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Case Report

Young Female's Heart was Bitten by Unknown Ghost -Isolated Cardiac Sarcoidosis: A case report

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Key Words : *Cardiac sarcoidosis • High-grade AV block • Syncope • Cardiac magnetic resonance imaging.*

Abstract:

Sarcoidosis is an inflammatory granulomatous disorder of unclear etiology that can affect multiple different organ systems. Isolated cardiac sarcoidosis is very rare condition which causes lethal arrhythmia and heart failure. A definite diagnosis of cardiac sarcoidosis remains challenging. The use of multimodality imaging plays a pivotal role in the diagnosis of this entity.

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Case summary:

In this report, we discuss a case of a 50-year-old women who presented with recurrent palpitation,dizziness,vertigo and pre syncope. Electrocardiogram revealed variable heart block including first degree AV block, second degree AV block, high degree AV block, complete AV block, trifascicular block and sometimes supraventricular arrythmia. 24 hours Holter monitoring show atrial bigeminy, first degree AV block and trifascicular block. A transthoracic echocardiography showed Thinning of basal anteroseptal and inferior septum with LV dilatation with reduction of Global Longitudinal Strain. A dual-chamber pacemaker was implanted. CT Coronary angiogram showed no coronary artery disease. Cardiac magnetic resonance revealed basal anteroseptal and inferioseptum thinning with focal edema with LGE suggestive of sarcoidosis. Computed tomography of the chest showed no lymphadenopathy or pulmonary infiltration. 18F-flurodeoxyglucose positron emission tomography (FDG-PET) of whole body showed We started steroid and follow up the patient. This case serves to highlight the challenges in identifying and managing isolated cardiac sarcoidosis in young patient with recurrent syncope with variable heart block. Early, even late initiation of steroid can improve arrythmia as well as left ventricular function.

Introduction:

Sarcoidosis is an inflammatory granulomatous disorder of unclear etiology that can affect multiple different organ systems. Cardiac involvement is underrecognized. While it is thought that 5% of patients with sarcoidosis will demonstrate symptoms of cardiac involvement, the rate of subclinical cardiac sarcoid is believed to be much higher, with some estimates as high as 20%–25%.[1,2] A definite diagnosis of cardiac sarcoidosis is quite challenging as there is no single reliable test to diagnose it. Even more so for cases with

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isolated cardiac involvement, and frequently a combination of imaging modalities along with biopsy is required. We report a case of middle-aged women who presented with recurrent syncope with different brady arrythmia and atrial arrythmia was diagnosed with isolated cardiac sarcoidosis with the use of multimodality imaging.

Case presentation:

A 42-year-old female no history of hypertension, hyperlipidemia or diabetes presented with recurrent episodes of syncope to the emergency department (ED). Approximately three months prior to presentation, she experienced her first episode of syncope while cooking. She also experienced four to five episodes of syncope which was short durated and prodromal symptoms like palpitation. She was worked up at an outside hospital where Electrocardiography showed bigeminy with right axis deviation with 1 AV block and RBBB (Fig 1).

Echocardiography showed no regional wall motion abnormality with good LV systolic function and, an exercise stress test was performed to evaluate for ischemia and/or arrhythmia negative. Electroencephalograph showed normal awake EEG record and Duplex study of carotid artery was normal on both sides. Patient was admitted in our hospital with two to three episodes syncope at night. Her vital signs were as follows: body temperature, 37.4°C; respiratory rate, 18 breaths per min; blood pressure, 100/70 mmHg; and heart rate 53 beats per min. Her heart sounds were normal, and no abnormal heart murmur was audible.ECG showed variable degree of AV block including 3:1, 2:1, RBBB and right axis deviation (Fig 2).

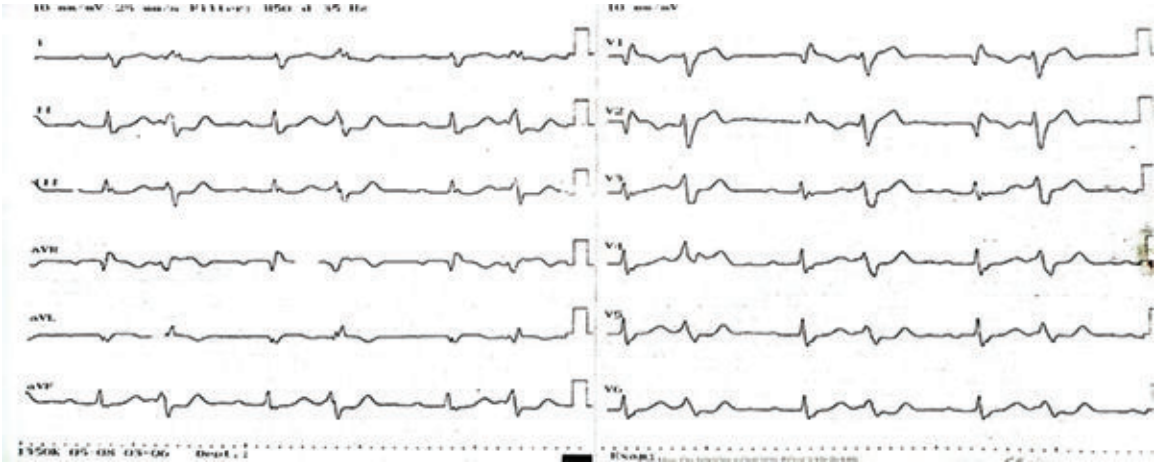

Fig 1: Twelve-lead electrocardiogram showing ventricular ectopics (bigeminy), first-degree atrioventricular block, right bundle branch block, left posterior hemiblock.

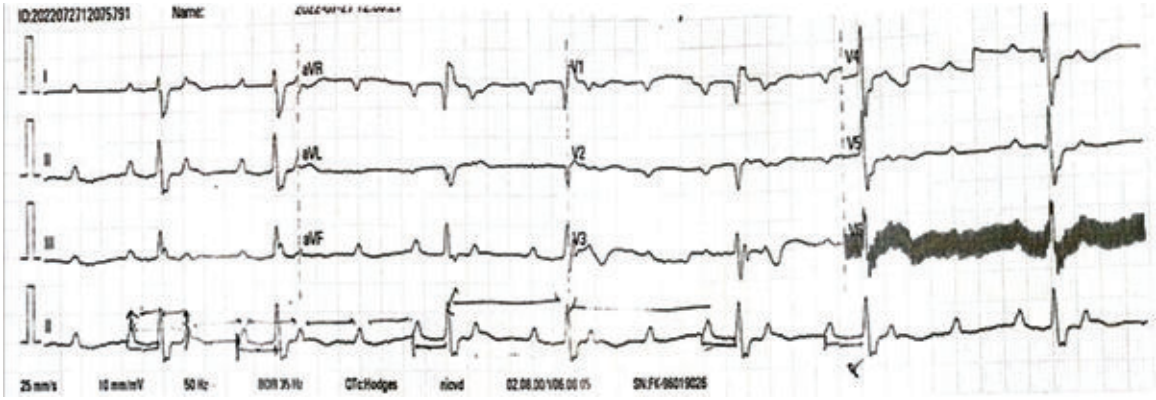

Fig.-2: *Twelve-lead electrocardiogram showing ventricular rate 54/min, 2:1, 3:1 AV block, right axis deviation, RBBB.*

On second day of admission, we did repeat ECG which showed variable heart block including first degree, second degree Mobitz type I AV block and 2:1 AV block (figure 3). Chest X-ray showed cardiomegaly with no hilar lymphadenopathy. Third day of admission patient again developed syncope with hemodynamic instability. ECG showed complete heart block (figure 4). A temporary transvenous pacemaker was placed.

24 hours Holter monitoring shows maximum heart rate 73, minimum heart rate 53, No significant pause, atrial bigeminy,1^0 degree AV block, right axis deviation and RBBB (Fig 5). A transthoracic echocardiography showed thinning of basal anteroseptal and infer septum with akinesia. LV dilated with LVEF of 35 to 40 %. Mild mitral regurgitation with diastolic dysfunction grade II and GLS -6.8 (Fig 6).

Cardiac enzymes, thyroid function test, serum electrolytes, anti-nuclear antibody, RA test were negative. But patient CRP, serum calcium, and serum angiotensin converting enzyme level, NT pro BNP were high (Table I).

Then dual-chamber permanent pacemaker (PPM) implantation was then performed given intermittent AV block with syncope (Fig 7). She was subsequently discharged. High resolution CT scan showed no hilar lymphadenopathy and lung involvement. Then High resolution contrast coronary computed tomography showed no significant stenosis of the coronary arteries (Fig 8).

Cardiac magnetic resonance (CMR) was performed to look for infiltrative disease. It revealed moderate LV systolic dysfunction (LV EF 32%) and anterior, anteroseptal, inferoseptal wall hypokinesia in base and mid part with delay

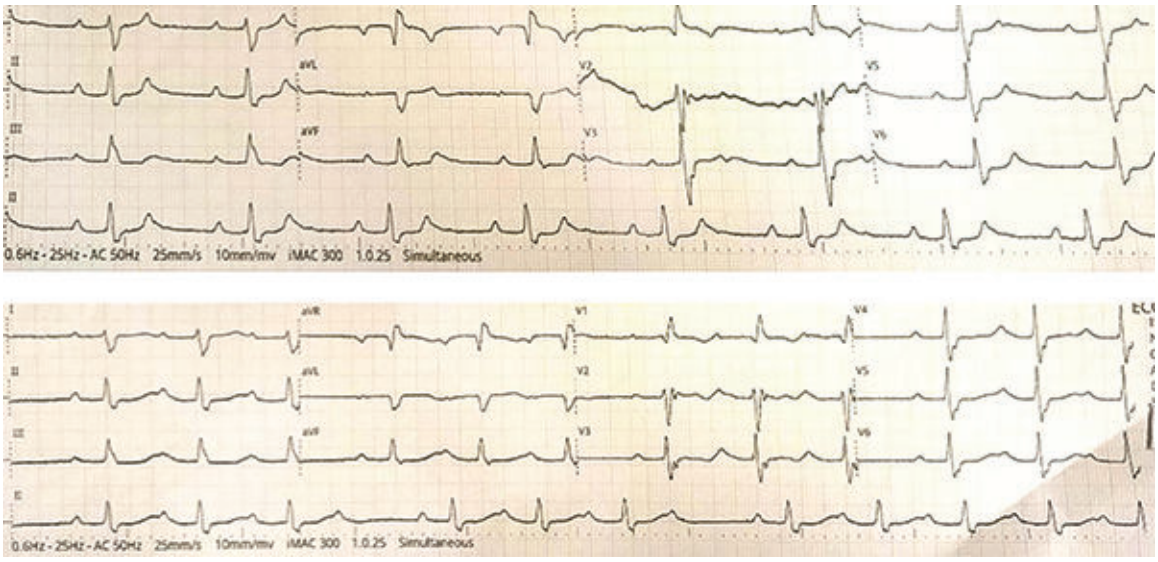

Fig.-3: *(A)-2:1 AV block with RBBB with right axis deviation (B)- Mobitz type I second degree AV block with right axis deviation with RBBB.*

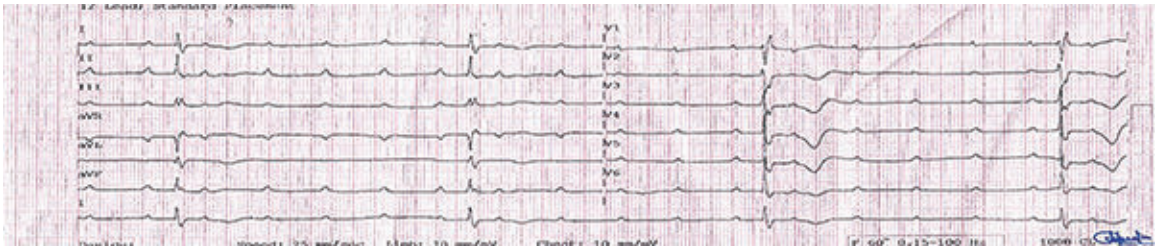

Fig.-4: *High degree AV block and Complete heart block.*

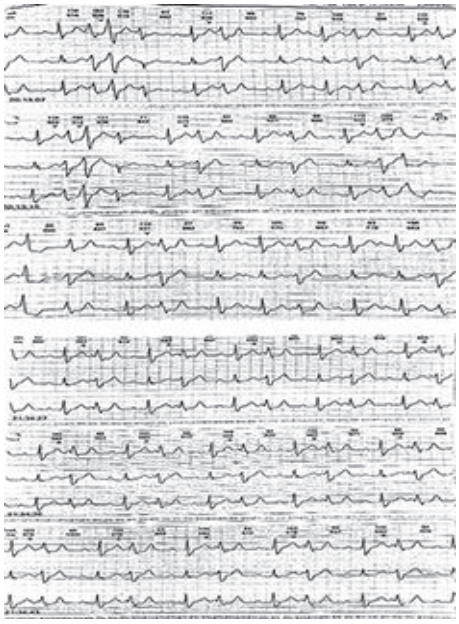

Fig.-5: *24 hours Holter monitoring shows atrial bigeminy, atrial couplet and first-degree AV block.*

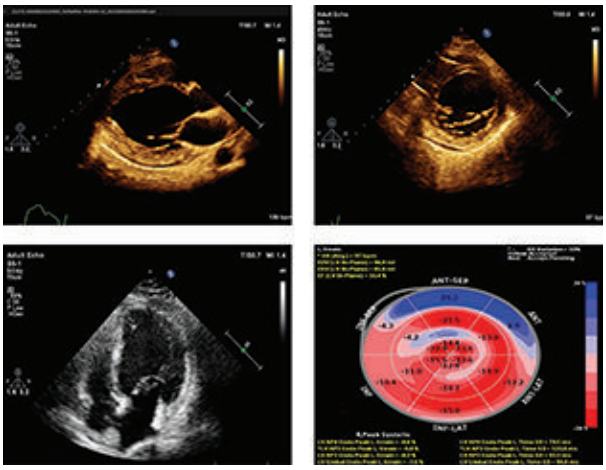

Fig.-6: *(A) PLAX view shows thinning and hypokinesia of basal part of anteroseptal. (B) PSX view show thinning of anterior and anteroseptal. (C) shows dilatation of LV cavity. (D) Shows LV Global Endo PEAK L.Strain -7.5%.*

Table-I

Different biochemical parameters of the patient.

Biochemical parameters	Results
Complete blood count	HB-13.8 gm/dl, WBC count- normal.
S. Electrolytes	Normal
Hs-Troponin I	0.07 (less than 0.034)
Random blood sugar	Normal
C- reactive protein	41mg/l (less than 10)
Anti-nuclear antibody	Negative
RA test	Negative
Thyroid Stimulating Hormone	Normal
Serum Calcium	14.74mg/dl (8.1-10.4)
Serum Angiotensin Converting Enzyme	69.81U/L (13-60)
NT pro BNP	6500 pg/ml

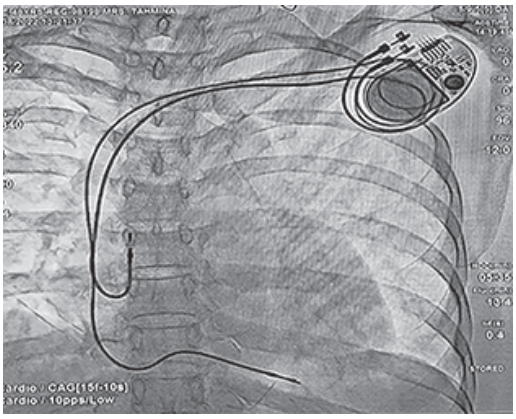

Fig 7: *Patient on dual chamber pacemaker.*

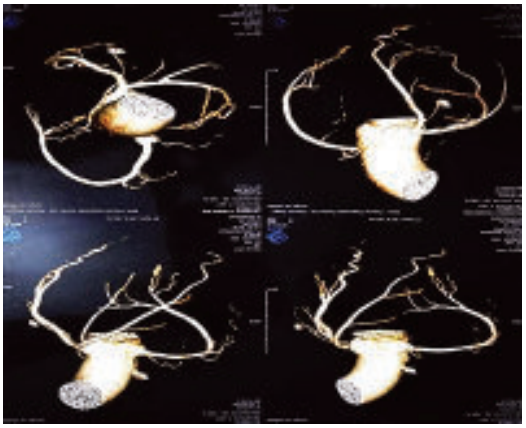

Fig-8: *High resolution CT coronary angiogram show normal coronary arteries.*

subendocardial Gadolinium enhancement (LGE) which demonstrate contagious extension into the RV. The enhancement is not corresponding to the area of coronary artery distribution. T2 weighted imaging shows intermediate intensity signal behavior also indicate myocardial edema (Fig 9).

Then we sent the patient for 18F-flurodeoxyglucose positron emission tomography (FDG-PET) of whole body to see any other organ involvement present or not with cardiac involvement (Fig 10).

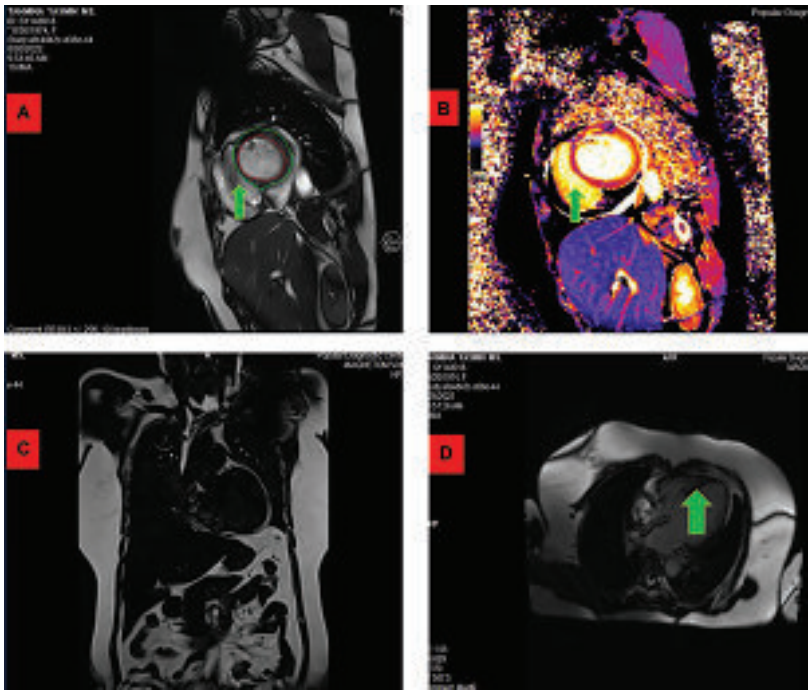

Fig 9 (A,B,C,D): *Cardiac magnetic resonance imaging showing late gadolinium enhancement (LGE) of basal interventricular septum ,some part of anterior wall l of the left ventricle, as well as some part of RV.*

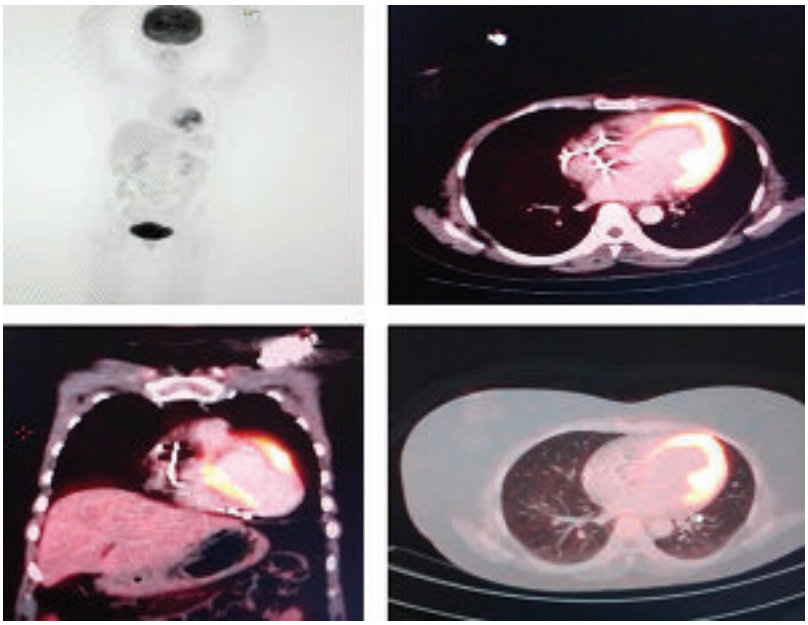

Fig 10 A,B,C,D: *18F-flurodeoxyglucose positron emission tomography (FDG-PET) of whole body showed only cardiac involvement.*

She was treated with prednisone 60 mg orally daily with slow tapering (60 mg two times daily for1 months, 50 mg two times daily for 1 months, 40 mg two times daily for 1months, 30 mg two times daily for 2 weeks, 20 mg two times daily for 2 weeks, 20 mg once daily for 1 week, and 10 mg once daily for 1 week) over a course of 6 months by consultation with pulmonologist.

Discussion:

Cardiac sarcoidosis is an uncommon entity, but it is thought to be underdiagnosed, perhaps in part due to the difficulty in recognizing the disease in early stages as well as previously unavailable imaging modalities that could provide tissue characterization.[1] There are two main scenarios by which cardiac sarcoidosis presents. One is apparent extra-cardiac sarcoidosis, where the presence of typical electrocardiographic, echocardiographic, PET, or CMR changes suffices to suspect cardiac involvement. The other is clinically isolated cardiac sarcoidosis, which given the non-specificity of imaging findings becomes a difficult differential in clinical practice. This multitude of possible clinical pictures makes cardiac sarcoidosis a frequently late or missed diagnosis. The constant evolution of multimodal imaging is changing the paradigm of cardiac sarcoidosis, improving its diagnostic yield and becoming the standard of care for its diagnosis.[3]

The diagnosis of cardiac sarcoidosis remains a major challenge amongst clinicians for a few main reasons. Firstly, the clinical manifestations of CS can vary widely as they depend on the location and extent of myocardial involvement.[3] Secondly, transvenous endomyocardial biopsy is a diagnostic tool which has a low sensitivity of 20% due to patchy/focal distribution of the granulomas resulting in sampling error and the procedure is not without risk of complications.[4] Finally, although various cardiac imaging modalities have been used to evaluate patient with suspected or known sarcoidosis, their true diagnostic accuracy remain unknown. To date, the two most commonly used diagnostic guidelines for cardiac sarcoidosis were published by the Japan Society of Sarcoidosis and Other Granulomatous Disorders and the Heart Rhythm Society (HRS).[5]

The four main clinical manifestations of cardiac sarcoidosis are conduction abnormalities, ventricular arrhythmias, congestive heart failure, and sudden cardiac death. Conduction abnormality can often be the initial manifestation of cardiac sarcoidosis; it may range from first degree heart block to complete heart block which accounts for 23–30% of the patients with CS.[6] Our patient was admitted with conduction abnormality including RBBB, first degree AV block, second degree AV block, high degree AV block, complete AV block, trifascicular block. Conduction abnormalities develop as a result of the formation of scar tissue or granulomas at the basal septum or near the nodal artery causing ischemic injury to the conduction pathway.[7] Our patient had recurrent palpitation and syncope initially from worsening infranodal disease that became evident even at rest later.

Supraventricular arrhythmias are uncommon (15%–17%) and it is usually due to granulomatous formation at the sinus node or atrial dilatation or pulmonary involvement rather than the result of atrial Granulomas.[6-8] Our patient had recurrent episodes of atrial tachycardia including atrial bigeminy even after pacemaker implantation. This might have been due to any of the abov causes.

As seen in our patient, the presence of unexplained conduction abnormalities in young adults less than 60 years of age should prompt further evaluation with non-invasive imaging modalities, such as speckle- tracking echocardiography, CMR, 18F-flurodeoxyglucose positron emission tomography (FDG-PET), or hybrid PET-CMR to look for infiltrative cardiomyopathies.[9] Delayed-enhanced CMR imaging studies have a reported sensitivity between 75–100%, specificity of 78–100%, positive predictive value of 55%, and negative predictive value of 100% in diagnosing cardiac sarcoidosis.[10] Nonetheless, the findings of LGE on CMR can also be present in cardiac amyloidosis, myocarditis, systemic sclerosis, or dilated cardiomyopathy and it does not differentiate an active cardiac sarcoidosis lesion from an inactive cardiac sarcoidosis lesion, which the former is amenable to immunosuppressive therapy.[10] Hence, we took into consideration the clinical presentation of our patient and correlated it to the findings of LGE on CMR and 18F-flurodeoxyglucose positron emission tomography (FDG-PET) only cardiac involvement established the diagnosis of isolated

cardiac sarcoidosis. As per the HRS guideline, the diagnosis of 'isolated cardiac sarcoidosis' was made and he was started on corticosteroid.[11]

Heart failure developed when there are widespread of granulomatous infiltration within the myocardium tissue, presence of ventricular aneurysms or valvular regurgitation, rhythm abnormalities,or a combination of any of the above conditions.[12,13] Progressive congestive heart failure accounts for 25%– 75% of all cardiac-related death in patient with cardiac sarcoidosis. Untreated active cardiac sarcoidosis may have progressive granulomatous infiltration of the myocardial tissue leading to the development of fatal arrhythmia or sarcoid myocarditis.[13] As in our patient, he developed recurrent syncope but rapidly progressed to unheralded syncope with high-grade AV block. Her LVEF worsened drastically as reported in the sequential echocardiograms and CMR. This is highly suggestive that the natural course of CS is often unpredictable and can be aggressive at times if left undiagnosed and untreated. Cardiac magnetic resonance is the most useful tool for accurate determination of LVEF as it has high intra observer, interobserver, and test–retest reproducibility compared to other available reference methods.

Treatment of cardiac sarcoidosis remains a challenge. Steroid therapy is the mainstay of treatment, despite a lack of randomized trials to demonstrate efficacy.[2] Immunosuppressive agents are also commonly used in treatment of cardiac sarcoidosis, but they too lack convincing data. Methotrexate is often used as a second-line agent in refractory cases. The management of the arrhythmias associated with cardiac sarcoidosis can be difficult as well. Steroid therapy has not shown a consistent effect on arrhythmias.[14] In our patient we started high dose of steroid and follow up the patient with 18F-flurodeoxyglucose positron emission tomography (FDG-PET).

Conclusion:

This case highlights the importance of search for sarcoidosis in a young female patient with conduction system disease without any other symptoms. Early initiation of steroid therapy can improve conduction abnormality and sometimes heart failure. Even late initiation of corticosteroid therapy remained effective in our patient with significant improvement of his heart function and recovery of AV conduction.

Conflict of Interest - None.

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