Predictors for and the role of abnormal mapping values at cardiac magnetic resonance in myocardial infarction with non-obstructive coronary arteries

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Funding Acknowledgements: Type of funding sources: Public hospital(s). Main funding source(s): Ospedale S. Orsola (Bologna, Italy)

Background: Cardiovascular magnetic resonance (CMR) plays a crucial role in the diagnostic approach of Myocardial infarction with non-obstructive coronary arteries (MINOCA), as a result of its ability to perform myocardial tissue characterization using mapping sequences.

Purpose: To analyze clinical and prognostic differences in MINOCA patients with and without abnormal mapping values when early CMR is performed.

Methods: We assessed all MINOCA cases from January 2017 to October 2021 in our Center. MINOCA was defined according to current European guidelines criteria. Acute myocarditis, Tako-tsubo syndromes and cardiomyopathies were excluded. CMR protocol included cine images, T1 and T2 mapping and late gadolinium enhancement (LGE). Abnormal mapping was considered as the presence of prolonged native T1 and T2 mapping with a specific pattern suggestive of ischemic myocardial injury. The receiver operating characteristics curve (ROC) for the detection of abnormal mapping was derived. Multivariate logistic regression analysis was used to determine predictors of abnormal mapping. The primary outcome of major adverse cardiovascular events (MACE) in patients with and without abnormal mapping was evaluated.

Results: The final cohort included 198 MINOCA, 161 (81.3%) of which constituted the abnormal mapping group (M+) while the remaining 37 consisted of MINOCA without either abnormal mapping values or presence of late gadolinium enhancement (normal CMR findings, m-). The mean time delay between acute clinical presentation and CMR was 4.8 ± 1.5 days. Among the M+ group, patients were older and presented familiarity for cardiovascular disease and hypercholesterolemia more frequently compared to the m- group. At admission, the M+ group more frequently presented ST segment alterations, wall motion abnormalities (WMA) and greater left ventricular (LV) volumes, compared to the m- ones. Furthermore, the M+ group exhibit greater peak high sensitivity-Troponin I (hs-TnI) values. The ROC curve for the detection of abnormal mapping showed that peak Tn values had an excellent area under the curve (AUC) of 0.935 (95%CI 0.902-0.968), p<0.001. At multivariable analyses, adjusted for confounding factors, the strongest predictor of abnormal mapping was the peak hs-TnI values (OR 1.02, 95% CI 1.01-1.03, p<0.001). Finally, MINOCA M+ had more MACE compared to MINOCA m- (16.8% vs 2.7%, p<0.001) at a mean follow up time of 33.7 ± 12.0 months.

Conclusion: Among selected MINOCA, abnormal mapping values when early CMR is performed identify a subgroup of patients with worse clinical presentation and outcome. Some baseline characteristics (such as ST alterations, WMA and LV volumes) may support the detection of abnormal mapping. Overall, peak hs-TnI values have an excellent diagnostic performance to predict abnormal mapping values and could be useful in identifying high-risk MINOCA and the consequent need for a CMR evaluation.