RESEARCH ARTICLE

Observation on validity of the five-tier system for fetal heart rate pattern interpretation proposed by Japan Society of Obstetricians and Gynecologists

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Objective: To evaluate the five-tier classification of fetal heart rate (FHR) tracings recently proposed by Japan Society of Obstetricians and Gynecologists (JSOG). Methods: The database between January and June 2009 was reviewed for women in active labor at ≥36 + 0 gestational weeks, with singleton fetuses in cephalic presentation and with umbilical artery blood gas analyses. Continuous FHR tracings were assessed according to the five-tier classification proposed by JSOG, where level 1 is normal, level 2 is subnormal and levels 3–5 are abnormal patterns. Results: A total of 341 parturient women were eligible for this study protocol. The median (range) of the levels in the first and the second stage of labor were 1 (1–4) and 2 (1–4), respectively (p < 0.001). Both pH and base excess of umbilical artery decreased with higher levels of FHR tracings interpretation (p < 0.01). Interventions resulting in delivery were more necessary in the first stage of labor than in the second stage of labor in cases of levels 3 and more. Conclusions: Five-tier system for FHR tracing interpretation proposed by JSOG intercorrelates with the fetal acid–base balance well. Categorization of FHR tracings by uniform diagnostic criteria will be useful to standardize therapeutic strategy by sharing common perception among obstetrical staff.

Keywords: Five-tier classification, fetal heart rate tracing, acid–base balance, intervention, inter-observer agreement

Introduction
Continuous intrapartum electronic fetal heart rate (FHR) monitoring was introduced in the 1960s in an attempt to provide a screening test to predict the development of asphyxia in the fetus, with subsequent hypoxic ischemic encephalopathy, long-term neurologic damage and even fetal death. Evaluation of changes in FHR patterns was expected to identify fetuses at risk for asphyxia and allow early and appropriate intervention before the development of intrapartum asphyxia. However, these goals and ideals have not been universally attained. Rates of cerebral palsy have not been decreased despite the widespread use of electronic FHR monitoring [1–4]. Although specific abnormal findings on electronic FHR monitoring were associated with an increased risk of cerebral palsy, the false positive rate was extremely high [5]. Additionally, unnecessary interventions with spiraling incidences of cesarean delivery for fetal distress and dystocia, and operative deliveries due to an increase in defensive obstetric practice have been associated with electronic FHR monitoring [4,6].

One of the issues of FHR monitoring has been its ambiguity of definitions. To resolve the matter, new definitions were proposed for clinical use and a new interpretative system using three tiers was recommended in the workshop sponsored by National Institute of Health, the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine [7]. The three-tier system consists of Category I including the normal tracings, Category II including indeterminate tracings that fit in neither Category I nor III and Category III including the abnormal tracings. The system reached an agreement due to simplicity and ease of teaching [8], although Category II covers too broad area to develop a clear policy of management for obstetricians, midwives or nurses. In Japan, after studying the ACOG publication, no consistent policy of management emerged, and many obstetricians continued to interpret FHR patterns by their own criteria. Because of this, Japan Society of Obstetricians and Gynecologists (JSOG) recently proposed a guideline for intrapartum management based on FHR tracing interpretation to standardize clinical decisions more specifically [9]. It is a five-tier coding system on the basis of baseline rate, type of decelerations, and duration of variable (Table 1), similar to the five-tier classification proposed by Parer and Ikeda [10]. The intent of JSOG was to subsequently determine its effectiveness and utility under actual clinical conditions.

The aims of this study were to (1) clarify whether each level of the JSOG five-tier system is associated with fetal acid–base balance, (2) elucidate whether the grading makes a difference between the first and the second stage of labor regarding the intervention of delivery and (3) examine the inter-agreement in assessment of the grading of FHR tracings.

Materials and methods

Study subjects
A review of labor and delivery records from 1 January 2009 to 30 June 2009 at Japanese Red Cross Nagoya Daiichi Hospital was conducted. The hospital is a tertiary referral center with about 1400 deliveries per year. Women in active labor at ≥36 gestational weeks, with singleton fetuses in cephalic presentation, were included in this study. When sampling for umbilical artery blood gas and acid-base balance analysis was not performed or selective cesarean sections (CS) were performed, the cases were excluded. This study was approved by the Institutional Ethical Committee of Japanese Red Cross Nagoya Daiichi Hospital.

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