Echocardiographic global longitudinal strain as a marker of myocardial fibrosis predicts outcomes in aortic stenosis

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Background: Left ventricular global longitudinal strain (LV-GLS) by speckle tracking echocardiography (STE) reflects intrinsic myocardial function, influenced by interstitial abnormalities. Cardiovascular magnetic resonance (CMR) detects myocardial fibrosis non-invasively, but it is limited for widespread use. We aim to establish LV-GLS as a marker of replacement myocardial fibrosis on CMR and validate the prognostic value of LV-GLS thresholds associated with fibrosis.

Methods: LV-GLS thresholds of replacement fibrosis were established in the derivation cohort: 151 patients (57±10 years; 58% males) with hypertension who underwent STE to measure LV-GLS and CMR for replacement myocardial fibrosis. Prognostic value of the thresholds was validated in a separate outcome cohort: 261 patients with moderate-severe aortic stenosis (AS; 71±12 years; 58% males; NYHA functional class I-II) and preserved LVEF ≥50%. Primary outcome was a composite of cardiovascular mortality, heart failure hospitalization, myocardial infarction and cerebrovascular events.

Results: In the derivation cohort, LV-GLS demonstrated good discrimination (c-statistics 0.74; 95% confidence interval: 0.66–0.83; P<0.001) and calibration (Hosmer-Lemeshow X2=6.37; P=0.605) for replacement fibrosis. In the outcome cohort, 52 events occurred over 16 [3.1, 42.0] months of follow-up. Patients with LV-GLS >–15.0% (corresponding to 95% specificity to rule-in myocardial fibrosis) had the worst outcomes compared to patients with LV-GLS <–21.0% (corresponding to 95% sensitivity to rule-out myocardial fibrosis) and those between –21.0 and –15.0% (log-rank P<0.001; Figure 1). Furthermore, LV-GLS offered independent prognostic value over clinical variables, AS severity, echocardiographic LVEF and E/e' (hazard ratio 1.18; 95% confidence interval: 1.07 to 1.30; P=0.001).

Conclusions: LV-GLS thresholds associated with replacement myocardial fibrosis is a novel approach to risk-stratify patients with AS and preserved LVEF (Figure 2).

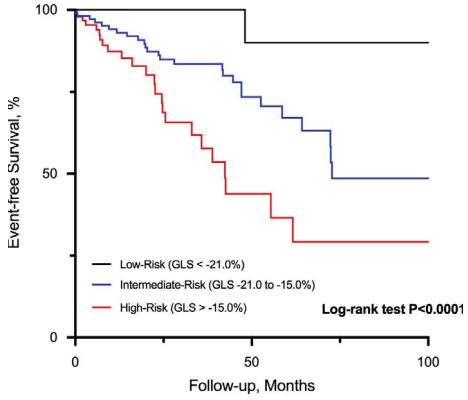

Figure 1

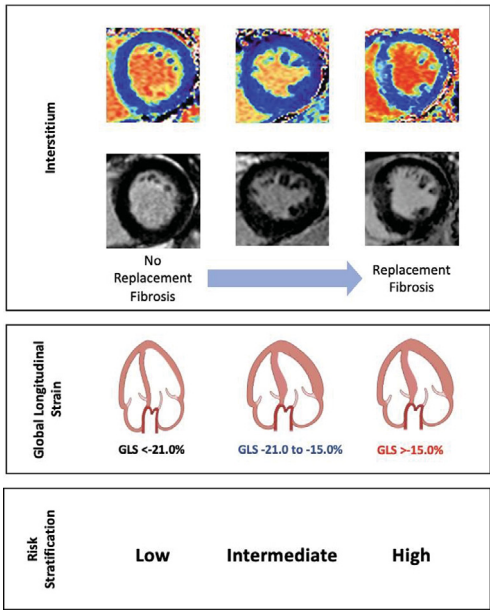

Figure 2