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Are Microvolt T-Wave Alternans and Doppler Echocardiography Useful Methods for the Effect of Hypothermia and Rewarming on Myocardial Dysfunction in Neonates with Hypoxic-Ischemic Encephalopathy?

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Introduction: Hypoxic-ischemic encephalopathy (HIE) due to perinatal asphyxia is an important cause of newborn mortality and disability. Myocardial dysfunction is a crucial factor for the prognosis which is developed by the myocardial cell damage due to the hypoxia. This is the first study which aims to evaluate predictive value of myocardial performance on arrhythmia and mortality in hypoxic infants via tissue Doppler and the microvolt T-wave alternans (MTWA) with therapeutic hypothermia and rewarming.
Methods: The study included 23 term newborns having the diagnostic criteria for HIE and scored using Sarnat staging as well as age and gender matched 12 healthy as control. To assess myocardial involvement, pulse and tissue Doppler echocardiography and MTWA were performed in the first six hours after birth, and after hypothermia and rewarming treatment on the fifth day of life.
Results: Comparing with the controls, the basal MTWA values were significantly higher in newborns with moderate and severe HIE in lead aVF (87.39±8.63, 73.50±27.43, $p<0.001$, respectively). The values in lead aVF were correlated with the existing acidemia ($r=0,517$ $p=0,012$). Moreover; when basal MTWA values compared with the post hypothermic and rewarming lead V1 (82.74±13.71, 56.05±18.95, $p<0.001$, respectively) and aVF (87.39±8.63, 59.24±22.48, $p<0.001$, respectively) values, the former was found out to be decreased significantly. Right Ventricle Diastolic Diameter and estimated Systolic Pulmonary Artery Pressure in HIE newborns in the first 6 hours found out to be higher significantly compared with the controls ($p=0,03$, $p<0,001$, respectively). Although there was no degradation in ejection fraction of the patients, the basal values of left and right ventricular systolic and diastolic functions in tissue Doppler measurements were lower comparing with the controls initially which raised significantly after treatment.
Conclusion: The cardiac functions of the newborns with HIE are effected negatively related with the severity of the acidemia. However; it was observed that via MTWA and tissue Doppler measurements, the myocardial dysfunction can be cured with therapeutic hypothermia. Thus, MTWA and tissue Doppler measurements can be used as a marker of myocardial dysfunction for the prognosis of newborns with HIE for further studies.