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Antenatal factors that increase the risk of fetal compromise

1. Oligohydramnios or polyhydramnios
2. Multiple pregnancy
3. Antepartum haemorrhage
4. Previous caesarean section
5. Hypertension or pre-eclampsia
6. Diabetes
7. Prolonged pregnancy
8. Intrauterine growth restriction
9. Induction of labor with prostaglandin/oxytocin
10. Regional anesthesia
11. Maternal pyrexia: ≥ 38°C
12. Meconium or blood-stained liquor
13. Pre-term labor
14. Uterine hyperstimulation

15 - Contractions last longer than 2 minutes, or 5 or more contractions in 10 minutes.
16 - Suspected chorioamnionitis or sepsis.
17 - Fresh vaginal bleeding that develops in labor, or blood-stained liquor .
18 - Maternal pulse over 120 beats a minute on 2 occasions 30 minutes apart.
19 - Confirmed delay in the first or second stage of labor

Intrapartum fetal surveillance

☆ Fetal Heart Rate Monitoring (FHR)

❖ Intermittent Auscultation
- Pinard stethoscope
- Handheld doppler device

* assess Fetal Heart Rate between Uterine Contractions.

- **Indication**: healthy women without risk factors
- **Method**: A baseline heart rate is assessed by listening and counting FHR between uterine contractions
- FHR is counted for 60 seconds. And is assessed at least every 15 minutes in the first stage of labor and every 5 minutes in the second stage.
- If abnormal, EFM is recommended

❖ Electronic fetal heart monitoring
- **Indication**: all situations where there is a high risk of fetal hypoxia/acidosis, also when abnormalities are detected during intermittent fetal auscultation
- **The electronic FHR monitor** is a device with two components. One establishes the FHR, and the other measures uterine contractions
- CTG has been shown to decrease the occurrence of neonatal seizures.
- EFM may be performed with an external or internal monitor

◆ External fetal monitor
- An ultrasound transducer transmits the FHR in beats per minute.
- **Pros**: 1.Non-invasive. 2.Does not require cervical dilatation or rupture of membranes.
- **Cons**: 1.Needs readjustment with maternal or fetal movements. 2.Difficult to obtain a clear tracing in obese women or those with polyhydramnios.

◆ Internal fetal monitor
- Performed with a spiral electrode inserted through vagina and cervix and attached to the fetal scalp.
- Internal uterine activity monitoring is done via an IUPC.
- **Indicated** when the external tracing is inadequate for accurate interpretation.
- **Contraindications** include placenta previa, face presentation, unknown presentation, HIV seropositivity, or active genital herpes.

* assess : ① Uterine Contractions ⟶ Normal resting tone (5-10 mmHg), During labor (10-15 mmHg), Pressure during Contrations (25-100 mmHg)

resting pressure > 20 mmHg ⟶ cause ↓ uterine perfusion

White (normal) ⟶ < 5 contractions in 10 minutes

Amber (suspicous) ⟶ ≥ 5 contractions in 10 minutes ⟶ ↓ resting time, hypertonus

② Baseline FHR ⟶ at rest (110-160 bpm) ⟶ Tachycardia, Bradycardia

White (normal) ⟶ stable (110-160 bpm)

Amber (suspicous) ⟶ ↑ of 20 bpm or more from the start of labor

Red (abnormal) ⟶ < 100 bpm or > 160 bpm

	Tachycardia	Bradycardia
Definition	A baseline value above 160 bpm lasting more than 10 minutes	A baseline value below 110 bpm lasting more than 10 minutes
Causes	1. Maternal pyrexia (most common) 2. Fetal hypoxia. 3. Medications (beta-agonist drugs) 4. Fetal arrhythmias (SVT) 5. Fetal anemia	1. Sudden drop in oxygenation, such as occurs with placental abruption 2. Decrease or cessation in umbilical blood flow, such as occurs with a prolapsed cord or uterine rupture 3. Maternal hypothermia, maternal hypotension, administration of beta-blockers, and fetal arrhythmias such as atrioventricular block are other possible causes
Management	1. Left lateral position 2. IV hydration 3. Oxygen 4. Stop oxytocin	1. Left lateral position 2. Increase IV hydration 3. Oxygen 4. Vaginal exam

③ FHR variability (Beat to Beat variation) ⟿ normally variable (5-25 bpm)
- ⟿ <5 bpm → minimal
- ⟿ 5-25 bpm → moderate
- ⟿ >25 bpm → marked

White (normal) ⟿ 5-25 bpm

Amber (suspicous) ⟿ <5 bpm for (30-50 minutes) or >25 bpm for (up to 10 minutes)

Red (abnormal) ⟿ <5 bpm for (>50 minutes) or >25 bpm for (>10 minutes) or Sinusoidal

❖ Hypoxia and acidosis, fetal sleep, medications, (e.g., narcotics, sedatives, b-blockers, betamethasone), prematurity, fetal tachycardia, and congenital anomalies decrease FHR variability.

④ Acceleration ⟿ normally FHR accelerate with Movement

⑤ Deceleration ⟿ abnormal

White (normal) ⟿ No decelerations or

Early decelerations or

Variable decelerations with No concerning characteristics

Amber (suspicous) ⟿ Repetitive Variable decelerations with Any concerning characteristics for <30 minutes or

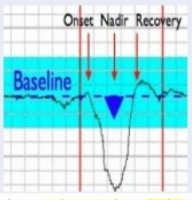
Variable decelerations with Any concerning characteristics for >30 minutes or

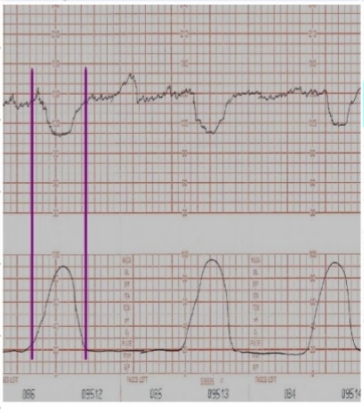
Repetitive Late decelerations for <30 minutes

Red (abnormal) ⟿ Repetitive Variable decelerations with Any concerning characteristics for >30 minutes or

Repetitive Late decelerations for >30 minutes or

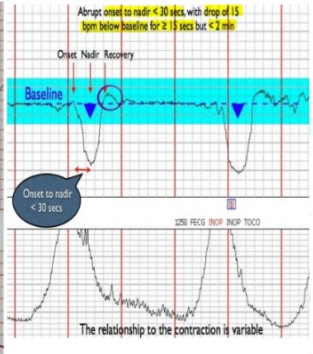
Single Prolonged decelerations lasting for 3 minutes or more

	Early Decelerations	Variable Decelerations	Late Decelerations	Prolonged Decelerations	Sinusoidal Decelerations
Cause	Caused by fetal head compression and do not indicate fetal hypoxia/acidosis	Caused by chemoreceptor stimulation secondary to cord compression	Found in association with uteroplacental insufficiency	They indicate hypoxia	It occurs in association with severe fetal anemia
Notes	• Gradual decrease in the FHR and return to baseline associated with uterine contraction • Uterine contraction → head compression → vagal stimulation → deceleration • The onset, nadir, and recovery of the decelerations coincide with the beginning, peak, and ending of the contraction	• Most common type • It is unrelated to uterine contractions, abrupt onset, recovery stage is seen (increase in FHR above the basal FHR after the end pf the deceleration) 	**Management** • Maternal left lateral position • Correct maternal hypotension with IV fluids • Stop oxytocin infusion • Administer O2 by mask • Vaginal examination • If persistent perform fetal scalp PH	• Usually lasting more than 3 minutes. • If associated with reduced variability, they indicate acute fetal hypoxia/acidosis and require emergent intervention.	**Severe fetal anemia** • anti-D alloimmunization • fetal-maternal hemorrhage • ruptured vasa previa A regular, smooth, undulating signal, resembling a sine wave



Early decelerations

Contraction يبدأ ويتوقف مع الـ



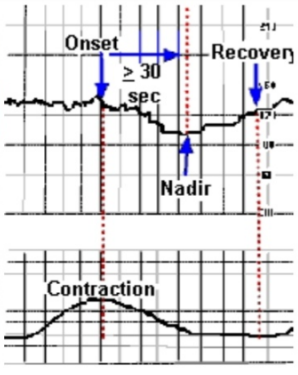
Variable decelerations

Contraction ليس له علاقة بال *

* onset to nadir <30 sec

* Variablity فيه

* shouldering فيه



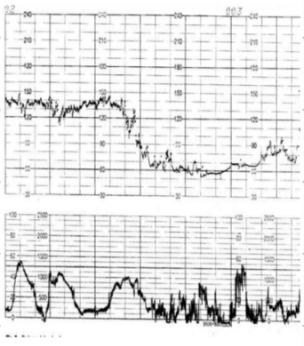
Late decelerations

Contraction يبدأ مع نهاية الـ

* onset to nadir >30 sec

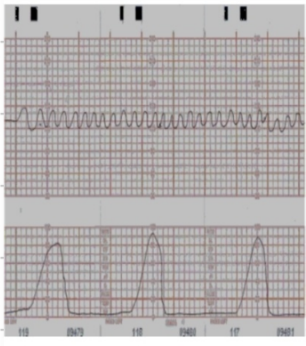
* Variablity مافيه

* shouldering مافيه



Prolonged decelerations

يستمر لأكثر من 3 دقائق



Sinusoidal decelerations

Interpretation of FHR

Interpretation	Baseline (bpm)	Variability	Decelerations	Accelerations
Reassuring	110-160	5-25	None	Present
Non-reassuring	161-180	< 5 for 30-90m	• Variable or Late decelerations, up to 90 minutes over 50% of contractions	–
Abnormal	Above 108 Bellow 100	<5 for over 90m	• Variable decelerations for more than 30 min despite conservative measure • Late decelerations over 30 minutes, occurring with over 50% of contractions • Single prolonged deceleration more than 3 min	–

	Category	Definition	Management
White	CTG is normal/reassuring	All 3 features are reassuring	Continue CTG and normal care
Amber	CTG is non- reassuring	1 non-reassuring feature	• Check temperature • Left-lateral position • Oral or intravenous fluids • Stopping oxytocin • Inform coordinating midwife and obstetrician
Red	CTG is abnormal and indicates further testing	1 abnormal feature or 2 non-reassuring features	• Same as non reassuring • Take Fetal Blood Sample FBS

☆2 Fetal blood sampling for pH and lactate (Scalp Sampling)

* used in cases of Abnormal CTG

❖ **Contraindications:** maternal infection, women seropositive to hepatitis B, C, or to HIV, suspected fetal blood disorders, uncertainty about the presenting part, preterm fetus.

Interpretation	pH	Lactate (mmol/L)
Normal	≥ 7.25	< 4.2
Repeat in 30 mins	7.21 – 7.24	4.2 – 4.8
Birth expedited	< 7.20	> 4.8
Urgent delivery	< 7.15	> 5.0

☆3 Fetal stimulation tests

Test	Recommendation
Digital stimulation	Digital stimulation of the fetal scalp during vaginal exam may be considered as an adjunct to FHM
Viboacoustic stimulation	Of value in non-reactive NST, but no prove in assessment during labour
Maternal glucose ingestion	No evidence to improve fetal wellbeing
Manual fetal manipulation	This procedure is not recommended

☆4 Fetal pulse oximetry

* monitor intrapartum fetal O_2 Saturation

* measure both Pulse Rate & Oxyhemoglobin Saturation

❖ Sensor is placed transvaginally through the cervix to rest against the fetal cheek or temple, requiring cervical dilatation (~ 2 cm or more) and ruptured amniotic membranes with a cephalic presentation.

☆5 Fetal Electrocardiogram Analysis

❖ Used in combination with standard EFM

❖ Specialized monitor with software collects both the familiar fetal heart rate and uterine activity signals, and the fetal ECG

❖ Interpretation is based on the observation that the fetal QRS and T wave change in relation to the metabolic state of the fetal heart