Thiele et al. Journal of Cardiovascular Magnetic Resonance 2011, 13(Suppl 1):O85
http://jcmr-online.com/content/13/S1/O85

Journal of Cardiovascular Magnetic Resonance

ORAL PRESENTATION Open Access

Prognostic value and determinants of a hypointense core in T_2-weighted cardiac magnetic resonance in acute reperfused ST-elevation myocardial infarction

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From 2011 SCMR/Euro CMR Joint Scientific Sessions
Nice, France. 3-6 February 2011

Introduction

A hypointense core of infarcted myocardium in T2-weighted CMR has been used as a noninvasive marker for intramyocardial hemorrhage and was related with adverse remodelling in recently published clinical trials. However, the clinical significance of such findings is not yet established.

Purpose

Aim of this study was to evaluate determinants and prognostic impact of a hypointense infarct core in T2-weighted cardiovascular MR (CMR) images, studied in patients after acute, reperfused ST-elevation myocardial infarction (STEMI).

Methods

We analyzed 346 STEMI patients undergoing primary angioplasty <12 hours after symptoms onset at 2 institutions in Germany and Canada. T2-weighted and contrast-enhanced CMR was used for assessment of the area-at-risk, myocardial salvage, infarct size, hypointense core in T2-weighted images and late microvascular obstruction (MO). Patients were categorized into 3 groups defined by the presence or absence of a hypointense core and also MO. Primary endpoint of the study was occurrence of major adverse cardiovascular events (MACE) defined as death, reinfarction and congestive heart failure requiring hospital admission within 6 months after infarction.

Results

There were 3 groups of patients; patients with hypointense core plus MO (n=122), patients without hypointense core with MO (n=108), and patients without hypointense core and without MO (n=116). The extent of infarct size (r=0.61) and late MO (r=0.74) correlated significantly with the volumetric extent of the hypointense core ($p<0.001$, respectively). In a multivariable regression model adjusted for significant variables in univariable regression analysis, the extent of late MO ($p<0.001$), infarct size ($p=0.01$), and impaired ejection fraction ($p=0.02$) were the strongest predictors of hypointense cores.

The presence of a hypointense core was a strong univariable and multivariable predictor of MACE (hazard ratio: 2.59, confidence interval: 1.27-5.27). When using a 3-level categorical variable including 1) MO and hypointense core both present 2) MO only present; 3) No MO and no hypointense core present, a risk gradient across the 3 groups could be observed (16.4% versus 10.8% versus 3.6%, $p=0.002$; Figure 1).

Conclusions

A hypointense infarct core within the area at risk of reperfused infarcted myocardium in T2-weighted CMR is closely related to infarct size, MO and impaired left ventricular function with subsequent adverse clinical outcome.

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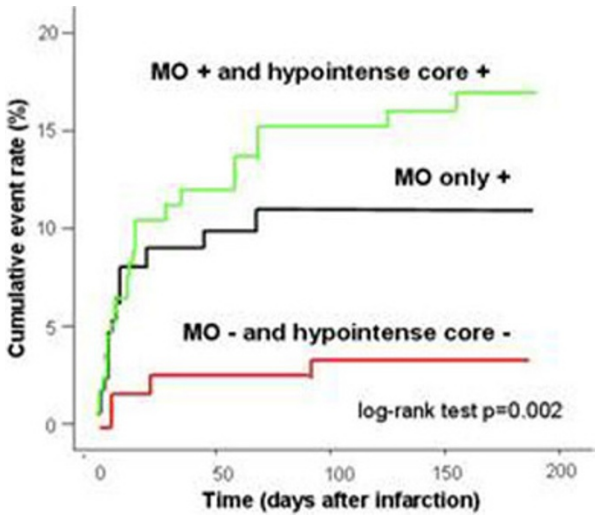

Figure 1

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Published: 2 February 2011

doi:10.1186/1532-429X-13-S1-O85
Cite this article as: Thiele *et al.*: Prognostic value and determinants of a hypointense core in T_2-weighted cardiac magnetic resonance in acute reperfused ST-elevation myocardial infarction. *Journal of Cardiovascular Magnetic Resonance* 2011 **13**(Suppl 1):O85.