulosus*, continues to pose a significant health concern in endemic regions. In pediatric populations, unlike in adults where the liver is most commonly affected, the lungs are the primary site of involvement, accounting for up to 65% of cases.[1-3] Due to their elastic and compliant thoracic structures, children are more likely to develop large or even giant pulmonary cysts. These cysts are at risk of rupturing either spontaneously or following trauma, leading to severe complications.[4]

The rupture of a pulmonary hydatid cyst represents one of the most dreaded events in the disease course, with reported incidences ranging from 25% to 45%.[5] Such ruptures can result from elevated intracystic pressure, increased cyst volume, or external mechanical forces. When rupture occurs, the release of hydatid fluid and parasitic debris into the bronchial tree or pleural cavity can provoke a cascade of immune and inflammatory responses, including infection, bronchial obstruction, allergic reactions, or even anaphylaxis.[6,7]

Early diagnosis remains challenging due to the often non-specific clinical presentation, particularly when imaging is delayed or avoided in the initial stages.[8] The management of a ruptured pulmonary hydatid cyst requires prompt surgical intervention, with treatment

strategies tailored to the extent of pulmonary damage and associated complications.

Here, we present a case of a large, spontaneously ruptured pulmonary hydatid cyst in a young girl, which was initially misdiagnosed and managed as a lung abscess. The case highlights the importance of early recognition and appropriate surgical management in reducing postoperative morbidity and long-term sequelae.

CASE REPORT

A 10-year-old female was referred to our center with a provisional diagnosis of a right pulmonary abscess. According to her medical history, the child had been symptomatic for approximately two weeks, initially presenting with persistent dry cough and mild fever. Within 24 hours, she experienced an episode of vomiting, expelling a substantial volume of clear, yellowish fluid, which prompted a visit to the local healthcare facility. Despite receiving broad-spectrum antibiotics, her condition worsened after four days, marked by a fever spike up to 39°C, necessitating hospitalization with a diagnosis of pulmonary suppuration and suspected lung abscess.

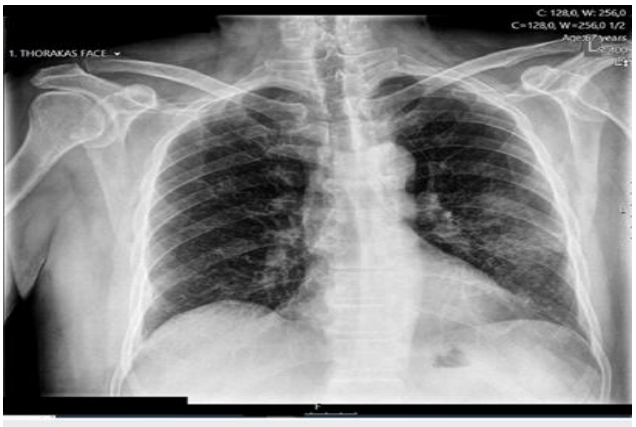

Figure 1: Preoperative chest X-ray.

After an unsatisfactory response to initial therapy and onset of respiratory distress, she was transferred to our tertiary care pediatric surgical center. Chest radiography revealed a rounded, air-filled cavitary lesion with irregularly thickened walls located in the midzone of the right lung. The right costophrenic angle showed obliteration due to exudative pleuritis. Mild elevation and flattening of the right hemidiaphragm were also noted, alongside basal pleuro-diaphragmatic adhesions.

Complete blood count showed normocytic anemia and a markedly elevated erythrocyte sedimentation rate (ESR) of 76 mm/hr. Biochemical panels were within normal limits. High-resolution CT scan displayed a large cavitary mass in the right lung's apical and anterior segments (S1 and S3), with near-complete involvement of these regions. The lesion had a spherical configuration with irregular inner contours and a fibrous capsule approximately 0.8 cm thick-features suggestive of a ruptured hydatid cyst (Figure 2).

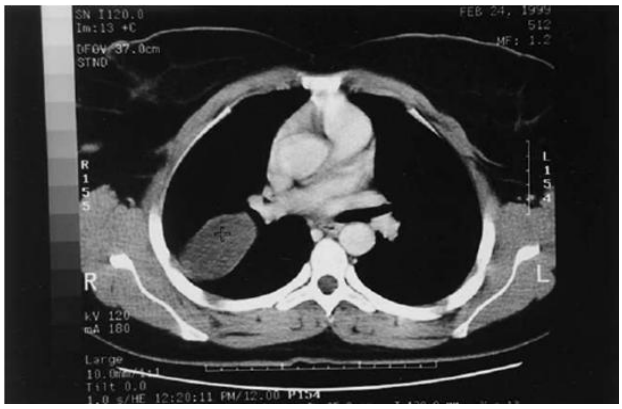

Figure 2: Preoperative chest CT-imaging data of pulmonary hydatid cyst complicated by rupture in bronchus.

Surgical intervention was planned after a short stabilization period. On the 16th day after symptom onset, a right posterolateral thoracotomy was performed. The ruptured hydatid larva was carefully extracted. The resulting cavity was packed using a hemostatic collagen sponge saturated with platelet-rich plasma. Chest tube drainage was placed through a secondary thoracostomy, and anatomical continuity was restored (Figure 3). The patient had an uneventful recovery and was discharged by the 8th postoperative day.

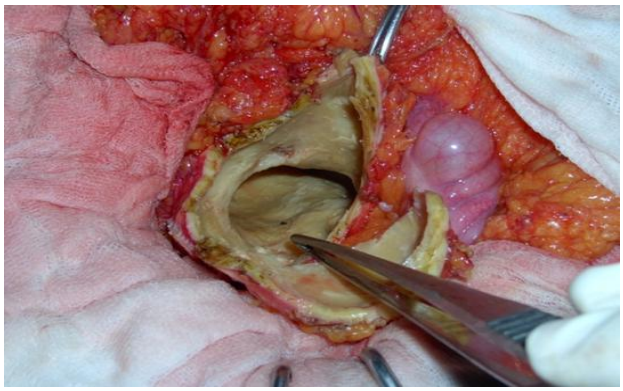

Figure 3: Intraoperative aspect of the residual cavity after removal of hydatid larvocyst complicated by endobronchial rupture.

One year after surgery, follow-up radiography showed significant improvement with a re-expanded lung, minimal residual pneumofibrosis, and complete resolution of pleural changes (Figure 4). A CT scan performed after 15 months revealed residual fibrotic scarring in the upper lobe, slight mediastinal shift, and small peribronchial nodules (Figure 5). Lung perfusion scintigraphy (Tc99m MAA) showed diminished blood

flow, especially in the upper right lobe, confirming long-term perfusion deficits (Figure 6).

A follow-up chest radiograph taken one year after the surgical procedure demonstrated a fully re-expanded right lung with progressive improvement in residual pulmonary alterations (Figure 4). The area previously occupied by the cyst exhibited localized pneumofibrotic changes. Signs of resolving exudative-fibrinous pleuritis were evident. Right costophrenic angle appeared clear, and the contour of diaphragm was well-defined. Notably, earlier observed pleuro-diaphragmatic adhesions had resolved, and there was an overall increase in right lung volume, indicating favorable postoperative progression.

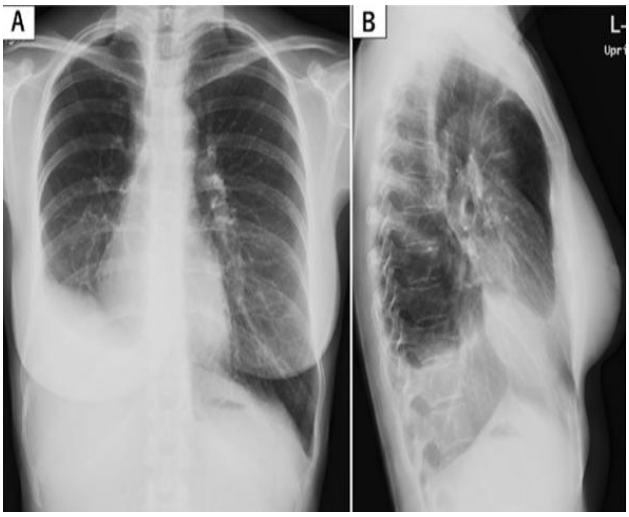

Figure 4 (A and B): Chest X-ray in 2 projections taken 1 year after surgery.

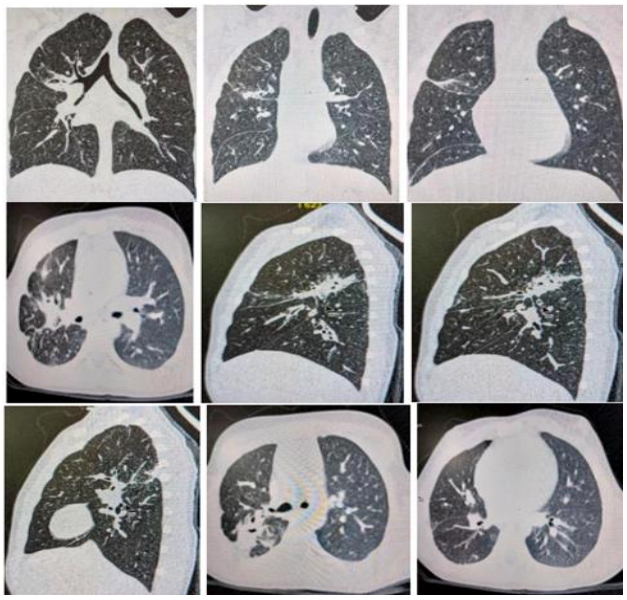

Figure 5: Postoperative CT performed 1, 2 years after the surgery. pulmonary hydatid cyst complicated by spontaneous rupture.

A contrast-enhanced CT scan conducted approximately 14 months post-surgery revealed patchy fibrotic remodeling within the upper lobe of the right lung, particularly involving segments S1 and S3. There was mild mediastinal shift toward the right side, presence of isolated peribronchial micronodules, and a few subcentimeter-sized lymph nodes within the mediastinum-findings consistent with chronic post-inflammatory changes (Figure 5). Despite these improvements, a lung perfusion scan performed 18 months after surgery revealed persistent perfusion abnormalities in the right lung, with markedly reduced tracer uptake in the upper lobe. The radiotracer distribution appeared irregular, with poorly defined segmental borders, and no comparable changes were observed in the left lung (Figure 6).

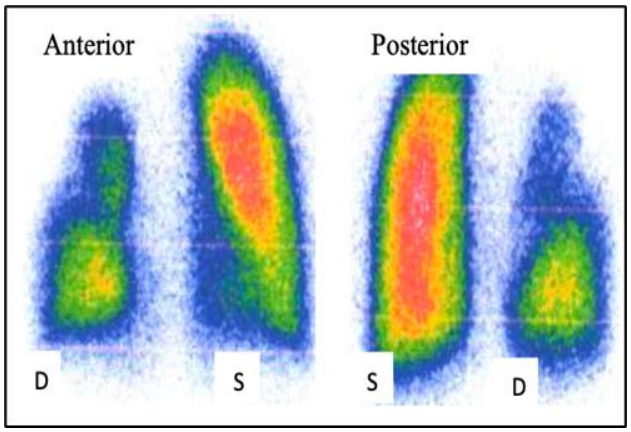

Figure 6: Lung scintigraphy (perfusion) with Tc99m MAA: the anterior and posterior scintigraphic image showed: the right lung is reduced in size (postoperative status), blurred contours in the upper lobe, uneven distribution of the radiopharmaceutical substances, diffuse increase of the lung blood perfusion, especially in the upper segments; and blood perfusion changes in the left lung are not found.

DISCUSSION

Pulmonary hydatid cyst rupture is a potentially life-threatening complication, which may present with symptoms such as expectoration of cystic fluid, hemoptysis, respiratory distress, or hypersensitivity reactions including anaphylaxis in severe cases.[9-12] The rupture often leads to secondary complications like hydrothorax, hydropneumothorax, empyema, or even lung abscess formation.

Histologically, ruptured cysts typically display the germinal membrane with degenerating parasitic elements, accompanied by neutrophilic and eosinophilic infiltration in the adjacent lung parenchyma.[13] In certain cases, the germinal membrane may detach and float freely in the pleural space along with hydatid fluid.[13,14]

There is ongoing debate regarding the optimal surgical approach for ruptured pulmonary hydatid cysts. Some experts advocate for simple cystotomy with extraction of the membranes, emphasizing bronchial stump closure but omitting cavity padding.[15,16] However, others recommend tailoring the surgical technique based on the extent of pulmonary damage. This may range from parenchyma-sparing methods with closure of bronchial fistulas and padding of the residual cavity to more aggressive resections when necessary.[17,18]

In our case, the use of a hemostatic sponge soaked in platelet concentrate within the residual cavity was instrumental in reducing the risk of prolonged air leaks, preventing infection, and promoting healing. Such techniques can help limit hospital stay and reduce overall postoperative complications.

CONCLUSION

This case underscores the diagnostic challenges in pulmonary hydatid disease, particularly when initial presentations mimic common respiratory infections or abscesses. Key historical indicators, like sudden expectoration of clear fluid following dry cough, should raise suspicion of hydatid cyst rupture, especially in endemic zones. Early radiological evaluation is essential to prevent misdiagnosis and delayed intervention.

The surgical technique employed evacuation, bronchial closure, and padding of the residual space, proved effective in ensuring a smooth postoperative recovery and lung re-expansion. Nevertheless, long-term follow-up revealed residual perfusion deficits, emphasizing the need for continued monitoring. Enhancing clinician awareness of hydatid disease presentations and complications remains critical for timely diagnosis and improved outcomes.

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