DIFFERENTIATION OF LEFT ATRIAL VOLUME BY TIME (DV/DT) IS A NOVEL AND USEFUL ECHO INDEX TO ASSESS LEFT ATRIAL GLOBAL AND PHASIC FUNCTION

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Background: Left atrial (LA) strain rate (SR) which represents a regional function is proposed to assess LA active relaxation, conduit function and active contraction. However, analysis of LA global and phasic function using differentiation of LA volume by time (dV/dt) has not yet been elucidated. Using velocity vector imaging (Siemens), time- LA volume and dV/dt curve can be automatically and rapidly provided. Thus, the aim of this study was to evaluate the usefulness of LA dV/dt as a new index of LA global and phasic function by comparing it with SR.

Methods: We examined 52 subjects; normal subjects (n=25, age 59±18 yrs, 13 men), hypertensive patients (HTN) with normal systolic function (n=27, age 64±13 yrs, 15 men). Peak LA dV/dt at systole, early diastole and atrial contraction and SR in the mid-septal and mid-lateral wall were measured in apical 4- chamber view. Moreover, the ratio of early diastolic transmitral flow velocity to mitral annular tissue velocity (E/e’) were measured.

Results: LA dV/dt was stably obtained in all subjects without influence of noise which was sometimes seen in SR. There was a good correlation between dV/dt and SR (r=0.97, p<0.0001), and also between dV/dt at early diastole and E/e’ (r=0.71, p<0.0001). Peak positive dV/dt and SR at systole in HTN were significantly reduced compared with normal (172±39 vs. 215±57 ml/s, 0.9±0.2 vs.1.1±0.3 s-1, respectively, p<0.05). Peak negative dV/dt and SR at early diastole in HTN were significantly lower compared with normal (-184±56 vs. -286±95 ml/s, -0.9±0.3 vs. -1.5±0.5 s-1, respectively, p<0.01), associated with significantly elevated E/e’ (9.8±1.9 vs.6.3±2.9, p<0.001). Peak negative dV/dt at atrial contraction in HTN was significantly higher compared with normal (-201±52 vs. -157±59 ml/s, p<0.05).

Conclusions: This study demonstrated that active relaxation of LA measured by dV/dt and SR at systole was reduced in HTN and conduit function measured by dV/dt and SR at early diastole was also reduced in HTN by impaired diastolic function and that intrinsic active atrial contraction measured by dV/dt at atrial contraction was increased in HTN compared with normal. Measurement of LA dV/dt will be a novel and promising method to assess LA function.