Aortic valve sclerosis, stenosis, and prognosis in the general population

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Background: The presence of aortic valve (AV) sclerosis and non-severe aortic stenosis has been a suggested marker of cardiovascular risk, but whether AV sclerosis and non-severe AV stenosis is independently associated with increased cardiovascular risk or a marker of coexistent risk factors remains to be clarified.

Objective: We examined clinical characteristics and prognosis associated with the presence of AV sclerosis and stenosis in the general population.

Methods: A total of 4,466 participants from a prospective cohort study of the general population were included. Patients with insufficient image quality (n=119) and known heart failure (n=130) were excluded, resulting in a population of 4,217 participants. Evaluation of AV sclerosis/stenosis was based on AV Doppler measurements, i.e., peak and mean AV velocity, and peak and mean AV gradient. The primary composite outcome was defined as major adverse cardiovascular events (MACE), including incident heart failure, myocardial infarction, or cardiovascular death. Multivariable Cox regression models were used to assess the association between AV sclerosis/stenosis by AV Doppler measurements and risk of the outcome.

Results: Mean age was 56.8 ± 17.5 years, and 56% were women. In total, 18.7% were smokers, 51% had hypertension (HTN), 5% had diabetes (DM), and 7% had ischemic heart disease (IHD). Mean left ventricular ejection fraction (LVEF) was 56.4 ± 6.4% with a median left ventricular mass index (LVMi) of 82.6 g/m2 (IQR 71.1; 96.8) and a mean AVA of 2.72 ± 0.72 cm2. Median AV peak velocity was 1.3 m/s (IQR 1.1; 1.4) and median AV peak gradient was 6.0 mmHg (IQR 5.0; 8.0). Median AV mean velocity was 0.9 m/s (IQR 0.8; 1.0) and median AV mean gradient was 3.0 mmHg (IQR 3.0; 4.0).

During a median follow-up of 3.5 years (IQR 2.6; 4.3), 190 patients (4.5%) reached the composite outcome. The incidence rate per 1,000 person years in the fourth quartile of AV peak velocity (AV peak velocity >1.4 m/s) was more than double that of the first quartile (AV peak velocity ≤1.1 m/s) (26.6 [95% CI 21.1 – 33.6] versus 12.9 [95% CI 9.9 – 16.9], p<0.001). In univariable analysis, all AV measurements of sclerosis/stenosis were associated with the composite outcome (p<0.001 for all) (Figure 1). All AV measurements remained independent predictors of the outcome after adjustment for demographic, clinical and echocardiographic risk factors (age, gender, smoking, HTN, DM, IHD, eGFR, LVMi, LAVi, LVEF and E/e′); AV peak PG (HR 1.19 per 5 mmHg increase, 95% CI 1.06 – 1.33, p=0.002), AV peak velocity (HR 1.05 per 0.1 m/s increase [95% CI 1.01 – 1.20], p = 0.013), AV mean PG (HR 1.30 per 5 mmHg increase [95% CI 1.09 – 1.56], p=0.002), AV mean velocity (HR 1.08 per 0.1 m/s increase [95% CI 1.02 – 1.23], p=0.005).
Conclusion: A greater degree of AV sclerosis/stenosis was independently associated with a higher risk of MACE.

Figure 1: Restricted cubic spline model