ENDOGENOUS THROMBIN POTENTIAL RATIO AS A PREDICTOR OF BIRTHWEIGHT PERCENTILE IN PREGNANCY

G. Tiscia[1], F. Cappucci[1], A. de Laurenzo[1], M.P. Palumbo[1], D. Colaizzo[1], E. Grandone[1|2]

[1]IRCCS Casa Sollievo della Sofferenza, Italy; [2]Università degli Studi di Foggia, Italy

Background. Early identification of pregnancies at risk for placental-mediated adverse outcomes remains challenging, particularly in women with prior obstetric complications, such as small-for-gestational-age (SGA) newborns. Subtle hemostatic alterations in these settings may escape detection by conventional coagulation tests. The thrombin generation assay (TGA) provides an integrated measure of procoagulant–anticoagulant balance and may better reflect coagulation changes related to placental dysfunction.

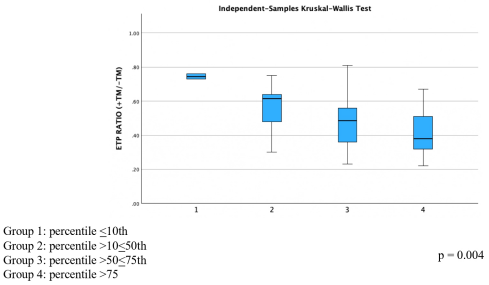
Aims. The primary aim was to compare first-trimester thrombin generation parameters in women at increased obstetric risk with those of healthy pregnant controls. The secondary aim was to evaluate the association between first-trimester thrombin generation and birthweight percentile at delivery.

Methods. In this prospective observational study, women were enrolled at 5–14 weeks' gestation and followed to delivery. Thirty-one women at increased obstetric risk (history of pregnancy loss or intrauterine fetal death, implantation failure, or previous SGA newborn) were compared with 21 gestational age–matched healthy controls. Twelve cases received prophylactic enoxaparin (4000 IU/day), with sampling ≥12 hours after the last dose. TGA was assessed on platelet-poor plasma using the calibrated automated thrombogram with PPP reagent, with and without thrombomodulin, analyzing peak thrombin, time-to-peak, endogenous thrombin potential (ETP), and ETP ratio

Results. Baseline characteristics were comparable between groups, including age (33.2 ± 4.9 vs 32.2 ± 4.7 years) and body mass index (24.3 ± 4.3 vs 26.1 ± 5.9 kg/m²), as well as parity, mode of delivery, and neonatal sex. First-trimester thrombin generation parameters did not differ significantly between cases and controls. Mean birthweight was lower in cases than controls (3150 ± 640 g vs 3400 ± 398 g), although not statistically significant. Notably, 10 cases delivered neonates with birthweight <10th percentile, compared with none among controls (p = 0.008). Across the whole cohort, the first-trimester ETP ratio was significantly associated with birthweight percentile. Lower ETP ratios were observed in pregnancies with birthweight <10th percentile compared with ≥10th percentile (0.46 ± 0.14 vs 0.53 ± 0.20), with a progressive increase across higher percentiles (Kruskal–Wallis, p = 0.004) (Figure 1). Enoxaparin use did not modify this association.

Conclusions. First-trimester ETP ratio was associated with fetal growth, supporting the potential role of early global coagulation assessment in identifying pregnancies at risk of SGA neonates.

Figure 1. Inverse relationship between ETP ratio and birthweight percentile



Group 1: percentile ≤10th
Group 2: percentile >10≤50th
Group 3: percentile >50≤75th
Group 4: percentile >75

p = 0.004