Cardiac magnetic resonance imaging in patients with myocarditis mimicking ST-elevation myocardial infarction

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Background and Aims

Making diagnosis can be difficult in patients with clinical signs of ST elevation myocardial infarction (STEMI) but without culprit lesion on coronary angiography. Coronary angiography performed because of suspected ST-elevation myocardial infarction reveals no epicardial coronary artery desease in 2.4 - 4.3 %
(Stensaeth, Int J Cardiovasc Imaging 2011; Vago, Cardiol Hung 2012)

The aim of the study was to investigate the magnetic resonance (MR) characteristics of the different diseases and follow-up patients with myocarditis mimicking STEMI.

Methods

Our prospective study was performed in 54 consecutive patients (47 male, 7 female; mean age 35±15 years;) with clinical signs of STEMI but without culprit lesion on coronary angiography. They underwent acute cardiac MR examination in the first 1-7 days. ECG synchronized cine movie, T2-weighted SPIR, delayed contrast enhancement (DE) images were taken. Left (LV) and righ ventricular (RV) volumes, ejection fractions (EF), masses, myocardial necrosis/scar (core and grayzone) were evaluated.
In patients with myocarditis control MR examination were performed after at least 3 months, and clinical follow up six monthly.

Results

In 91% of cases cardiac MRI could clarify the diagnosis, STEMI was proven in 6 cases, apical balloning syndrome in 6 female pts, myocardial contusion in one patient. In 36 pts (30 male, mean age 29±9 years) characteristics of myocarditis were found. In five pts MRI showed no cardiac disorder. There was no difference in laboratory (troponin-T, CK-MB, CRP) parameters in pts with myocarditis and STEMI. In pts with apical ballooning syndrome LVEF was lower compered to patients with myocarditis or infarction (myocarditis: 56±11%, infarction: 52±7%, Tako-Tsubo: 41±6%, p<0,05). In pts with myocarditis there was a positive correlation between the maximal level of CK-MB and troponin-T and the mass of grey zone (p=0.007), and negative correlation between gray zone/mass % and LVEF (p=0.001). Control MRI showed higher LVEF (56 vs 62 p=0.001) lower LV mass compared to acute data (132 g vs 115 g), the size of necrotic/fibrotic region was shrinking (core-gray zone 10.2 g vs. 6.4g p=0.025) however remaining DE could be detected 69% of pts with myocarditis. During the 3.3 years follow up hospitalisation did not occure due to heart failure, arrhytmia or clinical simptoms suggesting these disorders.

	AMI (n=6)	Myocarditis (n=36)	Tako-Tsubo (n=6)
	average ± SD		
Ejection fraction (%)	52 ± 7	56 ± 11	41 ± 6
End-systolic volume index (ml/m²)	43 ± 7	39 ± 13	49 ± 7
End-diastolic volume index (ml/m²)	92 ± 3	89 ± 12	84 ± 8
Stroke volume (ml)	84 ± 15	76 ±26	84 ± 12
Left ventricular mass (g)	155 ± 33	132 ±35	97 ± 18
Left ventricular mass index (g/m²)	79 ± 14	69 ± 17	56 ± 14

Table 1. Left ventricular MR parameters

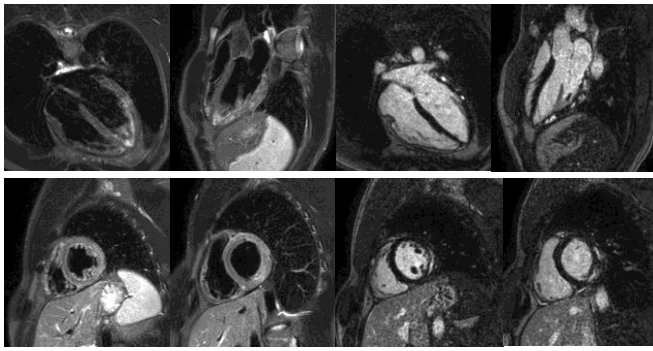

Figure 1. Four and three chamber, and short axis SPIR and DE images of a acute myocarditis.

	Acute	Follow-up	p
	average ± SD		
Ejection fraction (%)	56 ± 11	62 ± 11	0.002
End-systolic volume index (ml/m²)	39 ± 13	35 ± 9	NS
End-diastolic volume index (ml/m²)	89 ± 12	91±15	NS
Stroke volume (ml)	76±26	69±19	NS
Left ventricular mass (g)	132±35	115 ±27	0.001
Left ventricular mass index (g/m²)	69 ± 17	58 ± 11	0.001
	Median (confidence interval)		
Necrosis/fibrosis core (g)	5.5 (2.5-12.5)	1.5 (0-3.6)	0.025
Core+border zone (g)	10 (7.8-16.5)	6.4 (5.1-9.8)	0.025
Necrosis/fibrosis core /mass (%)	4.2 (2-9)	1 (0-3)	0.034

Table 2. Left ventricular MR parameters during follow up in pts with myocarditis

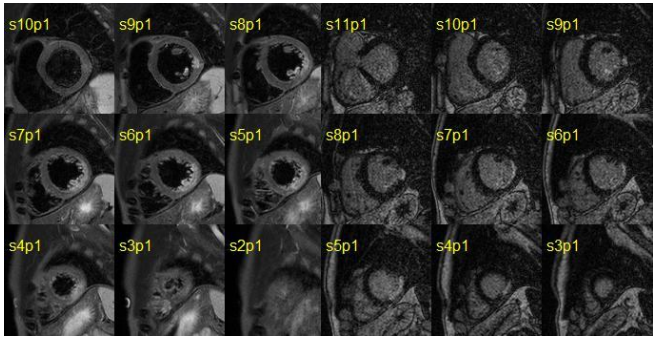

Figure 2. Short axis SPIR and DE images of a 35 year-old man with normal coronary angiography.

	AMI (n=6)	myocarditis (n=36)	p
	average		p<0.05
Peak troponin T	1.9	2.9	NS
Troponin T MR	1.7	2.1	NS
Peak CK-MB	97.4	74.9	NS
Peak CRP	43	73	NS

Table 3. Laboratory parameters

Conclusions

In cases with clinical signs of STEMI and normal coronary angiography, cardiac MRI can differentiate and provide exact morphological and functional information. In our study myocarditis mimicking STEMI affected mainly young male patients.

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