JACC: CARDIOVASCULAR IMAGING
VOL. 17, NO. 3, 2024

EDITORIAL COMMENT

Multiparametric Approach to Asymptomatic Aortic Stenosis

New Surrogate Markers Are Welcome*

Bernard Cosyns, MD, PhD,[a] Kristina H. Haugaa, MD, PhD[b,c]

The concept of mechanical dispersion (MD), assessed through strain echocardiography, was introduced over a decade ago as a parameter to evaluate the risk of ventricular arrhythmias. This marker was primarily used in conditions where risk stratification for primary preventive implantable cardioverter-defibrillator use was challenging, such as long QT syndrome, arrhythmogenic cardiomyopathies, and ischemic cardiac disease.[1-3] The introduction of speckle tracking–derived strain and later automated measurements improved the user experience and made the method more widely adopted.

MD was initially proposed as a marker of ventricular arrhythmias by reflecting contraction inhomogeneity or, as also suggested, mechanical dyssynchrony. Mechanical dyssynchrony, as a general term, is a risk marker for arrhythmias, and numerous trials have shown the antiarrhythmic effect of cardiac resynchronization therapy. The underlying mechanisms were explained by dyssynchrony reflecting fibrotic tissue serving as the substrate for arrhythmias and thereby reflecting increased arrhythmic risk.

Moving beyond traditional arrhythmic disorders, MD has also been demonstrated to predict adverse outcomes in other cardiac conditions, including aortic stenosis.[4] Asymptomatic severe aortic stenosis (SAS) is a much discussed topic in cardiology both because it is clinically challenging and because of uncertainties regarding timing of treatment and the risk of mortality.

In this issue of *JACC: Cardiovascular Imaging,* Thellier et al[5] evaluate the association of left ventricular (LV) MD and LV global longitudinal strain (GLS) in patients with asymptomatic or mildly symptomatic aortic stenosis. Thellier et al[5] included a sufficient number of patients in a retrospective study with strain echocardiography performed at baseline.

Thellier et al[5] hypothesized that LV MD would be associated with an increased risk of mortality and would provide additional prognostic information in addition to LV GLS. The results of the study demonstrated that LV MD was a reproducible parameter that was independently associated with an increased risk of mortality in patients with SAS. Furthermore, the combination of increased LV MD and depressed LV GLS identified a subgroup of patients with a higher risk of mortality. Thellier et al[5] thus could confirm previous reports that strain echocardiography provided better stratification of adverse outcome in asymptomatic or paucisymptomatic patients with SAS.

Interestingly, Thellier et al[5] have shown that neither an LV GLS decrease nor and LV MD increase was correlated with SAS severity, probably reflecting more advanced extravalvular or hemodynamic consequences of SAS in this asymptomatic group of patients.

The study was well performed, and statistical methods included propensity matching leading to adjustment of the data, which strengths the validity of the results.

As acknowledged by Thellier et al,[5] the study is retrospective and performed in a selected group of patients with SAS (ie, only patients with a preserved

*Editorials published in *JACC: Cardiovascular Imaging* reflect the views of the author and do not necessarily represent the views of *JACC: Cardiovascular Imaging* or the American College of Cardiology.

From the [a]Center for Cardiovascular Disorders, Department of Cardiology, University Hospital Brussels, Free University of Brussels, Brussels, Belgium; [b]ProCardio Center for Innovation, Department of Cardiology, Oslo University Hospital, Rikshospitalet, Oslo, Norway; and the [c]Faculty of Medicine, Institute of Clinical Medicine, University of Oslo, Oslo, Norway.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

ISSN 1936-878X/$36.00
https://doi.org/10.1016/j.jcmg.2023.10.011

LV ejection fraction, defined as ≥50%, no atrial fibrillation, an older cohort, only a minority of patients with transcatheter aortic valve replacement [AVR]), and these issues make extrapolation to the general group of patients with of SAS difficult. The endpoint of overall mortality could be related to other factors (ie, the development of left bundle branch block during follow-up with or without AVR, which has been demonstrated to convey a worse prognosis). The association with coronary disease could also have played a role but was not explored in all patients. The hypothesis that the changes in both LV GLS and LV MD are related to myocardial fibrosis and/or hemodynamic deterioration have not been explored, either. The assessment of fibrosis with cardiac magnetic resonance could provide more insights into the mechanisms leading to these changes. The type of LV hypertrophy (concentric vs eccentric) may indicate a more advanced stage of myocardial damage and may partially explain the higher LV MD. The regression of LV hypertrophy after AVR may be an important prognostic factor, and its relationship with LV MD and LV GLS changes could be interesting. Accordingly, the changes in hemodynamics and their impact on both parameters should be analyzed after AVR to reinforce the concept.

We increasingly recognize that some patients with asymptomatic SAS may need earlier valve intervention. However, we still struggle with selecting the specific patients at highest risk who may benefit from early interventions. An integrative approach, including many clinical characteristics, imaging evaluation of valvular and extravalvular consequences, biologic parameters (ie, B-type natriuretic peptide), and functional evaluation, is mandatory for the heart team to take the decision to intervene in due time. Ultimately, the goal is to ensure that interventions are undertaken in a targeted and informed manner, where the potential benefits outweigh the risks, thereby aligning with the principle of "do no harm." All previous experience has taught us that a combination of risk parameters is better than a single parameter in risk prediction in medicine. Combining multiple risk parameters, it seems reasonable to integrate LV MD and LV GLS in risk prediction models to enhance risk stratification and improve patients' outcomes in the management of asymptomatic SAS.

FUNDING SUPPORT AND AUTHOR DISCLOSURES

Dr Cosyns has received funding from the King Baudouin Foundation and the UZB Foundation. Dr Haugaa has received funding from the Norwegian Research Council, ProCardio (#309762), GENE POSITIVE (#288438), and EMPATHY (#298736).

ADDRESS FOR CORRESPONDENCE: Dr Bernard Cosyns, Centrum voor Hart en Vaatziekten, Department of Cardiology, Universitair Ziekenhuis Brussel, Vrij Universteit Brussels, 101 Laarbeeklaan, 1090 Brussels, Belgium. E-mail: bcosyns@gmail.com.

REFERENCES

1. Haugaa KH, Edvardsen T, Leren TP, Gran JM, Smiseth OA, Amlie JP. Left ventricular mechanical dispersion by tissue Doppler imaging: a novel approach for identifying high-risk individuals with long QT syndrome. *Eur Heart J*. 2009;30(3):330–337.

2. Sarvari SI, Haugaa KH, Anfinsen OG, et al. Right ventricular mechanical dispersion is related to malignant arrhythmias: a study of patients with arrhythmogenic right ventricular cardiomyopathy and subclinical right ventricular dysfunction. *Eur Heart J*. 2011;32(9):1089–1096.

3. Haugaa KH, Smedsrud MK, Steen T, et al. Mechanical dispersion assessed by myocardial strain in patients after myocardial infarction for risk prediction of ventricular arrhythmia. *J Am Coll Cardiol Img*. 2010;3(3):247–256.

4. Klaebo LG, Haland TF, Leren IS, et al. Prognostic value of left ventricular deformation parameters in patients with severe aortic stenosis: a pilot study of the usefulness of strain echocardiography. *J Am Soc Echocardiogr*. 2017;30(8):727–735.e721.

5. Thellier N, Altes A, Rietz M, et al. Additive prognostic value of left ventricular dispersion and deformation in patients with severe aortic stenosis. *J Am Coll Cardiol Img*. 2024;17(3):235–245.

KEY WORDS aortic stenosis, arrhythmia, global longitudinal strain, mechanical dispersion, speckle tracking