Late Gadolinium Enhanced High Resolution Magnetic Resonance Imaging Reveals Pathophysiological Condition of Cardiac Sarcoidosis

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SUMMARY

A 40-year-old man, who had been diagnosed with stage 2 pulmonary sarcoidosis, was referred to our hospital for further evaluation of dyspnea and cardiac function. The echocardiogram displayed thinning of the basal interventricular septum (IVS) and a reduced ejection fraction of 21%. Contrast-enhanced cardiac high resolution MRI (3 tesla) showed patchy subepicardial late gadolinium enhancement in the IVS, and anterior and lateral walls. There was no abnormality in the coronary angiography and the cardiac biopsy showed several small and well-defined noncaseating epithelioid granulomas. The granulomas contained multinucleated giant cells and asteroid bodies (a typical finding of sarcoidosis). Late gadolinium enhancement in high resolution MRI provided information on the pathophysiological condition of cardiac sarcoidosis very clearly, because 3 of 5 samples of endomyocardial biopsy from the septal wall of the right ventricle where late gadolinium enhancement was detected had positive findings for cardiac sarcoidosis (very high rate). These findings indicate that high resolution late gadolinium enhanced MRI might be very useful as a guide for endomyocardial biopsy in patients with cardiac sarcoidosis. (Int Heart J 2009; 50: 263-266)

Key words: Sarcoidosis, MRI, Endomyocardial biopsy

SARCOIDOSIS is a multisystem granulomatous disorder whose prognosis is generally favorable. The prognosis of sarcoidosis is influenced by the presence and severity of cardiac lesions. The clinical features of cardiac sarcoidosis include congestive heart failure, cor pulmonale, supraventricular and ventricular arrhythmias, conduction disturbances, ventricular aneurysms, pericardial effusion, and sudden death. Therefore, accurate diagnosis of heart involvement is very important. Many institutes use endomyocardial biopsy for the diagnosis
of cardiac sarcoidosis. However, a previous report showed that the diagnostic rate achieved with endomyocardial biopsy was very low, even in the patients in whom cardiac sarcoidosis was strongly suspected. This case report describes how late gadolinium enhancement in high resolution MRI provides clear information on the pathophysiological condition of cardiac sarcoidosis and might be very useful as a guide for endomyocardial biopsy in patients with cardiac sarcoidosis.

**Case Report**

A 40-year-old man, who had been diagnosed with stage 2 pulmonary sarcoidosis, was referred to our hospital for further evaluation of dyspnea and cardiac function. A resting ECG showed right bundle branch block and left anterior fascicular block. The echocardiogram displayed thinning of the basal interventricular septum (IVS) and a reduced ejection fraction of 21% (Figure 1). $^{99m}$Tc-Hexamibi single photon emission computed tomography revealed perfusion defects in the basal IVS and apex. Contrast-enhanced (0.2 mL/kg gadolinium-diethylenetriamine pentaacetic acid [Gd-DTPA]) cardiac high resolution magnetic resonance imaging (MRI) (3 tesla) showed patchy subepicardial late gadolinium enhancement in the IVS, and anterior and lateral walls (Figure 2A). Furthermore, late gadolinium enhancement was also detected in the septal wall of the right ventricle (Figure 2B). There was no abnormality in the coronary angiography and cardiac biopsy from the septal wall of the right ventricle.

![Figure 1](image.jpg)  
*Figure 1.* Parasternal long-axis echocardiogram recorded in diastole (A) and end-systole (B). Note the thinning of the basal interventricular septum (arrow) and a reduced ejection fraction.
Figure 2. Contrast-enhanced cardiac MRI in the long- (A) and short- (B) axis view reveals areas of hyperenhancement (arrows).

Figure 3. Cardiac biopsy showing well-defined noncaseating granulomas that contain multinucleated giant cells.
showed several small and well-defined noncaseating epithelioid granulomas. The granulomas contain multinucleated giant cells (Figure 3). Taken together, we diagnosed him as having cardiac sarcoidosis.

**DISCUSSION**

A definitive diagnosis of cardiac sarcoidosis requires the histologic examination of tissue specimens obtained by endomyocardial biopsy. However, Uemura, *et al*\(^5\) reported that the diagnostic rate achieved with endomyocardial biopsy was very low, even in the patients in whom cardiac sarcoidosis was strongly suspected. A previous report suggested that late gadolinium enhancement MRI reflected fibrogranulomatous tissues of sarcoidosis replacing the normal myocardium.\(^6\) Late gadolinium enhancement in high resolution MRI provided information on the pathophysiological condition of cardiac sarcoidosis very clearly, because 3 of 5 samples of endomyocardial biopsy from the septal wall of the right ventricle where late gadolinium enhancement was detected were positive for cardiac sarcoidosis (very high rate). To the best of our knowledge, this is the first report that shows high resolution late gadolinium enhancement MRI (3 tesla) might be very useful as a guide for endomyocardial biopsy in patients with cardiac sarcoidosis.

**REFERENCES**