CLINICAL IMAGE

Adenosine perfusion magnetic resonance imaging: a diagnostic aid for ectopic splenic tissue

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A 65-year-old woman presented with a history of exertional dyspnea and chest tightness. Her medical history included hypercholesterolemia, breast cancer, and splenectomy following trauma in childhood.

Physical examination and resting electrocardiography were unremarkable. Exercise electrocardiography showed minor inferolateral ST depression with associated chest tightness. She was therefore referred for functional testing for ischemia using adenosine perfusion myocardial magnetic resonance imaging.

Images were acquired using a 1.5-T magnetic resonance scanner with adenosine administered according to a standard protocol at 140 μg/kg/min for 4 minutes and gadoterate meglumine contrast agent administered intravenously at 0.05 mmol/kg. First-pass perfusion imaging was performed every cardiac cycle using a T1-weighted saturation recovery gradient echo sequence at stress and after 10 minutes of recovery, at rest.

The images showed normal cardiac structure and function with no inducible perfusion abnormalities; however, a 7×7 cm spherical mass of unknown etiology in the left upper quadrant was detected (FIGURE 1A). The mass showed enhancement with gadolinium-based contrast agent on rest perfusion images (FIGURE 1B). However, in the corresponding stress images acquired immediately following administration of adenosine, there was minimal contrast enhancement suggestive of attenuated perfusion (FIGURE 1C).

Reduced splenic perfusion during adenosine stress cardiovascular magnetic resonance due to attenuated blood flow as compared with rest has previously been described during adenosine perfusion myocardial magnetic resonance imaging. The adenosine infusion induces splenic arterial constriction through adenosine A_1 or A_{2B} receptor action, thus reducing the uptake of gadolinium-based contrast agent in the spleen and resulting in a relative splenic "switch-off" used clinically to indicate adequacy of pharmacological stress.[1]

It was considered likely that the mass represented a splenunculus and hence a denatured red cell nuclear scan was performed. The anterior planar image (FIGURE 1D) showed a markedly increased uptake in the region of the left upper quadrant mass, confirming the diagnosis of a splenunculus. The uptake was also seen in the liver and to a lesser extent, the stomach and the spine,

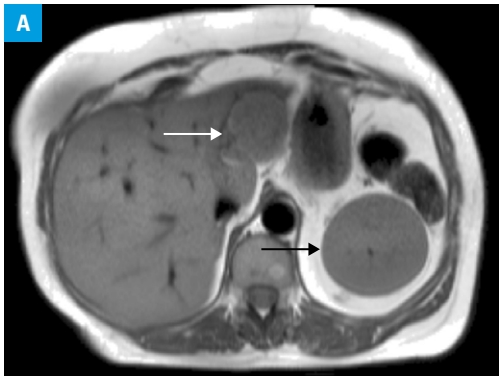

FIGURE 1 **A** – electrocardiography-gated T1-weighted single-shot black-blood (HASTE) axial anatomical imaging showing a well circumscribed mass consistent with residual splenic tissue (black arrow) and a hepatic hemangioma (white arrow)

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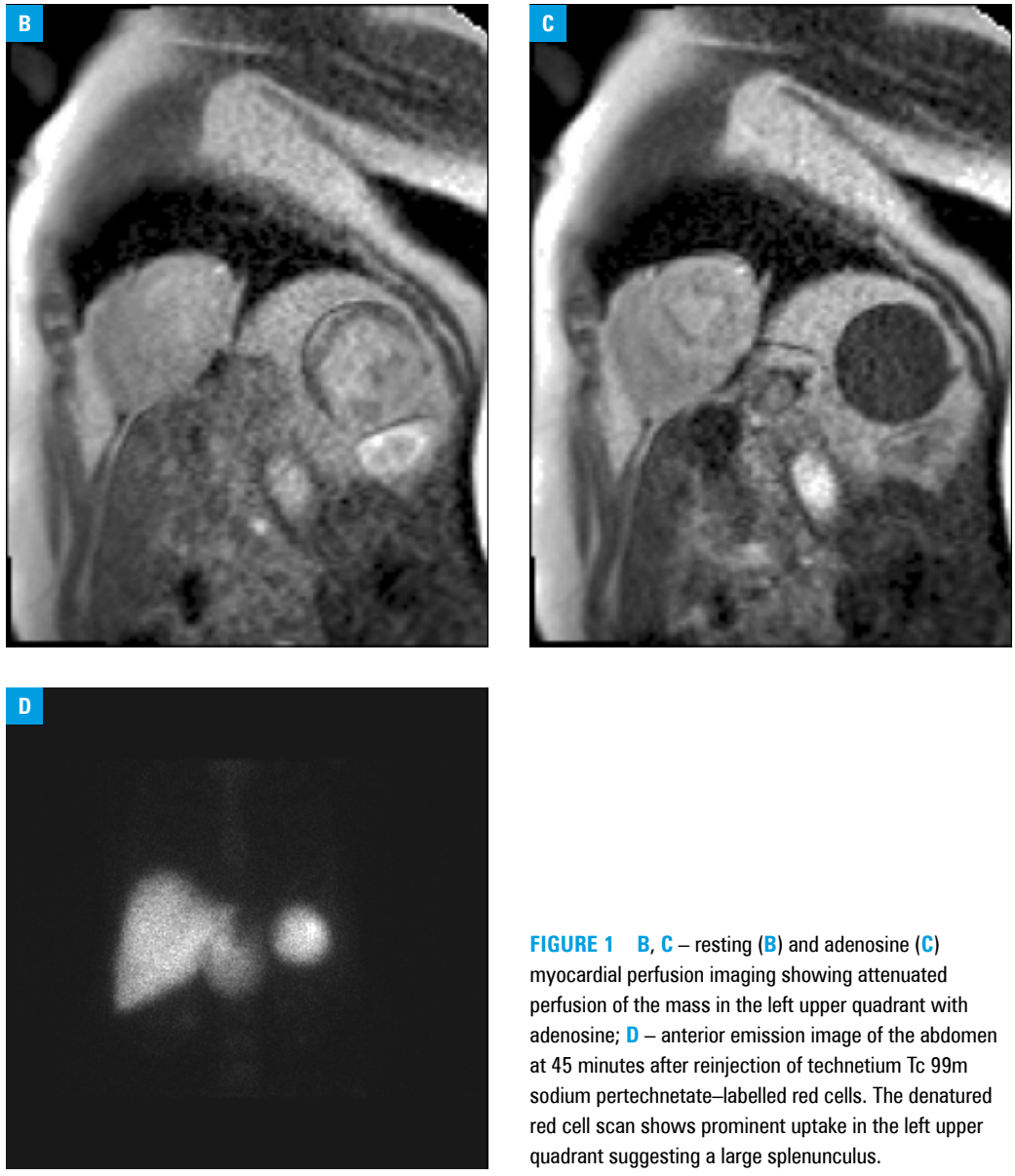

FIGURE 1 **B**, **C** – resting (**B**) and adenosine (**C**) myocardial perfusion imaging showing attenuated perfusion of the mass in the left upper quadrant with adenosine; **D** – anterior emission image of the abdomen at 45 minutes after reinjection of technetium Tc 99m sodium pertechnetate–labelled red cells. The denatured red cell scan shows prominent uptake in the left upper quadrant suggesting a large splenunculus.

reflecting the uptake elsewhere in the reticuloendothelial system.

A splenunculus is an accessory splenic tissue that shares vascular supply with the original spleen, typically adjacent to the main spleen, though it has been observed on mobile vascular peduncles, in the pancreas, and in the retroperitoneal area. It is an important mimic of metastases and its misdiagnosis can lead to inaccurate chemotherapy or surgery.[2,3] Splenunculi have been noted for a number of years; however, their diagnosis remains difficult. The accepted current gold standard is a radio-isotope red blood cell scan[4] using the physiological function of the spleen to remove damaged labelled erythrocytes, effectively labelling splenic tissue as well as other reticuloendothelial tissue. Whilst accurate, the process is time consuming and not commonly performed. Alternative methods include ultrasound, although it is a less sensitive technique.[5]

This is the first description of the use of adenosine perfusion imaging to aid the diagnosis of extracardiac pathology. Moreover, the vasoconstrictor response of the splenic artery to adenosine was used for the first time in order to characterize and identify ectopic splenic tissue. We propose this as a simple novel method to facilitate the diagnosis of splenunculi or ectopic splenic tissue in diagnostic imaging.

ARTICLE INFORMATION

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CONFLICT OF INTEREST None declared.

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