FETAL HEART TRACES 2.0

A. Introduction

The rationale behind Electronic Fetal Monitoring (EFM) or **Cardiotocography (CTG) in fetuses of a viable gestation and weight** is to screen for fetal hypoxia which can lead acidosis and acidaemia with resultant neurological handicap, and which can potentially be prevented or improved with urgent delivery.

Intrapartum fetal acidaemia can only be confirmed by fetal blood sampling which is rarely practised nowadays due to the HIV pandemic.

Routine antenatal CTG monitoring has no predictive capability and should not be used in low-risk pregnancies.

Electronic fetal monitoring can be done in labouring women with a low- or high-risk pregnancy.

B. Indications for frequent antenatal CTG (more than once a day)

- Intra-uterine growth restriction (IUGR) with absent or reversed end diastolic flow in the umbilical artery or high PI in the ductus venosus fetal Doppler interrogation.
- Pre-eclampsia
- Antepartum haemorrhage of unknown origin (as long as bleeding continues)

C. Indications for daily antenatal CTG in admitted patients

- Preterm pre-labour rupture of membranes (PPROM)
- All other patients could get daily CTG's for reassurance

D. Indications for continuous electronic fetal monitoring during labour

Labour abnormalities:

- Induced labour
- Augmented labour
- Prolonged labour

- Epidural
- Previous Caesarean section / VBAC (Vaginal birth after Caesarean section)
- Abnormal uterine activity

- **Suspected fetal distress in labour**
  - Meconium-stained liquor
  - Suspicious fetal heart rate on auscultation
  - Abnormal fetal heart rate on admission CTG
  - Intrapartum haemorrhage
  - Intrauterine infection
- **Fetal problems**
  - Multiple pregnancies - monitor all fetuses simultaneously and make sure that each trace is from a separate fetus.
  - Small for gestational age fetuses
  - Preterm labour
  - Post-term pregnancy
  - Oligohydramnios
  - Rhesus isoimmunisation
  - Poor obstetric history (especially previous stillbirth)
- **Maternal medical disease**
  - Hypertension
  - Diabetes Mellitus
  - Cardiac disease
  - Hemoglobinopathy
  - Severe Anaemia
  - Hyperthyroidism
  - Auto-Immune conditions
  - Renal disease
  - Pregnancy conceived by Assisted Reproduction

E. When reviewing CTG traces, assess all 5 features

- Baseline fetal heart rate
- Baseline variability
- Presence or absence of decelerations

- Presence of accelerations
- Absence or presence of uterine activity, frequency, duration, coupling

Baseline fetal heart rate

- This is usually between 110 and 160 beats/minute
- A baseline fetal heart rate between 100 and 109 beats/minute (having confirmed that this is not maternal heart rate) with normal baseline variability and no variable or late decelerations is normal but requires careful further observation.
- If the baseline fetal heart rate is between 161 and 180 beats/minute with no other non-reassuring or abnormal features on CTG:
    - Think about possible underlying causes such as infection, and investigate accordingly (check time frame)
    - Check the woman's temperature and pulse
    - Offer fluids and Paracetamol if she is febrile
    - If the temperature and pulse are normal, the risk of fetal acidosis is low but further close monitoring is indicated.
- A heart rate below 100 or above 180 bpm is considered abnormal and requires action.
- If the fetal heart rate is ≥ 160 bpm with decelerations, expedite delivery.
- If there is a single prolonged deceleration of the fetal heart rate for 3 minutes or more (acute bradycardia), prepare for urgent delivery.

Baseline variability

- The baseline variability should normally be 5 – 25 beats/minute
- **The following may cause a reduction in baseline variability (< 5bpm)**
    - Hypoxia
    - Drugs administered to the mother e.g., Opioids, steroids and magnesium sulphate
    - Prematurity
    - Sleep cycle activity – Not more than 50 minutes
- Intermittent periods of reduced baseline variability (< 5 beats per minute) are normal, especially during periods of sleep ("quiet state"), when preceded by a normal CTG and not associated with decelerations or a rising baseline. In normal fetuses, such periods can last

up to 50 minutes, but the CTG needs to be continued to confirm return to a more active pattern.

- If there is reduced baseline variability (< 5 bpm) for 30 minutes or increased variability (> 25 bpm) for 15 minutes, the doctor should be informed and the CTG continued.
- Reduced variability is considered abnormal if it lasts more than 50 minutes.
- Increased variability is considered abnormal if it lasts more than 25 minutes.
- A sinusoidal pattern (regular, smooth, undulating pattern, with an amplitude of 5-15 bpm and frequency of 3-5 cycles per minute, without accelerations) is ominous and usually pre-terminal, and needs immediate action.

Decelerations

When describing decelerations in fetal heart rate, specify:

- The depth and duration of the individual deceleration (at least 15 bpm and 15 seconds)
- Their timing in relation to the peaks of the contractions
- Whether or not the fetal heart rate returns to baseline
- For how long they have been present
- Whether they occur with over 50% of the contractions or less than 50%
- Whether they are **'early'**, '**variable**' or **'late'**
- **Early decelerations** are 'mirror images' of the contractions (in timing, not shape) and are usually associated with head compression and not with fetal compromise
- **Variable decelerations** that begin with the onset of a contraction (rapid drop, onset to nadir < 30 seconds) are quite common and usually caused by cord compression.
    - They can be a normal feature, if the pattern has not been present for more than 90 minutes and there are no concerning features. Ask the woman to change position or mobilise.
    - Caution is advised when such non-concerning ("typical") variable decelerations continue for more than 90 minutes.
    - Concerning features with variable decelerations include the heart rate dropping to below 60 bpm and taking > 60 seconds to recover, reduced variability within the deceleration, failure to return to baseline, a biphasic shape (W) and no shouldering (before or after the deceleration). It is considered abnormal if these types of variable decelerations ("atypical") occur with more than 50% of

contractions over a 30 minutes period, and even more so if accompanied by a fetal tachycardia or reduced variability.

- **Late decelerations** start after the peak of a contraction and often have a slow return to baseline, typically more than 30 seconds after the end of the contraction (gradual onset and gradual return).
    - In the presence of clinical risk factors (e.g., meconium, bleeding) or if the late decelerations persist longer than 30 minutes, delivery needs to be expedited.
- The longer and the deeper the individual decelerations with late recovery, the more likely the presence of fetal acidosis (particularly if the decelerations are accompanied by tachycardia and/or reduced baseline variability).
- A fetal tachycardia with variable or late decelerations is considered to be fetal distress and requires immediate delivery.

Accelerations

The presence of fetal heart rate accelerations (abrupt onset (start to peak < 30 sec) of a rise in FHR of more than 15 bpm above baseline, lasting for at least 15 seconds (before 32 weeks 10 bpm for 10 seconds) and maximum 10 minutes), is generally a sign that the baby is well, even when there is reduced baseline variability.

FLOW CHART

Assess all 5 features

1. Baseline fetal heart rate
2. Baseline variability
3. Presence or absence of decelerations
4. Presence of accelerations
5. Uterine activity

Baseline fetal heart rate

1. Between 110 and 160 bpm
2. 100 – 109 bpm with no other abnormal features is normal but requires careful monitoring
3. 161 – 180 bpm with no other non-reassuring or abnormal features = consider underlying conditions such as infection and monitor carefully
4. Abnormal if < 100 bpm or > 180 bpm

Baseline variability

1. Normally 5 - 25/minute
2. Periods of reduced variability can be normal up to 50 minutes
3. Inform doctor if reduced variability for longer than 30 min or increased variability for longer than 15 min
4. Abnormal if reduced variability > 50 minutes or increased variability > 25 min
5. 5.Sinusoidal pattern: expedite delivery

Accelerations

Presence of accelerations is generally a sign that the fetus is well

Decelerations

1. Describe the deceleration in detail
2. **Early deceleration:** mirror image of contractions (associated with head compression) – considered normal
3. **Typical variable deceleration:** begins with contraction and can be normal (usually due to cord compression) – consider non-reassuring if present for > 90 minutes
4. **Atypical variable deceleration:** with slow return of fetal heart rate to baseline, loss of variability during the deceleration, biphasic, to < 60 bpm, > 60 seconds – consider non-reassuring if > 30 minutes OR with > 50% of contractions; expedite delivery if > 30 min AND > 50% of contractions.
5. **Late deceleration:** starts after the peak of a contraction and often has a slow return to baseline - expedite delivery if present for > 30 minutes.
6. **Single deceleration > 3 minutes:** expedite delivery
7. **Tachycardia with decelerations** considered as fetal distress and expedite delivery
8. **Always consider risk profile, which may warrant action sooner**

Interpretation of CTG traces (based on NICE Guidelines)

N.B. It is not always possible or easy to interpret or categorise every CTG tracing**.**

CATEGORY	DEFINITION
Normal	**All four features are classified as reassuring** – reassure parents
Suspicious	**One feature is classified as non-reassuring and the remaining features are classified as reassuring:** ○ Continue monitoring and review CTG frequently to ensure it does not become pathological ○ Careful assessment by obstetrician or midwife, for probable causes ○ Correction of cause where possible ○ Plan further care, taking the whole picture into account (risk profile, progress of labour, parental preference) ○ Communicate concerns and plan to parents
Pathological	**Two or more features are classified as non-reassuring or one or more are classified as abnormal:** ○ Continue monitoring ○ Urgent review by obstetrician or senior midwife ○ Exclude acute events ○ Correct underlying causes if possible ○ Improve fetal oxygenation (e.g., left lateral, fluid bolus, stop oxytocics, give tocolytic) ○ Expedite delivery if CTG remains pathological ○ Communicate concerns and plan to parents For acute bradycardia, or a single prolonged deceleration for 3 minutes or more: prepare for urgent delivery while continuing supportive measures. Reassess if the CTG pattern recovers within 9 minutes, otherwise deliver

Suspicious category needs to be assessed in the context of the presence of additional risk factor that may warrant more urgent delivery. **Situational awareness** is crucial in the decision making.

Antenatal risk factors:

1. Twins
2. Assisted reproduction (IVF, etc.)
3. Advanced maternal age > 35yr
4. BMI > 30 kg/m^2
5. Post dates

6. Other maternal or fetal conditions

Intrapartum risk factors:

1 Oxytocin, misoprostol
2 Meconium
3 Pyrexia > 37.5ºC (some cases because of epidural)

MANAGEMENT OF CTG CHANGES AFTER EPIDURAL ADMINISTRATION

- Turn mother to the left lateral position
- Stop Oxytocin
- Administer Oxygen via face mask only if mother's saturation is low
- Correct Supine hypotension – Follow protocol
- If not correcting after 15 – 20 minutes, expedite delivery by Caesarean section if not imminently deliverable

References:

1. Adam, S. Soma-Pillay, P. Obstetric Essentials. 2018. 3rd Edition p45-47. University of Pretoria
2. NICE Guideline: Intrapartum care, Fetal monitoring during labour. March 2019 https://www.nice.org.uk/guidance/cg190/resources/interpretation-of-cardiotocograph-traces-pdf-248732173
3. FIGO CONSENSUS GUIDELINES ON INTRAPARTUM FETAL MONITORING Safe Motherhood and Newborn Health Committee Co-ordinator: Diogo Ayres-de-Campos

Authorship

This guideline was drafted by a clinical team from Mediclinic and reviewed by a panel of experts from SASOG and the BetterObs clinical team in 2019, and was revised by the scientific subcommittee of BetterObs in 2022. All attempts were made to ensure that the guidance provided is clinically safe, locally relevant and in line with current global and South African best practise. Succinctness was considered more important than comprehensiveness.

All guidelines must be used in conjunction with clinical evaluation and judgement; care must be individualised when appropriate. The writing team, reviewers and SASOG do not accept accountability for any untoward clinical, financial or other outcome related to the use of these documents. Comments are welcome and will be used at the time of next review.

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