Reproducibility of transabdominal and transvaginal Doppler flow of uterine arteries during the first trimester

Marchi L, Zwertbroek E, Snelder J, Kloosterman M, Bilardo CM
Academic Medical Center Gronigen, University of Groningen, Department of Obstetrics and Fetal Medicine Unit, Groningen, Netherlands, Groningen, Netherlands

Objective
To assess intra-observer repeatability (IAR), inter-observer reproducibility (IOR) and generalizability (general reliability) of 1st trimester Doppler measurements (pulsatility index-PI) of both uterine arteries (UtA) performed with 2 different ultrasound equipments trans-abdominally (TA) and trans-vaginally (TV).

Methods
First trimester (11-13+6 weeks’ gestation) TA and TV Doppler measurements of UtA were performed prospectively in 87 and 54 women, respectively. All examinations were performed blindly, by 3 FMF accredited operators and repeated twice. Operator A performed all measurements, operator B and C, who were less experienced, performed 21 and 53 measurements, respectively. To assess generalizability the measurements were performed with 2 different ultrasound systems: VolusonE8 (42 patients) and Aloka Alpha 6 (32 patients). IAR and IOR were assessed by Intraclass Correlation Coefficient (ICC) and Concordance Correlation Coefficient (CCC). Limits of Agreement (LoA) were calculated for the measurements of operator A. Correlations between BMI, time to get the first TA and TV measurement and repeatability were calculated by Pearson correlation coefficient.

Results
Mean age of the 87 women was 30±4 years, mean GA 12 ±4 days, mean BMI 24, 1 ±4, 2 kg/m2. Mean TA and TV PI were 1, 42 and 1, 45, respectively and mean PSV 86 and 95 cm/sec, respectively. Higher BMI required a significantly longer time to get the first TA measurement and had lower repeatability, but this was not the case for TV measurements. ICC, CCC for IAR were: 0. 95 and 0. 90 respectively (TV measurements) and 0. 9, 0. 81 for TA measurements. LoA for operator A were: 0. 56-0. 5 (TV measurements), 0, 53-0. 54 (TA measurements). ICC and CCC for IOR with operator B (the less experienced one) were: 0. 74 and 0. 58 respectively (TV measurements) and 0. 77, 0. 62 respectively for TA measurements. ICC and CCC for IOR with operator C were: 0. 88 and 0. 78 for TV measurements and 0. 81 and 0. 68 for TA measurements performed with Voluson E8 ; 0. 91 and 0. 82 (TV) and 0. 89 and 0. 80 (TA) for measurements performed with Aloka Alpha 6.

Conclusion
The IAR of Doppler measurements of UtA ranges from moderate (TA measurements) to substantial (TV measurements). The IOR is less satisfactory and is influenced by operator’s experience. More experienced operators have better performances, this is independent of the ultrasound equipment used.