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Evaluation of left ventricular strain assessment cardiac magnetic resonance-feature tracking in STEMI patients at different time points during a long term follow-up

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Introduction: Cardiac magnetic resonance-feature tracking (CMR-FT) is a method that allows accurate assessment of global circumferential strain (GCS), global radial strain (GRS) and global longitudinal strain (GLS).
CMR feature-tracking has been recently used to evaluate the benefits of metoprolol administration before primary percutaneous intervention (PCI) and to predict adverse myocardial remodeling at short term follow up (FU). However, it has not been previously investigated during a long term FU.

Purpose: Our aim was to evaluate LV remodeling, comparing CMR left ventricular (LV) strain assessment at three different time points in STEMI patients, and to evaluate effect of nitrates administration before PCI at long term follow up (FU).

Methods:
This is a retrospective observational single center study.

Sixteen acute STEMI patients (aged 55±12 yrs, 100% male) treated by primary percutaneous coronary intervention (PCI) within 12 h after symptoms onset, who undergone CMR in the early post-infarction phase (within 8 days from symptoms onset) between January 2006 and April 2008, were enrolled. All patients repeated a CMR exam at 4 months and after a median FU of 10 years (IQ 9-11).

The imaging protocol included assessment of infarct size, presence and extent of microvascular obstruction (MVO) by LGE, LVEF, CMR-FT measurements, and end-systolic and end-diastolic volumes. LV GRS, GCS and GLS were measured at first CMR within 1 week , at CMR at 4 months and at CMR after a median follow up of 10 years (IQ 9-11) after STEMI. Feature-tracking CMR analysis was performed on steady-state free precession cine images with a dedicated software (CVI42 v5.3, Circle Cardiovascular Imaging, Calgary, Canada).

Results:
Between the first and the second CMR, LVEF significantly increased (from 51% ±10 to 55%±9, p=0.036), LGE extent significantly reduced (12% ±8,9 to 9%±7,3, p=0.036), and GLS significantly improved (-14%±4 to -17% ± 2, p=0.028). Between the second and the last CMR, no differences in LVEF and in LGE extent were observed, while a significant improvement was noted in GRS and GCS (respectively, 32,6%±6 to 39% ±12, p=0.015, from -16%±3 to -18%±2 p=0.008). Ischemia duration before PCI correlated positively with
GRS at long term FU CMR (rho:0.729, p=0.017). Interestingly, STEMI who received nitrates before PCI had no difference in LVEF and LGE extent changes but a greater improvement in GLS (-16%±0.8 vs -21%± 0.8, p=0.007) at long term FU compared to those who not received nitrates.

Conclusions:

LV strain assessment with feature-tracking CMR adds incremental prognostic information on LV remodeling beyond LVEF and LGE at long term FU. Feature-tracking CMR strain could be a sensitive tool to evaluate long term benefit of nitrates administration before PCI in STEMI patients.