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Editorial



# Do We Really Need to Predict Paravalvular Regurgitation After TAVI With Aortic Valve Calcium Load Before the Procedure?

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▸ See the article "Distribution of Aortic Root Calcium in Relation to Frame Expansion and Paravalvular Leakage After Transcatheter Aortic Valve Implantation (TAVI): An Observational Study Using a Patient-specific Contrast Attenuation Coefficient for Calcium Definition and Independent Core Lab Analysis of Paravalvular Leakage" in volume 30 on page 292.



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Paravalvular regurgitation (PVR) after transcatheter aortic valve implantation (TAVI) was recognized as a risk factor for poor outcomes in earlier studies.[1)2)] This year, another article from the PARTNER 2 trial was published and demonstrated that moderate or worse but not mild PVR is associated with increased risk of all-cause mortality, cardiovascular death, rehospitalization, and reintervention at two years.[3)] The shape and size of the aortic annulus; left ventricular outflow tract-ascending aorta angle; extent and distribution of calcifications; anatomical, clinical, and procedural factors; and valve type and size are identified risk factors for PVR.[4)] Among those, the extent and distribution of calcifications are most studied risk factor since pre-procedural computed tomography (CT) is the standard imaging modality for measurement of aortic annulus.

In this issue of *Journal of Cardiovascular Imaging*, El Faquir et al.[5)] assessed the calcium load of each aortic valve cusp (AVC) and evaluated the relationships between calcium distribution and location of PVR with the degree of implanted valve frame expansion measured by rotational angiography fusion imaging. Several previous studies predicted PVR by CT and evaluation of calcification of aortic valve and annulus.[6-9)] Morphological feature[6)] and calcium eccentricity[7)8)] were related with PVR. Protruding annular calcification on the left and none of the coronary cusp were more highly related to PVR than was adherent annular calcification.[6)] The eccentricity index[7)] and calcium volume score[8)] were calculated to assess the distribution of calcium in the aortic annulus. The non-coronary leaflet had the highest mean calcium score, and increased left and right coronary leaflet calcium scores (per 100 Agatston unit [AU]) were associated with risk of PVR. Increased left coronary leaflet calcium (per 100 AU) was associated with need for post-implantation balloon aortic valvuloplasty.[9)]

Although the distribution of calcium on each cusp region was similar to that in a previous study,[9)] we demonstrated some limitations. The highest calcium load was at the non-coronary cusp region (NCR) and the lowest calcium load was at the right-coronary region (RCR). The location of PVR was most frequent in the left-coronary cusp region (LCR), which was not associated with the location of highest calcium burden at the NCR. The degree of

valve frame expansion was 71% at the NCR, 70% at the RCR, and 74% at the LCR, which also did not demonstrate a relationship with the distribution of calcium according to cusp region. Unlike previous studies, only one of 57 patients demonstrated PVR with moderate or worse degree (≥ moderate PVR) in this study. Earlier studies[6-9] reported 10–15% of ≥ moderate PVR, but most recent data from the PARTNER 2 trial[3] demonstrated only 6% of ≥ moderate PVR, prohibiting result comparison with our study.

Despite the limitations, if assessment of calcium burden and distribution according to AV cusps can predict ≥ moderate PVR, it may give interventional cardiologists more important information to improve clinical outcome. With improvement of devices and procedural techniques, the incidence of ≥ moderate PVR is decreasing. Assessment of calcium burden and distribution according to AV cusps to predict only mild or less PVR, which now has less clinical importance, may be time consuming and not be cost effective. There may be need for studies to select the proper patients who need to assess the calcium burden and distribution according to AVCs before the TAVI procedure to predict ≥ moderate PVR.

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