Educational Topic 26:
Intrapartum Fetal Surveillance

Rationale: Intrapartum fetal monitoring helps evaluate fetal well-being.

Intended Learning Outcomes:

A student should be able to:

- Describe the techniques of fetal surveillance
- Interpret intrapartum electronic fetal heart rate monitoring

TEACHING CASE

CASE: A 27 year-old G3P2 woman at 39 weeks gestation is admitted to the labor and delivery unit in early labor. She has had an uncomplicated pregnancy similar to her other two pregnancies, both of which delivered vaginally. Her last labor was 4 hours in length, and the infant's birth weight was 3900 grams after an uncomplicated delivery.

At the time of admission, her physical examination reveals a healthy appearing woman in moderate distress with contractions every 4-6 minutes, described as 7 on a pain scale of 1-10, with 10 being most severe. Her weight is 165 pounds, blood pressure is 135/82, and fundal height is 37 cm. The estimated fetal weight is around 4000 grams, the fetus is in the vertex presentation and her pelvic examination reveals a gynecoid pelvis with cervix dilated to 5cm/80% effacement/-1 station. Fetal heart rate is noted to be 120 beats per minute when the external monitor is applied.

This patient appears to be having a normal labor at term. The fetal heart rate is normal and the fetus is having accelerations of the fetal heart rate, also a reassuring finding. You determine she has a "category 1" tracing. Her contraction pattern appears normal, and we should expect a vaginal delivery in the next few hours.
Two hours later, the nurse calls you to the labor suite to review the fetal heart tracing below. She expresses concern about the changed appearance of the fetal heart tracing and asks for your opinion.

COMPETENCY-BASED DISCUSSION & KEY TEACHING POINTS:
Competencies addressed:
- Patient Care
- Medical Knowledge
- Systems-Based Practice

1. What is the purpose of intrapartum fetal heart rate monitoring?
   - The goal of intrapartum fetal monitoring is to recognize changes in fetal oxygenation that could result in adverse outcomes.

2. What are the commonly used methods of intrapartum fetal monitoring?
   - Electronic fetal monitoring is performed externally using a Doppler technology with computerized processing that interprets and counts the Doppler signals. Internal monitoring is performed using a fetal electrode in the form of a spiral wire placed on the fetal scalp or presenting fetal part.

3. What are the periodic changes that occur in the FHT? What is the physiology, and what interventions, if any, would be appropriate?
   - Current fetal heart rate (FHR) definitions were described as a result of the 2008 National Institute of Child Health and Human Development workshop on electronic fetal monitoring
   - Accelerations—abrupt increase in the FHR above the baseline that peaks at 15 beats per minute above the baseline with a duration of 15 seconds (at ≥ 32 weeks gestation) or peaking at 10 beats per minute for 10 seconds (before 32 weeks gestation). Presence of accelerations is usually associated with reassuring fetal well-being and the absence of hypoxia and acidemia.
   - Early decelerations—symmetrical, gradual decrease and return of the FHR with the nadir occurring at the same time as the peak of the contraction. In most cases the onset and the recovery occur coincident with the beginning and the end of the contraction. Early decelerations are usually the result of pressure on the fetal head resulting in a physiologic vagal reflex response with acetylcholine release at the fetal sinoatrial node, and therefore not concerning. Intervention is not required.
   - Late decelerations—symmetrical decrease and return in FHR associated with a uterine contraction. The nadir of the FHR deceleration and recovery occur after the peak and resolution of the contraction, respectively. Particularly when late decelerations are repetitive and associated with decreased baseline FHR variability, they are considered nonreassuring and a result of utero-placental insufficiency, decreased intervillous exchange of oxygen and carbon dioxide, and worsening hypoxia and acidemia. Interventions would include maternal repositioning, oxygen supplementation, intravenous fluid administration, and in some cases delivery of the fetus.

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• Variable decelerations—abrupt decrease in FHR lasting less than 2 minutes, with onset to nadir less than 30 seconds; timing may or may not be associated with uterine contractions. Variable decelerations are also mediated by the vagus nerve’s sudden release of acetylcholine at the fetal sinoatrial node; these are associated with umbilical cord compression. Interventions may include maternal position change or amnioinfusion.

4. What is the most important aspect in the evaluation of any fetal heart tracing?

• Baseline variability is the most important aspect and is defined as the fluctuation of the baseline FHR in amplitude and frequency. It is defined as absent, minimal (amplitude detectable to 5 beats per minute), moderate (amplitude 5-25 beats per minute), and marked (amplitude greater than 25 beats per minute). Moderate variability has been associated with an arterial umbilical cord pH higher than 7.00-7.15, and with reassuring fetal well-being and the absence of metabolic academia.

5. Define the three-tiered FHR interpretation system.

**Category I**

*Category I fetal heart rate (FHR) tracings include all of the following:*

• Baseline rate: 110–160 beats per minute (bpm)
• Baseline FHR variability: moderate
• Late or variable decelerations: absent
• Early decelerations: present or absent
• Accelerations: present or absent

**Category II**

*Category II FHR tracings include all FHR tracings not categorized as Category I or Category III. Category II tracings may represent an appreciable fraction of those encountered in clinical care. Examples of Category II FHR tracings include any of the following:*

**Baseline rate**

• Bradycardia not accompanied by absent baseline variability
• Tachycardia

**Baseline FHR variability**

• Minimal baseline variability
• Absent baseline variability not accompanied by recurrent decelerations
• Marked baseline variability

**Accelerations**

• Absence of induced accelerations after fetal stimulation

**Periodic or episodic decelerations**

• Recurrent variable decelerations accompanied by minimal or moderate baseline variability
• Prolonged deceleration ≥22 minutes but ≤10 minutes
• Recurrent late decelerations with moderate baseline variability
• Variable decelerations with other characteristics, such as slow return to baseline, “overshoots,” or “shoulders”
Category III

Category III FHR tracings include either:

- Absent baseline FHR variability and any of the following:
  - Recurrent late decelerations
  - Recurrent variable decelerations
  - Bradycardia
- Sinusoidal pattern

REFERENCES


ACOG Practice Bulletin 116, Management of Intrapartum Fetal Heart Rate Tracings, November 2010; Reaffirmed 2013.