Cardiac magnetic resonance improves no reflow diagnostic accuracy and prognostic stratification compared to coronary angiography in patients with ST-segment elevation acute myocardial infarction

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Objectives

To assess the no reflow (NR) diagnostic accuracy and prognostic stratification ability of coronary angiography versus cardiac magnetic resonance (CMR) in patients with ST-elevation myocardial infarction (STEMI).

Methods

We enrolled 53 consecutive STEMI patients within 12 hours of symptoms onset who underwent primary percutaneous coronary intervention (PCI). Angiographic NR (ANR) was defined as TIMI flow grade <3 and/or blush grade <2 post PCI. CMR NR (Philips Achieva 1.5 T) was defined as microvascular obstruction (MVO) on early and late T1 IR sequences acquired after injection of 0.15 mmol/kg of Gadobutrol. Patients underwent CMR between 2 and 5 days after STEMI and at 6 months follow-up.

Results

Nineteen patients (36%) had evidence of ANR and 35 (66%) showed MVO at CMR. Among patients with ANR, only 2 did not have MVO. Among patients with MVO, 17 had ANR and 18 did not.

Patients with MVO had larger infarct size as assessed by laboratoristic and CMR data. In fact, they had both higher troponin T (TnT) peak (8.24±5.31 vs 2.62±2.28 µg/l, p<0.0001) and larger LGE area (31.5±10.6 vs 19.6±10.3%, p<0.0001) compared to patients without MVO. Patients with MVO had significantly lower left ventricular ejection fraction (LVEF) (47.1±9.3 vs 56.3±8.3%, p<0.001) and increased LV end systolic volume (iESV) (40.8±12.0 vs 33.2±10.0 ml/sqm, p=0.02). In contrast, patients with ANR only showed a non-significant trend towards larger infarct size compared to those without ANR (TnT peak 7.72 ± 4.40 vs 5.56 ± 5.56 µg/l, p=0.12; LGE area 28.5±10.8 vs 26.9±12.6%, p=0.64).

At univariate analysis, a pre-PCI TIMI flow of 0-1 predicted MVO (OR 0.26 ,p=0.05), but not ANR (OR 0.52, p=0.38). The occurrence of ANR predicted the presence of MVO at CMR (OR 7.56, p=0.01), but not LGE extension (OR 1.01, p=0.64). Conversely, MVO occurrence was related to larger LGE (OR 1.12, p=0.002). TnT peak predicted MVO at univariate analysis (OR 1.742,p<0.001).

After multivariate analysis, only TnT peak was an independent predictor of MVO (OR 2.10, p<0.001).

Mean clinical follow-up was 390 ± 243 days. Follow-up CMR showed that patients with acute phase MVO had lower LVEF (51.7±9.3 vs 61.5±5.6%, p<0.05) and higher iEDV (90.6±18.3 vs 69.6±14.3 ml/sqm, p<0.05) and iESV (46.1±15.8 vs 27.3±9.6 ml/sqm, p<0.01). Patients with and without ANR did not have significant differences in LVEF, iEDV, iESV and LGE area at follow-up CMR. MACE-free survival was significantly worse in patients with MVO (34% vs 11% without MVO, p=0.05), while it was similar in patients with and without ANR (32% vs 28%, p=0.53). Patients with ANR, but without MVO did not have any MACE at follow up.

Conclusion

Our data suggest a higher diagnostic efficiency, accuracy and prognostic stratification of CMR vs angiography in STEMI patients.
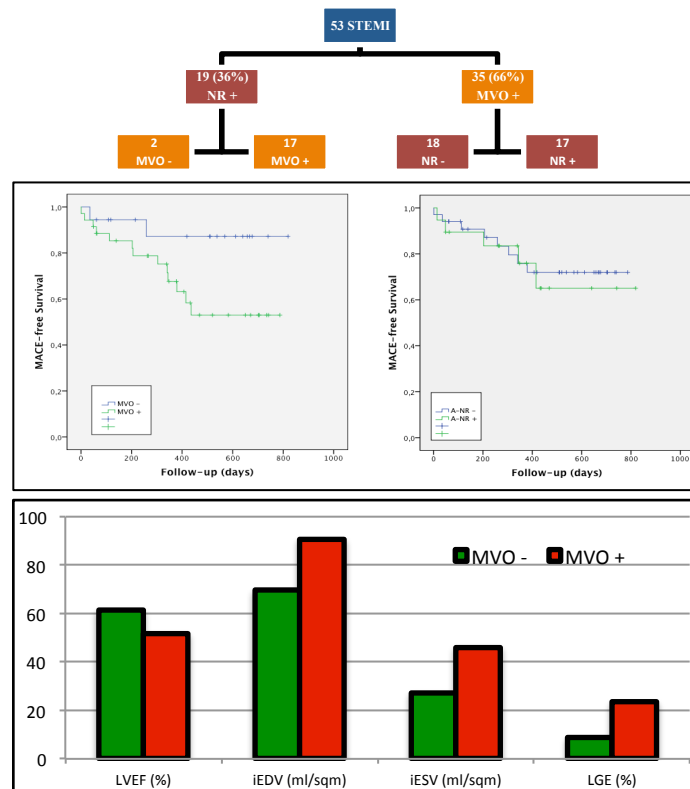
Comparison of LVEF, iEDV, iESV and LGE areas in patients with vs without MVO at follow-up CMR

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