Additional prognostic role of strain with stress cardiac magnetic resonance (PRO-GRESS)

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Background: Stress cardiovascular magnetic resonance (S-CMR) has been recognized as a reliable technique for the diagnosis and prognostic stratification of patients with known or suspected coronary artery disease (CAD). Recently, the novel technique of feature-tracking (FT) strain has been applied to S-CMR in order to improve the risk stratification of patients. However, no data are available on the prognostication role of FT strain in patients undergoing a S-CMR with dypiridamole. Aim of this study is to assess the additional role of FT strain in the long-term risk stratification of a large population of patients with known or suspected CAD undergoing a S-CMR with dypiridamole.

Methods: 731 consecutive patients (age: 63 ± 10 y, male 84%) with stable typical or atypical symptoms suggesting possible cardiac ischemia underwent dipyridamole S-CMR. The patients were followed up for 5.8 ± 1.2 years. CMR-FT analysis of steady state free precession (SSFP) short and long axis cine images obtained in rest and stress conditions was performed in each patient to obtain 2D global peak systolic rest and stress longitudinal (GLS), circumferential (GCS) and radial strains (GRS). Major adverse cardiac events (MACE) were defined as myocardial infarction and cardiac death.

Results: MACE occurred in 64 (8.7%) patients. Patients experiencing MACE showed higher indexed left ventricular (LV) end-diastolic (EDVi), end-systolic (ESVi) volumes and lower LV ejection fraction (LVEF), higher late-gadolinium enhancement (LGE) presence and reduced both rest and stress GLS, GCS and GRS. At multivariable analysis, LVEDVi (HR 1,01 [95% CI 1.001-1.022]) and LGE (HR 2.399 [95% CI 1.322-4.355] were independently associated with MACE ($p = 0.027$ and $p = 0.04$ respectively). By Kaplan-Meier analysis, patients with stress GLS ≥ -15.35% had significantly reduced event-free survival compared with those with stress GLS < -15.35 (log-rank $p = 0.001$). A model based on stress GCS > - 15.3% plus LVEDVi showed a similar prognostication value of a model made of LVEDVi plus LGE.

Conclusions: In patients with known or suspected CAD undergoing S-CMR with dypiridamole, a model based on LVEDVi plus stress GCS owns a prognostication value similar to LVEDVi plus LGE.