

Can Point-of-Care Ultrasound be used to evaluate the cerebro-placental ratio in near-term pregnancies?

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Objective

The cerebroplacental ratio (CPR) is associated with perinatal mortality and morbidity, and its use has been suggested in uncomplicated pregnancies near term to identify those at higher risk for adverse outcomes. A limitation to its widespread use in the general population is the lack of ultrasound equipment specifically dedicated to antepartum clinics. Point-of-care ultrasound (POCUS) has emerged as an affordable, bedside tool that may help address this limitation. However, no comparative studies have been conducted between POCUS and conventional ultrasound devices in the evaluation of CPR. Our aim was to assess the level of agreement between these two devices in evaluating CPR.

Methods

In a prospective cross-sectional study, we examined singleton pregnancies between 36 and 38 weeks. Two observers performed transabdominal Doppler recordings in a randomized sequence, each blinded to the other's results. The recordings were made using either a handheld ultrasound device (POCUS, Q7, Esaote, Genova, Italy) (Figure 1) or a conventional ultrasound system (My Lab Omega, Esaote, Genova, Italy). Doppler waveforms were obtained in the absence of fetal movements and during maternal apnea . Doppler waveforms were measured automatically from three or more consecutively similar waveforms, with the insonation angle as close to 0° as possible. The umbilical artery pulsatility index (UA PI) was measured using a free-floating cord loop, while the middle cerebral artery pulsatility index (MCA PI) was measured in a transverse view of the fetal head at the level of its origin from the circle of Willis. The two PI values were used to derive the cerebroplacental ratio (CPR). A third obstetrician assessed the quality of the ultrasound images, assigning a score from 0 to 3 for both image quality (IQS) and measurement quality (MQS).

Results

Seventy women participated in the study. The intraclass correlation coefficients between the two devices were 0.91 (95% CI: 0.87–0.98) for UA PI, 0.86 (95% CI: 0.83–0.92) for MCA PI, and 0.89 (95% CI: 0.84–0.95) for CPR. When comparing conventional ultrasound with POCUS, there were no significant differences in image quality scores for UA PI (2.53 vs. 2.49, p =0.506) or MCA PI (2.47 vs. 2.35, p = 0.136). Likewise, the measurement quality scores were similar for UA PI (2.68 vs. 2.55, p = 0.107) and MCA PI (2.45 vs. 2.20, p = 0.112) (Figure 2).

Conclusions

We observed excellent repeatability, with no significant differences in image quality between POCUS and conventional devices for measuring CPR.

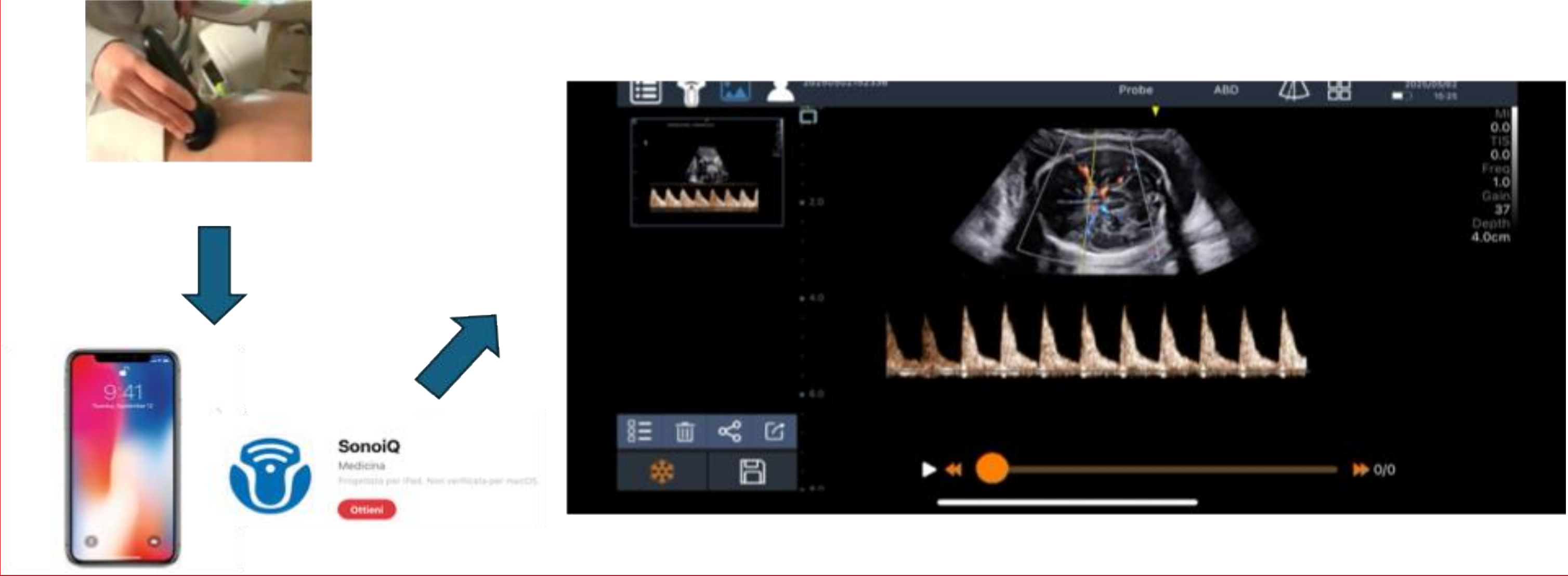


Figure 1: Example of POCUS recording

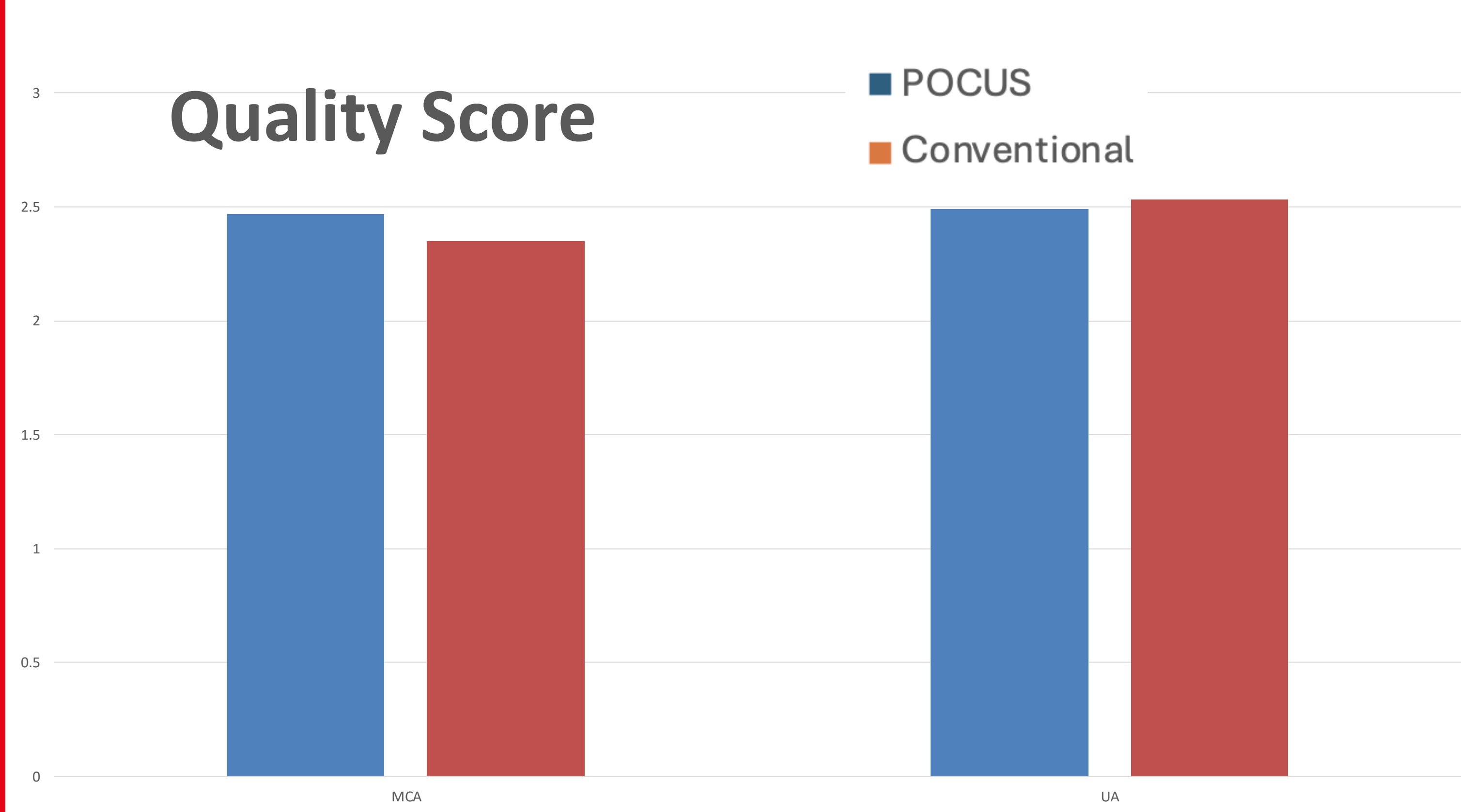


Figure 2: Comparison of conventional and POCUS recordings