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Left Atrial Inflow Propagation Rate Derived by Transesophageal Color M-Mode Echocardiography Is a Promising Index of Preload

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**Background**: Pulmonary capillary wedge pressure (PCWP) is a useful index of preload and an important determinant of cardiac function. We postulated that the rate of blood propagating into the left atrium (LAIF-PR) from the right upper pulmonary vein (RUPV) would be a useful measure of PCWP.

**Methods**: Thus, 52 (36 M/16 F) critically-ill pts on ventilators with a mean age of 49 ± 17 yrs (range, 16 to 70) were studied by multplane TEE. LAIF-PR was measured in systole and in early diastole as the slope of the color M-mode signal entering the left atrium from the RUPV. M-mode was aligned parallel to the RUPV from a long-axis view. Ejection fraction (EF) was measured by biplane Simpson's method. Cardiac output (CO) was computed thermodynamically.

**Results**: Systolic and diastolic LAIF-PR were feasible in 49 and 44 pts, respectively. Mean LAIF-PR (cm/sec) in systole was 40 ± 26 (range, 11 to 132) and in diastole 34 ± 22 (range, 5 to 102). Negative correlations with PCWP (mean 19 ± 9 mmHg, range 3 to 40) were good for LAIF-PR in systole (r = -0.71, SEE = 6 mmHg, p < 0.0001) and in diastole (r = -0.71, SEE = 6 mmHg, p = 0.0031). Mean EF was 50 ± 22% (range, 15 to 88%) and CO was 8.97 ± 3.52 l/min (range, 226 to 179.13 l/min). Age, heart rate, EF or EF did not significantly correlate with systolic or diastolic LAIF-PR. Left atrial diameter showed weak positive correlations with systolic (r = 0.25, p < 0.05) and diastolic (r = 0.22, p = 0.1) LAIF-PR. Multivariate regression analysis showed PCWP as the only independent predictor of systolic (p < 0.0001) and diastolic (p < 0.001) LAIF-PR among age, heart rate, CO, or left atrial diameter.

**Conclusions**: LAIF-PR derived by color M-mode TEE aligned with the RUPV is a promising new index of preload. Future studies addressing the determinants of LAIF-PR, such as left atrial compliance, are needed.

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Age-associated Changes in Left Atrial Appendage Function: A Population-based Transesophageal Echocardiographic Study

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**Background**: Impaired left atrial appendage (LAA) function has been associated with LA thrombus formation. Age-associated changes in LAA flow velocities and their relation to mitral inflow and pulmonary venous flow have not been described in a large, general population.

**Methods**: 435 subjects, a subgroup of the Stroke Prevention: Assessment of Risk in a Community (SPARC) study (subjects in sinus rhythm, without left atrial thrombus and vascular disease, aortic valve disease) underwent transesophageal echocardiography. Peak LAA contraction and relaxation velocities were measured by pulsed-wave Doppler within the LAA. LAA flow velocities were correlated with age, LA size (diameter), peak atrial contraction (A) velocity in mitral inflow and peak systolic (S) and atrial reversal (AR) velocities in pulmonary venous flow by linear regression analysis.

**Results**: Mean values of LAA contraction (C) and relaxation (R) velocities (cm/sec) are presented for each population decade:

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>C velocity (cm/sec)</th>
<th>R velocity (cm/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-54</td>
<td>80 ± 22</td>
<td>55 ± 44</td>
</tr>
<tr>
<td>55-64</td>
<td>77 ± 22</td>
<td>65-74</td>
</tr>
<tr>
<td>65-74</td>
<td>71 ± 24</td>
<td>75-84</td>
</tr>
<tr>
<td>75-84</td>
<td>74 ± 27</td>
<td>.85 y</td>
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<tr>
<td></td>
<td>(n = 119)</td>
<td>(n = 132)</td>
</tr>
<tr>
<td></td>
<td>(n = 84)</td>
<td>(n = 58)</td>
</tr>
<tr>
<td></td>
<td>(n = 42)</td>
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</tr>
</tbody>
</table>

Weak correlations were found between C velocity and age (r = 0.18, p = 0.002), R velocity and age (r = 0.12, p = 0.01) and C and R velocities (r = 0.39, p = 0.0001). No correlations were found between LAA velocities and mitral A velocity, pulmonary venous S or AR velocities or LA size.

**Conclusions**: Values of LAA flow velocities in various age groups of the general population are defined in the current study. These may serve as reference values for future studies of LAA function. Additional prospective studies are necessary to determine the clinical significance of abnormal LAA function.

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Impact of Transthoracic and Transesophageal Echocardiography in the Diagnosis of Acute Pulmonary Embolism

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Acute pulmonary embolism (PE) causes diastole of the right heart as an indirect sign of PE detected by both conventional (TEE) and transesophageal echocardiography (TEE). In contrast to TTE, TEE offers a direct visual access to central aspects of pulmonary artery (PA). To assess the diagnostic value of TTE and TEE for direct visualization of the thrombus and indirect signs for PE, 31 patients (22 male, 9 female; 57 ± 10 years) with suspected PE were included. TTE and TEE. Results were independently compared to contrast-enhanced spiral computed tomography (CT) of the pulmonary arteries, performed in all patients for validation.

**Results**: In 22 patients PE was documented by SCT. 40% of the emboli were centrally located (PA trunk, right or left PA), which were directly visualized in 78% by TTE and not by TEE. All peripheral emboli were missed by echocardiography. Indirect signs.

**Conclusions**: Echocardiographic evaluation of patients with suspected PE is greatly enhanced by TEE, since most central emboli can be directly visualized. Furthermore, the enlarged diameter of PA trunk (>31 cm) serves as a useful indirect sign for PE.

1075-122

Transmural Early Deceleration Time Predicts LV Pressure Changes: Implications for the Non-Invasive Estimation of LV Stiffness

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**Background**: In vitro and animal experimentation suggest that transmural Doppler early deceleration time (DT) is inversely related to LV stiffness.

**Methods**: We studied 10 patients (pts) undergoing heart surgery, before, after and during partial or complete bypass (CPB) to alter loading conditions. High fidelity LV pressure and transmural Doppler flow recordings obtained at the mitral annulus level and at the leaflet tips were digitally stored and analyzed off-line. Mitral annular dimensions were measured by multplane TEE and combined with mitral annular Doppler velocities to calculate instantaneous changes in LV volume (dV/dt) during early filling. LV(eft) stiffness during early filling (dP/dV(eft)/dV) was obtained at each stage.

**Results**: DT correlated best with LV(eft) stiffness (r = -0.89, p < 0.001) but weakly with LV(eft) stiffness (-0.37, p = 0.09) due to larger differences in LV(eft) volumes in pts with preserved LV systolic function and/or significant mitral regurgitation (n = 5).

**Conclusions**: DT predicts changes in LV pressure during early filling. This concept may be potentially applied to the non-invasive estimation of LV stiffness by combining Doppler measurements and echocardiographic LV volumes.

1075-123

Poor Inter-Observable Agreement in Reporting Mobile Echoes on Prosthetic Heart Valves: Implications of a Multicenter Trial

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**Background**: Mobile echoes detected by transesophageal echocardiography (TEE) on prosthetic heart valves have been associated with embolism but their reported prevalence varies widely. Poor agreement between observers may account for this.