Supplementary

Table S1 2D-LACI and 3D-LACI according to eGFR groups

Parameter	G1 (n=37)	G2 (n=11)	G3 (n=8)	G4 (n=13)	G5 (n=53)	P value
2D-LACI	0.20±0.05	0.20±0.07	0.24±0.08	0.26±0.11	0.36±0.09	<0.001
3D-LACI	0.25±0.06	0.27±0.08	0.31±0.07	0.34±0.12	0.44±0.09	<0.001

G1: eGFR ≥90 mL/min/1.73 m^2; G2: eGFR 60–89 mL/min/1.73 m^2; G3: eGFR 30–59 mL/min/1.73 m^2; G4: eGFR 15–29 mL/min/1.73 m^2; G5: eGFR <15 mL/min/1.73 m^2. eGFR, estimated glomerular filtration rate; 2D, two-dimensional; 3D, three-dimensional; LACI, left atrioventricular coupling index.

Table S2 Correlation analysis between each parameter and METs

Parameter	METs	
	r	P value
Age	–0.026	0.773
eGFR	0.562	<0.001
BMI	0.232	0.010
RWT	0.232	0.014
LVMI	–0.290	0.001
e’	0.489	<0.001
E/A	0.096	0.291
E/e’	–0.455	<0.001
LAVI	–0.251	0.006
PASP	–0.159	0.083
Peak HR	0.395	<0.001
LVEF	0.119	0.197
LASr	0.574	<0.001
LAScd	0.474	<0.001
LASct	0.354	<0.001
2D-LACI	–0.605	<0.001
3D-LACI	–0.669	<0.001

BMI, body mass index; eGFR, estimated glomerular filtration rate; RWT, relative wall thickness; LAVI, left atrial volume index; PASP, pulmonary artery systolic pressure; LASr, left atrial strain; LAScd, left atrial conduit strain; LASct, left atrial contractile strain; 2D, two-dimensional; 3D, three-dimensional; LACI, left atrioventricular coupling index.

https://dx.doi.org/10.21037/qims-2025-aw-2238

Table S3 Multivariate linear regression models

Model	Unstandardized coefficients		β unstandardized 95% CI		Standardized coefficients β	Partial r	Significance (P value)
	β	SE	Lower	Upper			
Model 1: clinical variables							
Male	0.454	0.222	0.015	0.894	0.178	0.159	0.043
BMI	0.006	0.018	−0.030	0.041	0.028	0.025	0.747
eGFR	0.012	0.003	0.006	0.019	0.424	0.297	<0.001
Anemia	−0.100	0.257	−0.609	0.409	−0.041	−0.030	0.697
CCB	−0.248	0.211	−0.667	0.171	−0.100	−0.091	0.243
Peak HR	0.015	0.005	0.005	0.026	0.244	0.227	0.004
Model 2: echocardiographic variables							
Model 2a (2D-LACI + LASr)							
RWT	−1.208	1.331	−3.416	1.000	−0.066	−0.063	0.366
LV mass index	−0.006	0.003	−0.011	−0.001	−0.21	−0.136	0.054
Mitral e’	−1.037	4.132	−7.891	5.817	−0.022	−0.0.18	0.802
Mitral E/e’ ratio	−0.008	0.031	−0.058	0.043	−0.023	−0.017	0.803
LAVI	0.022	0.014	−0.005	0.045	0.199	0.114	0.106
LASr	0.065	0.017	0.036	0.094	0.333	0.258	<0.001
2D-LACI	−4.498	1.060	−6.256	−2.739	−0.411	−0.296	<0.001
Model 2b (2D-LACI + LAScd)							
RWT	−0.770	1.372	−3.046	1.506	−0.042	−0.040	0.576
LV mass index	−0.007	0.003	−0.012	−0.002	−0.246	−0.160	0.027
Mitral e’	−0.798	4.245	−7.838	6.243	−0.017	−0.013	0.851
Mitral E/e’ ratio	−0.026	0.031	−0.077	0.025	−0.079	−0.060	0.402
LAVI	0.027	0.014	0.004	0.050	0.243	0.140	0.052
LAScd	0.061	0.021	0.025	0.096	0.236	0.203	0.005
2D-LACI	−5.331	1.021	−7.025	−3.638	−0.487	−0.373	<0.001
Model 2c (2D-LACI + LASct)							
RWT	−1.566	1.405	−3.897	0.764	−0.086	−0.081	0.267
LV mass index	−0.007	0.003	−0.012	−0.001	−0.233	−0.150	0.042
Mitral e’	1.306	4.268	−5.774	8.385	0.028	0.022	0.76
Mitral E/e’ ratio	−0.013	0.032	−0.066	0.041	−0.039	−0.029	0.695
LAVI	0.026	0.014	0.002	0.049	0.231	0.132	0.073
LASct	0.045	0.026	0.001	0.088	0.141	0.125	0.089
2D-LACI	−5.819	1.025	−7.519	−4.119	−0.532	−0.414	<0.001
Model 3: echocardiographic variables							
Model 3a (3D-LACI + LASr)							
RWT	−1.124	1.281	−3.663	1.414	−0.062	−0.059	0.382
LV mass index	−0.005	0.003	−0.011	0.001	−0.157	−0.102	0.132
Mitral e’	4.191	4.305	−4.339	12.721	0.091	0.065	0.332
Mitral E/e’ ratio	−0.033	0.030	−0.091	0.026	−0.105	−0.074	0.270
LAVI	0.020	0.012	−0.005	0.044	0.179	0.107	0.113
LASr	0.051	0.017	0.018	0.084	0.264	0.207	0.003
3D-LACI	−3.878	1.034	−5.928	−1.829	−0.383	−0.252	<0.001
Model 3b (3D-LACI + LAScd)							
RWT	−0.863	1.317	−3.474	1.747	−0.047	−0.045	0.514
LV mass index	−0.005	0.003	−0.011	0.001	−0.177	−0.115	0.096
Mitral e’	3.659	4.439	−5.137	12.455	0.079	0.056	0.412
Mitral E/e’ ratio	−0.041	0.030	−0.100	0.019	−0.131	−0.093	0.178
LAVI	0.022	0.013	−0.003	0.047	0.199	0.120	0.084
LAScd	0.045	0.021	0.004	0.087	0.177	0.149	0.031
3D-LACI	−4.577	1.001	−6.561	−2.593	−0.452	−0.313	<0.001
Model 3c (3D-LACI + LASct)							
RWT	−1.479	1.324	−4.104	1.145	−0.081	−0.077	0.266
LV mass index	−0.005	0.003	−0.011	0.001	−0.161	−0.104	0.135
Mitral e’	5.858	4.424	−2.909	14.625	0.127	0.091	0.188
Mitral E/e’ ratio	−0.033	0.030	−0.094	0.027	−0.107	−0.076	0.275
LAVI	0.021	0.013	−0.004	0.046	0.190	0.114	0.102
LASct	0.041	0.024	−0.006	0.089	0.131	0.120	0.086
3D-LACI	−4.789	0.997	−6.763	−2.814	−0.473	−0.332	<0.001
Model 4: combined clinical and echocardiographic variables							
Model 4a (2D-LACI)							
Male	0.265	0.206	−0.143	0.674	0.104	0.092	0.201
eGFR	0.006	0.003	0.001	0.012	0.218	0.160	0.027
Peak HR	0.008	0.005	−0.002	0.019	0.133	0.116	0.108
LAVI	−0.002	0.002	−0.006	0.002	−0.071	−0.063	0.383
LASr	0.034	0.025	−0.015	0.084	0.175	0.098	0.172
LAscd	0.019	0.031	−0.043	0.08	0.070	0.043	0.548
2D-LACI	−2.809	1.086	−4.964	−0.653	−0.266	−0.184	0.010
Model 4b (3D-LACI)							
Male	0.212	0.205	−0.195	0.620	0.083	0.073	0.304
eGFR	0.005	0.003	0.001	0.011	0.185	0.133	0.062
Peak HR	0.008	0.005	−0.002	0.018	0.130	0.113	0.112
LASr	0.031	0.025	−0.018	0.080	0.159	0.089	0.209
LAscd	0.016	0.030	−0.044	0.077	0.061	0.037	0.596
3D-LACI	−3.285	1.060	−5.388	−1.181	−0.333	−0.218	0.003

BMI, body mass index; eGFR, estimated glomerular filtration rate; CCB, calcium channel blocker; RWT, relative wall thickness; LASr, left atrial strain; LAScd, left atrial conduit strain; LASct, left atrial contractile strain; PASP, pulmonary artery systolic pressure; LAVI, left atrial volume index; 2D, two-dimensional; 3D, three-dimensional; LACI, left atrioventricular coupling index.

https://dx.doi.org/10.21037/qims-2025-aw-2238

Table S4 Comparison of ROC curves of 2D-LACI and 3D-LACI with DeLong tests

Variable	AUC	95% confidence interval	P value	Delong test pairwise comparison to 2D-LACI (P value)
2D-LACI	0.7718	0.6757 to 0.8679	<0.001	NA
3D-LACI	0.8105	0.7237 to 0.8972	<0.001	0.014

2D, two-dimensional; 3D, three-dimensional; LACI, left atrioventricular coupling index.

Table S5 The reproducibility of 2D-LACI and 3D-LACI

Parameter	Intraobserver			Interobserver		
	95% CI	ICC	P	95% CI	ICC	P
2D-LACI	0.955–0.978	0.968	<0.001	0.977–0.989	0.984	<0.001
3D-LACI	0.970–0.985	0.979	<0.001	0.985–0.993	0.990	<0.001

2D, two-dimensional; 3D, three-dimensional; LACI, left atrioventricular coupling index.

https://dx.doi.org/10.21037/qims-2025-aw-2238

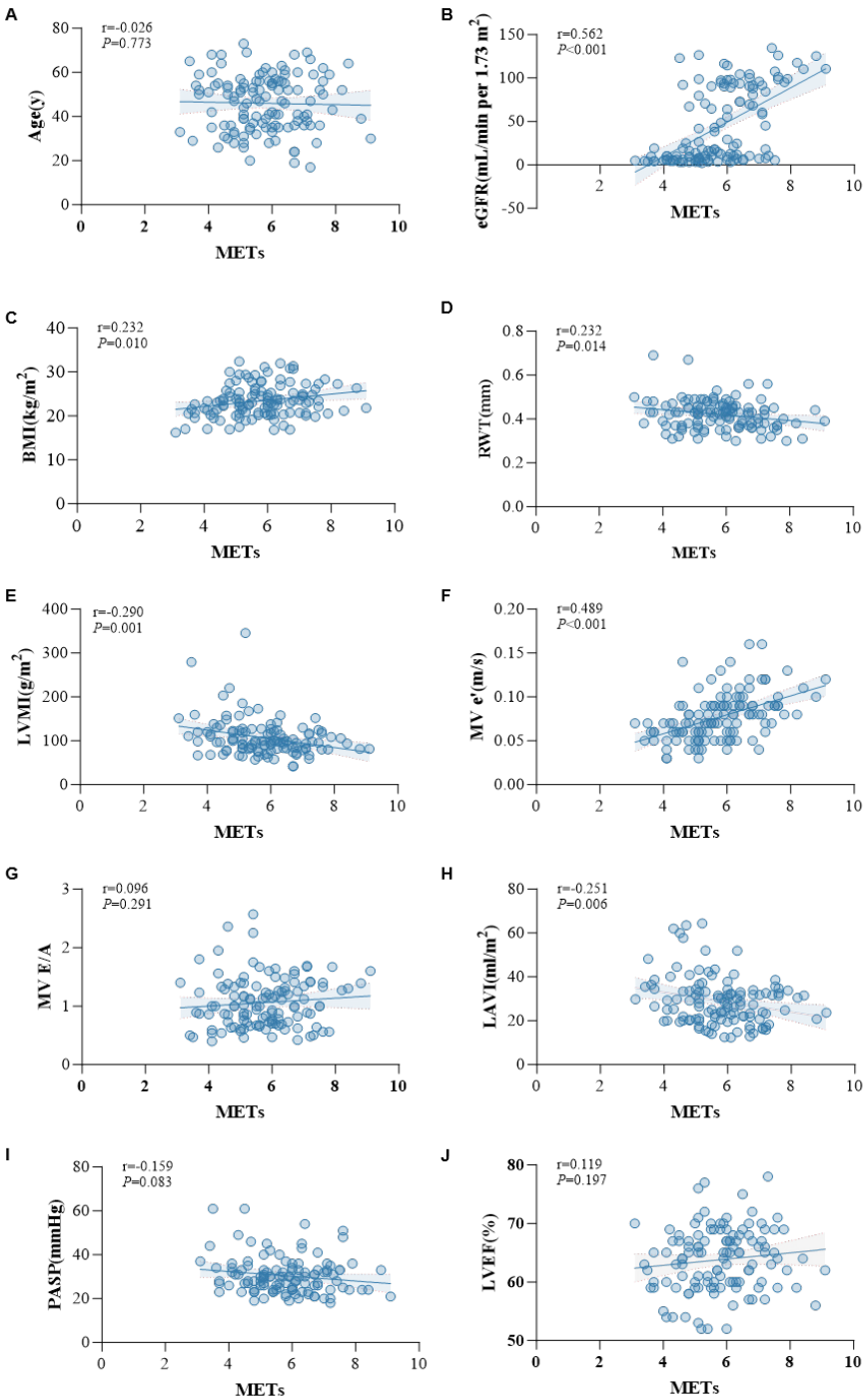

Figure S1 Scatter plot of the correlation analysis between the LACI, conventional echocardiography, clinical parameters and METs. (A) The relationship between the age value and METs value, r=–0.026, P=0.773. (B) The relationship between the eGFR value and METs value, r=0.562, P<0.001. (C) The relationship between the BMI value and METs value, r=0.232, P=0.010. (D) The relationship between the RWT value and METs value, r=0.232, P=0.014. (E) The relationship between the LVMI value and METs value, r=–0.290, P=0.001. (F) The relationship between the MV e' value and METs value, r=0.489, P<0.001. (G) The relationship between the MV E/A value and METs value, r=0.096, P=0.291. (H) The relationship between the LAVI value and METs value, r=–0.251, P=0.006. (I) The relationship between the PASP value and METs value, r=0.159, P=0.083. (J) The relationship between the LVEF value and METs value, r=0.119, P=0.197.

https://dx.doi.org/10.21037/qims-2025-aw-2238