Is the site of measure of umbilical artery flow important?

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Introduction
Resistance Index (RI) and pulsatility Index (PI) in the umbilical arteries are the main elements evaluating fetus' hemodynamics, with a proven impact on the prognosis (Alfirevic Cochrane 2017). There are 3 different sites to measure the umbilical waveform: the free loop and the placental and abdominal insertions. However, few studies that evaluated fetal hemodynamic and fetal outcome mentioned precisely the site of measure.

Objective
The aim of this study was to compare the value of RI and PI in the placental and abdominal insertions and between the two arteries at each site, in eutrophic and growth restricted fetuses.

Methods
We included singleton pregnancies. Cases of single umbilical arteries were excluded. For each fetus, RI and PI were measured in both arteries at the two sites. Comparison was performed using the student's t-test. Growth restriction was defined as an estimated fetal weight under the 10th percentile (CFEF 2015).

Results
We included 77 eutrophic fetuses and 16 growth restricted fetuses, between 18 and 40 WG. The mean RI was significantly different in the two arteries located at the abdominal site compared to the placental insertion, with a higher resistance at the abdominal site (0.718 vs 0.644 respectively; Δ =0.0741 (IC95[0.057;0.091]). No statistical difference was demonstrated between the two arteries at each insertion (Δ <0.01). Eutrophic fetuses had RI value > 95th centile in 33.7% (n=26) of cases at abdominal insertion, versus 2.6% (n=2) at placental insertion. Results were similar for PI values and for the group of the growth restricted fetuses.

Conclusion
We demonstrated a significant difference for PI and RI between the two ends of the umbilical cord. This can have an impact on the cerebroplacental ratio.

We recommend that further studies on this subject should specify which end of the umbilical cord is evaluated especially in studies that evaluate cerebroplacental ratio in growth restricted fetuses.