Lack of Slippage by Cardiovascular Magnetic Resonance Imaging Is Sine Qua Non for Constrictive Pericarditis

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A 46-year-old man was intubated because of congestive heart failure exacerbation, and was placed on dopamine/dobutamine for persistent low systolic blood pressure (75 to 85 mm Hg). One year before his mitral valve was replaced, a pacemaker was placed, and he underwent tricuspid valvuloplasty and coronary artery bypass grafting, all secondary to infective endocarditis. A transthoracic echocardiogram, transesophageal echocardiogram (Figure 1), computed tomography of the chest (Figure 2), and left and right heart catheterization demonstrated normal coronary arteries, left ventricular ejection fraction of 65%, cardiac output of 6 L/min, moderate right ventricular dilatation, no intracardiac or extracardiac shunts, and a thickened pericardium. His catheterization demonstrated no square-root sign, but showed a steep Y descent and normal X descent. A high-risk cardiac magnetic resonance (CMR) examination was completed with the utilization of a low specific absorption rate, gradient recalled echo, and radiofrequency tissue tagging with the pacemaker converted to a Voo mode and placed at the center of field, following the safety protocol in part outlined by Martin et al. The 15-minute CMR examination demonstrated a 1- to 2-cm variably thickened, dense, and adherent fibrous pericardium. The tag lines break between parietal and visceral pericardia during the cardiac cycle in a normal heart. In our patient, the tag lines do not break, which is seen in Movies I through III in the online-only Data Supplement.

Figure 1. Transesophageal echocardiogram showing thickened pericardium and acoustic shadow from the prosthetic mitral valve.

Figure 2. Computed tomography of chest showing a thick rind of pericardium encircling the heart. Pericardial thickening in our case is noncalcified, which is common in postsurgical causes of constrictive pericarditis. In cases of tuberculous pericarditis, pericardium could be calcified.

Figure 3. Four-chamber tagged cardiac magnetic resonance image showing lack of slippage between parietal and visceral pericardia. Also seen are the pacemaker and prosthetic mitral valve. The tag lines break between parietal and visceral pericardia during the cardiac cycle in a normal heart. In our patient, the tag lines do not break, which is seen in Movies I through III in the online-only Data Supplement.
pericardium nearly encasing the heart. The radiofrequency tagging sequences showed no slippage, but did show the presence of adherence between parietal and visceral pericardia and a septal bounce (Figures 3 and 4 and Movies I through III in the online-only Data Supplement). A definitive, non-equivocal diagnosis of constrictive pericarditis (CP) was made. These preoperative, noninvasive CMR findings were confirmed during pericardial stripping that same afternoon.

Constrictive pericarditis is a difficult diagnosis to make. Tagged CMR imaging has been shown to be useful in making this challenging diagnosis.2 Tagged CMR imaging was also used to make this diagnosis in an uncomplicated patient with a pacemaker.3 Steady state free-precession CMR imaging was used to evaluate thickened pericardium and exclude constriction by demonstrating with certainty the lack of adhesions between parietal and visceral pericardia.4 Cardiac magnetic resonance, unlike other modalities of cardiac imaging, can evaluate the pericardium with ease. The presence of adherence between the parietal and visceral pericardia, or their lack of slippage, is highly suggestive of CP. In our unpublished experience, we have 100% concordance with our intraoperative diagnosis when making the CMR diagnosis of CP. The presence of adhesions between the pericardia is an additional feature that can be used to differentiate CP among various causes of postoperative paradoxical septal motion.

In summary, we were unable to make a definitive diagnosis of CP in this critically ill patient via standard modalities. Under challenging circumstances, and in a patient with a pacemaker, an unequivocal diagnosis of CP was made with the use of CMR. In complex cases, this finding by CMR can be used to make a life-altering diagnosis of CP.

Disclosures

None.

References

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