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Non Invasive Imaging (Echocardiography, Nuclear, PET, MR and CT)

CARDIAC DETERMINANTS OF FUNCTIONAL CAPACITY: CARDIOPULMONARY EXERCISE TESTING COMBINED WITH EXERCISE-ECHOCARDIOGRAPHY

Poster Contributions

Poster Hall B1

Sunday, March 15, 2015, 9:45 a.m.-10:30 a.m.

Session Title: Exercise and Imaging: Healthy and Unhealthy Adaptations to Exercise

Abstract Category: 20. Non Invasive Imaging: Sports and Exercise

Presentation Number: 1173-011

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Background: Left ventricular (LV) diastolic pressure can be estimated by the echo-derived ratio of early diastolic transmitral velocity (E) and tissue septal velocity (e'). Cardiopulmonary exercise testing (CPET) provides indices of functional capacity such as peak oxygen consumption (VO₂), which are related to LV filling during exercise. We aimed at exploring the relationship between functional capacity and echo phenotype at rest and during exercise using CPET combined with exercise echocardiography.

Methods: 79 patients referred for functional evaluation (no heart disease patients 61%, stable CAD 32%, HFpEF 7%, mean age 68±9 y, men 56%, mean LVEF 65±6%) underwent maximal symptoms limited CPET (incremental, personalized ramp protocol) combined with exercise echocardiography.

Results: Study population was divided into two groups according to overall performance % of predicted peak VO₂ (cutoff value 60%): Group A, preserved exercise capacity and B, impaired exercise capacity. Group B patients had higher LV filling pressure (higher E/e') compared to group A, associated with higher exercise pulmonary pressure, lower cardiac output and right ventricular function (TAPSE).

Conclusion: An impaired functional capacity is associated with increased LV filling pressure and pulmonary pressure during exercise. CPET exercise-echo seems useful combination to unmask cardiac determinant of functional phenotype in patients with preserved LV ejection fraction.

	Group A (n=55)		Group B (n=24)		P	
	Rest	Peak	Rest	Peak	Rest	Peak
Age, years	68±8		67±10		ns	
LV end diastolic volume indexed, ml/m ²	43±8		41±10		ns	
LV mass indexed, g/m ²	93±18		90±21		ns	
LV ejection fraction, %	65±5	71±6	66±6	71±6	ns	ns
E/e' ratio	12±3	13±3	15±8	15±6	0.06	0.08
Cardiac output, L/min	4.2±1	9.4±1.6	4.3±1	7.6±2.2	ns	0.001
Cardiac power output, Watt	0.88±0.8	2.48±0.79	0.90±0.25	2.02±0.69	ns	0.001
TAPSE, mm	24±3	27±4	21±4	25±5	0.01	0.02
PASP, mmHg	29±4	46±7	32±13	53±14	ns	0.03
Workload, Watt		98±37		70±26		0.0003
Peak VO ₂ , ml O ₂ *Kg ⁻¹ *min ⁻¹		18.9±5		11.5±3		0.000
% of predicted peak VO ₂		83±18		48±9		0.000
Peak O ₂ pulse, ml/beat		11.4±3		7.8±2.5		0.000
Heart Rate Recovery, bpm		16±8		8±6		
VE/VCO ₂ slope		28±4		29±4		ns