

Differences in valve morphology between patients with bicuspid and tricuspid aortic valve

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Background: Bicuspid aortic valve (BAV) patients represent a significant minority of severe aortic stenosis (AS) patients undergoing transcatheter aortic valve implantation (TAVI). These patients demonstrate anatomic differences compared to tricuspid aortic valve (TAV). Ethnicity is associated with different valve morphologies characterized by Siever's classification.

Purpose: We aim to evaluate the prevalence of BAV subtypes and the differences in valve morphology and aortic root dimensions between BAV and TAV in patients undergoing computed tomography (CT) before TAVI.

Methods: In five Israeli medical centers, 131 patients with BAV and 674 patients with TAV underwent CT angiography. BAV morphology was defined according to the number of commissures and raphe, following Siever's classification. Aortic root dimensions were measured at the level of the aortic annulus, sinus of Valsalva (SOV), and sino-tubular junction (STJ). Finally, Agatston score unit (AU) for valve calcification was evaluated.

Results: Type 0 accounted for 27% (36/131), Type IA for 63% (82/131),

Type IC for 9% (12/131), and Type 2 for 1% (1/131). Calcium score in BAV patients was significantly higher compared to TAV patients, 4000±1897 vs. 2152±1216 AU; respectively ($P<0.001$). Distance from the annulus to the left main coronary artery was greater in BAV patients compared to TAV (13.8±3.6 mm vs. 12.8±2.8 mm; respectively, $P<0.001$), similar distance from annulus to right coronary artery was observed in BAV and TAV patients (16.7±3.7 mm vs. 15±3 mm; respectively, $P<0.001$). Aortic annulus perimeter was greater in BAV than TAV patients (79.3±11 mm vs. 73±8.7 mm, respectively, $P<0.001$), as well as SOV perimeter (35.7±4.5 mm vs. 32±3.7 mm, respectively, $P<0.001$), and STJ perimeter (32.3±5 mm vs. 27±3.3 mm; respectively, $P<0.001$).

Conclusion: In Israel, AS patients showed more frequently type 1A BAV. BAV patients have larger aortic root dimensions and higher calcium burden than TAV patients.