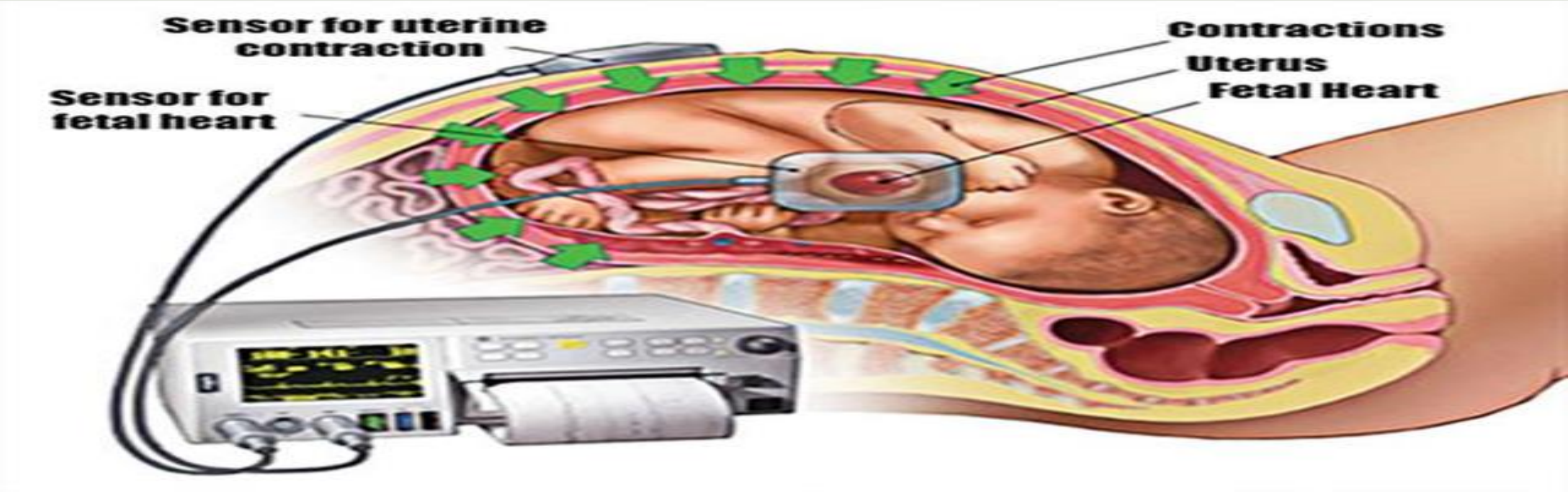
Somayeh khanjani,MD
Maternal Fetal Medicine Subspecialist
Isfahan University of Medical Sciences



ABNORMAL TRACING

Table 1 Description of cardiotocograph trace features

Overall care

- Make a documented systematic assessment of the condition of the woman and unborn baby (including cardiotocography [CTG] findings) every hour, or more frequently if there are concerns.
- Do not make any decision about a woman's care in labour on the basis of CTG findings alone.
- Take into account the woman's preferences, any antenatal and intrapartum risk factors, the current wellbeing of the woman and unborn baby and the progress of labour.
- Ensure that the focus of care remains on the woman rather than the CTG trace.
- Remain with the woman in order to continue providing one-to-one support.
- Talk to the woman and her birth companion(s) about what is happening and take her preferences into account.

Principles for intrapartum CTG trace interpretation

- When reviewing the CTG trace, assess and document contractions and all 4 features of fetal heart rate: baseline rate; baseline variability; presence or absence of decelerations (and concerning characteristics of variable decelerations* if present); presence of accelerations.
- If there is a stable baseline fetal heart rate between 110 and 160 beats/minute and normal variability, continue usual care as the risk of fetal acidosis is low.
- If it is difficult to categorise or interpret a CTG trace, obtain a review by a senior midwife or a senior obstetrician.

Accelerations

- The presence of fetal heart rate accelerations, even with reduced baseline variability, is generally a sign that the baby is healthy.

گروه I: الگوی طبیعی reassuring

ضربان قلب پایه: ۱۶۰ ـ ۱۱۰

۶ < Variability mode < ۲۵

Acceleration : وجود یا فقدان

early deceleration : وجود یا فقدان

Late or variable deceleration : فقدان

الگوی II: non reassuring

مواردی که در دو گروه I و III قرار نمی گیرند

الگوی غیر طبیعیIII

می توانند همراه با اسیدوز باشند اگر اصلاح نشوند منجر به مورتالیتی یا موربیدیتی می شوند

1-Absence of variability:
-Recurrent Late deceleration
- recurrent variable deceleration
- Bradycardia
2-Sinusoidal pattern

ادامه مانیتور الکترونیک دائم

ضمن آمادگی برای ختم بارداری

الگوی طبیعی

الگوی غیرطبیعی

هنگام زایمان : جنین زایمان را تحمل می کند و نیاز به مداخله نیست

ضمن آمادگی برای ختم بارداری

ـ در صورت استفاده از اکسی توسین قطع آن

ـ قرار دادن مادر به پهلو

ـ هیدراتاسیون مادر با ۱۰۰۰– ۵۰۰ میلی ایتر سرم نرمال سالین یا رینگر لاکتات

ـ تجویز اکسیژن ۱۰۰ در صد ۱۰ ـ ۸ لیتر د دقیقه با ماسک

– اگر علت تاکی کاردی جنین، تب مادر است: تجویز استامینوفن و مایعات

– اگر علت تاکی کاردی یا افت ضربان قلب، دکلمان است: ختم بارداری در کمتر از ۳۰ دقیقه

– معاینه واژینال

ختم حاملگی

Category III – Abnormal

Include either:

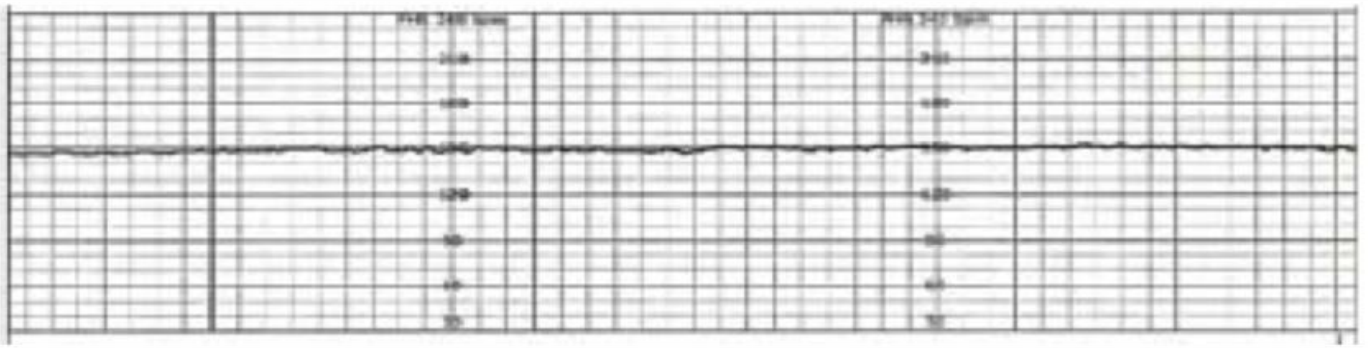
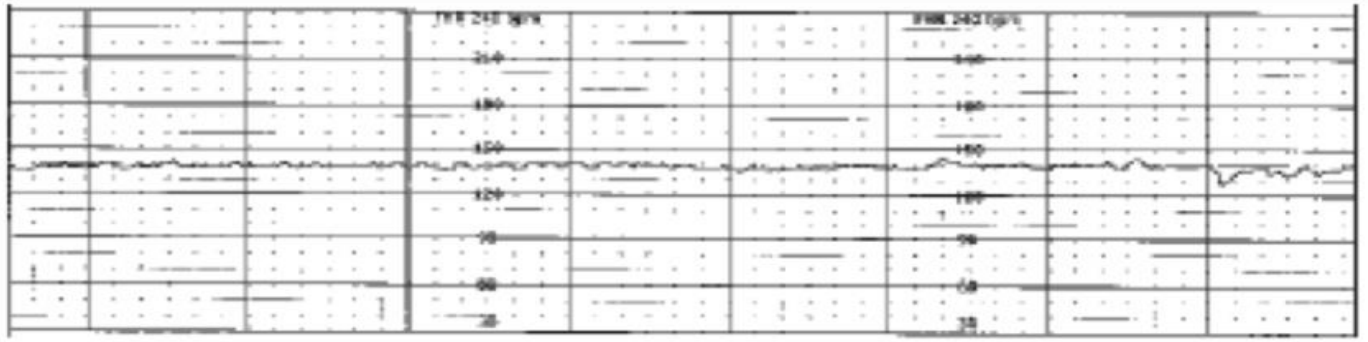
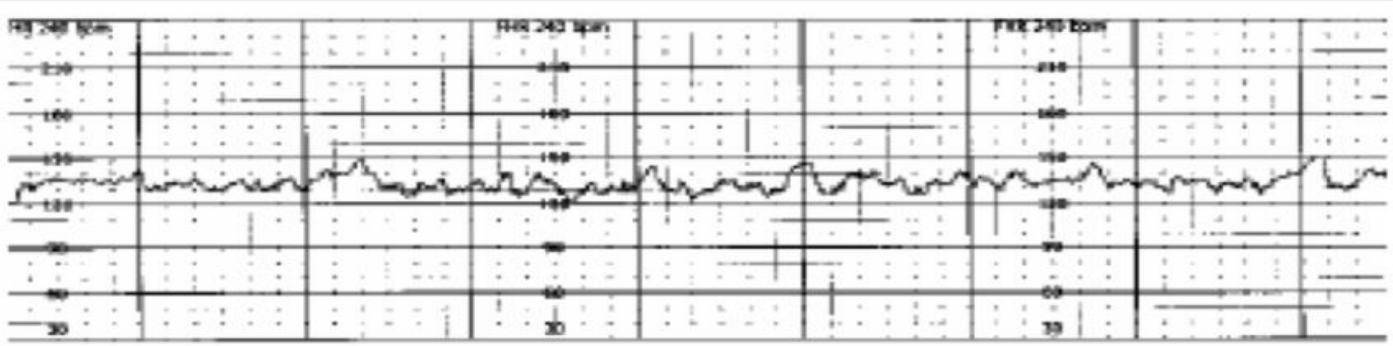
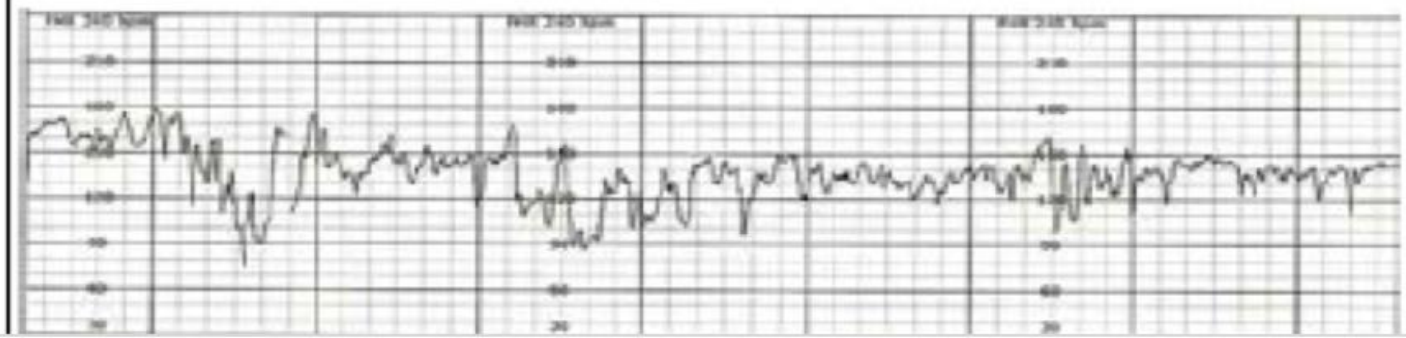
- Absent baseline FHR variability and any of the following:

  Recurrent late decelerations

  Recurrent variable decelerations

  Bradycardia

- Sinusoidal pattern

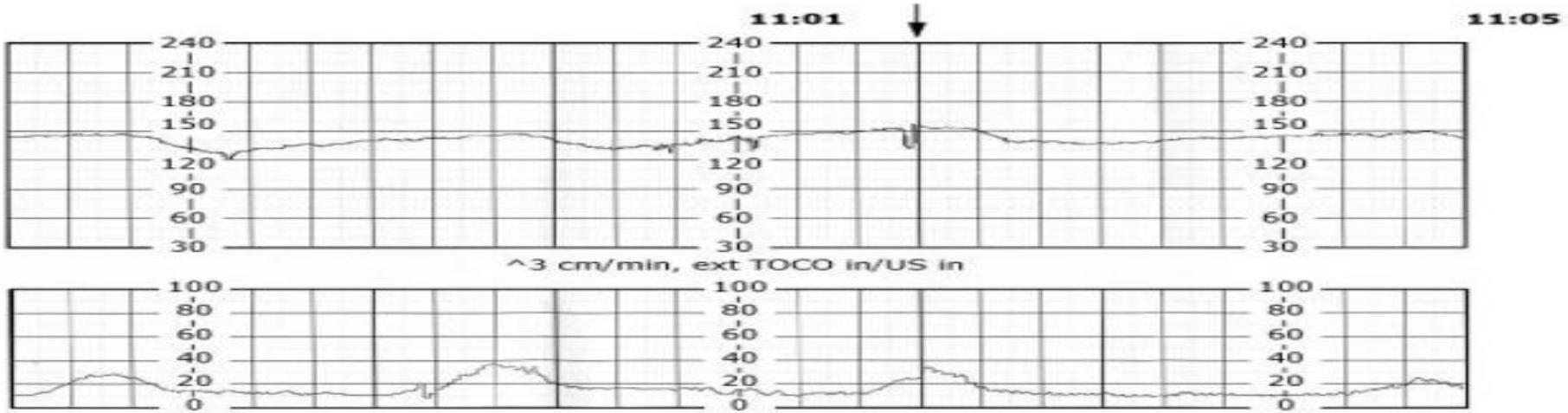
Undetectable from baseline **Absent**	
> Undetectable from baseline, ≤ 5 bpm **Minimal**	
6 – 25 bpm **Moderate**	
>25 bpm **Marked**	

In clinical practice, application of this definition has been challenging because of lack of interobserver agreement about absent versus minimal variability .

For this reason, management strategies have combined the categories of minimal and absent variability.

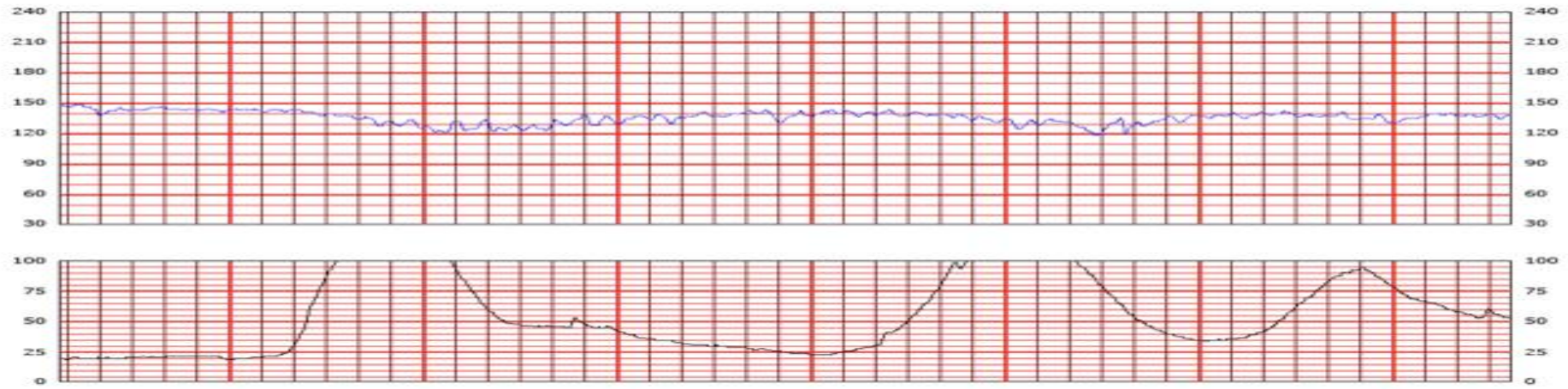
Late decelerations

Late decelerations



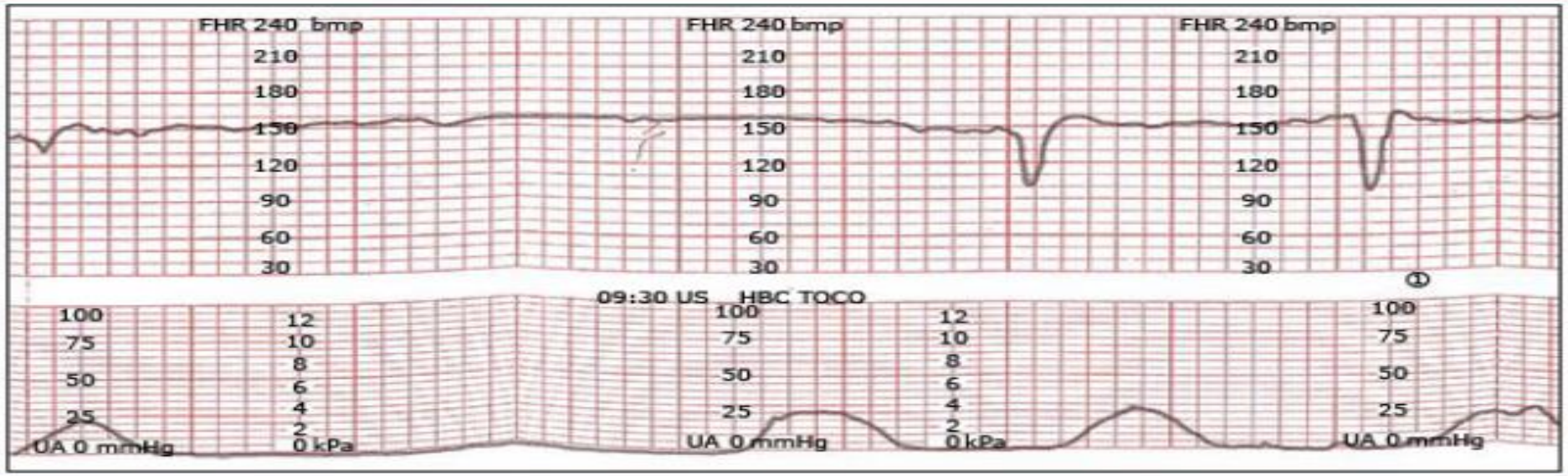
Late decelerations are characterized by a gradual decrease and return to baseline of the fetal heart rate associated with uterine contractions. The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction. The onset, nadir, and recovery usually occur after the onset, peak, and termination of a contraction. In this example, variability is minimal.

Late decelerations 2



Late decelerations are characterized by gradual decrease and return to baseline of the fetal heart rate associated with a uterine contraction. The deceleration is delayed in timing, with the nadir of the deceleration occurring after the peak of the contraction. The onset, nadir, and recovery usually occur after the onset, peak, and termination of a contraction. In this tracing, late decelerations have occurred after the first two contractions.

Variable decelerations

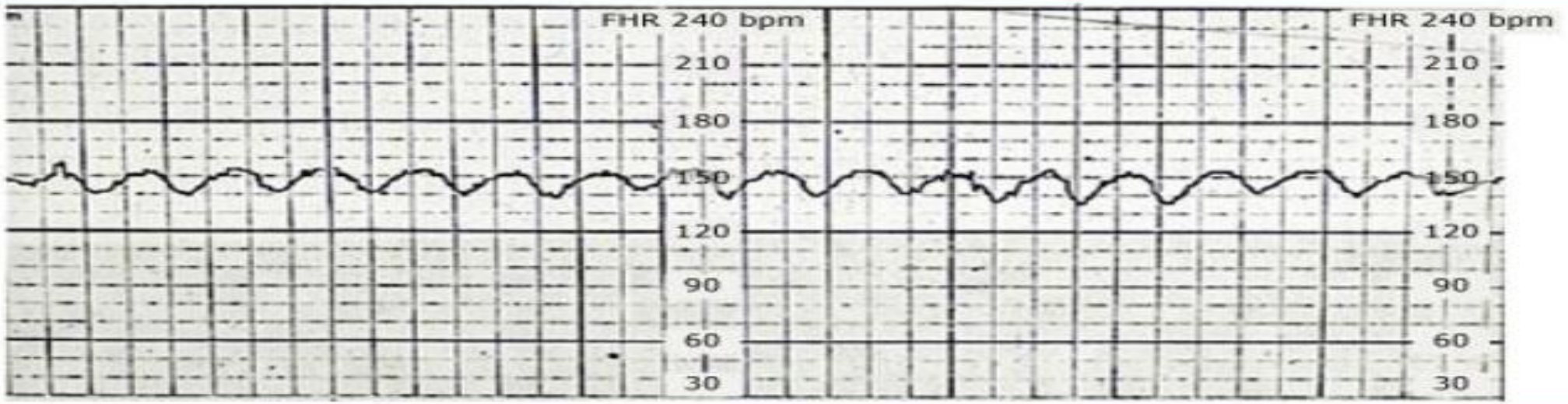


Recurrent variable decelerations with absent to minimal variability.

Late decelerations and variable decelerations are considered recurrent when:

they occur with at least 50 percent of uterine contractions in a 20-minute window:

Sinusoidal FHR pattern



Sinusoidal heart rate pattern in a patient presenting with spontaneous fetomaternal hemorrhage near term. The patient reported decreased fetal movement.

Sinusoidal FHR pattern –

is strongly associated with severe ***fetal anemia*** from any cause and may be one of the first manifestations of massive FMH .

A sinusoidal pattern may also be associated with hypoxia, acidosis, and asphyxia.

Of note, termed ***pseudosinusoidal***, however, there is no consensus on the exact definition of this pattern .

This pattern may be related to maternal opioid or sedative administration and is typically transient and associated with a good fetal outcome .

When the diagnosis of a sinusoidal versus pseudosinusoidal pattern is uncertain,

fetal well-being is suggested by periods of moderate variability, occasional FHR accelerations, and/or a reassuring biophysical profile score.

Management (sinusoidal pattern) :

True sinusoidal FHR patterns are exceedingly rare and thus intervention has not been studied in a systematic way.

The pattern has been associated with fetal anemia and some maternal narcotics.

Delivery is generally indicated if resuscitative measures do not improve the pattern.

Category III patterns were observed at some point in 0.1 percent of tracings.

However, category III patterns may also be caused by conditions unrelated to hypoxemia.

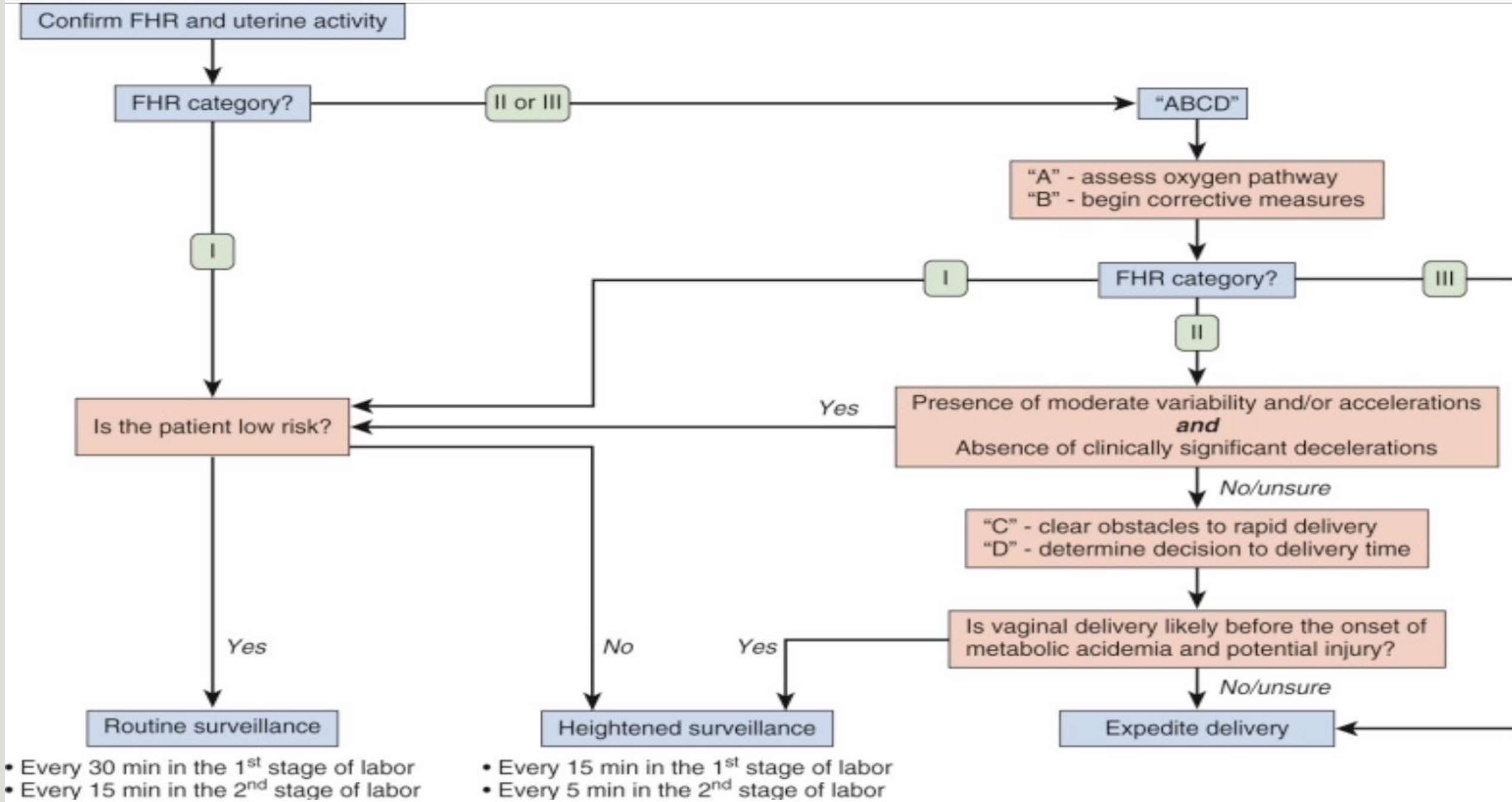
A category III tracing is considered ***abnormal*** because

studies have demonstrated that these findings are associated with an ***increased risk of fetal hypoxic acidemia***, which can lead to:

cerebral palsy and

neonatal hypoxic ischemic encephalopathy

Prompt evaluation, expeditious use of conservative measures to improve fetal oxygenation, and/or expeditious delivery are indicated when a category III pattern is observed because fetal/neonatal morbidity or mortality may occur if the pattern persists.


Confirm FHR and uterine activity
FHR category?
II or III
"ABCD"
"A" - assess oxygen pathway
"B" - begin corrective measures
I
I
FHR category?
III
II
Is the patient low risk?
Yes
Presence of moderate variability and/or accelerations
and
Absence of clinically significant decelerations
No/unsure
"C" - clear obstacles to rapid delivery
"D" - determine decision to delivery time
Is vaginal delivery likely before the onset of metabolic acidemia and potential injury?
Yes
No
Yes
No/unsure
Routine surveillance
Heightened surveillance
Expedite delivery
• Every 30 min in the 1st stage of labor
• Every 15 min in the 2nd stage of labor
• Every 15 min in the 1st stage of labor
• Every 5 min in the 2nd stage of labor

Description	Feature		
	Baseline (beats/ minute)	**Baseline variability (beats/ minute)**	**Decelerations**
Reassuring	110 to 160	5 to 25	None or early Variable decelerations with no concerning characteristics* for less than 90 minutes
Non-reassuring	100 to 109† OR 161 to 180	Less than 5 for 30 to 50 minutes OR More than 25 for 15 to 25 minutes	Variable decelerations with no concerning characteristics* for 90 minutes or more OR Variable decelerations with any concerning characteristics* in up to 50% of contractions for 30 minutes or more OR Variable decelerations with any concerning characteristics* in over 50% of contractions for less than 30 minutes OR Late decelerations in over 50% of contractions for less than 30 minutes, with no maternal or fetal clinical risk factors such as vaginal bleeding or significant meconium
Abnormal	Below 100 OR Above 180	Less than 5 for more than 50 minutes OR More than 25 for more than 25 minutes OR Sinusoidal	Variable decelerations with any concerning characteristics* in over 50% of contractions for 30 minutes (or less if any maternal or fetal clinical risk factors [see above]) OR Late decelerations for 30 minutes (or less if any maternal or fetal clinical risk factors) OR Acute bradycardia, or a single prolonged deceleration lasting 3 minutes or more

Abbreviation: CTG, cardiotocography.

* Regard the following as concerning characteristics of variable decelerations: lasting more than 60 seconds; reduced baseline variability within the deceleration; failure to return to baseline; biphasic (W) shape; no shouldering.

† Although a baseline fetal heart rate between 100 and 109 beats/minute is a non-reassuring feature, continue usual care if there is normal baseline variability and no variable or late decelerations.

concerning characteristics

- lasting more than 60 seconds
- reduced baseline variability within the deceleration
- failure to return to baseline
- biphasic (W) shape
- no shouldering

variable decelerations

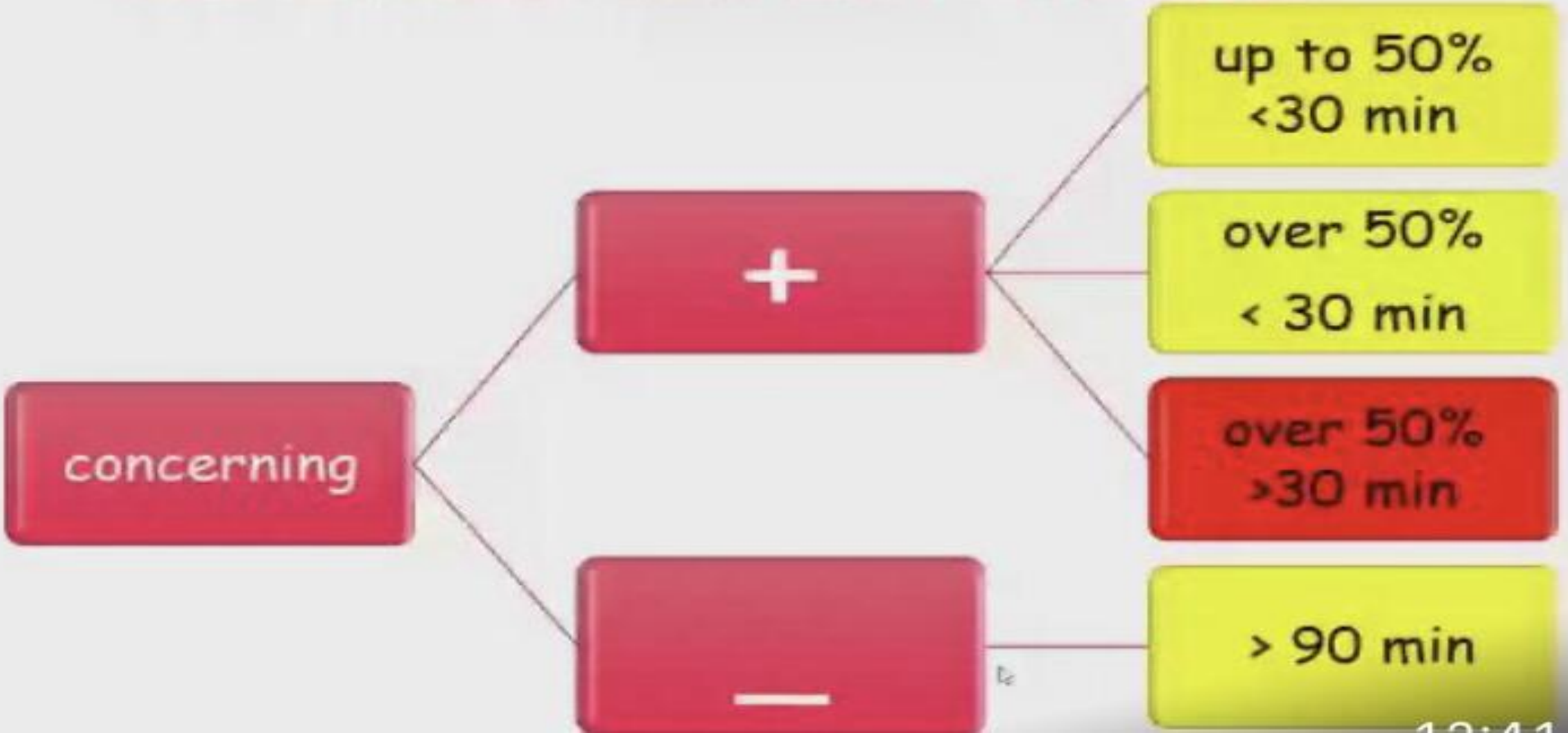


Table 2 Management based on interpretation of cardiotocograph traces

Category	Definition	Management
Normal	All features are reassuring	• Continue CTG (unless it was started because of concerns arising from intermittent auscultation and there are no ongoing risk factors; see recommendation 1.10.8) and usual care • Talk to the woman and her birth companion(s) about what is happening
Suspicious	1 non-reassuring feature AND 2 reassuring features	• Correct any underlying causes, such as hypotension or uterine hyperstimulation • Perform a full set of maternal observations • Start 1 or more conservative measures* • Inform an obstetrician **or** a senior midwife • Document a plan for reviewing the whole clinical picture and the CTG findings • Talk to the woman and her birth companion(s) about what is happening and take her preferences into account
Pathological	1 abnormal feature OR 2 non-reassuring features	• Obtain a review by an obstetrician **and** a senior midwife • Exclude acute events (for example, cord prolapse, suspected placental abruption or suspected uterine rupture) • Correct any underlying causes, such as hypotension or uterine hyperstimulation • Start 1 or more conservative measures* • Talk to the woman and her birth companion(s) about what is happening and take her preferences into account • If the cardiotocograph trace is still pathological after implementing conservative measures: – obtain a further review by an obstetrician **and** a senior midwife – offer digital fetal scalp stimulation (see recommendation 1.10.38) and document the outcome • If the cardiotocograph trace is still pathological after fetal scalp stimulation: – consider fetal blood sampling – consider expediting the birth – take the woman's preferences into account

Description	Feature		
	Baseline (beats/ minute)	Baseline variability (beats/ minute)	Decelerations
Reassuring	110 to 160	5 to 25	Nc Ve
Non-reassuring	100 to 109† OR 161 to 180	Less than 5 for 30 to 50 minutes OR More than 25 for 15 to 25 minutes	Ve Of Ve or Of Ve 30 Of La du
Abnormal	Below 100 OR Above 180	Less than 5 for more than 50 minutes OR More than 25 for more than 25 minutes OR Sinusoidal	Ve (de Of La Of Ac

Category	Definition
Normal	All features are reassuring
Suspicious	1 non-reassuring feature AND 2 reassuring features
Pathological	1 abnormal feature OR 2 non-reassuring features

es

es

12:40

Category	Definition	Management
Normal	All features are reassuring	• Continue CTG (unless it was started because of concerns arising from intermittent auscultation and there are no ongoing risk factors; see recommendation 1.10.8) and usual care • Talk to the woman and her birth companion(s) about what is happening
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Need for urgent intervention	Acute bradycardia, or a single prolonged deceleration for 3 minutes or more	• Urgently seek obstetric help • If there has been an acute event (for example, cord prolapse, suspected placental abruption or suspected uterine rupture), expedite the birth • Correct any underlying causes, such as hypotension or uterine hyperstimulation • Start 1 or more conservative measures* • Make preparations for an urgent birth • Talk to the woman and her birth companion(s) about what is happening and take her preferences into account • Expedite the birth if the acute bradycardia persists for 9 minutes • If the fetal heart rate recovers at any time up to 9 minutes, reassess any decision to expedite the birth, in discussion with the woman

Abbreviation: CTG, cardiotocography.

* If there are any concerns about the baby's wellbeing, be aware of the possible underlying causes and start one or more of the following conservative measures based on an assessment of the most likely cause(s): encourage the woman to mobilise or adopt an alternative position (and to avoid being supine); offer intravenous fluids if the woman is hypotensive; reduce contraction frequency by reducing or stopping oxytocin if it is being used and/or offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg).

Table 15. Classification of intrapartum EFM tracings

	Normal Tracing Previously "Reassuring"	Atypical Tracing Previously "Non-reassuring"	Abnormal Tracing Previously "Non-reassuring"
Baseline	110–160 bpm	Bradycardia 100–110 bpm Tachycardia > 160 for > 30 min to < 80 min. Rising baseline	Bradycardia < 100 bpm Tachycardia > 160 for > 80 min. Erratic baseline
Variability	6–25 bpm ≤ 5 bpm for < 40 min.	≤ 5 bpm for 40–80 min.	≤ 5 bpm for > 80 min. ≥ 25 bpm for > 10 min. Sinusoidal
Decelerations	None or occasional uncomplicated variables or early decelerations	Repetitive (≥ 3) uncomplicated variable decelerations Occasional late decelerations Single prolonged deceleration > 2 min. but < 3 min.	Repetitive (≥ 3) complicated variables: deceleration to < 70 bpm for > 60 secs. loss of variability in trough or in baseline biphasic decelerations overshoots slow return to baseline baseline lower after deceleration baseline tachycardia or bradycardia Late decelerations > 50% of contractions Single prolonged deceleration > 3 min. but < 10 min.
Accelerations	Spontaneous accelerations present (FHR increases >15 bpm lasting > 15 seconds (< 32 weeks' gestation increase in the FHR > 10 bpm lasting >10 seconds) Accelerations present with fetal scalp stimulation	Absence of acceleration with fetal scalp stimulation	Usually absent*
ACTION	EFM may be interrupted for periods up to 30 min. if maternal-fetal condition stable and/or oxytocin infusion rate stable.	Further vigilant assessment required, especially when combined features present.	ACTION REQUIRED Review overall clinical situation, obtain scalp pH if appropriate/prepare for delivery.

*Usually absent, but if accelerations are present, this does not change the classification of tracing.

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Management (nonsinusoidal patterns)

If scalp stimulation and in utero resuscitation promptly lead to resolution of the abnormal tracing, operative delivery can be averted.

If scalp stimulation does not result in an FHR acceleration and there is no improvement in the FHR tracing after resuscitative measures, delivery should be expedited since a 10-minute period of a category III pattern, particularly with a large total area of deceleration, has a significant association with academia.

However, the time from this decision to delivery should consider the health of both mother and fetus: there may be circumstances (eg, difficult maternal airway, maternal coagulopathy, severe obesity) when safe delivery cannot be performed expeditiously.

It is also important to consider the probable underlying cause(s) of the abnormal pattern, as urgent delivery is necessary in some acute settings, such as uterine rupture, visible cord prolapse, or severe abruption, but may be delayed in other settings to correct for maternal acute illness, such as sepsis, trauma, or diabetic ketoacidosis.

Physician judgment plays an important role in terms of assessing the probable cause of the abnormal tracing, choosing the appropriate interventions for the specific patient setting, assessing the response to those interventions, and timing of cesarean or other operative delivery if the abnormal pattern persists.

In utero resuscitation —

The following general measures for management of nonsinusoidal abnormal patterns are aimed at improving uteroplacental perfusion and maternal/fetal oxygenation.

Multiple interventions are generally applied simultaneously:

Reposition: the patient onto her left or right side to relieve cord compression and/or improve uteroplacental perfusion . If ineffective and the tracing shows recurrent variable decelerations, a prolonged deceleration, or bradycardia, try a knee-chest or all fours position to relieve a possible cord compression.

Administer an intravenous (IV) fluid bolus:(eg, 500 to 1000 mL of Lactated Ringer or normal saline solution). An intravenous fluid bolus of a non-glucose containing crystalloid solution can improve placental blood flow and fetal oxygenation if the patient is hypovolemic from prolonged lack of oral or intravenous intake, vomiting, or sympathetic blockade, and thus may improve fetal oxygenation . However, fluids should be administered cautiously in patients at increased risk of volume overload, such as women with preeclampsia, cardiac disease, or receiving beta-adrenergic drugs for tocolysis. No randomized trials have evaluated the effect of intravenous fluid boluses alone on fetal heart abnormalities.

Discontinue uterotonic drugs: to improve uteroplacental blood flow, which is reduced during contractions. Discontinuation of uterotonic drugs often provides adequate uterine relaxation to correct FHR abnormalities in patients receiving these drugs.

Tachysystole (defined as more than 5 contractions in 10 minutes, averaged over a 30-minute window), prolonged contractions, or any contractile activity that exceeds the compensatory mechanism of the specific fetoplacental unit can reduce uteroplacental blood flow.

If the FHR pattern persists after discontinuation of uterotonic drugs or in the absence of their use, **administer a tocolytic**(eg, terbutaline 250 mcg subcutaneously), unless abruption is suspected.

Uterine hypertonus may be reversed with one or two doses of intravenous (IV) nitroglycerin (50 mcg). The onset of uterine relaxation occurs within 30 seconds to two minutes and lasts only a minute or two

Uterine relaxation may improve uteroplacental blood flow and, in turn, fetal oxygenation, but a clear improvement in maternal and neonatal outcome has not been demonstrated

Supplemental oxygen (eg, 8 to 10 L/min of oxygen via nonrebreather mask). Although maternal administration of oxygen has been a standard practice when FHR abnormalities occur, the benefits and potential harms (generation of free radicals) of oxygen therapy are controversial, especially when the mother is not hypoxemic . Thus, oxygen treatment for in utero resuscitation should be considered of uncertain benefit. Based on the following evidence, the authors and editors do not administer oxygen to normoxemic laboring women with FHR abnormalities.

January 4, 2021

Maternal Oxygen Supplementation Compared With Room Air for Intrauterine ResuscitationA Systematic Review and Meta-analysis

Nandini Raghuraman, MD, MS[1]; Lorene A. Temming, MD, MSCI[2]; Michelle M. Doering, MLIS[3]; et al

A limitation of the analysis was that it did not specifically assess use of oxygen for management of abnormal FHR tracings. If maternal hyperoxemia is achieved, a therapeutic effect on recurrent late decelerations due to impaired placenta-to-fetus oxygen delivery is plausible; however, data from underpowered randomized trials have not shown a statistically significant improvement

Even if improved delivery of oxygen to the fetal tissues is beneficial in some cases, the underlying causes of fetal hypoxemia need to be addressed (eg, maternal hypotension or hypovolemia, cord compression, tachysystole, abruption), as fetal acidemia will not be corrected by maternal oxygen administration alone

Consult the anesthesia team
in patients who were recently given neuraxial drugs for labor pain. If maternal hypotension secondary to recent epidural dosing is identified, administration of an alpha-adrenergic agonist (such as phenylephrine or ephedrine) and an intravenous fluid bolus is corrective and will improve uteroplacental blood flow. These medications should be administered by someone with expertise in the dosing and side effects of these medications

. Whether medication is indicated even in the absence of hypotension is an individualized decision as reduced placental perfusion from sympathetic blockade can occur without marked changes in maternal blood pressure.

General approach —
It is hypothesized that detection of potential fetal decompensation and timely and effective intervention before acidemia becomes severe can prevent perinatal/neonatal morbidity or mortality .

Therefore, when an abnormal tracing is identified, preparations for operative delivery should be made while initiating resuscitative measures to improve uteroplacental perfusion and oxygen delivery.


Thank
You