

Editorial



Evaluation of LA Dynamics: a Classical Yet Still Challenging Topic until Now

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As is well known, the left atrium (LA) is usually thought of as a way to supply blood flow to the left ventricle (LV) (the conduit function) as well as a place to store blood (the reservoir function); however, the LA also satisfies an important active pumping role in filling the ventricles with blood (the booster pump function). The principal function of the LA is to modulate LV filling and cardiovascular performance. The atrial booster pump function reflects the magnitude and timing of atrial contractility, but is dependent on the degree of venous return (atrial pre-load), LV end-diastolic pressures (atrial afterload), and LV systolic reserve.¹⁾

Many studies have analyzed the precise functions of LA with regard to numerous diseases, and there are several studies in the field of LA contractions.²⁻⁵⁾ LA size and function can be assessed by echocardiography, cardiac computed tomography, and cardiac magnetic resonance imaging. In clinical practice, echocardiography is the most common assessment tool because of its simplicity, safety, and ability to image in real time with high temporal resolution.⁶⁾ Normally, LA function is assessed using 2-dimensional echocardiography through volumetric analysis, spectral Doppler, tissue Doppler, strain, and strain rate imaging.^{7,11)} However, not all methods produce perfect numerical representations of LA functions.

In this paper, the authors focused on the LA active pumping function to find a simpler method of assessment compared to current vendor-dependent tools in serious ischemic patients.¹²⁾ The attempts to find simpler and more convenient indexes that do not rely on vendors to evaluate complex, ever-changing LA function are significant. In particular, LA active emptying fractions have significant associations with many indexes, including classical indicators of LA functions such as the E/e' ratio and LA volume index in multivariable regression analysis.

The spectrum of diastolic dysfunction varies widely, depending on the type of disease and its severity. From mild early cases to more severe forms, diastolic dysfunction has various presentations such as low ejection fraction, valvular dysfunction, or cardiomyopathy. According to these conditions, the size and ratio of the E and A waves in the transmitral flow vary, representing the conduit and booster pump function each. Therefore, to analyze LA function, it is necessary to determine the characteristics of the target group as the first step.

This study included patients with serious coronary disease, however we can see the diastolic function of this group is not so impaired from relatively preserved average ejection fraction (48%), younger age group (62 years old), small amount of LA enlargement patients (16%), low E/e' ratio (mean value of 9), and pattern of E/A ratio (0.8). In particular, we found that LA active emptying fractions have a significant inverse correlation with the usual indexes of LA dysfunction in this group.

On the contrary, an MRI study in a normal group showed that as age increases, volumetric atrial contraction contribution also increases. In this study with 120 normal subjects, we found a significant linear correlation between atrial contraction contribution and age. This is most likely due to abnormal left ventricular relaxation.¹³⁾

Important considerations for such detailed volumetric LA analysis should include valvular problems, atrial fibrillation, renal dysfunction, or cardiomyopathy. Similarly, later analysis of active contraction in the extended population can be also helpful. Finally, there are expected clinical benefits to analyzing the relationship between pre-operative LA contraction function and post-coronary artery bypass graft prognosis.

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