



Should Aortic Valve Calcification be Checked Before Percutaneous Coronary Intervention?

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Although aortic valve calcification (AVC) had long been considered as a passive and degenerative process, it has more recently been considered as an active and highly regulated pathophysiological process and histologically similar to atherosclerosis¹⁾. The progression of AVC has been suggested to have two different phases²⁾. The early phase is the atherosclerotic process, which is associated with dyslipidemia and inflammation³⁾. The second phase of calcium accumulation and ossification is considered to be unrelated to vascular risk factors. Many previous studies have suggested that the early phase of AVC is strongly associated with atherosclerosis of the vascular system including coronary artery disease. For example, several studies have demonstrated a significant association between AVC and increased risk of coronary events and all-cause mortality⁴⁾. Moreover, AVC has been reported to be a marker of subclinical coronary artery disease and can serve as a window to the atherosclerosis of coronary arteries⁵⁾. Detecting AVC by transthoracic echocardiography (TTE) and multidetector computed tomography (MDCT) might be useful for assessing the atherosclerotic process of coronary diseases.

Periprocedural myocardial injury (PMI), which is a common complication of percutaneous coronary intervention (PCI), is considered to be associated with subsequent morbidities and mortality. Therefore, predicting and avoiding PMI during the PCI procedure are clinically meaningful to achieve a better clinical outcome. Prior studies with coronary imaging modalities,

such as coronary computed tomography angiography, intravascular ultrasound, and optical coherence tomography, have revealed potential predictors of PMI, including the remodeling index, coronary calcification, fibrous cap thickness, and lipid core and plaque burden⁶⁾. In particular, the progression of coronary calcification might lead to mechanical stress on coronary plaques followed by thrombosis during PCI procedures. Although these imaging modalities allow a precise evaluation of the coronary atherosclerotic process, including coronary calcification, such modalities are not always available in various institutions. Therefore, predicting PMI using a noninvasive and widely available imaging modality, such as TTE, would be clinically crucial.

In their study, Shibata *et al.* clearly demonstrated a significant relationship between AVC and PMI after PCI⁷⁾. The incidence of PMI was significantly higher in patients with AVC than in those without AVC, and the presence of AVC independently predicted PMI after adjusting for other significant variables. Shibata *et al.* concluded that the presence of AVC detected using TTE can predict the occurrence of PMI. Their findings suggest the importance of AVC as a window to significant coronary atherosclerosis that can lead to PMI after PCI.

Although the association between AVC and PMI appears to be robust, several issues still remain unsolved. First, the relationship between the severity of AVC and occurrence of PMI is unclear. A previous study has demonstrated a relationship between the coronary calcium score and presence of AVC⁸⁾. However, the relationship between the coronary calcium score and severity of AVC is still unknown. Additionally, whether the risk of PMI can be stratified according to the severity of AVC has not been investigated. Compared with MDCT, TTE depends on gain settings and possibly reflects both fibrosis and calcification, which leads to a more sensitive estimation of AVC grade. Therefore, MDCT might be better for evaluating the severity of AVC. Second, the incremen-

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tal predictive value of calcification of another valve for PMI should be considered. Although mitral annular calcification (MAC) was not associated with the occurrence of PMI in the study by Shibata *et al.*⁷⁾, previous studies have suggested that MAC is a strong and independent predictor of cardiovascular events⁹⁾. Moreover, it has been reported that both aortic and mitral valve calcification were important predictors of all-cause and cardiovascular mortality in long-term peritoneal dialysis patients¹⁰⁾. Considering these findings, a combined evaluation of AVC, mitral valve calcification, and MAC may more strongly predict the occurrence of PMI. Further studies are required to determine the predictive value of calcification of another valve as well as AVC.

Although the above-mentioned issues should be investigated in future studies, the clinical message from the study by Shibata *et al.* is crucial⁷⁾. AVC is a powerful predictor of PMI, which might lead to poor clinical outcomes. All clinicians should be aware of the importance of AVC. Moreover, considering that AVC can be detected simply and noninvasively using TTE, the presence of AVC as a window to coronary atherosclerosis should always be tested before establishing the treatment strategy for PCI.

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