

CARDIAC SARCOIDOSIS AND CORONARY ARTERY DISEASE: A TWO-HIT MECHANISM TO LEFT VENTRICULAR DYSFUNCTION (OR IS IT)?

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ABSTRACT. This report describes a case of cardiac sarcoidosis in a 40-year-old man with minimal risk factors for coronary artery disease who was found to have a critical coronary lesion on angiography performed for declining left ventricular function. The case highlights the diagnostic and therapeutic issues surrounding cardiac sarcoidosis and raises the question of a possible link between sarcoidosis and premature coronary artery disease. It also stresses the importance of ruling out ischemia in any patient with declining left ventricular function. (*Sarcoidosis Vasc Diffuse Lung Dis* 2013; 30: 237-240)

KEY WORDS: Cardiac sarcoidosis, coronary artery disease, ischemia

Abbreviation List

CAD: Coronary artery disease
CRP: C-reactive protein
ESR: Erythrocyte sedimentation rate
EKG: Electrocardiogram
ICD: Implantable cardioverter-defibrillator
LAD: Left anterior descending coronary artery
LV: Left ventricle
LVEF: Left ventricular ejection fraction
MRI: Magnetic resonance imaging
RBBB: Right bundle-branch block

CASE

The patient is a 40-year-old man with a history of hypertension and sarcoidosis demonstrated on

pathology after a splenectomy. He has been asymptomatic and has no history of syncope, presyncope, dizziness, or lightheadedness. He has never smoked or used drugs. Family history includes a second cousin with sarcoidosis. Physical examination was unremarkable. CRP was 7.4, ESR 31, and cholesterol and fasting glucose were normal.

An ECG (Fig. 1) demonstrated RBBB with left posterior fascicular block. Echocardiography showed a left ventricular ejection fraction (LVEF) of 45% with inferior hypokinesis. Cardiac MRI revealed left ventricular dilation, LVEF 37%, and large regions of late gadolinium enhancement (LGE) involving the basal anterolateral, mid inferior, anteroapical, and inferolateral walls (Fig. 2). Some myocardial segments with LGE clearly spare the subendocardium, which is a pattern not consistent with prior myocardial infarction and supports the diagnosis of cardiac sarcoidosis. In other segments, the LGE involves the subendocardium, which is typical for prior myocardial infarction but could also be consistent with cardiac sarcoidosis in the appropriate clinical setting.

Given the patient's history of systemic sarcoidosis, coupled with MRI and ECG evidence of cardiac involvement, he was referred for ICD implantation

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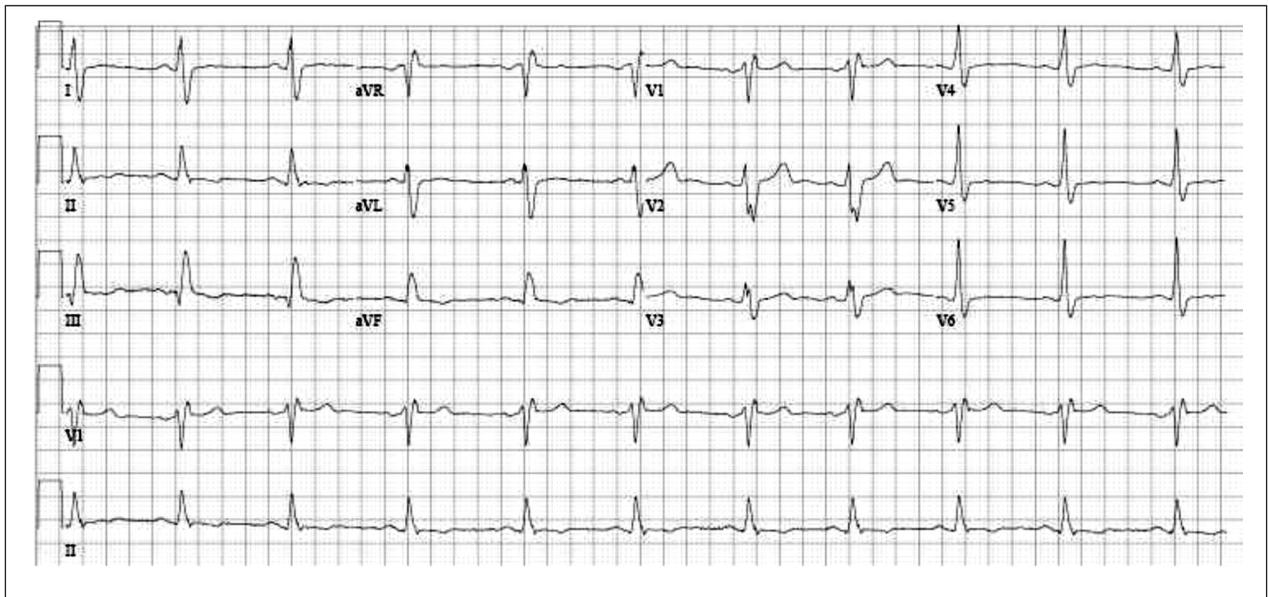


Fig. 1. ECG

as primary sudden cardiac death prevention. The patient adamantly refused device implantation, citing his lack of symptoms over the past several years.

He was prescribed systemic glucocorticoids as primary treatment of his cardiac sarcoidosis, but was nonadherent to the regimen. Repeat echocardiography was notable for a decline in LVEF to 27% with interval development of anterior dyskinesia. He eventually agreed to an ICD for primary prevention. In addition, he was referred for cardiac catheterization to rule out coronary artery disease (CAD) as an alternate etiology for this abrupt decline in LVEF.

Coronary angiography revealed a proximal 80% lesion of the left anterior descending artery (LAD) (Fig. 3). Percutaneous coronary intervention with placement of two drug-eluting stents to the LAD was performed. He was initiated on beta blocker, statin, clopidogrel, angiotensin-receptor blocker, and aspirin.

DISCUSSION

This case highlights several issues regarding cardiac sarcoidosis and LV dysfunction in young people. Our patient had a biopsy-proven diagnosis of sarcoidosis with both ECG and MRI findings

suggestive of cardiac sarcoidosis, meeting the diagnostic criteria established by the Japanese Ministry of Health and Welfare. He had no symptoms of his LV dysfunction and no symptoms to suggest CAD.

The patient's precipitous drop in LVEF prompted coronary angiography, which uncovered his severe proximal LAD lesion. Of note, the distribution of fibrosis noted in some of the myocardial segments on his cardiac MRI was atypical for prior myocardial infarction. A primarily anterior distribution would also be expected for his proximal LAD lesion, rather than the largely inferior and inferolateral LGE seen in the study.

A primary issue is this young patient's CAD in the setting of limited CAD risk factors. The patient did have an elevated CRP level, which was thought to reflect his underlying systemic inflammatory disease. While not necessarily explaining this patient's premature CAD, this finding highlights the well-established connection between inflammation and atherosclerosis, and to extend this consideration to the entity of sarcoidosis.

An extremely limited number of cases of sarcoidosis involving the coronary arteries have been reported in the pathology literature (1, 2). While approximately 25% of patients with sarcoidosis were found in an early study to have cardiac involvement,

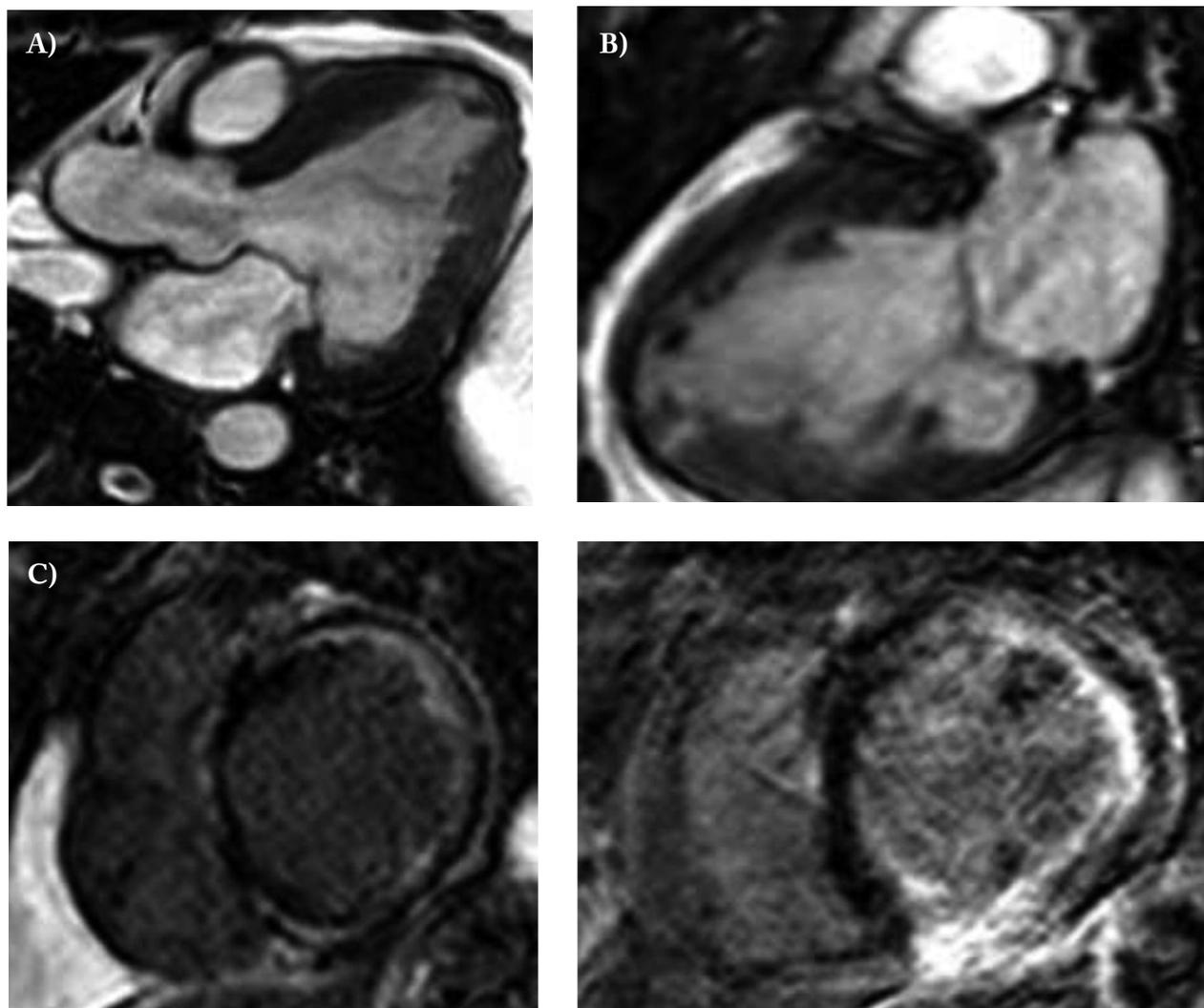


Fig. 2. MRI. A): End-systolic image from 3-chamber view demonstrating apical thinning. B): End-systolic image from 2-chamber view with apical and inferobasal thinning. C): Short-axis views with late gadolinium enhancement of the lateral and inferior walls. Note that the late gadolinium enhancement spares the subendocardium on the basal inferoseptal wall (left). But in the basal to mid anterior, anterolateral, and inferolateral walls, the late gadolinium enhancement involves the subendocardium (right)

coronary sarcoid lesions were not reported (3). Recently, an autopsy series of patients with sarcoidosis and sudden cardiac death found only one incidence of epicardial coronary sarcoid pathology (4). In general, the elevated arrhythmia burden associated with sarcoidosis has been attributed to myocardial lesions leading to conduction disturbances and tachyarrhythmias in the atrium or ventricle, rather than ischemia due to sarcoidosis-related coronary disease (5).

Given the inflammatory nature of coronary atherosclerosis, an association between sarcoidosis and

CAD would not be a surprising finding. In particular, granulomatous diseases and atherosclerosis have a common connection to the intracellular signaling molecules involved in Th1 immune responses, including TNF, interferon gamma, and multiple interleukins. Emerging research into sarcoidosis and inflammatory diseases has shown key genetic predispositions involving the major histocompatibility complex class II. For example, polymorphisms in HLA-DRB1 alleles have been shown to correlate with the risk of developing sarcoidosis (6). Other polymorphisms of the same HLA-DRB1 region

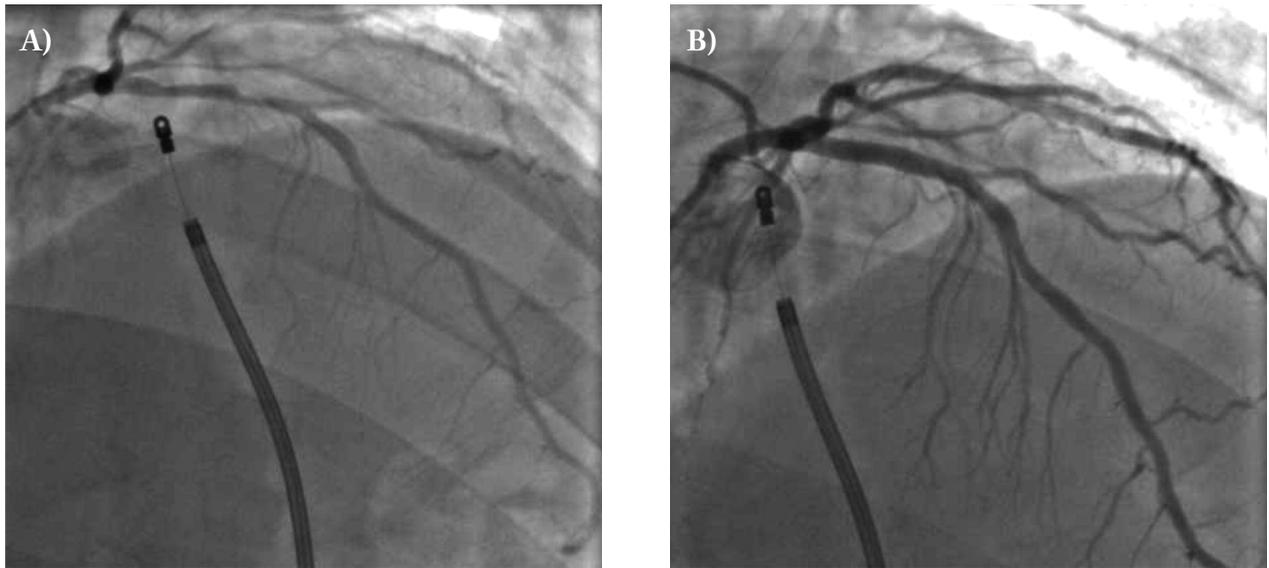


Fig. 3. Coronary Angiography. A: RAO cranial projection demonstrating proximal LAD lesion. B: RAO cranial projection post-intervention

have been associated with increased cardiovascular risk in rheumatoid arthritis (7), as well as in the general population (8).

CONCLUSION

This case highlights the rare entity of cardiac sarcoidosis with a potential connection between the inflammatory processes common to both sarcoidosis and CAD. While a limitation of our report is the impossibility of a histologic diagnosis of the coronary lesion, the patient's paucity of traditional CAD risk factors makes sarcoidosis-mediated CAD a distinct theoretical possibility. This case also reinforces the need to consider all possible causes for a patient's LV dysfunction, particularly ischemia, even when other etiologies have already been demonstrated. To the growing list of overlapping risk factors between CAD and heart failure, this case offers yet another consideration in sarcoidosis.

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