Applying the NICHD Categories Case Studies in Fetal Monitoring

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NICHD 2008
Three - Tier Fetal Heart Rate Interpretation System

Category I
- Moderate Variability
- FHR 110-160 bpm
- No late or variable decelerations
- ± early decelerations
- ± accelerations

“Normal”

Category III
- Absent variability with recurrent:
  - Late decelerations
  - Variable decelerations
  - Bradycardia OR
  - Sinusoidal pattern

“Abnormal”
**NICHD 2008**

Category II Tracings

Everything else

“The Mess In the Middle”

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**2008 NICHD 3 Tier System Fails To:**

- Clearly identify the relationship between FHR patterns and significant acidemia.
- Simplify and make clear the framework for determining the choice and timing of our interventions

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**FHR Patterns and Acidemia**

- Minimal FHR variability (with decelerations) should be considered as potentially indicative of fetal acidemia and should be managed accordingly.
- Moderate FHR variability reliably predicts the absence of fetal metabolic acidemia at the time it is observed.
- Absent FHR variability with decelerations... is abnormal and conveys an increased risk of fetal acidemia at the time it is observed.

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**Simplify the Framework 3 Clinical Categories**

- Normal
- Indeterminate
- Abnormal

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Factors Increase Likelihood for Significant Acidemia

- Recurrent... decelerations
- That progress to a greater depth and longer duration
- Are more indicative of impending fetal acidemia.

Typical and observable changes associated with an increased risk for birth in the presence of a significant fetal acidemia?

1. Evolutionary loss of FHR variability
2. In association with recurrent decelerations and/or bradycardia
3. That get deeper over time

Evolutionary loss of Variability

In Association Decelerations That Get Deeper Over Time

Based On the Degree of Variability Accompanies the Decelerations

Make a Presumptive Diagnosis of the FHR Patterns Relationship to Significant Acidemia
In a fetus with an initially normal FHR pattern the development of significant acidemia evolves over a period of time, of the order of at least one hour. (60 – 90 minutes)

1 Hour Window of Opportunity ±

Estimated time to delivery

Local realities = Event to delivery time

Patient Profile
• 25 y/o G1 P0
• Admitted @ 39 3/7 weeks
• Labor
• Epidural

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CASE 1

10:12

Recurrent decelerations - 50% UC’s in 2 consecutive 10 minute windows

Continuous monitoring Yes ☐ No ☐
MD/CNM notification Yes ☑ No ☐

Bedside evaluation  Yes ☑ No ☐

Preparation for Delivery  Yes ☑ No ☐

Delivery  Yes ☑ No ☐ MD SVE - Leaves room

Complete. Feels urge to push
10:30 13 minutes later

10:30 18 minutes later

11:10 40 minutes later

12:00 50 minutes later

Ensure ability to rescue fetus  Yes ✔  No  ☐

Ensure ability to rescue fetus  Yes✔  No  ☐
13:00 60 minutes later

Neonatal Resuscitation Available   Yes ☑ No ☐

13:37 birth

Is this tracing associated with Significant Acidosis?

A. Yes  B. No  C. Maybe

Delivery Outcome

• 3535 gm. female
• By low forceps for prolonged second stage and maternal exhaustion (3 hrs. 25 minutes)
• Apgar Score 9/9

Cord Gases
CUA: 7.31/22/49/-2
CUV: 7.36/28/43/-1
Moderate FHR variability reliably predicts the absence of fetal metabolic acidemia at the time it is observed.

98% of the fetuses with moderate FHR variability, with or without decelerations or second stage bradycardia will be born in the absence of a significant metabolic acidemia, and/or in the presence of neonatal vigor.

When moderate FHR variability is present at the time of birth < 1% of neonates will be born with an Apgar score < 7 at 5 minutes.

Patient Profile

- 16 y/o G1 P0 @ 40 6/7 weeks arrives in triage contracting strongly
- SVE in triage 5/100/-2
- AROM – thick mec
- FSE/IUPC are placed - amnioinfusion begun
- Complete within 3 hours admission

Time: 23:50 – complete and pushing
01:50: 20 minutes later – decision C/S

01:59: 9 minutes later Terbutaline given

02:20: 21 minutes later

02:28: 4 minutes later delivery
Is this tracing associated with Significant Acidosis?

A. Yes  
B. No  
C. Maybe

Delivery Summary

- 1 hr. 20 minutes of recurrent decelerations with minimal - absent variability
- Male
- Apgar score 3/7/8

Cord Gases:
- CUA : 6.82/114/14/-13
- CUV : 6.93/84/27/-11

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CASE 3

Patient Profile

- 29 y/o G 2 P1 @ 39 3/7 wks.
- Spontaneous labor
Inadequate uterine monitoring

0₂ and IV increased
24:00 SVE 4 cm – plan C/S

00:03 SQ Terbutaline  To OR

00:09 Positioned for spinal

00:20  00:28 delivery
Is this tracing associated with Significant Acidosis?

A. Yes  B. No  C. Maybe

12%  47%  41%

Birth Outcome

• C/S for “fetal distress.”
• 1900 gm. Female
• APGARS 5/8.

Cord Gases

CUA:7.17/62/9/-8
CUV:7.22/52/16/-7
Timing of Interventions: Factors to Consider

1 Hour Window of Opportunity ±

Local realities = in house surgical team immediate C/S capabilities

Estimated time to delivery – presumption remote delivery- 4 cm

(23:40 – 00:03) - 23 minutes minimal variability + recurrent late decelerations(some deep – 60 beats below baseline)

00:03 Restoration of moderate FHR variability immediately before delivery

Summation

4 Simple Guidelines FHR Monitoring

1. FHR decelerations as an independent finding are poorly predictive of complicated outcomes.

2. The degree of variability is the most sensitive indicator of the adequacy of oxygen delivery to the fetus at any given moment in time.

3. The deeper the decelerations the > likelihood for developing a significant acidemia.

4. A metabolic acidemia typically develops slowly in association with recurrent decelerations and an evolutionary reduction of FHR variability over time.

Evidence Based Indications For Action

Based on the degree of variability that accompanies the decelerations

Make a presumptive Diagnosis

Significant acidemia?

YES?

NO?

MAYBE?

Fetal acidemia and electronic fetal heart rate patterns: Is there evidence of an association? J. T. PARKER1, T. KING1, S. FLANDERS1, M. FOX1, & S. J. KILPATRICK2
Continuous Observation
Notification
Bedside Evaluation
Prepare for birth
Expedite Birth
Prepare For Neonatal Resuscitation
Prepare to Transfer/Transport

Intrauterine Resuscitation

Timing of Interventions: Factors to Consider

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Example: 3 – Tiered System that Integrated Patterns Presumed Relationship Acidemia with the Categories

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Integrated 3 Tier System

• More clearly identify the relationship between FHR patterns and significant acidemia.

• Better clarify how our presumptive diagnosis informs the choice and timing of our interventions.