

Predictors of Permanent Pacemaker Implantation after Transcatheter Aortic Valve Implantation

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Background:

Conduction system abnormalities requiring permanent pacemaker (PPM) implantation are a frequent complication following transcatheter aortic valve implantation (TAVI). The His-bundle crosses through the lowest portion of membranous septum (MS) to the left ventricular surface. We therefore hypothesized that MS length may serve as an anatomic surrogate of the distance between aortic annulus and His and thus show an inverse relation to risk of conduction system abnormalities post TAVI.

Methods:

Sixty seven consecutive patients with symptomatic severe aortic stenosis underwent a native and contrast-enhanced 256-slice computed tomography with iterative reconstruction technique before TAVI. The coronal view was used to measure the MS length and to evaluate the presence of calcification in the basal septum. The aortic annulus plane was reconstructed in systole and the perimeter interference was calculated as the relative difference between the implanted device perimeter and the measured annulus perimeter. Four patients with previous pacemaker and 2 patients with previous aortic valve replacement (valve in valve) were excluded. For logistic regression analysis 59 patients (mean age = 80.1 ± 7.8 years) were included.

Results:

Eighteen patients (30.5%) required PPM implantation after the procedure due to high degree atrioventricular block (n = 12), new-onset bundle branch block with PR prolongation (n = 3), slow atrial fibrillation (n = 3), and asystole during the implantation procedure in one patient. Multivariable logistic regression model revealed a 1.8-fold increased risk for PPM in patients with calcification in the basal septum (odds ratio = 1.8, P = 0.5), a 1.1-fold increased risk with high perimeter interference (odds ratio = 1.1, P = 0.06), a 1.7-fold increased risk with increased distance between aortic annulus and the distal edge of the implanted device (odds ratio = 1.7, P = 0.001), and a 0.67-fold decreased risk with increased MS length (odds ratio = 0.67, P = 0.006).

Conclusion:

Short MS and deep prosthesis implantation may facilitate mechanical compression of the conduction tissue in the muscular septum and may predict the need of PPM after TAVI.