A 57-year-old man with hemodialysis-dependent end-stage renal disease presented with left upper quadrant abdominal pain, chills, and vomiting. He also noted a nonproductive cough of several days' duration but reported no chest pain, dyspnea, fever, or hemoptysis. His history was remarkable for a gunshot wound to the left chest requiring a thoracotomy 20 years prior. He also had hypertension and type II diabetes, and he had been treated with 6 months of isoniazid therapy for a positive purified protein derivative 20 years prior. There was a 60 pack-year smoking history, but no alcohol or illicit drug use. A chest radiograph obtained during evaluation demonstrated two lung masses, which prompted hospital admission (Fig 1).

Physical examination disclosed a comfortable man who was afebrile. The chest revealed a well-healed left thoracotomy scar and bilateral inspiratory crackles. The cardiovascular examination demonstrated a 3/6 apical systolic murmur and bilateral 2+ pitting pedal edema. An arteriovenous fistula of the left arm had a palpable thrill. Laboratory studies were remarkable for a normal leukocyte count, a hemoglobin level of 10 g/dL, and a serum creatinine level of 5.3 mg/dL.

An echocardiogram obtained after admission demonstrated left ventricular hypertrophy, mild systolic dysfunction, and moderate mitral regurgitation; there was no pericardial effusion. A CT scan of the chest was performed (Fig 2).

What is the diagnosis?
Figure 1. Posteroanterior (top) and lateral (bottom) chest roentgenograms revealing two homogenous densities with smooth margins in the left hemithorax. The densities are better appreciated on the lateral projection. A metallic foreign body from a prior gunshot injury is seen on the left.

Figure 2. CT scan (mediastinal windows) reveals homogenous, spherical densities within the left lung. The more inferior tumor appears adjacent to the lateral pleura, and the superior tumor is more posteriorly located. Both opacities are surrounded by a pleural rim and lie along the expected location of the oblique fissure.
Diagnosis: Multiple left-sided vanishing tumors

Vanishing tumor refers to the transient localized collection of pleural fluid in the interlobar fissures, usually in association with congestive heart failure from various causes. This radiographic feature of congestive heart failure is uncommon but well-recognized. It is unclear as to when the term vanishing tumor was first applied to these collections of pleural fluid, but in 1928 Stewart first reported this entity as “interlobar hydrothorax.” Recognition of this radiographic presentation is important, not because it changes the management of congestive heart failure, but because it helps avoid an unnecessary workup for a pulmonary malignancy.

Vanishing tumor is a phenomenon predominantly occurring in the right hemithorax. Van Gelderen retrospectively analyzed chest radiographs of 12 consecutive patients in cardiac failure with interlobar pleural fluid collections who were seen over an 8-year period. All of these collections were right-sided, and seven patients simultaneously had vanishing tumors in both major and minor fissures. These patients all had typical symptoms and signs of cardiac failure, however, vanishing tumors may be the sole manifestation of heart failure. More than 75% of vanishing tumors occur in the right minor fissure and less frequently in the major fissure; concurrent involvement of both the major and minor fissures is reported in about one fifth of cases.

Loculated subcostal pleural fluid simulating a tumor also has been reported, but left-sided vanishing tumor is rare.

The pathogenesis of vanishing tumors involves the adhesion and obliteration of the pleural space due to pleuritis, thus preventing the free accumulation of fluid. In this setting, whenever hydrostatic and/or oncotic forces produce fluid at the pleural surface beyond the resorptive ability of the pleural lymphatics, a localized pleural effusion that is recognized as a vanishing tumor may result. This hypothesis is supported by the finding of adhesive pleuritis at autopsy in cases of known vanishing tumors. However, the coexistence of a free pleural effusion and a vanishing tumor has been reported by Bedford and Loribond, who found both conditions in 5 of 11 autopsied patients. Although pleural inflammation presumably is a prerequisite for the development of a vanishing tumor, symptoms and a history of pleurisy are usually absent. In addition, the pleural adhesions may be transient, as has been suggested by reports of patients with vanishing tumors who, after resolution, developed bilateral free-flowing pleural effusions on subsequent presentations. Last, the right-sided predilection of vanishing tumors is best explained by the increased hydrostatic pressure and the impaired venous and lymphatic drainage that is present in the right hemithorax in congestive heart failure.

Vanishing tumors have a characteristic radiographic appearance; they appear crisp, well-demarcated, and very radiodense on one view, and ill-defined, vague, and much less dense on the other projection, which is an important characteristic of pleural disease. Because the minor fissure is horizontal in orientation, it is projected on-end whenever the x-ray beam is perpendicular to the long axis of the body. A lateral view chest radiograph will almost always reveal the spindle shape of the shadow to better advantage. Rarely, the collection may appear triangular when it is in the peripheral portion of the fissure. On the posteroanterior projection, the effusion may have a round, oval, spindle, wedge, or linear shape, depending on the volume and position of the fluid, the angle of projection of the x-ray beam, the position assumed by the patient, and the amount of compression of the surrounding pulmonary parenchyma.

The case that we report is unique in several aspects. To our knowledge, this is the first well-documented case of multiple left-sided vanishing tumors of the lung. In contrast to most previous reports, our patient did not present with overt symptoms of congestive heart failure. However, he did have end-stage renal disease, which could account for the fluid overload in the presence of
inadequate dialysis. He also had had a thoracotomy following a gunshot wound to the left chest that could have resulted in pleural symphyses, which explains the presence of multiple interlobar effusions. Several prior chest radiograph reports ultimately were obtained that revealed intermittent left-sided vanishing tumor, but there was no evidence of free pleural effusion on either side. This patient's vanishing tumors resolved over several weeks with the increased fluid removal by hemodialysis (Fig 3). This case emphasizes the need to recognize the characteristic radiographic features of vanishing tumor in order to avoid expensive and potentially risky investigations to exclude pulmonary malignancy.

REFERENCES
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