Assessment of fetal well being

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INTRODUCTION

- ANTENATAL FETAL SURVEILLANCE IS ASSESSMENT OF FETAL WELL BEING IN ANTEPARTUM PERIOD TO ENSURE DELIVERY OF HEALTHY NEONATE.

Two main objectives are:-

- ✓ Early detection of fetuses at risk to prevent perinatal mortality and morbidity.
- ✓ Find out normal fetuses and avoid unwarranted interventions.

ANTEPARTUM FETAL ASSESSMENT

METHODS:-

1 a CLINICAL ASSESSMENT

- Weight gain
- Fundal height
- Abdominal girth
- Auscultation of fetal heart

b fetal movement count by mother(kick chart)

2.Ultrasound for fetal parameters

3.NST (non-stress test)

4.biophysical profile (BPP)

5.Doppler

INDICATIONS

- **MATERNAL**
- **FETAL**
- **PREGNANCY RELATED**

MATERNAL

- **Hypertension**
- **Diabetes**
- **Heart disease**
- **Chronic renal disease**
- **Severe anemia**
- **Acute illnesses**

Fetal

- Fetal growth restriction (IUGR)
- Rh isoimmunisation
- Fetal cardiac arrhythmias
- Fetal infections

PREGNANCY RELATED

- Multiple pregnancy
- Gestational hypertension
- Preeclampsia(PET)
- Decreased fetal movement
- Abnormal placentation
- Placental abruption
- Amniotic fluid disorders
- PROM
- GDM
- Previous unexplained still birth
- Post term pregnancy

WHEN TO START?

Depends on factors like:-

- Past history of adverse outcome
- Severity of maternal and fetal conditions

CLINICAL ASSESSMENT

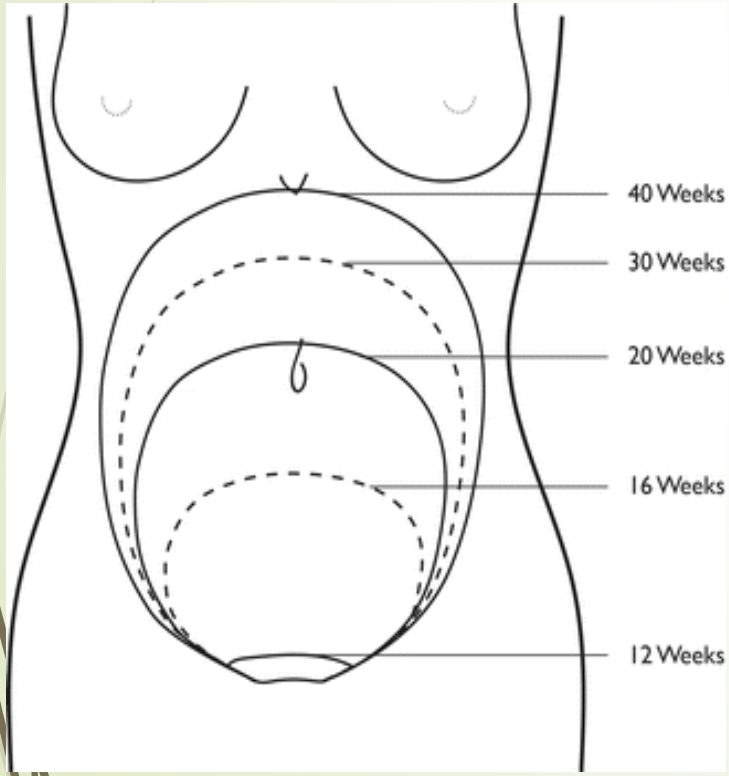
- **WEIGHT GAIN**

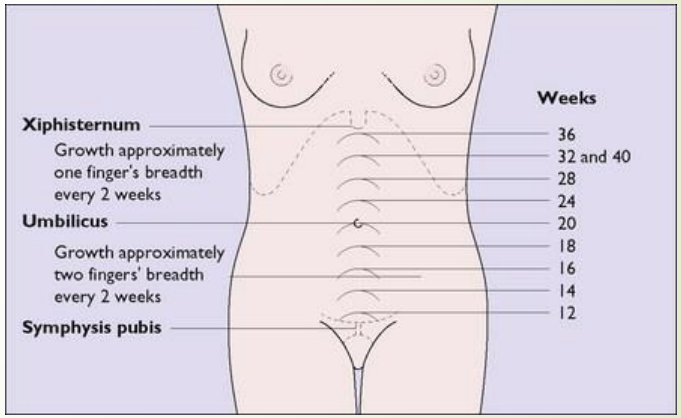
Recommended Ranges of Weight Gain
During Singleton Gestations Stratified by Pre pregnancy Body Mass Index

Category	BMI	Wt. in kg	kg
Low	19.8	12.5–18	
Normal	19.8–25	11.5–16	
High	26–29	7–11.5	
Obese	29	7	

(Williams 23rd ed.)

Symphysis-fundal height (SFH)





Symphysis-fundal height

- Measured from superior border of pubis symphysis to fundus
- From 24th wks of gestation corresponds to period of gestation .
- Difference of 3-4 cms acceptable
- below 10th percentile or difference of >3-4cms suggests IUGR
- Either large or small for GA .
- positive predictive value of 60%
- negative predictive value of 76.8%

Abdominal girth (NOT COMMONLY USED)

- **Measured at lower border of umbilicus.**
- **Increases by 2.5cm per week after 30wks.**
- **95-100cms at term.**
- **Static or falling values alarming sign.**

Fetal movement counting: kick counting or chart counting

- the number of kicks in a certain time period.
- By 20 weeks **fetal movements**.is felt ... **Fetal movement** is one indicator of **fetal** health
- **most fetuses have circadian** (biologically timed) activity rhythms and more active in the evening hours a fetus more active an hour after the mother eats due to the increase in blood glucose (sugar) in the mother's blood. A **change in the normal number of fetal movements may indicate the fetus is under stress**.

Cont,

- **Quickening**: start to feel those first kicks at about 16-25 weeks(average is about 20-22 weeks) -- or earlier if this isn't first pregnancy.
- There are many ways to chart movements:
- **The simplest one is to record the amount of time it takes for her to feel 10 movements(should feel 10 movements in no more than 2 hours).**
- start counting movements at around 28 weeks.
- Sleep cycle 20-40 min, rarely exceed 90 min

Fetal movement count

- Fetus spends 10% of its time making gross fetal body movements
- 30 such movements made each hour.
- Periods of active fetal body movement last about 40 minutes
- Quiet periods last about 20 minutes.
- Longest period without fetal movements about 75 minutes.
- Mother appreciate 70% to 80% of gross fetal movements.
- (GABBE 6TH ED.)

Factors affecting maternal perception of fetal movement

- Fetal and placental factors :-
- Placental location
- The length and type of fetal movements
- Amniotic fluid volume (AFV)
- Maternal factors :-
- Parity, obesity.
- Psychological factors *anxiety*.

ULTRASOUND FOR FETAL PARAMETERS

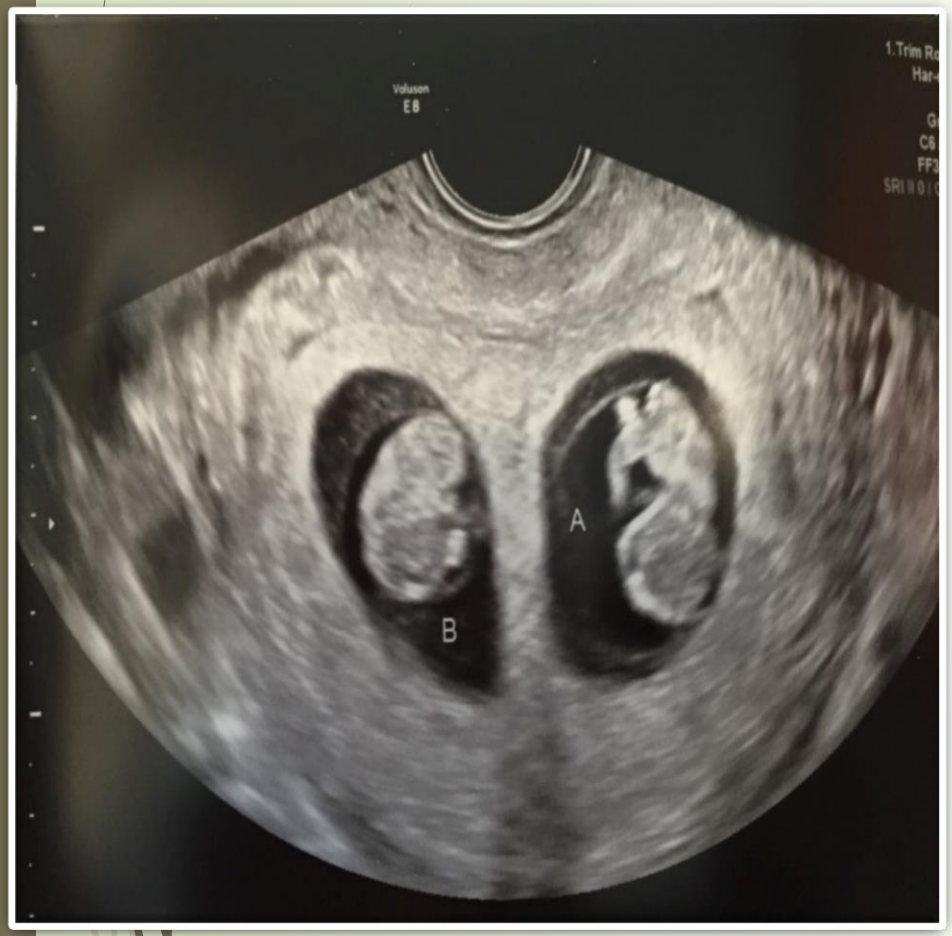
- **HIGH RESOLUTION UTRASOUND**
- **BASIC**
- **TARGETED**

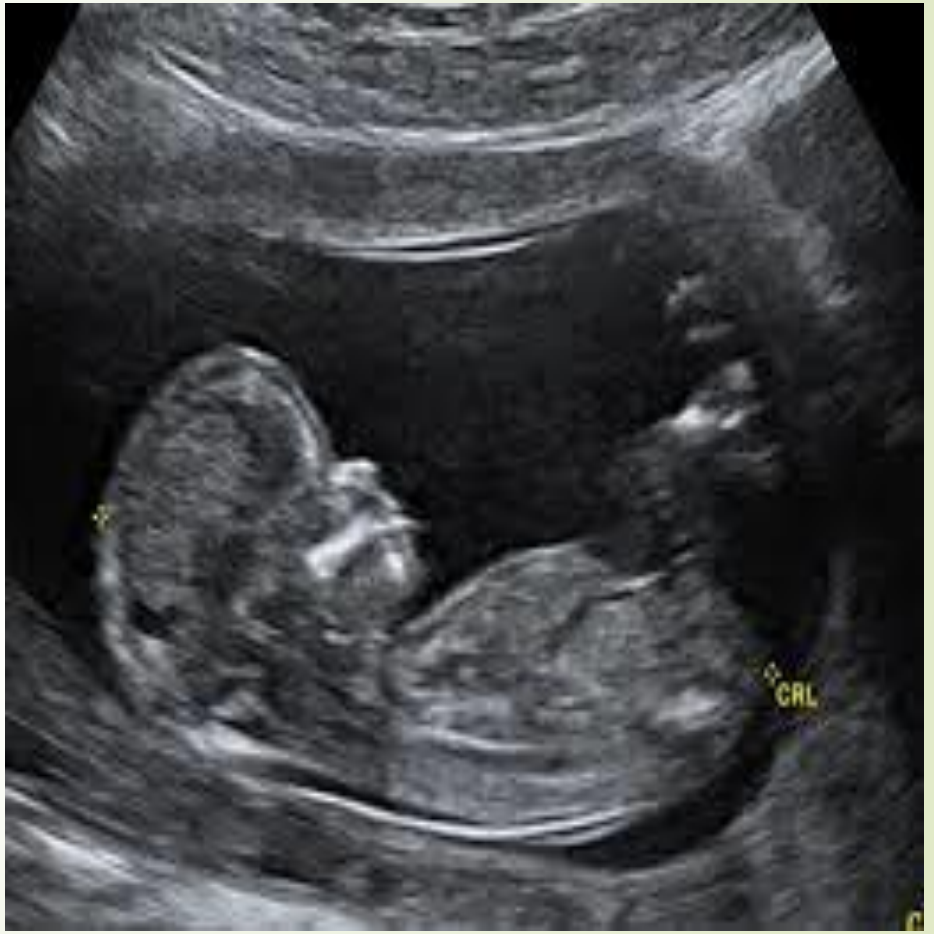
BASIC:(early pregnancy,1st term ultrasound screening test)

Done at 10-14wks :-

- **No. of fetuses**
- **Fetal (heart, viability)**
- **Gestational age- CRL**
- **Any gross anomaly like anencephaly, limb reduction defects.**
- **Nuchal translucency**
- **Placental localization**
- **Cervical length**
- **maternal pelvic masses**

First trimester ultrasound





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2nd &3rd triemester

- **Serial measurements of BPD,AC,HC,FL.(growth us scan)**
- **HC/AC ratio:**

  exceeds 1 before 32wks.

  After 34wk falls below 1.

  In symmetric IUGR remains normal.

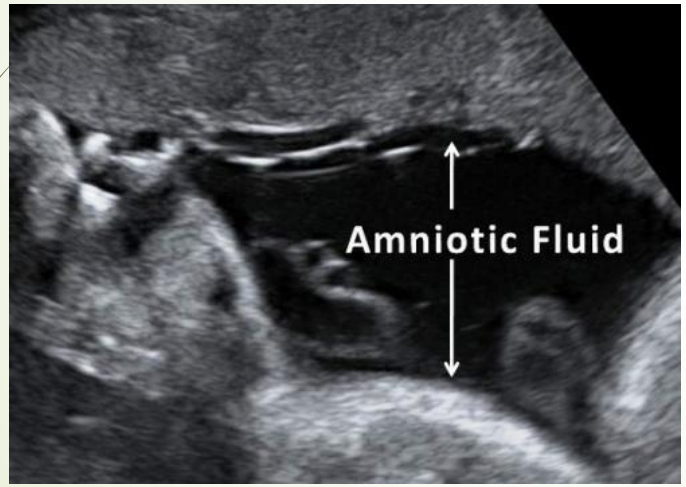
  Ratio can identify 85% IUGR fetuses.
- **FL/AC Ratio**
- **AC remains single best parameter to detect IUGR**

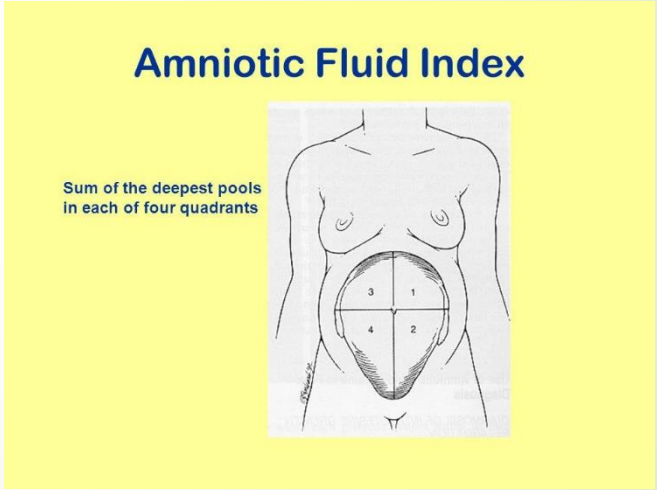
AMNIOTIC FLUID VOLUME

Single deepest pocket >2-8 cm normal

Or

Amniotic fluid index 5-25cm. (four quadrant technique.)





Amniotic fluid function:

1. Allow room for fetal growth, movement and development.
2. Ingestion into GIT→ growth and maturation.
3. Fetal pulmonary development (20 weeks).
4. Protects the fetus from trauma.
5. Maintains temperature.
6. Contains antibacterial activity.
7. Aids dilatation of the cervix during labour.

Targetted ultrasound : Detailed anomaly scan/ morphology scan

- **All patients– 18-22 w to check for congenital anomalies**
- **Transverse section for fetal head**
- **Shape and internal structures. BPD,HC Measured to detect hydrocephalus, anencephaly**
- **Transverse and longitudinal views of abdomen to rule out anomalies of stomach, kidneys, bladder, ventral wall.**
- **Transverse section of fetal thorax to four chambered view of heart.**

Non stress test (CTG)

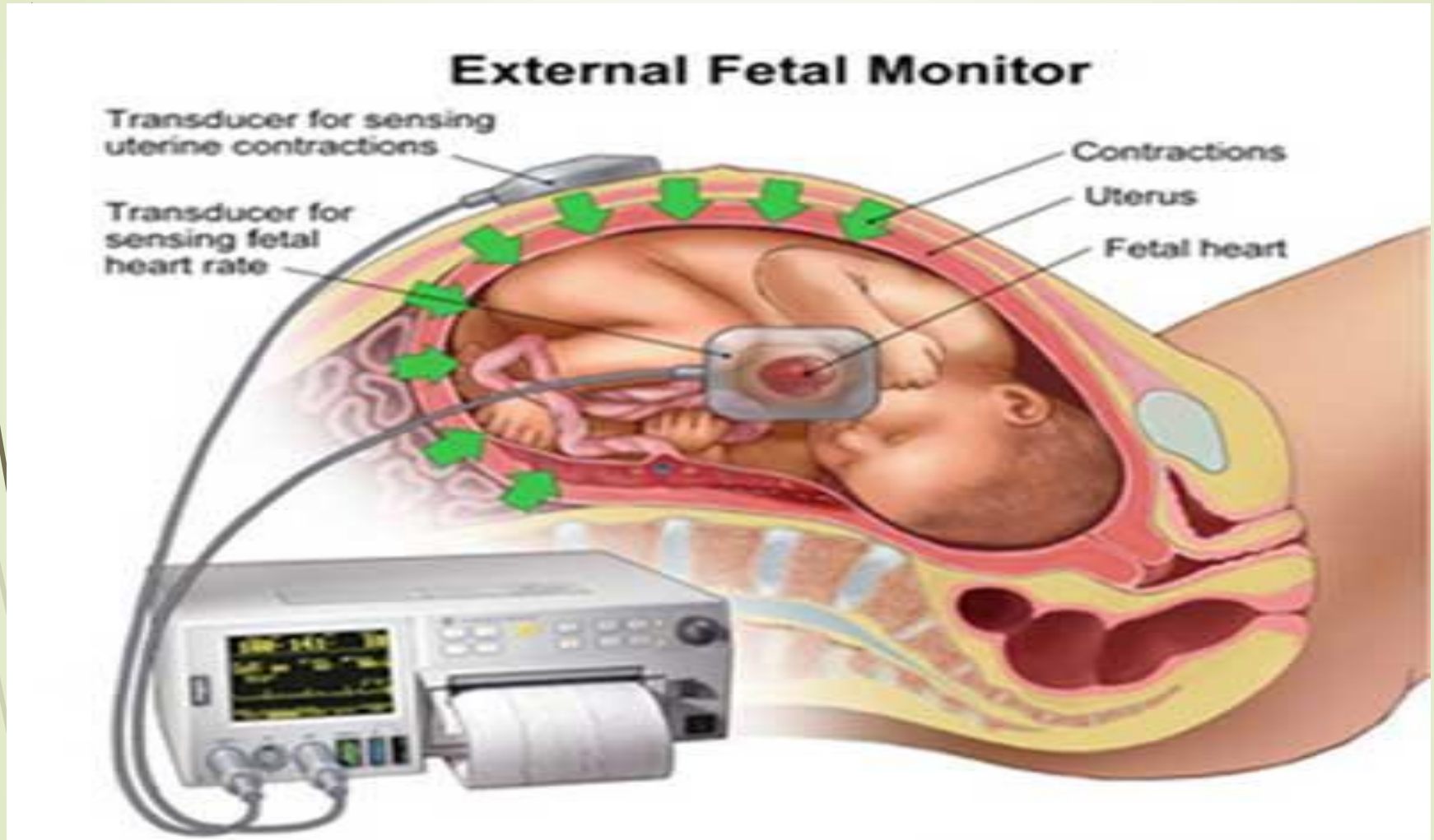
- Freeman first described the NST in 1975.
- Physiologic premise of the NST is that:-

Non hypoxic fetus

stimulus

accelerate its heart rate

NST(CTG)


External Fetal Monitor
Transducer for sensing uterine contractions
Transducer for sensing fetal heart rate
Contractions
Uterus
Fetal heart

Ctg

- Cardiotocography (CTG) is a continuous electronic record of the fetal's heart rate obtained via a transducer placed on the mother's abdomen .
- It is sometimes referred to as 'electronic fetal monitoring

- **External Cardiotocography:**
- For continuous or intermittent monitoring of the **fetal heart rate and the activity of the uterine muscle .**
- Two transducers on the mother's abdomen(one above the fetal heart and the other at the fundus).
- The tocodynamometer ("toco") is placed over the uterine fundus. It provides information that can be used to monitor uterine contractions.
- The second tranducer is placed over the area of the fetal back. This device transmits information about the FHR.

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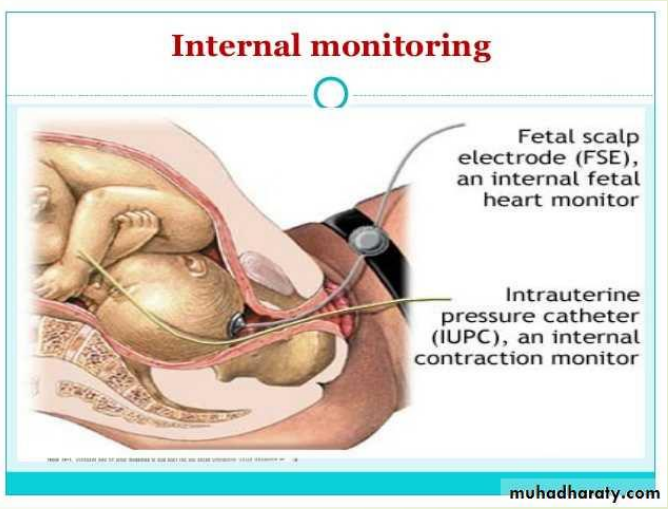
Internal Cardiotocography:

- Uses an electronic transducer **connected directly to the fetal scalp** through the cervical opening and is connected to the monitor.
- Amniotic membranes must be ruptured
- Cervix dilated 2 cm.
- Presentation must be cephalic
- Presenting part down against the cervix.



Method

- Patient is placed in a lateral tilt position
- FHR and uterine activity are monitored with an external transducer
- FHR is monitored for 20 minutes.
- For 40 minutes in some cases to compensates for sleep cycles then called *EXTENDED NST*.
- In some cases when the fetus is not reactive, acoustic stimulation by artificial larynx a sound stimulus for 1 to 2 seconds.

Intrapartum CTG Interpretation

- Baseline fetal heart rate (FHR)
- Baseline FHR variability
- Presence of accelerations
- Decelerations
- Uterine activity (contractions)

Fetal heart baseline

- differentiate between fetal and maternal heartbeats
- baseline fetal heart rate will usually be between **110 and 160 beats/minute.**
- Fetal Tachycardia :Baseline FHR **greater than 160** beats per min
- Fetal bradycardia : Sustained fetal heart rate **less than 110** beats per minute

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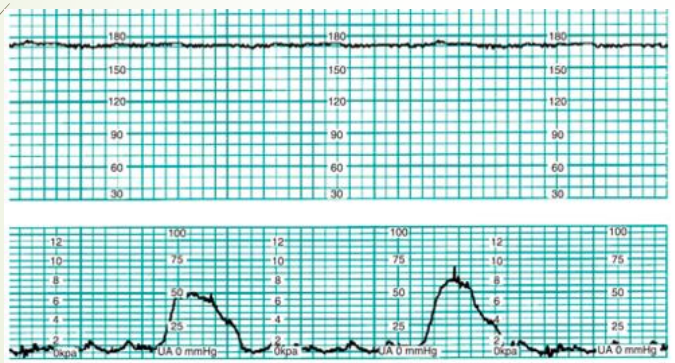
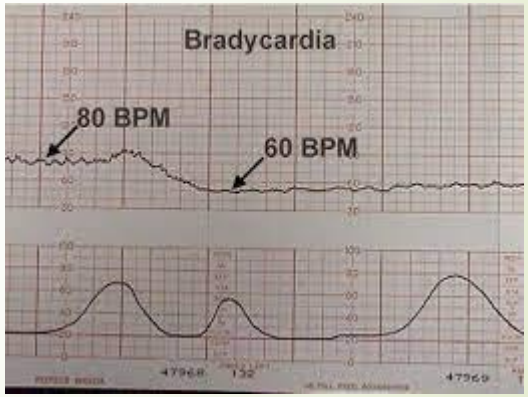

180
150
120
90
60
30
100
75
50
25
12
10
8
6
4
2
0kpa
UA 0 mmHg


Bradycardia
80 BPM
60 BPM

causes of fetal tachycardia :

- Maternal fever
- Chorioamnionitis
- Fetal sepsis
- Drugs (Atropine, Phenothiazines, Beta-sympathomimetics)
- Tachyarrhythmias
- Fetal heart failure
- Severe fetal anemia, fetal hydrops
- Maternal hyperthyroidism

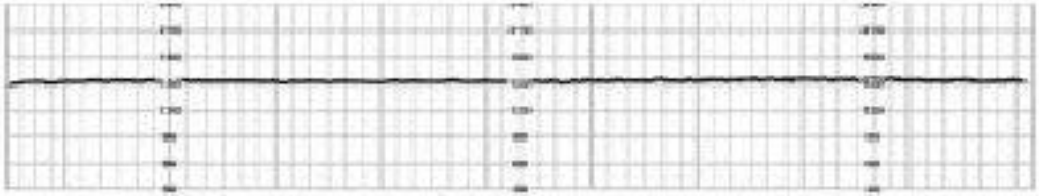
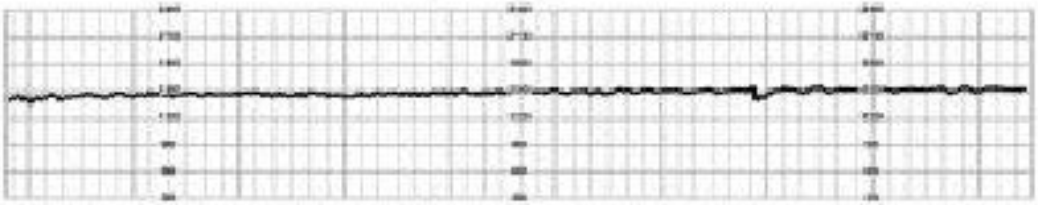
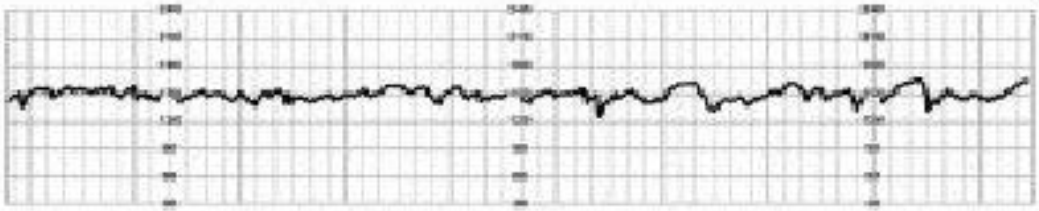
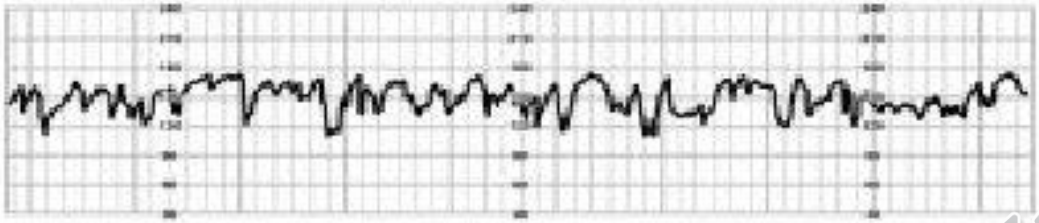
Variability:

- variability will usually be between **5 and 25 beats/minute**
- intermittent periods of reduced baseline variability are normal, especially during periods of sleeping .

Causes of decreased variability include:

- Hypoxemia/acidosis
- Fetal sleep cycles
- Drugs (Analgesics, barbiturates, phenothiazines, anesthetics)
- Prematurity
- Arrhythmias
- Pre-existing neurological abnormality
- Congenital anomalies

FHR Variability

Absent variability = Amplitude range undetectable	
Minimal = < 5 BPM	
Moderate = 6 to 25 BPM	
Marked = > 25 BPM	

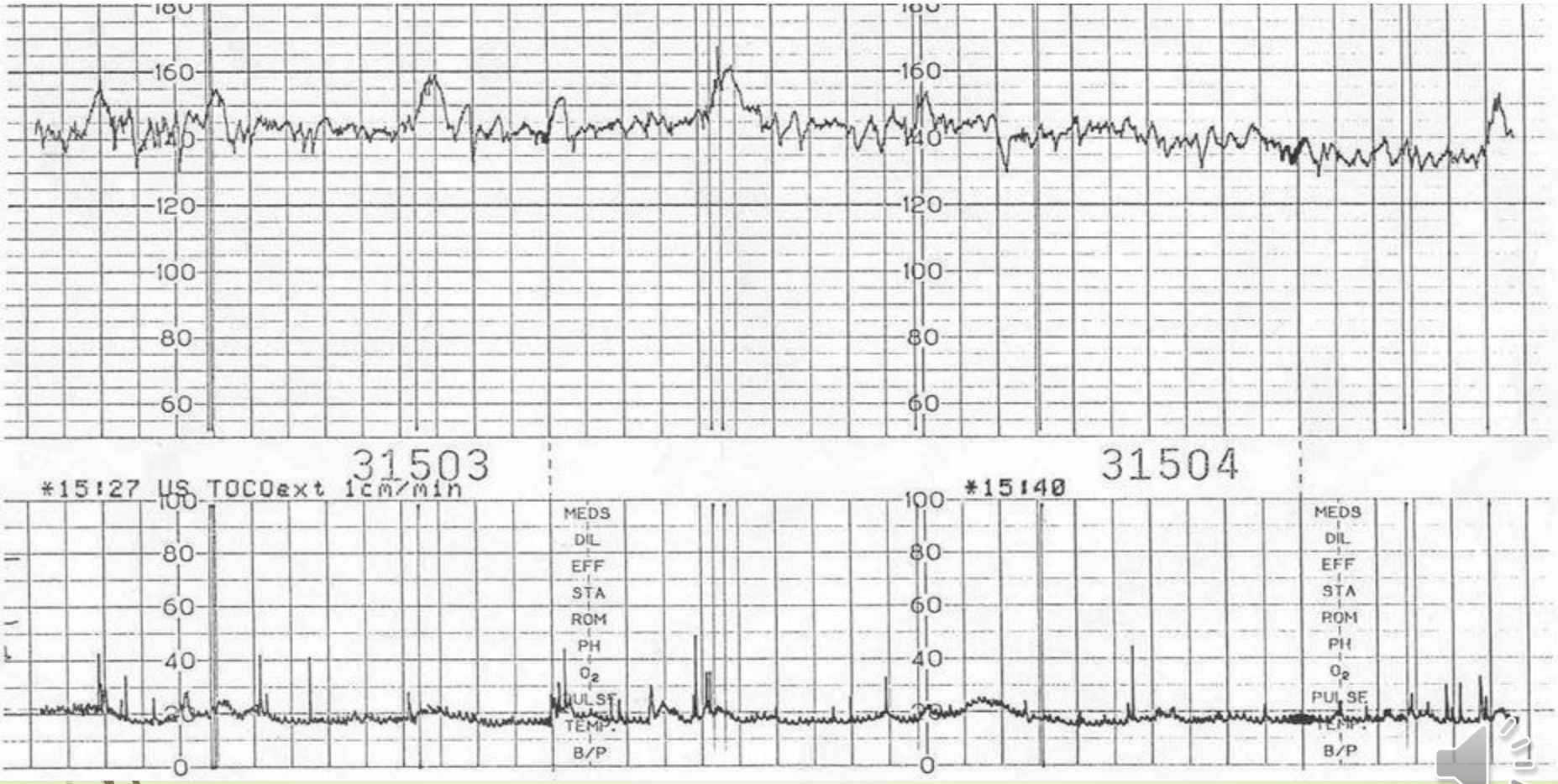
Accelerations:

- Increase in FHR greater than or equal to 15 bpm, for greater than or equal to 15 seconds from the onset to return to baseline.
- The presence of accelerations, even with reduced baseline variability, is generally a sign that the baby is healthy.
- The absence of accelerations on an otherwise normal cardiotocograph trace does not indicate fetal acidosis.
- If digital fetal scalp stimulation (during vaginal examination) leads to an acceleration in fetal heart rate, regard this as a sign that the baby is healthy

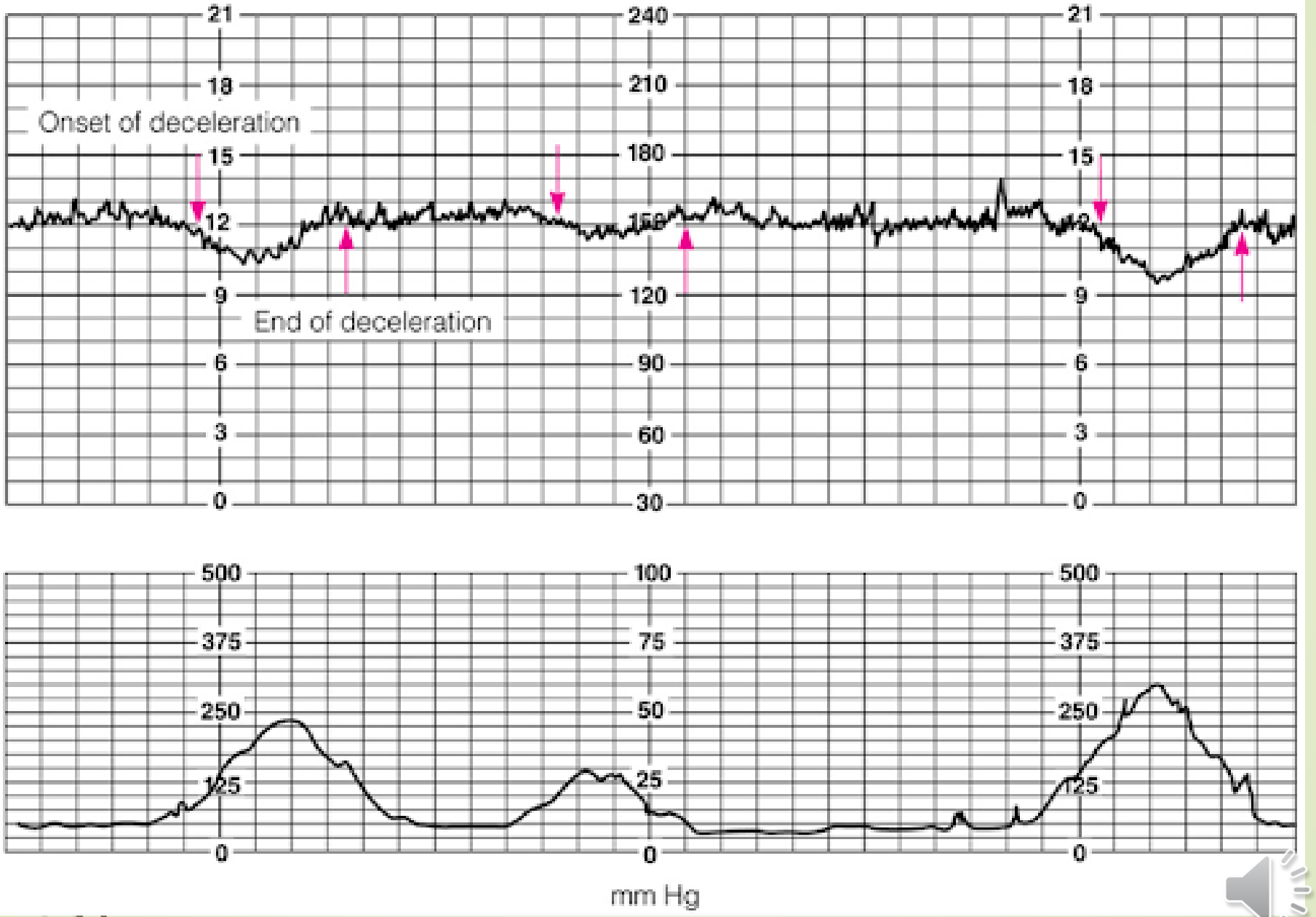
Decelerations:

- Decreases in fetal heart rate from the base line by at **least 15b/m**, lasting for **at least 15 seconds**

A Normal Antenatal CTG

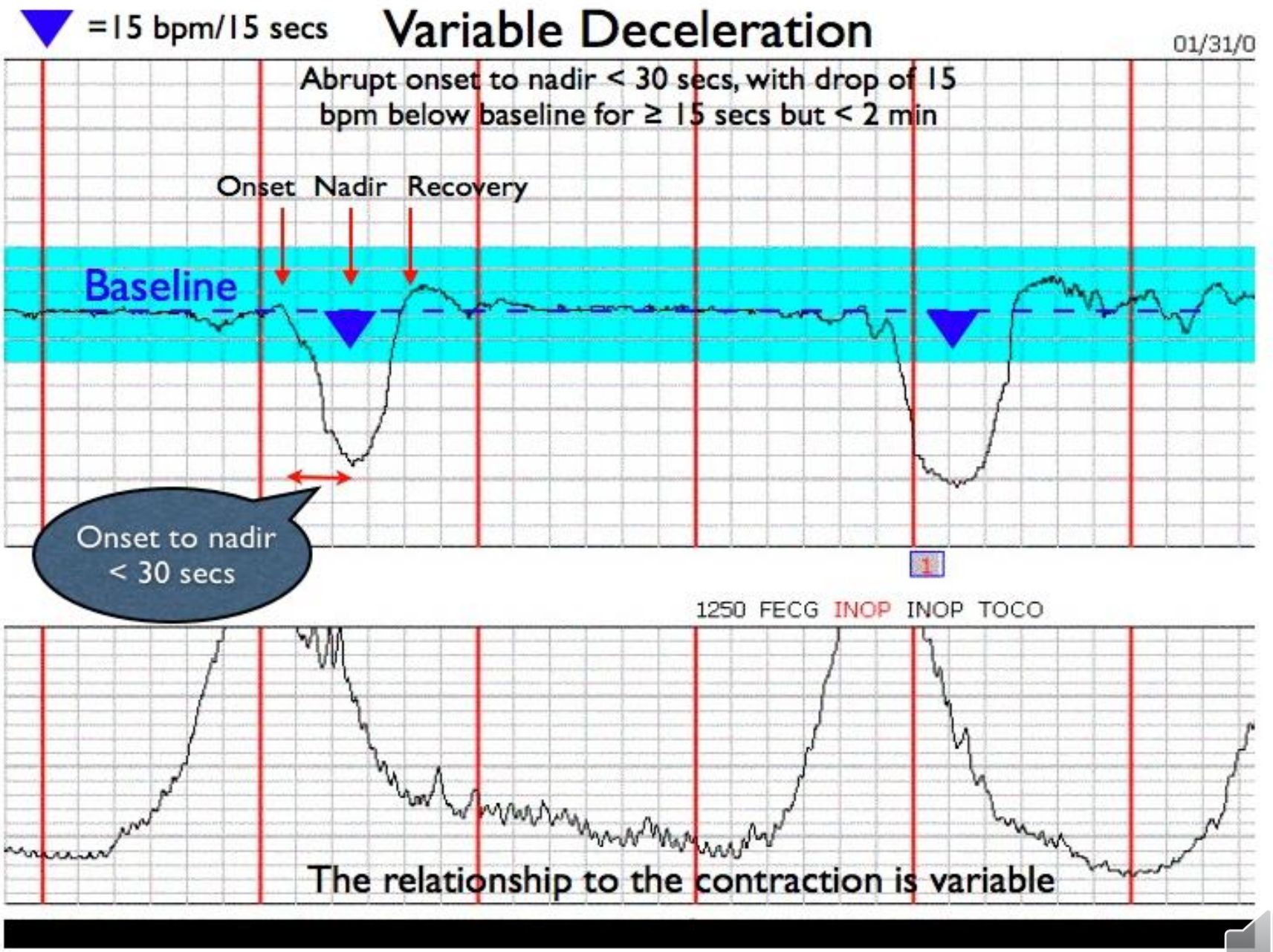


Early Decelerations



Variable decelerations:

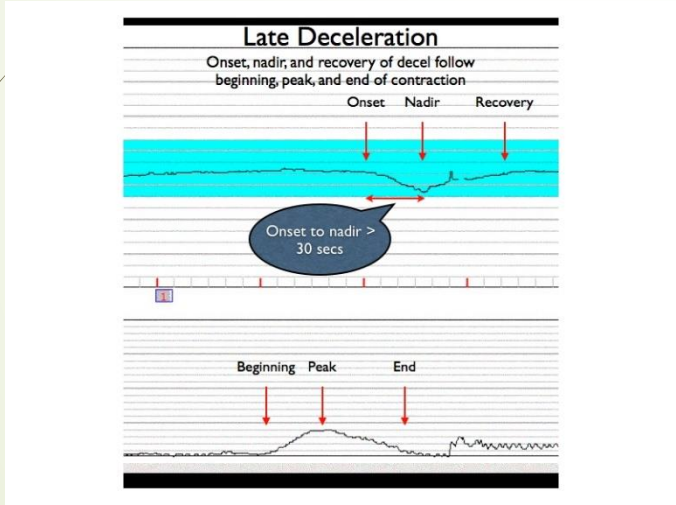
- Variable decelerations **are variable in duration, intensity, and timing .**
- Variable decelerations Abrupt(sudden) decrease in FHR of > 15 beats per minute measured from the most recently determined baseline rate.
- The onset of deceleration to nadir is less than 30 seconds. The deceleration lasts > 15 seconds and less than 2 minutes .
- Related **to cord compression.**

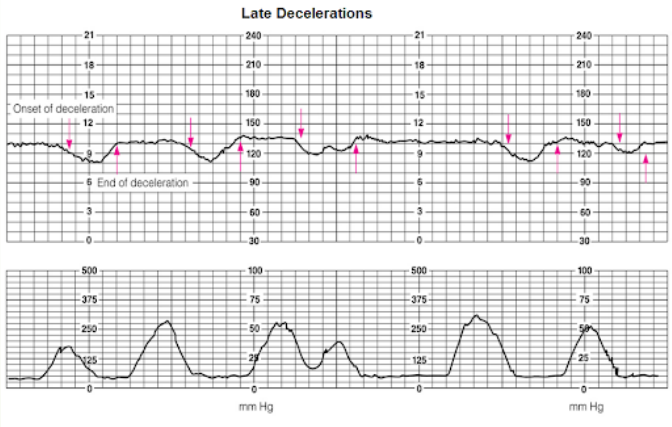

=15 bpm/15 secs
Variable Deceleration
01/31/0
Abrupt onset to nadir < 30 secs, with drop of 15 bpm below baseline for ≥ 15 secs but < 2 min
Onset
Nadir
Recovery
Baseline
Onset to nadir < 30 secs
1250 FECG INOP INOP TOCO
The relationship to the contraction is variable

Late Decelerations:

- Gradual decrease in FHR with onset of deceleration to nadir >30 seconds.
- **Onset** of the decleration occurs **after the beginning of the contraction**, and the **nadir** of the deceleration occurs **after the peak of the contraction.**
- Related **to decreased uteroplacental perfusion**

Late deceleration





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- It is important to remember the following learning points regarding EFM:
- It is used to **identify intrapartum hypoxia** – a significant cause of fetal death and disability; fetal hypoxia can lead on to fetal asphyxia and death.
- It should not be used unless indicated as it **increases the rates of caesarean section and instrumental delivery in low-risk women.**
- It has become an integral component of labour management **in high-risk women**.

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- **<u>Intermittent auscultation</u>** of the fetal heart rate to women at **<u>low risk</u>** of complications in established first stage of labour:
- Intermittent auscultation immediately **after a contraction** for at **least 1 minute**, at least **every 15 minutes** in the first stage of labour and and at least every 5 minutes in the second stage and record it as a single rate.
- Palpate the maternal pulse hourly, or more often if there are any concerns, to differentiate between the maternal and fetal heartbeats.

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- **<u>High-Risk pregnancies</u>** need **continuous FHM** :
- Maternal medical illness ,Gestational diabetes, Hypertension ,Asthma.
- Obstetric complications : Multiple gestation ,Post-date gestation ,Previous cesarean section ,Intrauterine growth restriction ,Oligohydramnios ,Premature rupture of the membranes, Congenital malformations ,Third-trimester bleeding.
- Oxytocin induction/augmentation of labor, Preeclampsia ,Meconium stained liquor.

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- **Continuous cardiotocography** if any of the following **risk factors** :

- Maternal pulse over 120 beats/minute on 2 occasions 30 minutes apart
- Temperature of 38°C or above on a single reading, or 37.5°C or above on 2 consecutive occasions 1 hour apart
- Suspected chorioamnionitis or sepsis
- The presence of significant meconium
- Fresh vaginal bleeding that develops in labour
- Severe hypertension: a single reading of either systolic blood pressure of 160 mmHg or more or diastolic blood pressure of 110 mmHg or more, measured between contractions
- Hypertension: either systolic blood pressure of 140 mmHg or more or diastolic blood pressure of 90 mmHg or more on 2 consecutive readings taken 30 minutes apart, measured between contractions
- A reading of 2+ of protein on urinalysis and a single reading of either raised systolic blood pressure (140 mmHg or more) or raised diastolic blood pressure (90 mmHg or more)
- Confirmed delay in the first or second stage of labour
- Contractions that last longer than 60 seconds (hypertonus), or more than 5 contractions in 10 minutes (tachysystole)
- Oxytocin use.

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 of variable decelerations:

-Lasting more than 60 seconds

- Reduced baseline variability within the deceleration
- Failure to return to baseline
- Biphasic (W) shape

Categorise Cardiotocography traces as follows:

-normal: all features are reassuring

- suspicious: 1 non-reassuring feature
- pathological: 1 abnormal feature or 2 non-reassuring features

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 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 he 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 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 he preferences into account • If the cardiotocograph trace is still pathological after implementing conservative mea – obtain a further review by an obstetrician **and** a senior midwife – offer digital fetal scalp stimulation (see recommendation 1.10.38) and document t 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

Intrapartum care: NICE guideline CG190 (February 2017)

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 abru 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 ex 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 positio to avoid being supine); offer intravenous fluids if the woman is hypotensive; reduce contraction frequency by reducing or stopping oxytocin if being used and/or offering a tocolytic drug (a suggested regimen is subcutaneous terbutaline 0.25 mg).

CTG interpretation and further management

- **If CTG is normal:** continue CTG or if it was started because of concerns arising from intermittent auscultation, remove CTG after 20 minutes if there are no non-reassuring/abnormal features and no ongoing risk factors.

- **If suspicious:** commence conservative measures – left lateral position, oral/intravenous fluids, stop oxytocin, consider tocolysis.

- **If the CTG is abnormal:** Offer to take fetal blood sample (FBS; for lactate or pH) after implementing conservative measures, or expedite birth if an FBS cannot be obtained and no accelerations are seen as a result of scalp stimulation.

CTG interpretation table

Lactate (mmol/l)	pH	Interpretation
≤4.1	≥7.25	Normal
4.2–4.8	7.21–7.24	Borderline
≥ 4.9	≤ 7.20	Abnormal

Fetal blood sampling interpretation

- **Normal(PH:>=7.25):** and there are no accelerations in response to fetal scalp stimulation, consider taking a second fetal blood **sample no more than 1 hour** later if this is still indicated by the cardiotocograph trace.

- **Borderline (PH 7.21-7.24):** and there are no accelerations in response to fetal scalp stimulation, consider taking a second fetal blood sample no more than 30 minutes later if this is still indicated by the cardiotocograph trace.
- **Abnormal (PH<7.2) :** Delivery.

PREDICTIVE VALUE

- With a reactive NST, the chance for fetal death within 1 week is 1.9 per 1,000, giving a negative predictive value of 99.8% after correction for lethal anomalies.
- Best sensitivity and positive predictive value for IUGR and Hypertensive disorders -70%
- Reactive NST is reassuring.
- Nonreactive NST is nonspecific and requires further evaluation.

(Pediatr Clin N Am 56 (2009) 489–504)

Contraction Stress Test

CST/OCT first biophysical technique widely applied for antepartum fetal surveillance.

Principle

uterine contractions

↓

Reduction in blood flow to the intervillous space.

↓

Inadequate placental respiratory reserve

↓

Recurrent late decelerations in response to hypoxia.

TECHNIQUE

- ✓ Patient is placed in the semi-Fowler's position at a 30- to 45-degree angle with a slight left tilt .
- ✓ Fetal heart rate and uterine contraction baseline is determined.
- ✓ Blood pressure is recorded every 5 to 10 minutes to detect maternal hypotension.
- ✓ oxytocin started @.5-1 miu /min.
- ✓ An adequate CST requires uterine contractions of moderate intensity lasting about 40 to 45 seconds with a frequency of three in 10 minutes.

INTERPRETATION

- ✓ *Negative: No late or significant variable decelerations*
- ✓ *Positive: Late decelerations with at least 50% of contractions*
- ✓ *Suspicious: Intermittent late or variable decelerations*
- ✓ *Hyperstimulation: Decelerations with contractions longer than 90 seconds' duration or 2-minute frequency*
- ✓ *Unsatisfactory: Fewer than three contractions per 10 minutes or an uninterpretable tracing*

MANAGEMENT PROTOCOL OF CST

- ✓ **Positive CST is usually repeated in 24 hours .**
- ✓ **This is of historical importance .**
- ✓ **Not used now.**

(IANDONALD 6TH ED.,GABBE 6TH ED.)

BIOPHYSICAL PROFILE (BPP)

- **Thorough evaluation of fetal well-being .**
- **Potential to significantly reduce the false-positive rate of the NST/CST.**
- **The BPP was initially described by Manning and colleagues in 1980.**
- **Rationale:-Fetal biophysical activities controlled by centers in the fetal brain sensitive to varying degrees of hypoxia.**

BPP SCORING(MANNING)

score /10(5 parameters either 2/0)

1. **Movements:**	SCORE
Three or more gross body movements in a 30-minute period.	**2**
➨ **Simultaneous trunk and limb**	
Fewer than 3 gross body movements in a 30-minute period	**0**

CONT.

	SCORE
2. TONE At least one movement of a limb from a position of flexion to one of extension, with a rapid return to flexion.	2
Fetal limb in extension with no return to flexion with movement	0
3. Breathing At least 30 seconds of sustained FBMs observed over a 30-minute period	2
Fewer than 30 seconds of sustained FBMs observed over a 30-minute	0

Cont.

	SCORE
4.**AFP**: **At least a single amniotic fluid pocket measuring 2 cm in 2 perpendicular planes**	**2**
No amniotic fluid pocket that measures at least 2 cm ,2 perpendicular planes	**0**
5. **NST reactive**	**2**
NST non reactive	**0**

MODIFIED BPP

- Attempt to simplify and reduce the time.
- Focusing on the components of the BPP most predictive of perinatal outcome.
- Two parameters:-
- 1. NST indicator of present fetal condition.
- 2. AFI is a marker of long-term status.

DOPPLER VELOCIMETRY

- Noninvasive technique to assess blood flow by characterizing downstream impedance
- **Three fetal & one maternal vascular circuits** :-
  - **Umbilical artery**
  - **Middle cerebral artery**
  - **Ductus venosus**
  - **Uterine artery**

INDICATIONS

- IUGR
- PIH
- GDM
- RH ISOIMMUNISATION
- INTRAHEPATIC CHOLISTASIS OF PREGNANCY

Biochemical screening

- In 1956 , the first biochemical marker identified in maternal serum was alpha – feto-protein ; the association between a raised serum afp and open spina bifida was not demonstrated until 1974 .
- AFP is produced by the fetal liver . It crosses into maternal serum from amniotic fluid or via the placenta
- Maternal AFP rises throughout most of pregnancy (from 12 -32 week) , **hence accurate dating is mandatory**

. . . .

- The separation between the AFP levels in pregnancy is greatest at **16-18 week** , and therefore **screening is optimum at this stage .**
- **raised MSAFP is associated with:**
- **-multiple pregnancy & wrong date**
- **-abdominal wall defect (gastroschisis , exomphalos**
- **-neural tube defect**
- **-congenital nephrosis**

. . . .

- There is also some degree of association between raised MSAFP AND :
- -pre-eclampsia
- -preterm delivery
- Male fetus

. . . .

- **Low MSAFP is associated with:**
- -down syndrome (trisomy 21)
- -Edward syndrome (trisomy 18)
- Type 1 DM
- Overestimated GA
- HIGH maternal weight

- AFP screening now has a minor role in the detection of fetal defect due to the widespread use of sophisticated ultrasound technique .

First trimester biochemical screening

- Two biochemical markers :
- -free beta-HCG
- -PAPP-A (pregnancy associated plasma protein –A)

- MEASURED between 11-13 week

Second trimester biochemical screening

- Carried out between 15-20 weeks
- -two component : MSAFP & TOTAL hcg
- -THREE component(triple test) : MSAFP &hcg &uE3
- four component(quadrablet test) : MSAFP &hcg &uE3 & inhibin

- In down : low (e3 , AFP) HIGH (HCG&INHIBIN)
- In trisomy 18 and 13 : all are low

ULTRASOUND SCREENING

- The incidence of **major structural** abnormalities is **2-3 %** .
- Certain conditions increase a women chance of having malformed fetus (HIGH RISK):

-advanced age , type 1 DM , maternal drug use (anticonvulsant / warfarin) , +ve family history

HOWEVER , 95 % of abnormalities occur in fetuses born to mothers who have no risk factor at all .

So… ROUTINE SCREENING IS RECOMMENDED FOR ALL .

1ST TRIMESTER US SCREENING
11-13+6 week

- 1- **NT(nuchal translucency**) measurement : the maximum thickness of the subcutaneous translucency between skin and the soft tissue overlying the cervical spine .

- -aneuploidy
- -cardiac defect
- Skeletal dysplaisas
- Genetics syndromes

- 2- assessment of **nasal bone**

- **First trimester combined screening (NT +hcg+PAPP-A) is now the recommended screening test for downs syndrome** .

Soft markers

- Nuchal edema (more than 6 mm)
- Ventriculomegaly (10 mm or greater)
- Echogenic bowel
- Renal pelvic dilatation (7 mm or greater)
- Small measurement (less than 3rd centile)
- Facial clefting

- **When you suspect abnormal baby in the previously mentioned screening tests (US/BIOCHEMICAL) AN INVASIVE OR NON-INVASIVE diagnostic TEST MAY BE CONSIDERED .**

NON-INVASIVE DIAGNISTIC TEST

- FREE FETAL DNA (in maternal circulation)
- -detection rate of more than 99 %
- in maternal circulation can be detected from 4 weeks and is rapidly cleared from maternal circulation
- Not available in all centres .

INVASIVE DIAGNOSTIC TESTS

- 1- AMNIOCENTESIS
- 2- CHORIONIC VILLUS SAMPLING (CVS)
- 3-FETAL BLOOD SAMPLING

AMNIOCENTESIS

- The aspiration of amniotic fluid from the amniotic sac via a needle inserted through the maternal abdomen
- It is the commonest prenatal diagnostic procedure in UK .
- **Usually performed between 15-16 week**
- Indication :
- 1)women with +ve screening test of down syndrome
- 2)women with advanced maternal age
- 3)+ve soft markers on US screening
- 4)parental balanced translocation
- 5)previouse history of chromosomal abnormalities

AMNIOCENTESIS

- Complication :

-1% fetal loss (higher if early done)

-cell culture fail in .5 % , necessitating further invasive test .

- Blood stained sample
- Fetal injury (rare)
- Infection (less than 1/1000)

CHORIONIC VILLUS SAMPLING/PLACENTAL BIOPSY

- Sampling of placental tissue .
- Placental biobsy after 1st trimester
- The procedure can be **performed from 11 -13+6** week
- Transabdominal and trans-cervical are both used .
- **Complication :**
- **-fetal loss more than 1 % (2nd trimester amniocentesis is safer)**
- **Limb defect (if before 10weeks)**
- **Placental mosaicism can occur in 2% (false negative)**

FETAL BLOOD SAMPLING

- Can be performed from 16 to 18 week , however , before **20 weeks** it carries increased risk of cord accidents .
- Fetal blood can be sampled from :

- Placental insertion or fetal insertion of **umbilical cord**
- **Cardiac puncture**
- **Intrahepatic vessels**

FETAL BLOOD SAMPLING

- Indication :

-rapid high quality karyotyping (48-72hours) , this is particularly useful when abnormalities detected late in pregnancy .

-diagnosis of fetal haematological problems (anemia , thrombocytopenia)

Complication :

-bleeding at the site of the needle

-fetal bradycardia

-fetal loss (1-2 %)

THANK YOU

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