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Hydatid Cyst with Bronchial Fistula: Radiological and Clinical Insights

O. Ettachfini[1*], A. Hafidi[1], Y. Bouktib[1], B. Boutakioute[1], M. Oualiel Idrissi[1], N. Guanouni Idrissi Cherif[1]

[1]Department of Radiology, Arrazi Hospital, Mohammed VI University Hospital Center, Marrakech, Morocco

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***Corresponding author:** O. Ettachfini
Department of Radiology, Arrazi Hospital, Mohammed VI University Hospital Center, Marrakech, Morocco

Abstract | **Case Report**

Pulmonary hydatid disease is a common parasitic infection in endemic regions and represents the second most frequent localization of echinococcosis after hepatic involvement. Pulmonary cysts may remain clinically silent for years until rupture or secondary infection occurs. We report the case of an 18-year-old male presenting with thoracic pain, dyspnea, cough, and fever. Chest radiography revealed a large cystic opacity within the left hemithorax, while thoracic computed tomography demonstrated characteristic findings of a complicated pulmonary hydatid cyst with bronchial fistulization, including an air-fluid level and detached floating membranes. This case highlights the major role of imaging, particularly CT, in diagnosing ruptured pulmonary hydatid cysts, evaluating associated complications, and guiding therapeutic management.

Keywords: Pulmonary Hydatid Cyst, Echinococcus Granulosus, Bronchial Fistula, Thoracic CT, Ruptured Hydatid Cyst, Pulmonary Echinococcosis.

INTRODUCTION

Hydatid disease is a parasitic zoonosis caused predominantly by Echinococcus granulosus. The disease remains endemic in regions where close interaction exists between livestock and dogs, including North Africa, the Mediterranean basin, the Middle East, and South America.

Following hepatic localization, the lung represents the second most frequent site of involvement, accounting for approximately 10–30% of cases. Pulmonary hydatid cysts generally evolve slowly and may remain asymptomatic for prolonged periods because of the elasticity of lung parenchyma. Clinical manifestations usually occur when the cyst enlarges significantly or becomes complicated by rupture, infection, or compression of adjacent structures.

Bronchial rupture is among the most frequent and clinically significant complications. Imaging plays a fundamental role in diagnosis, lesion characterization, evaluation of complications, and therapeutic planning. We report a case of complicated pulmonary hydatid cyst with bronchial fistula and discuss its radiological features and therapeutic implications.

CASE PRESENTATION

An 18-year-old male patient with no significant past medical history was admitted for progressive thoracic pain, dry cough, dyspnea, and fever evolving over two weeks.

Clinical examination demonstrated signs of respiratory distress with tachypnea and reduced breath sounds at the left lung base. Percussion revealed dullness over the lower left hemithorax, while auscultation identified decreased vesicular breath sounds associated with basal crackles.

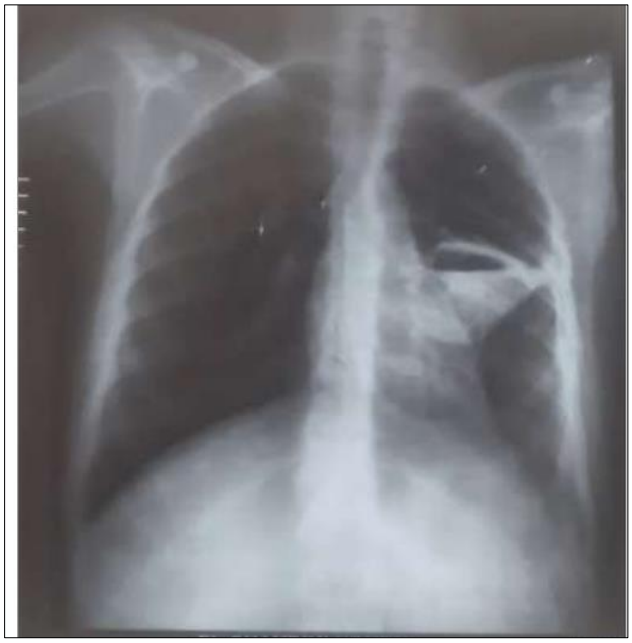
Laboratory investigations revealed leukocytosis with a white blood cell count of 14,000/mm³ associated with mild inflammatory syndrome.

Initial chest radiography demonstrated a well-defined oval opacity involving the left hemithorax, projecting predominantly over the upper and middle pulmonary fields. The lesion exhibited homogeneous fluid density suggestive of a cystic structure. Associated findings included slight elevation of the left hemidiaphragm and mild rightward mediastinal deviation secondary to mass effect.

Thoracic computed tomography demonstrated a cystic lesion involving the dorsal segment of the culmen and lingular region. The lesion displayed a thin wall with mild peripheral contrast enhancement. A characteristic air-fluid level associated with detached floating membranes, corresponding to the "crescent sign," was identified, indicating rupture into the bronchial tree.

Additional findings included surrounding pulmonary consolidation and ground-glass opacities, thickening of adjacent interlobular septa, moderate pleural and fissural effusion, and basal left lung atelectasis associated with traction bronchiectasis. These findings were highly suggestive of a complicated pulmonary hydatid cyst with bronchial fistulization.

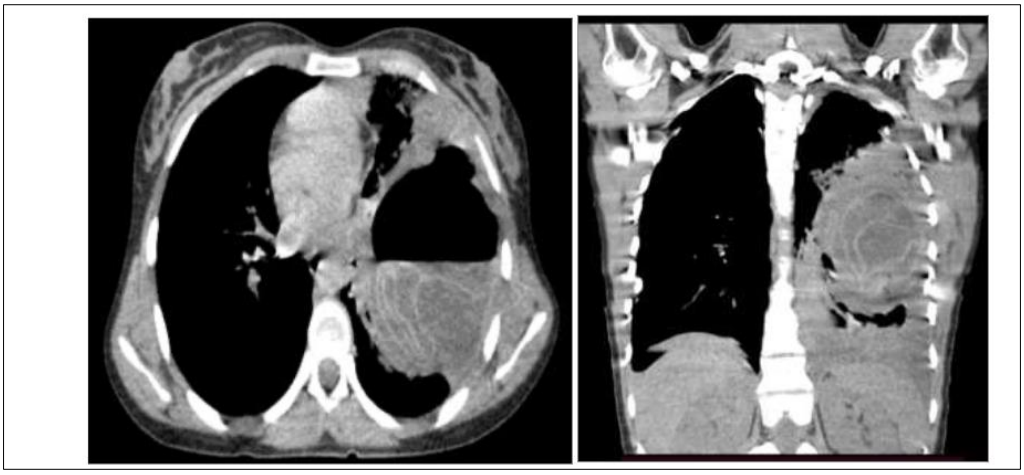
The patient subsequently underwent surgical management combined with antiparasitic medical therapy.

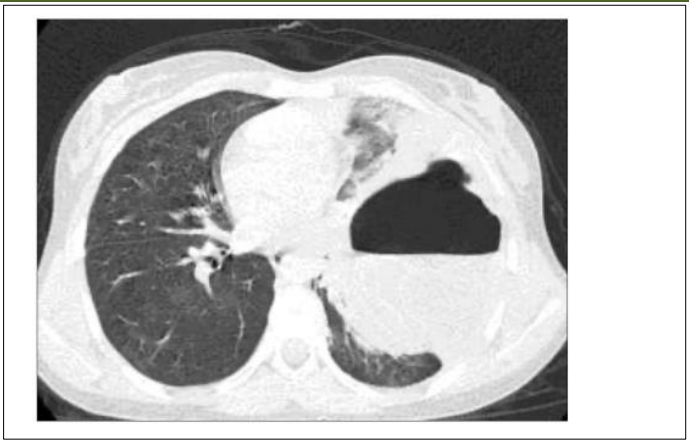


The chest X-ray revealed the presence of an oval-shaped, well-defined opacity in the left hemithorax, projecting over the upper and middle lung fields. The lesion demonstrated:

- Homogeneous water-density appearance, suggesting a cystic nature.
- Slightly elevated left diaphragm, indicating possible lower lobe atelectasis.
- Mild mediastinal shift to the right, secondary to the mass effect of the cyst.

These findings prompted further investigation with a chest CT scan, which revealed characteristic findings suggestive of a complicated pulmonary hydatid cyst.





CT scan of the chest revealed a cystic formationin the dorsal segment of the culmen and lingula, with a thin wall slightly enhanced by contrast. A distinctive air-fluid level with floating membranes, known as the"crescent sign," was noted.

Associated findings included:

- Consolidation and ground-glass opacity around the cyst.
- Thickening of adjacent septal and non-septal lines.
- Pleural and fissural effusion of moderate abundance.
- Atelectasis of the basal left lung parenchyma with traction bronchiectasis.
- These features are highly suggestive of a pulmonary hydatid cyst with early complications

DISCUSSION

Hydatid disease is a parasitic infestation caused by the larval form of Echinococcus granulosus. Humans represent accidental intermediate hosts following ingestion of parasite eggs through contaminated food, water, or direct contact with infected dogs.

Pulmonary localization is particularly frequent in children and young adults because of increased elasticity and vascularity of lung tissue, which facilitate cyst growth. Pulmonary hydatid cysts may remain asymptomatic for long periods and are often discovered incidentally. Symptomatic presentation generally occurs following enlargement or rupture of the cyst.

Bronchial rupture represents the most common complication of pulmonary hydatid disease and occurs when increased intracystic pressure leads to erosion into adjacent bronchi. Patients may present with cough, hemoptysis, expectoration of hydatid membranes, fever, or acute respiratory distress. Secondary bacterial infection may further complicate the clinical picture.

Chest radiography remains the first-line imaging modality and may demonstrate a well-defined rounded or oval opacity. However, the radiographic appearance varies considerably depending on cyst integrity and complications. Once rupture occurs, characteristic signs may appear, including the crescent sign, water-lily sign, inverse crescent sign, or Cumbo sign, corresponding to partial detachment of the endocyst membranes.

Thoracic CT is considered the imaging modality of choice for evaluating pulmonary hydatid disease. CT accurately demonstrates cyst morphology, membrane detachment, air inclusion, bronchial communication, pleural extension, and associated pulmonary complications. In our case, the presence of an air-fluid level and floating membranes strongly suggested rupture into the bronchial tree.

CT also allows evaluation of additional complications such as pleural rupture, empyema, pneumothorax, secondary infection, and vascular compression. Associated findings including surrounding consolidation, ground-glass opacities, and atelectatic changes reflect inflammatory response and secondary parenchymal involvement.

The differential diagnosis of complicated pulmonary hydatid cyst includes lung abscess, cavitary tuberculosis, necrotic bronchogenic carcinoma, infected congenital bronchogenic cyst, aspergilloma, and cavitary fungal infections. Recognition of characteristic imaging signs and epidemiological context is essential for accurate diagnosis.

Surgical treatment remains the cornerstone of management and aims to remove the cyst while preserving maximal pulmonary parenchyma. Procedures include cystectomy, capitonnage, or segmental pulmonary resection depending on lesion size and extent of destruction. Albendazole therapy is commonly administered pre- and postoperatively to decrease recurrence risk and reduce secondary dissemination.

Early diagnosis and prompt management are essential to prevent severe respiratory complications and

improve patient prognosis, particularly in endemic regions where hydatid disease remains a major public health concern.

CONCLUSION

Pulmonary hydatid cyst is a frequent parasitic disease in endemic regions and may remain asymptomatic until complicated by rupture or infection. Bronchial fistulization represents a potentially severe complication associated with characteristic imaging findings. Thoracic CT plays a pivotal role in diagnosis, evaluation of complications, and surgical planning. Early recognition and appropriate treatment are essential to prevent morbidity and optimize clinical outcomes.

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