Gallium Imaging in Pulmonary Artery Sarcoma Mimicking Pulmonary Embolism: Case Report

Paul J. Myerson, Daniel A. Myerson, Richard Katz, and J. P. Lawson

Griffin Hospital, Derby, Connecticut

Primary pulmonary artery sarcoma provides perfusion–ventilation images, as well as arteriographic studies, that can suggest pulmonary embolism. The awareness of atypical correlation among the studies for pulmonary embolism can lead to an early suspicion of pulmonary artery tumor. Imaging with ^{67}Ga-citrate may facilitate earlier diagnosis.

J Nucl Med 17: 893–895, 1976

Primary pulmonary artery neoplasia is a rare entity that mimics the findings of pulmonary embolism in the early clinical course. The following case of pulmonary artery leiomyosarcoma illustrates the opportunity for early diagnosis and surgical intervention. Imaging with ^{67}Ga-citrate was used, apparently for the first time, to aid in the diagnosis.

CASE REPORT

A 42-year-old white woman presented with left pleuritic pain. During the year before, she had had three similar episodes, one of which included a pleural effusion that was serous, with negative cytology. There was no history of phlebitis and the patient was not on oral contraceptives. Physical examination was noncontributory. Complete blood count, urinalysis, and electrocardiogram were normal. Arterial blood gases revealed a pH of 7.4, pCO_2 of 40, pPO_2 84, and an O_2 saturation of 96.3%. A chest roentgenogram showed relative hyperlucency in the left upper zone and a small pleural reaction at the left base. The cardiac silhouette was normal, and a midthoracic scoliosis convex to the right was present (Fig 1A). Pulmonary perfusion imaging with ^{99m}Tc-albumin revealed a segmental deficit in the left lower zone and poor perfusion in the left upper zone, but a ^{133}Xe ventilation study was normal. A small defect was also seen at the right base anteriorly (Figs. 2A and 2B). Intravenous pyelography and bilateral venography were normal.

The diagnosis of pulmonary embolism was made and the patient was started on intravenous heparin. Pulmonary angiography, performed because of recurrent symptoms, revealed convex intra-arterial filling defects obstructing the pulmonary artery of the left lower lobe and partially occluding several branches of the left upper lobe artery (Fig. 1B). At this time, studies of the vena cava and both iliac venous systems were normal.

After angiography, the patient was placed on Coumadin and was followed as an outpatient. Followup perfusion images remained unchanged on the left,

Received Feb. 12, 1976; revision accepted April 27, 1976.

For reprints contact: Paul J. Myerson, Griffin Hospital, 130 Division St., Derby, CT 06418.

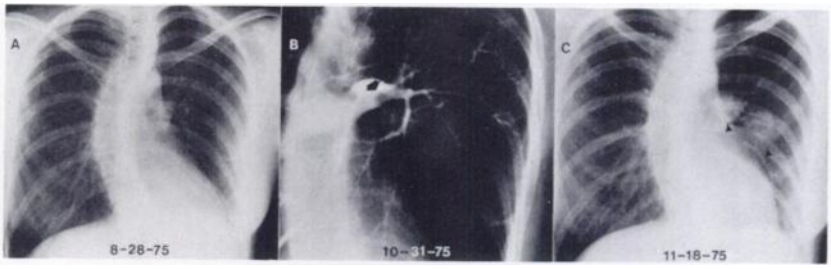

FIG. 1. (A) Chest roentgenogram reveals relative hyperlucency in left upper zone and blunted left costophrenic angle. (B) Pulmonary angiogram shows large convex intra-arterial filling defect (arrow). (C) Chest roentgenogram shows two masses in left lung (arrows).

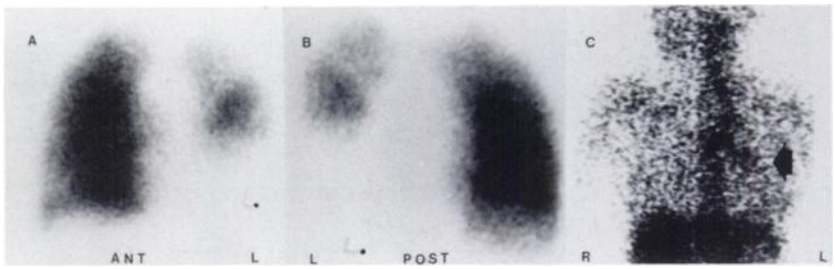

FIG. 2. Anterior (A) and posterior (B) perfusion lung scans reveal segmental deficit in left lower zone and diminished perfusion in left upper zone. (C) Gallium imaging shows positive uptake (arrow) in area of tumor.

while the right perfusion deficit returned to normal. Two months after discharge, a chest roentgenogram showed a left upper lobe mass posterior to the left hilum and a smaller peripheral mass (Fig. 1C). Two weeks later, the central lesion was larger on roentgenogram and showed uptake on a ^{67}Ga-citrate image (Fig. 2C). A left pneumonectomy was performed after further enlargement of the masses, and the pathologic diagnosis of the larger mass was primary pulmonary artery leiomyosarcoma. The smaller peripheral mass represented infarcted lung.

DISCUSSION

Thirty-four pulmonary artery sarcomas, including nine leiomyosarcomas, have previously been reported in the world literature (*1*). Most of these were studied before the advent of pulmonary angiography and scintillation imaging, and they usually presented as large hilar masses or end-stage cor pulmonale. Previously noted distinguishing features in such advanced cases are (A) unilateral lobulated hilar mass projecting into the lung on chest roentgenogram; (B) lack of an accentuated pulmonic sound in cor pulmonale during physical examination; and (C) the arteriographic finding of a mass lucency involving the main pulmonary trunk as well as both pulmonary arteries and branches (*2–4*). Olsson et al. reported a case of pulmonary artery leiomyosarcoma with earlier presentation, in which the patient showed nonspecific lung densities on the chest roentgenogram. Surgical intervention was undertaken when scintillation imaging showed a unilateral total absence of perfusion, an uptake pattern that is unusual in pulmonary embolism (*5*).

The early clinical picture in primary or secondary pulmonary artery tumor is nonspecific and simulates recurrent pulmonary embolization, especially in young women. Hemoptysis, dyspnea on exertion, nonproductive cough, chest pain, and palpitations are symptoms common to both clinical entities (*1*).

In our case, we were puzzled by the arteriographic finding of a central convex lucency suggesting acute pulmonary embolus, together with static perfusion deficits on repeated studies. With chronic pulmonary embolization, one would expect a changing perfusion pattern secondary to the resolution and recurrence of emboli. Despite our patient's atypical feature, embolization was not completely excluded as a diagnostic consideration and a trial of anticoagulation and observation was instituted. When the pulmonary densities appeared on the chest roentgenogram, we considered pulmonary hemorrhage secondary to anticoagulants, iatrogenic pseudoaneurysm secondary to the pulmonary arteriogram, primary pulmonary artery neoplasia, and bronchogenic neoplasm invading the pulmonary artery. A positive ^{67}Ga-citrate scan at this time was instrumental in indicating malignancy, since none of the clinical signs indicated infected hematoma. Prokop, among others, has found normal ^{67}Ga images in patients with clinically proven hematomas that were not infected (personal communication, 1976). Thoracotomy was undertaken when the densities rapidly increased in size.

We wonder whether ^{67}Ga-citrate imaging would have been positive in our patient at the time when the tumor appeared to be entirely within the lumen of the left pulmonary artery. Mori et al. studied ^{67}Ga accumulation relative to cell types and noted 100% (3/3) positivity in fibro- and myosarcomas (*6*). Mishkin et al. found no ^{67}Ga uptake in five angiographically proven cases of pulmonary embolism (*7*).

In a recent study, Siemsen et al. reported that ^{67}Ga-citrate imaging was positive in 88% (109/124) of thoracic lymphomas, 85% (60/71) of pulmonary carcinomas, and 100% (6/6) of pulmonary abscesses. Pulmonary embolism and hematoma were not included in their study of 575 cases. Siemsen et al. state that the gallium study may be positive before the chest roentgenogram, and that lesions over 2 cm in diameter may show uptake (*8*).

Thus, ^{67}Ga-citrate imaging appears to have great potential in differentiating primary or secondary pulmonary artery tumor from pulmonary embolus. Gallium imaging is recommended in cases with the presumed diagnosis of pulmonary embolus whenever a clinical finding or a pulmonary perfusion study is atypical.

REFERENCES

1. SETHI GK, SLAVEN JE, KEPES JJ, et al.: Primary sarcoma of the pulmonary artery. *J Thorac Cardiovasc Surg* 63: 587–593, 1972

2. MOFFAT RE, CHANG CH, SLAVEN JE: Roentgen considerations in primary pulmonary artery sarcoma. *Radiology* 104: 283–288, 1972

3. Case records of the Massachusetts General Hospital: No. 49-1966. *N Engl J Med* 275: 1063–1071, 1966

4. MUNK J, GRIFFEL B, KOGAN J: Primary mesenchymoma of the pulmonary artery: Radiological features. *Br J Radiol* 38: 104–111, 1965

5. OLSSON HE, SPITZER R, ERSTON W: Primary and secondary pulmonary artery neoplasia mimicking acute pulmonary embolism. *Radiology* 118: 49–53, 1976

6. MORI T, HAMAMOTO K, ONOYAMA Y, et al.: Tumor imaging after administration of ^{99m}Tc-labeled bleomycin. *J Nucl Med* 16: 414–421, 1975

7. MISHKIN FS, NIDEN AH, PICK RA, et al.: Gallium lung imaging as an aid in the differential diagnosis between pulmonary infarction and pneumonitis. *J Nucl Med* 16: 551, 1976

8. SIEMSEN JK, GREBE SF, SARGENT EN: Gallium 67 scintigraphy of pulmonary diseases as a complement to radiography. *Radiology* 118: 371–375, 1976