Supplementary

Appendix 1

CMR scan protocols

The parameters in Renji Hospital: (I) b-SSFP cine sequences: repetition time (TR) =2.8 ms, echo time (TE) =1.4 ms, slice thickness =7 mm, acquired matrix =1.2 mm × 1.2 mm, phases per cardiac cycle =30, field of view (FOV) =300 mm × 300 mm. (II) PSIR sequence: TR =6.1 ms, TE =3 ms, slice thickness =10 mm, FOV =300 mm × 300 mm, acquired matrix =1.6 mm × 1.9 mm.

The parameters in Anzhen Hospital: (I) b-SSFP cine sequences: TR: 43.5 ms, TE: 1.45 ms, slice thickness =8 mm. FOV: 300 mm × 300 mm. acquired matrix =1.25 mm × 1.25 mm. (II) LGE images TR: 900 ms; TE: 3.5 ms. slice thickness =8 mm. FOV: 300×300 mm. acquired matrix =0.98 mm × 0.98 mm.

In both centers, steady-state free-precession cine images were obtained during repeated breath-holds in three long axes (2-chamber, 3-chamber, and 4-chamber view) and in a stack of short axes covering the ventricles. A commercially available gadolinium-based contrast agent (gadopentetate dimeglumine, Magnevist, Bayer Healthcare) was administered intravenously at a dose of 0.1 mmol/kg body weight, and contrast-enhanced images were acquired after a 10-minute delay with the use of an inversion-recovery segmented gradient echo sequence.

Reproducibility

Inter-observer variability was determined by analysis of a randomly generated set of 30 scans by two investigators. Assessment of CMR cine images by each investigator was performed independently of the other, while intra-observer variability was assessed by repetition of the analysis after a fixed time frame (1 month).

https://dx.doi.org/10.21037/cdt-23-162

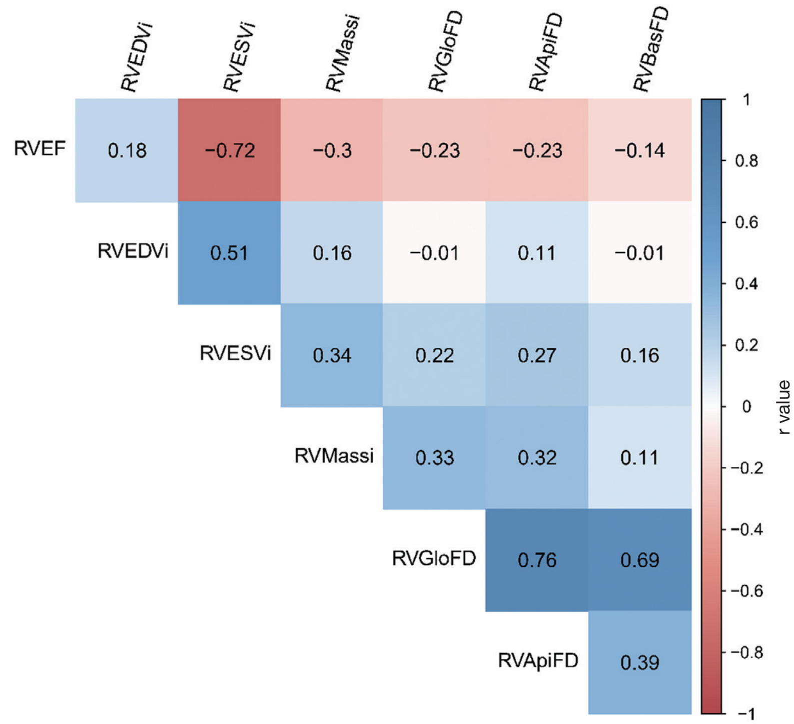

Figure S1 Pearson correlation coefficients (r value) between RV FDs and RV function parameters. r<0 indicates negative correlation, r>0 indicates positive correlation. r value closer to 1 or -1 represents stronger correlation, while r value closer to 0 means weaker correlation. FD, fractal dimension; RV, right ventricle; Bas, max basal; Glo, global; Api, max apical; RVEF, right ventricle ejection fraction; RVEFVi, right ventricle end-diastolic volume index; RVESVi, right ventricle end-systolic volume index; RVMassi, right ventricle mass index.

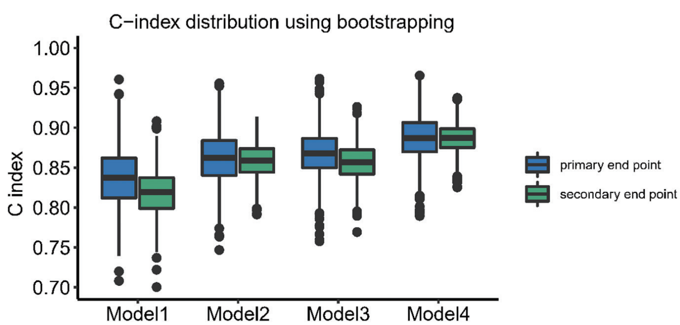

Figure S2 Internal validation results of C-index distribution of prediction models with a 1000-bootstrapping method. Model 1: ESC risk factors (age, peak LVOT resting gradient, NSVT, family history of SCD, history of syncope, left atrium size, max LVT) + LGE%. Model 2: model 1 + LV max apical FD. Model 3: model 1 + RV global FD. Model 4: model 1 + LV max apical FD + RV global FD. ESC, European Society of Cardiology; FD, fractal dimension; LVOT, LV outflow tract; NSVT, non-sustained ventricular tachycardia; LV, left ventricle; RV, right ventricle; Max LVT, maximal LV wall thickness; LGE, late gadolinium enhancement.

 https://dx.doi.org/10.21037/cdt-23-162

Table S1 Coefficients of variables in model 4

Variables	Primary end point	Secondary end point
Age	0.07752	0.06118
Peak LVOT resting gradients	0.00764	0.02302
NSVT	0.01203	0.72482
Family history of SCD	0.42003	0.06509
History of syncope	1.43670	0.22554
Left atrium size	0.03565	0.03569
Max LVT	–0.01681	–0.04867
LGE (%)	0.06606	0.08081
LV max apical FD	0.11150	0.12779
RV global FD	0.12999	0.14322

LVOT, LV outflow tract; NSVT, non-sustained ventricular tachycardia; SCD, sudden cardiac death; Max LVT, maximal LV wall thickness; LGE, late gadolinium enhancement; LV, left ventricular; FD, fractal dimension; RV, right ventricular.

Table S2 Intra-observer and inter-observer variability in biventricular fractal analysis and LGE percentage measurement

Variables	Observer	ICC	P value
LV global FD	Intra	0.99	<0.001
	Inter	0.99	<0.001
LV max apical FD	Intra	0.98	<0.001
	Inter	0.97	<0.001
LV max basal FD	Intra	0.96	<0.001
	Inter	0.96	<0.001
RV global FD	Intra	0.99	<0.001
	Inter	0.98	<0.001
RV max apical FD	Intra	0.94	<0.001
	Inter	0.93	<0.001
RV max basal FD	Intra	0.92	<0.001
	Inter	0.90	<0.001
LGE percentage	Intra	0.95	<0.001
	Inter	0.94	<0.001

LGE, late gadolinium enhancement; ICC, intraclass correlation coefficient; LV, left ventricular; FD, fractal dimension; RV, right ventricular.

https://dx.doi.org/10.21037/cdt-23-162