Risk stratification in patients with structurally normal hearts: does fibrosis type matter?

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Background: The clinical relevance of tissue abnormalities identified by CMR in patients with structurally normal hearts remains unclear.

Purpose: The study sought to assess the prognostic significance of nonischemic myocardial fibrosis (MF) on cardiovascular magnetic resonance (CMR) – both macroscopic MF assessed by late gadolinium enhancement (LGE) and diffuse microscopic MF quantified by extracellular volume fraction (ECV) – in patients with structurally normal hearts.

Methods: Consecutive patients undergoing CMR were screened for inclusion to identify those with LGE imaging and structurally normal hearts. ECV was calculated in patients with available T1 mapping. The associations between myocardial fibrosis and the outcomes of all-cause mortality, new-onset heart failure [HF], and an arrhythmic outcome were evaluated.

Results: In total 525 patients (mean age 43.1±14.2 years; 30.5% males) were included. Over a median follow-up of 5.8 years, 13 (2.5%) patients died and 18 (3.4%) developed new-onset HF. Nonischemic midwall (Figure 1B-C)/subepicardial LGE (Figure 1D) was present in 278 (52.9%) patients; isolated RV insertion fibrosis was present in 80 (15.2%) patients (Figure 1A). In 276 patients with available T1 mapping, the mean ECV was 25.5 ± 4.4%. There was no significant association between LGE and all-cause mortality (HR: 1.36, CI: 0.42-4.42, p=0.61), or new-onset HF (HR: 0.64, CI: 0.25-1.61, p=0.34). ECV (per 1% increase) correlated with all-cause mortality (HR: 1.19, CI: 1.04-1.36, p=0.009), but not with new-onset HF (HR: 0.97, CI: 0.86-1.10, p=0.66) (Figure 2). There was no significant association between arrhythmic outcomes and LGE (p=0.60) or ECV (p=0.49). In a multivariable model after adjusting for covariates, ECV remained significantly associated with all-cause mortality (HR per 1% increase in ECV: 1.26, CI: 1.06-1.50, p=0.009).

Conclusion: Nonischemic LGE in patients with structurally normal hearts is common and does not appear to be associated with adverse outcomes, whereas elevated ECV is associated with all-cause mortality and may be an important risk stratification tool.