Supplementary

Appendix 1

Supplemental methods

Calculation of echocardiographic parameters

Estimation of right atrial pressure: (I) when the right atrial size is normal and there is mild tricuspid regurgitation, the estimated right atrial pressure is approximately 5 mmHg; (II) when the right atrial size is mildly enlarged and there is moderate tricuspid regurgitation, the estimated right atrial pressure is approximately 10 mmHg; (III) when the right atrial size is significantly enlarged and there is severe tricuspid regurgitation, the estimated right atrial pressure is approximately 15 mmHg.

Pulmonary artery systolic pressure (PASP) is calculated using the following formula:

PASP =4× tricuspid regurgitation velocity2 + right atrial pressure

Relative wall thickness is calculated using the following formula:

Relative wall thickness = (interventricular septal thickness + left ventricular posterior wall thickness)/left ventricular end-diastolic diameter

Cardiac magnetic resonance scanning and analysis

A 3 T whole-body scanner (MAGNETOM Skyra, Siemens Healthineers, Erlangen, Germany) was utilized for cardiac magnetic resonance (CMR). Cardiac imaging synchronization was achieved with a four-lead vector cardiogram for electrocardiogram (ECG) gating. Initially, two-dimensional (2D) scout images were captured in transverse, coronal, and sagittal planes to locate the heart. Subsequently, cine images were acquired using an ECG-gated 2D balanced steady-state free precession (bSSFP) sequence during multiple breath-hold sessions. T1 mapping was performed both before and 15–20 minutes after contrast administration using a modified Look–Locker inversion–recovery (MOLLI) sequence, including one four-chamber long-axis slice and three short-axis slices (apex, mid-ventricular, and basal)16. Native T1 and extracellular volume fraction measurements of the global left ventricle were semiautomatically calculated using the CMR software cvi42 (version 5.3, Circle Cardiovascular Imaging, Calgary, Alberta, Canada). Standard cardiac structural parameters, such as maximal left ventricular wall thickness and left ventricular mass index were determined by tracing the endocardium and epicardium in long-axis and short-axis cine images during the end-systolic and end-diastolic phases.

The formulas of calculating hemodynamic parameters

Cardiac index = cardiac output/body surface area

Stroke volume = cardiac output ×1,000/heart rate

Pulmonary vascular resistance = (mean pulmonary artery pressure – pulmonary artery wedge pressure)/cardiac output

Table S1 The characteristics of the three new hemodynamic parameters

New hemodynamic parameters	Overall population (n=40)
mPAP/CI ratio, mmHg/L/min/m^2	14.0±9.1
PAWP/CI ratio, mmHg/L/min/m^2	8.8±5.5
(PAWP + mPAP)/CI ratio, mmHg/L/min/m^2	22.9±14.3

For normally distributed data, we showed continuous variables by their mean and standard deviation. CI, cardiac index; mPAP, mean pulmonary artery pressure; PAWP, pulmonary artery wedge pressure.

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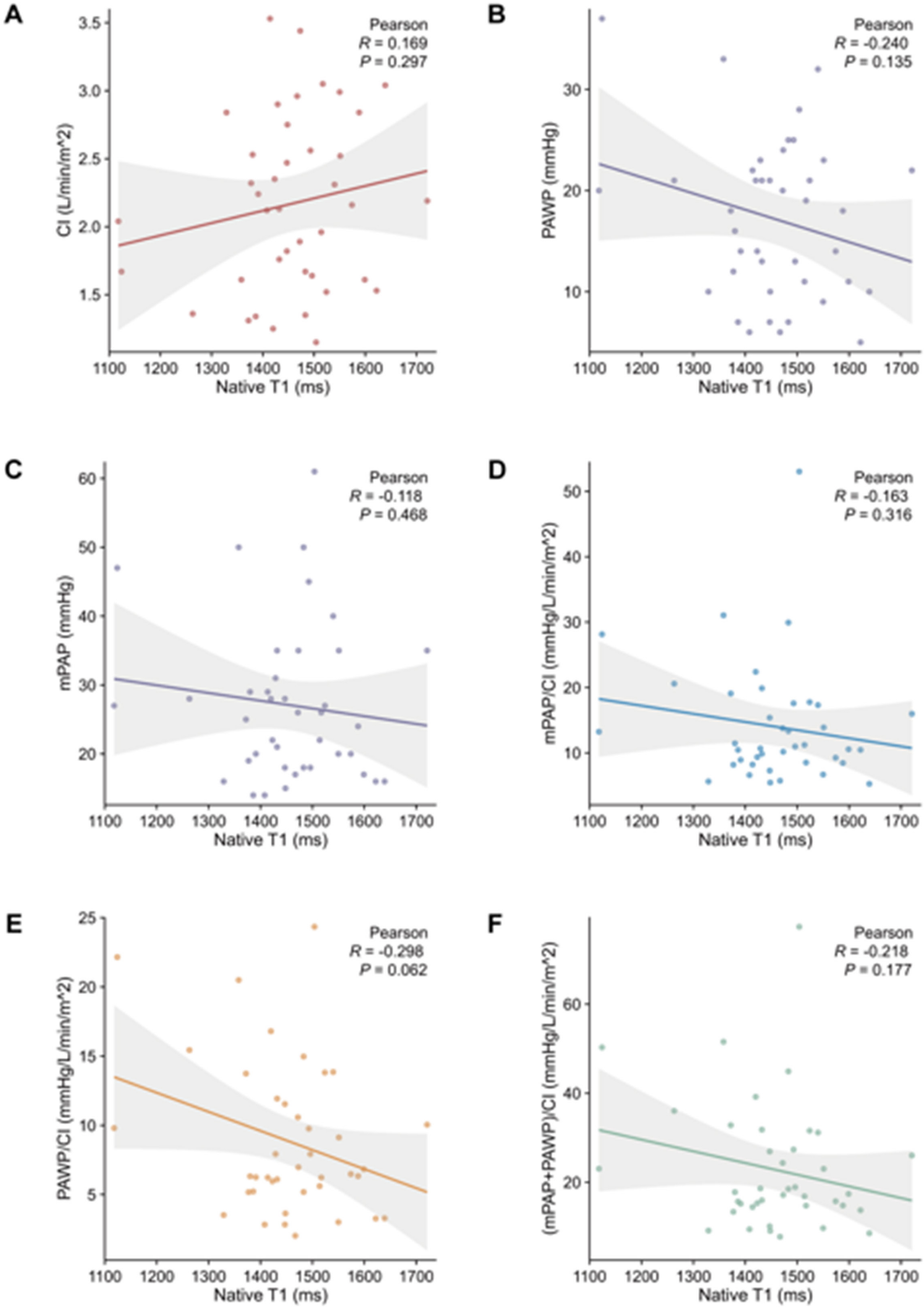

Figure S1 Correlations between native T1 and different hemodynamic parameters were conducted using the Pearson test. (A) CI, (B) PAWP, (C) mPAP, (D) mPAP/CI ratio, (E) PAWP/CI ratio, and (F) (PAWP + mPAP)/CI ratio did not show statistically significant correlations with native T1. CI, cardiac index; mPAP, mean pulmonary artery pressure; PAWP, pulmonary artery wedge pressure.

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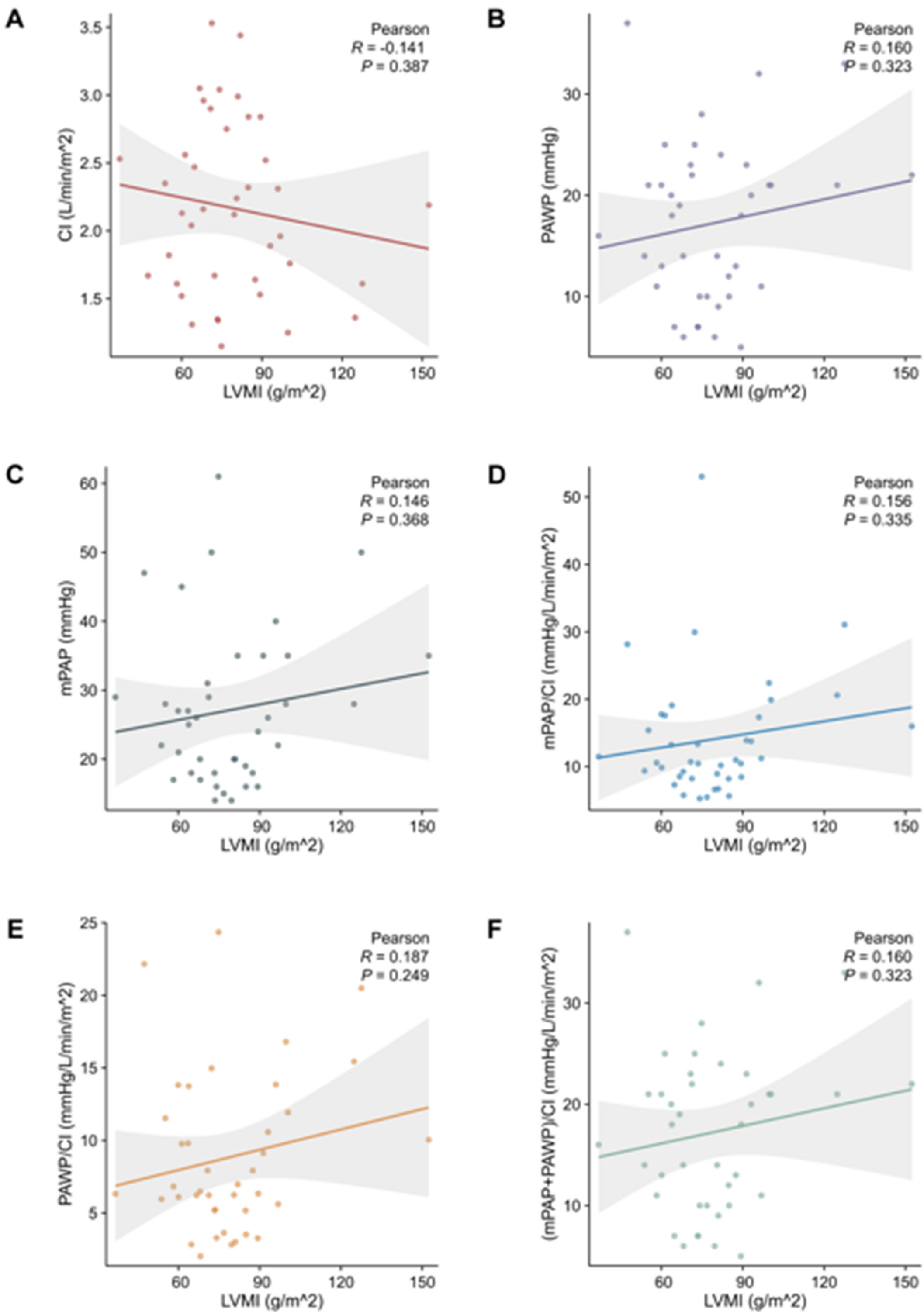

Figure S2 Correlations between LVMI and different hemodynamic parameters were conducted using the Pearson test. (A) CI, (B) PAWP, (C) mPAP, (D) mPAP/CI ratio, (E) PAWP/CI ratio, and (F) (PAWP + mPAP)/CI ratio. The correlation analysis between the aforementioned indicators and LVMI showed no statistical significance. CI, cardiac index; LVMI, left ventricular mass index; mPAP, mean pulmonary artery pressure; PAWP, pulmonary artery wedge pressure.

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