

SS 06 CV-04 10:10

Quantitative T2 mapping for myocardial edema detection in re-perfused myocardial infarction: validation and comparison with T2-weighted image

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PURPOSE: To evaluate the usefulness of quantitative T2 mapping compared with conventional T2-weighted imaging (T2WI) in detection of myocardial edema in acute myocardial infarction (AMI).

MATERIALS AND METHODS: To validate T2 values of normal myocardium, myocardial T2 was measured in 6 healthy volunteers. Between February, 2012 and June, 2012, 15 cardiac MRIs were performed in AMI patients after reperfusion therapy with quantitative T2 mapping, T2WI and late gadolinium enhancement (LGE). Based on the LGE, regional T2 values and T2WI signal intensity (SI) were measured in the infarcted zones and remote zones of myocardium. T2 values in infarcted zone were compared with T2WI SI in infarcted zone.

RESULTS: T2 value of normal myocardium of healthy volunteers was 52.4 ± 4.3 ms. On T2WI, only 6 patients (40%) showed edema in infarcted zone with hyper SI. (Group 1, 114 ± 32 in infarcted zone vs. 69 ± 21 in remote zone). Three patients (20%) showed iso SI (Group 2, 53.1 ± 9.2 vs. 54.1 ± 5.4) and 6 (40%) showed hypo SI (Group 3, 36.7 ± 19 vs. 59.2 ± 17.1). On T2 map, 14 patients (93%) showed edema in infarcted zone with increased T2 value (65.9 ± 9.4 vs. 49.9 ± 3.2). One infarcted zone with severe microvascular obstruction(MVO) showed similar T2 value between infarcted zone and remote zone. Mean T2 values of group 1, 2, and 3 in infarcted zone were 73 ± 9.1 , 61.5 ± 3.5 and 60.2 ± 7.7 respectively. There was no difference in T2 value between remote zone of AMI (50.2 ± 3.4) and normal myocardium of healthy volunteers ($p > 0.05$).

CONCLUSION: Quantitative T2 mapping can delineate myocardial edema without limitations of T2WI in acute myocardial infarction.