HEART VALVE DISEASE

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Correlation between noninvasive and invasive evaluation of aortic stenosis severity: practicality and accuracy of the ejection-fraction-peak Doppler derived aortic pressure gradient ratio
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Purpose: Transesophageal echocardiography (TTE) has widely replaced cardiac catheterization in the evaluation of aortic stenosis (AS) severity. However, the traditional Doppler continuity equation aortic valve area (AVA) calculation is technically difficult and time consuming. We sought to assess the accuracy of a recent simplified index for measuring AVA: the ejection fraction-peak Doppler derived aortic pressure gradient (EF/PDpeak-d) ratio.

Methods: The study population consisted of 20 consecutive patients (11 men and 9 women with a mean age of 73±7 years) with isolated or prevalent aortic valve disease in whom invasive catheterization-derived aortic valve measurements were available. Aortic pressure gradient (PGc) was calculated by superimposing the pressure recordings. Cardiac output was determined by the Fick technique. The AVA invasive (AVAinv) was calculated with the Gorlin formula. EF by TTE was 53±12%, PGpeak-d was 70±25 mm Hg, PGmean-d 44±18 mm Hg and AVAinv 0.8±0.3 cm². EF by cardiac catheterization, EF by TTE was obtained measuring from the 4-chamber view the end-diastolic and end-systolic volumes using the area-length method. The PDpeak-d and mean aortic pressure gradient (PGmean-d) were determined by continuous-wave Doppler from the apical view. The EF/PDpeak-d ratio was then calculated, obtaining noninvasive AVA (AVA inv). Left ventricular and ascending aorta pressures were recorded using Pigtail 6 F catheter by pull-back technique from the left ventricle to the ascending aorta. The pressure gradient (PGc) was calculated by superimposing the pressure recordings. Cardiac output was determined by the Fick technique. The AVA invasive (AVAinv) was calculated with the Gorlin formula.

Results: EF by TTE was 53±12%, PGpeak-d was 70±25 mm Hg, PGmean-d 44±18 mm Hg and AVAinv 0.8±0.3 cm². EF by cardiac catheterization was 56±15%, PGc was 47±23 mm Hg and AVA 0.7±0.3 cm². There was: a highly significant correlation between EF by TTE and cardiac catheterization (r=0.96) and also in this case the difference between the two means (53±12% versus 56±15%) was not significant (p=0.3); a high correlation between PGmean-d and PGc (r=0.82) and the difference between the two means (44±18 versus 47±23 mm Hg) was not significant (p=0.3); a high correlation between AVAinv and AVAc (r=0.86) and also in this case the difference between the two means (0.8±0.3 versus 0.7±0.3 cm²) p=0.2 was not significant. A highly significant correlation (r=0.87) between AVAinv and AVAc (0.7±0.4 versus 0.8±0.4 cm²; p=0.4) was also found in a subgroup of 7 patients (35%) with EF<50% (mean value 39±10%).

Conclusions: In our study population the EF/PDpeak-d ratio has been a simple, practical and reliable index in order to assess AS severity during routine TTE. This index has also showed excellent diagnostic accuracy in patients with AS and left ventricular dysfunction.

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Evaluation of ventricular long axis contraction for outcome prediction in asymptomatic aortic regurgitation: A prospective 12-month follow-up study
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Purpose: The estimation of left ventricular (LV) long axis contraction at rest can unmask a subnormal LV functional status in patients with asymptomatic aortic regurgitation (AR). We prospectively investigated the long-term prognostic significance of LV long axis contraction in those patients.

Methods: Sixty-five consecutive patients, aged 58±15 years, with asymptomatic AR and normal resting LV ejection fraction, without coronary artery or aortic root disease, were studied by transthoracic echocardiographic at baseline, followed for 12 months and re-evaluated at the end of the follow-up period.

Results: Twenty-four of 65 patients had a peak systolic wave velocity at the lateral mitral annulus (LaS) <9 cm/sec at baseline; in those patients, LV diameters (p<0.01), volumes (p=0.01), mass (p<0.001) and end-systolic wall stress (p<0.001) increased significantly after 12 months, while LV shortening and ejection fractions (p=0.001) as well as tissue Doppler right ventricular peak systolic wave velocity (p<0.05) decreased significantly. In the rest of patients with a baseline LaS≥9 cm/sec, none of the above parameters was significantly affected during follow-up. Aortic valve replacement was performed in 6 of 24 patients (25%) with a baseline LaS<9 cm/sec and in one with a LaS≥9 cm/sec. In patients with LaS<9 cm/sec, a cut-off value for LaS of 6.25 cm/sec predicts aortic valve replacement within the next year with 83% sensitivity and 89% specificity.

Conclusion: Evaluation of ventricular long axis contraction may provide a reliable means for outcome prediction in patients with asymptomatic AR.

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Increased prevalence of aortic valve calcification and stenosis in patients with left ventricular hypertrophy and dynamic outflow tract obstruction
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Purpose: Fixed left ventricular outflow tract obstruction is associated with aortic regurgitation (AR). The prevalence of secondary aortic valve disease in patients with dynamic left ventricular outflow tract obstruction is not known. The aim of the study was therefore, to assess the prevalence of aortic valve pathology in patients with left ventricular hypertrophy (LHV) and dynamic left ventricular outflow tract obstruction.

Methods: Clinical and echocardiographic data were obtained from 1995-2006. The prevalence of aortic valve disease (calcification, stenosis or regurgitation) was first assessed in patients with LHV and resting or provokable outflow tract gradients ≥30 mm Hg due to systolic anterior mitral motion. We then excluded patients with aortic stenosis (AS; peak gradients of ≥25 mm Hg) and compared the remaining LV obstructive group (LVO) to patients with LHV and but no outflow tract obstruction (LVNO). Progression of aortic valve disease was assessed in those who had at least 1 year of echocardiographic follow up.

Results: There were 250 patients with LV outflow tract obstruction (mean age 65±13 years). The prevalence of AS (n=15) was 6% (41 patients). Aortic calcification was found in 55% and regurgitation found in 31% of patients. LVO (209 patients) and LVNO (144 patients, 43% with apical hypertrophy) groups were similar in age and for coronary atherosclerosis risk factors. The prevalence of aortic valve calcification was significantly higher in the LVO group (46% vs 22%; p<0.001) whereas the prevalence of aortic regurgitation was similar (28% in both groups). At a mean follow up of 50±27 and 52±28 months for the LVO (91 patients) and LVNO (60 patients) groups, 7 vs 1 patient, developed AS, respectively (p=1.0).

Conclusions: Aortic valve calcification and stenosis are common in patients with LVO. The prevalence of aortic regurgitation was not increased in patients with LVO, as it was comparable to the LVNO group and to previous reports in elderly patients (29%). Whether a cause and effect relationship
between LVO and aortic valve calcification and stenosis exists, is not clear from this study and a longer follow up period may be needed.

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The Impact of using different measures of relative wall thickness on assessment of left ventricular geometry in asymptomatic aortic stenosis. A SEAS substudy

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Purpose: To evaluate the impact of using different measures of relative wall thickness (RWT) on assessment of left ventricular (LV) geometry in patients with aortic stenosis (AS).

Methods: Echocardiographic LV mass index (hypertrophy (LVM)) if ≥116/104 g/m² in men/women), RWT and midwall shortening were evaluated in 1728 patients (39% women, aged 67±10 years) with asymptomatic AS, recruited in the Simvastatin Ezetimibe in Aortic Stenosis (SEAS) study. RWT was defined as the ratio of either posterior wall thickness (RWTp, concentric geometry if ≥0.43), or the average of posterior and septal wall thickness (RWTm, concentric geometry if ≥0.45) to LV radius. Both variables were also normalized for age using previously published regression coefficients (RWTpa and RWTma, concentric geometry if ≤0.54 m/sec, and RWTma 55.6 14.7 21.0 8.7

Comparison to RWTp, RWTm, use of RWTp and RWTma reclassified LV geometry in 2.8% and 3.5% of patients (Table 1). Compared to RWTp and RWTm, use of RWTpa and RWTma reclassified LV geometry in 2.8% and 3.5% of patients (Table 1). Compared to RWTp, RWTm, use of RWTp and RWTma reclassified LV geometry in 2.8% and 3.5% of patients (Table 1). Compared to RWTp, RWTm.