

Oral presentation

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Microvascular obstruction following PCI is associated with reperfusion hemorrhage and chronic left ventricular impairment

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Introduction

Myocardial hemorrhage occurs when severely ischemic myocardium is reperfused and is a potential marker for subsequent LV remodeling. The relationship between reperfusion hemorrhage (RH) and microvascular obstruction (MVO) is poorly understood. Although gross hemorrhage is detectable on T2-weighted imaging, the true incidence of hemorrhagic transformation in acute myocardial infarction is unknown.

Purpose

To use T2*-mapping as a sensitive CMR technique for the detection of hemorrhage within acutely reperfused infarcts and examine the association with MVO and the impact on LV function.

Methods

30 patients were studied who had received PCI following an acute STEMI. Each subject had a CMR within a week of intervention and at 1 year. Hemorrhage was detected with T2* mapping using a black-blood navigator-gated gradient multiecho sequence (TR 17 ms, 7 echoes, TE 2.3 - 16.1 ms). The region of hemorrhage (T2* < 20 ms) was compared to the extent of necrosis and microvascular obstruction (MVO) on contrast enhanced sequences.

Results

RH was detected in 17 patients (57%). The areas of hemorrhage and MVO were seen in the same location in all subjects (Figure 1). Acutely hemorrhagic infarcts showed

increased end diastolic volume index (94.6 ± 23.7 vs 72.3 ± 15.1 ml, $p < 0.01$) and reduced ejection fraction (56 ± 14 vs $64 \pm 7.8\%$, $p < 0.05$) compared to non-hemorrhagic infarcts at 1 year follow-up.

Conclusion

The incidence of RH is more common than previously reported using less sensitive imaging techniques. Hemorrhage and MVO appear in the same distribution suggesting that the two processes are closely related. Hemorrhagic transformation of the infarct might therefore be a potential mechanism for the poor outcome observed in infarcts with MVO.

RH occurs in the same regions as MVO and is associated with poor recovery of function at 1 year follow-up.

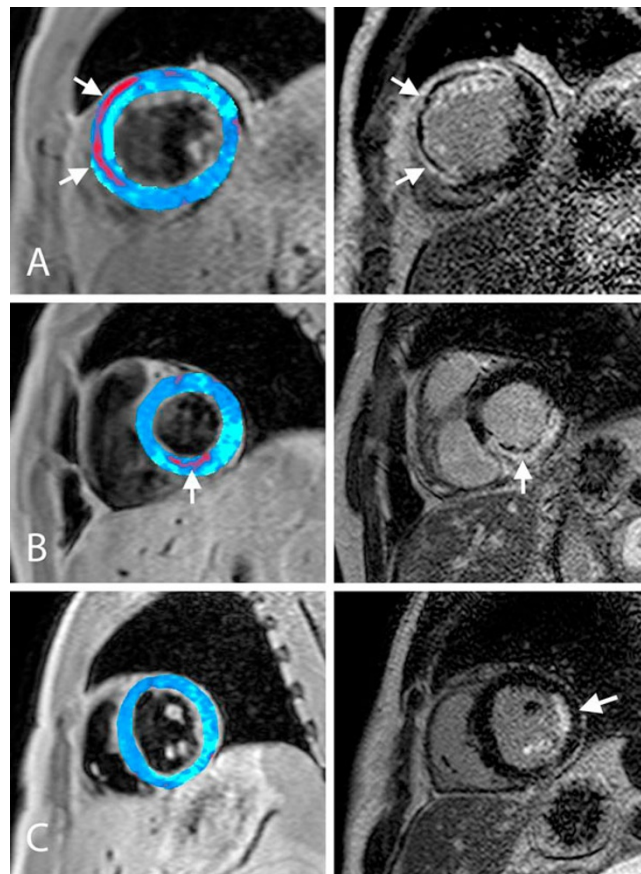


Figure 1

Paired LV short axis plane CMR images from three patients with acute STEMI obtained shortly after PCI. The left column shows the T2* maps with areas of hemorrhage depicted in red ($T2^* < 20$ ms). The right column shows the delayed contrast enhanced images. Enhancing myocardium indicates the extent of infarcted tissue while MVO is demonstrated by sub-endocardial non-enhancement. In Patient A the LAD was reperfused - the distribution of hemorrhage and MVO within the anterior infarct are similar. In Patient B the RCA was reperfused - Both subendocardial hemorrhage and MVO are present in the inferior wall. In Patient C the OM was involved - There is a partial-thickness lateral wall infarct, but no hemorrhage or MVO.

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