Semi-Automated Assessment of Left Ventricular Volumes and Global Longitudinal Strain

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Background. Although left ventricular (LV) volumes and global longitudinal strain (GLS) are clinically important and recommended by the current echocardiographic chamber quantification guidelines, these measurements, especially strain, are not routinely performed. Consequently, in clinical practice, qualitative assessment of LV size and function is usually used instead. We tested a new approach for automated measurement of LV volumes and GLS using speckle tracking by comparing them to the conventional manual methodology. **Methods.** Transthoracic images were obtained in 30 patients with a wide range of LV volumes and ejection fraction (EF), and analyzed by an expert using conventional methodology to trace LV endocardial borders in 2-, 3- and 4-chamber views in order to obtain biplane end-diastolic and end-systolic volumes (EDV, ESV) and EF, and GLS by averaging measurements from all 3 views. Same parameters were obtained using the semi-automated software (Epsilon Imaging), which performs automated detection of the LV endocardial boundary in a single frame in the same 3 views, which is then automatically tracked throughout the cardiac cycle. Minimal editing was performed as necessary. In addition, 3 less experienced readers (first-year cardiology fellows) performed the same analyses and their measurements were compared to the experienced reader's. **Results.** Time required for the automated analysis with editing was approximately 1 minute per patient, compared to 2 minutes for conventional manual analysis. Parameters obtained with the semi-automated approach were in excellent agreement with the reference values: r-values 0.99 for biplane EDV, ESV and EF and 0.98 for GLS. The biases were -9.4±9.8ml, -7.0±9.6ml, 0.5±1.6% and 0.2±1.1%, respectively. The same parameters analyzed by the less experienced readers were also in excellent agreement with the experienced reader: r=0.89-0.97 for EDV, 0.89-0.98 for ESV, 0.91-0.98 for EF and 0.90-0.98 for GLS, with relatively small biases and narrow limits of agreement. **Conclusions.** The semi-automated technique is feasible, fast and provides quantitative parameters of LV volumes, EF and GLS, which are comparable to conventional measurements, even when performed by less experienced readers. This technique has the potential to facilitate the workflow in a busy echocardiography laboratory and allow routine use of LV volumes and GLS in the every-day practice.