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CLINICAL CASE

Malignant pericardial effusion as the initial manifestation of lung adenocarcinoma: case series

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Abstract

Malignant pericardial effusion (MPE) is an uncommon but serious presentation of advanced lung adenocarcinoma. We report two cases where MPE was the initial manifestation, diagnosed through imaging, echocardiography, pericardiocentesis, and cytology. Both patients died before receiving oncologic treatment, underscoring the poor prognosis associated with MPE. Findings are contextualized with a literature review on diagnosis, prognosis, and management. This report highlights the need to consider malignancy in acute pericardial effusions and emphasizes the importance of a multidisciplinary approach to ensure early recognition and timely therapeutic interventions to improve outcomes.

Keywords: *Pericardial effusion. Pulmonary adenocarcinoma. Neoplasms. Complications. Case reports.*

Derrame pericárdico maligno como manifestación inicial de adenocarcinoma pulmonar: serie de casos

Resumen

El derrame pericárdico maligno (DPM) es una manifestación inusual pero grave del adenocarcinoma pulmonar avanzado. Presentamos dos casos en los que el DPM fue la manifestación inicial, diagnosticados mediante tomografía, ecocardiograma, pericardiocentesis y citología. Ambos pacientes fallecieron antes de iniciar tratamiento oncológico, lo que evidencia su mal pronóstico. Se contextualizan los hallazgos con una revisión de la literatura sobre diagnóstico, pronóstico y tratamiento. Este reporte destaca la importancia de considerar causa maligna en derrames pericárdicos agudos, y la necesidad de un abordaje multidisciplinario para optimizar el diagnóstico temprano y las intervenciones terapéuticas oportunas.

Palabras clave: *Derrame pericárdico. Adenocarcinoma pulmonar. Neoplasias. Complicaciones. Reporte de caso.*

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Introduction

Malignant pericardial effusion (MPE) is an uncommon but potentially life-threatening complication of advanced malignancies. It typically arises from metastatic spread rather than primary pericardial tumors, with lung cancer, particularly lung adenocarcinoma, being the most frequently implicated primary site. Lung adenocarcinoma accounts for approximately 50-82%. One percent of MPE cases, as reported in multiple series.[1,2] The development of MPE may indicate a poor prognosis and can present with non-specific symptoms or rapidly evolve into cardiac tamponade, making timely diagnosis and management critical.[3,4]

Despite its clinical importance, MPE remains underreported in certain regions, and published data from Latin America are scarce.[5] Here, we present two cases of MPE secondary to lung adenocarcinoma diagnosed in Western Mexico, aiming to contribute to the regional understanding of this severe oncological complication. This manuscript has been prepared in accordance with the international CAse REport guidelines to ensure a structured, transparent, and clinically useful presentation of the case.[6]

Case presentation

The first case involved a 47-year-old woman with no significant medical history, diagnosed with MPE secondary to lung adenocarcinoma. The clinical course began in December 2023 with a productive, non-purulent cough, accompanied by progressive dyspnea, initially during intense physical exertion, as well as asthenia, adynamic, non-selective anorexia, postprandial nausea, and occasional vomiting. There was also an involuntary weight loss of approximately 7 kg over a 5-month period, without fever or diaphoresis.

A chest computed tomography (CT) scan revealed a pericardial effusion (PE), mediastinal lymphadenopathy, and bilateral pulmonary nodules (Fig. 1). An echocardiogram was also performed, showing a PE of approximately 1200 mL, with no signs of hemodynamic instability or acute pericarditis.

In March 2024, further investigations were initiated due to the suspicion of a lymphoproliferative, infectious, neoplastic, autoimmune, or endocrine process. A diagnostic pericardiocentesis was performed, removing approximately 900 mL of pericardial fluid.

A biopsy of a nodule in the right lung base was subsequently scheduled, and histopathological analysis confirmed the diagnosis of lung adenocarcinoma. In May 2024, the patient developed deep vein thrombosis, treated with enoxaparin and rivaroxaban. She died in June 2024 without having received treatment for the adenocarcinoma.

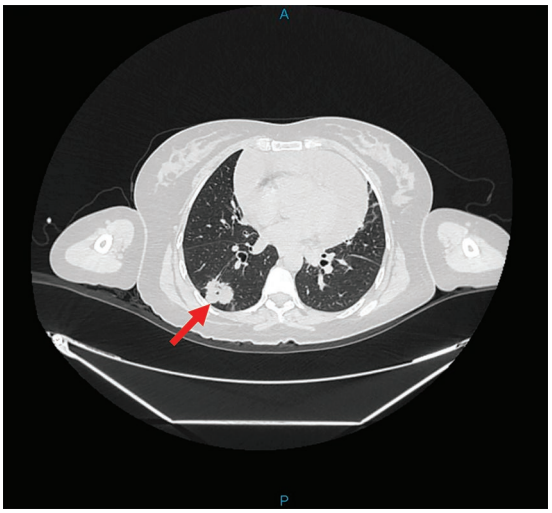


Figure 1. Chest computed tomography scan showing a pericardial effusion with an estimated separation of 40 mm, mediastinal lymphadenopathy measuring 10 × 10 mm, and bilateral pulmonary nodules. The red arrow indicates the largest pulmonary nodule located in the right lung base, measuring 30 × 20 mm.

The second case, a 57-year-old male with a history of heavy smoking, amounting to a smoking index of 112 pack-years, and occupational exposure to both dark coal and wood charcoal for 35 years, as well as a diagnosis of chronic obstructive pulmonary disease, presented with MPE secondary to lung adenocarcinoma.

His symptoms began in September 2022, with a dry cough, shortness of breath, and progressively worsening exertional dyspnea. Initially, the dyspnea occurred with significant physical exertion but gradually worsened, eventually manifesting with minimal effort. The patient also reported paroxysmal nocturnal dyspnea and orthopnea.

A chest and abdominal CT scan revealed a malignant-appearing tumor in the lower lobe of the left lung with metastatic activity involving the ipsilateral pulmonary hilum, mediastinum, and multiple mediastinal lymph nodes (Fig. 2). An echocardiogram also demonstrated a global PE.

Subsequently, a biopsy of a nodule at the base of the left lung was performed, and histopathological analysis confirmed the diagnosis of lung adenocarcinoma. The patient died in March 2023 without having received oncologic treatment. Table 1 summarizes the chronological

Table 1. Clinical, diagnostic, and disease progression timeline of two patients with malignant pericardial effusion as the initial manifestation of lung adenocarcinoma

Patient	Date	Relevant clinical/diagnostic/therapeutic even
Case 1	December-2023	Productive, non-purulent cough; progressive dyspnea; 7-kg weight loss
	January-2024	Chest CT: pericardial effusion, mediastinal lymphadenopathy, bilateral lung nodules
	January-2024	Echocardiogram: 1200 mL pericardial effusion without hemodynamic compromise
	March-2024	Diagnostic pericardiocentesis: 900 mL; cytology positive for adenocarcinoma
	April-2024	Biopsy of right lung nodule: lung adenocarcinoma confirmed
	May-2024	Deep vein thrombosis; treated with enoxaparin and rivaroxaban
	June-2024	Death before initiation of oncologic treatment
Case 2	September-2022	Progressive dyspnea, orthopnea, paroxysmal nocturnal dyspnea
	October-2022	Thoracoabdominal CT: lower left lobe tumor with mediastinal and hilar metastases
	October-2022	Echocardiogram: global pericardial effusion
	November-2022	Diagnostic pericardiocentesis; cytology positive for adenocarcinoma
	November-2022	Biopsy of left lung lesion: lung adenocarcinoma confirmed
	March-2023	Death before receiving oncologic treatment

The table highlights the often subtle or non-specific initial symptoms, the diagnostic value of pericardiocentesis, and the poor prognosis even before oncologic treatment is initiated. CT: computed tomography.

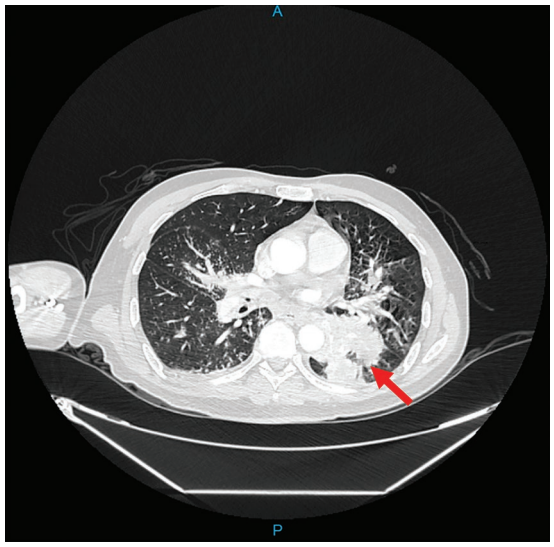


Figure 2. Chest computed tomography scan demonstrating an irregular tumor with soft-tissue density involving the superior, posterior, and lateral segments of the left lower lobe, extending into the inferior lingular segment of the ipsilateral upper lobe. The red arrow indicates the primary left lower lobe tumor. The lesion encases bronchial and vascular structures without evidence of invasion and exhibits avid contrast enhancement. It extends to the ipsilateral pulmonary hilum with invasion into the middle mediastinum and the contralateral hilum.

clinical course of both patients, encompassing initial symptoms, imaging findings, diagnostic interventions including pericardiocentesis, biopsy, and final outcomes.

Discussion

PE as a result of malignancy is relatively uncommon, with an incidence of approximately 10% in autopsy patients with known cancers.[7] When it does occur, MPE is typically a marker of advanced disease and is associated with a poor prognosis. The median survival following a diagnosis of MPE ranges from 7 to 15 weeks.[8,9] This is consistent with the clinical course observed in the cases presented. Specifically, non-small cell lung cancer is the most frequent solid tumor associated with MPE, with a 2-year survival rate under 10%.[7,10]

Although MPE often follows a silent and insidious course, it may rarely be the initial manifestation of malignancy.[11] When symptomatic, patients typically present with dyspnea, chest pain, or signs of hemodynamic compromise.[12,13] Notably, up to 90% of malignant PE cases are clinically silent and may be discovered only post-mortem.[14] If undiagnosed, the progressive accumulation of pericardial fluid can lead to cardiac tamponade, a potentially fatal complication.[15]

Our cases highlight the importance of including malignancy in the differential diagnosis of new or recurrent PEs, especially those with rapid accumulation. Clinicians should maintain a high index of suspicion even in the absence of other suggestive cancer symptoms.[16]

Lung cancer accounts for approximately 50% of malignant PE cases, followed by breast cancer (18%) and melanoma or gastrointestinal adenocarcinomas (7%).[3,17,18] Among these, lung adenocarcinoma has been associated with higher recurrence of MPE and worse survival compared to breast or hematolymphoid malignancies.[19,20] MPE significantly affects quality of life and survival, with a reported prevalence of up to 21% in advanced malignancy.[21]

Malignant PE can be categorized as "confirmed" when cytological or histological evidence of tumor cells is present, or "suspected" based on clinical context. Confirmed MPE carries a significantly worse prognosis.[22] Diagnostic accuracy may be enhanced by the use of tumor markers such as carcinoembryonic antigen, CYFRA 21-1, and CA-125, particularly in lung cancer.[23,24] Among these, CYFRA 21-1 shows high specificity for distinguishing malignant from benign effusions.[25]

Advanced imaging techniques like cardiac magnetic resonance imaging can be helpful in identifying pericardial thickening, myocardial invasion, or direct tumor infiltration, and may clarify inconclusive echocardiographic findings.[26] Cytological analysis of pericardial fluid remains the cornerstone of diagnosis, with higher diagnostic accuracy than pericardial biopsy.[22] In contrast, pleural effusions yield around 60% with cytology, increasing to over 90% with thoracoscopy-guided biopsies.[20]

Management strategies include pericardiocentesis, surgical pericardial window, and balloon pericardiotomy. In recurrent cases, intrapericardial instillation of sclerosing agents (e.g., cisplatin, bleomycin) may offer prolonged palliation.[13] Given the poor prognosis, early palliative care referral and shared decision-making should be considered standard in the management of MPE.[20]

Conclusion

While MPE is rare as an initial manifestation of malignancy, it is crucial to include malignancy in the differential diagnosis of rapidly accumulating PEs. Early detection and management are key to improving patient outcomes and preventing fatal complications.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare to have followed the ethical standards of the relevant experimentation committee, according to the World Medical Association and the Declaration of Helsinki. The procedures were approved by the institutional Ethics Committee.

Confidentiality, informed consent, and ethical approval. The authors have obtained approval from the Ethics Committee for the analysis of routinely collected and anonymized clinical data; therefore, individual informed consent was not required. Relevant ethical recommendations have been followed.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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