Permanent pacemaker insertion following transcatheter aortic valve replacement: Not infrequent, not benign, and becoming predictable

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Al-Azzam and colleagues¹ share their transcatheter aortic valve replacement (TAVR) experience to better understand the factors associated with permanent pacemaker insertion (PPI) following TAVR. In a retrospective review of 300 patients, 19.7% of patients had PPI within 30 days of TAVR. The authors found insertion of a self-expanding prosthesis and presence of a baseline right bundle branch block (RBBB) were predictive of PPI, whereas aortic valve oversize and calcium score were not.

Prior work suggests a host of factors predictive of PPI following TAVR. These include aortic valve calcium score, landing zone calcification,² left ventricular outflow tract (LVOT) calcium volume in the area below the left coronary cusp (LVOT_{LC}) and right coronary cusp (LVOT_{RC}),³ implantation depth,^{3,4} porcelain aorta,⁵ aortic valve oversize,⁶ use of self-expanding valve,^{7,8} baseline RBBB,^{3,6,8-11} baseline left bundle branch block, male gender,¹² and left ventricular end-diastolic diameter,⁶ to name a few. Taking each factor individually, the current weight of evidence suggests insertion of a self-expanding valve and baseline RBBB are most consistent in predicting the need for PPI following TAVR. Al-Azzam and colleagues' findings corroborate both in their single-center study.¹

Other factors gaining traction as predictors of PPI following TAVR include LVOT_{LC} and LVOT_{RC} calcium volume and implantation depth.^{3,4} Aortic valve calcium score was not predictive of PPI in this study, but as the authors suggest, aortic valve calcium score is likely too generalized of a measurement. LVOT_{LC} and LVOT_{RC} calcium volume are better determinants of calcification specific to the membranous septum and atrioventricular conduction system. Like greater calcium volume, greater implantation depth of the prosthesis lower in the LVOT might increase the mechanical stress on the conduction system leading to higher rates of conduction disturbances. There is growing evidence that LVOT_{LC} and LVOT_{RC} calcium volume and implantation depth are predictive of PPI following TAVR, but these were not addressed in this study.

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Central Message

Risk of pacemaker insertion following transcatheter aortic valve replacement must be accurately predicted using known risk factors, disclosed, and thoroughly considered in the decision-making process.

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PPI following TAVR occurs frequently with rates as high as 1 in 3 patients in some series, whereas rates following surgical aortic valve replacement are lower.^{5,13-15} Furthermore, PPI following TAVR is not benign. It is associated with increased cost, a longer duration of hospitalization, and higher rates of repeat hospitalization and mortality or repeat hospitalization at 1 year.⁶ In patients who are high risk for surgical aortic valve replacement, these risks are a reasonable price to pay. As TAVR becomes more common in patients with intermediate and even low risk for surgical aortic valve replacement, these risks may be too high. Determining the proper balance will require careful risk assessment and further investigation.

With continued improvements in both TAVR valve design and experience, it is conceivable in the near future a majority of aortic valve replacements will be performed using a transcatheter approach. When comparing TAVR with the current gold standard of surgical aortic valve replacement, it is essential to predict the risks and benefits of TAVR as completely and accurately as possible, especially because TAVR expands into low- and intermediate-risk patient populations. For the reasons noted above, this includes the risk of PPM and its consequences. Work, such as this by Al-Azzam and colleagues,¹ helps to better predict the true risks of TAVR. On the basis of these and others' results, preprocedural decision making, consultation, and informed consent for TAVR

should include and document an increased risk of PPM implantation in those patients undergoing TAVR with self-expanding prosthesis and with known RBBB.

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