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Association between left ventricular diastolic dysfunction and subclinical coronary artery calcification

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Background: Assessment of diastolic dysfunction (DD) by echocardiography is an integral part of the evaluation of patients with normal ejection fraction (EF) and symptoms suggestive of heart failure. However, many patients with DD are asymptomatic. Computed tomography calcium scoring (CTCS) is often used to assess patients at low-intermediate risk for coronary artery disease (CAD).

Aim: The purpose of this study is to evaluate the association of DD with subclinical coronary artery calcification.

Methods: Consecutive patients presenting for executive check-up who underwent resting transthoracic echocardiography followed by CTCS were retrospectively identified between January 2010 and December 2014. Two-dimensional and tissue Doppler imaging parameters were analyzed for assessing and grading of DD. Coronary artery calcium (CAC) score was quantified.

Results: A total of 191 patients (mean age 52 ± 12 years, 17% age ≥ 65, 20% with diabetes) were included. Of them, 69 (36%) patients had DD. Patients with higher CAC score were older, had more comorbidities, lower e' velocity, and were more likely to have DD. In the multivariate analysis, DD alone, age > 65 years, or both were associated with almost 3-fold increase of subclinical atherosclerosis. After propensity analysis, DD was still associated with increased odds ratio (OR) for subclinical CAC (OR 3.66 [1.54-8.72], P = 0.03), and similarly for e'< 10 cm/s. Compared to patients age < 65 years and normal diastolic function, those age > 65 years or DD had OR 3.49 (1.45-8.35) for subclinical coronary atherosclerosis (CAC > 0), whereas those age > 65 years and DD had OR 9.30 (2.00-42), (P = 0.005 and P = 0.004, respectively).

Conclusions: Our analysis suggests that DD was strongly associated with CAC > 0 even after adjusting for age and comorbidities. Assessment of CAC as part of the routine clinical evaluation of patients with normal EF and atypical symptoms without a history of coronary atherosclerotic disease is warranted for further risk stratification.

Table 1

Abstract P808 Figure. Baseline characteristics

	All patients N=191	CAC 0 N = 111	CAC 1-99 N = 50	CAC 100-399 N = 16	CAC ≥ 400 N = 14	P-value
Age, years	52 ± 12	48 ± 13	55 ± 9	56 ± 8	67 ± 8	< 0.0001
Age ≥ 65 years	33 (17%)	15 (13%)	6 (12%)	2 (13%)	10 (71%)	< 0.0001
Female gender	33 (17%)	28 (25%)	3 (6%)	2 (13%)	0 (0%)	0.006
BMI, kg/m2	29 ± 5	28 ± 4	29 ± 5	30 ± 5	33 ± 7	0.012
Hypertension	63 (33%)	28 (25%)	19 (38%)	7 (44%)	9 (64%)	0.047
Diabetes	38 (20%)	21 (19%)	6 (12%)	5 (31%)	6 (43%)	0.014
Dyslipidemia	72 (38%)	36 (32%)	19 (38%)	8 (50%)	9 (64%)	0.087
Smoking history	123 (64%)	65 (59%)	33 (66%)	13 (81%)	12 (86%)	0.091
Heart rate, Bpm	69 ± 10	70 ± 10	66 ± 10	74 ± 9	71 ± 13	0.050
LA volume index, ml/m²	21 ± 9	20 ± 9	23 ± 9	21 ± 8	22 ± 10	0.36
EF, %	65 ± 7	65 ± 8	64 ± 6	63 ± 6	64 ± 7	0.67
E/A	1.13 ± 0.41	1.22 ± 0.42	1.05 ± 0.33	1.00 ± 0.34	0.78 ± 0.24	< 0.0001
DT, ms	216 ± 50	209 ± 57	220 ± 48	223 ± 33	254 ± 57	0.028
e' lateral	9.9 ± 2.9	10.6 ± 3.1	9.2 ± 2.3	9.2 ± 2.1	8.4 ± 2.7	0.002
e'lateral<10	90 (47%)	42 (38%)	30 (60%)	8 (50%)	10 (71%)	0.014
E/e'	7.9 ± 2.3	7.7 ± 2.4	7.8 ± 2.1	8.1 ± 2.0	10.0 ± 2.4	0.007
Diastolic function						0.002
Normal	122 (64%)	83 (75%)	29 (58%)	8 (50%)	2 (14%)	
Grade 1	60 (31%)	24 (22%)	18 (36%)	8 (50%)	10 (72%)	
Grade ≥ 2	9 (5%)	4 (3%)	3 (6%)	0 (0%)	2 (14%)	