

Early Dynamic Changes in Pulse Oximetry Signals in Preterm Newborns with Histologic Chorioamnionitis.

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Objective

No reliable clinical markers of histologic chorioamnionitis (HCA), a major and often subclinical cause of prematurity leading to high neonatal morbidity and mortality, are available to date. Increasing evidence indicates myocardial dysfunctions in affected fetuses and newborns. We sought to assess the value of nonlinear dynamics from pulse oximetry signals in identifying affected newborns.

Methods

Design: Prospective case-control study. *Setting:* Tertiary level neonatal intensive care unit, Brindisi Hospital. *Patients and intervention:* Pulse oximetry-derived signals (pulse rate, oxygen saturation, and perfusion index), recorded within the first 1.5 hrs of life, were analyzed for 110 very low-birth-weight infants, of whom 54 had histopathological evidence of HCA.

Results

Four different time series parameters were determined for nonlinear dynamical (NLD) analysis. Significantly decreased Lempel-Ziv, Lyapunov largest exponent, and correlation dimension, with significantly increased Hurst values for heart rate and perfusion index ($p < .00001$), were observed in newborns with HCA. Heart rate Lempel-Ziv ≤ 0.218 showed 100% sensitivity (95% confidence interval, 98.8-100) and 100% specificity (95% confidence interval, 98.6-100) in distinguishing cases from controls, with positive and negative predictive values of 100% and 95.7%, respectively.

Conclusions

Our findings indicate that early autonomic tone balance abnormalities are present in newborns with HCA and suggest that early dynamic analysis of pulse oximetry signals could be useful in identifying affected infants.