Intrapartum Fetal Heart Rate Ambiguity, When Signals Get Crossed, Confused, Or Conflicted

Larry Veltman, MD
HASC Perinatal Safety Tract
September 12, 2013
Was it Bad Luck or Bad Medicine?
The Heat is Always On;  
The Same Allegations Over and Over

- Failure to respond to fetal distress
- Failure to do a timely delivery
- Improper use of forceps or vacuum

- Improper use of oxytocin
- Failure to conduct proper resuscitation

- Management of shoulder dystocia
Allegation: Failed Approach To Fetal Compromise

• Nurses fail to identify the fetal heart tracing as predictive of metabolic acidemia
• Nurses recognize the problem with the tracing but fail to timely notify the attending physician
• Physicians do not go to the hospital after receiving calls from nurses
• Chain of command (escalation policy) not implemented.
Allegation:
Failed Approach To Fetal Compromise

• Physicians do not make timely decisions to initiate a cesarean section

• Physicians use other interventions (vacuum extraction or forceps) to facilitate delivery with concerning patterns

• Cesarean sections ordered but delayed (staff or operating room unavailable)
Four Articles

1. **Fetal Monitoring Bundle**
   
   *Howard Minkoff, MD, and Richard Berkowitz, MD, on behalf of the Greater New York Hospital Association’s Perinatal Safety Committee*

2. **P.U.R.E. (purposeful, unambiguous, respectful, and effective)**
   
   Conversations and electronic fetal monitoring: gaining consensus and collaboration
   
   *Larry Veltman, MD; Kristine Larious, RN, RNC, BSN, MBA*

3. **Intrapartum management of category II fetal heart rate tracings: towards standardization of care**
   
   *Steven L. Clark, MD; Michael P. Nargiote, MD; Thomas J. Garite, MD; Roger K. Freeman, MD; David A. Miller, MD; Kathleen B. Simpson, RN, PhD, Michael A. Selfort, MD, PhD; Gary A. Dilly, MD; Julian T. Pacer, MD; Richard L. Berkowitz, MD; Mary D’Alton, MD; Dwight J. Rouse, MD; Larry G. Gilety, MD; Anthony M. Vintzileos, MD; J. Peter van Doorst, MD; Frank H. Bochn, MD; Lisa A. Miller, CNM, JD; Gary D. V. Hankins, MD*

4. **Signal ambiguity resulting in unexpected outcome with external fetal heart rate monitoring**
   
   *Duncan R. Neilson Jr, MD; Roger K. Freeman, MD; Shelora Mangan, RNC, MSN, CNS*
Fetal Monitoring Bundle

Howard Minkoff, MD, and Richard Berkowitz, MD, on behalf of the Greater New York Hospital Association’s Perinatal Safety Committee

1. A Credentialed Staff
2. An Escalation Policy
3. A Known and Available Responsible Party
4. Capability for Rapid Response
“All medical staff and employees responsible for fetal monitoring interpretation (resident and attending obstetricians, midwives, and labor room and antepartum nurses) were obligated to take this examination within 1 year of employment and pass within 18 months.”

Communication issues that cannot be solved

- Charge Nurse
- Nursing manager
- Contacts physician
- Medical staff leader
- Department Chair
- Executive committee
- Credentials committee
- QA committee
- Board of Trustees
The Responsible Party

• Any hospital providing an obstetric service should have the capability of responding to an obstetric emergency.

• The required personnel, including nurses, anesthesia personnel, neonatal resuscitation team members, and obstetric attendants, should be in the hospital or readily available.

Guidelines for Perinatal Care, 7th Edition, 2012
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P.U.R.E. Conversations

P.U.R.E. (purposeful, unambiguous, respectful, and effective)
Conversations and electronic fetal monitoring: gaining consensus and collaboration

Larry Veltman, MD; Kristine Larison, RN, RNC, BSN, MBA

- Purposeful
- Unambiguous
- Respectful
- Effective
EFM Communication: What It’s About

• Getting the message across
  – Resolve disagreement or conflict
• Getting the appropriate response
  – Respectful
  – The needed action
• Debriefing
  – What did we do well?
  – What could we have done better?
  – What will it take to improve?
  – Who will take ownership?
Hoping and Hinting

• “She’s having some subtle lates.” (“I’d really like you to come in and look at the tracing.”)
• “Let’s watch it a little longer. She is progressing pretty well” (“I have an enormous day tomorrow. If only I can get a couple of hours more sleep. She really didn’t say I needed to come.”)
When There is a Lawsuit

• “I was really worried about the tracing and I wanted him to come in.”

• “She didn’t ask me to come in. She really didn’t seem that concerned about the tracing.”
Components of a Stop-the-Line Assertive Statement

- **Get Attention** - Call the person by name
- **Express Concern** - Use an “I statement”
  - “I need clarity…”
  - “I am concerned . . . .”
- **State the Problem** - Brief, clear, objective
  - State in 10 seconds or less for immediate attention
  - Don’t “Hint & Hope”
- **Propose a Solution** - “We or Let’s . . . .”
  - Don’t ask a Yes/No question!
  - Use of “we” or “let’s” indicates it’s a team problem.
  - If you don’t know the solution, restate the problem, using team words
  - Within scope of your clinical role

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“When can I expect you?”

“Do you want me to come in?”
S-B-A-R
The Infrastructure of Effective FHR Interpretation and Management

- Periodic EFM interpretation and expertise for nurses and medical staff – NICHD nomenclature - required
- “Speaking up” / psychological safety / chain of command
- Peer review / accountability
- Coverage of the unit – OB hospitalists, anesthesia
- OR utilization & team availability
- Situational awareness / huddles / exit strategies
- Drills for emergency deliveries
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
The Basic Principle

• Assess the likelihood of developing significant acidemia prior to delivery

• Moderate variability or accelerations = absent fetal acidemia at the point of observation

• 16 footnotes – must be read
  – E.g., Treat minimal to absent variability as one entity.
Moderate variability or accelerations

- Significant decelerations with ≥50% of contractions for 1 hour
  - Yes
  - No
  - Latent Phase
    - Normal labor progress
      - No
      - Yes
      - Cesarean
    - Yes
    - Active Phase
      - Normal progress
      - No
      - Yes
      - Observe
  - No
  - Second Stage
    - Normal progress
      - No
      - Yes
      - Cesarean or OVD
    - No
    - Yes
    - Observe

- Significant decelerations with ≥50% of contractions for 30 minutes
  - Yes
  - No
  - Observe for 1 hour
    - Yes
    - No
    - Persistent pattern
      - Yes
      - No
      - Manage per algorithm
    - Cesarean or OVD
      - Observe
Signal Ambiguity
Have you ever heard...

- “The baby was much sicker than the monitor suggested.”
- “We had no idea that there was a fetal demise. The tracing looked reassuring.”
- “The need for the resuscitation team was a complete surprise.”
Signal ambiguity resulting in unexpected outcome with external fetal heart rate monitoring

Duncan R. Neilson Jr, MD; Roger K. Freeman, MD; Shelora Mangan, RNC, MSN, CNS

Electronic fetal monitors have evolved greatly in the last several decades, allowing accurate recording of the fetal heart rate (FHR) with an external Doppler transducer with much less signal loss than was present in the earlier products. This improved sensitivity has resulted in decreased use of the internal fetal scalp electrode and greater reliance on the external transducers.

In this article, we report a confusing situation which may occur during exter-

We report cases of unexpected adverse fetal outcome from monitored labors in which the fetal heart rate tracing was interpreted as reassuring. In these cases, portions from another signal source, usually maternal, were imperceptibly substituted into the fetal tracing in a way that masked the evidence of fetal compromise.

**Key words:** adverse fetal outcome, fetal heart monitoring, maternal heart rate, signal ambiguity

Because of maternal tachycardia, a pulse oximeter was applied and its trac-
What is Signal Ambiguity?

“...a confusing situation which may occur during external fetal monitoring in which the fetal signal is replaced by an alternative signal from the mother or a second fetus without the usual recognizable transition associated with such signal source shifting. This masks the condition of the fetus without the attending staff being alerted to the loss of fetal signal.”

FIGURE 9
Continued acceleration pattern (3:05 PM)

FIGURE 10
Fetal scalp electrode applied midway through the second contraction on this record

This reveals underlying deep deceleration pattern previously masked (3:15 PM).

J Perinat Neonat Nurs Volume 25 (2) 2011, 180–192
Signal Ambiguity Q and A

• Are there any warning signs?
  – A warning that signal ambiguity may be occurring is the presence of “fetal” (really maternal) accelerations during the second stage of labor associated with pushing. It is common for the maternal heart rate to accelerate during pushing and not common to have fetal heart rate accelerations (usually there are decelerations) during the second stage.
  – There is a lack of response to fetal scalp stimulation when the maternal pulse is being recorded.

• Under what circumstances does it occur?
  – It may occur in any situation where the maternal heart rate or second fetal heart rate in twins is faster than the fetal heart rate of the index fetus. (e.g., second stage pushing, maternal tachycardia from fever, IUFD)
  – Signal ambiguity occurs generally with external monitoring. Placement of an internal scalp electrode will clarify the situation. (In the case of a stillborn fetus, the maternal heart rate may be recorded with a fetal scalp electrode.)
Signal Ambiguity Q and A

• **Is it easy to detect?**
  – The signal may shift back and forth between the mother and the fetus causing further confusion regarding the presence of a reassuring pattern.

• **Does it only occur with some fetal monitors?**
  – This is not a situation confided to only one manufacturer of fetal heart monitors.

• **Can one figure out who is at risk?**
  – There is not a particular way to figure out who might be high risk for signal ambiguity in advance.
Avoiding Signal Ambiguity

• Develop a policy to use a maternal pulse oxymeter, at least during the second stage for every woman in labor.
• Use a fetal scalp electrode for labor whenever accelerations appear in the second stage.
• (With an IUFD, the scalp electrode may pick up maternal heart beat.)
• Use a maternal pulse oxymeter when maternal tachycardia could approach the normal range of fetal heart rate.
The Future May Be Here!
Intrapartum Heart Rate Ambiguity: A Comparison of Cardiotocogram and Abdominal Fetal Electrocardiogram with Maternal Electrocardiogram

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- FDA Approved in 2011
  - Maternal EKG
  - Fetal EKG
  - Uterine activity (electromyography)
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