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LV filling pressure in severe AS: An echocardiographic and hemodynamic study

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Introduction The non-invasive assessment of left ventricular (LV) filling and LA pressure in patients with aortic stenosis (AS) remains challenging.

The aim of our study was to identify the echocardiographic parameters that may predict elevated pulmonary capillary wedge pressures (PCWP) measured by cardiac catheterization in patients with severe AS without other valve disease.

Methods and results From January 2010 to December 2012, we included 85 consecutive patients with severe AS scheduled for clinically indicated cardiac catheterization study. Comprehensive transthoracic echocardiography (TTE) was performed in all patients within 24 hours of the hemodynamic study. Mean age was 75 ± 9 years, 65% of them were male, 65%, 22% and 54% had respectively a history of hypertension, diabetes, and dyslipidemia. NYHA functional class was \geq III in 63% of patients. By TTE, mean LV ejection fraction, max left atrial (LA) volume indexed, were respectively $60 \pm 9\%$, and $38 \pm 16 \text{ mL/m}^2$. Mean mitral septal E/e' ratio was 18.6 ± 9 . Cardiac catheterization found 60% cases of coronary artery disease and the mean PCWP was 13.5 ± 7 mmHg. As compared to patients with low PCWP (< 13 mmHg), those with higher PCWP had similar LVEF, and AS severity but significantly higher LA indexed volume (41 ± 19 vs. $29 \pm 10 \text{ mL/m}^2$, $p=0.004$) and septal E/e' (22.4 ± 10 vs. 14.7 ± 5 , $p=0.001$). A maximal LA indexed volume $> 29 \text{ mL/m}^2$ predicted a PCWP > 13 mmHg with a sensitivity of 77% and a specificity of 62% (area under the curve=0.73). Similarly, mitral annular septal $E/e' > 12$ predicted PCWP > 13 mmHg with a sensitivity of 90% and a specificity of 60% (area under the curve=0.73).

Conclusion In severe AS patients, maximal LA indexed volume $> 29 \text{ mL/m}^2$ and E/e' ratio > 12 , derived from TTE, appear as good markers of elevated PCWP. Further studies are needed to investigate their prognostic values.

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Structural myocardial dysfunction in bicuspid aortic valve disease? A speckle tracking study

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Objective Analyze longitudinal strain values in patients with bicuspid aortic valve (BAV) disease in comparison to patients with degenerative aortic valve, and a control population.

Methods Patients with BAV and tricuspid degenerative aortic valve were selected in the absence of 1) left ventricular ejection fraction impairment (LVEF $< 50\%$), 2) history of myocardial infarction and 3) atrial fibrillation. The study included 49 patients with BAV (54 ± 19 years), 30 with degenerative aortic stenosis or regurgitation (77 ± 11 years) and 30 healthy control subjects (48 ± 15 years). Severe aortic stenosis was present in 12 (25%) and 8 (26%) patients, respectively, in the BAV and degenerative groups. Global longitudinal strain (GLS) was computed from the three apical views using speckle tracking imaging modality (EchoPAC, GE).

Results LVEF was similar between the three groups. In contrast, global longitudinal strain was lower in BAV ($-18.7 \pm 2.4\%$) than in degenerative ($-19.8 \pm 2.4\%$, $P=0.04$) and control groups (-20.8 ± 2 , $P<0.001$). LS in apical segments was similar between all groups, but basal and mid LS values were higher in healthy subjects. Thus, the base-to-apex gradient was more pronounced in case of valvular aortic disease. Patients with a severe aortic stenosis had similar LS value regardless of the etiology. However, a lower GLS value, related to a lower apical LS, was observed in BAV patients ($18.8 \pm 2\%$ vs. $20.4 \pm 2\%$, $P=0.02$) in case of mild-to-moderate valvular aortic impairment.

Conclusion In patients with severe aortic stenosis, no difference in longitudinal strain was observed between the bicuspid or degenerative aetiology. However, longitudinal strain was lower in BAV patients in case of mild-to-moderate aortic stenosis, suggesting an additional factor of myocardial dysfunction.