Fetal distress in labor: fetal middle cerebral artery Doppler at term
Fondazione Ca' Granda, Ospedale Maggiore Policlinico, Milan, Italy

Objective
To evaluate whether fetal middle cerebral artery pulsatility index (MCA PI) and cerebro-placental ratio (CPR) were associated with the rate of emergency delivery for fetal distress during labor in normal fetuses at term of pregnancy.

Methods
Prospective cohort (October 2014-December 2015) of singleton pregnancies with an estimated fetal weight above the 10th centile at routine third trimester ultrasound underwent a scan for the assessment of fetal MCA PI and umbilical artery PI in the context of the 40 weeks’ visit. Three measurements were undertaken for each vessel and the means of the three values were used for statistical analysis. In all cases, Doppler assessment was carried out within 7 days of delivery. Doctors who attended deliveries were blinded from Doppler results. The relationship between Doppler measurements and the risk of emergency delivery for non-reassuring fetal status was analyzed by logistic regression, and the performance of the model was determined by receiver operating characteristic curve analysis.

Results
A total of 403 pregnancies fulfilled the selection criteria. During labor, 75 fetuses (18.6%) showed signs of fetal distress on cardio-tocographic monitoring and were delivered by emergency cesarean section (n=57, 76%) or operative vaginal procedure (n=18, 24%). Compared with the 328 fetuses undergoing a normal vaginal delivery, the 75 fetuses requiring emergency delivery had a significantly lower mean MCA PI (1.30 vs. 1.16, respectively; p<0.001) and mean CPR (1.78 vs 1.61, respectively; p=0.001) at the time of the 40 weeks’ examination. Multivariate analysis showed that a significant contribution to the need for emergency delivery for fetal distress was only provided by mean MCA PI (p=<0.001). The area under the curve (AUC) was 0.695 [95%CI: 0.621-0.770]) and, for false positive rates of 20% and 30%, the detection rates were 49.3% and 62.7%, respectively.

Conclusion
In normal term fetuses, a low MCA PI is associated with an increased risk of emergency delivery for fetal distress during labor.