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Speckle Tracking in small individuals – beware of the algorithm but not the insonation angle

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Objectives
In this study we aimed at validating the Speckle Tracking (ST) algorithm in small individuals by applying and analyzing ST (2Ch mode) from a single segment within the same animal with two different approaches for comparison of transverse strain and circumferential strain respectively.
Methods
Echocardiography (Vivid7, GE Vingmed) was performed in 14 pigs weighing less than 6kg. First, the region of interest (ROI) was chosen parallel to the septum in parasternal long axis view for analysis of transverse strain (ParaTrans) with extraction of transverse strain from the longitudinal algorithm, and then transversely within the same segment analyzing the transverse strain with the longitudinal algorithm (LongTrans). Then we addressed circumferential strain in the basal septum in short axis viewed from two perspectives (insonation angles) perpendicular to each other (epigastric and parasternal) analyzing circumferential strain with the longitudinal algorithm (EpiCirc), then perpendicular to the same segment (ParaCirc), analyzing circumferential strain with the longitudinal algorithm for comparison. Paired t-test (mean±SD), linear regression and Bland-Altman Plots (BAP) were performed.
Results
ParaTrans was significantly different from LongTrans (28.2±5.4% vs 32.6±9.9%, $p=0.04$), however significantly correlated ($R=0.7$, $p<0.05$) but with a significant bias in the BAP ($R=0.7$, $p<0.05$). EpiCirc and ParaCirc was not different, significantly correlated ($R=0.7$, $p<0.05$) and with no bias in the BAP.
Conclusion
This study demonstrates a weakness within the 2Ch ST algorithm. Transverse strain measured with the longitudinal algorithm showed significant lower values with a larger variance biased relative to the magnitude of strain, therefore not capable of assessing reliable values compared to the longitudinal algorithm applied in the same segment. It also demonstrates the ST algorithms capability in assessing strain reliably regardless of insonation angle and direction within the 2D image also in small individuals.