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Title: New insights into functional consequences of pulmonary embolism by cardiac MRI

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Body: Introduction: The objective of the present study was to evaluate a magnetic resonance imaging (MRI) algorithm which facilitates morphological diagnosis of pulmonary embolism (PE), right ventricular function and pulmonary perfusion (PP) in same examination. Methods: 12 patients with documented PE on multidetector computed tomography (MDCT) and 14 healthy probands served as controls underwent multicomponent cardiovascular MRI. Diagnosis of PE was based on embolus visualization in MDCT. First, cine MRI was done employing multiple standard views. Second, high resolution, contrast-enhanced dynamic imaging of PP was performed. Third, a three-dimensional MRI angiography was acquired. Quantitative analysis of PP was derived from the signal intensity curve. Results: In patients with PE compared to controls, RV ejection fraction was significantly lower ($47.1 \pm 10.4\%$ vs. $57.2 \pm 2.9\%$, $p=0.002$). Diagnosis of PE on a patient basis was 100% concordant between MDCT and MRI. PP in MRI of areas affected by PE compared to normal lung areas showed a lower relative peak enhancement ($172 \pm 157\%$ vs. $542 \pm 213\%$, $p<0.001$), maximum peak enhancement ($314 \pm 198\%$ vs. $691 \pm 264\%$, $p<0.001$), wash-in rate (89 ± 72 a.u. vs. 184 ± 77 a.u., $p<0.001$), AUC (3212 ± 2269 vs. 7215 ± 3199 , $p<0.001$) and a longer time-to-peak enhancement (17.5 ± 6.9 s vs. 9.5 ± 3.0 s, $p<0.001$). Conclusions: Multicomponent cardiovascular MRI facilitated characterization of pulmonary arterial supply, RV function and PP during a single session examination and may serve as a profound basis for rapid clinical decision and for determination of therapeutic options in patients suspected of pulmonary embolism.