Fetal compromise in labour

Concern for the wellbeing of the fetus is one of the most common reasons for medical intervention during labour.

The fetus may have been compromised before labour, and the reduction in placental blood flow associated with contraction may reveal this and over time lead to fetal hypoxia and eventually acidosis.

Fetal compromise may present as fresh meconium staining to the amniotic fluid or an abnormal CTG.

However, neither of these findings confirms fetal hypoxia or acidosis.

Meconium can be passed for physiological reasons, such as fetal maturity, and it is well recognized that the abnormal CTG carries a very high false-positive rate for the diagnosis of fetal compromise.

‘Suspected fetal compromise’ is therefore a more accurate term than ‘fetal distress’.

In many cases,babies delivered by caesarean section or instrumental birth for suspected fetal compromise are found to be in good condition.

Recognition of fetal compromise

Meconium staining of the amniotic fluid is considered significant when it is either thick or tenacious, dark green, bright green or black.

Any particulate meconium should also be of concern. Thin and light meconium is more likely to represent fetal gut maturity than fetal compromise.

However, when any meconium is seen in the liquor, consideration should be given to starting continuous EFM with the CTG and this is mandatory if the meconium is thick and dark.

Another reason for commencing the CTG is if a change in the heart rate is noted with intermittent auscultation, particularly fetal tachycardia, bradycardia or FHR decelerations.

The CTG may have already been recorded throughout the labour because of underlying risk factors that predate the labour

Accurate interpretation of the CTG is a skill that needs to be practised, and there is significant interobserver variability.

There are national guidelines, which should be used to classify the CTG as ‘normal’, ‘suspicious’ or ‘pathological’.

Management of possible fetal compromise

A number of resuscitative manoeuvres should be considered when a CTG is classified as ‘suspicious’.

These include

1.repositioning of the mother.
2.Intravenous fluids.
3.reducing or stopping the oxytocin infusion .
4.correction of epidural associated hypotension.

It is reasonable to continue observation of the CTG and more complex intervention is not required.

If a CTG becomes ‘pathological’,

these reversible factors should also be considered, but it is also important to carry out an immediate vaginal examination to exclude malpresentation and cord prolapse and to assess the progress of the labour.

If the cervix is fully dilated, it may be possible to deliver the baby vaginally using the forceps or ventouse.

Alternatively, if the cervix is not fully dilated, a fetal blood sampling can be considered.

This is usually only possible when the cervix is dilated 3 cm or more.

1.A normal result will permit labour to continue, although it may need to be repeated every 30–60 minutes if the CTG abnormalities persist or worsen.

2.An abnormal result mandates immediate delivery by caesarean section if the cervix is not fully dilated.

Fresh, thick meconium in the presence of a reassuring CTG is still a cause for concern, and although the labour may be allowed to continue, the threshold for intervention will be lowered and a paediatrician should be present at delivery.

Resuscitating the fetus in labour

1.Maternal dehydration and ketosis can be corrected with intravenous fluids.

2.Maternal hypotension secondary to an epidural can be reversed by a fluid bolus, although a vasoconstrictor such as ephedrine is occasionally necessary.

3.Uterine hyperstimulation from excess oxytocin can be treated by turning off the infusion temporarily and using tocolytic drugs, such as terbutaline.

4.Venocaval compression and reduced uterine blood flow can be eased by turning the woman into a left lateral position.

Fetal blood sampling procedure

Explanation is given and consent obtained from the woman.
She is asked to lie in the left lateral position.

An amnioscope is inserted into the vagina and its distal end is applied to the fetal head.

The scalp is cleaned and a small cut is made using a blade with a guard.
The resulting blood is collected into a microtube.

The amount of blood required is approximately 0.25 ml.

Fetal blood sampling

- is used to improve the specificity of CTG in the detection of fetal hypoxia.
- It should be obtained if the trace is pathological, unless obvious immediate delivery may be required (e.g. bradycardia of <80 beats/ min for >3min).
- The woman should be in left lateral.

Interpretation of the FBS results

- *Normal (pH ≥ 7.25):* repeat FBS within 1h if CTG remains pathological.
- *Borderline (pH 7.21–7.24):* repeat FBS within 30min if CTG remains pathological.
- *Abnormal (pH 7.20):* immediate delivery

The base deficit can also be useful in interpretation of the fetal scalp pH.

A base excess of more than -12.0 mmol/l demonstrates a significant metabolic acidosis, with increasing risk of fetal neurological injury beyond this level.

More than one fetal scalp sample may be necessary over the course of the labour.

If an abnormal CTG persists in labour, then, despite normal values, fetal scalp sampling should be repeated every 60 minutes, or sooner if the CTG deteriorates.

If the result is borderline, it should be repeated no more than 30 minutes later.

Remember:

- It is estimated that 10% of CP is due to intrapartum hypoxia (the rest may be attributed to antenatal)

- Blood supply to the placental pool is restricted, with contractions (especially in the 2nd stage) placing a physiological strain on the fetus.

- Ability to withstand the stress is dependent on fetal reserve.

- A fetus that was coping in the antenatal period but has no extra reserve may decompensate in labour.

Intrapartum surveillance

The options for intrapartum surveillance are:

1• intermittent auscultation (IA)

2• continuous CTG, also known as electronic fetal monitoring (EFM).

On admission in labour, an assessment should be made to identify fetal and maternal risk factors

• If the woman has no risk factors she should be offered intermittent auscultation performed for a full minute after a contraction:

• at least every 15min in the 1st stage

• every 5min or after every other contraction in the 2nd stage.

Electronic fetal monitoring

Results in:

A• increase intervention and operative delivery rates

B• no marked decrease in CP.

Most likely because:

1• CTG is not specific enough in detecting fetal hypoxia

2• failure to consider the clinical situation

3• poor interpretation

4• delay in taking action

5• intrapartum hypoxia as a cause of CP is rare.

6• Additional tests, such as fetal scalp blood sampling in labour, are required to increase specificity.

Some centres use fetal ECG ST waveform analysis (STAN) to improve the positive predictive value of the CTG.

Antenatal risk factors that should prompt recommendation of EFM in labour

Maternal

- Previous CS.
- Cardiac problems.
- Pre-eclampsia.
- Prolonged pregnancy (>42wks).
- Prelabour rupture of membranes (>24h).
- Induction of labour.
- Diabetes.
- Antepartum haemorrhage.
- Other significant maternal medical conditions.

Fetal

- IUGR.
- Prematurity.
- Oligohydramnios.
- Abnormal Doppler velocimetry.
- Multiple pregnancy.
- Meconium-stained liquor.
- Breech presentation

Intrapartum risks requiring EFM

1• Oxytocin augmentation.
2• Epidural analgesia.
3• Intrapartum vaginal bleeding.
4• Pyrexia >37.5ºC.
5• Fresh meconium staining of liquor.
6• Abnormal FHR on intermittent auscultation.
7• Prolonged labour

Fetal surveillance: cardiotocography
Definitions of terms used in EFM

1• *Baseline rate:* mean level of the FHR when this is stable, and after exclusion of accelerations and decelerations.

2• *Baseline variability:* degree to which the baseline varies, i.e. bandwidth of baseline after exclusion of accelerations and decelerations.
Variability of 5–25 beats/min is defined as normal, 0–5 beats/min as reduced, and >25 beats/min as saltatory.

3• *Acceleration:* a transient rise in FHR by at least 15 beats over the baseline lasting for 15s or more.

4. *Deceleration:* a reduction in the baseline of 15 beats or more for more than 15s.

The most useful features in assessing fetal well-being are normal variability and presence of accelerations.

Always be concerned about a CTG if you cannot identify the baseline rate.

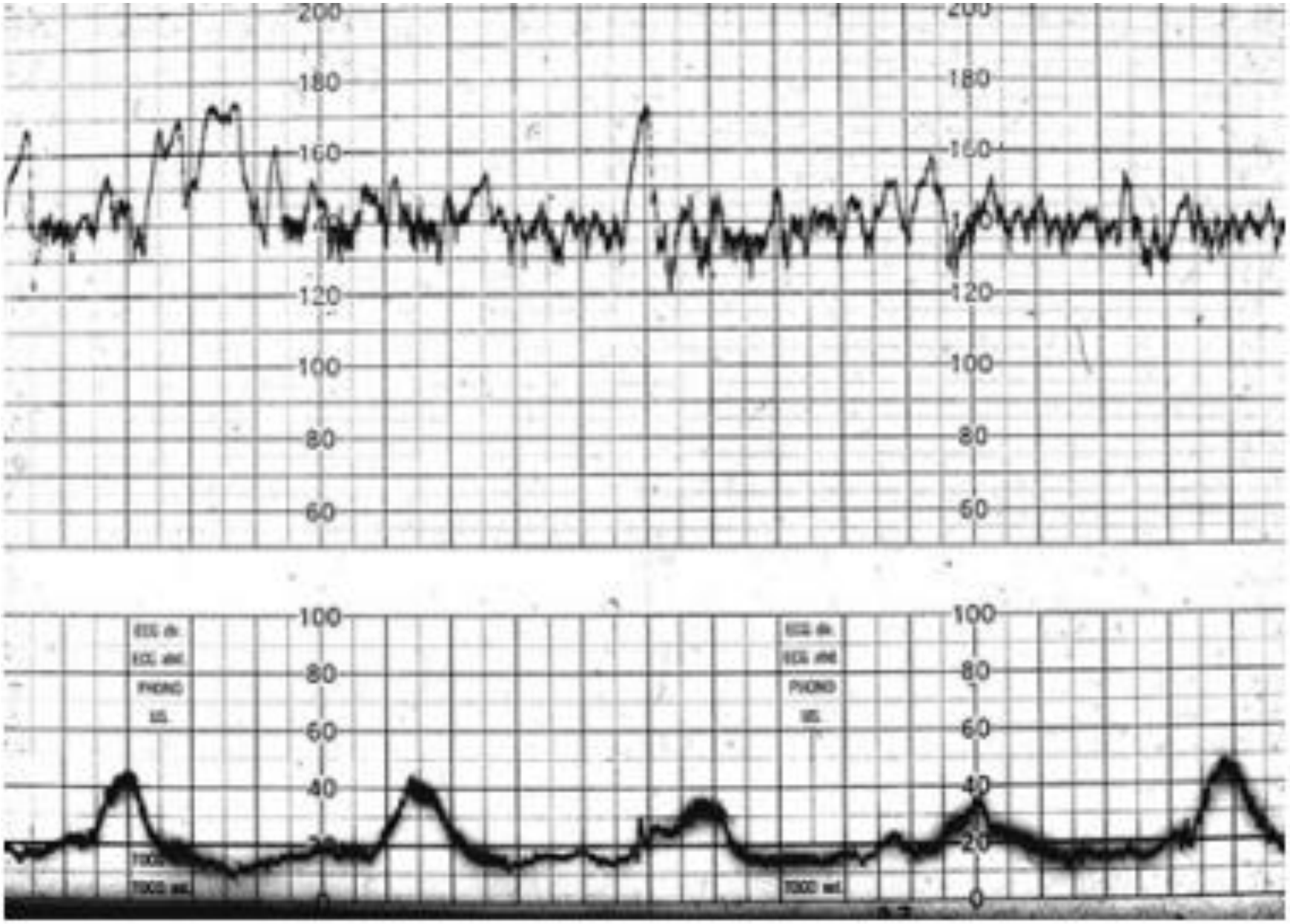

Fig. 6.3 Cardiotocographic trace.

Causes of decreased baseline variability

- Fetal hypoxia.
- Fetal sleep cycle (should be for <40 and maximally 90min).
- Fetal malformation (CNS or cardiac) or arrhythmias.
- Administration of drugs including:
- methyldopa
- magnesium sulphate
- narcotic analgesics
- tranquillizers
- barbiturates
- general anaesthesia.
- Severe prematurity.
- Fetal heart block.
- Fetal anomalies.

Abnormalities in baseline rate

A *bradycardia* is a baseline FHR of less than 110 beats/min.

• 100–110 beats/min is moderate baseline bradycardia and on its own is not considered to be associated with fetal compromise if the baseline variability is normal and accelerations are present.

• A baseline below 100 beats/min should raise the possibility of hypoxia or other pathology.

Beware of maternal heart rate being recorded as the FHR.

A *tachycardia* is a baseline FHR >160 beats/min and is associated with maternal pyrexia and tachycardia, prematurity, and fetal acidosis.

- 160–180 beats/min is moderate baseline tachycardia and on its own is probably not indicative of hypoxia if the baseline variability is normal and accelerations are present

- A baseline >180 beats/min should always raise suspicion of underlying pathology

Decelerations

1• *Early decelerations:* the peak of the deceleration coincides with the peak of the contraction .
This is related to head compression and, therefore, should only be seen in active second stage of labour.

2• *Late decelerations:* have at least a 15s time lag between the peak of the contraction and the nadir of the deceleration .

They may be suggestive of acidosis, especially if accompanied with
tachycardia and reduced baseline variability.

Shallow, late decelerations in the presence of reduced baseline variability on a non-reactive trace should be of particular concern and may even be preterminal, especially if there are associated clinical risks including IUGR, absent FM, bleeding, infection, prolonged pregnancy, or severe pre-eclampsia

- *Variable decelerations:* have variable pattern in timing, size, and shape and are associated with cord compression :

- *typical* variables are U or V shaped, quick to drop and to recover, and often have ‘shouldering’ (not usually associated with hypoxia)

- *atypical* variables have a duration of >60s, a loss >60 beats from the baseline, slow recovery, a combined variable, and a late deceleration component

- with progressive hypoxia the decelerations become deeper and wider with rising baseline rate.

Subsequent reduction of baseline variability suggests possible fetal acidosis

Other abnormalities

Sinusoidal pattern: a rare undulating pattern (sine wave) with little, or no, variability.

Can indicate significant fetal anaemia, but
in short spells (<10min) may be a result of fetal behaviour (thumb-sucking).

A sinusoidal pattern should always be taken seriously. Blood group antibodies, Kleihauer test, and a scan for middle cerebral artery velocity to detect fetal anaemia may be indicated.

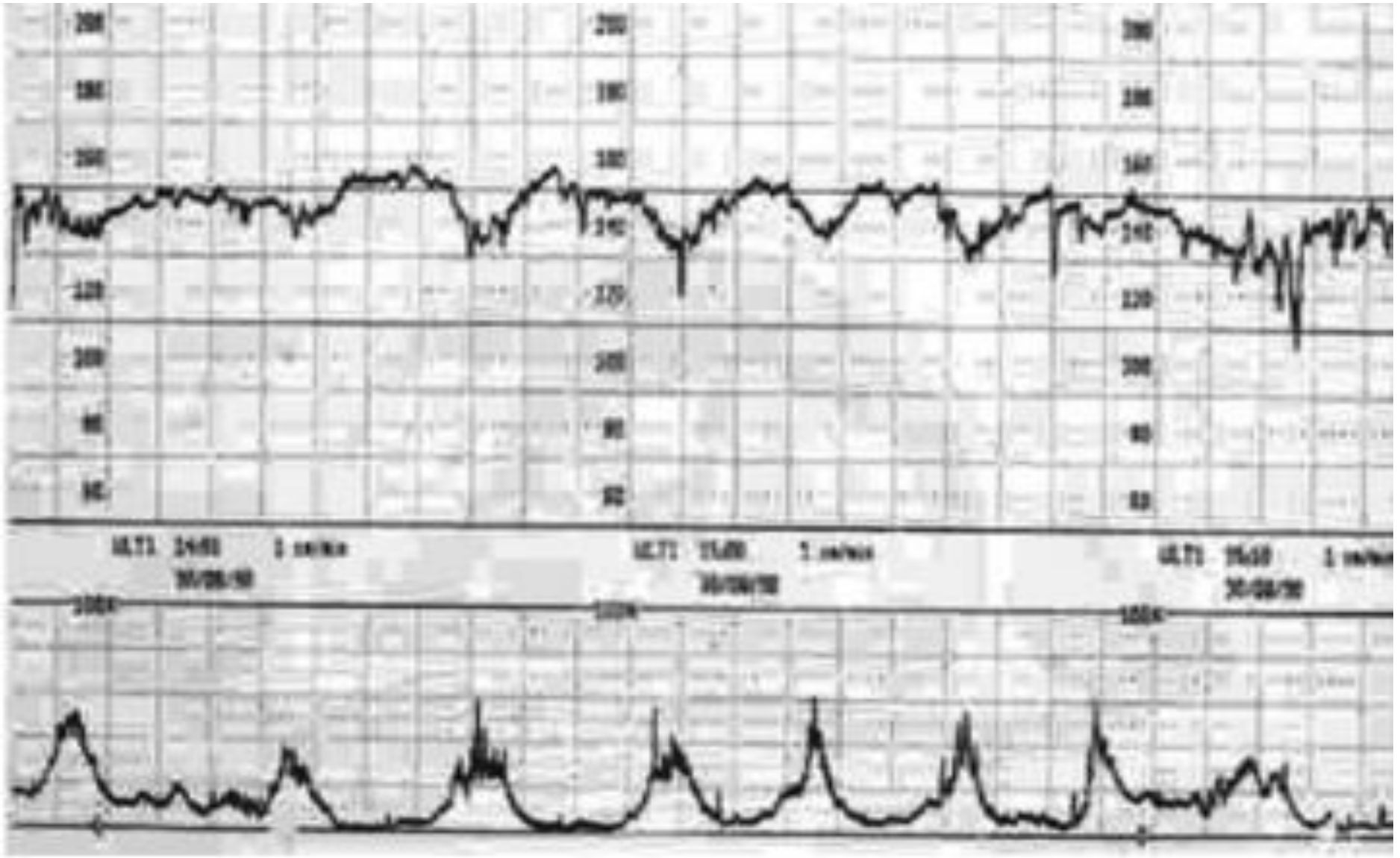

Fig. 6.4 Cardiotocograph trace with early decelerations.

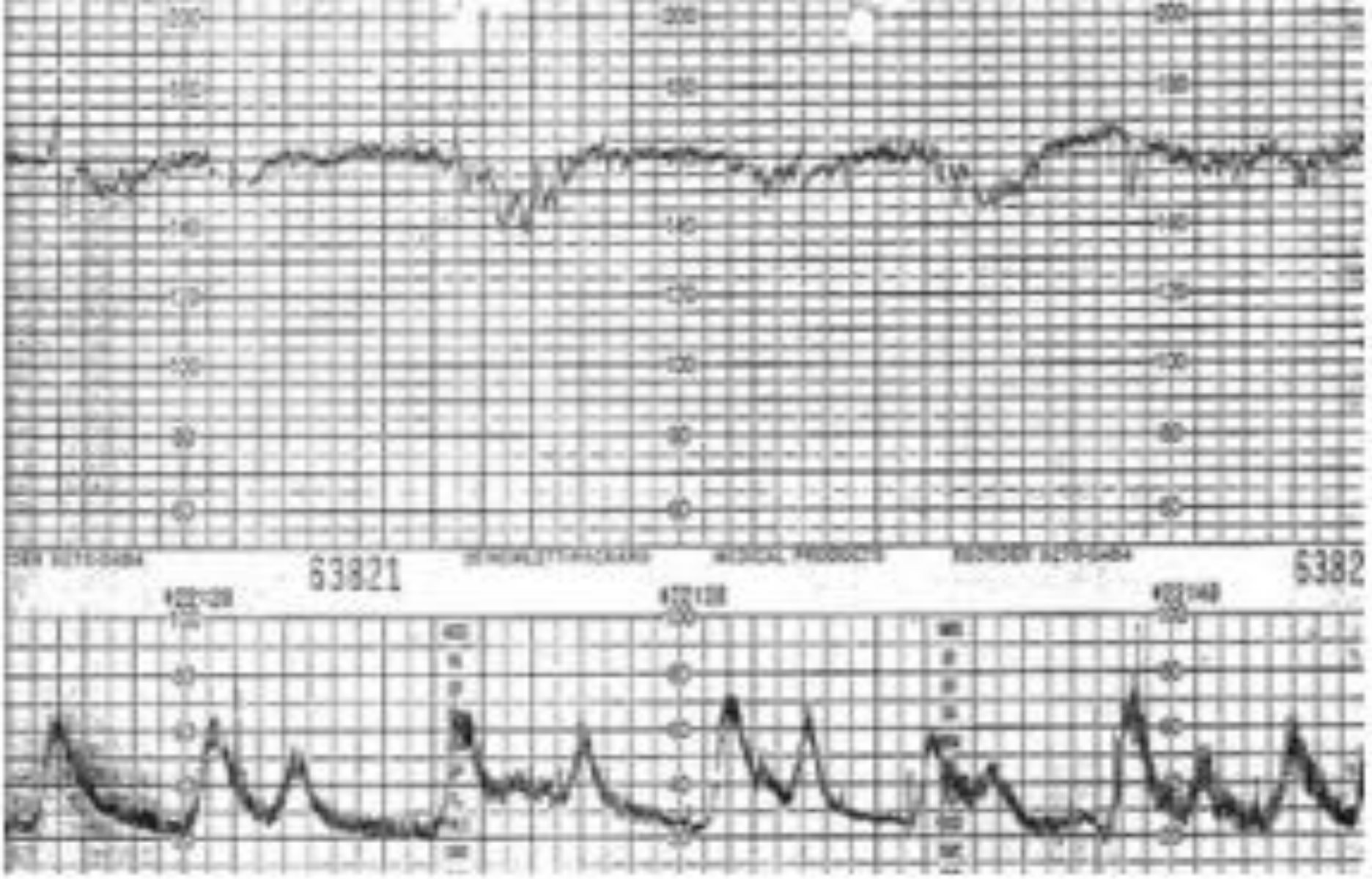

Fig. 6.5 Cardiotocograph trace with late decelerations.

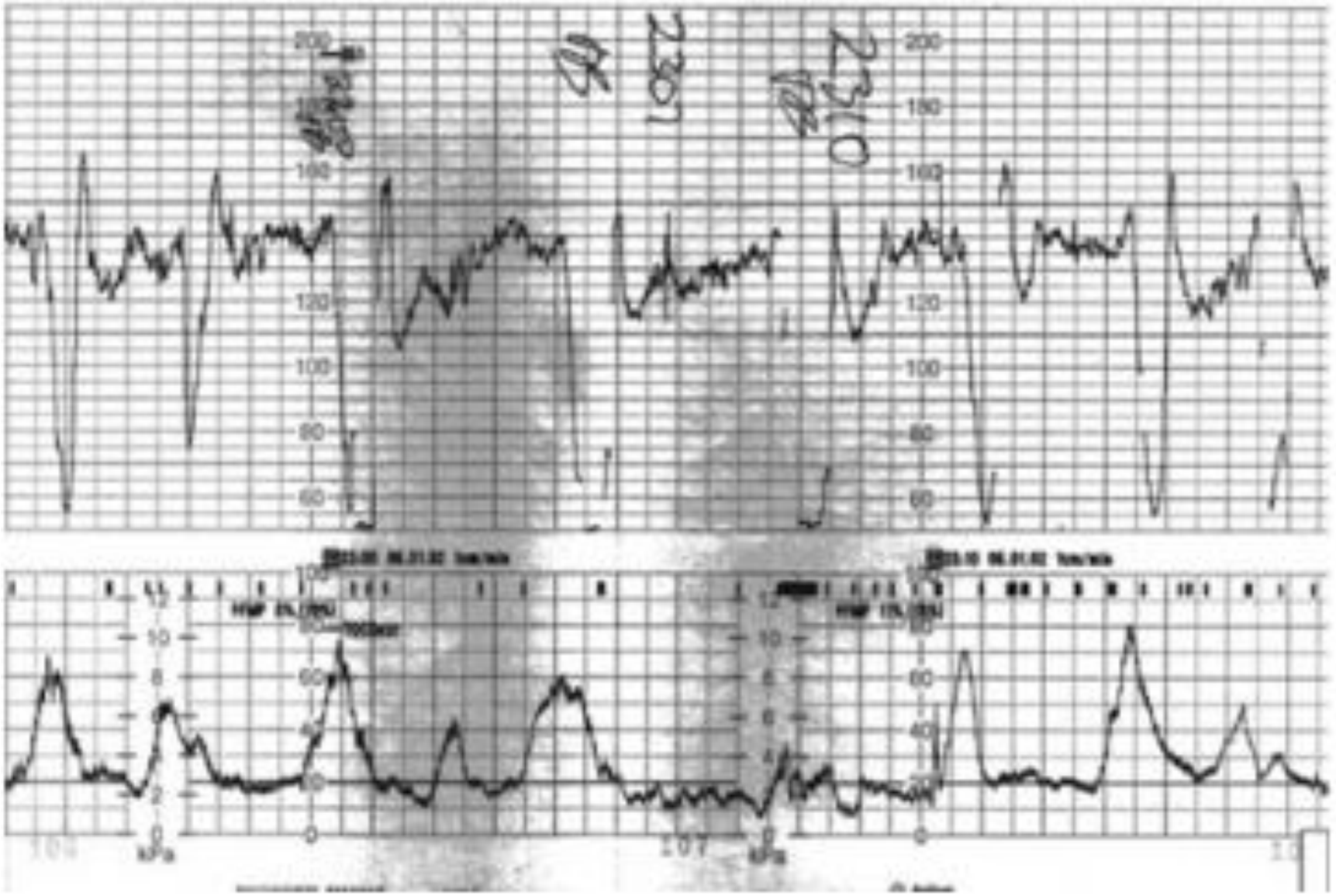

Fig. 6.6 Cardiotocograph trace with variable decelerations.

Fetal surveillance: cardiotocography classification

In order to help with the difficulties encountered when assessing a CTG a classification scheme was introduced that can be used to define a CTG as
normal, suspicious, or pathological

Table 6.2 Fetal heart-rate feature classification

	Baseline (beats/min)	Variability (beats/min)	Decelerations	Accelerations
Reassuring	110–160	≥5	None	Present
Non-reassuring	100–109 161–180	<5 for ≥40 but <90min	Early decelerations Variable decelerations being present for 50% of contractions for ≥90min Single prolonged deceleration up to 3min	The absence of accelerations in an otherwise normal CTG is of uncertain significance
Abnormal	<100 >180 Sinusoidal pattern for ≥10min	<5 for ≥90min	Atypical variable decelerations Late decelerations being present for >50% of contractions for ≥30min Single prolonged deceleration >3min	

NICE. (2011). *Intrapartum care: management and delivery of care to women in labour*. CG55. http://www.nice.org.uk

CTG classification:

1• *Normal:* all four features are in the reassuring category.

2• *Suspicious:* no more than one non-reassuring feature when analysing the CTG.

3• *Pathological:* two or more non-reassuring features or one or more abnormal features.

Maternal factors that may contribute to an abnormal CTG

1• The woman's position: advise her to adopt left lateral.

2• Hypotension.

3• Vaginal examination.

4• Emptying bladder or bowels.

5• Vomiting.

6• Vasovagal episodes.

7• Siting and topping-up of regional anaesthesia