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CARDIOVASCULAR IMAGES
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Young Man with Chest Pain and Positive Cardiac Enzymes

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Clinical History

An 18-year old previously healthy man presented to an outside hospital emergency room with non-exertional, constant aching sensation in the center of his chest that was preceded by a 1 week history of "flu-like" symptoms. His presenting EKG demonstrated a concave ST segment elevation (Fig. 1) and his presenting cardiac enzymes were elevated (troponin 1.78 and CK-MB 65). A cardiac ultrasound (ECHO) demonstrated a structurally normal heart with a low-normal left ventricular ejection fraction (LVEF) of 50%; without obvious regional wall motion abnormalities. He was given a provisional diagnosis of myocarditis, and subsequently transferred to MGH for further evaluation and management.

Findings

Cardiac magnetic resonance (CMR) revealed increased T2 signal of the sub-epicardial myocardium, predominantly affecting the inferior-lateral wall (Fig. 2). Post-gadolinium delayed enhancement images showed sub-epicardial hyper-enhancement of ~50% (pathognomonic for non-ischemic injury) in the same region of the left ventricular myocardial wall (Fig. 3 and 4). Mild inferio-lateral hypokinesis was noted with calculated LVEF of 49% (End-diastolic volume 153 cc, End-systolic volume 78 cc, and Stroke volume 75 cc).

Discussion

Acute myocarditis is an inflammatory reaction with myocyte injury, commonly due to a viral infection or autoimmune etiology. Clinical outcomes range from spontaneous recovery to dilated cardiomyopathies and life-threatening arrhythmias. Myocarditis is commonly under-diagnosed clinically, serving as a diagnosis of exclusion for patients presenting with chest pain or heart failure despite a normal coronary angiogram.

Both acute inflammation and necrosis result in edema, which can be detected by T2-weighted CMR imaging.

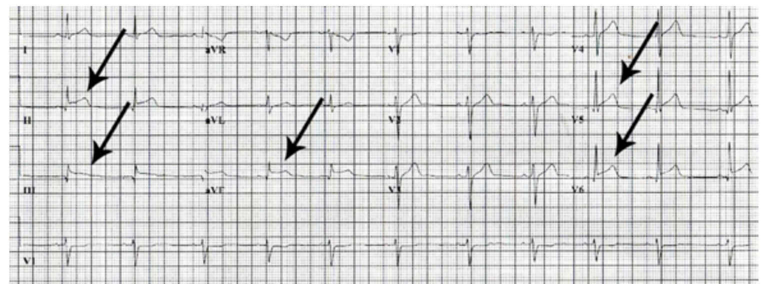

Figure 1

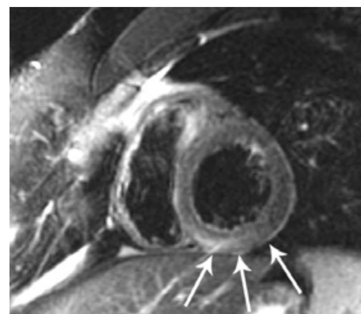

Figure 2

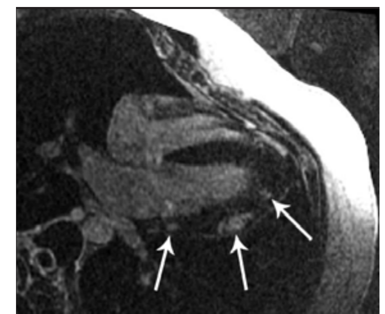

Figure 3

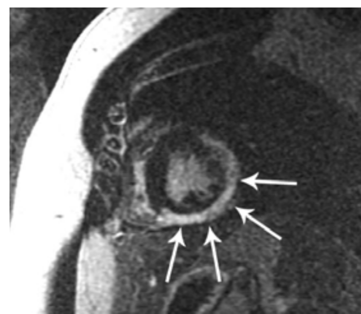

Figure 4

Figure 1. Initial EKG

Figure 2. T2-weighted short axis

Figure 3. Delayed enhancement: short axis of the left ventricle

Figure 4. Delayed enhancement: 4 Chamber view

Myocardial necrosis also contributes to sub-epicardial post-gadolinium delayed hyper-enhancement. Acute myocardial infarction, in contrast to myocarditis, is characterized by sub-endocardial or transmural enhancement on delayed post-gadolinium images. Our case illustrates that CMR is an attractive clinical imaging modality for the non-invasive diagnosis of myocarditis.

Please Note: References for this article are available within the online version.

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