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**Direct measurement of left ventricular outflow tract by newly developed transthoracic real-time 3D-echocardiography increases accuracy in assessment of aortic valve stenosis.**

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**Background:** Evaluation of aortic valve stenoses is one of the most important current clinical applications of echocardiography. The widely employed continuity equation requires measurement of the left ventricular outflow tract (LVOT) area. We aimed at investigating whether direct measurement in a volume data set is superior to conventional calculation from the LVOT-diameter.

**Methods:** We performed left ventricular outflow tract measurement in 20 normal subjects and 15 patients with moderate to severe aortic stenosis with a newly developed transthoracic real-time three-dimensional echocardiography technique (SONOS 7500, Philips, Best, Netherlands). The off-line 3D-evaluation software (TomTec, Munich, Germany) allows free choice of section plans within the acquired volume data set. The aortic valve area was calculated by two independent observers according to the continuity equation from the mean of LVOT area values as determined from several sequential systolic frames. These results were compared to area estimates obtained by M-mode LVOT-diameters (area = PI (d/2)² exp2). Additionally, the sonographically calculated aortic valve orifices were compared to direct planimetry by transesophageal examination or invasive measurements.

**Results:** In all cases both observers found a significant reduction in LVOT-area during systole (p < 0.01). Frequently, the contraction of the LVOT resulted in an elliptical shape, as underscored by a significant decrease of the longitudinal/transverse axis ratio (p < 0.01). Determination of aortic valve orifice deviated less from invasively or planimetrically measured values (mean difference: 0.04 cm²) than conventionally calculated LVOT-areas based on M-mode (mean difference: 0.16 cm²).

**Conclusion:** The transthoracic real-time 3D-echocardiography technique offers better estimates of aortic valve area, approximating planimetric and invasive measurements, as compared to application of the continuity equation to conventional M-mode echocardiography.

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**Can plasma NTproBNP assess right ventricular overload in patients with acute pulmonary embolism?**

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**Objective:** Right ventricular (RV) dysfunction can be echocardiographically detected in half of pts with acute pulmonary embolism (APE). Plasma NTproBNP released upon myocardial stretch reflects left ventricular dysfunction in congestive heart failure. Therefore, we assessed if NTproBNP relates the degree of RV overload in APE.

**Material and Method:** We investigated 74 pts (27M, aged 63±17 years) with proven APE. On admission blood samples were collected for NTproBNP assay (Roche, ECLIA) and TTE was performed for the determination of RV overload.

**Results:** APE group comprised 54 (73%)pts with RV overload (RV+), defined by RV/LV ≥ 0.6 and/or TVPG > 30 mmHg with acceleration time of pulmonary ejection > 80ms, while 20 (27%) others showed no alteration of RV morphology or function (RV-). Plasma NTproBNP was significantly lower in RV than in RV+ (median 183±89 pg/ml (range: 16-31168) vs 461±96 pg/ml (range: 161-69058), p < 0.001). Significant correlations between echocardiographic indices of RV overload and NTproBNP were found (table). Moreover, ROC curve analysis revealed that plasma NTproBNP > 200 pg/ml showed 98% sensitivity and 55% specificity for the detection of RV overload.

**Conclusions:** Plasma NTproBNP reflects its severity of RV overload and may be helpful in its detection in patients with acute pulmonary embolism.

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**Mechanism and prevention of tricuspid regurgitation in patients transplanted according to the bialarial anastomosis technique: an echocardiographic study on 150 patients.**

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**Background:** Tricuspid regurgitation (TR) is a common post-transplant complication, especially after bialarial anastomosis. We investigated the mechanism of TR development after bialarial anastomosis in order to prevent this complication.

**Methods:** 150 patients with bialarial anastomosis (post-transplant times: 1-12 years) underwent comprehensive echocardiographic assessments, including morphological and functional tricuspid valve (TV) evaluations, right atrial (RA) geometry measurements, and measurements of the tricuspid annulus (TA) systolic excursion and tissue Doppler wall motion velocity at different levels of the TA and atrial anastomosis, in addition to invasive hemodynamic evaluations.

**Results:** Patients with TR equal or higher than grade I had higher RA anterior wall motion velocities (p < 0.05; p < 0.001) and in those without TR the RA anterior wall D/R ratios were lower than the D/R ratios at the interventricular septum (p < 0.001). The RA anterior wall D/R ratios were predictive for post-transplant TR. With D/R ratios < 1, the probability of TR was only 2.2%, whereas for D/R equal or higher than 1.1 the probability of TR reached 91.7%. We found a positive correlation between D/R ratios and TR intensity (p < 0.01; r = 0.69). The ratio between the systolic excursion of the anterior and septal TA was higher in patients without TR than in those with TR (p = 0.003).

**Conclusions:** Our data suggest that TV competence after bialarial anastomosis is related to the tension of the anterior RA wall. In patients with relatively short RA anterior wall length due to a short recipient component (D/R > 1) the resulting higher wall tension leads to the systolic motion of the TA anterior wall and consequently impedes optimal valve closure. The preservation of long recipient RA anterior wall segments (D/R < 1) prevents the development of TR.

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**Tissue Doppler imaging (TDI) in patients with aortic valve stenosis - clinical usefulness and diagnostic accuracy.**

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**Background:** Mitral annular velocities derived from tissue Doppler imaging (TDI) complement traditional variables in the evaluation of left ventricular (LV) performance. The mitral E’/E ratio has been suggested as an estimate of LV filling pressures in selected subsets of patients (pts.). However, the diagnostic usefulness of TDI has not been studied in patients with moderate or severe aortic valve stenosis (AS).

**Methods & Results:** 17 pts with moderate or severe AS (aortic valve area 0.8±0.4 cm²/ m², mean pressure gradient 61±13 mmHg, age 64±11 y., AS group) and 29 age-matched asymptomatic controls (age 60±11 y., CON group) underwent echocardiographic measurements of ejection fraction (EF) and mitral inflow velocities (E, A, E/A-ratio). Mitral annular velocities (S’, E’, A’) derived from pulsed TDI were obtained at the septal mitral annulus. In AS pts., LV end-diastolic pressure (LVEDP) and cardiac index (CI) were derived from left and right heart catheterization.

<table>
<thead>
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<th>Parameter</th>
<th>RV/LV</th>
<th>IVC exp</th>
<th>TVPG</th>
<th>RV</th>
<th>RRs</th>
<th>SO2 (%)</th>
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<td>0.40</td>
<td>0.38</td>
<td>0.32</td>
<td>0.34</td>
</tr>
<tr>
<td>p</td>
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<td>0.001</td>
<td>0.003</td>
<td>0.003</td>
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<td>0.008</td>
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</tbody>
</table>

**ROC curve of NTproBNP for RV overload.**

**Conclusions:** Plasma NTproBNP reflects its severity of RV overload and may be helpful in its detection in patients with acute pulmonary embolism.