Management of Category 2 Tracings: A Guideline

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We have no conflicts of interest.

Learning Objectives

As a result of completing this learning activity, the learner will be able to:
1. Identify characteristics of category I and category III tracings per NICHD guidelines.
2. Identify the characteristics of significant decelerations per this guideline.
Why do we care about managing category II tracings?

- Category II tracings are a source of discomfort about management among care providers and nursing staff.

- In a study by Cahill including over 500 patients, the last 30 minutes of FHR tracings:
  - 2.3% were Category I
  - 97.6% were Category II
  - .09% were Category III


Category 1 and Category 3 Tracings:
A review of definitions

**Category I** includes all of the following:

- Baseline rate 110-160 bpm
- Accelerations present or absent
- Moderate variability
- No late decelerations
- No variable decelerations
- No prolonged decelerations
- Early decelerations may be present

**Category III** includes at least one of the following:

- Absent variability with:
  - recurrent late decelerations
  - recurrent variable decelerations
  - bradycardia for at least 10 minutes
  - Sinusoidal pattern for at least 20 minutes

Three Tier Fetal Heart Rate Interpretation System Obstet Gynecol 2008;112:665

Category 2 Tracings include:

- Baseline Rate:
  - Bradycardia not accompanied by absent variability
  - Tachycardia
- Baseline FHR variability
  - Minimal 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 with minimal or moderate baseline variability
  - Prolonged decelerations ≥ 2 minutes but < 10 minutes
  - Recurrent late decelerations with moderate baseline variability
  - Variable decelerations with other characteristics, such as slow return to baseline or other atypical features

44 different combinations!!!
How is the guideline supported in the literature?

In a 2003 study of term fetuses, \( n = 488 \), Williams and colleagues reported that minimal and absent variability for at least 60 minutes was associated with a pH 7.0 in 12-31% of the cases.

Williams, KH Galerneau F., AJOG, 2003
How is the guideline supported in the literature?

Term fetuses with an initially normal FHR tracing and normal scalp pH, but who subsequently developed an abnormal tracing, remained non-acidemic (scalp pH >7.25) for at least 90 minutes of the abnormal pattern.

Fleisher A, et al., The Development of fetal acidosis in the presence of an abnormal fetal heart rate tracing. In the average for gestational age fetus, AJOG, 1982

Results of the study by Low and colleagues showed that there was an approximately 60 minute window from the start of FHR patterns containing minimal variability and late or prolonged decelerations, which preceded fetal "asphyxial decompensation".


How is the guideline supported in the literature?

• Four NICHD defined features demonstrated the greatest association with acidemia:
  – Recurrent variable decelerations
  – Recurrent late decelerations
  – Recurrent prolonged decelerations
  – Tachycardia
  (after adjusting for parity, obesity, fever and prolonged first stage)

• Another factor (not defined by NICHD) that demonstrated superior predictive ability for acidemia was “total deceleration area”

Cahill, Association and prediction of neonatal acidemia, AJOG, Sept 2012; 207:206

How is the guideline supported in the literature?

Considering all labor:
  • Category I 77.9%
  • Category II 22.15%
  • Category III 0.004%

N = 4444

Results: the longer the time spent in category II in the last two hours, the higher the likelihood of apgar less than 7 at 5 minutes and NICU admission.

Category I and II FHR tracings are common in labor and category III tracings are rare.

How is the guideline supported in the literature?

Normal fetal base excess entering labor is -2 mmol/L.

In a fetus exhibiting repetitive FHR decelerations for periods of hours
- BE decreased by approximately 1 mmol/L per 5 minutes (Scott, AJOG, 1977)
- Severe cord occlusion or marked reductions in uterine blood flow (rupture) may decrease BE in sheep or human fetus by 1 mmol/L per 2-3 minutes

A frequency of complete umbilical cord occlusion occurring 1 minute every 5 minutes, allows for sufficient recovery time (4 minutes) resulting in minimal development of metabolic acidosis over time

More frequent umbilical cord occlusion (1 per 2 minutes) may result in rapid development of metabolic acidosis

Sheep study - BE normalizes at 0.1 mmol/L per minute between umbilical cord occlusion or after bradycardic event
- For a fetus with a BE of -12, it would take 2 hours for BE to normalize if undelivered and the insult is completely abated.


Important Points of the Guideline

- Normal fetal heart rate tracing
  - Recurrent decelerations
    - Minimal-absent variability
  - Metabolic acidemia and potential injury

Metabolic acidemia and potential injury


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- Variability refers to the prominent baseline FHR pattern during a 30 minute evaluation period (more than 50% of the time)
- Marked variability is considered the same as moderate variability for the purposes of this algorithm
- Minimal and absent variability are considered the same for the purposes of this algorithm.

Variability examples

- Absent: undetectable
- Minimal: detectable but less than or equal to 5 bpm
- Moderate: range from 6-25 bpm
- Marked > 25 beats/min

Clarification: Significant Decelerations

- Variable decelerations that are less than 60 bpm at the nadir regardless of the baseline AND lasting greater than 60 seconds
- Variable decels 60 x 60 have an association with increased morbidity

Clarification: Significant Decelerations

- Late decelerations of any depth
- Gradual descent over 30 seconds to the nadir
- Nadir appears after the peak of the contraction.

Clarification: Significant Decelerations

- Any prolonged deceleration as defined by NICHD: > 2 minutes and < 10 minutes
- Identification of prolonged deceleration should prompt discontinuation of the algorithm until the deceleration is resolved

Important clarification

- Application of the algorithm may be initially delayed up to 30 minutes while attempts are made to alleviate category ll pattern with conservative therapeutic interventions.
- Once a category ll FHR pattern is identified, FHR is evaluated and algorithm applied every 30 minutes.
- Any significant change in FHR parameters should result in reapplication of the algorithm.
Further clarification points

• When the algorithm suggests delivery is indicated, such delivery should be ideally initiated within 30 minutes of the decision for cesarean.

• If at any time the tracing reverts to category I status or deteriorates for even a short time to category III status, the algorithm no longer applies. Reinstitute when the pattern reverts to category II.

• This algorithm is not intended to guide management of fetus with extreme prematurity.

• Algorithm may be overridden at any time if, after evaluation of the patient, the provider believes it is in the best interest of the fetus to intervene sooner.

How does this algorithm apply to the SBAR communication process?

The algorithm can be embedded into the SBAR between providers and nurses. Below is an example:

S: Baseline of 125, minimal variability and intermittent variable decelerations. I have initiated a position change, fluid bolus and have seen no improvement in the FHR pattern.

B: 4cm dilated, G1, P0...

A: The FHR has not improved and remains category II for 30 minutes despite interventions.

R: According to the category II algorithm, we should continue monitor closely and evaluate in another 30 minutes. Does this plan sound good to you? When would you like another update?

• Let’s look at some case studies and strips
References:

- Figure 1., Reprinted from AJOG, 209, Clark, et al, Management of Second Stage Guideline, Aug. 2013, with permission from Elsevier
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