

Control/Tracking Number : 05-SS-A-21697-AHA

Activity : Abstract

Current Date/Time : 5/27/2005 4:02:42 PM

Isolated Diastolic Dysfunction Is A Contraction Abnormality: New Insights From Left Ventricular Longitudinal And Torsional Dynamics By Velocity Vector Imaging

Peng Li, Zhimin Wang, Manel Ballester, Jagat Narula, Mani Vannan, University of California, Irvine, Orange, CA

Background: Early diastolic filling is contingent on adequate left ventricular (LV) suction which is postulated to be dependent contraction of the oblique, sub-epicardial fibres. We studied the contraction pattern of the LV septum and the apex in normals and those with isolated diastolic dysfunction.

Methods: 17 normals and 30 patients with LVH and normal LV systolic function underwent 1) 2-D echo and Doppler measurement of mitral E and A velocities, and 2) Velocity Vector Imaging (Siemens, CA), which is a B-Mode speckle-tracking algorithm to measure myocardial longitudinal and twist dynamics. Apical 4 chamber (A4C) and parasternal short-axis (SAX) view below the papillary muscle level were used to measure myocardial longitudinal and twist velocities. The septal stripe was used the anatomical landmark which separated the LV side of the septum (LVS) and the RV side of the septum (RVS).

Results: (mean \pm SD); *Normals:* In the A4C view the, peak longitudinal velocity of the LVS was 2.9 ± 0.2 cm/sec and occurred at 298 ± 32 msec while that of the RVS was 2.6 ± 0.1 cm/sec at 353 ± 38 msec, $p < 0.01$ for time to peak velocity. In the SAX view the peak twist (anti-clockwise) velocity of the apex was 1.9 ± 0.2 cm/sec, the peak untwist (clockwise) velocity of the apex was similar at 1.7 ± 0.1 cm/sec, $p = \text{NS}$; The peak E velocity was 1.4 ± 0.2 cm/sec.

Patients with LVH: In the A4C view the, peak longitudinal velocity of the LVS was 3.7 ± 0.2 cm/sec and occurred at 288 ± 23 msec and that of the RVS was 2.6 ± 0.1 cm/sec which peaked at 402 ± 31 msec ($p < 0.001$ for time to peak velocity). In the SAX view the apical twist velocity was 2.3 ± 0.2 cm/sec, and the apical untwist velocity was significantly slower at 1.1 ± 0.1 cm/sec ($p < 0.001$). The peak E velocity was 0.6 ± 0.1 cm/sec. Thus, a) peak contraction of the RVS occurs later than LVS in normals, b) apical twist and untwist velocities are comparable in normals, c) peak contraction of RV septum is significantly delayed in LVH, and d) untwist and mitral E velocity are markedly decreased in LVH.

Conclusions: The inter-ventricular septum is anatomically and functionally bi-layered. Systolic contraction of the RVS and apical untwist contribute to LV elongation and diastolic filling. Abnormal *systolic contraction* of the RVS and apical untwist may be the basis of diastolic dysfunction.