CLINICAL VIGNETTE

A 21-Year-Old with a Positive Troponin

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Case Presentation

The patient is a 21-year-old college student with no medical history who came into the hospital emergency room with chest discomfort. He described this discomfort as a non-radiating substernal chest pressure. There was no positional component to his symptoms, and there were no associated palpitations or dyspnea. He noted that the pain had been present for 3 months continuously, but it became worse when he consumed beer as he had done that night.

Upon arrival, he was found to be diaphoretic but otherwise stable. An ECG done showed sinus bradycardia at 55 bpm with ST elevation in all leads. A troponin was drawn and resulted 0.6 ng/mL (elevated), and the patient was admitted to the hospital. Overnight, serial troponins peaked at 2.6 ng/mL and then started to trend down. An echocardiogram done in the emergency room showed normal systolic function without any valvular abnormalities or identifiable cardiomyopathy. There was no pericardial effusion described.

The working diagnosis at this time was myocarditis and a cardiac magnetic resonance (CMR) imaging study was performed the next day. This showed normal pericardial thickness without delayed hyperenhancement; however; there was marked mid-myocardial delayed enhancement involving the entire septum. There was also subepicardial enhancement of the basal and mid-anterolateral segments.

The patient was diagnosed with myopericarditis. He was discharged on ibuprofen, colchicine, and omeprazole as well as 3 months of heavy activity restriction.

Discussion

Myocarditis is an inflammatory disease of cardiac muscle. Symptoms range from simply fatigue, to chest pain, cardiac arrhythmias, heart block, heart failure, or even sudden cardiac death. The presumed etiology for sudden cardiac death in these patients is ventricular tachycardia or atrial fibrillation.[1-4] If the inflammation expands to the pericardium, there may be a pleuritic component to the chest pain and sometimes a pericardial effusion. The presentation of myocarditis may be acute, subacute, or chronic.

Laboratory studies in patients with myocarditis often show an elevated troponin. In patients clinically in heart failure, the brain natriuretic peptide (BNP) may be elevated as well. The presenting ECG in patients with myocarditis may be normal or have ST abnormalities that mimic pericarditis or acute myocardial infarction.[5-9]

The echocardiogram is typically normal in acute cases of myocarditis; however, it may show a dilated cardiomyopathy in patients presenting with heart failure or may show regional wall motion abnormalities as this may represent localized inflammation.[7,10] Coronary angiography is often times done in these patients as chest pain, elevated troponin, and ECG changes are concerning for myocardial infarction (MI). Angiography typically shows normal coronary arteries, especially since the usual age of onset of myocarditis ranges from 20-50 years old, younger than when most patients present with MI.[7,11]

Cardiac Magnetic Resonance (CMR) imaging is a useful tool as this imaging modality allows detection of various features of myocarditis. These include assessment of left ventricular size and geometry, as well as systolic and diastolic function. Delayed enhancement of the myocardium is the most useful as this indicates areas of the heart muscle that are affected by inflammation.[12,13] Edema, myocyte necrosis, and scar are not only identified but also are localized to specific regions within the myocardium. Associated pericardial disease can also be identified with thickening of the pericardium and effusions visualized.[13,14]

While CMR is useful in certain populations with myocarditis, the definitive diagnosis of myocarditis as defined by the World Health Organization and the International Society and Federation of Cardiology (WHO/ISFC) is by established histologic criteria on endomyocardial biopsy and immunohistologic stains and PCR demonstrating a viral genome.[15-19] Given that myocarditis may be focally distributed, endomyocardial biopsy is sometimes guided by CMR to optimize the diagnostic yield.[20]

The diagnosis of myocarditis should be differentiated from other, similar-presenting myocardial disease processes as the treatment differs. These include eosinophilic myocarditis, amyloidosis, hemochromatosis, and Giant Cell myocarditis, which is auto-immune mediated and may respond to immunosuppressive therapy.[21]

The etiology of myocarditis is due to a variety of infectious and non-infections causes, but in the absence of autoimmune disease or a hypersensitivity reaction, viruses are the frequently presumed cause. The most common viruses being

enteroviruses, Parvovirus B-19, and human herpes virus 6 with viral genomes often detected by PCR within the myocardium of affected patients.[20,22-24]

Treatment of viral myocarditis is usually supportive in some instances with colchicine. NSAIDs have been found to be ineffective.[25-27] In patients with acute heart failure, standard heart failure treatment is recommended with diuresis as needed and early initiation of an ACE inhibitor. Beta-blocker therapy is usually avoided in acute, decompensated heart failure but later, bisoprolol, extended release metoprolol, or carvedilol are an intrinsic part of therapy.[28]

The long-term prognosis of myocarditis is variable. Worse outcomes have been reported in patients with biopsy-proven myocarditis as well as those with viral myocarditis with the viral genome detected on heart biopsy.[15,29,30] VAD therapy can be considered in patients where HF is intractable to medical therapy or when cardiogenic shock does not respond to medical therapy.[31,32]

Myocarditis should be suspected in patients presenting with an elevated troponin, heart failure, cardiogenic shock, or arrhythmias with no other identifiable cause. Patients may also give a history of a recent viral, bacterial, or parasitic infection. While endomyocardial biopsy is the diagnostic gold-standard, CMR provides a useful tool to identify and localize inflamed myocardium and thus may help determine medical treatment.

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