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Differential diagnosis of MINOCA patients: the contribution of early cardiac magnetic resonance imaging to the final diagnosis in patients with normal coronary angiography

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Acute Coronary Syndromes: Myocardial Infarction with Non-obstructive Coronary Arteries

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Introduction: The diagnostic value of cardiac magnetic resonance (CMR) imaging has been suggested in determination of the cause behind Myocardial Infarction with Non-obstructive Coronary Arteries (MINOCA). According to the current STEMI Guideline CMR is considered to have the best diagnostic performance, when CMR timing is within its optimal =2 weeks.

Purpose: The aim of our study was to establish the prevalence of the underlying pathologies using early (1-7 days) CMR examination in patients with signs of troponin positive acute coronary syndrome (ACS) but normal coronary angiography (NCA). We also aimed to investigate how early CMR changes the provisional diagnosis, and to provide detailed information of CMR characteristics of our pts and to compare laboratory parameters and risk factors of each group.

Methods: Between 2010-2018 (n=234) consecutive pts (40.2±12.1y,159 male) with troponin positive ACS underwent CMR examination following NCA (=20% stenosis), in a mean length of time of 2.5 days. Cine movie, T2-weighted and late gadolinium enhanced images (LGE) were performed. Left ventricular end-diastolic and end-systolic volumes (LVESVi), ejection fraction (LVEF), mass (LVM) and myocardial necrosis were evaluated. We analysed the risk factors and laboratory values of our patients.

Results: CMR proved acute myocardial infarction (MI) in 42 pts (52% male), acute myocarditis in 138 pts (89% male), Takó-Tsubo cardiomyopathy (TTC) in 25 woman, myocardial contusion in one case, in three cases CMR raised the suspicion of sarcoidosis and in 25 pts (56% male) there was no CMR abnormality. LVEF was lower, LVESVi was elevated in TTC patients compared to MI and myocarditis (LVEF:44± 9.1 vs 56.5±7 vs 55±6.6%; LVESVi: 52.5±12.9 vs 41±16.8 vs 42.1±8.9 ml/m² p<0.001). The most frequently affected areas of the myocardium by LGE were the basal and mid inferolateral segments in case of myocarditis (69% of pts). In MI pts the anterior wall was affected only in 16%, while the involvement of inferior wall was visible in 57% of the pts. Early CMR examination established a definitive diagnosis in 88% of the cases, in 11% there was no CMR abnormality and it remained inconclusive in only 1% of the cases. CMR changed the provisional diagnosis in 47% of the pts.

Myocarditis pts were younger (myocarditis: 32.5±10.8 vs MI 47.6±15.5 vs TTC 65.5±9.6 y; p<0.001) and lower percentage had hypercholesterinaemia (myocarditis:18.8 vs MI: 40 vs TTC:54.5%, p<0.01) or hypertension (myocarditis:14.3 vs MI:38.7 vs TTC:55.6%, p<0.001). Laboratory values showed significant elevation of hsTroponin and CKMB of MI and myocarditis pts compared to other groups (p<0.05), but there was no difference between these two groups.

Conclusion: In patients with the working diagnosis of MINOCA and normal coronary angiography early CMR established a definitive diagnosis in 88% of our patients and changed the provisional diagnosis in 47% of the
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Prevalence of the underlying pathologies in MINOCA patients (%)

- Acute myocardial infarction
- Acute myocarditis
- Tako-Tsubo cardiomyopathy
- Myocardial contusion
- Uncertain
- No CMR abnormality