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Echocardiographic diagnosis of diastolic heart failure

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Chronic dyspnea is associated with a variety of diseases and is also a major symptom of heart failure (HF). The differential diagnosis of dyspnea is a daily routine in every cardiology practice. Approximately one-half of patients with HF have a preserved ejection fraction (HFpEF). Diagnosis of HFpEF is challenging and relies largely on demonstration of elevated cardiac filling pressures represented by the pulmonary capillary wedge pressure (1). Healthy individuals with normal relaxation are able to increase the rate of myocardial relaxation when there is a need for increased diastolic filling. Faster relaxation allows the achievement of a lower minimal left ventricular (LV) diastolic pressure at a shorter time interval than in the resting state. Hence, increased LV filling can occur even with a shortened diastolic filling time. When myocardial relaxation is reduced in the resting state, it cannot be increased as much as necessary to meet the demands of exertion or stress. In this situation with abnormal myocardial relaxation, a reduced diastolic filling period and a lack of atrial contraction compromise LV filling substantially, causing the increase in left atrial and LV diastolic pressures (hence, decreased diastolic reserve). Collectively, there is growing evidence that the diastolic stress test can provide important diagnostic findings that can be helpful in the management of patients presenting with dyspnea of an unclear etiology (2). Many patients present with exertional dyspnea and exercise intolerance, but have normal LV filling pressures at rest. In these patients, it is important to evaluate filling pressure with exercise. Exercise can be performed using a supine bicycle or treadmill protocol. Alterantively dobutamine can be used, though its vasodilator as well as inotrope effect determine a very different hemodynamic response compared to that of exercise. We need to record mitral inflow by pulsed Doppler echocardiography at the level of the mitral tips, mitral annular velocities by spectral Doppler echocardiography, and tricuspid regurgitation jet by continuous-wave Doppler at baseline and after the termination of exercise. Diastolic function parameters can be obtained after the assessment of regional wall motion abnormalities, especially when an exercise echocardiogram is performed for the evaluation of dyspnea. In patients with diastolic heart failure, left atrial pressure is increased (3), leading to an increase in mitral E velocity, whereas annular e' velocity remains reduced given the limited preload effect on e'. Moreover, an increase in the pulmonary artery systolic pressure can be detected by the increase in peak velocity of the tricuspid regurgitation jet. On the other hand, in the absence of cardiac disease, e' increases to a similar extent to the increase in mitral E velocity, and the normal E/e' ratio essentially is unchanged with exercise. The concept of the diastolic stress test were introduced more than 10 years ago by Ha et al (4). Subsequently, exercise E/e' ratio was validated against invasive measurements. Importantly, exercise septal E/e' ratio was an important determinant of exercise capacity, and its decline with age was noted in a large series of patients referred for exercise echocardiography. Furthermore, a recent study showed the incremental prognostic value of exercise E/e' ratio over clinical variables and exercise wall motion score index. In conclusion, diastolic stress test has an interesting role in patients with heart failure and preserved ejection fraction that present symptoms during activity, normal ejection fraction and inconclusive diastolic function at rest.

Recent Publications

1. Nagueh SF, Appleton CP, Gillebert TC, Marino PN, Oh JK, Smiseth OA, Waggoner AD, Flachskampf FA, Pellikka PA, Evangelisa A. Recommendations for the evaluation of left ventricular diastolic function by echocardiography. *Eur J Echocardiogr.* 2009; 10:165-193.
2. Oh JK, Park SJ, Nagueh SF. Established and Novel Clinical Applications of Diastolic Function Assessment by Echocardiography. Circ Cardiovasc Imaging 2011;4:444-445.
3. Ratanasit N, Karaketklang K, Chirakarnjanakorn S, Krittayaphong R, Jakrapanichakul D. Left atrial volume as an independent predictor of exercise capacity in patients with isolated diastolic dysfunction presented with exertional dyspnea. *Cardiovascular Ultrasoun*d 2014,12:19-26.

4. Ha J, Oh J, Redfield M, Ujino K, Seward J, Tajik A. Triphasic mitral inflow velocity with middiastolic filling: clinical implications and associated echocardiographic findings. *J Am Soc Echocardiogr.* 2004;17: 428–431.

Biography

Fabiola B Sozzi works as a Staff Cardiologist at University Hospital Policlinico of Milan, Italy, with high-specialization nomination. She has high skills in multimodality imaging of heart disease using echocardiography integrated with cardiac magnetic resonance imaging, cardiac computed tomography and nuclear. She also works in the acute clinical setting treating acute cardiac syndromes. She gained a high expertise in echocardiography at Thoraxcenter of Rotterdam (NL), where she defended PhD thesis on "Stress cardiac imaging" under the supervision of Professor J Roelandt. She is Visiting Professor at University of Milan where she leads several research projects and teaches at Faculty of Medicine and School of Specialization of Cardiology. She is author of 70 papers published in indexed peer-reviewed international journals and reviewer of several medical international journals.

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