Atypical Presentation of Acute Myocarditis with High Degree AV Block

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Introduction:

Myocarditis, an inflammatory injury to the myocardium, is an uncommon but serious condition affecting 4 to 14 people per 100,000 each year globally with a mortality rate of up to 7%. It is also a challenging diagnosis as there is no pathognomonic presentation. In addition, it is uncommon for myocarditis to present with AV heart block. Here we present a rare unique case of inflammatory myocarditis presenting with severe troponinemia manifesting solely as high degree AV block without evidence of tissue injury or mechanical compromise of the myocardium.

Clinical Presentation:

Chief Complaint: 60-year-old female with no prior cardiac history presented with sudden new onset substernal chest pain radiating to the jaw and back.

Associated Symptoms: Dyspnea, Palpitations, Nausea, Increased Fatigue, Lightheadedness

Relevant History: No prior history of similar episodes. No history of tobacco, alcohol, or drug use. She reported having recovered from COVID-19 infection a few months prior, but otherwise denied any recent illness.

Hospital Course:

Initial Vitals: Upon admission, the patient was hypertensive to 166/106 mmHg with mild bradycardia of 58 bpm. Otherwise, patient was afebrile and satting 100% on room air.

Initial Laboratories: Tests were remarkable for a critically elevated troponin of 1068 ng/L with elevated inflammatory markers with a CRP of 15 mg/L and ESR of 46 mm/hr. Mild leukocytosis of 13.1 x $10e^3$/µl was noted but remaining laboratories were unremarkable. Viral titers were negative.

Diagnostics: EKG initially showed sinus bigeminy without ST elevation or acute signs of ischemia. Echocardiogram revealed preserved ejection fraction of 65% with no wall motion abnormalities (Figure 1). Given concern for NSTEMI, the patient received a full dose aspirin and heparin infusion was immediately transferred to cath lab urgent PCI. Cardiac catheterization revealed no signs of obstructive coronary artery disease (Figure 2).

Treatment Course: At this time, patient experienced profound symptomatic bradycardia(40 bpm), with associated lightheadedness and fatigue. The subsequent EKG revealed a new third-degree atrioventricular block (Figure 3). Given this finding, a dual-chamber pacemaker was emergently placed.

Outcome: Pacemaker placement resulted in subsequent normalization of the heart rate with complete resolution of symptoms and troponinemia with supportive care.

Diagnostic Studies:

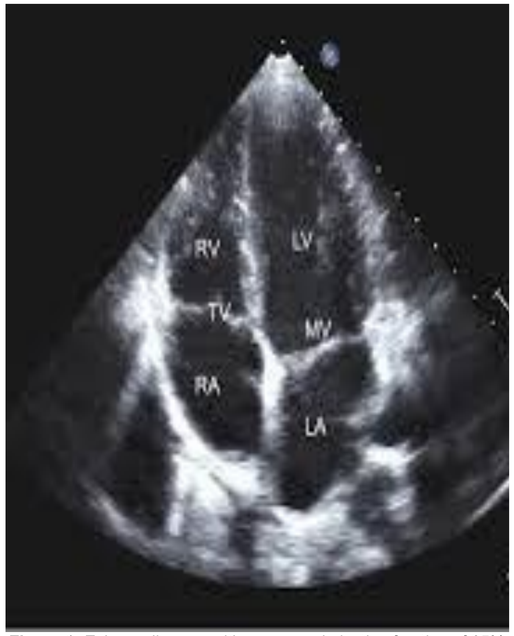

Figure 1: *Echocardiogram with preserved ejection fraction of 65% without signs of wall motion abnormalities despite troponinemia.*

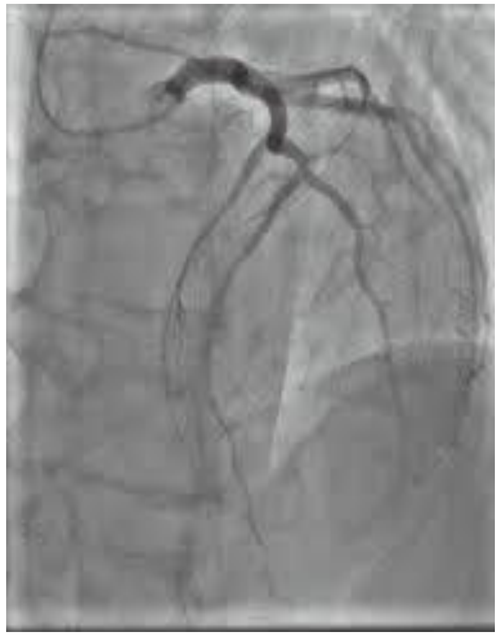

Figure 2: *Coronary artery catheterization depicting non-obstructive coronary artery disease.*

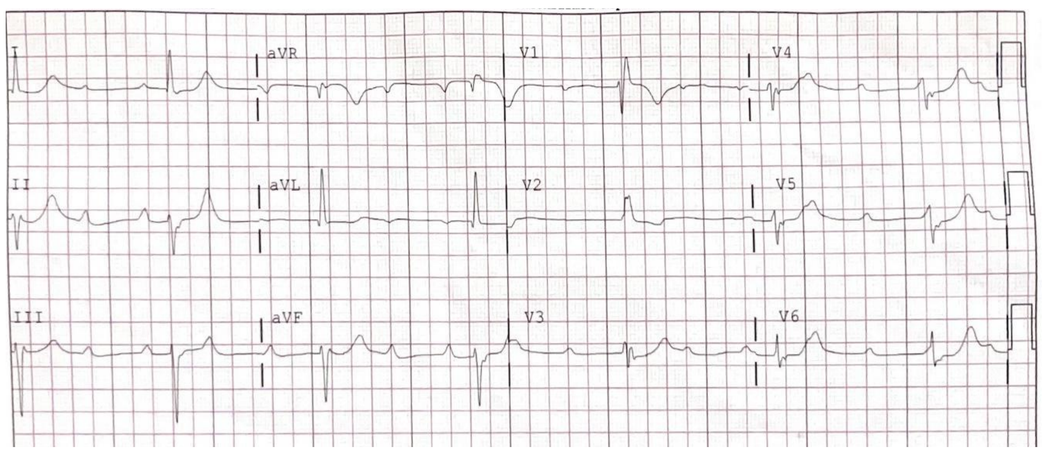

Figure 3: *EKG demonstrating severe bradycardia secondary of 3rd degree AV block in the setting of acute myocarditis.*

Discussion:

Uniqueness: This case is unique for two reasons. First, high degree heart block is an unusual manifestation of myocarditis. 2017 review by Ogunbayo et al. showed the incidence of heart blocks and high degree AVB occurring in myocarditis were 1.7% and 1.1% respectively. Female gender and Asian race was noted to be independently associated with higher incidence of these arrhythmias. Although percentage of conduction abnormalities reported in myocarditis has increased since 2017, myocarditis presenting as AV block without other mechanical complications is singularly rare. Another distinctive aspect of this case is the severe troponemia without other evidence of severe myocardial injury. This degree of tropinemia is routinely expected to present as mechanical compromise with wall motion abnormalities, reduced inotropy, or coronary obstruction. However, in this case, neither was observable.

Comparative Cases: Similar cases of high-degree AV block in the setting of myocarditis have been reported infrequently in recent years. For example, Charfeddine et al. in 2020, reported a case of myocarditis with new grade II AV block in a 17-year-old male requiring PPM in the setting of flu-like symptoms and preserved ejection fraction, with troponinemia reaching 181 ng/L. Similarly, another case published in 2023 by Camilleri et al. describes a 21-year-old female with acute lymphocytic myocarditis resulting in complete heart block requiring PPM with significant troponemia similar to our case. However this patient was also shown to have significant mechanical compromise with a resulting reduction in ejection fraction to 20 percent. Our clinical report differentiates itself as the only reported case of complete AV block without mechanical compromise with a much higher degree of troponinemia in the setting of acute myocarditis.

Conclusion:

This case of myocarditis is unique in its high-grade of AV block in the setting of exceedingly high troponin levels without signs of mechanical compromise. It provides further evidence that inflammatory heart disease can damage the cardiac conduction system without affecting myocardial inotropy. Furthermore, this case also demonstrates that a high degree of troponinemia in the setting of acute myocarditis is not necessarily a poor prognostic sign or an indication of acute ischemia or mechanical failure. Further study is required to elucidate the mechanism of conduction delay in acute myocarditis, as well as appropriate prognostic factors in such cases.

References:

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