

SPECT/CT imaging of a retroperitoneal nodule in a patient with history of infiltrating renal urothelial carcinoma

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ABSTRACT

A 62 year old woman status post radical nephroureterectomy for high grade urothelial carcinoma was found on CT to have a 1 cm retroperitoneal nodule in the nephrectomy bed. The nodule's differential diagnosis included recurrent urothelial carcinoma versus relocation of the patient's splenule seen on earlier CT imaging. We report using SPECT/CT with Tc-99m labeled denatured red blood cells to definitively diagnose the nodule as a relocated splenule.

CASE REPORT

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A 62 year old woman underwent laparoscopic radical left nephroureterectomy for a high-grade urothelial carcinoma in the lower renal pole. The 4.6 cm lesion had infiltrated through the renal parenchyma and into peripelvic fat. Surgical margins and twenty-three lymph nodes were negative for malignancy. CT imaging prior to the nephroureterectomy revealed a 1 cm splenule lying along the lateral border of the abdominal cavity positioned anterior to the inferior margin of the spleen (Fig. 1).

Several months after the nephroureterectomy, a follow up CT revealed a 1 centimeter nodule lying in the left nephrectomy bed (Fig. 2). It was felt that this most likely represented the same splenule, though given the significant change in position, and given the aggressive nature of the patient's tumor, recurrent carcinoma needed to be ruled out.

The patient was injected with 4 mCi of Tc-99m labeled denatured red blood cells. SPECT images revealed intense physiologic activity in the spleen, as well as subtle separate activity along the medial margin of the spleen (Fig. 3). Fused

SPECT/CT imaging easily localized the activity to the nodule in question (Fig. 4), confirming the diagnosis of a splenule.

DISCUSSION

Splenules are incidental findings of little clinical significance in most patients. However, they must be properly identified in various situations, such as: torsion, infarction, or in differentiating them from metastatic lesions. Proper identification not only guides patient treatment but may also prevent unnecessary surgery (1).

Splenules result from the failure of the splenic anlage to fuse during the fifth week of fetal life. Accessory splenic tissue is relatively common having been identified in 16% of patients undergoing contrast enhanced abdominal CT (2) and seen in 10-30% of patients at autopsy (3). Patients have been noted to have as many as six splenules (4).

Splenules typically are rounded well-margined soft tissue structures that measure less than 2 centimeters. Occasionally, the splenule may be ovoid, or very rarely triangular. They are most commonly located in splenic hilum near the tail of the pancreas (2). However, considerable variability in location exists and they may be found along the splenic vessels, gastrosplenic or splenorenal ligaments or even in the pancreatic tail (2,5).

The differential diagnosis of splenules not only includes metastatic carcinoma, as in this case, but also other entities such as splenosis, endometriosis, mesenchymal tumors, and other rare conditions such as peritoneal mesothelioma and splenogonadal fusion.

These differential diagnoses can be differentiated using clinical history and radiological appearance. Splenosis is heterotopic autotransplantation of splenic tissue usually following a traumatic rupture of the splenic capsule. This rupture results in seeding of splenic tissue into the abdominal cavity. Although histologically indistinguishable from splenules or other splenic tissue, other factors aid in differentiating splenosis nodules from splenules. Nodules related to splenosis may be numerous, are usually sessile, and lack the elastic muscular capsule of a splenule. Splenules are usually very few in number, pedunculated, and are contained within a capsule. Additionally, splenules usually derive their vasculature from the splenic artery; whereas, splenosis nodules derive their blood supply from small arteries near their implantation site (6).

Splenogonadal syndrome is a rare malformation resulting from the fusion of splenic tissue with the nearby developing gonad during weeks 5-8 of gestation. More than 98% of reported cases have involved the left gonad and the syndrome occurs predominately in males, with a male to female ratio of 16:1 (7). The syndrome may result in streaks of splenic tissue extending from the spleen, or may also result in isolated splenic tissue within or adjacent to the gonads. Characteristic location and shape differentiate splenogonadal syndrome from splenules. Splenogonadal syndrome is associated with cryptorchidism and orofacial or limb developmental abnormalities (8).

On noncontrast CT, the attenuation of splenules is comparable to that of the spleen. However, small splenules (<1 cm) may be hypodense when compared to the spleen (2). With contrast administration, splenules should enhance homogeneously.

Technetium-99m labeled denatured red blood cells localize to splenic tissue via phagocytosis and red blood cell sequestration (9). As demonstrated by this case, SPECT/CT imaging with denatured red blood cells facilitates the assessment of splenules with a high level of diagnostic confidence.

TEACHING POINT

Although splenules are usually incidental findings of little clinical importance, these lesions may require further evaluation, particularly in patients with a history of malignancy. Fused SPECT/CT imaging with Tc-99m labeled denatured red blood cells facilitates the definitive diagnosis of a splenule and may also help in identifying splenules that have relocated within the abdominal cavity.

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FIGURES



Figure 1: A 62 year old woman with urothelial carcinoma and a suspicious 1 cm nodule ultimately diagnosed as a relocated splenule. Abdominal axial CT with oral contrast and without intravenous contrast, obtained prior to the nephroureterectomy, revealed a 1 cm splenule (arrow) lying along the lateral border of the abdominal cavity positioned inferior and anterior to the spleen (bottom magnified view).



Figure 2: A 62 year old woman with urothelial carcinoma and a suspicious 1 cm nodule ultimately diagnosed as a relocated splenule. Following the left nephroureterectomy, an abdominal CT with oral contrast and intravenous contrast in portovenous phase, demonstrated a 1 cm nodule (arrow) in the nephrectomy bed. The nodule enhanced with contrast and ranged from 39-97 hounsfield units.

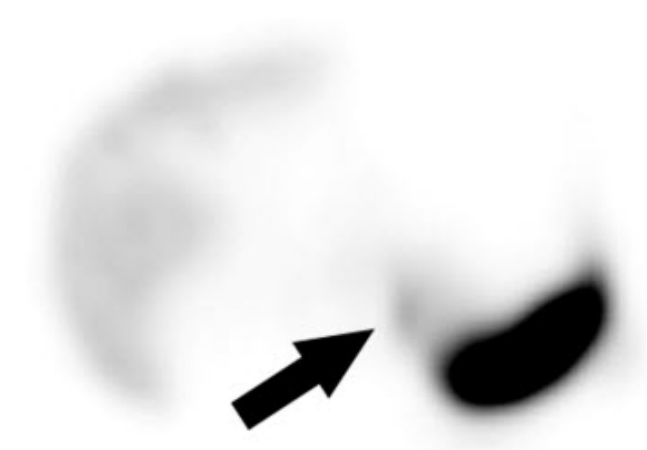


Figure 3: Axial abdominal SPECT obtained 1 hour following the administration of 4 mCi Tc-99m labeled denatured red blood cells revealed physiologic uptake within the spleen and liver. SPECT imaging revealed some uptake in the region of the nodule (arrow) but without definitive anatomic correlation.

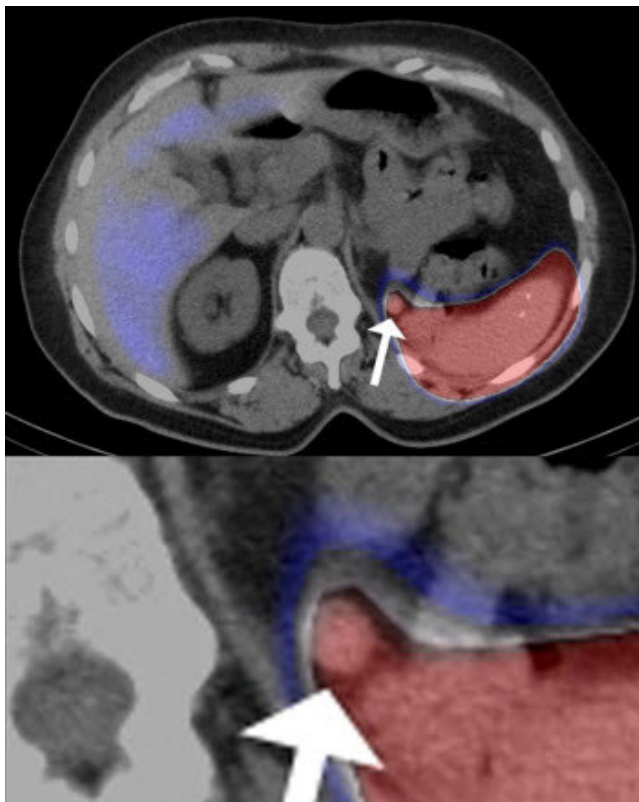


Figure 4: A 62 year old woman with urothelial carcinoma and a suspicious 1 cm nodule ultimately diagnosed as a relocated splenule. Axial abdominal SPECT/CT images were obtained an hour after intravenously injecting 4 mCi of Tc-99m labeled red blood cells. Fusion of the image in figure 3 to the corresponding localization CT slice localizes uptake in the nodule (arrow) allowing for the definitive diagnosis of a splenule (bottom magnified view). Imaging was performed on a Siemens Symbia 16-slice SPECT-CT scanner. Fusion was performed using the Siemens Syngo Somaris software package.

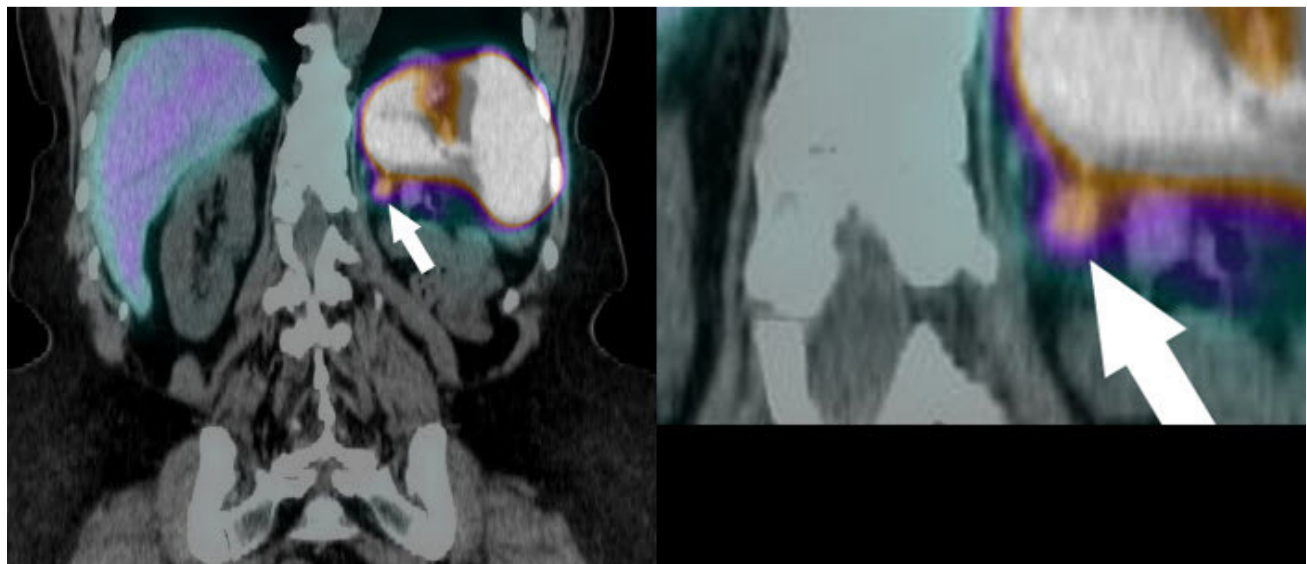


Figure 5: A 62 year old woman with urothelial carcinoma and a suspicious 1 cm nodule ultimately diagnosed as a relocated splenule. Coronal SPECT/CT image from the same study as in figure 4 shows uptake in the nodule located inferior to the medial splenic tip in question (arrow), allowing for the definitive diagnosis of a splenule (right magnified view).

ABBREVIATIONS

CT= Computed tomography
SPECT=Single photon emission computed tomography
Tc99m= Technetium 99m

KEYWORDS

SPECT/CT, Splenule, Renal Urothelial Carcinoma, Nephrectomy

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