ASSESSMENT OF FETAL WELLBEING DURING LABOR

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During labour uterine perfusion is dramatically reduced during each contraction, and fetal assessment is very important because labor is very stressful condition.

the use of operative delivery for ‘non-reassuring fetal status’ remains to occur every day in delivery wards.

The aim of monitoring:

The aim of monitoring of fetal well-being during labour is to prevent birth asphyxia and so reduce perinatal mortality, neonatal intensive care unit (NICU) admissions at term, umbilical cord acidosis (pH <7.2) and base deficit >12 mmol/L, low Apgar scores, neonatal hypoxic ischaemic encephalopathy at term, and long-term handicap.

Arterial pH Hypoxaemia will result when gas exchange across the placenta is impaired, with a gradual fetal accumulation of CO2. This leads to fetal acidaemia, which can be detected by analyzing fetal capillary or neonatal arterial pH.

The lower limit of normal fetal or neonatal pH is 7.20.

The type of acidosis is also important

In a *respiratory acidosis*, the *P*CO2 is elevated but the base excess is normal, a condition that will be *easily resolved* with the onset of neonatal respiration and gas exchange. *Metabolic acidosis* is associated with a transition to anaerobic metabolism and an accumulation of acids, such as lactate. It is defined by a base deficit >12 mmol/L and is *a marker of moderate to severe neonatal morbidity.*

One of the best methods available for detection of fetal wellbeing is the FHR because the FHR change with condition of the fetus.

<u>explanation:</u>

Intrauterine asphyxia or hypoxia produce changes in the blood of the fetus this will sensitize the chemoreceptor and baroreceptor **à** either sympathetic over stimulation **à** tachycardia or vagal stimulation **à** bradycardia.

** at first asphyxia **à** sympathetic over stimulation **à** tachycardia **à** late asphyxia **à** co2 accumulation and shift from aerobic to anaerobic metabolism **à** accumulation of lactic acid **à** lowering of PH **à** vagal stimulation **à** bradycardia.

But FHR is regarded indirect evidence (not much useful) in assessing the fetal wellbeing so it is considered as a screening test and not diagnostic.

In order to be sure we have to take a scalp blood sample in utero for acid, PH, PCO2 this show only 35% of these fetuses with FHR abnormalities are really affected.

* Methods of assessing FHR:

1- intermittent auscultation.

2- Continuous electronic fetal monitoring

In the 1st method we auscultate every 1/4 hour by pinard stethoscope give us a clue only if the fetus is viable and not to assess fetal wellbeing (external method).

CTG can be used for continuous fetal monitoring (external)

There is internal method which gives more satisfactory and accurate results but is invasive (electrode inserted in the fetal scalp) here the fetal ECG is recorded and can detect changes in the pattern of FHR.

Etiology of fetal distress during labor

could be due to maternal, fetal, umbilical, placental, and uterine factors:

1- Maternal: maternal hyper or hypotension, severe anemia, heart diseases, epilepsy, pulmonary diseases, (asthma, COLD) **à** HYPOXIA.

2- Fetal factors: such as fetal anemia (in case of Rh-isoimmunization), infections, twin to twin transfusion.

3- Uterine factors: titanic uterine contractions, or excessive or misuse of oxytocic drugs.

4- Umbilical cord problems:

vasa brevia artery, short cord, cord prolapse.

5- Placental factors:

Infarction, abruption, post mature placenta (placental aging)

Monitoring the fetus during labor

There is probably little value in continuous EFM (electronic fetal monitoring) in low-risk pregnancies. Such women may have a short (20 minutes) CTG recording on admission to the labor ward. If the CTG is normal thereafter the fetal heart is listened to every 15 minutes with a Pinard stethoscope /or sonicaid.

The presence of any of the following risk factors at the onset of labour would label a fetus as being at 'high risk' of intrapartum hypoxia,
for which continuous fetal monitoring (EFM) should be offered:

- hypertension/pre-eclampsia,
- diabetes,
- antepartum haemorrhage (APH),
- significant maternal medical disease,
- intrauterine growth restriction (IUGR),
- preterm gestation,
- isoimmunization,
- multiple pregnancy,
- If a fetal heart abnormality is recorded with the Pinard stethoscope/sonicaid.

- breech presentation,
- previous caesarean section,
- Women who develop meconium staining of the amniotic fluid during labor & those with significant meconium staining of the amniotic fluid.
- pre-labour rupture of membranes for >24 hours,
- oligohydramnios abnormal umbilical artery Doppler studies,
- post-term pregnancy,
- epidural analgesia,
- induced or augmented labour.

Continuous electronic fetal heart rate monitoring

This is performed with either:

1) An external fetal heart rate monitor with Doppler ultrasound

2) An electrode attached to the fetal scalp showing the fetal heart rate derived from the fetal ECG.

Either of these provides the fetal heart rate and this is recorded on a continuous trace. In normal labor, this should be between 110 and 160 beats/minute EFM is used as a screening test to detect those babies who are developing metabolic acidosis.

The diagnostic test is to perform a fetal scalp sample and measure the scalp pH.

Changes in the fetal heart rate may be classified into three groups.

1- Speed of heart rate

a- tachycardia b- bradycardia

2- Baseline variability

a- Loss of baseline variability

b- Increased baseline variability

3- Intermittent variations

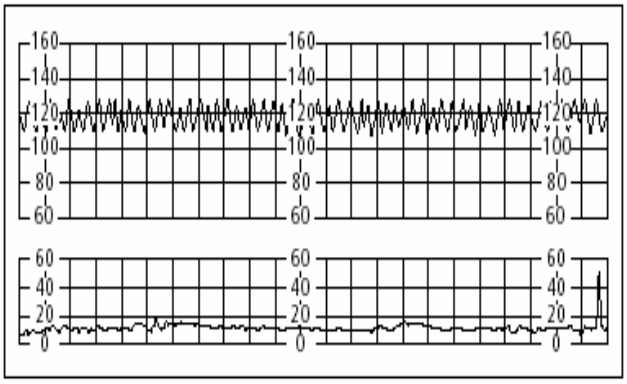


Figure 12.16 A CTG demonstrating minor sinusoidal rhythm. The baseline is 110 beats/minute.

*3) Intermittent variations

a- accelerations: are in intermittent periods in which the fetal heart rate is raised quite markedly above the baseline. They are a sign of fetal health.

b- Decelerations: Decelerations are intermittent changes in the baseline and fall into three categories:

a- Early decelerations:

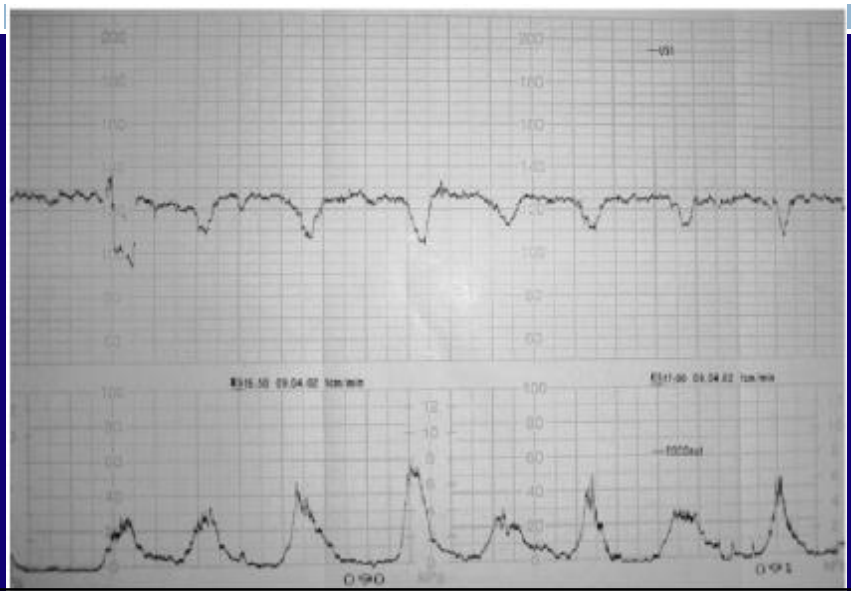
b- Late decelerations.

c- Variable decelerations.

a- Early decelerations:

These are due to vagal stimulation following head compression as the fetus descends the birth canal usually occur in the late 1st stage and 2nd stage of labor. They usually have no significance

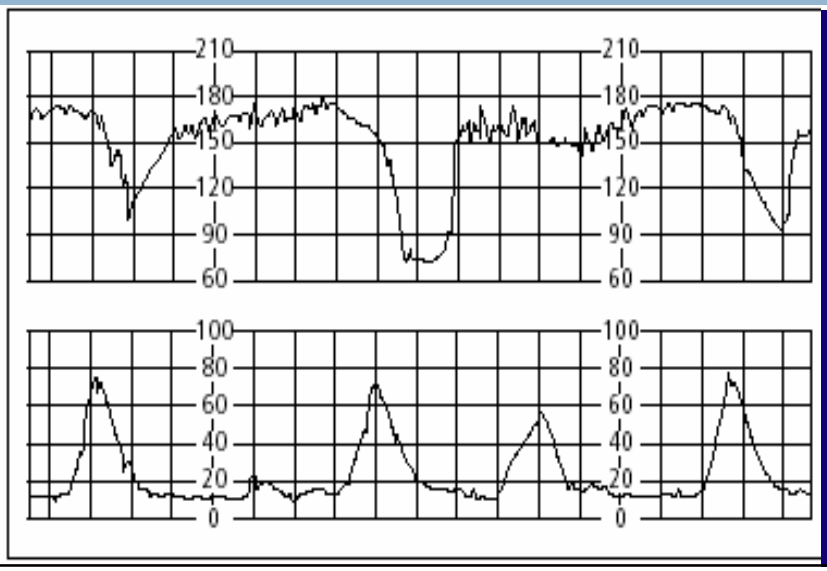
Early deceleration



b- Late decelerations.

They start more than 30 seconds after the contraction has started and continue after the contraction has finished. They are thought to be metabolic in nature and require a fetal blood sample.

Late deceleration

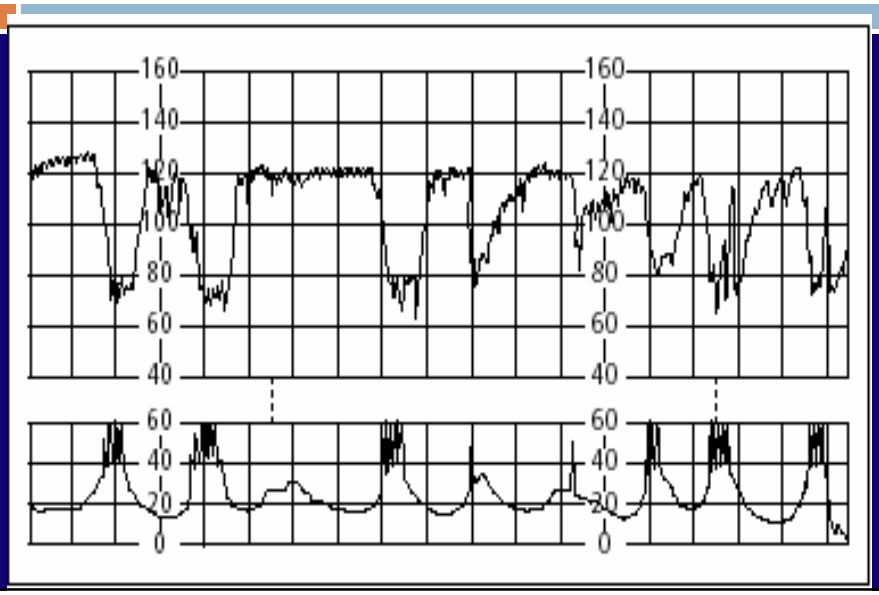


c- Variable decelerations.

Recurrent variable decelerations: the important features to note are that the decelerations vary both in shape and in their relationship to the uterine contraction.

The most common cause of these is cord compression.

Variable deceleration



Passage of meconium

Stimulation of the vagus in utero causes the fetal gut to contract and the anal sphincter to relax so that meconium (fetal stool) is passed into the amniotic fluid. Meconium is made up of swallowed cells in late pregnancy and alimentary tract cells, all of which are stained with bile.

With a normal fetal heart rate trace, the fetus is unlikely to be hypoxic, but if the fetal heart rate trace is abnormal when meconium is passed, then a fetal blood sample (FBS) should be performed.

meconium

When the screening tests are abnormal

then

Diagnostic or secondary tests are necessary to avoid unnecessary obstetric intervention.

SECONDARY TESTS OF FETAL WELL-BEING

1- Vibroacoustic stimulation

- The use of vibroacoustic stimulation applied to the maternal abdomen in the presence of a non-reactive antenatal CTG.
- The healthy fetus responds with an acceleration in fetal heart rate. An acceleration evoked by vibroacoustic stimulation associated with normal PH
- Vibroacoustic stimulation cannot completely eliminate the need for scalp sampling, However, it can reduce the need for scalp sampling

2- Fetal blood sample

Fetal blood sampling is a diagnostic test for fetal acidosis.

The PH results are interpreted as follows:

- PH >7.25: normal.
- PH 7.21–7.24: pre-asphyxia.
- PH <7.20: asphyxia.

3- Scalp stimulation

if Scalp stimulation is associated with fetal heart acceleration this is usually associated with normal PH

Fetal electrocardiogram

There are changes occur in both the fetal PR interval and ST segment of the fetal electrocardiogram (ECG) in response to hypoxaemia

ST segment analysis in labour shows promise for advancement of the methods of intrapartum fetal monitoring either by internal fetal electrodes or non invasive external fetal ECG

Fetal pulse oximetry

Fetal pulse oximetry :There is no evidence that fetal pulse oximetry is of benefit in labour.

Management of suspected fetal distress

- Intrauterine resuscitation
- Improve placental blood supply
- Improve maternal oxygenation
- Improve umbilical blood flow
- untreatable fetal complications – such as abruption, cord prolapse, chorioamnionitis and scar dehiscence