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Titel des Beitrags: Integration of infarct size, tissue perfusion, and metabolism by hybrid cardiac positron emission tomography/computed tomography: evaluation in a porcine model of myocardial infarction.

Abstract: BACKGROUND: Hybrid positron emission tomography/computed tomography (PET-CT) allows for combination of PET perfusion/metabolism imaging with infarct detection by CT delayed contrast enhancement. We used this technique to obtain biomorphological insights into the interrelation between tissue damage, inflammation, and microvascular obstruction early after myocardial infarction. METHODS AND RESULTS: A porcine model of left anterior descending coronary artery occlusion/reperfusion was studied. Seven animals underwent PET-CT within 3 days of infarction, and a control group of 3 animals was scanned at>4 weeks. Perfusion and glucose uptake were assessed by [(13)N]-ammonia/[(18)F]-deoxyglucose (FDG), and 64-slice CT delayed contrast enhancement was measured. In the acute infarct model, CT revealed a no-reflow phenomenon suggesting microvascular obstruction in 80% of all infarct segments. PET showed increased FDG uptake in 68% of the CT-defined infarct segments. Ex vivo staining and histology showed active inflammation in the acute infarct area as an explanation for increased glucose uptake. In chronic infarction, CT showed no microvascular obstruction and agreed well with matched perfusion/metabolism defects.
on PET. CONCLUSIONS: Perfusion/metabolism PET and delayed enhancement CT can be combined within a single hybrid PET-CT session. Increased regional FDG uptake in the acute infarct area is frequently observed. In contrast to the chronic infarct setting, this indicates tissue inflammation that is commonly associated with microvascular obstruction as identified by no reflow on CT. The consequences of these pathophysiological findings for subsequent ventricular remodeling should be explored in further studies.

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