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Authors

Gerscovich, Eugenio
Neufeld, Ethan
Sekhon, Simran

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Intra-renal splenosis mimicking a solid renal mass

Ethan A Neufeld, Simran Sekhon and Eugenio O Gerscovich

Abstract

We present the case of a young woman found to have an exophytic solid renal mass who was referred to our institution for ablation of said mass versus partial nephrectomy. The patient had a history of splenectomy. Ultrasound demonstrated a homogeneous solid left renal mass, and the diagnosis of intra-renal splenosis was considered based on the patient's history. The diagnosis was confirmed using Tc-99 m heat-damaged red blood cell scintigraphy, obviating the need for an invasive procedure. The diagnosis of intra-renal splenosis should be considered for a solid renal mass with an appropriate history of prior splenic trauma or splenectomy.

Keywords

Splenosis, renal ultrasound, solid renal mass

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Case

A 36-year-old woman was referred to our institution for ultrasound evaluation of an exophytic left upper pole solid renal mass. The patient had a history of Wilms' tumor diagnosed at age 6 for which she underwent a right nephrectomy and partial left nephrectomy. For this reason, she had been undergoing annual screening abdominal ultrasound of her left kidney and right renal fossa to evaluate for recurrence. She also had a history of splenectomy for a reportedly enlarged spleen.

When performing an upper abdominal ultrasound for screening of her left kidney and evaluation for mild transaminitis at an outside institution, an exophytic left upper pole renal mass was identified. A follow-up CT scan performed in the portal venous phase of contrast enhancement demonstrated this to be a 4 cm homogeneously enhancing mass (Figure 1). At the time, it was unclear what the etiology of the mass was, but the appearance was suspicious of primary renal malignancy such as renal cell carcinoma as there was no reported history of a mass at this location in her prior medical records.

She was referred to our medical center to evaluate her suitability for either radiofrequency ablation (RFA) of the left upper pole renal lesion or partial nephrectomy. A repeat ultrasound at our institution was performed as a pre-procedure evaluation. The repeat ultrasound verified a $4 \times 3.1 \times 3.6$ cm homogeneous, well-circumscribed mass within the upper pole of the left kidney (Figure 2). Internal blood flow to the mass was present on Doppler evaluation indicating its solid and vascular nature (Figure 3). Due to its diffusely homogeneous appearance and the absence of the spleen, the diagnosis of splenosis was considered and a Technetium-99 m (Tc-99 m) heat-damaged red blood cell (RBC) study was requested prior to any surgical intervention. Tc-99 m heat-damaged RBCs localize with high specificity to splenic tissue and this was felt to be the definitive test to establish this possible diagnosis.

Tc-99 m-labeled heat damaged RBC scintigraphy with single-photon emission computed tomography

Department of Radiology, University of California Davis, Sacramento, CA, USA

Corresponding author:
Ethan A Neufeld, Department of Radiology, UC Davis Medical Center, 4860 Y Street, Suite 3100, Sacramento, CA 95817, USA.
Email: eneufeld@ucdavis.edu

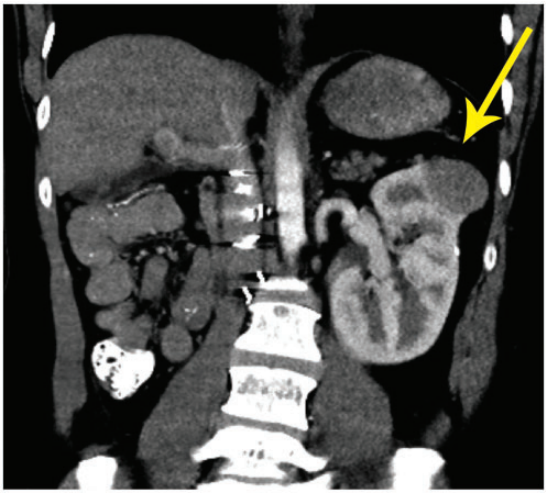

Figure 1. Coronal image from contrast enhanced CT of the abdomen/pelvis in portal venous phase – a partially exophytic solid mass seen arising from the superior pole of the left kidney. The left kidney is enlarged due to compensatory hypertrophy from prior right nephrectomy in the patient's childhood. The spleen is absent consistent with history of prior splenectomy.

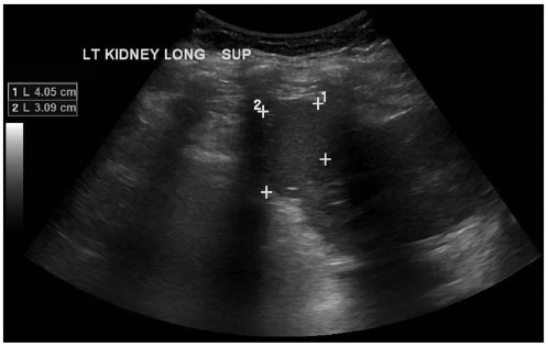

Figure 2. Grayscale ultrasound longitudinal image of the superior pole of the left kidney – a circumscribed homogeneous partially exophytic mass is demonstrated. The internal echnogenicity of the mass resembles the sonographic appearance of splenic tissue. Note an absent spleen due to previous splenctomy.

(SPECT) imaging was performed (Figure 4). It demonstrated expected liver and bone marrow activity as well as absence of the right kidney and spleen per history stated above. There was focal radiotracer activity, indicating accumulation of heat-damaged RBCs associated with the mass, in the upper pole of the left kidney. This finding was consistent with functioning splenic tissue and confirmed the suspected diagnosis. The decision was made at that time to withhold RFA or surgical resection in lieu of conservative management with imaging follow-up via ultrasound.

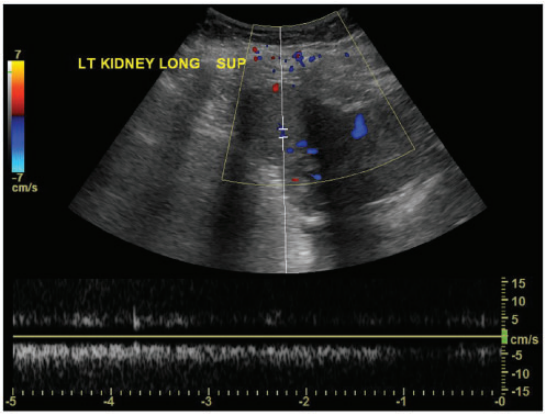

Figure 3. Color and spectral Doppler ultrasound longitudinal image of the mass in the upper pole of the left kidney – internal blood flow is present as demonstrated with a venous waveform on spectral Doppler.

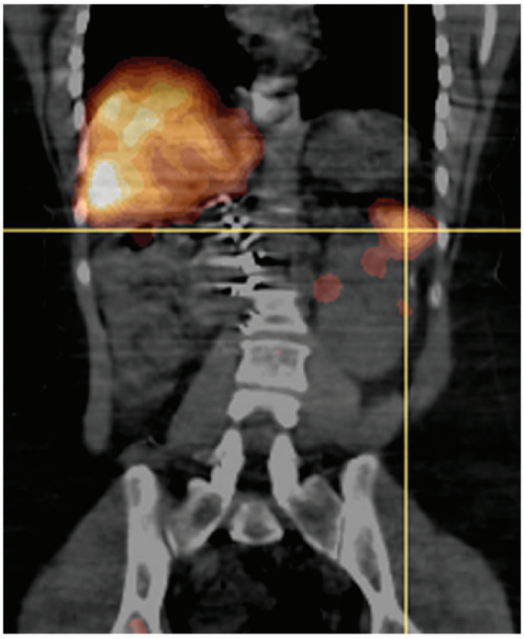

Figure 4. Coronal reformat SPECT/CT image from Tc-99 m-labeled heat damaged red blood cell scintigraphy – expected accumulation of activity in the liver and bone marrow. The spleen and right kidney are absent. There is focal accumulation of tagged red blood cells in the upper pole of the left kidney corresponding to the the mass identified on CT and ultrasound.

Discussion

Splenosis is a condition defined by autotransplantation of splenic tissue in an ectopic location and is the sequela of splenic trauma and/or surgical intervention.[1] Even after controlled surgical removal for thrombocytopenia, it is estimated that remnant splenic tissue will

be present 5–20% of the time.[2] The ectopic splenic tissue induces angiogenesis and remains functional, able to phagocytize senescent RBCs and perform immunologic function. Foci of splenic tissue can attach to various locations in the abdomen and develop into small masses which enhance on CT and may grow over time.[1] When found on imaging, this can be a diagnostic dilemma in the absence of appropriate history or prior studies. As one may expect, the most common locations of splenosis are in the left upper quadrant of the abdomen, typically on the undersurface of the diaphragm, serosa of the small or large intestine, parietal peritoneum, and omentum.[1] It can also develop in less common locations where the diagnosis can be less certain. Entities such as pancreatic tail splenosis, intrahepatic splenosis, and intrathoracic splenosis are well described, though challenging diagnoses to make.[3] When these enhancing masses are identified and the diagnosis is not considered, the findings may be concerning for malignancy.[4] Such cases may lead to unnecessary biopsy or other interventions. This can have serious consequences as splenic tissue – even when ectopic – is prone to bleeding due to its high vascularity and poorly formed capillary network.[5]

Historically, the diagnosis of ectopic splenic tissue was made via Technetium-99 m-labeled sulfur colloid scintigraphy, where the ectopic splenic tissue in question would take up the labeled sulfur colloid.[2] While this technique may still be used, the extensive uptake of sulfur colloid by bone marrow and hepatic tissue can limit its utility in some circumstances.[6] Currently, the standard of diagnosing ectopic splenic tissue is Technetium-99 m heat-damaged RBC scintigraphy. Heat-damaged RBCs localize more specifically to splenic tissue than sulfur colloid.[6] When evaluated with SPECT/CT, this technique is highly sensitive and specific for the detection of ectopic splenic tissue. Many unusual cases of splenosis that could not be confidently diagnosed via other imaging modalities have been confirmed using heat damaged RBC scintigraphy. Alternatively, ferumoxide-enhanced MRI has been described to be able to distinguish ectopic splenic tissue from other masses, but this is less well studied.[7]

Conclusion

Our case illustrates the importance of identifying the absence of the spleen and the implications of its absence on findings elsewhere in the abdomen. Even in cases of uncomplicated splenectomy, small splenic remnants can be identified at a later time and can be a diagnostic challenge if this entity is not considered. Intra-renal splenosis is a rare entity with our institution not having previously encountered it, and only a few case reports in the literature.

The radiology department of the Veteran's Administration hospital in Gainesville, Florida reported a solid left renal mass identified incidentally on upper abdominal sonography that required nuclear medicine scintigraphy to diagnose as ectopic splenic tissue.[3] The department of urology at the University of Pennsylvania diagnosed a case of intra-renal splenosis of the left kidney via percutaneous biopsy which was further verified via Tc-99 m heat-damaged RBC scintigraphy.[4] While these examples were able to be diagnosed by relatively non-invasive methods, other examples such as a published case by Bock in the *Journal of Urology* are only diagnosed via pathology after partial or total nephrectomy.[8]

While indeed rare, this case demonstrates an important presentation of splenosis that can be a diagnostic dilemma if not considered. The imaging appearance can raise concern for primary renal malignancy and patients may be referred for partial or total nephrectomy unnecessarily. By being aware of this entity, such procedures may be avoided via an appropriate imaging work up.

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Ethical approval

The patient in the study provided written consent for the images to be published and used for this purpose.

Guarantor

EOG.

Contributors

Simran Sekhon interpreted initial ultrasound and researched the case as well as the background literature. Ethan A Neufeld researched the case, performed literature review, obtained images, and wrote the manuscript. Eugenio O Gerscovich reviewed the manuscript and images, provided counsel, and approved final manuscript.

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