

## Editorial



# Assessment Regarding the Safety of Stress Cardiovascular Magnetic Resonance in Patients With Moderate to Severe Aortic Stenosis

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The burden of aortic stenosis (AS) is increasing in the rapidly aging population. We previously showed a proportion of AS patients  $\geq 60$  years of 80%. The age-standardized incidence, prevalence, and death rate of AS were approximately 1 person, 3 persons, and 0.2 persons per 100,000 in 2017, respectively.<sup>1)</sup>

AS is often associated with coronary artery disease (CAD) and the most common form of valvular heart disease in elderly patients. Significant CAD was found in 10.6% of patients with severe AS in our previous study.<sup>2)</sup> Evaluation of the functional significance of CAD in patients with severe AS is clinically relevant for planning a potential percutaneous coronary intervention or coronary artery bypass grafting (CABG). However, evidence regarding the role of stress testing in severe AS is lacking. Guidelines recommending testing may uncover symptoms and is recommended for risk stratification of asymptomatic patients with severe AS. Exercise echocardiography provides additional prognostic information based on assessment of the increase in mean pressure gradient and change in left ventricular (LV) function.<sup>3)</sup>

Myocardial ischemia in patients with severe AS can occur in the absence of CAD and is apparently due to inadequate LV hypertrophy (LVH) with high systolic and diastolic wall stress and reduced coronary flow reserve.

Adenosine stress cardiovascular magnetic resonance (CMR) can detect stress-induced abnormal hypoperfusion with signs and symptoms of ischemia without CAD. Adenosine stress CMR is one of the few noninvasive clinical methods that can assess the transmural distribution of coronary blood flow and myocardial perfusion reserve index. We previously showed that severe AS patients with angina but without obstructive CAD had a reduced myocardial perfusion reserve, which is indicative of microvascular dysfunction, compared with severe AS patients without any symptoms. In addition, angina in patients with severe AS without obstructive CAD might be attributed to LVH, which can cause myocardial ischemia due to coronary microvascular dysfunction.<sup>4)</sup>

Recently, Saeed and Chambers<sup>5)</sup> reported that exercise testing is safe and feasible and reveals symptoms in a significant proportion of patients. In addition, serial testing has incremental

prognostic value compared with a single baseline test. Exercise testing in patients with AS is underused and should be performed routinely to refine the hemodynamic severity of AS.

In the current issue of *Journal of Cardiovascular Imaging*, Salatzki et al.<sup>6)</sup> tested the safety of dobutamine and adenosine CMR in patients with moderate to severe AS (n = 187). The safety results were compared with those of 187 age-, gender-, and body mass index-matched patients without AS. Severe complications were not reported in the control group. The authors reported similar non-severe complications and minor symptoms between patients with moderate to severe AS (n = 16) and patients without AS (n = 17). Nineteen patients with AS experienced non-severe complications or minor symptoms during dobutamine stress CMR compared with 18 patients without AS (p = 0.855). The authors concluded that moderate to severe AS was not associated with complications during the CMR stress test. The incidence of non-severe complications and minor symptoms was greater with dobutamine than adenosine stress CMR.

This study had several limitations. This was a retrospective study performed at a single center with a relatively small sample size, limiting support for conclusions regarding infrequent complications. In addition, the number of patients with severe AS was very small (n = 30). Severe AS is a contraindication in dobutamine stress CMR according to the Guideline for Cardiovascular Magnetic Resonance Imaging from the Korean Society of Cardiovascular Imaging.<sup>7)</sup> The number of patients with severe AS was too small to generalize the results of this study to severe AS.

Dobutamine stress CMR and adenosine stress CMR showed clinical usefulness and safety for evaluation of the presence or absence of CAD in significant AS. Coronary CTA may potentially be the most useful imaging modality to determine the presence or absence of CAD in patients with significant AS. In actual clinical practice, dobutamine stress CMR to determine the presence or absence of concomitant CAD is not necessary when the number of patients who cannot undergo coronary CTA examination is small. However, adenosine stress CMR showed clinical usefulness because the transmural distribution of coronary blood flow and myocardial perfusion reserve index can be evaluated rather than confirming the presence or absence of accompanying CAD.

A risk stratification model to predict the incidence of adverse events in patients with AS during dobutamine stress CMR should be developed. The study results indicated that older age, higher prevalence of hypercholesterolemia, prior CABG, prior

stroke, and myocardial ischemia are independent predictors for a higher incidence of adverse events in patients undergoing dobutamine stress CMR.

Creating a risk stratification model to predict complications after performing dobutamine stress CMR in patients with moderate to severe AS is clinically important. However, because the number of patients included in the study was 187, a relatively small number, and the results were derived only from a single center, the results would likely be confirmed in a study targeting moderate to severe AS patients that includes a large cohort and multiple centers.

Despite the limitations, Salatzki et al.<sup>6)</sup> should be recognized for their assessment regarding the safety of dobutamine and adenosine stress CMR in patients with moderate to severe AS.

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#### Conflict of Interest

The author has no financial conflicts of interest.

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