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Hypertensive crisis: cardiovascular resistance index for prediction of labetalol response

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Objective

To determine the role of hemodynamic and biophysical markers as predictors of treatment failure with beta-blocker drugs in pregnant women with hypertensive crisis.

Methods

Prospective cohort study of singleton pregnancies with hypertensive crisis at admission or during hospitalization. Maternal heart rate (HR), systolic (SBP) and diastolic blood pressure (DBP) were obtained before using intravascular labetalol. Uterine artery Doppler pulsatility index (UtA-PI) were measured when possible. Cardiovascular resistance index (CVRI) was estimated as SBP/HR. Non-responders to labetalol were considered if maximum dose was reached (220 mg) or a C-section for fetal distress during treatment was performed. A Hyperdynamic profile was considered if: HR > 90 bpm, UtA-PI < 90^{th} percentile and EFW > 10^{th} percentile. High resistance profile was considered if: UtA-PI > 90^{th} percentile or EFW < 10^{th} percentile or HR < 90 bpm. Responders and non-responders were compared with Mann-Whitney and chi2 tests. Time-to-response between Hyperdynamic and High resistance profiles was compared with Cox regression and Kaplan-Meier curves. Finally, a multivariate logistic regression analysis was performed to determine factors related with therapeutic failure with beta-blocker.

Results

There were 44 pregnancies included, 57% (n=25) were non-responders to labetalol. Responders showed a higher rate of Hyperdynamic profile compared to non-responders (26% vs. 4 %; p=0.03). Non-responders showed a higher CVRI than responders (2.27 [2.03-2.48] vs. 1.90 [1.47-2.14]; p=0.002), reflecting a higher SBP and lower HR. Time-to-response was significantly shorter in Hyperdynamic than High resistance profile (p<0.05). Multivariate analysis determine that a lower gestational age, higher SBP and lower HR were the best predictors of non-response to labetalol (S= 63%; F(+)= 5%; AUC= 0.87; LHR(+)= 11.9).

Conclusion

Pregnant women with hypertensive crisis not responding to labetalol were associated with a higher cardiovascular resistance index and a lower gestational age. The identification of hemodynamic profiles seems to be determinant to establish personalized management in pregnant women with severe hypertension.