

Accumulation of Pericardial Fat Correlates with Left Ventricular Diastolic Dysfunction in Patients with Normal Ejection Fraction

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Table 1. Characteristics of patients with and without LVDD

Parameters	Total	LVDD (+)	LVDD (-)	p-value
Number	229	141	88	
Age, years	67(12)	69(10)	63(12)	<0.001
Male gender, %	59	59	60	0.89
Obesity, %	30	33	26	0.37
Body mass index, kg/m ²	23.5 (3.3)	23.7 (3.2)	23.1 (3.6)	0.16
Abdominal obesity, %	56	60	50	0.17
Waist circumferences, cm	86.8 (9.3)	87.9 (8.6)	85.1 (10.0)	0.03
Hypertension, %	74	80	64	<0.01
Systolic blood pressure, mmHg	131 (20)	134 (20)	126 (18)	<0.01
Diastolic blood pressure, mmHg	74 (12)	73 (13)	74 (12)	0.62
Dyslipidemia, %	65	69	58	0.12
Total cholesterol, mg/dL	187 (33)	187 (33)	190 (34)	0.83
LDL cholesterol, mg/dL	110 (30)	108 (32)	112 (32)	0.58
HDL cholesterol, mg/dL	55 (17)	54 (16)	58 (19)	0.14
Triglycerides, mg/dL [†]	104 (74-149)	107 (77-156)	101 (71-146)	0.14
Diabetes mellitus, %	35	42	23	<0.01
Fasting plasma glucose, mg/dL	98 (26)	102 (29)	93 (19)	<0.01
Hemoglobin A1c, % [†]	5.8 (5.5-6.4)	5.9 (5.6-6.6)	5.7 (5.4-6.3)	0.02
Metabolic syndrome, %	43	49	33	0.02
Current smoker, %	20	18	23	0.50
Estimated GFR, ml/min/1.73 m ²	71 (19)	68 (20)	76 (17)	<0.01
B-type natriuretic peptide, pg/mL [†]	29 (15-63)	34 (15-71)	26 (14-46)	0.07
Medications				
Statins, %	37	42	30	0.07
Aspirin, %	48	54	38	0.02
β-Blockers, %	24	22	26	0.52
ACE inhibitors or ARBs, %	45	50	38	0.08
Thiazolidinediones, %	6	6	5	0.77
Atrial fibrillation, %	18	16	21	0.48
Coronary angiography, %	58	65	48	0.01
Coronary artery disease, %	40	46	31	0.03
Echocardiography				
LVEF, %	64 (6)	64 (6)	64 (6)	1.00
LV mass index, g/m ²	105 (27)	109 (27)	99 (25)	<0.01
Left atrial diameter, mm	38 (6)	38 (5)	36 (6)	<0.01
E/A [†]	0.8 (0.7-1.1)	0.8 (0.7-1.1)	0.8 (0.7-1.1)	0.98
E-wave deceleration time, ms	221 (65)	227 (71)	211 (53)	0.06

Data are mean (standard deviation) or number (percentage). [†]Median and 25th-75th

percentiles. LVDD: left ventricular diastolic dysfunction, LDL: low-density lipoprotein,

- 5 HDL: high-density lipoprotein, GFR: glomerular filtration rate, ACE: angiotensin converting enzyme, ARB: angiotensin II receptor blocker, LVEF: left ventricular ejection fraction, LV: left ventricle, E/A: early/late diastolic peak flow velocity ratio.

Table 2. Univariate and multivariate backward stepwise logistic regression analyses of
 10 pericardial fat volume and risk factors associated with the presence of LVDD

Factors	Univariate		Multivariate	
	OR (95%CI)	p value	OR (95%CI)	p value
Age (per 10 years)	1.60 (1.25-2.04)	<0.001	1.50 (1.16-1.95)	0.02
Male gender (yes)	0.95 (0.55-1.63)	0.84	Not selected	
Body mass index (per kg/m ²)	1.06 (0.98-1.15)	0.16	Not selected	
Abdominal obesity (yes)	1.47 (0.86-2.52)	0.16	Not selected	
Hypertension (yes)	2.30 (1.27-4.20)	<0.01	Not selected	
Dyslipidemia (yes)	1.60 (0.92-2.78)	0.10	Not selected	
Diabetes mellitus (yes)	2.44 (1.34-4.46)	<0.01	2.24 (1.16-4.33)	0.02
Coronary artery disease (yes)	1.25 (0.89-1.75)	0.20	Not selected	
Estimated GFR (per 10 ml/min/1.73 m ²)	0.81 (0.70-0.94)	<0.01	Not selected	
B-type natriuretic peptide (per 100 pg/mL)	1.73 (0.95-3.18)	0.07	Not selected	
LVEF (per %)	1.00 (0.96-1.04)	0.99	Not selected	
LV mass index (per g/m ²)	1.02 (1.00-1.03)	<0.01	Not selected	
PF volumes (per 100 cm ³)	2.36 (1.46-3.80)	<0.001	2.06 (1.22-3.47)	<0.01

PF: pericardial fat, LVDD: left ventricular diastolic dysfunction, GFR: glomerular
 filtration rate, LVEF: left ventricular ejection fraction, LV: left ventricle.

Table 3. Multivariate-adjusted odds ratio for the presence of LVDD

Model Adjustments	Model 1		Model 2		Model 3	
	Odds ratio (95%CI)	P value	Odds ratio (95%CI)	P value	Odds ratio (95%CI)	P value
Age (per 10 years)	1.54 (1.20-1.97)	<0.01	1.55 (1.20-2.00)	<0.01	1.54 (1.19-1.99)	<0.01
Male gender	0.77 (0.42-1.41)	0.39	0.74 (0.40-1.37)	0.33	0.74 (0.40-1.38)	0.35
Hypertension	–	–	1.35 (0.69-2.65)	0.38	1.36 (0.70-2.67)	0.37
Diabetes mellitus	–	–	2.02 (1.04-3.92)	0.04	2.09 (1.06-4.12)	0.03
Abdominal obesity	–	–	–	–	1.23 (0.63-2.40)	0.54
PF volume (per 100 cm ³)	2.38 (1.43-3.97)	<0.01	1.95 (1.13-3.34)	0.02	2.09 (1.15-3.79)	0.02

LVDD: left ventricular diastolic dysfunction, PF: pericardial fat

