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Cardiovascular magnetic resonance in takotsubo cardiomyopathy: a series of 88 patients in Europe and North America

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Introduction

Stress-induced cardiomyopathy (Takotsubo cardiomyopathy, TTC) is an increasingly recognized acute cardiac syndrome. Cardiovascular magnetic resonance (CMR) allows for assessing irreversible injury (late gadolinium enhancement [LGE]) and myocardial edema and contributes to our understanding and differential diagnosis of this new entity. So far, various CMR criteria have been used in rather small populations.

Purpose

We aimed to establish CMR criteria for the diagnosis of TTC and used a comprehensive approach in a large series of TTC patients recruited by 2 CMR centers in Europe and North America.

Methods

Between 2005 and 2009, 88 patients (83 female, age 71 ± 12 years) with acute cardiac symptoms and a left ventricular (LV) dysfunction pattern not explained by coronary artery disease underwent CMR in a 1.5-T scanner. LV function, T2-weighted triple-inversion-recovery imaging and LGE images after administration of gadolinium-DTPA were evlauated visually. In 37 patients, the recommended CMR criteria for acute myocarditis (Lake Louise Criteria) were analyzed. 61 (69%) patients underwent follow-up CMR after three months.

Results

In 80 (91%) patients, cine images revealed a typical pattern with apical ballooning, in 7 (8%) with midventricular ballooning and in 1 patient (1%) an "inverted", basal pattern with moderate-to-severe reduction of LV ejection fraction in all patients (mean 45 ± 9%).

A transmural area of high T2 signal in the mid and apical regions was visible in 56 (64%) patients matching the distribution of LV dysfunction. In 7 patients (8%) patients, LGE was detected consistent with focal or patchy myocardial scarring with ≥ 2SD, but ≤ 5SD, with a signal intensity lower than that typically observed in myocardial infarction or myocarditis (<5 standard deviations above mean of normal myocardium in all patients).

Of 37 TTC patients assessed using the Lake Louise Criteria, 23 (62%) were positive for acute myocardial inflammation. Follow-up CMR showed complete normalization of LV function (mean 67 ± 6%) and inflammatory parameters in the absence of LGE in all patients.

Conclusion

In this largest CMR series to date in TTC patients, the main diagnostic features for TTC are: 1) Typical pattern of mid and apical LV dysfunction; 2) Edema in the mid and apical myocardium 3) Absence of LGE >5 standard deviations; 4) Criteria for myocardial inflammation. Recovery of LV wall motion abnormalities, inflammatory parame-

ters and LGE at CMR follow-up can be used to confirm the diagnosis retrospectively. The accuracy and clinical utility of these features as diagnostic criteria should be studied.

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