

Umbilical vein flow reduction and its association with adverse perinatal outcomes

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Objective

To evaluate the relationship between the umbilical vein flow (UVF) flow measured close to term and adverse perinatal outcomes (APO) in uncomplicated singleton term pregnancies.

Methods

Prospective multicentre observational study conducted across two tertiary Maternity Units between January 2021 and December 2022. Patients with a singleton fetus between 35-38 weeks of gestation were included. At US examination, the abdominal circumference (AC), UV diameter and peak velocity of the UV were measured, and from these variables, the UVF and the UVF/AC were calculated. The primary outcome of the study was the occurrence of composite APO, defined as one of the following: acidosis (umbilical artery pH<7.15 and/or base excess > 12) at birth and/or 5-min Apgar score <7 and/or neonatal reanimation and/or neonatal intensive care unit (NICU) admission.

Results

Overall, 322 fetuses were included, of whom 23 (10.2%) were affected by the composite APO. In our population, the median value of the UVF/AC was 0.64 (IQR 0.47 – 0.78) ml/mm/mm. Moreover, there were 275/322 (85.4%) spontaneous deliveries, 23/322 (7.1%) operative vaginal delivery and 24/322 (7.5%) caesarean section. Fetuses affected by the composite APO had a lower median value of the UVF/AC (0.57(IQR 0.41-0.68) vs 0.65 (IQR 0.48-0.81); P=0.03). At multivariable logistic regression analysis, the UVF/AC (aOR 0.55, 95% CI 0.33 – 0.91, p=0.02) was independently associated with the composite APO. Subsequently, we divided our population into 4 subgroups (less than 10 percentile, 10 -50 percentile, 51-90 percentile and greater than 90 percentile). Fetuses at the lowest UVF/AC percentiles were significantly more at risk of composite APO than those with higher UVF/AC (17.8% vs 11.9% vs 5.6% vs 0.0%).

Conclusion

Our results suggest an association between low values of UVF with an increased incidence of APO in low-risk fetuses at term. This might result in a better risk-stratification of pregnancies before labor.