

# Pembrolizumab Causing Cardiogenic Shock

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## INTRODUCTION

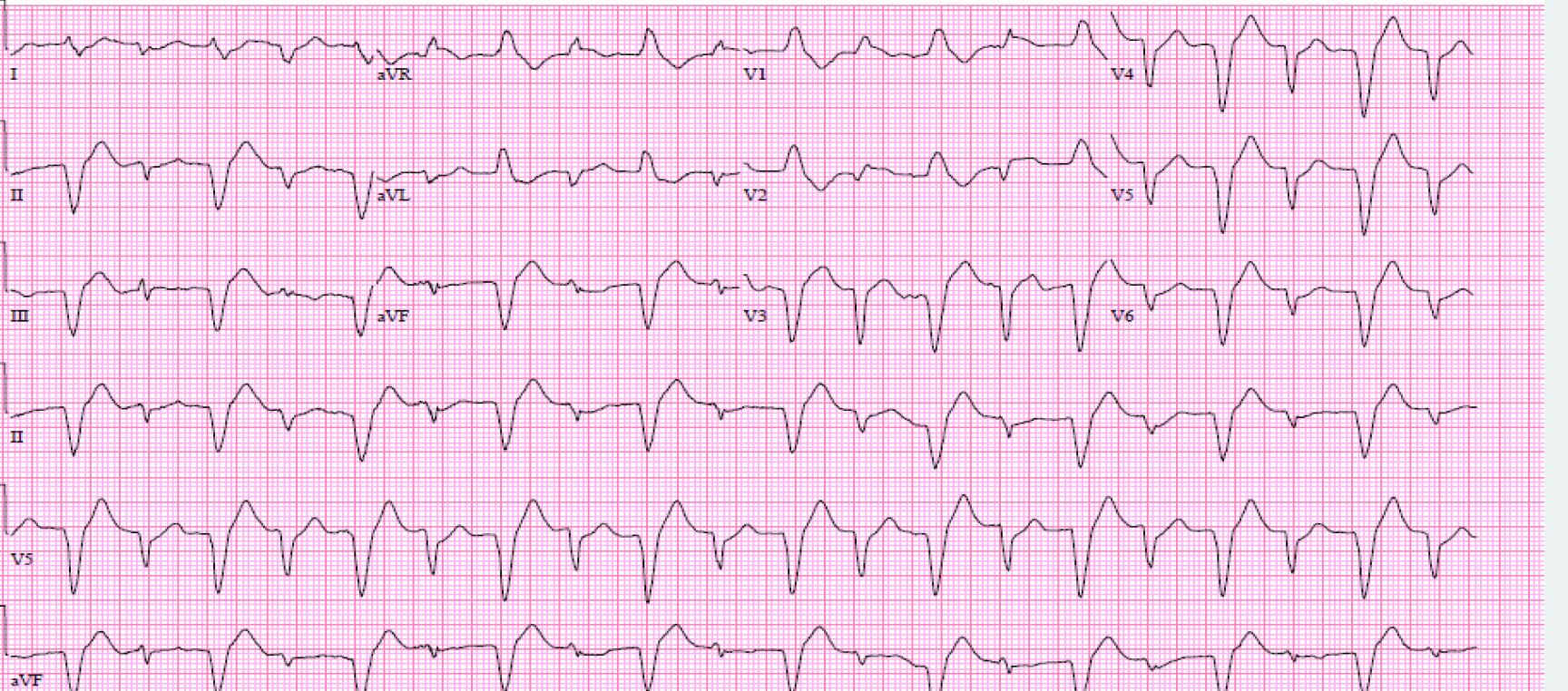
- Myocarditis due to immuno-checkpoint-inhibitor (ICI) toxicity is a rare diagnosis.
- Its clinical course is often fulminant, with a notably high mortality (46%) and no standardized treatment guidelines.
- We present a case of severe cardiogenic shock secondary to ICI-associated myocarditis.

## CASE

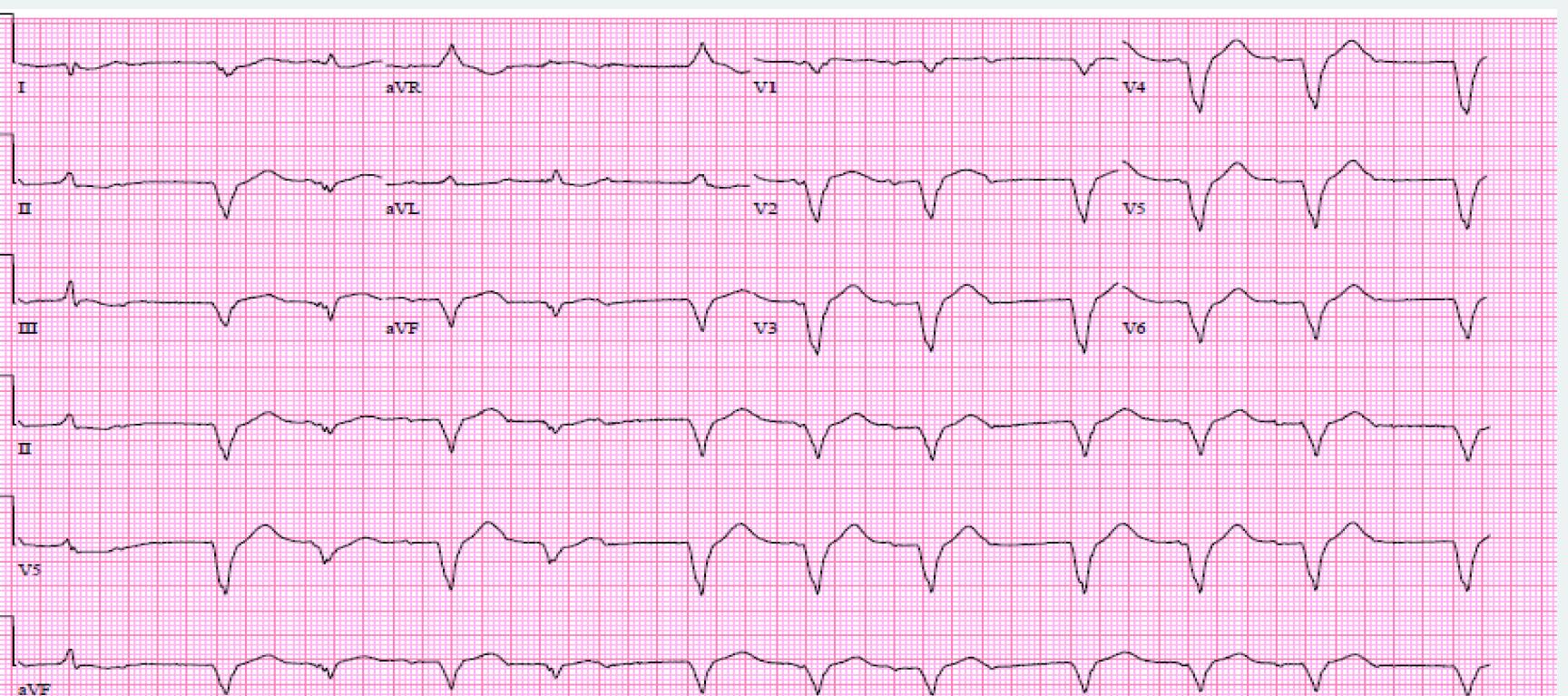
- A 72-year-old female with history of stage III adenocarcinoma of the lung treated with carboplatin, paclitaxel, and pembrolizumab presented with syncope, dyspnea on exertion, and generalized weakness for three to five days without chest pain.
- On exam she was tachycardic, hypotensive, and with elevated jugular venous distension.
- Electrocardiogram showed sinus rhythm with premature ventricular contractions and bigeminy.
- Lab work was significant for elevated troponin (non-high sensitivity) peaking at 29, elevated aspartate aminotransferase and alanine transaminase, and an N-terminal pro hormone B-type natriuretic peptide of 10882.
- Computed tomography angiography showed no pulmonary embolism.
- Patient underwent left heart catheterization for non-ST elevation myocardial infarction, which showed non-obstructive coronaries and severe left ventricular dysfunction secondary to non-ischemic cardiomyopathy.
- Echocardiogram showed left ventricular ejection fraction (EF) of 15-20%, as compared to EF of 55-60% prior to pembrolizumab.
- Right heart catheterization (RHC) was notable for normal filling pressures with low cardiac output. She was determined to be in cardiogenic shock and was managed with an Impella and milrinone infusion.
- Her acute decompensated heart failure was thought to be due to pembrolizumab-associated myocarditis and an endomyocardial biopsy (EMB) was done during the RHC.

## DIAGNOSIS

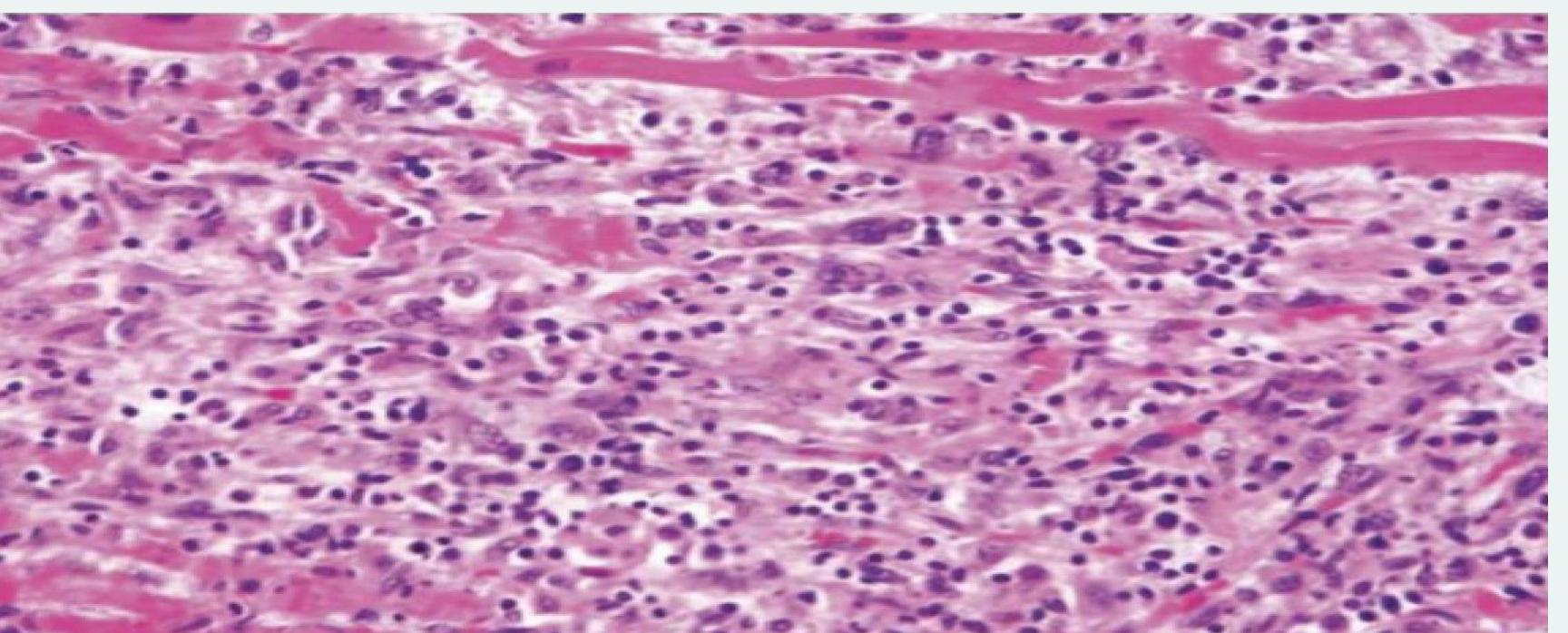
She developed paroxysmal rapid atrial fibrillation during the RHC as shown in the EKG below.



She then progressed into a complete heart block requiring transvenous pacemaker.



EMB showed lymphocytic myocarditis with mild interstitial and subendocardial fibrosis consistent with ICI-associated myocarditis.



## MANAGEMENT

- Treatment with methylprednisolone and plasma exchange therapy only partially decreased her troponin I and troponin T levels.
- As per cardio-oncology's recommendation, she was started on etanercept and ruxolitinib, and was weaned off inotropes and the Impella, with post-wean echocardiogram demonstrating improved EF of 45-50%.
- Myocarditis was managed with an eight-week prednisone taper and Dapsone (for bacterial prophylaxis).
- Troponin T was trended weekly until undetectable.
- Heart failure was managed with guideline directed medical therapy.
- Complete heart block was definitively managed with a cardiac resynchronization therapy pacemaker.

## DISCUSSION

- ICI blocks negative regulators of the T-cell immune response. T-cell response has been implicated in causing cardiac cell injury in ICI myocarditis via mechanisms that remain poorly understood.
- Corticosteroids are effective in mitigating myocardial damage and based on retrospective studies, long-term tapers are recommended.
- In fulminant cases, adjunct immunosuppressive therapies are warranted, however there are no standardized recommendations.
- For our patient, we utilized a novel regimen of steroids, JAK1/2 inhibitors, and recombinant TNF receptor with good clinical outcome.
- Further clinical trials are needed to guide treatment of rare but fatal ICI-associated myocarditis.

## CONTACT

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