Electronic Fetal Heart Rate Monitoring – Category II

Understanding, Not Reacting

KALEIDESCOPE 2016
ECG Interpretation

- Rate
- Rhythm
- PR, QRS, QT interval
- Axis
- ST-segment ...

- “only after consideration of all these factors should interpretation be considered” — Harrison’s
FHR Interpretation

- Rate
- Variability
- Periodic changes
  - Accelerations
  - Decelerations
- Uterine contraction pattern
FHR Interpretation

• Essentially perfect sensitivity for exclusion of acidemia
• Much worse positive predictive value for the detection of acidemia
• If it looks good, it is good. If it looks bad, it may or may not be bad.
Fetal Heart Rate

120-160 bpm  preterm
110-150 bpm  term
Fetal Tachycardia

Differential Diagnosis?
Fetal Tachycardia
Differential Diagnosis

- Chorioamnionitis
- Fever, regardless of source
- Drugs/medications
- Fetal hypoxia
Fetal Bradycardia

Differential Diagnosis?
Fetal Bradycardia
Differential Diagnosis

• Fetal anomaly – trisomy
• Fetal Heart Block (irregular, or 50-60 bpm).
• Hypothermia
• Pre-terminal, dying fetus – fade away
Variability

What is it? What does it represent physiologically?
Variability

• Second- to- second modulation of cardiac output via heart rate to meet constantly changing oxygen demands of the fetus as efficiently as possible (≥ 6 bpm)

• Develops with maturity due to later maturation of parasympathetic nervous system in the fetus.

• This reflex is suppressed in the presence of acidemia
Reduced Variability
Differential Diagnosis

• Sleep cycle
• Drugs (narcotics, MgSO4 (?))
• Prematurity
• Hypoxia/acidemia
Fetal tissue needs more or less cardiac output
Reduced Variability

Hypoxia/acidemia

Fetal tissue needs more or less cardiac output

BRAIN

Heart

Graph below the text
Fetal tissue needs more or less cardiac output

Fetal sleep cycle (< 60 min)

Reduced Variability
Variability

• For practical purposes, consider diminished = absent
• Ignore increased variability
• This is a feature of FHR baseline, not of internal deceleration structure

• Variability, along with presence of accelerations, are the most reliable of all FHR features for exclusion of acidemia
Accelerations

Your Best Friend
Accelerations

- 15 bpm (apex) x 15 sec (baseline to baseline)
- 10 x 10 ≤ 32 weeks - be careful!
- Excludes metabolic acidemia (pH < 7.2)
- Spontaneous or induced: equivalent
- A feature of variation from baseline, not within a deceleration
Decelerations

- Early
- Variable
- Late
- Prolonged

Nature of deceleration is determined by timing of onset relative to a contraction, duration, and shape.
Decelerations

- Early – uniform (mirrors shape of contraction)
- Variable – non-uniform in shape and onset
- Late – uniform (mirrors shape of contraction)
- Prolonged – non-uniform in shape and onset.
Early Deceleration

- Vagal stimulation due to head compression
Early Deceleration

- Often mistaken for small variables
- Are equally innocuous
- More common in breech fetuses in labor, and in marked prematurity
- Of no clinical significance
Late Deceleration

Onset, nadir, and recovery of decel follow beginning, peak, and end of contraction

Onset  Nadir  Recovery

Onset to nadir > 30 secs

Beginning  Peak  End
Late Decelerations

- All fetuses are anoxic with a contraction > 40 mmHg in strength
- A protective response to contraction-induced hypoxia in the marginally compensated fetus
- “Diving seal” reflex
- Lost in adults – may be revived
- May also involve direct myocardial depression in late stages
Late Decelerations

- Appear before loss of accelerations/variability (hypoxia precedes acidemia)
- A contraction of equal magnitude will produce a late of equal magnitude (in labor, an “occasional late” is usually a variable)
- Management depends upon clinical context: Do I know why the baby is hypoxic? Can I fix the hypoxia? Is the baby acidemic? How long until delivery?
Late decelerations represent protective cardiovascular response to contraction-induced reductions in fetal oxygenation. Per algorithm, if labor is progressing normally in active phase or second stage, careful observation would be appropriate. If the fetus is remote from delivery, delivery would be appropriate.

Per algorithm, expedited delivery is indicated regardless of labor progress.

Fixing Late Decelerations

- Oxygen – rarely, only if mother is hypoxic
- Fix hypotension – yes
- Hydration – almost never
- Position change – yes (venacaval compression)
- Reduction in oxytocin – yes
- Amnioinfusion - no
Variable Deceleration

Abrupt onset to nadir < 30 secs, with drop of 15 bpm below baseline for ≥ 15 secs but < 2 min.

Onset  Nadir  Recovery

Baseline

Onset to nadir < 30 secs

The relationship to the contraction is variable.
Variable Deceleration
Umbilical Cord
Variable Deceleration
Variable Deceleration
Variable Decelerations

- May occur before, during or after a contraction
- Variable shape and duration
- Cause is cord compression
- Management depends upon depth and duration, associated variability/accelerations, and predicted length of labor.
Fixing Variable Decelerations

- Oxygen – No
- Hydration – No
- Position change – yes (relieve cord compression)
- Reduction in oxytocin – yes
- Amnioinfusion - yes
Significant variable decelerations seen here suggest umbilical cord compression during contraction, which could, over time, lead to significant acidemia. Per algorithm, if labor is progressing normally in active phase or second stage, careful observation would be appropriate. If the fetus is remote from delivery, delivery would be appropriate.

ATYPICAL VARIABLE DECELERATIONS WITH MINIMAL/NEAR ABSENT BASELINE VARIABILITY
IUGR FETUS WITH OLIGOHYDRAMNIOS
Prolonged Deceleration (> 2 minute)

• Most commonly are simply unrelieved cord compression = bad variables.
• May represent abruption, uterine rupture or maternal cardiovascular collapse.
• Always bad
• No place for scalp stimulation
• Management depends upon situation – do I know what caused it? Can I fix it quickly?
Category I
Category III
Most troubling patterns are category II

A more detailed description is always necessary.
Special Categories

- Sinusoidal pattern vs. pseudosinusoidal
- Overshoot
- Too sick for late decelerations
  
- Generally represent terminally asphyxiated fetuses – rare exception is fetal anemia.

- Know them by the company they keep
Medication effect has been excluded clinically as part of the initial period of intrauterine resuscitation attempts. While the fetus may have experienced prelabor central nervous system injury, absence of late decelerations excludes ongoing hypoxia in a neurologically intact fetus. However, since such fetuses may not tolerate labor without sudden deterioration and demise, cesarean delivery would be appropriate, per algorithm, if pattern persists for 1 hour.

Intrapartum management of category II fetal heart rate tracings: towards standardization of care

Steven L. Clark, MD; Michael P. Nageotte, MD; Thomas J. Garite, MD; Roger K. Freeman, MD; David A. Miller, MD; Kathleen R. Simpson, RN, PhD; Michael A. Belfort, MD, PhD; Gary A. Dildy, MD; Julian T. Parer, MD; Richard L. Berkowitz, MD; Mary D’Alton, MD; Dwight J. Rouse, MD; Larry C. Gilstrap, MD; Anthony M. Vintzileos, MD; J. Peter van Dorsten, MD; Frank H. Boehm, MD; Lisa A. Miller, CNM, JD; Gary D. V. Hankins, MD

Interpretation and management of fetal heart rate (FHR) patterns during labor remains one of the most problematic issues in obstetrics. Multiple basic science investigations and clinical trials have been published since the introduction of this technique in the late 1950s.1-7 Unfortunately, this body of work has primarily served to raise more questions than it has answered—as a medical community, we seem to know less than we thought we did 30 years ago.

There is currently no standard national approach to the management of category II fetal heart rate (FHR) patterns, yet such patterns occur in the majority of fetuses in labor. Under such circumstances, it would be difficult to demonstrate the clinical efficacy of FHR monitoring even if this technique had immense intrinsic value, since there has never been a standard hypothesis to test dealing with interpretation and management of these abnormal patterns. We present an algorithm for the management of category II FHR patterns that reflects a synthesis of available evidence and current scientific thought. Use of this algorithm represents one way for the clinician to comply with the standard of care, and may enhance our overall ability to define the benefits of intrapartum FHR monitoring.

Key words: fetal heart rate monitoring, neonatal encephalopathy, patient safety
Management of Category II FHRT

Moderate variability or accelerations

Yes

Significant decelerations with ≥50% of contractions for 1 hour

Yes

Latent Phase

Normal labor progress

Yes

Cesarean

No

Active Phase

Normal labor progress

Yes

Observe

No

Second Stage

Normal progress

Yes

Cesarean or OVD

No

Observe

Significant decelerations with ≥50% of contractions for 30 minutes

Yes

Observe for 1 hour

No

Persistent pattern

Yes

Cesarean or OVD

No

Manage per algorithm