Safety and prognostic value of vasodilator stress CMR in patients with heart failure and reduced ejection fraction

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Background: Recent data suggest that patients with HFrEF (heart failure with reduced left ventricular ejection fraction (LVEF) <40%) referred for stress cardiovascular magnetic resonance (CMR) may have a less optimal haemodynamic response to intravenous vasodilator. The prognostic value of stress CMR has been poorly investigated in this population.

Purpose: To assess the safety and the prognostic value of vasodilator stress perfusion CMR in patients with HFrEF.

Material: Between 2008 and 2018, we prospectively included consecutive patients with HFrEF referred for vasodilator stress perfusion CMR with dipyridamole. HFrEF was defined by a previous history of HF and known LVEF <40%. All patients with LVEF ≥40% measured by CMR were excluded.

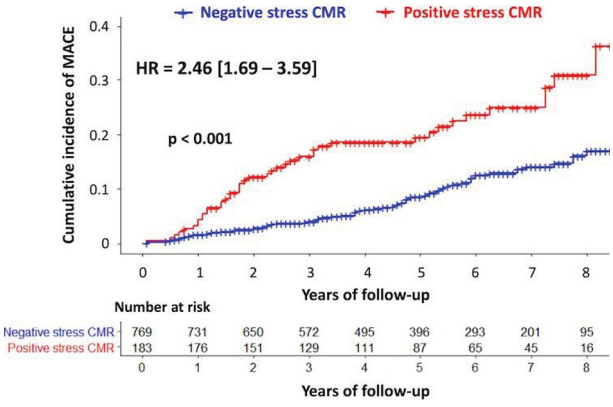
They were followed for the occurrence of major adverse cardiovascular events (MACE) defined by cardiovascular death or nonfatal myocardial infarction (MI). The secondary endpoint was a composite outcome of cardiovascular death or rehospitalization for acute HF defined by the use of intravenous diuretics. The safety of the stress perfusion CMR was assessed by clinical monitoring for 1 hour after the end of the CMR.

Univariable and multivariable Cox regressions were performed to determine the prognostic association of inducible ischemia or late gadolinium enhancement (LGE) by CMR.

Results: Of 1084 patients with HFrEF (65±11 years, median LVEF 34.6±4.9%), 1049 (97%) completed the CMR protocol and among those 952 (91%) completed the follow-up (median 5.6±2.4 years). Reasons for failure to complete CMR included declining participation (n=11), renal failure (n=9), intolerance to stress agent (n=8), claustrophobia (n=4) and poor gating (n=3).

Stress CMR was well tolerated without occurrence of death or severe disabling adverse event. Among patients who underwent CMR, 600 (57%) were diagnosed with MI defined by LGE. Patients without inducible ischemia or LGE experienced a substantially lower annual event rate of MACE (1.8%) than those with ischemia and without LGE (9.4%), or those with both ischemia and LGE (12.0%; p<0.001 for all). Using Kaplan-Meier analysis, the presence of inducible ischemia and LGE were significantly associated with the occurrence of MACE (hazard ratio [HR], 2.46 [95% CI, 1.69–3.59]; p<0.001) (Figure). In multivariable stepwise Cox regression including clinical characteristics and CMR, the inducible ischemia was an independent predictor of a higher incidence of MACE at follow-up (adjusted HR, 2.26 [95% CI, 1.52–3.35]; p<0.001). However, there was no significant difference between patients with or without ischemia for the secondary outcome (p=0.28).

Conclusions: Stress CMR is safe and has a good discriminative prognostic value to predict the occurrence of MACE in patients with HFrEF.



Kaplan-Meier curves for MACE