

## **Fetal aortic intima-media thickness measurement as a second-trimester predictor of preeclampsia**

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### **Objective**

The objective was to assess if fetal aortic intima-media thickness (aIMT) measurement can help predict preeclampsia in patients with pregestational diabetes (PGDM). The study's second aim was to examine if intima-media thickening occurs before maternal-fetal Doppler ultrasound examination abnormalities.

### **Methods**

We conducted a nested-case control study recruiting eighty-one patients in a singleton pregnancy with pregestational diabetes (PGDM). All women we divided into the preeclampsia group (n=18) and controls (n=63) based on the pregnancy outcome. We perform ultrasound scans during regular visits in pregnant patients complicated by pregestational diabetes at the 26<sup>th</sup>-28<sup>th</sup>, 32<sup>nd</sup>-34<sup>th</sup>, and around the 38<sup>th</sup> week of gestation. All measurements of aIMT we obtained in the fetal aorta in coronal view between renal and iliac arteries. Each measurement was triple-checked in different artery areas within one image, and the arithmetic mean was calculated. Intra-observer bias did not exist because a single sonographer obtained all measurements. In the next step, we assessed Doppler velocimetry of the umbilical artery (UmA), medial cerebral artery (MCA), and uterine artery on both arteries. Ultrasound software automatically calculated PI in UmA, MCA, and the mean PI in uterine arteries. We performed anthropometric measurements (height, weight, and BMI) and blood pressure measurements at the onset of the study. All patients used aspirin (150mg daily) as a preeclampsia prophylaxis. We stored all measurements in our clinical database.

### **Results**

With the aIMT measurements, we created a ROC curve with AUC [95% CI] = 0.83 [0.58,1], and a cut-off point for increased risk of preeclampsia at aIMT $\geq$ 0.56mm. For patients with increased aIMT, the risk of developing preeclampsia is over six times higher OR[95%CI]=6.56 [1.98, 21.76]. It remains at this level after adjusting to maternal age, smoking, BMI, type of diabetes, parity, and abnormalities found in Doppler ultrasound. The thickness of fetal aortic intima-media is not significantly different if measured in the 26<sup>th</sup>-28<sup>th</sup> or 32<sup>nd</sup>-34<sup>th</sup> gestational week (p=0.83).

### **Conclusion**

The thickening of the intima-media complex is a form of subclinical vascular adaptation to increased placental resistance and can be observed before abnormalities in routine Doppler scans. Secondly, aIMT can be thicker due to exposure to hyperglycemia that induces local inflammation and the creation of reactive oxygen species. The two mechanisms can simultaneously lead to thickening aIMT and increase the risk of preeclampsia. Therefore, we see the potential usefulness of aIMT measurements as a second-trimester predictor of preeclampsia in PGDM patients at higher risk of developing hypertensive disorder of pregnancy.