ST-segment analysis of the fetal electrocardiogram improves fetal heart rate tracing interpretation and clinical decision making.

Ross MG, Devoe LD, Rosen KG.

Department of Obstetrics and Gynecology, Harbor-UCLA Research and Education Institute, Torrance, California 90501, USA.

INTRODUCTION: Since its introduction into clinical use, the efficacy of electronic fetal heart rate (FHR) monitoring (EFM) has been questionable. This has been due partly to the marked variation in interpretation of the FHR pattern and subsequent decisions for obstetric intervention, (e.g., the need for prompt delivery). Current application of EFM is limited to the assessment of FHR patterns and uterine contractions. Recent development of higher-order FHR analysis has yielded monitoring systems that can add automated fetal electrocardiographic ST segment analysis to the standard FHR and uterine contraction information. Our goal was to evaluate the effect of adding ST segment analysis to standard FHR information on observer agreement for clinical decision making.

METHODS: Seven practitioners who were trained and experienced in combined FHR and ST monitoring reviewed 51 fetal monitor tracings, ranging from 2 to 4 h in length. Reviews were conducted in two sessions and at different times. The first session presented only the FHR and uterine contraction information, following which the participants determined the time at which intervention (decision for operative vaginal or Cesarean section delivery) was indicated. In the second session, the participants were provided with a randomized sequence of the same tracings with the addition of ST segment information, as produced by the STAN monitor system (Neoventa Medical, Gothenburg, Sweden). Observer agreement was based on the proportion of participants who agreed on the need for an intervention, and the per cent agreement on the timing of the intervention within 20 min before or after the median time of intervention.

RESULTS: Of the 51 cases included in this study there were ten fetuses with umbilical artery (UA) pH between 7.05 and 7.14, and nine with UA pH of < 7.05. Observer agreement increased significantly for required intervention when the ST segment information was available for tracing analysis as compared with review of the standard tracing alone (0.96 vs. 0.80, $p < 0.05$) and the timing of intervention (0.92 vs. 0.66, respectively, $p < 0.05$). Similarly, correct identification for needed interventions on fetuses with abnormal outcomes increased from 86 to 93% while unneeded interventions on normal fetuses decreased from 43 to 6%.

CONCLUSION: The addition of ST analysis to standard FHR monitoring improves observer consistency in both the decision for and timing of obstetric interventions. The incorporation of ST segment data with the standard FHR tracing may reduce the number of unneeded obstetric interventions when fetal compromise is absent.