Inner Spaces
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## Points

- Cardiomyopathies are not uncommon in practice and include a diverse group presenting either with failure or with arrhythmias and tachycardias.
- The assessment of cardiomyopathies needs a thorough evaluation of structure and function.
- Cardiac MRI today is the gold standard for the assessment of cardiomyopathies and allows evaluation of wall-motion abnormalities, global function and the presence / absence of abnormal enhancement or areas of fat replacement.

# Cardiac MRI and Cardiomyopathies

Cardiomyopathies are conditions that directly affect the myocardium, leading to either a reduction in function or the presence of electrical disturbances. Traditionally, these can be divided into dilated, hypertrophic, restrictive and miscellaneous. Inflammatory and infiltrative conditions commonly affect the heart, the commonest being sarcoidosis. ARVD (arrhythmogenic right ventricular dysplasia) is not an uncommon condition affecting the right side of the heart.

Cardiac MRI is a unique modality that captures both the structure and function of the heart. It is inherently more sensitive and specific than echocardiography, with better spatial resolution.

Cardiac MRI is performed using cine sequences, which allow us to study wall-motion abnormalities and global function, including the ejection fraction and volumes. After intravenous contrast, we can study the presence or absence of delayed hyperenhancement, which allows us to assess the extent of myocardial inflammation / fibrosis.

### Dilated Cardiomyopathy (DCM) (Fig. 1)

In DCM, cardiac MRI shows global hypokinesia with absence of infarction and subtle mid-myocardial fibrosis in a few cases.

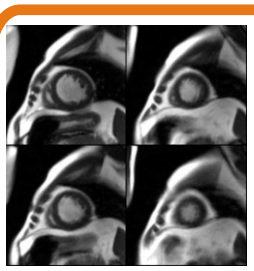

Fig. 1A

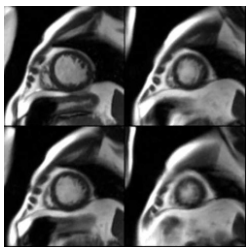

Fig. 1B

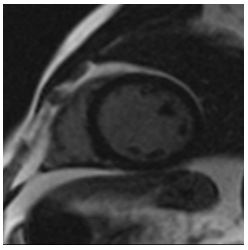

Fig. 1C

*Fig. 1 (A-C): Dilated cardiomyopathy. End-diastole (A) and end-systolic (B) images from a cine study, show severe, diffuse hypokinesia. The post-contrast, delayed image (C) shows complete absence of enhancement, suggesting that there is no infarction or fibrosis. This is suggestive of idiopathic dilated cardiomyopathy.*

### Hypertrophic Cardiomyopathy (HCM) (Fig. 2)

Cardiac MRI is the most sensitive modality to assess the presence of apical HCM, which is often missed on echocardiography. In hypertrophic obstructive cardiomyopathy, cardiac MRI allows us to assess the extent of myocardial fibrosis and damage as well as the sub-aortic stenosis and flow impairment

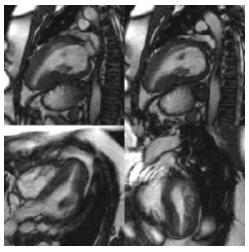

Fig. 2A

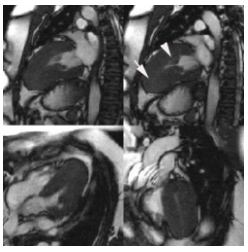

Fig. 2B

*Fig. 2 (A, B): Hypertrophic cardiomyopathy. End-diastolic (A) and end-systolic (B) images from a cine study, show severe apical hypertrophy (arrows). Note the "spade-like" appearance (arrowhead) of the LV cavity in end-systole.*

*The online version is up at* ***http://www.jankharia.com/innerspaces/current.htm***

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## ARVC (Fig. 3)

The presence of fat infiltration, abnormal enhancement of the RV myocardium due to fibrosis and areas of sacculation and irregularity are well seen with cardiac MRI

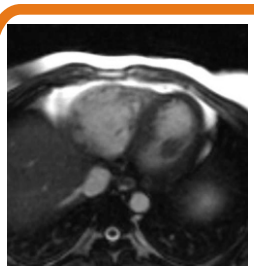

Fig. 3A

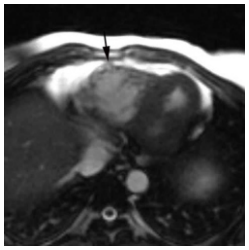

Fig. 3B

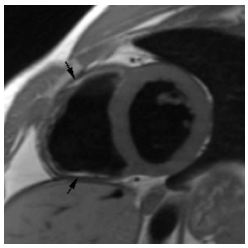

Fig. 3C

*Fig. 3 (A-C): ARVD. End-diastolic (A) and end-systolic (B) images from a cine-study, show an irregular anterior wall with sacculation in systole (arrow in B). The high-resolution short-axis image, shows fat infiltration in the RV wall, appearing white on this T1W image.*

## Inflammatory (Fig. 4)

Sarcoidosis is the commonest inflammatory condition to affect the heart and presents with abnormal, focal areas of enhancement in the RV and LV with wall motion abnormalities. Often mediastinal and hilar lymphadenopathy is seen in the same study.

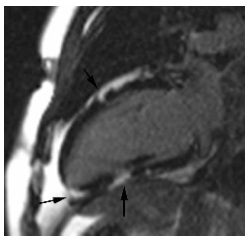

Fig. 4A

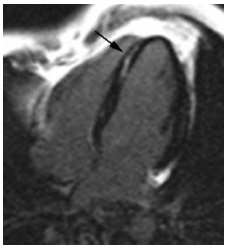

Fig. 4B

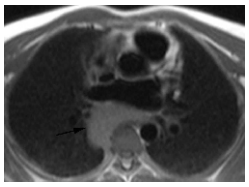

Fig. 4C

*Fig. 4 (A-C): Sarcoidosis. Two-chamber (A) and four-chamber (B), post-contrast, delayed images, show abnormal areas of mid-myocardial enhancement (arrows) in the anterior and inferior walls and septum, suggestive of an inflammatory / infiltrative process. The axial HASTE image (C) shows a non-necrotic, enlarged subcarinal lymph node (arrow), which on biopsy showed non-caseating granulomatous disease.*

## Thalassemia

In a previous newsletter, we have already discussed the role of cardiac MRI in the estimation of liver Fe.

Designed by MKIS

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