A woman in her 70s with a history of hypertension, hyperlipidemia, and venous thromboembolism presented to the hospital with 2 months of progressively worsening dyspnea on exertion. Her medical history was significant for a single episode of lower-extremity deep venous thrombosis during a prior hospitalization, complicated by multiple subsegmental pulmonary emboli. At that time, she underwent inferior vena cava filter placement, followed by initiation of anticoagulation therapy. Her current medications included metoprolol tartrate, simvastatin, and warfarin sodium. She denied any substantial tobacco or alcohol use, and her family history was negative for venous thromboembolic disease. Her initial physical examination had unremarkable results, with laboratory evaluation of prothrombin time significant for an international normalized ratio of 2.8. Computed tomography (CT) of the chest revealed a large filling defect within the main pulmonary artery, flattening of the interventricular septum, and multiple pulmonary nodules. Bedside transthoracic echocardiography demonstrated evidence of severely increased right ventricular systolic pressure, with moderate right ventricular dilation. She was referred for urgent pharmacomechanical interventions, including catheter-directed embolectomy and thrombolysis, for a presumed diagnosis of submassive pulmonary embolism. Following the procedure, she experienced no substantial clinical or radiographic improvement. She underwent a repeated CT scan of the chest (Figure).

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**WHAT IS YOUR DIAGNOSIS?**

A. Venous thromboembolic disease

B. Pulmonary artery sarcoma

C. Locally advanced lung cancer

D. Pulmonary tumor embolism

**Figure.** Computed tomographic scan of the chest, showing a large filling defect (arrowhead) within the main pulmonary artery (A, lung window; B, mediastinal window).
Diagnosis
B. Pulmonary artery sarcoma

Discussion
The repeated CT scan demonstrated a persistent filling defect in the main pulmonary artery, with multiple pulmonary nodules, and no substantial hilar or mediastinal lymphadenopathy. The presence of multiple pulmonary nodules, along with the persistent filling defect despite multiple therapeutic interventions, should prompt the clinician to consider the possibility of undiagnosed malignant neoplasm. A full-body positron emission tomographic scan was performed, showing hypermetabolic activity within the lumen of the main pulmonary artery, along with multiple hypermetabolic pulmonary nodules. A CT-guided biopsy of a peripherally located pulmonary nodule demonstrated atypical spindle-shaped cells, consistent with a diagnosis of metastatic pulmonary artery sarcoma.

In general, sarcomas of the pulmonary artery are rare, with fewer than 250 cases reported in the literature. Clinically, these patients experience progressive intraluminal growth of the tumor, eventually causing severe right ventricular outflow tract obstruction. The most commonly reported symptoms include dyspnea, chest pain, nonproductive cough, and hemoptysis. Physical examination may reveal evidence of right ventricular systolic dysfunction, including elevated jugular venous pressure, hepatomegaly, and peripheral edema. The pattern of metastasis is typically hematogenous, with predilection for the lung; nodal metastases are uncommon. Patients with pulmonary artery sarcoma generally have a poor prognosis, with reported median overall survival ranging from less than 2 months in patients with metastatic disease to several years or more in patients with localized disease who undergo complete surgical resection.

Several clinical findings were suggestive of a diagnosis other than venous thromboembolism in this case, including a therapeutic international normalized ratio on admission to the hospital, the lack of response to thrombolytic therapy, and the presence of multiple pulmonary nodules on imaging. Although vascular malignant neoplasms, specifically tumors involving the great vessels, are generally uncommon, they should remain on the differential diagnosis in the appropriate clinical setting. Other diagnoses to be considered include locally invasive lung or mediastinal tumors, fibrosing mediastinitis, certain pulmonary infections (such as tuberculosis), and tumor emboli. Misdiagnosis of pulmonary artery sarcoma as pulmonary embolism has been well documented in the literature. Certain radiographic findings, such as extraluminal tumor extension, can suggest the presence of pulmonary artery sarcoma. However, these findings may not appear until late in the clinical course, when the tumor has become inoperable. The early use of positron emission tomography in these patients to visualize the hypermetabolic state of tumor cells may help clinicians more clearly differentiate neoplastic processes, such as pulmonary artery sarcoma, from pulmonary embolism.

The treatment of pulmonary artery sarcoma is controversial, with limited data available to guide clinical decision making. For patients with metastatic angiosarcomas, there is evidence of improved survival following treatment with combination chemotherapy regimens including ifosfamide and doxorubicin hydrochloride. One retrospective analysis found a median overall survival of 11 months in patients receiving doxorubicin-based regimens, compared with approximately 2 months in patients not receiving systemic chemotherapy. For the patient described in this clinical challenge, there was concern that the large volume of intravenous fluid associated with the use of ifosfamide would cause further deterioration of her right ventricular function. For this reason, she was initially treated with single-agent doxorubicin.

A few weeks after hospitalization, the patient’s condition deteriorated substantially, with profound dyspnea and clear signs of respiratory distress. After a lengthy discussion with the patient and family, she was transitioned to hospice care and died shortly thereafter.