



Cardiovascular

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T1 mapping in Takotsubo Cardiomyopathy

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Aims: To investigate the clinical impact of T1 mapping for detecting myocardial impairment in takotsubo cardiomyopathy (TTC) over time.

Methods and results: In 23 patients with the apical ballooning type of TTC, the following 3T magnetic resonance (MR) examinations were performed at baseline and 3 months after TTC onset: T2-weighted imaging, T2 mapping, native T1 mapping, extracellular volume fraction (ECV), and late gadolinium enhancement. Eight healthy controls underwent the same MR examinations. Serial echocardiography was performed daily for ≥ 7 days and monthly until 3 months after onset. The median time from onset to MR examination was 7 days. During the acute phase, patients had, relative to controls, higher native T1 (1438 ± 162 vs. 1251 ± 90 ms, $P < 0.001$), ECV ($35 \pm 5\%$ vs. $29 \pm 4\%$, $P < 0.001$), and T2 (90 ± 34 vs. 68 ± 12 ms, $P < 0.001$) for the entire heart. Per-region analysis showed that higher native T1 and T2 in the basal region were correlated with lower left ventricular ejection fraction ($r = -0.599$, $P = 0.004$ and $r = -0.598$, $P = 0.003$, respectively). Receiver operator characteristic analysis showed that the area under the curve for native T1 (0.96) was significantly larger than that for T2 (0.86; $P = 0.005$) but similar to that for ECV (0.92; $P = 0.104$). At 3-month follow-up, native T1, ECV, and T2 in the apical region remained significantly elevated in all patients with TTC. The number of left ventricular (LV) segments with elevated native T1 (cut-off value 1339 ms) was significantly correlated with prolonged LV wall motion recovery time ($r = 0.494$, $P = 0.027$).

Conclusion: Characterization of myocardium with native T1 mapping is a promising method for predicting LV wall motion restoration in TTC.

Keywords: T1 mapping; magnetic resonance imaging; takotsubo cardiomyopathy