

1048-177 Occult Cardiac Abnormalities are not Uncommon in Critically Ill Patients: Echocardiographic Evaluation of 467 Consecutive Patients Admitted to a Medical Intensive Care Unit

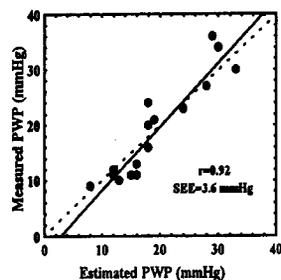
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The purpose of this study was to evaluate the diagnostic yield of routine transthoracic two dimensional echocardiography and Doppler (TTE-D) in patients admitted to a Medical Intensive Care Unit (MICU). Complete TTE-D were performed within 18 hours of admission in 467 consecutive patients (age 52 ± 17) with life threatening non-cardiac illnesses. No patient had a clinically apparent acute ischemic syndrome, congestive heart failure or other significant cardiac disease. Major cardiac abnormalities with potential implications for the diagnosis and therapy of the acute medical illness were found 169 patients (36%) (age 57 ± 18). A single cardiac abnormality was noted in 103 patients; 34 had two; 16 had three and 16 had \geq four cardiac abnormalities. Major cardiac abnormalities included: LA ≥ 5 cm ($n = 17$), dilated RA ($n = 11$), dilated RV with overload pattern ($n = 6$), significant LVH ($n = 53$), LV ≥ 6 cm ($n = 9$), EF ≤ 0.35 ($n = 25$), \geq moderate valvular insufficiency ($n = 46$), or stenosis ($n = 8$), LVOT peak gradient ≥ 40 mmHg ($n = 2$), RV systolic pressure ≥ 40 mmHg ($n = 38$), \geq moderate pericardial effusion ($n = 15$) [4 with hemodynamic compromise], regional wall motion abnormalities ($n = 34$), LV thrombus ($n = 8$), valve vegetations ($n = 12$), aortic root diameter ≥ 4 cm ($n = 3$), intracardiac shunt ($n = 3$), and aortic dissection ($n = 1$). **Conclusion:** Routine TTE-D in critically ill patients at the time of admission to the MICU identifies a significant number of occult, major cardiac abnormalities, many of which require specific therapy and/or may complicate the diagnosis and therapy of the major illness for which MICU admission was indicated.

1048-178 Noninvasive Estimation of Pulmonary Artery Wedge by Doppler Echocardiography in Patients with Heart Failure and Atrial Fibrillation

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Several Doppler echocardiographic methods for noninvasively estimating pulmonary artery wedge pressure (PWP) in patients with heart failure (HF) and sinus rhythm have been previously validated. The value of Doppler echocardiography for predicting PWP in patients with atrial fibrillation (AF) is unknown. Accordingly, we investigated 41 patients (M: 31; F: 10; age 56 ± 6 years) with AF and HF due to dilated cardiomyopathy by simultaneous right heart catheterization and Doppler echocardiography. Measurements (average of 10 cycles) included: acceleration time (AT) and rate (AR); deceleration time (DT) and rate (DR) of mitral flow; left ventricular isovolumic relaxation time (IVRT); systolic (X) and diastolic (Y) flow velocity and systolic fraction (X/X + Y) of right upper pulmonary venous flow; 2-D echo left atrial volumes. On univariate analysis DR and systolic fraction of pulmonary venous flow showed the strongest correlations with PWP ($r = 0.74$ and $r = 0.64$, respectively). Multilinear regression analysis led to the following equation: $PWP = 15.5 + (1.78 \cdot DP) - (0.24 \cdot \text{systolic fraction})$ which was prospectively tested in a further 17 patients with AF and HF (figure).



In conclusion Doppler echocardiography is a useful tool for noninvasively assessing PWP in patients with HF even when they are in AF.

1049 New Echocardiographic Methods and Applications

Wednesday, March 19, 1997, 9:00 a.m.-11:00 a.m.
Anaheim Convention Center, Hall E
Presentation Hour: 9:00 a.m.-10:00 a.m.

1049-161 Doppler tissue imaging is a reliable technique for the diagnosis of mild acute rejection in heart transplant recipients

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The aim of the study was to examine the accuracy of Doppler tissue imaging (DTI) in the detection of mild acute rejection (AR) in 34 heart transplants at the time of their routine endomyocardial biopsy. Using DTI, color M-mode images were obtained in parasternal long-axis view. Instantaneous velocities were measured during systole and diastole in the mid interventricular septum (IVS) and in the subendocardium and subepicardium of the posterior wall (PW). Out of AR, myocardial velocities showed good intra-individual reproducibility (variability: 5%). Forty AR episodes (26 mild, 10 moderate and 4 severe) occurred in 14 heart transplants. Ejection fraction significantly decreased only during moderate and severe AR but remained unchanged during mild AR. Velocity decrease was more pronounced during moderate and severe AR than during mild AR in both IVS ($-40 \pm 17\%$ vs $-19 \pm 27\%$, $p < 0.05$ during systole, $-33 \pm 17\%$ vs $-30 \pm 21\%$ NS during early diastole) and in the subendocardial PW ($-37 \pm 24\%$ vs $-21 \pm 19\%$, $p < 0.05$ during systole, $-47 \pm 17\%$ vs $-20 \pm 11\%$, $p < 0.01$ during early diastole). The best marker of AR was the velocity decrease within the subendocardium of PW during early diastole. Sensitivity and specificity for the diagnosis of mild AR were 87% for a 10% decrease of this velocity whereas usual echo-Doppler markers (left ventricular mass index, ejection fraction, pericardial effusion, pressure half-time and isovolumic relaxation time decrease) showed a poor sensitivity of 21%.

Conclusion: Mild AR is associated with a significant decrease in myocardial velocities as assessed by Doppler tissue imaging. Therefore, DTI appears to be a reliable tool for noninvasive acute rejection diagnosis.

1049-162 Application of Doppler Tissue Imaging for the Evaluation of Left Ventricular Relaxation and the Estimation of Filling Pressures

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Myocardial relaxation velocities are reduced in patients with impaired relaxation. Doppler tissue imaging (DTI) is a new technique that permits recording of myocardial velocities. We, therefore, evaluated the combination of DTI with the transmitral velocity to differentiate patients with a pseudonormal pattern from normals. Study subjects ($n = 90$) were divided into 3 groups according to mitral inflow E/A ratio and left ventricular (LV) ejection fraction (EF): 29 with normal LVEF and LV relaxation (Normals); 33 with EF $< 60\%$ and EA ratio ≥ 1 (pseudonormal [PN]); and 28 with EF $\geq 60\%$ and EA ratio < 1 (impaired relaxation [IR]). Doppler velocity of early myocardial relaxation (E_m) was obtained by placing the sample volume at the mitral annulus lateral border. Left atrial pressure (LAP) was simultaneously recorded in a subset of 30 patients with a pulmonary artery catheter. E_m was reduced in both groups of patients (PN and IR) compared to Normals (5.7 ± 2.5 and 5.9 ± 2.1 vs 9 ± 3 cm/sec, respectively; $p < 0.0001$). Similarly the acceleration (Acc) and deceleration (Dec) rates of E_m were lower in PN and IR vs Normals (Acc: 82 ± 34 and 88 ± 43 vs 125 ± 47 cm/sec², $p < 0.0001$; Dec: 49 ± 38 and 45 ± 30 vs 107 ± 59 , respectively; $p < 0.0001$). LAP (18 ± 8 mmHg) related weakly to mitral E ($r = 0.63$) and had no significant relation to E_m . The ratio of E/E_m related well with LAP [$r = 0.8$; $LAP = (1.3E/E_m) + 1.2$] with a mean difference between Doppler and catheter pressures of 0.4 ± 4 mmHg. We conclude that myocardial early relaxation velocity is capable of identifying patients with diastolic dysfunction and along with mitral E wave provides a reliable estimation of LAP.

1049-163 Tissue Doppler Imaging in Quantitative Assessment of Ventricular Function in Normals

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Tissue Doppler Imaging (TDI) is a new technique for determining the velocity of myocardial motion, but variations in normal have not been defined. **Purpose:** to determine the normal reference range of TDI and the variation