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Additional impact of microvascular obstruction assessed by magnetic resonance imaging on long-term outcome after st-elevation myocardial infarction - a comparison to traditional prognostic markers

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Background

The presence of microvascular obstruction (MO) assessed by cardiovascular magnetic resonance imaging (MRI) has been shown to be a prognostic marker for combined clinical endpoints (including unstable angina and repeat target vessel revascularization) after ST-elevation myocardial infarction (STEMI) in a limited number of patients. Whether the presence and especially the extent of MO gives also prognostic information for "hard" endpoints and whether MO adds information independent of traditional prognostic markers and scores has not been investigated, yet.

Methods

STEMI patients reperfused by primary angioplasty (n = 408) within 12 hours after symptom onset underwent contrast-enhanced-MRI at a median of 3 days after the index event (IQR 2-4). MO was measured 15 minutes after gadolinium injection with late enhancement sequences. Clinical follow-up was conducted after 19 months (IQR 10-27). The primary endpoint was defined as composite of death, non-fatal myocardial reinfarction and congestive heart failure. Secondary outcomes included the individual components of the composite endpoint.

Results

The presence of MO demonstrated the strongest unadjusted associations with MACE and mortality compared to traditional markers (unadjusted HR 3.67, 95% CI 1.67-8.5, p = 0.001; and HR 4.63, 95%CI 1.08-19.84, p = 0.04, respectively). Furthermore, the risk for MACE and mortality increased with the extent of MO (Tertiles 1-3: 6%, 16.4%, 24.4%, p < 0.001; and 1.5%, 5.2%, 9.6%, p = 0.01). MO presence showed a strong trend towards higher occurrence of reinfarction (p = 0.06) and congestive heart failure (p = 0.07).

In a multivariate Cox regression analysis including all parameters significant in univariate analysis (TIMI risk-score, Killip-class, ST-resolution, post-PCI TIMI-flow, infarct size, left-ventricular ejection fraction, endsystolic volume, age and diabetes mellitus), MO was identified as the strongest independent predictor for the occurrence of the composite endpoint (HR 2.60, 95%CI 1.15-5.86, p = 0.02). Apart from MO, diabetes (HR 1.93, 95% CI 1.13-3.29, p = 0.02), Killip class (HR 1.71, 95%CI 1.20-2.44, p = 0.003), post-PCI TIMI-flow (HR 1.34, 95%CI 1.00-1.79, p = 0.05), age (HR 1.03, 95%CI 1.01-1.06, p = 0.02) and ejection fraction (HR 1.03, 95%CI 1.01-1.05, p = 0.008) were independently associated with the combined clinical endpoint.

Conclusion

In the setting of traditional prognostic markers and scores, the presence and extent of MO is a strong independent predictor for the occurrence of death, non-fatal myocardial reinfarction and congestive heart failure after STEMI.