Influence of Time-to-Reperfusion on the Presence and Extent of Myocardial Salvage, Infarct Size and Microvascular Damage in Patients With ST-Segment Elevation Myocardial Infarction: Evidence From Cardiovascular Magnetic Resonance

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Background: Previous studies evaluating the influence of time-to-reperfusion on infarct size (IS) and myocardial salvage over time in patients with ST-segment elevation myocardial infarction (STEMI) yielded conflicting results. Cardiovascular magnetic resonance (CMR) can visualize areas of irreversible myocardial and microvascular injury (infarct size, IS and microvascular obstruction, MVO, respectively) with late gadolinium enhancement (LGE) imaging and areas of salvaged myocardium at risk with T2-weighted imaging.

Methods: Seventy patients with first STEMI, successfully treated with primary PCI within 12 hours from symptom onset, underwent CMR 5±2 days after hospital admission. Patients were subcategorized into 4 quartiles on the basis of pain-to-ballon time distribution: <60 minutes (group A, n= 19), >60 to 150 minutes (group B, n= 17), >150 to 360 minutes (group C, n= 17), and >360 minutes (group D, n= 17). Breath-hold T2-weighted and LGE CMR imaging was used to characterize reversible and irreversible myocardial injury.

Results: Shorter time-to-reperfusion (group A) was associated with smaller IS and MVO and larger salvaged myocardium at risk. A progressive increase overtime in IS (8%, 11%, 12%, 18%, p=0.005, respectively), and MVO (0.5%, 1.5%, 3.7%, 6.6%, p=0.039, respectively) was observed, whereas salvaged myocardium at risk suddenly decreases after 60 minutes (8.5%, 3.2%, 2.4%, 2.1%, p=0.003, respectively). Lately reperfused patients (group D) had significantly larger areas of IS and MVO with higher prevalence of intramyocardial hemorrhage compared to group A, with an almost complete disappearance of salvaged myocardium at risk.

Conclusions: In patients with reperfused STEMI, time-to-reperfusion determines the extent of reversible and irreversible myocardial injury. CMR can identify and quantify areas of salvaged myocardium at risk representing an important tool to be used in large clinical trials assessing different reperfusion strategies.

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