Splenic Simulation of a Renal Mass

Renal radionuclide angiograms, combined with static images, provide a simple screening procedure for space-occupying lesions. Sequential imaging with the scintillation camera permits differentiation of vascular from nonvascular renal lesions without patient morbidity (*1–5*). Correct interpretation requires an appreciation of the normal renal appearance and its variations. Our case illustrates the potential hazard of misinterpretation of normal adjacent structures.

A 52-year-old woman was admitted for complete urologic evaluation because of periodic urinary-tract infections. Physical examination was normal. An excretory urogram revealed an apparent left upper pole renal mass on anterior and oblique views. A retrograde pyelogram supported the excretory findings.

A renal radionuclide angiogram and static images were then obtained. With the patient supine and the detector head placed posteriorly, 17 mCi of ^{99m}Tc-glucoheptonate was administered by rapid bolus injection into an antecubital vein. Images were recorded at two frames per second using a minicomputer with disk storage. The dynamic perfusion study revealed a vascular mass at the superolateral aspect of the left kidney (Fig. 1B). The later static images (Fig. 1A) showed flattening of this margin of the kidney. This combination suggested a vascular lesion such as a hypernephroma involving the margin of the left kidney. To exclude the possibility that it might represent the spleen, the patient was also injected with 3 mCi of ^{99m}Tc-sulfur colloid. A posterior image with both radiopharmaceuticals present revealed the apparent vascular renal mass to represent normal spleen (Fig. 1C). A contrast renal angiogram confirmed the absence of a left renal mass.

Most renal mass lesions (cyst, neoplasms, abscesses) appear as negative defects on static images. The renal dynamic perfusion study has been shown to provide additional information in the evaluation of known or suspected masses. This easily performed study permits assessment of the vascularity of a renal lesion and allows separation of hypervascular from avascular mass lesions. Most frequently a well-defined avascular lesion suggests a renal cyst on the perfusion study, although areas of ischemia or necrotic tumor may present a similar appearance (*3*). Conversely, most renal neoplasms contain considerable vasculature and present as a "blush" on the early sequential images (*2,3*). Less commonly, hamartomas, arteriovenous malformations, and areas of focal pyelonephritis may exhibit hyperperfusion on the dynamic study (*1*).

A knowledge of the normal appearance of the renal perfusion study is imperative when this technique is used to investigate suspected lesions. The normal sequence of visualization of the bolus is: abdominal aorta, kidney and spleen at essentially the same time, and finally hepatic blood pool. The normal splenic blush may interfere with interpretation of perfusion of the left kidney (*4*). In this case, the normal splenic perfusion was interpreted incorrectly as a vascular lesion (tumor) involving the superolateral aspect of the left kidney. Repeat imaging with a reticuloendothelial-localizing agent such as ^{99m}Tc-sulfur colloid will provide for identification of the spleen and will assist in the correct interpretation. This case emphasizes the need for awareness of surrounding normal structures as possible causes of blushes on renal perfusion studies. Care should be used in interpreting apparent vascular lesions. Additional scanning procedures may be required to identify the structure correctly (*6*).

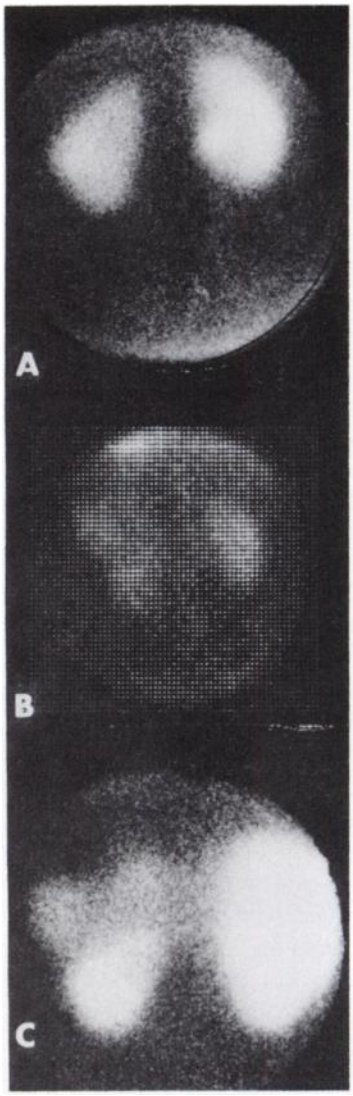

FIG. 1. (A) Posterior static image with ^{99m}Tc-glucoheptonate shows flattening of left kidney superolaterally. (B) Single frame from dynamic perfusion study reveals vascular mass in same region. (C) Static image with ^{99m}Tc-sulfur colloid and ^{99m}Tc-glucoheptonate shows suspected vascular mass to represent normal spleen.

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Uptake of ^{99m}Tc-Pyrophosphate by Metastatic Extragenital Seminoma

Technetium-99m-labeled pyrophosphate, polyphosphate, and diphosphonate often localize in tissues outside the skeleton and renal system. Intrathoracic extraosseous concentrations of these agents have been reported in several conditions, including squamous-cell carcinoma of the lung (*1,2*), myocardial infarction (*3,4*), malignant pleural effusions (*5*), and lymphosarcoma (*1*). Localization in some cases was associated clearly with pathologic calcification (*6,7*), but in others the uptake mechanism remains obscure. The present communication describes a case of ^{99m}Tc-pyrophosphate concentration in lung metastases from an extragenital seminoma.

A 46-year-old man, previously treated with radiotherapy for seminoma, was referred for a bone scan in December 1974 to evaluate a recurrent backache.

In 1961 the patient had presented with pain in the left loin and left iliac fossa. At laparotomy a large mass of matted nodes, involving the upper left ureter, was found in the retroperitoneum. Tuberculosis was suspected and the patient was treated with streptomycin, but the laboratory tests for tuberculosis were all negative. The biopsy specimen was necrotic, and histologically the lesion was attributed to chronic pyogenic inflammation.

After remaining well for 11 years, the patient had a recurrence of left iliac fossa pain. Relevant clinical findings were a nonfunctioning left kidney, as shown by ^{131}I-Hippuran renogram and intravenous pyelogram, a normal blood urea level (26 mg/dl), normal testes, and a normal chest radiograph. Laparotomy revealed a large mass of nodes at the same site as in 1961. Biopsy specimens contained large cells, each having a clear cytoplasm with a large centrally placed nucleus and prominent nucleoli. A diagnosis of typical seminoma was made.

In addition, the tumors showed areas of degeneration and necrosis. When the 1961 sections were reviewed, the features were identical with those of the necrotic areas of tumor in the 1973 sections. The patient was treated with radiotherapy, the testes being included in the treatment field. He resumed a normal life until the backache returned in November 1974.

A whole-body bone scan was undertaken 3 hr after the injection of 8 mCi of ^{99m}Tc-pyrophosphate, and selected areas of interest were imaged 2 hr later with a scintillation camera. Areas of abnormal skeletal uptake were detected in the lumbar vertebrae and right sacroiliac region. In addition, two well-defined areas of uptake were seen in the lungs (Fig. 1A). The left kidney was not seen, but the right kidney and bladder were clearly visible. There were no other areas of abnormal uptake. A chest radiograph (Fig. 1B) taken 6 days later revealed a large metastasis, 9 × 11 cm, in the right lung and a smaller metastasis, 5.5 × 5.5 cm, in the left lung, both corresponding in size and position with the lesions detected during bone scanning. At this time the patient had a blood urea concentration of 23 mg/dl. Fifteen days later, on completion of radiotherapy, a chest radiograph showed that the lesions in the right and left lungs had decreased in size to 5 × 5.5 cm and 3.5 × 3.5 cm, respectively. The condition of the patient deteriorated rapidly, however, and he died 13 days later.

At autopsy, a large soft reddish-gray tumor mass was found to extend from the left renal vein down the posterior abdominal wall and into the pelvis. To this mass were stuck the hydronephrotic left kidney, parts of the stomach, the small gut, pancreas, and the splenic flexure of the colon. There was tumor involvement of the lower half of the left kidney, the left renal vein, and the lower lumbar vertebral bodies, with metastatic tumor in the para-aortic lymph nodes and also in a single mediastinal node (Fig. 2). In the lower lobe of the right lung there was a 6-cm-diameter tumor nod-

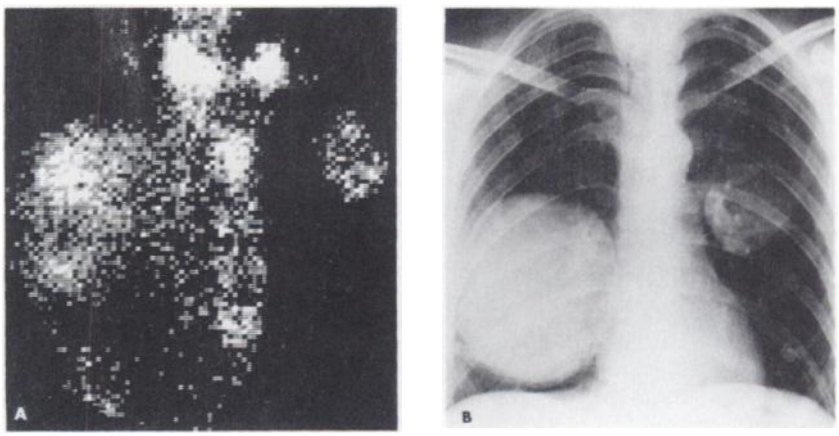

FIG. 1. (A) Anterior chest scan using ^{99m}Tc-pyrophosphate. In addition to sternal uptake, which is particularly well defined in sternoclavicular and manubriosternal joint regions, there are two areas of extraosseous ^{99m}Tc localization within lung fields. (B) Chest radiograph, taken 6 days after bone scan, shows well-defined tumors in lungs.