Aim: We hypothesized that the ratio of peak E to Vp (E/Vp) is directly correlated with the severity of LV pathology and with LV filling pressures.

Methods: We examined 96 consecutive subjects (75 men, 59±10 years) LV end-diastolic pressure (LVEDP) was measured within 24 hours from echocardiography, during a diagnostic left heart catheterization study.

Results: While the E/A ratio showed no correlation to the severity of LV pathology describing an U-shaped curve, E/Vp showed a direct linear correlation (r=0.79, p<0.001). Among all Doppler parameters of LV filling, E/Vp had the best accuracy in separating pts with from those without pulmonary congestion. Analysis of the receiver-operating characteristic (ROC) curve showed the best separation for a cutoff value of E/Vp of 1.84 (area under the ROC curve of 0.84, sensitivity, 88%; specificity, 87%; and accuracy, 87%). In the group with invasive measurements, both peak E-wave and E/A ratio had only weak correlations with LVEDP (r=0.45, p<0.04 for each), while E/Vp showed a significant direct correlation (r=0.63, p<0.003).

Conclusions: E/Vp ratio increases directly with the severity of LV pathology and has a good correlation with directly measured LVEDP. This combined index can accurately separate pts who are prone to pulmonary congestion from those who are not.

Association of the ratio of peak E-wave velocity to flow propagation velocity with left ventricular pathology and filling pressures.

Value of color M-mode time delay and Doppler isovolumic relaxation period and their ratio in assessment of left ventricular systolic and diastolic function.
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Purpose: Inter-relation of systolic and diastolic left ventricular (LV) function is a known cardiac phenomenon. The purpose of this work is to study the value of two intervals namely color M-mode time delay (TD) and isovolumic relaxation period (IVRP) and their ratio (TD/IVRP), in assessment of both systolic and diastolic LV function.

Methods: This study included 57 cases (43 pts with a variety of nonvalvular heart disease known to affect diastolic function & 14 normal subjects). Conventional echo-Doppler was done to identify cases with impaired systolic function from those with normal ejection fraction (EF), and to identify cases with normal diastolic function (NL) from those with diastolic dysfunction of relaxation abnormality (RX), pseudonormal pattern (PN) or restrictive filling pattern (RF). We measured TD using color M-mode, and IVRP using Doppler technique, and we calculated their ratio (TD/IVRP). Each of the 3 measures (TD, IVRP and TD/IVRP) was compared in cases with, versus those without systolic dysfunction and in cases with any pattern of diastolic dysfunction versus NL.

Results: 21 cases had impaired EF, while 36 had normal EF. 23 cases had RX, 5 cases had PN and 15 cases had RF. TD was higher in cases with impaired EF compared to those with normal EF (126.8±78.3 Vs 79.4±29.0, p<0.001). IVRP was lower in cases with impaired EF compared to those with normal EF (63.3±32.1 Vs 82.2±18.8, p<0.005). TD/IVRP was higher in cases with impaired EF versus those with normal EF (2.27±1.33 Vs 1.04±0.57, p<0.0001). There was no significant correlation between IVRP and EF, while there was a weak negative correlation between TD and EF (r=-0.34, p<0.01) and somewhat better negative correlation between TD/IVRP and EF (r=-0.45, p<0.001) and TD/IVRP and TD (r=-0.40, p<0.001). TD was significantly higher in pts with RX, PN, and RF compared to NL (102.2±63.0, 102.0±13.0, 122.1±66.4 and 59.3±11.4 respectively), (p<0.0001 for RX versus NL, p<0.001 for PN versus NL and p<0.0005 for RF versus NL. IVRP was significantly different in NL (79.3±8.3 msec) compared to RX (93.0±23.8, p<0.05) and compared to RF (46.0±9.9, p<0.0001), but was not significantly different from normal in PN (70.0±25.5, p=NS). The ratio of TD/IVRP showed significant progressive increase with progression of the pattern of diastolic dysfunction from NL (0.74±0.13) to RX (1.16±0.74, p<0.05), to PN (1.57±0.44, p<0.005), with the higher value in RF (2.67±1.28, p<0.0001).

Conclusion: TD, IVRP and TD/IVRP are easily obtainable and reliable measures for identification of left ventricular systolic and diastolic dysfunction.