Intrapartum Fetal Monitoring - Dr. Hana

- The intrapartum period is probably the most dangerous and traumatic period of our lives – a time associated with a high mortality and morbidity for both mother and child.
- Maternal and fetal monitoring essential to pick up problems early and thus institute timely intervention.

Aim

- The aim is to identify fetal distress caused by anoxia caused by placental insufficiency
- Anoxia can result in cerebral insufficiency leads to cerebral palsy
- Anoxia causes increased bleeding tendency which leads to intracranial, pulmonary hemorrhage & fetal death

What physiological changes occur in the infant in presence of anoxia?

- Physiological responses to anoxia: 1st response is a sympathetic response “Flight & Fight reaction”
  - Increased heart rate
  - Tachycardia
  - BP rise
  - Tightening of sphincters

2nd response is a parasympathetic response [stimulation of vagus nerve]

- Opening of sphincters → passage of meconium
- Decreased heart rate → bradycardia
- BP fall → asystole
- Physiological changes → PO2 low → PCO2 rise → acidosis → pH drop
- Effect on cardiac oxygenation → changes on ECG

Liquor color

- Meconium staining - past or present, indicates fetal distress – Parasympathetic response
- Infant needs careful monitoring to determine severity of anoxia & risk of meconium aspiration with first breath

Methods

1. Intermittent auscultation
2. Electronic fetal heart rate monitoring
3. Fetal blood pH analysis
4. Scalp stimulation
5. Vibroacoustic stimulation test
6. Fetal pulse oximetry
7. Fetal electrocardiography
8. Doppler ultrasound
9. Color of amniotic fluid
10. Admission test

Intermittent Auscultation

- Auscultation requires the ability to differentiate the sounds generated by the device used. The maternal pulse should be checked during auscultation to differentiate maternal and fetal heart rates. False conclusions about fetal status could be reached if the maternal sounds are mistaken for fetal heart sounds. If the fetal heart is technically inaudible so that the fetal heart rate cannot be established, then electronic fetal monitoring should be commenced. The greatest accuracy results when the FHR is counted for 60 seconds.
Electronic Fetal Heart monitoring

FHR Pattern

Baseline:

1. Normal = 110 – 160 beats/min
2. Tachycardia – Moderate 160 – 180 beats/min
   - Severe > 180 beats/min
3. Bradycardia – Moderate 100 – 110 beats/min
   - Severe < 100 beats/min

FHR Variability

- Normal changes and fluctuations in the FHR over time.
- Best assessed between contractions.
- Considered to be the best indicator of fetal well-being.
- Variability can be influenced by hypoxic events, maternal hemodynamic issues, drugs, etc.

Examples of Variability

- Absent: Not detectable from baseline
- Minimal: Less than 5 bpm from baseline
- May occur with:
  - Normal fetal sleep patterns
  - Mother has received analgesia for pain
  - Moderate: 6-25 bpm from baseline (optimal pattern)
  - Marked: More than 25 bpm from baseline

Periodic and Episodic FHR Characteristics

- Periodic: Refers to changes in the FHR that occur with or in relationship to contractions
- Episodic: Refers to changes in the FHR that occur independent of contractions

Late Deceleration

- Occur in response to utero-placental insufficiency. Blood flow to the fetus is compromised and there is less oxygen available to the fetus)
**Prolonged Deceleration**

- Deceleration of the FHR from the baseline lasting more than 2 minutes but less than 10 minutes.
- No explanation for why these occur
- Commonly associated with uterine hyperstimulation.
- Can also occur without any uterine activity

**Characteristics of Contractions**

- Frequency: How often they occur? They are timed from the beginning of a contraction to the beginning of the next contraction.
- Regularity: Is the pattern rhythmic?
- Duration: From beginning to end - How long does each contraction last?
- Intensity: By palpation mild, moderate, or strong.
- By IUPC (intra-uterine pressure catheters) intensity in mmHg
- Subjectively: Patient description

**Methods of Electronic Fetal Monitoring**

- External (cardiotocography)
  - Noninvasive method
  - Utilizes an ultrasonic transducer to monitor the fetal heart
  - Utilizes the tocodynamometer (toco) to monitor uterine contraction pattern
- Internal Fetal Monitoring
  - Invasive
  - FHR is monitored via a fetal scalp electrode
  - Uterine activity is monitored by an intrauterine pressure catheter (IUPC)
Fetal blood pH analysis

Indication

- Abnormal FHR pattern
  - Bradycardia
  - Tachycardia
  - Persistent, reduced/absent baseline variability
  - FHR decelerations
    - Late deceleration
    - Moderate and severe variable decelerations
    - Persistent, severe early decelerations
  - Bizarre, unusual FHR patterns
- Thick meconium-stained amniotic fluid
- Maternal acidosis or alkalosis

<table>
<thead>
<tr>
<th>pH</th>
<th>Management</th>
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<tbody>
<tr>
<td>Normal pH (7.25 – 7.45)</td>
<td>Try vaginal delivery</td>
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<tr>
<td>Preacidotic pH (7.24 – 7.20)</td>
<td>Repeat within 15-20 min</td>
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<tr>
<td>Acidotic pH (&lt; 7.20)</td>
<td>Repeat immediately, if same value → delivery</td>
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Other kinds of intrapartum fetal health assessment

1. Scalp stimulation
2. Vibroacoustic stimulation test
3. Fetal pulse oximetry
4. Fetal electrocardiography
5. Doppler ultrasound

Interpretation of EFM (FIGO 1985)

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<th>Interpretation</th>
<th>Findings</th>
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<td>Normal pattern</td>
<td>Baseline FHR 110-150 bpm</td>
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<td>Amplitude of baseline variability 5-25 bpm</td>
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<tr>
<td>Suspicious pattern</td>
<td>Baseline FHR 100-110 bpm and 150-170 bpm</td>
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<td>Amplitude of baseline variability 5-10 bpm &amp; &gt; 40 min</td>
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<td>Increased variability &gt; 25 bpm</td>
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<td>Variable decelerations</td>
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<td>Pathological pattern</td>
<td>Baseline FHR &lt; 100 bpm / &gt; 170 bpm</td>
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<td>Amplitude of baseline variability &lt; 5 bpm &amp; &gt; 40 min</td>
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<td>Severe variable deceleration</td>
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<td>Severe repetitive early decelerations</td>
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