A novel approach for first-trimester uterine artery Doppler assessment: the transverse technique

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Objective
Low-dose aspirin started by the end of the first-trimester is recommended for women at high-risk of preeclampsia. Algorithms combining uterine artery (UtA) pulsatility index (PI) and other biomarkers in the first-trimester are highly effective in predicting such risk. First-trimester UtA-PI is usually measured using the sagittal approach, with moderate inter-observer reproducibility. We aimed to evaluate a novel approach for first-trimester UtA-PI measurement; the transverse technique.

Methods
We conducted a prospective observational study of 40 women with a singleton pregnancy between 11-13+6 weeks of gestation. Consecutive bilateral measurements of the ascending branch of the UtA-PI were performed using the 2 techniques (transverse and sagittal approach in random order) by 4 sonographers (10 cases each). The two techniques were compared for the measurement indices (PI), the time required for each measurement and the subjective difficulty to obtain a satisfactory measurement. One sample t-test and Wilcoxon rank sign test were used when appropriate. Bland–Altman difference plots were used to assess measurement agreement. The intra-class correlation (ICC) was used to evaluate the reliability of measurements. A target plot was used to assess measures of central tendency and dispersion.

Results
We observed no difference in the mean time to acquire the measurements (Sagittal: 118 seconds vs Transverse: 106 seconds, p=0.38). The 4 sonographers reported the transverse technique was subjectively easier to perform (p=0.04). The bias (95% LOA) between sagittal and transverse measurements was -0.0454 (-0.6273 to 0.5365) for the right, -0.0705 (-0.5742 to 0.4287) for the left, and -0.0534 (-0.4788 to 0.3719) for the mean UtA-PI. The intra-class correlation coefficient (ICC) was 0.8847, 0.9349 and 0.9366 for the right, left and mean UtA-PIs respectively. Measurements obtained using the transverse technique after correcting for gestation were significantly closer to the expected distribution than the sagittal technique.

Conclusion
This novel transverse approach for the measurement of UtA-PI in the first-trimester appears comparable to the sagittal approach and could potentially facilitate the broad implementation of first trimester preeclampsia screening.