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Imaging

THE ATRIAL CONDUIT FUNCTION: A NEW PARAMETER TO CLASSIFY DIASTOLIC DYSFUNCTION

Poster Contributions
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Background: Diastolic dysfunction (DD) is a relatively common medical condition whose grading may be difficult when relying on traditional Doppler parameters only. Recently, MRI has focused attention to the phasic function of the left atrium (LA), quantifying the conduit contribution to left ventricular (LV) filling as the integral of net, diastolic, instantaneous difference between synchronized LA and LV volume curves. We hypothesized that amount of blood managed by LA as a conduit would be reduced in case of mild DD, but greatly increased with more advanced degrees of DD. As MRI has limited availability, we addressed our goal implementing a 3D-echocardiographic approach in DD patients with a recent episode of heart failure (HF).

Methods: We enrolled 46 patients (36 males) aged 66±12 years, with HF, DD and various degrees of associated systolic dysfunction. All patients underwent single-beat, full-volume 3D-echocardiography. We calculated simultaneous LA and LV volumes and their relative curves as a function of time (t) using a spreadsheet. The atrial conduit volume (LACV) was computed according to the formula: LACV(t) = [LV(t) - LVmin] - [LAmax - LA(t)] and expressed percentually to LV stroke volume. Patients were then allocated to four (0-3/4, from none to severe) DD grades, according to classical Doppler parameters and then collapsed into mild (0-1, n=27) or severe (2-3/4, n=19) DD groups.

Results: No difference between mild and severe DD groups was found for LV ejection fraction (42 ± 10%, 37 ± 11%), end-diastolic volume (78 ± 21 ml/m2, 80 ± 16 ml/m2), stroke volume (32 ± 10 ml/m2, 29± 9 ml/m2), cardiac mass (128 ± 35 g/m2, 111 ± 33 g/m2) and maximum atrial volume (28 ± 12 ml/m2, 31 ± 11 ml/m2) ($p > 0.05$ for all). A significant difference, however, was detected for LACV (31+21% vs. 55+23%, $p<0.001$) using the simultaneous atrial and ventricular volume curves.

Conclusions: Our study confirms that the atrial conduit function changes as a function of DD. This finding suggests that estimates of LACV, relative to LV stroke volume, can be viewed as a possible new parameter in the grading process of DD patients. Such parameter might be potentially useful, particularly when the degree of DD cannot be unambiguously defined.