Tissue Doppler, Speckle Tracking and Strain Imaging

Vendor-independent software shows limited variability in speckle tracking strain measurements on images of different vendors

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Background

Vendors use proprietary speckle tracking software algorithms for echocardiographic strain measurements, which results in high inter-vendor variability. Little is known about potential advantages or disadvantages of using vendor-independent software in clinical practice.

Purpose: We therefore investigated the reproducibility, accuracy, and ability to identify scar of strain measurements on images from different vendors by using a vendor-independent software.

Methods: A vendor-independent software (TomTec Image Arena) was used to analyze datasets of 63 patients which were obtained on four ultrasound machines from different vendors (GE, Philips, Siemens, Toshiba). We measured the tracking feasibility, inter-vendor bias, the relative and absolute test-re-test variability of strain measurements and their ability to detect scar. Cardiac magnetic resonance delayed enhancement images were used as the reference standard of scar definition.

Results: Tracking feasibility differed depending on the image source ($p < 0.05$). Variability of global longitudinal strain (GLS) (Figure 1A) was similar (ANOVA $p = 0.124$) among the images of different vendors whereas variability of segmental longitudinal strain (SLS) (Figure 1B) showed modest difference (ANOVA- peak systolic strain (PS); $p = 0.077$, end-systolic strain (ES); $p = 0.171$, post-systolic strain (PSS); $p = 0.020$). Relative test-re-test variability of GLS showed no differences (ANOVA $p = 0.360$). Absolute test-re-test errors of SLS measurements showed modest differences among images of different vendors (ANOVA- PS; $p = 0.018$, ES; $p = 0.001$, PSS; $p = 0.090$). No relevant difference in scar detection capability was observed (Figure 1C).

Conclusions: Vendor independent software leads to low bias among strain measurements on images from different vendors. Likewise, measurement variability and the ability to identify scar becomes similar. Our findings suggest that a vendor independent speckle tracking software could help to overcome inter-vendor bias. To which extend such measurements would be more accurate compared to vendor specific software remains to be determined.

Abstract Figure 1