The Role of Cardiac Magnetic Resonance Imaging in Antiphospholipid Syndrome

DORUK ERKAN, MD, Division of Rheumatology, Hospital for Special Surgery; HALE EREL, MD, Division of Radiology; YUSUF YAZICI, MD, Division of Rheumatology, Hospital for Special Surgery; MARTIN R. PRINCE, MD, PhD, Division of Radiology, Weill Medical College of Cornell University, New York, New York, USA. Address reprint requests to Dr. D. Erkan, Division of Rheumatology, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021. E-mail: derkan@pol.net

A 28-year-old woman presented to another hospital with 24 hours of right-side numbness followed by weakness. She was previously healthy until 8 months earlier, when she had developed transient (20 min) right eye vision field defects and was treated for ocular migraines. She had a second episode 6 weeks prior to admission. She has been taking oral contraceptives for the last 2 months. On admission, she had a systolic ejection murmur at apex and right hemiparesis. Magnetic resonance imaging (MRI) of the brain was positive for multiple acute infarctions involving supratentorial brain and left cerebellum. Echocardiography showed mitral valve vegetation and a multilobulated 0.5 × 1 cm right atrial mass, which was interpreted as thrombus, even though an atrial myxoma was not completely excluded. Her laboratory tests were remarkable for thrombocytopenia (122×10^9/l), positive lupus anticoagulant test, and IgG anticardiolipin antibody > 80 GPL. Ten days after the admission, despite full dose anticoagulation with low molecular weight heparin, she developed expressive aphasia and she was transferred to our hospital. The brain MRI confirmed a new stroke involving the left lentiform nucleus and thalamus (Figure 1A, axial T2 weighted image), and left parietal lobe ischemia, which is prominent by diffusion imaging technique (Figure 1B). Electrocardiography (ECG) gated spin echo MRI in the coronal (Figure 2A), sagittal (Figure 2B), and axial (Figure 2C) planes and axial cross-sectional fast gradient recalled echo (GRE) (FastCard) bright blood cardiac MRI (Figure 2D) revealed thrombus in the superior vena cava and left atrium. MRI did not reveal the right atrial mass that was initially reported with echocardiography.

The antiphospholipid syndrome (APS) is a distinct clinical syndrome associated with vascular thrombosis and/or pregnancy morbidity in the presence of circulating antiphospholipid antibodies, most commonly anticardiolipin antibodies and lupus anticoagulant[1]. Intracardiac thrombus formation can occur in patients with APS and can be difficult to differentiate from intracardiac tumors such as myxoma. Timely detection of the thrombosis is crucial in the management of APS. Cardiac MRI, which has steadily improved since its introduction 15 years ago, is one of the new diagnostic tools for the detection of thrombi.

Today, cardiac MRI already has many clinical indications,

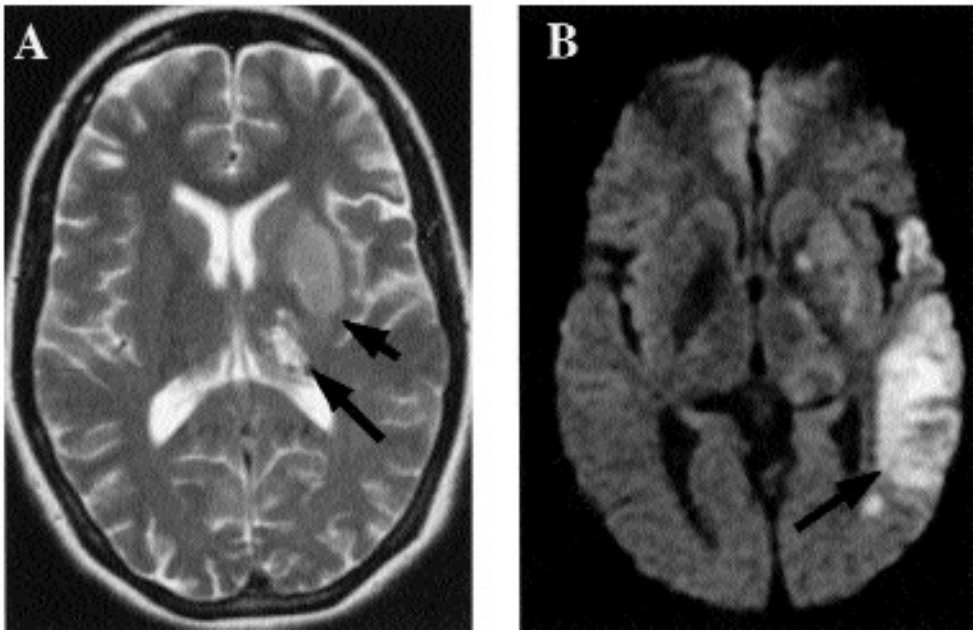

Figure 1. MRI of the brain showing the left lentiform nucleus (short arrow) and thalamus (long arrow) infarct (A, axial T2 weighted image); and left parietal lobe ischemia, which is prominent by diffusion imaging technique (B).

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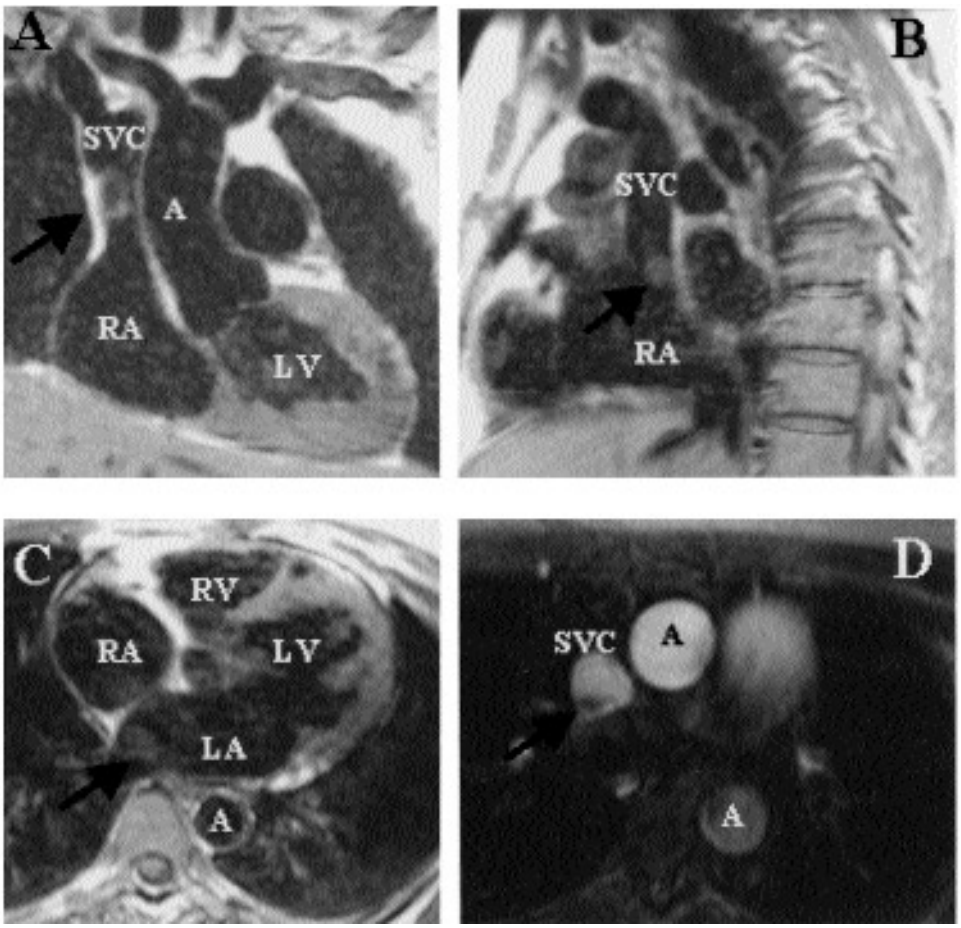

Figure 2. ECG gated spin echo MRI in coronal (A), sagittal (B), and axial (C) planes and axial cross-sectional fast GRE bright blood cardiac MRI (D) reveal thrombus formations (arrows) in superior vena cava and left atrium (RA: right atrium, RV: right ventricle, LA: left atrium, LV: left ventricle, A: aorta, SVC: superior vena cava).

in particular for evaluating acquired and congenital heart diseases and thoracic vascular diseases. Besides morphologic information on cardiac and thoracic great vessels, MRI examinations can also evaluate ventricular function (i.e., ejection fraction, stroke volumes, regurgitation fractions, cardiac output), tissue viability, and coronary artery morphology and flow. Cardiac MRI does not require x-rays or injection of iodinated or radioactive contrast material. This represents a significant safety advantage over other imaging modalities. The signal void from flowing blood on spin echo (SE) images and the high signal intensity from blood on GRE images eliminate the requirement of contrast media injection for discrimination of the blood pool from the cardiovascular solid structures. Therefore, cardiac MRI can be totally noninvasive.

Spin echo imaging has been highly effective for imaging intracardiac masses[2]. The most frequent intracardiac mass is a thrombus, which is usually located in the left heart chambers. MRI can differentiate between tumor and nontumorous thrombus, a major advantage over echocardiography[3], and this was clearly demonstrated in our patient. Tumors are hyperintense on SE T2 weighted images. Further, on GRE images, a clot has lower signal intensity compared to myocardium, where the tumor has intermediate signal intensity. If gadolinium (superparamagnetic contrast media) is administered, tumor enhances, but thrombus does not. These signal characteristics are useful for differentiating between the tumor and a clot. MRI also helps to define the age of clot, which is very important to determine the most appropriate treatment. On SE images, fresh clot shows high intensity, whereas an old clot has low signal intensity.

Clinicians should be aware of the usefulness and major advantages of cardiac MRI for the differentiation of cardiac masses, especially when echocardiography is inconclusive.

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