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Two-Dimensional Speckle-Tracking Echocardiography in Normal Korean Population: Is Now to Start Using in Routine Clinical Practice?

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Left ventricle (LV) strain measurement by using the two-dimensional (2D) speckle-tracking echocardiography (STE) was first described in 2004,[1] and has been widely applied in research, and the number of publications in the medical literature regarding the clinical utility of STE has been grown rapidly.[2][3] STE is based on frame-by-frame image tracking of tiny natural acoustic markers within the myocardium and subsequent measurement of LV deformation.[4] Assessment of strain by 2D STE is now present as a semiautomatic method in many ultrasound vendors and in off-line programs. Moreover, several previous reports have demonstrated the usefulness of STE-derived global longitudinal strain (GLS) as a novel echocardiographic methodology of cardiac function, which has been demonstrated as a prognostic value in the general population,[3] in patients with myocardial infarction,[5] and in heart failure patients with preserved and reduced LV ejection fraction (LVEF).[6]

However, in spite of long experience and confidential results, STE has not yet fully adopted in routine clinical practice, as the robustness of the method has been in doubt mainly due to insufficient reproducibility and vendor dependency of measurement itself.[7] In addition, the reason of variability of strain parameters are diverse which are influenced by patient (age, gender, race), hemodynamic (blood pressure, heart rate), and cardiac (LV chamber size, wall thickness) factors limits its usage in real practice. Hence, the routine use of myocardial strain in clinical practice essentially requires the definition of a normal range first. The article of Park et al.[8] in this issue of the Journal of Cardiovascular Ultrasound, tried to address these issues and to define STE based normal values for LV GLS in the Korean population by conducting a multicenter study of healthy volunteers. In this study, to minimize the vendor dependency and inter-observer variation of strain values, authors used acquired images from GE Medical Systems (Horten, Norway) only and analyzed the data in the Core lab by one researcher. The main results of this study can be summarized as follows: in total of 501 subjects, 1) normal reference values of LV GLS and strain rate was -20.4 ± 2.2% [95% confidence interval (CI) = -25.4–-16.7%], -1.21 ± 0.21^{-s} (95% CI = -1.59–-0.92^{-s}), respectively, and there was modest correlation between LVEF and GLS (r = -0.296, $p < 0.001$) or GLS rate (GLSR; r = -0.271, $p < 0.001$); 2) GLS and GLSR values were significantly more negative in women than in men; and 3) age was not significantly associated with LV myocardial deformation.

Until recently, there have been scarce studies reporting a comprehensive assessment of LV myocardial deformation in healthy Korean population, including data about the impact of age and sex on these parameters. In this study, Park et al.[8] reported the age- and sex-specific normal values of LV GLS and GLSR in Korean population which were similar to those of previous studies in other countries.[9][10] This study is quite meaningful because with these confidence results of reference values for GLS may expect to enhance the usage of strain in routine clinical practice in Korea. However, there are several limitations to be noted. First, the study included normal adults between 20 years and 80 years of age, there was no relationship between age and myocardial deformation. This results is quite controversial to previous studies that strain values, especially GLS, became less negative with aging.[11][12] One possible explanation may be that the relatively low number of elderly have enrolled compared to younger subjects. Second,

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the normal values might only limit to the vendor used in this study (GE Medical Systems). Additional studies will be needed by using other vendors, and comparative data between different vendors might provide further convergence of measurements and ultimately leverage the clinical application of this methodology. Third, authors only suggested the values of GLS in this study. There are many well-defined parameters in LV strain trace such as segmental, radial, or circumferential strains and this information might be wasted when using GLS as the only measurements.

Numerous previous reports have demonstrated that myocardial strain imaging provides unique diagnostic and prognostic information. In addition, Park et al.[8] clearly demonstrated the normal reference values of GLS using healthy volunteers in Korea and this meaningful measurements might be helpful for enhancing accessibility of STE based LV strain imaging. However, the strain imaging methodology is still undergoing development (such as 3D strain) and several issues need to be addressed before strain image can become a mainstream modality for assessment of global LV function. Moreover, prospective clinical trials should be warranted to investigate the added clinical value that clinical decisions based on LV strain imaging results in better outcome. In the meanwhile, we should keep in mind that strain imaging can be applied as a supplementary diagnostic method in routine practice.

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