Korean Circ J. 2022 Dec;52(12):887-889
https://doi.org/10.4070/kcj.2022.0286
pISSN 1738-5520·eISSN 1738-5555

kcj
Korean Circulation Journal

Editorial

Check for updates

Hemodynamic Challenges With Moderate Aortic Stenosis: Beyond Severe Aortic Stenosis

Dong-Hyuk Cho, MD, PhD

Division of Cardiology, Department of Internal Medicine, Korea University Medicine, Seoul, Korea

▸ See the article "Moderate Aortic Stenosis in Patients With Heart Failure" in volume 52 on page 878.

OPEN ACCESS

Received: Oct 15, 2022
Revised: Nov 2, 2022
Accepted: Nov 10, 2022
Published online: Nov 24, 2022

Correspondence to
Dong-Hyuk Cho, MD, PhD
Division of Cardiology, Korea University Medicine, Anam Hospital, 73, Goryeodae-ro, Seongbuk-gu, Seoul 02841, Korea.
Email: why012@gmail.com

ORCID iDs
Dong-Hyuk Cho
https://orcid.org/0000-0001-8480-9082

Funding
The author received no financial support for the research, authorship, and/or publication of this article.

Conflict of Interest
The author has no financial conflicts of interest.

Data Sharing Statement
The data generated in this study are available from the corresponding author upon reasonable request.

Aortic stenosis (AS) is a common valvular disease with a high morbidity and mortality.[1] As symptoms in patients with AS correlate with the severity of valvular obstruction, clinicians have mainly focused on relief of valvular obstruction by aortic valve replacement (AVR). However, the paradigm for treatment of AS has recently shifted from valvular obstruction to extra-valve cardiac damage. In patients with severe AS undergoing AVR, 87% of patients showed left ventricular (LV) remodeling and dysfunction (stage 1). Additionally, more severe extra-valve cardiac damage, such as left atrial enlargement and mitral damage (stage 2), pulmonary vasculature abnormalities and tricuspid damage (stage 3), and right ventricular dysfunction (stage 4) were detected in 51%, 25%, and 9% of the patients, respectively.[2] Extent of cardiac damage was associated with worse prognosis, independent of valvular obstruction severity. Furthermore, the prevalence of accompanying comorbidities, especially heart failure (HF), is rapidly increasing in aging population.[3] Thus, poor prognosis and high prevalence of extra-valve cardiac damage are clinical challenges in AS treatment.

Improved outcomes of transcatheter AVR (TAVR) have led to increasing interest in application of TAVR for less severe AS.[4-6] Although moderate AS is considered a benign disease requiring close monitoring, a meta-analysis of 25 observational studies reported that all-cause and cardiac mortality were 9.0 and 4.9 per 100 person-years, respectively, significantly worse than those in no or mild AS group.[7] In that study, reduced LV ejection fraction (EF) was associated with higher mortality. Studies using cardiac magnetic resonance (CMR) imaging also provided profound information about myocardial damage beyond valve status. A CMR study demonstrated increased diffuse fibrosis and replacement fibrosis in AS compared with healthy subjects.[8] LV dysfunction and mortality progressed according to the burden of fibrosis. These findings imply that hemodynamic challenges and subsequent cardiac damage are critical factors determining worsening prognosis in patients with moderate AS.

In this issue of the *Korean Circulation Journal*, Truong et al.[9] made an important contribution to current medical research through a retrospective study of 162 patients with moderate AS and elevated brain natriuretic peptide (BNP) levels compared to 167 patients in the none or mild AS groups. In addition to the difference in aortic valve pressure gradient (22.1 vs. 13.7 mmHg), extra-valve cardiac damage was found to be more common in the moderate AS group than in the control group. LV systolic dysfunction and LA enlargement were more frequent, and pulmonary artery systolic pressure and RV function were more impaired in

The contents of the report are the author's own views and do not necessarily reflect the views of the *Korean Circulation Journal*.

the moderate AS group than in the control group. The primary outcome was a composite of all-cause mortality and hospitalization. During a median follow-up of 3.85 years, all-cause mortalities and hospitalizations were common (mortalities: n=61, 18.4% and hospitalization: n=508, 153.0%). After adjustment for cardiovascular risk factors, the presence of moderate AS was independently associated with a higher risk of primary outcomes (hazard ratio [HR], 1.45; 95% confidence interval [CI], 1.05–2.01; p=0.02). All-cause mortality occurred in 23.0% and 13.8% of the patients in the moderate and control groups, respectively. However, the difference in mortality was not statistically significant between groups. A total of 299 and 209 hospitalizations occurred in the moderate AS and control groups, respectively. Multivariate analysis showed that moderate AS was associated with a higher risk of hospitalization (HR, 1.45; 95% CI, 1.18–1.79; p=0.005). These findings demonstrate that moderate AS and elevated LV filling pressure (defined by elevated BNP) result in hemodynamic loading on the myocardium and worse prognosis. This suggests that in patients with moderate AS, especially those with evidence of elevated filling pressure, clinicians should focus on and closely monitor hemodynamic loads and extra-valve cardiac damage, and not only valvular obstruction per se.

This article forms a link between moderate AS and HF and worse long-term outcomes, which leads to the next clinical question: "What should we do right now for our patients with moderate AS and HF?" Unfortunately, the authors were unable to provide information regarding treatments such as surgical AVR (SAVR) or TAVR. Another unanswered question is the change in valvular obstruction severity and extra-valve cardiac damage during follow-up. Data for follow-up echocardiography with prospective design studies will be needed to stratify patients who will benefit from early interventions.

Current practical guidelines cannot provide evidence-based treatment options to improve the long-term outcomes of moderate AS. In an observational study of moderate AS and HF and reduced ejection fraction, TAVR, but not SAVR, was associated with a lower risk of mortality.[10] These findings provide a background for provocative randomized controlled trials (RCTs) to investigate the effects of AVR in patients with moderate AS and HF. Several RCTs are currently underway to address this issue. The Transcatheter Aortic Valve Replacement to Unload the Left Ventricle in Patients with Advanced Heart Failure trial hypothesized that reducing hemodynamic overload using TAVR may improve LV function and HF symptoms in patients with moderate AS and advanced HF (NCT02661451). In addition, the Prospective RCT to Assess the Management of Moderate Aortic Stenosis by Clinical Surveillance or TAVR trial is currently enrolling patients to randomize those with moderate AS to TAVR or medical treatment only (NCT04889872). These trials will explore the potential benefits of AVR in specific populations with moderate AS and elevated LV filling pressure beyond severe AS. Furthermore, this trial will provide significant insights into the hemodynamic interactions between the aortic valve, myocardium, and pulmonary vasculature in the AS population.

REFERENCES

1. Ito S, Oh JK. Aortic stenosis: new insights in diagnosis, treatment, and prevention. *Korean Circ J* 2022;52:721-36.
PUBMED | CROSSREF
2. Généreux P, Pibarot P, Redfors B, et al. Staging classification of aortic stenosis based on the extent of cardiac damage. *Eur Heart J* 2017;38:3351-8.
PUBMED | CROSSREF

3. Park JJ, Lee CJ, Park SJ, et al. Heart failure statistics in Korea, 2020: a report from the Korean Society of Heart Failure. *Int J Heart Fail* 2021;3:224-36.
PUBMED | CROSSREF
4. Kim DH, Kang DH. Early surgery in valvular heart disease. *Korean Circ J* 2018;48:964-73.
PUBMED | CROSSREF
5. Moon I, Kim M, Choi JW, et al. Early surgery versus watchful waiting in patients with moderate aortic stenosis and left ventricular systolic dysfunction. *Korean Circ J* 2020;50:791-800.
PUBMED | CROSSREF
6. Yu CW, Kim WJ, Ahn JM, et al. Trends and outcomes of transcatheter aortic valve implantation (TAVI) in Korea: the results of the first cohort of Korean TAVI registry. *Korean Circ J* 2018;48:382-94.
PUBMED | CROSSREF
7. Coisne A, Scotti A, Latib A, et al. Impact of moderate aortic stenosis on long-term clinical outcomes: a systematic review and meta-analysis. *JACC Cardiovasc Interv* 2022;15:1664-74.
PUBMED | CROSSREF
8. Chin CW, Everett RJ, Kwiecinski J, et al. Myocardial fibrosis and cardiac decompensation in aortic stenosis. *JACC Cardiovasc Imaging* 2017;10:1320-33.
PUBMED | CROSSREF
9. Truong VT, Ernst J, Pallerla A, et al. Moderate aortic stenosis in patients with heart failure. *Korean Circ J* 2022;52:878-86.
CROSSREF
10. Jean G, Van Mieghem NM, Gegenava T, et al. Moderate aortic stenosis in patients with heart failure and reduced ejection fraction. *J Am Coll Cardiol* 2021;77:2796-803.
PUBMED | CROSSREF