Pericardial enhancement in pericarditis and pericardial constriction: evaluation with myocardial delayed enhancement sequences

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Purpose

Current techniques to evaluate pericarditis include MRI, computed tomography (CT), and echocardiography. CT provides high spatial resolution and exquisite sensitivity to detect pericardial calcification, but also involves use of iodinated contrast media and ionizing radiation. Echocardiography is fast, inexpensive and is helpful in differentiating restrictive versus constrictive pericarditis, but is less useful in showing pericardial thickening. MRI protocols typically consist of black blood imaging and SSFP sequences to detect pericardial thickening, anatomic deformity, and functional abnormalities. Myocardial delayed enhancement sequences have recently been applied in pericardial imaging to detect pericardial enhancement/inflammation. We evaluated the use of myocardial delayed enhancement sequences in 27 patients with pericarditis or pericardial constriction.

Methods

Single shot MDE (sshmde) is a cardiac gated inversion recovery fast gradient recalled echo technique in which all data for a single slice is acquired in 3 R/R intervals (1 R/R to bring the slice to steady state and 2 R/R to acquire all of the lines in k-space). TI was selected using a multi TI cine sequence (CINE IR) performed in a short axis projection through the mid-left ventricle and then reviewed to determine the optimal TI (which typically ranged between 175-225 msec). Axial and/or short axis black blood imaging was performed using either a single shot or fast spin echo cardiac gated double inversion recovery sequence. SSFP short axis cine was then performed followed by a gadolinium contrast injection with delayed enhancement acquisitions in short axis and long axis planes acquired 5-15 minutes later.

Results

Pericardial enhancement was seen on MDE sequences in 17/27 patients with pericarditis or pericardial constriction. Two patients had constrictive pericarditis (on the basis of clinical symptoms, pericardial thickening, and abnormal septal motion in early diastole) and pericardial enhancement which improved on follow up examination after steroid therapy. Two patients had constrictive physiology with normal pericardial thickness on black blood images, but intense pericardial enhancement on delayed enhancement images. In 5 cases, the extent of pericardial enhancement was greater than the extent of pericardial thickening visualized on black blood and SSFP images.

Discussion

Myocardial delayed enhancement sequences are useful in the evaluation of pericarditis and pericardial thickening. Pericardial enhancement presumably reflects active inflammation which may respond to medical therapy, in contrast to non-enhancing thickened pericardium which likely represents fibrosis and/or calcification (Fig. 1). MDE sequences may also increase the sensitivity for detection of abnormal pericardium, particularly overlying the left ventricle where the pericardium is more closely opposed to the myocardium and difficult to visualize on non-contrast sequences.

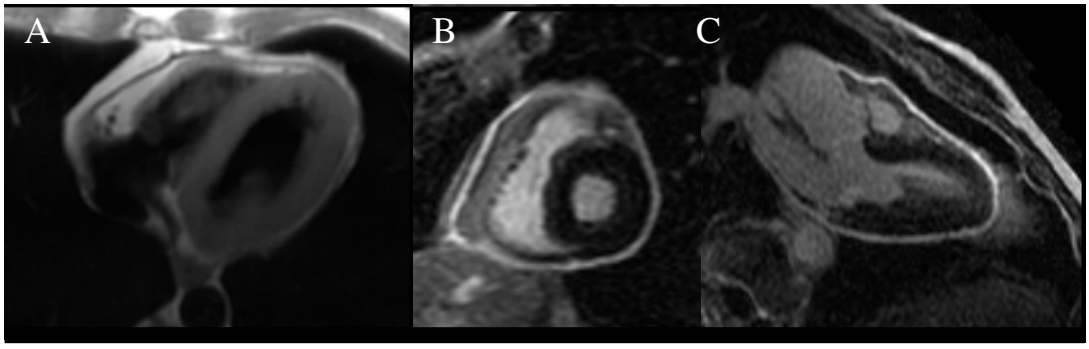

Fig. 1. Axial double IR FSE image (A) shows mild pericardial thickening overlying the right ventricular free wall. MDE short and long axis views (B and C) reveal diffuse enhancement of the pericardium.