Fetal monitoring
Why perform fetal monitoring

- Identify the fetus in distress
- To avert permanent fetal damage or death
Definitions

Fetal distress
- A condition in which fetal physiology is so altered as to make death or permanent injury

Hypoxia
- Reduction of tissue oxygen supply below physiologic level

Asphyxia
- Combination of hypoxia & metabolic acidosis
CP
- Is a major disorder of neurodevelopment.
- “chronic disability”
- not result of recognized progressive disease

Mental retardation 41%
seizures 23%
cortical visual impairment 14%
Development of CP

- At any time during:
  - Prenatal
  - Perinatal
  - Postnatal
8.2-9% of CP case were potentially attributable to birth asphyxia
partial asphyxia causes:

generalized or focal cerebral necrosis

in the parasagittal regions and the border zones between parietal and occipital lobes
Total anoxia

For < 8 min did not produce consistent injury

>10 min invariably resulted neuropathology

beyond 20 – 25 min there were no survivors
intrapartum cause of CP:

- Evidence of a **metabolic acidosis** (ph< 7 and base deficit > 12mmol/l)
- Early onset of severe or moderate neonatal **encephalopathy** in infants born at 34w or more
- Cerebral palsy of the **spastic quadriplegic** or dyskinetic type
- **Exclusion** of other identifiable etiologies such as trauma, coagulation disorders, infections or genetic disorders.
Fetal Heart rate
Association of FHR pattern with adverse perinatal outcome was recognized.
4 Basic Features

- Baseline
- Variability
- Bradycardia < 110 bpm
- Tachycardia > 160 bpm
Baseline FHR: (110-160 bpm)

Mean level of FHR when this is stable

excluding Accelerations and Decelerations
Bradicardia

- Maternal B blocker therapy
- Hypothermia
- Hypoglycemia
- Hypothyroidism
- Fetal cardiac conduction defect (structural abn, viral inf,)


Tachycardia

- Decrease vagal outflow
- Increase sympathetic outflow:
  - fever,
  - infection
  - maternal hyperthyroidism
  - Fetal hypoxia
  - fetal anemia
  - medication:
    * sympathomimetic (ritodrine, terbutaline)
    * parasympatholytic (atropine, phenothiazines)
Periodic changes:
- accelerations
- decelerations that occur with contractions.

Decelerations:
- early
- late
- variable.
Baseline variability

- The minor fluctuations on baseline FHR at 3-5 cycles p/m produces Baseline variability.
- Examine 1 min segment and estimate highest peak and lowest trough.
Baseline Variability

Normal:
- Normal is more than or equal to 5 bpm.
- Non reassuring, Less than 5 bpm or less, but less than 30 min

Abnormal:
less than 5 bpm for 90 min or more.
Baseline variability

Fig. 4 - Classification of baseline variability
Decreased Fetal Heart Variability

- Medication: narcotics, barbiturates, atropine, general anesthesia
- Hypoxia
- Fetal sleep cycle
- Prematurity
- Fetal tachycardia
Accelerations

- Accelerations transient increase in FHR of 15 bpm or more lasting for 15 sec
  (with contraction)

Presence of FHR Accelerations usually have good outcome
Decelerations:
transient slowing of FHR below the baseline level of more than 15 bpm and lasting for 15 sec. Or more.
(with contraction)
Non-stress Test

- 2 or more accelerations of 15 beats/minute
  - or more, lasting 15 seconds or more within
  - 20 minutes
NON-STRESS TESTING
Contraction Stress Test

- 3 contractions in 10 minutes
- Repetitive decelerations starting at or beyond peak of contraction considered a positive test
Accelerations

Acceleration showing a transient increase of greater than 15 bpm
Early Decelerations

- **Head compression**
  - Begins on the onset of contraction and returns to baseline as the contraction ends.
  - Should not be disregarded if they appear early in labor or Antenatal.
EARLY DECELERATIONS
EARLY DECELERATION

Early Decelerations occurring at the same time as the contractions
EARLY DECELERATIONS
Late Decelerations.

- Uniform periodic slowing of FHR with the onset of the contractions often with slow return to the baseline.

- **Repetitive** late decelerations increases risk of Umbilical artery acidosis and Apgar score of less than 7 at 5 mins and Increased risk of CP.
Late Decelerations

- Due to acute and chronic uteroplacental insufficiency
- Are precipitated by hypoxemia
- Associated with respiratory and metabolic acidosis
- Common in patients with PIH, DM, IUGR or other form of placental insufficiency.
LATE DECELERATIONS
Late Deceleration
Variable Decelerations

- Fetal heart rate deceleration is variable in shape, onset, non-repetitive
- Caused by compression of the umbilical cord
- Often associated with oligohydramnios with or without rupture of membranes
- Acidosis if prolonged and recurrent
Variable Decelerations

Variable decelerations with variation in shapes and timings
Variable Decelerations
Response to Variable Decelerations

- Change maternal position to right or left side, or Trendelenburg
- Elevate presenting part (lift off cord)
- 100% oxygen
- Stop oxytocin
- Persistent Bradycardia: Deliver forceps (if delivery imminent) or C-section (if delivery is not imminent)
Decelerations

Figure 24-2 FHR deceleration patterns and implied etiology according to E.H. Hon. (From E.H. Hon. An Atlas of Fetal Heart Rate Patterns Hartley Press, New Haven, 1968)
Prolonged Deceleration

Drop in FHR of 30 bpm or more lasting for at least 2 mins

- Is pathological when it crosses 2 contractions in 3 mins
- Results in reduced O2 transfer to placenta
- Associated with poor neonatal outcome
Prolonged Decelerations

CAUSES

- Cord prolapse
- Maternal hypertension/hypotension
- Uterine hypertonia
- Epidural/spinal or pudendal anesthesia
Prolonged Deceleration

Fig. 6  Prolonged deceleration.
Sinusoidal pattern

- Baseline abnormality
- Smooth sine wave
- Amplitude 5-15 beat/min (above but not below the baseline).
- Frequency 2-5 cycle/min
- Little beat to beat variability
- Acceleration is absent
Sinusoidal pattern

- Associated with:
  - hypoxia
  - sever fetal anemia: *(fetomaternal hemorrhage)*
  - chorioamnionitis
  - fetal sepsis
  - administration of narcotic analgesia
  - Cord compression
  - hypovolemia
  - Anaemia
Sinusoidal pattern
Relationship between FHR and PH

- No deceleration
- early deceleration
- mild variable deceleration
- Severe variable
- late deceleration

\[
\begin{align*}
\text{pH} & > 7.29 \\
\text{pH} & < 7.15 \\
\text{low pH}
\end{align*}
\]

- No acceleration

poor perinatal outcome
Biophysical Profile

- **Fetal breathing:**
  30 seconds of sustained fetal breathing in 30 minutes

- **Fetal movement:**
  3 or more gross body movements in 30 minutes

- **Fetal tone:**
  one episode of limb motion from flexion to extension to flexion

- **Amniotic fluid:**
  pocket of fluid measuring at least 2cm