Predictive value of fetal scalp blood lactate concentration and pH as markers of neurologic disability.

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Abstract

OBJECTIVES: We aimed to analyze the predictive value of the fetal scalp blood lactate concentration and pH, especially in regard to outcome variables that are strong predictors of impaired long-term outcome. An additional aim was to establish cutoff lactate levels in fetal scalp blood.

STUDY DESIGN: We conducted a retrospective study of all patients who had fetal scalp blood sampling performed because of an ominous fetal heart rate pattern at Huddinge University Hospital from October 1993 to October 1998. Fetal scalp blood sampling was performed in 1709 patients. The pH and the lactate concentration were determined in fetal scalp blood of 1221 and 814 of these patients, respectively. Outcome variables included pH <7.0 in umbilical artery blood; base deficit >16.0 mmol/L in umbilical artery blood; Apgar scores <7 at 1 minute, <7 at 5 minutes, and <4 at 5 minutes; and hypoxic-ischemic encephalopathy.

RESULTS: Sensitivity and specificity were generally higher in the lactate group than in the pH group, particularly in relation to an Apgar score <4 at 5 minutes and moderate to severe hypoxic-ischemic encephalopathy. In 326 patients the scalp blood lactate concentration and pH value had been obtained at the same time, thus allowing a comparison between these methods. The areas under the receiver operating characteristic curves were significantly higher for the lactate concentration than for the pH value with 2 outcome variables: Apgar score <4 at 5 minutes (P =.033) and moderate to severe hypoxic-ischemic encephalopathy (P =.015).

CONCLUSIONS: Our findings suggest that determination of the lactate concentration in fetal scalp blood is a more sensitive diagnostic tool than is determination of the pH value for predicting either an Apgar score <4 at 5 minutes or moderate to severe hypoxic-ischemic encephalopathy. In previous studies we also showed lactate measurements to be more often successful than pH analysis. Therefore we consider the measurement of lactate in fetal scalp blood to be an attractive alternative to pH analysis, and determination of the lactate concentration in fetal scalp blood seems to be a useful tool for monitoring the condition of the fetus. A suitable cutoff limit for fetal scalp blood lactate concentration as an indicator of fetal asphyxia could be 4.8 mmol/L.