

Supplementary material

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Table S1 Baseline characteristics of study patients

	LVEDP \leq 15mmHg	LVEDP $>$ 15mmHg	P-value
No. participants	43	77	
Male, n(%)	29(67.4)	49(64.6)	0.68
BSA, m ²	1.8(0.2)	1.8(0.2)	0.59
BMI, kg/m ²	21.7(2.0)	22.1(1.8)	0.13
Heart rate, bpm	70(10)	69(11)	0.62
Hyperlipidemia n(%)	8 (19)	14 (18)	0.32
Smoking n(%)	11(26)	22 (29)	0.11
SBP, mmHg	128(12)	136(19)	0.02
DBP, mmHg	79(8)	78(10)	0.75
VP, cm/s	55(17)	47(15)	0.004
A-dur, AD, ms	124(24)	120(23)	0.38
e' sep, cm/s	7(6, 8)	6(4, 7)	0.002
e' lat, cm/s	9.7(2.2)	7.9(2.0)	<0.001
E/e' sep	11(3.5)	14.5(4.6)	<0.001
E/e' lat	7.8(2.5)	10.7(3.5)	<0.001
LVEF, %	64(6)	64(7)	0.21
LAVI, ml/m ²	29(6)	35(9)	<0.001
TR max, cm/s	241(34)	264(35)	0.001
Average E/e'	9.4(2.8)	12.6(3.7)	<0.001
DT, cm/s	201(44)	203(62)	0.89
E/A	1.0(0.3)	1.0(0.4)	0.65
PVs, cm/s	59(11)	61(14)	0.48
PVd, cm/s	42(38, 52)	41(37, 50)	0.77
PVs/ PVd	1.4(0.3)	1.4(0.9)	0.59
PVa, mm/s	26(3)	32(5)	<0.001
PVa-dur, ms	116(17)	148(24)	<0.001
PvaD-AD, ms	-8(26)	27(24)	<0.001

Abbreviation: LVEDP:left ventricular end-diastolic pressure; BSA, body surface area; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; LVEF:left ventricular ejection fraction; A:The peak velocity during late diastole of anterior mitral leaflet; E:the peak velocity during early diastole of anterior mitral leaflet; LAVI: left atrial volume index; TR max: peak tricuspid regurgitation velocity; e': Tissue Doppler velocities in early diastole; DT: E wave deceleration time; A-dur: E peak persistence time; E/e' sep: ratio of early diastolic mitral velocity to early diastolic mitral annulus velocity; E/e' lat: ratio of early diastolic mitral annulus velocity to early diastolic mitral annulus velocity; e'lat: diastolic left ventricular wall velocity of mitral annulus, e'sep: diastole velocity of mitral annulus at interventricular septal side; VP: flow propagation speed of left ventricular inflow tract; PVa-dur: duration of reverse A wave of pulmonary vein during atrial contraction; PvaD-AD: the difference between the reverse flow time of pulmonary vein in atrial contraction and the flow time of mitral valve in atrial contraction

Table S2 ROC curve comparison of LVEDP estimated by echocardiographic parameters.

Parameter	Cutoff value	Sensitivity	Specificity	Yoden index	95% CI	<i>P</i>	AUC
VP, cm/s	≤55	83.10%	47.60%	0.31	0.57-0.75	0.003	0.66
A-dur, AD, ms	≤99	16.90%	95.30%	0.12	0.46-0.64	0.36	0.55
e' sep, cm/s	≤7	83.10%	44.20%	0.27	0.58-0.75	0.001	0.67
e' lat, cm/s	≤8	63.60%	72.10%	0.36	0.62-0.82	<0.001	0.74
E/e' sep	>12.7	62.30%	79.10%	0.41	0.66-0.82	<0.001	0.74
E/e' lat	>7.8	80.50%	62.80%	0.43	0.68-0.84	<0.001	0.76
LAVI, ml/m ²	> 26.8	71.40%	69.80%	0.41	0.67-0.83	<0.001	0.75
TR max, cm/s	> 278	44.20%	97.70%	0.42	0.63-0.79	<0.001	0.71
Average E/e'	>10.5	66.20%	76.70%	0.43	0.68-0.84	<0.001	0.76
DT, cm/s	≤168	32.50%	81.40%	0.14	0.41-0.60	0.95	0.5
E/A	> 0.7	83.10%	25.60%	0.09	0.42-0.61	0.78	0.52
PVs, cm/s	>33	32.50%	76.70%	0.09	0.44-0.63	0.49	0.54
PVd, cm/s	≤49	72.70%	39.50%	0.12	0.42-0.61	0.77	0.52
PVs/ PVd	>1.33	61%	51.20%	0.12	0.43-0.62	0.62	0.53
PVa, mm/s	>31	53.20%	95.30%	0.49	0.74-0.88	<0.001	0.82
Pva-dur, ms	>128	76.60%	83.70%	0.6	0.80-0.93	<0.001	0.87
PvaD-AD, ms	>7	88.30%	81.40%	0.7	0.77-0.91	<0.001	0.85

CI: confidence interval; AUC: area under the curve; others, see Table S1

Table S3 Results of multiple regression analysis

Variable	Non standardized coefficient β value	Standard error	Standardized coefficient β value	<i>t</i>	<i>P</i>
LAVI, ml/m ²	0.292	0.065	0.323	4.469	<0.001

TR max, cm/s	0.04	0.014	0.199	2.819	0.006
PVs, cm/s	-0.109	0.041	-0.19	-2.673	<0.001
PVa, mm/s	0.351	0.108	0.252	3.247	0.002
PvaD-AD, ms	0.075	0.019	0.306	4.004	<0.001

Abbreviations: see Table S1

Table S4 Baseline characteristics of study patients

	L-LVEDP index	H-LVEDP index	<i>P</i> -value
No. participants	42	78	
Male, n(%)	31(74)	48(62)	0.28
BSA, m ²	1.82(0.2)	1.79(0.2)	0.32
BMI, kg/m ²	21.9(2.1)	22.6(1.9)	0.65
Heart rate, bpm	66(10)	68(11)	0.96
Hyperlipidemia n(%)	8 (19)	16 (20)	0.76
Smoking n(%)	15 (36)	30 (39)	0.06
SBP, mmHg	130(13)	134(19)	0.23
DBP, mmHg	81(8)	77(10)	0.07
LAD, mm	37(4)	44(5)	0.006
IVSD, mm	10(9, 10)	11(9.5, 11)	0.03
LVPWD, mm	9.5(1.3)	9.9(2.0)	0.22
LVEDV, mL	80(66, 92)	75(62, 85)	0.17
LVESV, mL	28(21, 38)	25(19, 33)	0.12
LVEF, %	64(59, 69)	66(58, 71)	0.45
LAVI, ml/m ²	23(5)	32(8)	<0.001
TR max, cm/s	250(227, 264)	269(244, 289)	<0.001
Average E/e'	8.8(7.6, 11.4)	12.4(10.0, 15.2)	<0.001
DT, cm/s	202(44)	203(63)	0.98
E, m/s	0.72(0.19)	0.80(0.20)	0.04
A, m/s	0.76(0.18)	0.88(0.24)	0.006
E/A	0.96(0.74, 1.24)	0.88(0.72, 1.19)	0.39
Ar-A duration, ms	19(13, 30)	29(19, 41)	0.07

Abbreviation: LVEDP:left ventricular end-diastolic pressure; BSA, body surface area; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; IVSD; interventricular septal thickness in end-diastolic period; LAD:left atrial diameter; LVEDV:left ventricular end-diastolic volume; LVEF:left ventricular ejection fraction; LVESV:left ventricular end-systolic volume; LVPW:left ventricular posterior wall thickness in end-diastolic period; A:The peak velocity during late diastole of anterior mitral leaflet; E:the peak velocity during early diastole of anterior mitral leaflet; LAVI: left atrial volume index; TR max: peak tricuspid regurgitation velocity; e': Tissue Doppler velocities in early diastole; DT: E wave deceleration time

Table S5 Cox regression analysis of factors associated with risk of the primary endpoint

Variables	Unadjusted		Adjusted	
	HR(95%)	<i>P</i> value	HR(95%)	<i>P</i> value
Male, n(%)	1.12(0.91-1.25)	0.21	-	-
BSA, m ²	0.87(0.41-2.01)	0.13	-	-
BMI, kg/m ²	1.01(0.78-1.18)	0.16	-	-
Heart rate, bpm	0.77(0.39-1.98)	0.31	-	-
Hyperlipidemia n(%)	1.17(0.76-2.11)	0.07	-	-
Smoking n(%)	1.05(0.89-1.92)	0.11	-	-
SBP, mmHg	1.56(1.02-2.16)	0.02	1.48(1.13-1.92)	0.01
VP, cm/s	1.26(1.02-2.27)	0.32	-	-
A-dur, AD, ms	1.13(1.02-1.89)	0.26	-	-
e' sep, cm/s	1.05(0.98-2.11)	0.08	-	-
e' lat, cm/s	1.42 (1.16-1.79)	0.09	-	-
E/e' sep	0.87 (0.66-0.98)	0.02	0.91(0.47-0.98)	0.01
E/e' lat	0.45 (0.23-0.78)	0.15	-	-
LVEF, %	0.68 (0.67-0.99)	<0.001	0.87(0.57-0.91)	0.005
LAVI, ml/m ²	1.21 (1.01-2.16)	0.006	1.51(1.18-1.78)	0.12
TR max, cm/s	1.56 (1.28-2.31)	<0.001	1.32(1.01-1.76)	0.25
Average E/e'	0.96 (0.57-1.76)	0.32	-	-
DT, cm/s	1.16 (0.98-1.73)	0.47	-	-
E/A	0.65 (0.23-1.29)	0.06	-	-
PVs, cm/s	1.36(1.02-2.12)	<0.001	1.37(1.01-2.16)	0.19
PVd, cm/s	1.12(0.98-1.72)	0.22	-	-
PVs/ PVd	0.95(0.77-1.02)	0.18	-	-
PVa, mm/s	1.35(1.03-1.96)	0.02	1.26(1.03-2.08)	0.03
Pva-dur, ms	0.76(0.52-1.14)	0.08	-	-
PvaD-AD, ms	1.48(1.15-1.93)	0.003	1.21(1.15-2.27)	0.07
the LVEDP index	1.65(1.18-2.13)	<0.001	1.49 (1.33-2.15)	0.002

Abbreviations: see Table S1