Title

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Journal

Chest Journal, 163(4)

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Publication Date

2023-04-01

DOI

10.1016/j.chest.2022.10.040

Peer reviewed

CHEST

A 49-Year-Old Woman With Exertional Dyspnea and Dizziness

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CASE PRESENTATION: A 49-year-old woman with a history of right breast cancer status post radiation therapy presented to our ED with increasing chest pain, exertional dyspnea, fatigue, and dizziness for several weeks. She denied syncope or near-syncope, and she had no personal or family history of cardiac disease. Her outpatient medications included tamoxifen and venlafaxine.

CHEST 2023; 163(4):e157-e162

Physical Examination Findings

On presentation, the patient was afebrile, with BP 174/79 mm Hg, heart rate 48 beats/min, respiratory rate 22 breaths/min, and oxygen saturation 97% on room air. On physical examination, she was mildly anxious but in no acute distress, and lungs were clear to auscultation bilaterally. Cardiac examination was significant for bradycardia without murmurs, gallops, or rubs. The remainder of her examination was unremarkable.

Diagnostic Studies

The patient's laboratory data showed electrolytes, thyroid-stimulating hormone, B-type natriuretic peptide, and three sets of high-sensitivity cardiac troponin T, all within normal limits. An initial ECG revealed bradycardia, with heart rate 40 beats/min and intermittent 2:1 atrioventricular block. No acute cardiopulmonary disease was evident on chest radiograph. A transthoracic echocardiogram demonstrated left ventricular ejection fraction 60% and no structural abnormalities. Lyme titers were negative.

Several hours after her presentation, the patient experienced worsening chest pain and dyspnea. Her heart rate dropped to 32 beats/min, with a BP of 99/54 mm Hg. Repeat ECG revealed complete heart block with a junctional escape rhythm at a rate of 36 beats/min (Fig 1).

The patient subsequently received cardiac MRI and an 8F-flurodeoxyglycose positron emission cardiac tomography scan (FDG-PET). The cardiac MRI showed patchy areas of mesocardial and subepicardial delayed gadolinium enhancement in the mid to basal left ventricular anterior wall, interventricular septum, and right ventricular free wall (Fig 2). There was associated myocardial edema, as reflected by increased T2 signal of the same segments. FDG-PET revealed focal, patchy areas of increased FDG uptake in the same regions as seen on cardiac MRI with normal myocardial perfusion at rest (Fig 3).

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DOI: https://doi.org/10.1016/j.chest.2022.10.040

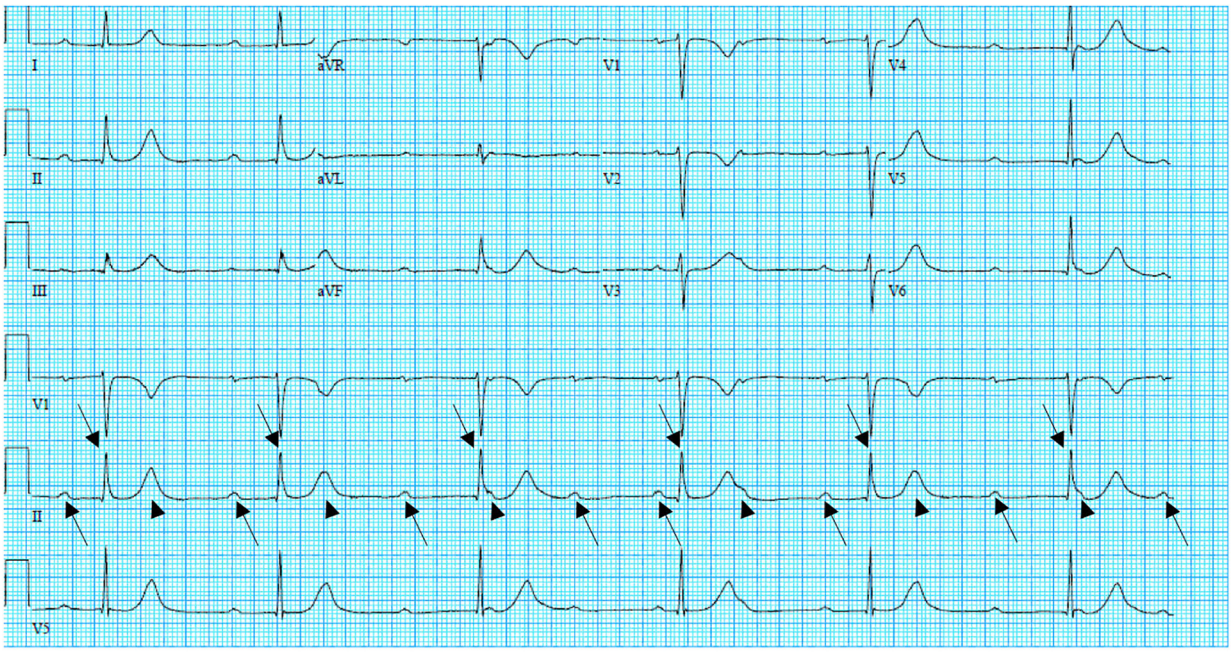

Figure 1 – *The patient's repeat ECG demonstrated complete heart block with junctional escape rhythm. The arrows show complete dissociation between atrial activity (upward arrows) at a rate of 84 beats/min and ventricular activity (downward arrows) at a rate of 36 beats/min. Arrowheads are where the P waves are hidden within T waves or QRS complexes.*

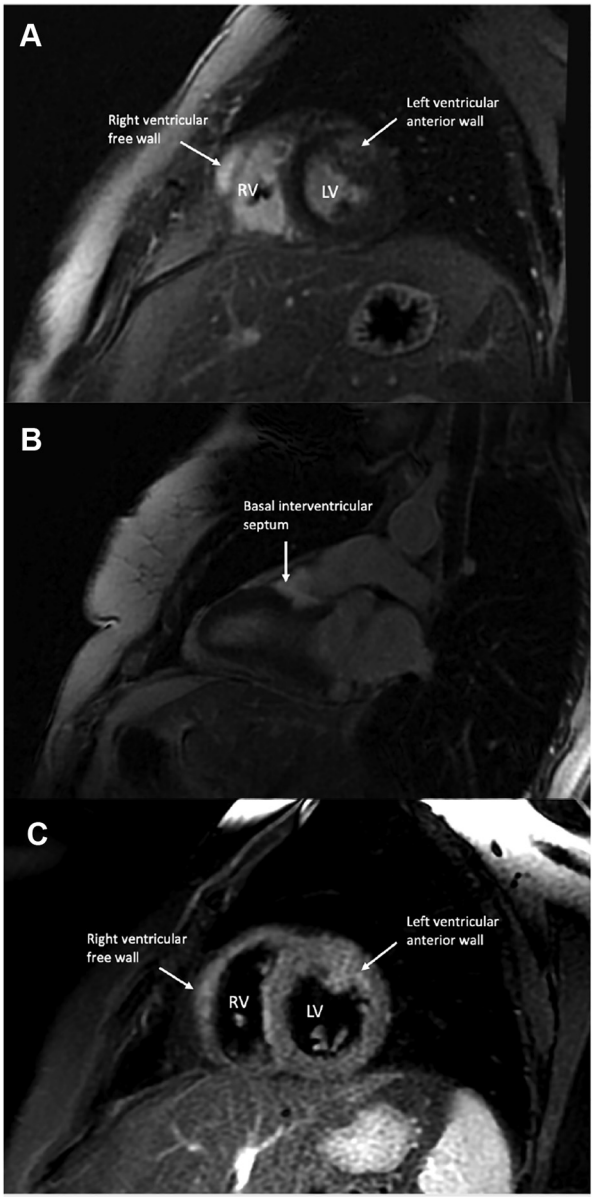

Figure 2 – *Cardiac MRI reveals delayed gadolinium enhancement of the (A) right ventricular free wall and left ventricular anterior wall and (B) basal interventricular septum. T2-weighted image shows edema of the right ventricular free wall and left ventricular anterior wall (C). RV = right ventricle; LV = left ventricle.*

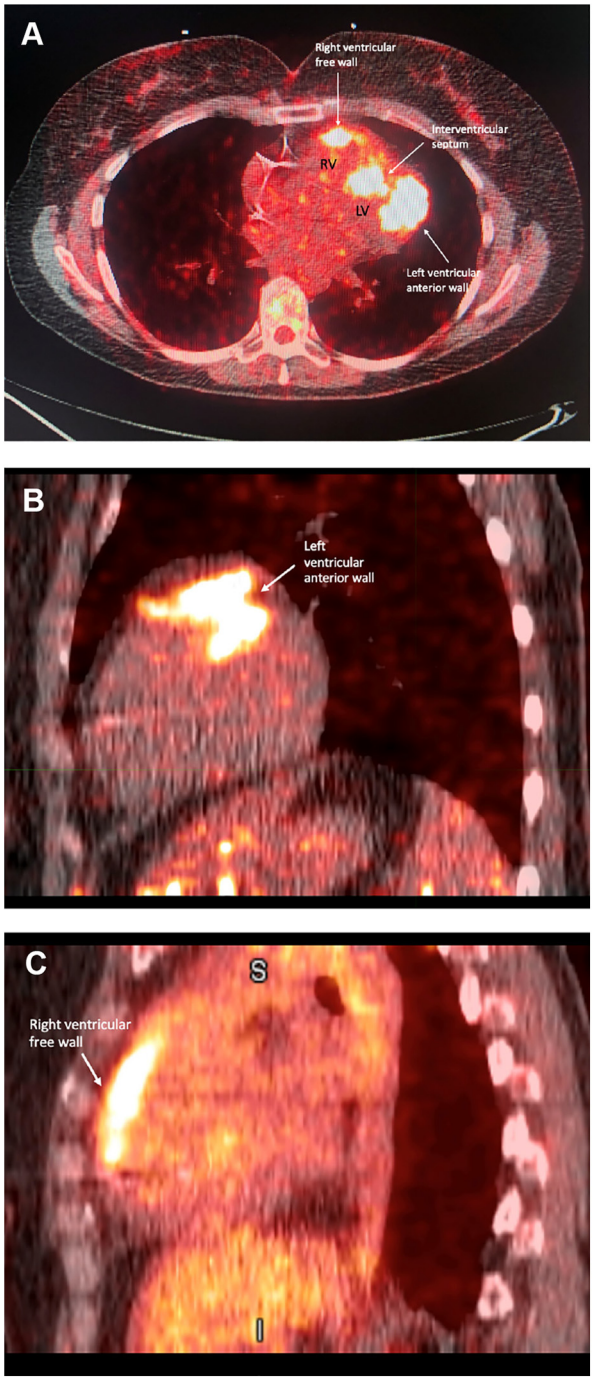

Figure 3 – *Increased myocardial FDG uptake of the mid to basal left ventricular anterior wall, interventricular septum, and right ventricular free wall on FDG-PET (A). Increased myocardial FDG uptake of the left ventricular anterior wall (B) and right ventricular free wall (C) in the sagittal view. Normal myocardial perfusion at rest (D). RV = right ventricle; LV = left ventricle.*

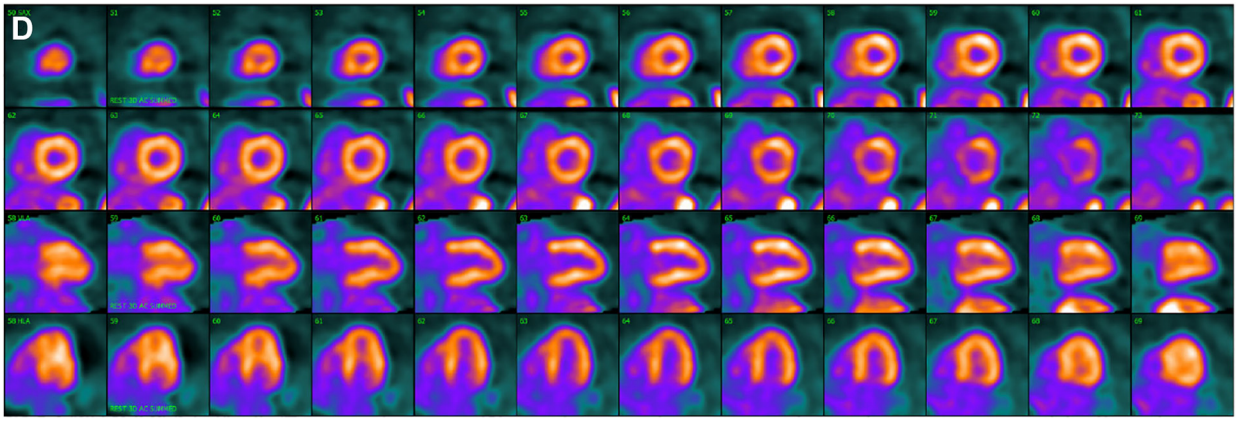

Figure 3 – *Continued*

What is the diagnosis?

Discussion

Sarcoidosis is a granulomatous disease that frequently affects multiple organ systems. Rarely, the disease can manifest as isolated cardiac sarcoidosis (CS). Initial clinical presentations of CS include asymptomatic, conduction abnormalities, ventricular arrhythmias, heart failure, and sudden cardiac death.

Current guidelines for diagnosis of CS rely on histologic evidence from (1) myocardial tissue or (2) extracardiac sarcoidosis combined with clinical or imaging evidence of cardiac involvement. Isolated CS is considered an unusual presentation of the disease, although the literature reports a wide-ranging initial presentation prevalence of 3% to 54% attributed to diagnostic challenges. With the current Heart Rhythm Society guidelines, a definitive diagnosis of CS would have required an endomyocardial biopsy. This method has a sensitivity of 25% and thus has limited utility in establishing the diagnosis of CS in some patients.

Cardiac MRI and FDG-PET have had greater diagnostic accuracy than endomyocardial biopsy, with FDG-PET being more sensitive but less specific than cardiac MRI. Delayed gadolinium enhancement on cardiac MRI is frequently seen in the ventricular septum, left ventricular basal segment, left ventricular lateral wall, and papillary muscles. These affected myocardial regions, sparing of the subendocardium, and increased T2 signal on MRI are consistent with CS. Typical FDG-PET findings of CS include both perfusion defects and focal FDG uptake.

The updated Japanese Guideline on Diagnosis and Treatment of Cardiac Sarcoidosis (2017) takes advantage of these imaging modalities and accepts the diagnosis of CS without histologic evidence. The major criteria for clinical diagnosis of CS include high-grade AV block, basal thinning of the ventricular septum or abnormal ventricular wall anatomy (ventricular aneurysm, thinning of the middle or upper ventricular septum, regional ventricular wall thickening), left ventricular contractile dysfunction, high cardiac tracer accumulation on FDG-PET, and delayed gadolinium enhancement on cardiac MRI.

Treatment of CS focuses on immunosuppressive therapies for active inflammation, management of cardiac conduction abnormalities and arrhythmias, as well as guideline-directed medical therapy for heart failure and risk reduction to prevent lethal arrhythmias. Commonly used immunosuppressive agents include mycophenolate mofetil, methotrexate, azathioprine, leflunomide, cyclophosphamide, and infliximab. Although there are no established guidelines pertaining to immunosuppressive regimens in CS, corticosteroids are commonly used and have improved AV conduction disease. Despite appropriate therapies, CS remains a serious condition, with 5-year survival rates ranging from 60% to 90%.

Clinical Course

Initially, the patient's young age and history of radiation therapy for breast cancer 5 years earlier led to a suspicion for radiation-induced cardiac disease. There was very low concern for an ischemic event, given the normal troponin data. However, the cardiac MRI and FDG-PET imaging were consistent with CS on further workup. In the absence of signs of extracardiac involvement, the patient met three of four required major criteria for isolated CS with her presentation of complete heart block and the imaging findings.

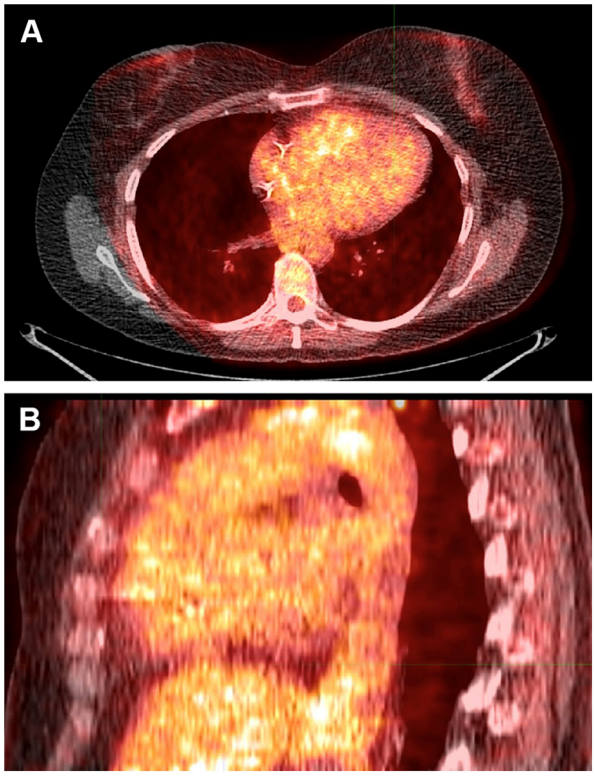

Figure 4 – *Resolution of previously demonstrated abnormal myocardial FDG uptake on FDG-PET in the axial (A) and sagittal (B) views.*

The patient received a dual-chamber pacemaker, then was started on prednisone and mycophenolate mofetil after cardiac imaging revealed probable CS. After a 3-month course of immunosuppressive therapy, the patient demonstrated a beneficial response, with repeat FDG-PET imaging showing resolution of active sarcoidosis (Fig 4).

Clinical Pearls

1. *Cardiac sarcoidosis is a diagnostically challenging disease with a variety of potential presentations, including lethal cardiac arrhythmias.*
2. *Cardiac MRI and FDG-PET are valuable tools in the diagnosis of isolated cardiac sarcoidosis.*
3. *Immunosuppressive therapies are the mainstay of treatment for cardiac sarcoidosis.*

Financial/Nonfinancial Disclosures

None declared.

Acknowledgments

Other contributions: *CHEST* worked with the authors to ensure that the Journal policies on patient consent to report information were met.

Suggested Readings

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