EDITORIAL COMMENT

Magnetic resonance imaging of persistent myocardial obstruction after myocardial infarction. A tool becoming increasingly important in clinical cardiology?

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Aggressive reperfusion therapy using percutaneous coronary intervention (PCI) techniques has contributed significantly with the decrease of cardiac mortality after myocardial infarction in the last decade. This by limiting myocardial necrosis and infarct size [1]. Despite complete restoration of flow in the epicardial coronary artery after PCI, myocardial perfusion is not restored in up to 30% of patients due to microvascular obstruction [2]. Microvascular obstruction is known to be associated with a higher incidence of left ventricular remodeling, post infarct complications, congestive heart failure and death [3]. Imaging of the extent of microvascular obstruction is important because local delivery of pluripotent cells, having cardiomyogenic potential, in viable infarct borders might regenerate heart tissue [4]. The preferred way to detect microvascular obstruction with MRI is using gadolinium enhanced magnetic resonance imaging. This can be done using first-pass perfusion and with late gadolinium enhancement [5, 6].

After contrast injection, initially hypoenhanced regions, corresponding to areas with microvascular obstruction, are seen surrounded by a larger region of hyperenhancement. The hypoenhancement is due to substantially reduced perfusion at the microcirculatory level, which prevents penetration of contrast into the core of the infarct. Because the flow in these regions is low, they become dark initially but become hyperenhanced later, as soon as contrast accumulates.

Acute myocardial infarction is also accompanied by myocardial edema [7]. T2-weighted (T2w) MRI is a noninvasive method to visualize myocardial edema after myocardial infarction [8]. In T2w images, there is a high signal intensity in the area of the infarction, corresponding with the amount of myocardial water [9, 10]. Because the area of edema is larger than the true infarction size, the hyperintense area on T2w images corresponds to a viable area, which is at risk [10]. The peri-infarct zone can be calculated as the size of edema on T2w MRI and the infarct size on delayed contrast enhanced MRI [8]. The current study of Choi et al. [11] in the International Journal of Cardiac Imaging shows, that in a pig pig model the extent of persistent microvascular obstruction was nearly half in a group without high signal intensity on T2w imaging compared to the group with high intensity signals. The contrast ratio of T2w images showed a significant inverse correlation with the extent of persistent microvascular obstruction observed in delayed enhancement images. The contrast ratio of T2-weighted image showed also a significant inverse correlation with the extent of intramyocardial hemorrhage seen in postmortem histochemical staining. In clinical practice, these findings could be used for risk stratification of patients after myocardial infarction or

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to select patients for additional treatment with injection of cells after percutaneous intervention. Further clinical studies are needed to prove the additional value of this strategy.

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