

Appendix 1 CMR acquisition

All CMR examinations were performed on 3.0-T scanner (Ingenia, Philips Healthcare, The Netherlands) with 32 coil elements. The study consisted of cine imaging, T1 mapping and late gadolinium enhancement (LGE) imaging. A single-shot balanced steady-state free-precession sequence was used for cine acquisitions. A stack of short-axis planes from the apex to the base along with long-axis planes (two-, three-, and four-chamber views) was collected. Typical temporal resolution for strain imaging was 24–30 frames per cardiac cycle. The imaging parameters were as follows: field of view, 230 mm × 230 mm; voxels, 2 mm × 2 mm × 8 mm; repetition time (3.0–3.2) ms; echo time (1.5–1.6) ms; sense factor, 2; minimum inversion time, 105 ms; and flip angle, 45°. LGE imaging was acquired 10 minutes after injection of gadopentetate dimeglumine. LGE imaging was performed in the long-axis views and short-axis slices covering the whole left ventricular (LV) region. For the determination of native T1 times, basal, midventricular, and apex short-axis images were acquired using a modified Look-Locker inversion recovery (MOLLI) sequence. For ECV calculation, the same acquisition and plane was performed again 15 minutes after the administration of contrast.

CMR imaging analysis

Conventional CMR imaging analysis

All CMR cine images, T1 mapping, and strain were analyzed using a post-processing workstation cvi42 (v5.13, Circle Cardiovascular Imaging, Calgary, Alberta, Canada). Left and right ventricular volume and function were obtained by tracing epicardial and endocardial contours automatically at end-diastolic and end-systolic phases based on LV short-axis cine images and manual adjustment. Papillary muscles and trabeculae included in the blood pool. LV epicardial contours were drawn for LV mass. RV volume and EF were analyzed on the axial views. RV volume is the sum of atrialized RV and functional RV volumes. All volumes and mass were indexed to body surface area (BSA). LGE images were assessed visually for the presence of

myocardial LGE by two experienced imagers (X.H.T. and Y.L.Y.; both with 8 years of experience in CMR) who were blinded to patient profiles and clinical outcomes, with any controversial adjudicated by a second expert reader (H.L.; 15 years of experience).

T1 mapping imaging analysis

T1 times were extracted based on the LV short axis MOLLI images with motion correction. The endocardial and epicardial contours were traced manually on the pre-contrast T1-mapping images and post-contrast T1-mapping images. A region of interest was placed in the LV cavity excluding the papillary muscle for blood pool T1 value quantification. The extracellular volume (ECV) was calculated as:

$$ECV = (1 - \text{hematocrit}) \times \frac{1/T1_{\text{myo-post}} - 1/T1_{\text{myo-pre}}}{1/T1_{\text{blood-post}} - 1/T1_{\text{blood-pre}}} \quad [1]$$

Strain analysis

All long-axis slices (two-, three-, and four-chamber views) and short-axis slices were selected for the CMR feature tracking strain analysis. The endocardial and epicardial contours were automatically traced during the LV end-diastolic phase. The drawn contours were verified in every phase and manually adjusted, while excluding the endocardial trabeculae and papillary muscles. The peak left ventricular global longitudinal strain (LVGLS) was derived from all three long-axis views. Short-axis slices were used to evaluate left ventricular global circumferential strain (LVGCS) and peak left ventricular global radial strain (LVGRS). Peak right ventricular global longitudinal strain (RVGLS) was acquired from a standard four-chamber long-axis slice. The endocardial contour was delineated in the end-systolic and end-diastolic phase, while excluding the endocardial trabeculae and papillary muscles. After software analysis, the right ventricular global longitudinal strains were obtained. The atrialized portion of the right ventricle is included in the right ventricle.

Table S1 Intra- and inter-observer reproducibility of the measurements of myocardial strain and mapping parameters

Variables	Intra-observer reproducibility			Inter-observer reproducibility		
	ICC	95% CI	Bias	ICC	95% CI	Bias
LVGLS	0.85	0.66–0.93	–0.42	0.77	0.52–0.90	–0.59
LVGCS	0.94	0.86–0.97	0.21	0.93	0.85–0.97	0.29
LVGRS	0.94	0.85–0.98	–1.23	0.92	0.78–0.97	–1.53
RVGLS	0.97	0.93–0.98	0.16	0.94	0.87–0.98	0.21
Native T1	0.97	0.92–0.99	–3.45	0.92	0.82–0.97	–7.75
ECV	0.90	0.78–0.99	–0.05	0.81	0.58–0.92	–0.25

LVGLS, left ventricular global longitudinal strain; LVGCS, left ventricular global circumferential strain; LVGRS, left ventricular global radial strain; RVGLS, right ventricular global longitudinal strain; ECV, extracellular volume; ICC, intraclass correlation coefficient; CI, confidence interval.