Global longitudinal strain measured using feature-tracking cardiac magnetic resonance imaging is an independent predictor of all cause mortality in patients with preserved ejection fraction

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Introduction
Ejection fraction is the principal measure used clinically to assess cardiac mechanics and provides significant prognostic information. However, echocardiographic strain imaging has shown significant abnormalities of myocardial deformation can be present despite preserved ejection fraction, which maybe associated with adverse prognosis. Cardiac-Magnetic-Resonance (CMR) feature-tracking techniques now allow assessment of strain from routine cine-images, without specialized pulse sequences. Whether abnormalities of strain measured using CMR feature-tracking have prognostic value in patients with preserved ejection fraction is unknown.

Purpose
To evaluate the prognostic value of CMR feature-tracking derived global longitudinal strain (GLS) in a large multicenter population of patients with preserved ejection fraction.

Methods
Consecutive patients with preserved ejection fraction (EF=50%) and a clinical indication for CMR at four US medical centers were included in this study. Feature-tracking GLS was calculated from 3 long-axis-cine-views. The primary endpoint was all-cause death. Cox proportional hazards regression modeling was used to examine the independent association between GLS and death. The incremental prognostic value of GLS was assessed in nested models.

Results
Of the 1274 patients in this study, 115 died during a median follow-up of 6.2 years. By Kaplan-Meier-analysis, patients with GLS=median (~20%) had significantly reduced event free survival compared to those with GLS < median (log-rank p<0.001) (Figure-top panel). The continuous relationship between GLS and the hazard of death is shown in the cubic spline (Figure-lower panel). By Cox multivariable regression modeling, each 1% worsening in GLS was associated with a 23.6% increased risk-of-death after adjustment for clinical and imaging risk factors (HR=1.236 per %; p<0.001). Addition of GLS in this model resulted in significant improvement in the global-chi-square (67 to 168; p<0.0001) and Harrel's C-statistic (0.716 to 0.825; p<0.0001).

Conclusions
CMR feature-tracking derived GLS is a powerful independent predictor of mortality in patients with preserved ejection fraction, incremental to common clinical and imaging risk factors.
Abstract:

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