Editorial

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The Advantage of Cardiac CT in the Evaluation of the Bicuspid Aortic Valve Compared to Transthoracic Echocardiography

경흉부심장초음파와 비교하여 이첨대동맥판 평가에서 심장 CT의 장점

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See the article, "*Diagnostic Performance of Cardiac CT and Transthoracic Echocardiography for Detection of Surgically Confirmed Bicuspid Aortic Valve: Effect of Calcium Extent and Valve Subtypes*", in volume 84 on page 1324-1336 (https://doi.org/10.3348/jksr.2022.0170).

Bicuspid aortic valve (BAV) is a common and heterogeneous congenital cardiac anomaly. BAV presents as two primary morphological subtypes: fused BAV, characterized by the presence of three aortic sinuses and dissimilar cusps, and two-sinus BAV, characterized by two aortic sinuses with relatively symmetric cusps (1-3). These subtypes may exhibit further variations in cusp fusion patterns. BAV is associated with potential complications, including aortic valve regurgitation, aortic stenosis (AS), and aortic dilatation. Notably, BAV-associated aortopathy is a widespread and multifaceted clinical challenge in the field of radiology. The decision-making process regarding the timing of intervention demands a personalized and intricate approach, necessitating a comprehensive evaluation of various factors. These factors include the assessment of aortic dimensions, meticulous scrutiny of valve function, vigilant monitoring of the rate of aortic growth, consideration of familial predisposition and genetic history, careful evaluation of individual patient characteristics, and thorough assessment of the surgical expertise and experience available within the multidisciplinary aortic team. This multifaceted evaluation serves as the foundation for informed and patient-centered clinical

management of BAV-associated aortopathy (4). Therefore, prompt diagnosis is imperative.

Although the initial imaging modality for assessment is transthoracic echocardiography (TTE), it is subject to limitations due to the high prevalence of aortic calcification in AS. Aortic calcification can introduce artifacts into echocardiographic imaging, leading to shadowing and obscuration of the underlying structures. These artifacts can complicate the assessment of valve morphology and the quantification of stenosis severity. In this context, electrocardiogram-gated cardiac CT scans allow for the assessment of aortic valve calcification using the Agatston method, which is a widely accepted quantitative approach. The severity threshold for aortic valve calcification is defined as a score exceeding 1300 Agatston units (AU) in female or 2000 AU in male, as recommended in a previous study (5).

Cardiac CT has been demonstrated to be superior in discriminating between the BAV and the tricuspid aortic valve. Notably, previous researches have not considered the influence of valvular calcification on diagnostic accuracy. Consequently, Kim et al. (6) aimed to compare the diagnostic accuracy of cardiac CT and TTE, accounting for both valve morphology and the presence of valvular calcification. Their study showed that cardiac CT is an invaluable diagnostic modality for the detection of BAV, exhibiting a performance that is significantly superior to TTE. This increased sensitivity, coupled with a notably improved negative predictive value and overall diagnostic accuracy, was statistically significant ($p < 0.001$, $p < 0.001$, and $p = 0.003$, respectively).

Furthermore, a detailed analysis of the error rates revealed intriguing insights into the diagnostic capacities of these two imaging modalities. For instance, TTE exhibited an error rate of 10.9% when compared with CT in identifying the two-sinus type of BAV. However, for the fused type, TTE demonstrated a significantly higher error rate of 28.3% ($p = 0.04$), emphasizing the clear advantage of CT over TTE in detecting the latter subtype of BAV, which often presents with unique diagnostic challenges. These findings underscore the pivotal role of CT in enhancing the accuracy and reliability of BAV diagnosis, particularly in complex or challenging cases.

Conflicts of Interest

The author has no potential conflicts of interest to disclose.

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