

The novel index of contractile function: shape of dynamics's curve of cardiac output during dobutamin stress echo

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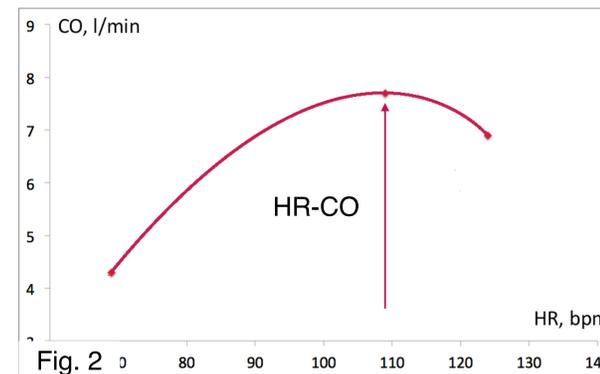
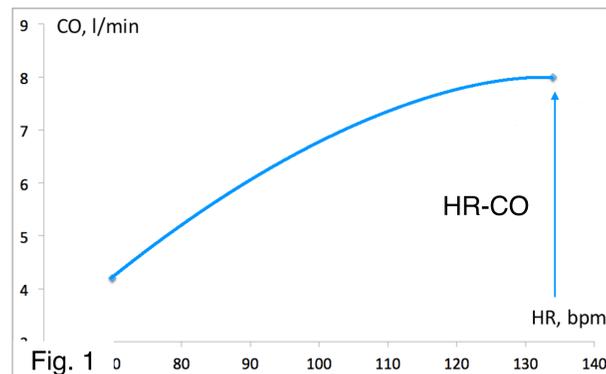
Purpose

The purpose of study was to examine of myocardial cardiac reserve by novel index of contractile function of myocardium. We hypothesised that the normal response of the survivor myocardium is an increase cardiac output up to submaximal heart rate in the form of monophasic curve of cardiac output (Fig.1) as opposed to biphasic curve as response in myocardial disfunction (Fig. 2).

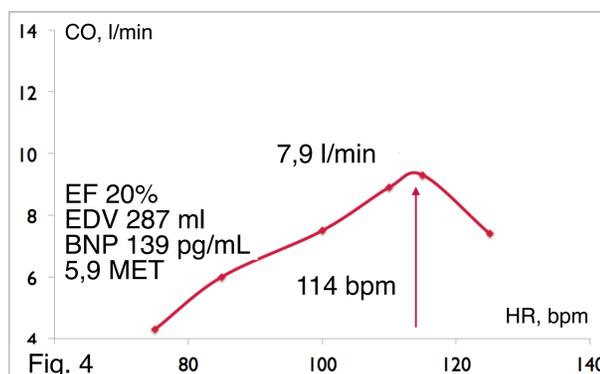
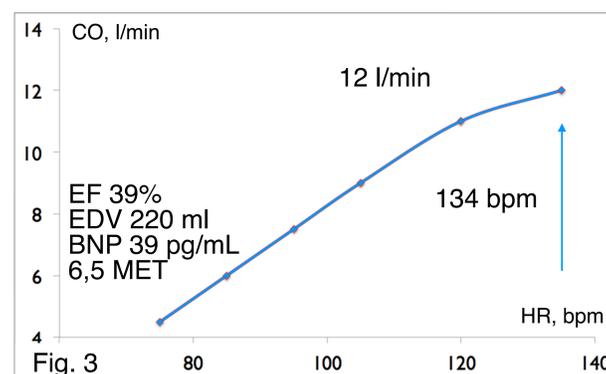
Methods

66 patients (age 65.7±8.8 years; 13 women) with heart diseases were studied during dobutamine stress echocardiography (MyLab70, Esaote S.p.A.) During the stress test the blood flow in the ascending aorta (suprasternal position) was registered with the help of continuous wave Doppler. Value of cardiac output during the stress test was calculated every 10-20 bpm increase from Doppler records. Heart rate with maximal value of cardiac output called myocardial cardiac reserve (HR-CO).

Measured rest echo parameters, brain natriuretic peptide and Minnesota Living with Heart Failure Questionnaire scores were assessed in all the patients. Rest echocardiography assessed the following parameters: end-diastolic volume, end-systolic volume, ejection fraction of the left ventricle.



	Group A (n=33)	Group B (n=33)	
End-diastolic volume	110.2±41.5 mL	174.3±94.2 mL	p<0.05
End-systolic volume	53.1±34.7 mL	110.6±87.6 mL	p<0.05
Ejection fraction	54.3±13.7 %	44.9±18.7 %	p<0.05
BNP	34.5±39.3 pg/mL	109.5±78.9 pg/mL	p<0.05
MLHFQ score	4.8±11.3	19.6±23.9	p<0.05
CO at load-peak	8.0±3.3 L/min	6.9±2.3 L/min	p<0.05



Clinical case of dynamics's curve of cardiac output in CRT patient

Results

All patients were separated into two groups. Group A (n=33) were patients with normal myocardial cardiac reserve defined as an increment of cardiac output up to submaximal heart rate and monophasic dynamics of cardiac output. Group B (n=33) were patients with depressed myocardial cardiac reserve and byphasic dynamics of cardiac output. The two groups statistically significant (p<0.05) differed for the end-diastolic volume, the end-systolic volume, the ejection fraction of the left ventricle, the brain natriuretic peptide level at rest, the cardiac output at load-peak and MLHFQ scores (Table).

Fig. 3 and 4 demonstrate clinical case of patient right after CRT and one year later respectively.

Conclusion

Myocardial cardiac reserve is a measure of the ability of the myocardium to increase its contractility with stress. The normal response is an increase cardiac output up to submaximal heart rate in the form of monophasic curve of cardiac output. Appreciation of the myocardial cardiac reserve will be able to better inform optimal design for diagnostic and therapeutic strategies.

Disclosure of interest

A. Tsyganov, none; A. Bobrov, travel support from Esaote S.p.A.; L. Bobrov, none

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