Evaluation of the reproducibility of two speckle tracking software for the antenatal semi-automated assessment of the fetal cardiac function

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Objective. Antenatal morphometric and functional evaluation of the fetal heart by means of speckle tracking technique can be performed using different software developed for the analysis of prenatally acquired ultrasound clips of the fetal heart. The objective of the study was to evaluate the reproducibility of two speckle tracking software in the antenatal semi-automated assessment of the fetal cardiac function and morphometry.

Materials and Methods. Prospective study conducted in two academic units in Italy (Parma) and Spain (Barcelona) including a non-consecutive series of non-anomalous fetuses. The evaluated speckle tracking software were TomTec-GmbH at the University of Parma and FetalHQ at the University of Barcelona.

At each participating unit, two-dimensional ultrasound clips of the four-chamber view of the fetal heart were acquired by dedicated operators. The morphometric and functional echocardiography analysis of the ultrasound clips was performed by two operators (ADT and LN), using the two proprietary software. The inter-software reproducibility of the endocardial global longitudinal strain (endoGLS) and fractional area change (FAC) of left (LV) and right ventricles (RV) and ejection fraction (EF) of LV was evaluated by the intraclass correlation coefficient (CC).

Results. 34 cases (9 from Parma and 25 from Barcelona) were included at a median gestation of 30 (22-40) weeks. Moderate-to-good reproducibility for the morphometric and functional parameters of LV was demonstrated (endoGLS 0.596, 95%CI 0.1016-0.664, $p < 0.01$; EF 0.757, 95%CI 0.513-0.879, $p < 0.01$; FAC 0.788, 95%CI 0.575-0.894, $p < 0.01$). Conversely, the morphometric and functional parameters of the RV showed no reproducibility between the two software (endoGLS 0.386, 95%CI -0.229-0.693, $p = 0.08$; FAC 0.357, 95%CI 0.357, 95%CI -0.288-0.679, $p = 0.11$).

Conclusions. This study demonstrates a fair reproducibility of the speckle tracking analysis of the morphometric and functional parameters of the LV but no inter-software reproducibility of the morphometric and functional parameters of the RV.