Fetal Heart Rate Variability

Anesthetic Pearls: Drug Effects causing Changes in Fetal Heart Rate Variability

Fetal Heart Rate Variability is one of the most important methods used to determine intrauterine fetal health and wellbeing.

Fetal Heart Monitoring Definitions:

A. Normal Pattern:
- Periodic Changes
- Heart rate of 120-160 beats/min.
- Beat to beat variability is present (long-term variability band width is between 6 - 25 bpm)
- There are no decelerative periodic changes below baseline levels (there may be periodic accelerations).

B. Early Deceleration:
- Onset, nadir, and recovery of the fetal heart rate to base line coincides with the onset, peak, and end of the uterine contraction.
- These are usually attributed to **fetal head compression**, although the stimulus causing early deceleration may be more ominous.

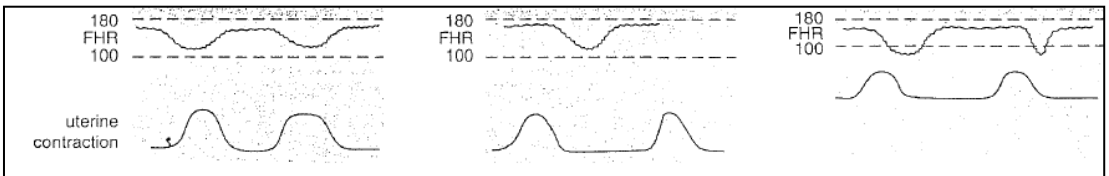
C. Late Deceleration:
- Smooth in configuration and are the mirror image of uterine contraction (just later).
- The onset, nadir, and recovery are delayed by 10 to 30 second after onset, apex, and resolution of the contraction.
- They are likely to be the consequence of **uteroplacental insufficiency**.

D. Variable Deceleration:
- Characterized by appearance of a dip which is variable in duration and shape from uterine contraction to contraction and are usually abrupt in onset and cessation.
- May be the consequence of **cord compression**.

Central Nervous System depressant drugs may cause a reduction in Fetal Heart Rate Variability for a transient period of time. The obvious concern is the effect each medication exerts on uterine activity.

1. **Demerol:** Onset 10 min, slow maximal effect at 25 min, and recovery in 30 min.
2. **Morphine:** Onset 5 min, maximal effect at 25 min, and recovery in 30 min.
3. **Phenergan:** Onset 10 min, maximal effect at 25 min, and recovery in 30 min.
4. **Vistaril:** Onset 10 min, maximal effect at 25 min, recovery in 30 min, and unstructured offset.
5. **Magnesium Sulfate:** Causes a statistically significant increase in Fetal Heart Rate indices of variability. Onset at 10 min, peak at 15 min, and recovery in 30 min.

Key Point: Magnesium Sulfate is the only agent which uniformly decreases uterine activity while at the same time causing an increase in the Fetal Heart Rate indices of variability.



. Periodic patterns and their significance.

	Early Decelerations	Late Decelerations	Variable Decelerations
Cause	Head compression	Utero-placental insufficiency	Cord compression
Features	"U"-shaped onset with contraction	"U"-shaped onset after contraction starts	Shape varies Onset time varies
	Peaks with contraction	Peaks after contraction	Peak varies
	HR stays > 100	HR stays > 100	HR goes < 100
	O_2 not therapeutic	O_2 therapeutic	O_2 not therapeutic
	Atropine preventative		Atropine preventative