

Non-invasive maternal hemodynamic assessment to classify high-risk pregnancies complicated by fetal growth restriction

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Objective. To verify whether the use of the temporal criterion of 32 weeks' gestation is effective in identifying maternal hemodynamic differences between early- and late-onset fetal growth restriction (FGR), and to test the statistical performance of a classificatory algorithm for FGR.

Materials and Methods. A prospective multicenter study including singleton pregnancies with a diagnosis of FGR based on the international Delphi survey consensus was conducted. Hemodynamic assessment was performed by USCOM-1A. Comparisons between early- and late-onset FGR, FGR associated with hypertensive disorders of pregnancy (HDP-FGR), and isolated FGR (i-FGR) were performed. Finally, a classificatory analysis based on the Random Forest model was performed to identify variables with the ability to differentiate FGR phenotypes.

Results. During the study period, 146 pregnant women fulfilled the inclusion criteria. In 49 (48.1%) women, FGR was

associated with HDP. Fifty-nine (57.8%) cases were classified as early-onset. Comparison of the maternal hemodynamics between early- and late-onset FGR did not show any difference. Similarly, non-significant findings were observed in sensitivity analyses performed for HDP-FGR and for i-FGR. In turn, comparison between pregnant women with FGR and hypertension and women with i-FGR, independently of the gestational age at FGR diagnosis, revealed substantial differences, with the former showing higher vascular peripheral resistances and lower cardiac output. The classificatory analysis identified both phenotypic and hemodynamic variables as relevant in distinguishing HDP-FGR from i-FGR ($p = 0.009$).

Conclusions. Our data show that HDP, rather than gestational age at FGR diagnosis, allows us to appreciate specific maternal hemodynamic patterns and to accurately distinguish two different FGR phenotypes.