ELECTRONIC FETAL MONITORING

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FINANCIAL DISCLOSURE

• None

OBJECTIVES

• Moving forward with fetal monitoring
  • Work arounds (briefly)
  • ACOG categories
  • Management of category II
    • ACOG
    • Clark et al
ELECTRONIC FETAL MONITORING

- 1975 – 2010
  - Decreased fetal death incidence
  - Cesarean section rate increased 110%
  - Cerebral palsy incidence unchanged
  - Lawsuit rate / live-birth rate increased 340%
  - No evidence of benefit
  - Evidence of harm
  - Decided not to upgrade because we didn't listen.

WHY HAS EFM FAILED?

- Classic example of need for evidence-based medicine and thinking
- Data is subjective, but complex
- Is the basic premise flawed?
- Standardization and communication

EFM WORK-AROUNDS

- Premise: Add a new technology to fix a broken technology
  - Fetal Pulse Oximeter
  - STAN Monitoring
EFM - MOVING FORWARD

- Standardization/communication
- Management guidelines
SPEAKING A COMMON LANGUAGE

“It has become increasingly obvious to clinicians, epidemiologists, and physiologists that a major impediment to progress in the evaluation and investigation of FHR monitoring is lack of agreement in definitions and nomenclature.”

- Clarified definitions
- Set forth broad research agenda

Parer, J.T., NICHD conference, 1997
FHR MANAGEMENT PRINCIPLES

- FHR correlates with fetal acid-base status at the time of observation
- FHR does not predict cerebral palsy
- Consider evolution over time (art/gestalt)
- Consider entire clinical picture (art/gestalt)

3 TIER CATEGORIZATION

- **Category I: Normal**
- **Category II: Indeterminate** – requires ongoing assessment/evaluation
- **Category III: Abnormal** – requires urgent action
CATEGORY II MANAGEMENT

• Recurrent variable decelerations
• Recurrent late decelerations
• Tachycardia
• Prolonged deceleration/bradycardia
• Minimal variability
• Tachysystole
• 30 minute rule

RECURRENT VARIABLE DECELERATIONS

• Deeper and longer is worse
• Management:
  • Maternal position change
  • Amnioinfusion
    • Decrease recurrence of variable decels
    • Decrease c-section for “suspected fetal distress”
AMNIOINFUSION WORKS!

- C-section
  - 10 studies
  - Pooled OR= 0.62 (95% CI 0.43-0.83)
- Reduction in variable decelerations
  - 4 studies
  - Pooled OR= 0.53 (95% CI 0.38-0.74)

RECURRENT LATE DECELERATIONS

- Reflects uteroplacental insufficiency
- Differential diagnosis:
  - Maternal hypotension (post epidural)
  - Tachysystole
  - Maternal hypoxia
- Treatments:
  - Oxygen
  - Decrease contractions (potentially)
  - Fluid bolus
  - Position change

OXYGEN-PHYSIOLOGY

- Umb vein pO2= 30
- Fetus extracts/delivers oxygen efficiently
  - High Hgb
  - O2 dissociation curve
- Animal data suggest that late decels are caused by hypoxia, and that increasing fetal pO2 can reverse
OXYGEN- POTENTIAL RISKS

- May alleviate abnormal FHR patterns
- Some data suggest that it may lower pH
- Maternal hyperoxia may increase free radical activity
- Neonatal data suggests that high O2 in resuscitation is bad

OXYGEN

- Data on pH are weak, at best
- Data from pulse oximetry data suggests modest increase in O2 sat with O2, much below what is observed in neonatal resuscitation
- Free radicals- why don’t we see this issue in other places where high O2 is used

OXYGEN

- Some potential reasons to be concerned
- Not enough to completely stop using oxygen
- Recommendation:
  - Use oxygen when you think the risk of fetal hypoxia is high
  - Don’t use for every Cat II tracing
FETAL TACHYCARDIA

- Differential Diagnosis:
  - Chorio
  - Meds (terbutaline)
  - Maternal medical disorders
  - Abruptio with fetal bleeding
  - Epidural
  - Treatment focused on underlying cause

PROLONGED DECELS/FETAL BRADYCARDIA

- Clinically handled the same
- Differential diagnosis:
  - Hypotension
  - Cord prolapse
  - Rapid fetal descent
  - Tachysystole
  - Abruptio
  - Uterine rupture
  - Trainees: good spot for an internal checklist

Issue with ACOG management guidelines….relies heavily on variability
PRINCIPLES

• Goal: intervene before acidemia
• Absent and minimal variability are the same
• Marked = moderate variability
• Can wait 30 minutes for interventions to alleviate Cat 2 to work
• Once Cat 2 identified, evaluate FHR every 30 min and re-apply algorithm if indicated
• Carefully evaluate atypical variable decels
“Significant” Decelerations

- Variables > 60 sec and nadir more than 60 bpm below baseline
- Variables > 60 sec and nadir less than 60 bpm regardless of baseline
- Any late decelerations

Figure 1. Algorithm for management of category II fetal heart rate tracings that have not resolved with appropriate conservative corrective measures, which may include supplemental oxygen, maternal position changes, intravenous...
CLINICAL RECOMMENDATIONS
• Combination approach: some good messages in Clark algorithm, but perhaps too prescriptive
• Combine knowledge from ACOG/AWHONN and others with clinical experience and clinical intuition
• Continue learning: look at the cord gas of every baby you deliver and correlate to the tracing
  • Become your own little computer!

SUMMARY
• EFM work-arounds do not exist
• Category system enhances communication
• Dig deeper in Category II
• Management guidelines
  • Amnioinfusion works
  • Be thoughtful about oxygen
• ACOG/Clark guidelines