Intrapartum Fetal Heart Rate Monitoring

A Standardized Approach to Interpretation and Management

Lesson 2: Terminology
Recent progress in the standardization of FHR definitions is reflected in the endorsement of the 1997 NICHD FHR definitions by:

- ACOG – May 2005
- AWHONN – May 2005
- ACNM – December 2006

The 1997 definitions were updated in 2008 by a second NICHD workshop and published in September, 2008.

Terminology

Endorsement of the NICHD definitions represented the first time that physicians, nurses and midwives all agreed to use the same language...
A FHR tracing has the appearance of an irregular horizontal line.
What is that line?
What appears to be an irregular horizontal line actually is a series of closely-spaced, individual points.

Each point represents an individual heart rate calculated from the interval between two R waves in the fetal ECG.*
Along with uterine contractions, there are five essential components of a FHR tracing:

- Baseline rate
- Variability
- Accelerations
- Decelerations
- Changes or trends over time
Decelerations

Early
Late
Variable
Prolonged
Early Deceleration

- Visually apparent usually symmetrical, gradual decrease and return of the FHR associated with a uterine contraction

- In most cases the onset, nadir, and recovery of the deceleration are coincident with the beginning, peak, and ending of the contraction, respectively
Late Deceleration

- Visually apparent usually symmetrical gradual decrease and return of FHR associated with a uterine contraction.

- Delayed in timing, in most cases, the onset, nadir, and recovery of the deceleration occur after the beginning, peak, and ending of the contraction, respectively.
During a uterine contraction, decreased maternal perfusion of the intervillous space may cause the fetal arterial PO2 to fall below a critical threshold.
Decreased fetal PO2 (hypoxemia) during a uterine contraction is detected by chemoreceptors ↓

Chemoreceptors signal the medullary vasomotor center ↓

Sympathetic outflow results in peripheral vasoconstriction to redistribute oxygenated blood away from the extremities, gut and kidneys ↓

Blood flow to the brain, heart, adrenal glands and placenta is preserved or increased ↓

Peripheral vasoconstriction causes the blood pressure to rise ↓

Rising blood pressure is detected by baroreceptors ↓

Baroreceptors signal the medullary vasomotor center ↓

Parasympathetic (vagal) stimulation of the heart causes a gradual slowing of the FHR to reduce cardiac output and maintain normal blood pressure

This combined chemo and baroreceptor mediated reflex is reflected in the fetal heart rate tracing as a late deceleration.
As the uterine contraction subsides, maternal perfusion of the intervillous space is reestablished.
Perfusion of the intervillous space with oxygenated maternal blood causes the fetal PO2 to rise above the critical threshold. Autonomic reflexes subside and the FHR returns to baseline.
# Hypoxemia

## Initial fetal response to hypoxemia in the lamb

### Blood Flow

<table>
<thead>
<tr>
<th>Reference</th>
<th>Brain</th>
<th>Heart</th>
<th>Adrenal</th>
<th>Kidney</th>
<th>Body</th>
<th>MAP</th>
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</tbody>
</table>

1. AJOG 1974;120:817-24  
2. AJOG 1979;135:637-46  
7. AJOG 1994;170:156-61  
Variable Deceleration

Visually apparent abrupt decrease in FHR at least 15 bpm below the baseline, lasting at least 15 seconds and less than 2 minutes in duration
Variable Deceleration – Cord Compression

**Venous compression**
- Decreased venous return
- Relative hypovolemia
- Reflex increase in FHR

**Arterial compression**
- Increased SVR, elevated BP
- Baroreceptor stimulation
- Vagal outflow

Reverse
Evidence in the literature does not support assigning specific clinical significance to observations such as…

“Variable with a late component”
“Overshoot”
“Shoulders”
“Variability within the deceleration”
“W-shaped”, “V-shaped”, “U-shaped” variables
Decelerations

In addition, evidence in the literature does not support classification of decelerations as:

- Mild
- Moderate
- Severe
Prolonged Deceleration

A prolonged deceleration is a visually apparent decrease in FHR from the baseline with a depth of at least 15 bpm and a duration of at least 2 minutes, but less than 10 minutes.

A deceleration lasting 10 minutes or longer is a **baseline change**.