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Titel des Beitrags: PET/MRI early after myocardial infarction: evaluation of viability with late gadolinium enhancement transmurality vs. 18F-FDG uptake.

Abstract: F-18 fluorodeoxyglucose (FDG) myocardial PET imaging is since more than two decades considered to delineate glucose utilization in dysfunctional but viable cardiomyocytes. Late gadolinium enhancement (LGE) MRI was introduced more than a decade ago and identifies increased extravascular space in areas of infarction and scar. Although the physiological foundation differs, both approaches are valuable in the prediction of functional outcome of the left ventricle, but synergistic effects are yet unknown. We aimed to compare the improvement of LV function after 6 months based on the regional FDG uptake and the transmurality of scar by LGE in patients early after acute myocardial infarction (AMI). Twenty-eight patients with primary AMI underwent simultaneous PET/MRI for assessment of regional FDG uptake and degree of LGE transmurality 5-7 days after PCI. Follow-up by MRI was performed in 20 patients 6 months later. Myocardium was defined 'PET viable' based on the established threshold of >= 50% FDG uptake compared with remote myocardium or as 'MRI viable' when LGE transmurality of <= 50% was present. Regional wall motion was measured by MRI. Ninety-five dysfunctional segments were further analysed regarding...
regional wall motion recovery. There was a substantial intermethod agreement for segmental LGE transmurality and reduction of FDG uptake (\(\alpha = 0.65\)). 'PET viable' and 'MRI viable' segments showed a lower wall motion abnormality score (PET: initial: 1.4 ± 0.6 vs. 1.9 ± 0.8, \(P < 0.008\); follow-up: 0.5 ± 0.7 vs. 1.5 ± 1.0, \(P < 0.0001\); MRI: initial: 1.5 ± 0.6 vs. 2.0 ± 0.8, \(P < 0.002\); follow-up: 0.7 ± 0.8 vs. 1.6 ± 1.0, \(P < 0.0001\)) and a better regional wall motion improvement (PET: -0.9 ± 0.7 vs. -0.4 ± 0.7, \(P< 0.0007\); MRI: -0.8 ± 0.7 vs. -0.4 ± 0.7, \(P < 0.009\)) compared with 'PET non-viable' or 'MRI non-viable' segments, respectively. Eighteen per cent of the dysfunctional segments showed discrepant findings ('PET non-viable' but 'MRI viable'). At follow-up, the regional wall motion of these segments was inferior compared with 'PET viable/MRI viable' segments (1.1 ± 0.8 vs. 0.5 ± 0.7, \(P < 0.01\)), had an inferior functional recovery (-0.5 ± 0.6 vs. -0.9 ± 0.7, \(P < 0.03\)), but showed no difference compared with concordant 'PET non-viable/MRI non-viable' segments. The simultaneous assessment of LGE and FDG uptake using a hybrid PET/MRI system is feasible. The established PET and MRI 'viability' parameter prior to revascularization therapy also predicts accurately the regional outcome of wall motion after AMI. In a small proportion of segments with discrepant FDG PET and LGE MRI findings, FDG uptake was a better predictor for functional recovery.

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