

## Use of fetal middle cerebral artery Doppler in predicting hypertrophic cardiomyopathy

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### Objective

The main objective of the study was to evaluate the relation between fetal peak systolic velocity of the middle cerebral artery (MCA-PSV) and the development of neonatal hypertrophic cardiomyopathy (HCM) in pregnant women with gestational or pregestational diabetes. As a secondary objective, we wanted to assess other ultrasound markers that could be related to neonatal HCM in diabetic women.

### Methods

We conducted an observational, unicentric, retrospective study during the period April 2022-April 2023. Participants were classified in two cohorts: the first one included women with gestational or pregestational diabetes. The other one contained pregnant women without diabetes, selected in a random way. In both cohorts fetal ultrasound exam including fetal echocardiography was performed between 32 and 36 weeks of gestation. The main variables of the study are the fetal MCA-PSV and the presence of HCM in the newborn. Estimated fetal weight (EFW), fetal subcutaneous fat thickness (SFT) of the abdominal wall, fetal interventricular septum thickness (IST), amount of amniotic fluid and fetal Doppler study of the umbilical and middle cerebral artery were assessed by ultrasound scan. Neonatal weight, data from labor and neonatal outcomes such as hypoglycemia and Intensive Care Unit (ICU) admission were collected at birth. Demographic data such as age, body mass index (BMI), obstetric and personal history like the type of diabetes, hypertension and levels of glycated haemoglobin were also collected. A statistical descriptive and comparative analysis between the two cohorts was made.

### Results

The study included a sample of N=63 pregnant women. Mean maternal age was 34 years old and mean BMI was 28Kg/m<sup>2</sup>. 25% of the women were nulliparous. Induction of labor rate was 69% and in 25% of cases the delivery was by caesarean section. The prevalence of neonatal macrosomia was 17%. The cohort of diabetic women (75%), included 28 women with gestational diabetes and 18 with pregestational diabetes. Four cases of neonatal HCM (7%) were observed, all of them in the diabetic women group. When comparing both cohorts, statistical differences were found in the induction of labor rate (86% vs 40%), BMI (29 Kg/m<sup>2</sup> vs 25 Kg/m<sup>2</sup>), fetal IST (4,7mm vs 4mm), fetal SFT (5,3mm vs 4mm), EFW percentile (76 vs 59) and fetal MCA-PSV (56cm/s vs 48cm/s) between diabetic and non diabetic women, respectively. When comparing the subgroup of gestational vs pregestational diabetes statistical differences were only observed in the EFW percentile that was higher in the pregestational group. MCA-PSV was significantly higher in newborns that developed HCM compared to those fetuses that did not develop it (66cm/s vs 55cm/s, p=0.045) in diabetic patients. Fetal IVS was also significantly higher in this neonatal HCM group (5,4mm vs 4,6mm). On the contrary, differences in subcutaneous fat thickness were not found between HCM and non-HCM groups.

### Conclusion

According to the study, the ultrasound measurement of fetal MCA-PSV and fetal intraventricular septum thickness at 32-36 weeks of gestation could be useful to predict which fetuses are at higher risk of developing hypertrophic cardiomyopathy.