Cardiac Magnetic Resonance Imaging Can Clearly Depict the Morphology and Determine the Significance of Cor Triatriatum

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A 46-year-old asymptomatic woman with a history of breast cancer and chemotherapy treatment was referred for echocardiography examination as part of a preoperative assessment workup before orthopedic surgery to evaluate her left ventricular ejection fraction. Echocardiography showed a linear echodensity within the left atrium (LA) (Figure 1), but there was incomplete depiction of the spatial relationship between the echodensity and surrounding structures.

Cardiac magnetic resonance imaging was performed to further characterize this structure. The cardiac magnetic resonance imaging protocol included several pulse sequences: T1-weighted turbo spin echocardiogram, T2-weighted black blood image, and steady-state free precession cardiac magnetic resonance imaging, in addition to phase-contrast technique.

A single, membrane-like structure was seen traversing the LA cavity (Figure 2), extending from just below the fossa ovalis to the LA wall (Figure 3 and Movies I and II in the online-only Data Supplement). All pulmonary veins drained into the posterosuperior LA, except for the left upper pulmonary vein, which drained into the anteroinferior LA. The LA was dilated. Left ventricular systolic function was at the lower limits of normal (left ventricular ejection fraction, 56%), whereas right ventricular systolic function was normal. In addition, a bovine arch was detected (Figure 4).

Use of the phase-contrast technique in the sagittal oblique plane was planned to depict the size of the opening in the membrane (Figure 5), which determines the degree of obstruction to pulmonary venous return. An area of 2.4 cm² was traced, suggesting a hemodynamically insignificant obstruction.

Cor triatriatum is a rare cardiac malformation accounting for only 0.1% of all cardiac defects. Embryologically, cor triatriatum may be caused by failure of resorption of the common pulmonary vein, producing an LA divided by an abnormal fibromuscular membrane. Clinical presentation depends on the degree of restriction of blood flow from the upper chamber to the lower chamber of the LA through a fibromuscular membrane containing 1 or more fenestrations.

The communication between the 2 divided atrial chambers may be large, small, or absent, depending on the size of the opening in the membrane. Elevations of both pulmonary venous pressure and pulmonary vascular resistance may result in severe pulmonary artery hypertension. Surgical resection of the membrane is the treatment of choice for patients with significant obstruction.  

Cardiac magnetic resonance imaging obviously demonstrates the relationship between the membrane and pulmonary
veins. It also allows for precise measurement of the size of the membrane opening and hence determines the significance of the obstruction. In addition, it allows accurate assessment of cardiac function and chamber size, and it can detect any associated anomalies.

Disclosures
None.

References

Figure 2. Dark blood turbo-spin-echo magnetic resonance axial images (with 2 different window widths and levels) show a membrane (arrows) traversing the left atrium.

Figure 3. Cine magnetic resonance images using a steady-state free precession sequence clearly depict the membrane within the left atrium (arrows); 2-chamber (left) and 4-chamber (right) views.
Figure 4. Cine magnetic resonance image using a steady-state free precession sequence shows only 2 great vessels—instead of the normal three—originating from the aortic arch (a bovine arch).

Figure 5. Magnitude image (left) and corresponding phase-contrast image (right) in the sagittal oblique plane show the size of the opening in the membrane (arrows), which by tracing revealed an area of 2.4 cm².
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