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Case Report

Cardiac angiosarcoma with multiple pulmonary metastases: A case report and literature review ☆,☆☆,★

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ABSTRACT

In this report, we describe a 42-year-old man with dyspnea and recurrent hemoptysis who was diagnosed with cardiac angiosarcoma and multiple pulmonary metastases. Before visiting our hospital, he had been misdiagnosed with a lung infection. Bronchoscopy, multiple imaging methods, and extensive laboratory studies failed to identify a clear etiology. Cardiac magnetic resonance imaging and percutaneous lung biopsy revealed cardiac angiosarcoma with multiple pulmonary metastases. Cardiac angiosarcoma is extremely rare and diagnosis is difficult. Diffuse alveolar hemorrhage is not a common manifestation of pulmonary metastases of angiosarcoma and in patients with hemoptysis, clinicians should consider a malignant etiology that is not restricted to the lungs.

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Introduction

Primary cardiac tumors are rare, with an incidence of only 0.0001%-0.030% at autopsy; cardiac angiosarcoma comprises 31.2% of primary malignant cardiac tumors [1], among which cardiac angiosarcoma is extremely rare and difficult to diagnose. Here, we describe a 42-year-old Chinese man with the complaints of dyspnea and hemoptysis who was diagnosed with cardiac angiosarcoma and multiple pulmonary metastases. Cardiac magnetic resonance imaging revealed space-occupying lesions in the pericardium near the right atrium. Computed-tomography-guided percutaneous lung biopsy showed fibrinoid material with spindle-shaped nuclei and mild-to-moderate cellular atypia. Moreover, pulmonary immunohistochemical staining revealed the presence of CD31 and CD34, which are characteristic of angiosarcoma.

Case report

A 42-year-old Chinese man who worked in an iron factory where the extensive dust can cause various types of lung damage, with body weight 76 kg and height 175 cm, was admitted to our hospital with the complaints of a 3-month history of recurrent dyspnea and a 1-month history of recurrent hemoptysis, both of which were gradually worsening. On the basis of constitutional symptoms, he had previously been diagnosed with pneumonia and completed 14 days of antibiotic treatment at a rural hospital; he had then been referred to our hospital for further diagnosis and treatment.

Physical examination revealed that the patient's vital signs were stable. Respiratory examination revealed bilateral symmetrical chest movements, but dull and reduced breath sounds were observed in some parts of the chest. There were no signs of deep venous thrombosis. The most prominent abnormal laboratory results were a low hemoglobin level (105 g/L) and slightly elevated levels of white blood cells (12×10^9/L) and neutrophils (12×10^9/L). Chest computed tomography showed multiple nodules and ground-glass opacities in both lungs (Fig. 1), suggesting inflammation or diffuse alveolar hemorrhage. Mediastinal window analysis revealed a possible small pericardial effusion. Computed tomography angiography of the thorax ruled out pulmonary embolism and vascular malformations, but showed low density shadow in right atrium (Fig. 2).

Negative findings in immunological tests, including tests for systemic lupus erythematosus, rheumatoid arthritis, vasculitis, as well as complement screening and M-protein, tentatively excluded autoimmune disease. Hemosiderin-positive cells were not found in sputum. The results of a tuberculosis test were normal. Bronchoscopy showed sites of old and new hemorrhage within the trachea. Bronchoalveolar lavage revealed no pathological cells. Subsequent diagnostic exploration comprised computed tomography scanning to identify the specific location of the lung lesion, followed by percutaneous lung biopsy to facilitate histological and immunohistochemical examinations. Considering the patient's manifestations of dyspnea and pericardial effusion, echocardiography was performed; this examination showed pericardial thickening on the lateral wall of the right atrium, as well as pericardial effusion. Cardiac magnetic resonance revealed space-occupying lesions in the pericardium near the right atrium. The signals were heterogeneous, comprising a mixture of long and slightly short T1 signals, with T2 signals of equal length. Most lesions had high signal intensity on fat-suppressed T2-weighted imaging, and the maximum cross-section size was 8.5 cm × 5.2 cm (Figs. 3–5). The lesions were nonuniform and had strong signals on both enhanced and delayed enhanced scans. The pericardium was slightly thickened, and it exhibited enhancement on enhanced scans.

Histological examination of lung biopsy tissue showed a small amount of fibrinoid material with spindle-shaped nuclei and mild-to-moderate cellular atypia (Fig. 6A). Immunohistochemical findings were negative for cytokeratin and thyroid transcription factor-1, positive for CD31 (Fig. 6B), weakly positive for CD34 (Fig. 6C), and 50% positive for Ki-67 (Fig. 6D).

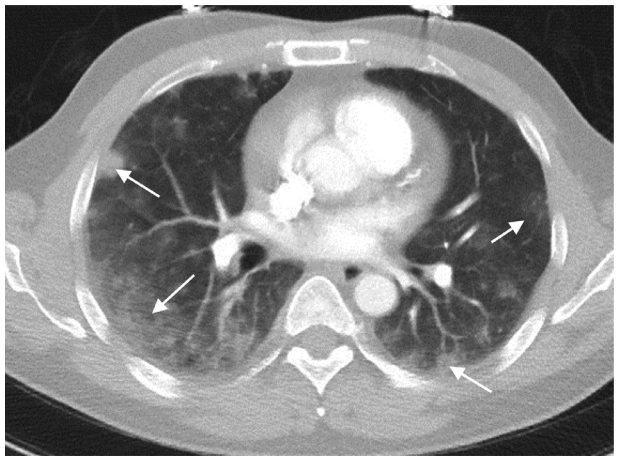

Fig. 1 – Computed tomography angiography of the thorax: multiple nodules and ground glass shadows in both lungs (white arrow).

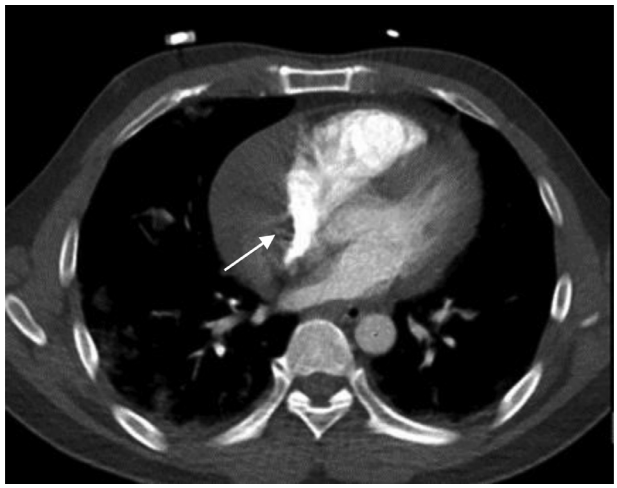

Fig. 2 – Computed tomography angiography of the thorax: low-density filling defect in the right atrium (white arrow).

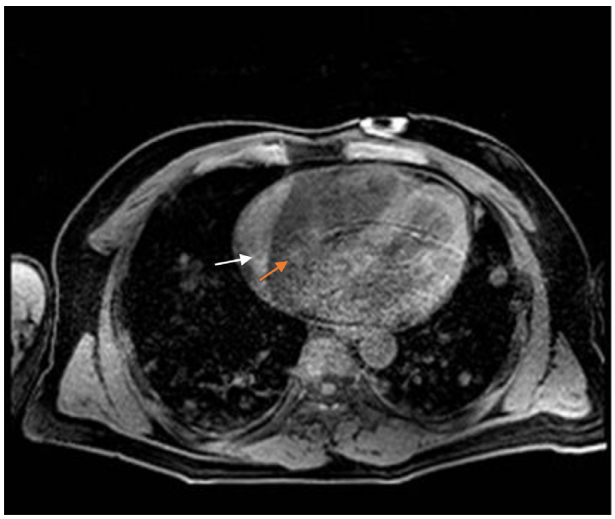

Fig. 3 – T1-weighted image: lesions presented mixed long T1 and slightly short T1 signals (red arrow). A short, subardium fusiform T1 with a high signal indicates pericardium hemopericardium (white arrow).

All of the above findings supported a diagnosis of cardiac angiosarcoma with multiple pulmonary metastases. The patient was no longer eligible for surgery; therefore, he received chemotherapy with epirubicin (110 mg) plus paclitaxel (300 mg). After 2 cycles of chemotherapy, chest computed tomography revealed that treatment had been ineffective. The patient died 4 months after he had been diagnosed with cardiac angiosarcoma.

Discussion

Although cardiac angiosarcoma is extremely rare, it is the most aggressive type of primary cardiac tumor. Its incidence

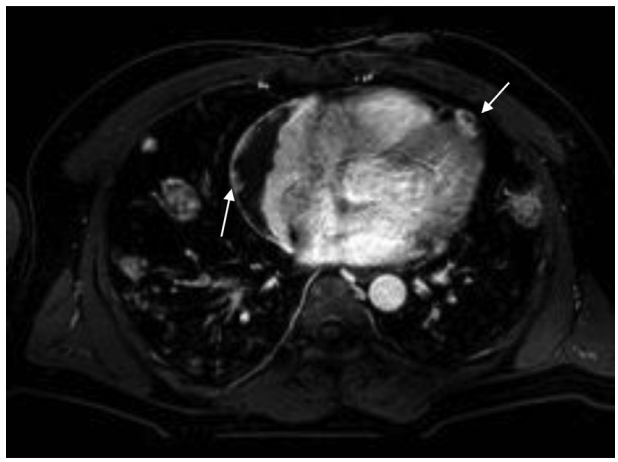

Fig. 4 – T1-weighted image enhanced scanning arterial phase: the pericardial nodular enhancement was obvious, suggesting pericardial metastasis (white arrow).

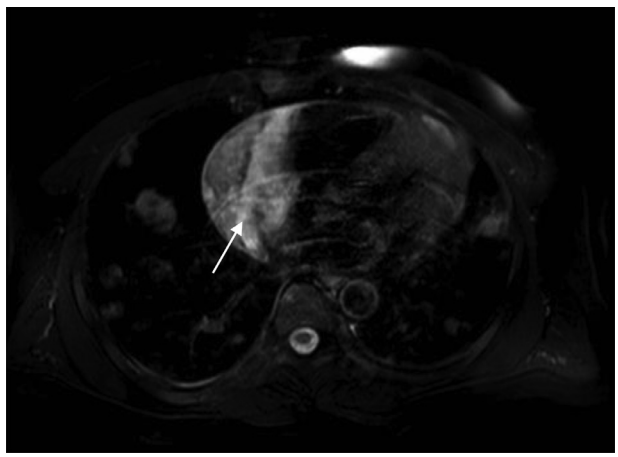

Fig. 5 – T2 fat saturation: hypersignal in the lesion (white arrow).

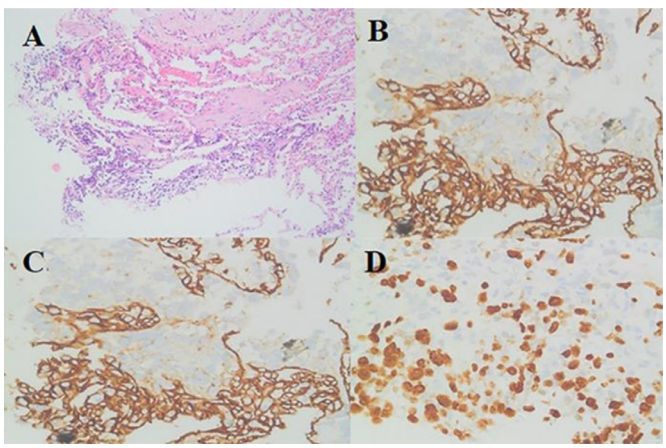

Fig. 6 – Percutaneous lung biopsy for lung puncture at 10 magnification. (A) Histopathological findings: spindle-shaped nuclei with mild-to-moderate cellular atypia consistent with pericardial angiosarcoma. (B-D) immunohistochemical findings: (B) CD34 weakly positive; (C) CD31 positive; (D) Ki-67 50%.

Table 1 – Case reports of cardiac angiosarcoma involving the lungs in the last 20 years.

Reference	Clinical feature at presentation	Other organ(s) involved	Main diagnosis methods	Treatment	Prognosis (lifetime)
Juergens [9]	Not mentioned	None	PET-CT and MRI	Radical resection of lung and heart tumors	Still alive until the article was published
Hod [10]	Dyspnea, hemoptysis	None	Lung biopsy	Chemotherapy	Less than1 year
Chen [11]	Dyspnea, chest pain	None	Lung biopsy	Refuse treatment	6 months after the first symptoms
Zhrebker [12]	Dyspnea, night sweats, and cough	None	Lung biopsy	Refuse treatment	2 months after the first symptoms
Dong [13]	Cough, hemoptysis, chest pain, and numbness in lower extremities	Lumbar	MRI and vertebral body lesion biopsy	Not mentioned	Not mentioned
Mahdhaoui [14]	Hemoptysis	Liver	CT and hepatic lesion biopsy	Not mentioned	Not mentioned
Naruse [15]	Cough	None	Heart biopsy	Chemotherapy (paclitaxel 100 mg/m^2)	18 months after the first consult
Palkar [16]	Cough, hemoptysis	Adrenal glands	Autopsy	Empiric antibiotics and high-dose intravenous steroids	Hospital day 28
Jain [17]	Hemoptysis	None	Autopsy	Anti-tubercular treatment	3 months after the first symptoms
Crenitte [18]	Cough, dyspnea	None	Lung biopsy	Chemotherapy	Half year after the first symptoms
Larbcharoensub [19]	Hemoptysis	Hepatic, cerebellar and bony	Autopsy	Not mentioned	Not mentioned
Cardoso [20]	Hemoptysis	None	Resection of a lung nodule and cardiac neoplasm	Surgical resection	11 month after the first symptoms
Zheng [21]	Hemoptysis	None	Lung biopsy	Died before treatment	3 month after the first symptoms
Pournazari [22]	Dyspnea, chest pain	None	Lung biopsy	Glucocorticoid	3 years after the first symptoms
Dulal Karki [23]	Chest pain, dyspnea	None	Autopsy	Antibiotis, glucocorticoid	Not mentioned
van Wyk [24]	Weight loss	None	Transvenous endomyocardial biopsy	Not mentioned	1 month after the first symptoms
Gonçalves [25]	Dyspnea, hemoptysis	Cerebral	Lung biopsy	Chemotherapy with paclitaxel	1 years after the first symptoms
Xin [26]	Chest pain, dyspnea	None	Lung biopsy	Chemotherapy combined with immunization	Still alive until the article was published
Bing [27]	Hemoptysis	Hepatic, adrenal glands	Lung biopsy	Antibiotis	Not mentioned
Min [28]	Dyspnea, hemoptysis	None	Lung and heart biopsy	Chemotherapy, targeted therapy	5 months after the first symptoms

CT, computed tomography; MRI, magnetic resonance imaging; PET-CT, positron emission computed tomography-computed tomography.

is higher in men than in women [2]. In a recent study of patients with cardiac angiosarcoma, the median disease-specific survival was 7.22 months and the mean age at diagnosis was 44.4 ± 15.5 years [3]. Our patient was 42 years old, which is consistent with the previous findings.

Affected patients usually do not exhibit specific symptoms of cardiac angiosarcoma; therefore, diagnosis is usually late and the prognosis is poor. Patients often present with shortness of breath and chest discomfort. Some authors have reported rare clinical signs such as cardiac tamponade [4], neurological events and abdominal pain [5], abdominal distention [6], or lower extremity pain [7]. Considering the nonspecific clinical presentation, misdiagnosis is not uncommon for patients with cardiac angiosarcoma.

In a retrospective observational study of 11 men who exhibited angiosarcoma with pulmonary involvement, the most common misdiagnoses included tuberculosis (45.5%), vasculitis (18.2%), nontuberculous infectious disease (9.1%), and constrictive pericarditis (9.1%) [8]. We found similar results upon reviewing the past 20 years of case reports concerning cardiac angiosarcoma with pulmonary involvement (Table 1). Patients often present with hemoptysis and dyspnea, which are common clinical manifestations of infectious diseases and vasculitis. Eight patients (40%) received anti-infective or hormonal therapy because of misdiagnosis, and definitive diagnosis was made at autopsy in four patients (20%). Because of its rarity and nonspecific symptoms, early diagnosis of cardiac angiosarcoma was difficult; 6 patients (30%) already had multiple metastases when diagnosis was confirmed. Only 2 patients were eligible for tumor resection, and their durations of survival were longer.

As noted above, the rarity and nonspecific symptoms of cardiac angiosarcoma hinder early diagnosis; patients often visit a respiratory disease clinic for treatment. When diagnosis is confirmed, patients may already have multiple metastases. Similarly, our patient had pulmonary metastases at the time of diagnosis.

Imaging examinations are important for early diagnosis of cardiac angiosarcoma because of the nonspecific symptoms. Chest computed tomography scans of patients with hemoptysis show bilateral, randomly distributed nodules of variable shape and size, surrounded by ground-glass opacities [10,14,16,17,19–21]. Echocardiography may be useful for early diagnosis of primary cardiac tumors, which usually are present in the form of echogenic, nodular masses. The diagnostic sensitivities of transthoracic and transesophageal echocardiography are reportedly 93.3% and 96.8%, respectively [29]. In our patient, chest computed tomography scans revealed cardiac enlargement and a pericardial mass, which suggested the presence of a tumor. Transthoracic echocardiography showed pericardial thickening.

Cardiac magnetic resonance imaging can provide useful information, including the anatomical structure and tissue characteristics of the tumor. In previously reported cases [9,13,24], cardiac magnetic resonance imaging revealed a pericardial mass that appeared heterogeneous and hyperintense relative to the myocardium. Enhanced magnetic resonance imaging showed multiple lines within the tumor that radiated from the epicardium to the pericardium. Surgical cardiac biopsy is necessary for histopathological examination and immunohistochemical staining; angiosarcomas exhibit positive staining of CD31, CD34, and factor VIII. The patients in most previous cases were diagnosed by surgical biopsy, but our patient was diagnosed on the basis of percutaneous lung biopsy findings. Factor VIII expression was not observed in our patient, but CD31 expression was recorded because the corresponding test has greater sensitivity and specificity.

Cytological analysis of pericardial effusion may yield negative results, even in the presence of a neoplastic mass. We performed percutaneous lung biopsy. The specific location of the lung lesion was first determined by computed tomography; the puncture needle was then inserted through the skin into the lung lesion, and diseased tissue was collected for analysis. Immunohistochemical staining of pulmonary tissue revealed the expression of CD31 and CD34, which are characteristic of angiosarcoma.

Current evidence for the evaluation of cardiac tumors is mainly limited to case series or case reports, and surgical resection is the most common treatment for primary cardiac angiosarcoma [3]. Complete resection is the optimal therapeutic goal; when surgery is complete, adjuvant chemotherapy is generally preferred, although this approach has not been extensively validated. The prognosis is generally poor because of delayed diagnosis, and the effectiveness of chemotherapy in this setting remains unclear. Our patient was ineligible for surgery because the tumor had metastasized to the pericardium and lungs. As noted above, he received two cycles of chemotherapy with epirubicin (110 mg) plus paclitaxel (300 mg), but the results were poor. He eventually died of disease progression, and his overall survival was 4 months.

Primary cardiac tumors are rare and aggressive, and their prognoses are poor. Here, we have reported a case of cardiac angiosarcoma and multiple pulmonary metastases in a patient who exhibited hemoptysis and diffuse alveolar hemorrhage; our findings may aid in the diagnosis and treatment of malignant cardiac diseases.

Patient consent

Consent was obtained from the patient's wife and next of kin (son) for publication of this case report and any accompanying images.

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