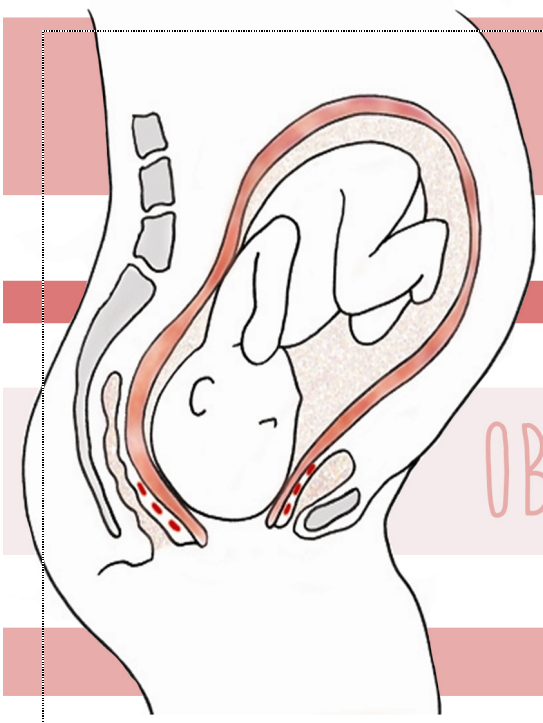

OBSTETRICS AND GYNECOLOGY

(Tutorial 9) fetal heart monitoring and fetal surveillance

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Done by: Razan Alshatwi & Shroog Alharbi

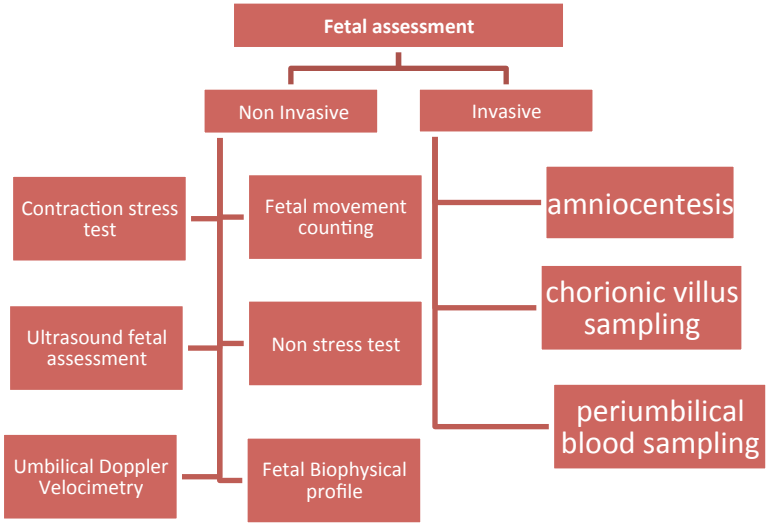
Revised by: Rawan Al-Mutairi

Doctor's note Team's note Not important Important 431 teamwork

(431 teamwork do not highlight it in yellow, but put it in a yellow "box")

Objectives:

Not given



Fetal assessment

Aim: Ensure fetal wellbeing (Identify patients at risk of fetal asphyxia). To prevent prenatal mortality & morbidity.

Screening For High Risk Pregnancy

- History (history of previous abnormal baby, past medical history, any associated risk factor)
- Age (very old or very young)
- Social burden
- Smoking
- Past medical conditions E.x. D.M, HTN
- Past obstetric history

431 teamwork: Ages 35 and more associated with higher risk of mortality and morbidity rate, higher risk of chromosomal abnormalities and higher risk of malformation, chronic diseases

Fetal And Neonatal Complications Of Antepartum Asphyxia

- Stillbirth (Mortality)
- Metabolic acidosis at birth
- Hypoxic renal damage
- Necrotizing enterocolitis
- Intracranial hemorrhage
- Seizures
- Cerebral palsy

Conditions Associated With Increased Perinatal Morbidity/Mortality

- Small for gestational age fetus (IUGR)
- Decreased fetal movement
- Postdates pregnancy (>294 days)
- Pre-eclampsia/chronic hypertension
- Pre-pregnancy diabetes
- Insulin requiring gestational diabetes
- Preterm premature rupture of membranes
- Chronic abruption

When To Start Fetal Assessment Antenatally

- Risk assessed individually by taking history and identifying the risk factors.
- For D.M. fetal assessment should start from 32 weeks onward if uncomplicated
- If complicated D.M. start at 24 weeks onward
- For Post date pregnancy start at 40 weeks
- For any patient with decrease fetal movements start immediately
- Fetal assessment is done once or twice weekly

Antenatal Fetal Assessment

1. Fetal movement counting
2. Non stress test
3. Contraction stress test
4. Ultrasound fetal assessment
5. Umbilical Doppler Velocimetry

* Noninvasive:

Fetal movement counting

Cardiff technique:

Done in the morning, patient should: Calculate how long it takes to have 10 fetal movements. 10 movements should be appreciated in 12 hours

Sadovsky technique: (usually not done)

For one hour after meal the woman should lie down and concentrate on fetal movement, 4 movements should be felt in one hour. If not, she should count for another hour.

If after 2 hours four movements are not felt, she should have fetal monitoring (CTG).

Non stress test

This test assesse the frequency of fetal movements using an external

fetal heart rate (FHR) monitoring device to detect the present or absent of acceleration. “From Kaplan Lecture Notes”

The base line fetal heart rate 120-160 beats/minute.

Done using the Cardiotocometry Record for 20 minutes with the patient in left lateral position. Why?

Cardiac output is the lowest in supine position because of the inferior vena cava compression resulting in decreased cardiac return (hypotension and you will see deceleration). CO is the highest in the left lateral position. “From Kaplan Lecture Notes”

1. Reactive CTG:

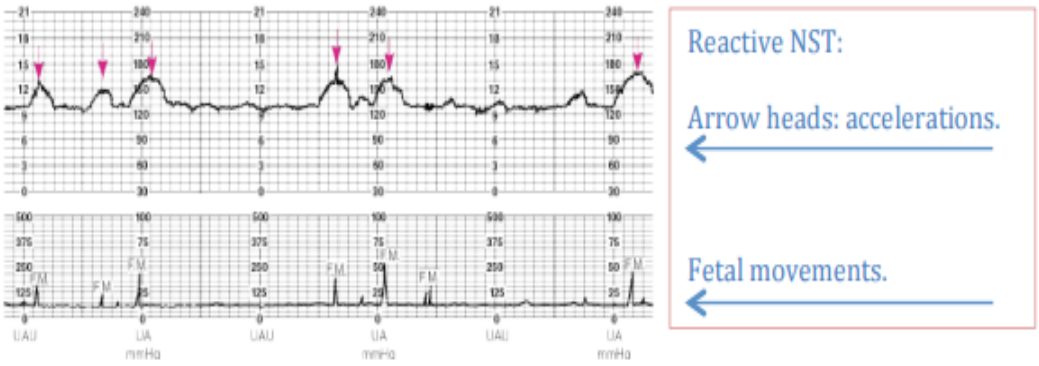
- At least two accelerations from base line of 15 bpm for at least 15 sec within 20 minutes.

Accelerations mean the fetal heart rate will increase more than the basement. Accelerations are always reassuring.

2. Non-reactive:

- No acceleration after 20 minutes > proceed for another 20 minutes.
- If non-reactive in 40 minutes > proceed for contraction stress test or biophysical profile.
- The positive predictive value of NST to predict fetal acidosis at birth is 44%. Not every non-reactive CTG means acidosis or asphyxia and not every reactive CTG means a well fetus.

Eighty percent of nonreactive NSTs are false positives (meaning the fetus is not hypoxemic) Non-hypoxemic causes include fetal sleep,



prematurity, drug effects, and CNS anomalies. “From Kaplan Lecture Notes”

Contraction stress test

Fetal response to induced stress of uterine contraction and relative placental insufficiency

The aim of that to see the response of fetal heart rate with those contractions

Changes of fetal heart rate related to maternal contractions.

1. No change.
2. Acceleration: increases with uterine contractions ➟ Normal response.
3. Deceleration: decreases with uterine contractions.

Should not be used in patients at risk of preterm labor or placenta Previa

Should be proceeded by NST. Why? To check if there are already contractions.

Contraction is initiated by nipple stimulation or by oxytocin I.V.

The objective is 3 contractions in 10 minutes.

If late deceleration occur > positive CST

Why will the fetus have deceleration in placenta insufficiency? Because during contraction there will be loss of the diastolic blood flow leading to asphyxia and low HR.

Negative CST: requires absence of any late decelerations with contractions. This is reassuring for fetal well-being

Positive CST: is worrisome. This requires the presence of late decelerations associated with at least 50% of contractions. Fifty percent of positive CSTs are false positive (meaning the fetus is not hypoxemic). They are associated with good FHR variability. The 50% of true positives are associated with poor or absent variability. Management is prompt delivery.

Contraindicated in previous classical uterine incision, previous myomectomy, placenta Previa, incompetent cervix, preterm membrane rupture, and preterm labor. "From Kaplan Lecture Notes"

Interpretation of CTG

Normal Baseline FHR 110–160 bpm

Moderate bradycardia 100–109 bpm

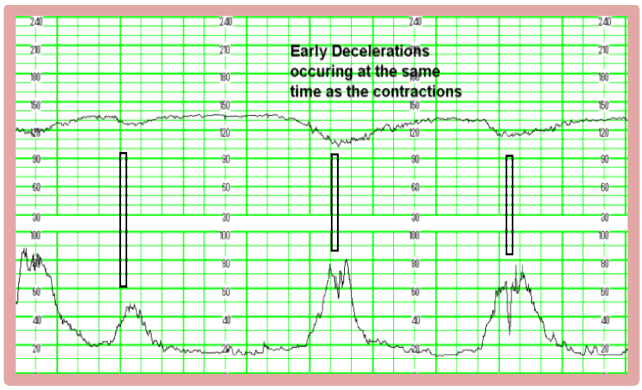
Moderate tachycardia 161–180 bpm

Abnormal bradycardia < 100 bpm

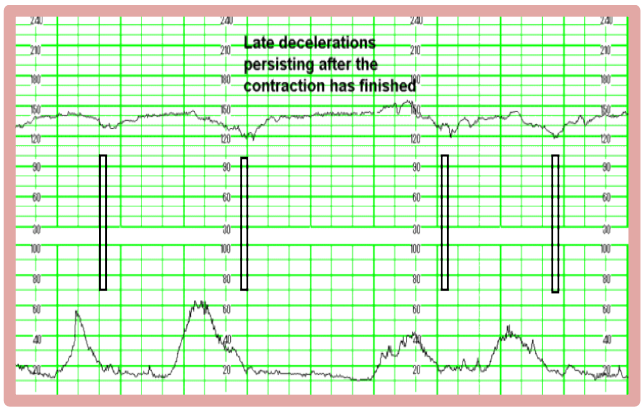
Abnormal tachycardia > 180 bpm

Deceleration

1. Early deceleration: occurring at the same time as the contractions.
Ex: Head Compression.
That occurs at delivery at the second stage when the head pass through the bone pelvis

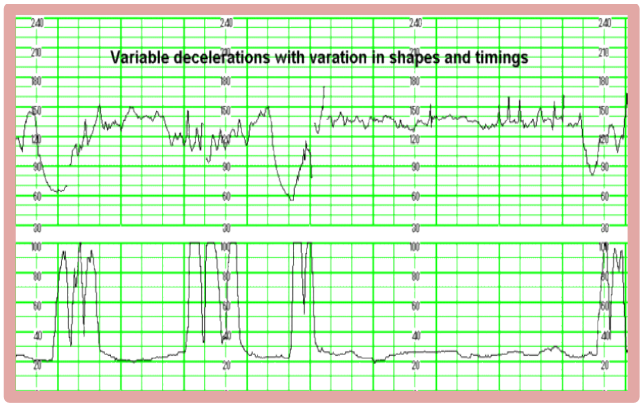


2. Late deceleration: persisting after contraction has finished. (The peak of deceleration comes after the peak of the contraction). Rx: stop syntocinon. Give oxygen, salbutamol or beta-mimetics and put her on left lateral position
Ex: U-Placenta Insufficiency

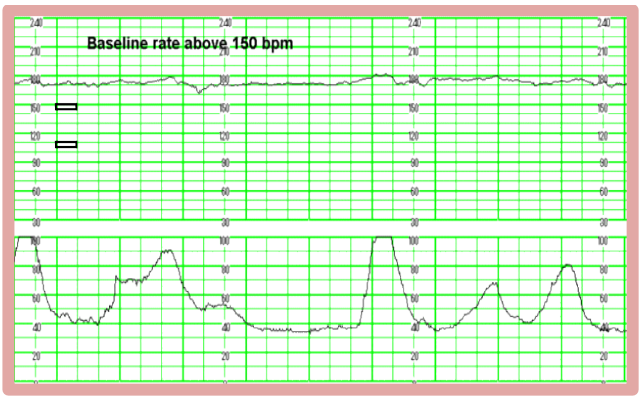


3. Variable deceleration: variation in shapes and timing.
Ex: Cord Compression, Primary CNS Dysfunction.

Rx: Amnioinfusion in cord compression



Tachycardia Ex: hypoxia, Chorioamnionitis, Maternal fever, B-Mimetic drugs, fetal anemia, sepsis, heart failure, arrhythmias. Rx: if she has fever screen for infection.



How to read CTG:	http://geekymedics.com/2011/05/29/how-to-read-a-ctg

Partogram

It is a sheet of paper in the delivery room to evaluate the progression of labor, includes:

- Iv fluids & avoid oral intake
- Maternal vital signs every 1-2 hours
- Input-output monitoring
- Analgesia
- Fetal heart rate monitoring (CTG)

- Uterine contractions monitoring
- Vaginal examination for cervical dilatation & position inactive phase every 2 hours
- Amniotic membrane status, amniotic fluid color

FETAL PH ASSESSMENT

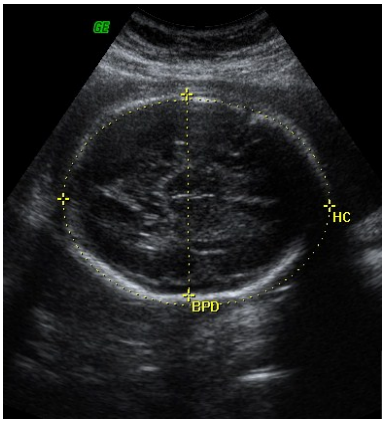
In continuous deceleration do fetal scalp testing for blood PH. Insert a needle through the vagina to the scalp of the fetus. Prerequisites include cervical dilation, ruptured membranes, and adequate descent of the fetal head. Contraindications are suspected fetal blood dyscrasia. A small, shallow fetal scalp incision is made resulting in capillary bleeding. Normal fetal pH is > or = 7.20 if less deliver. "Kaplan"

Ultrasound fetal assessment

1) Assessment of fetal growth by ultrasound

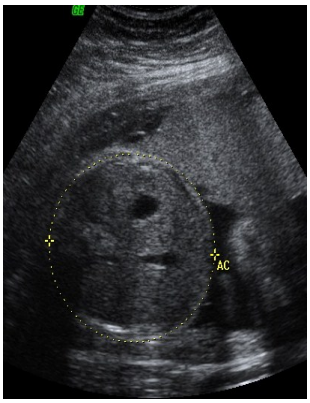
Biometry:

-Biparietal diameter (BPD)
-Abdominal Circumference (AC)
-Femur Length (FL)
-Head Circumference (HC)

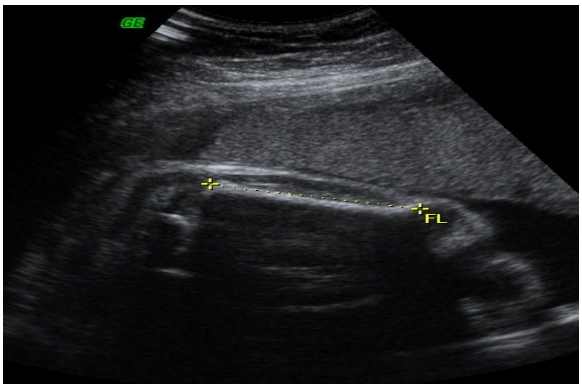


The measurement are compared to growth chart

BPD

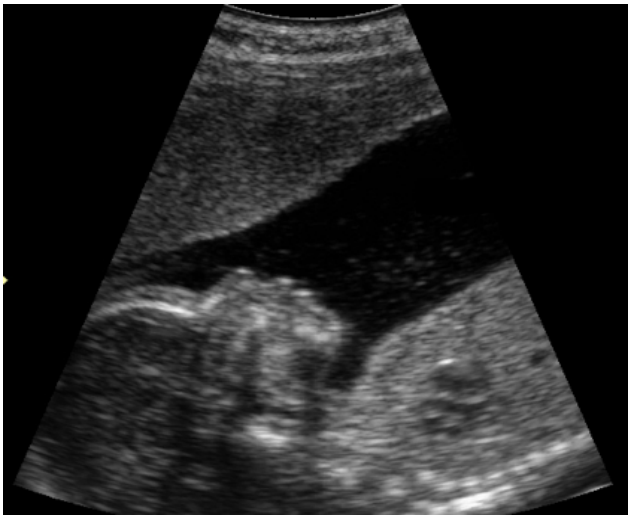


AC



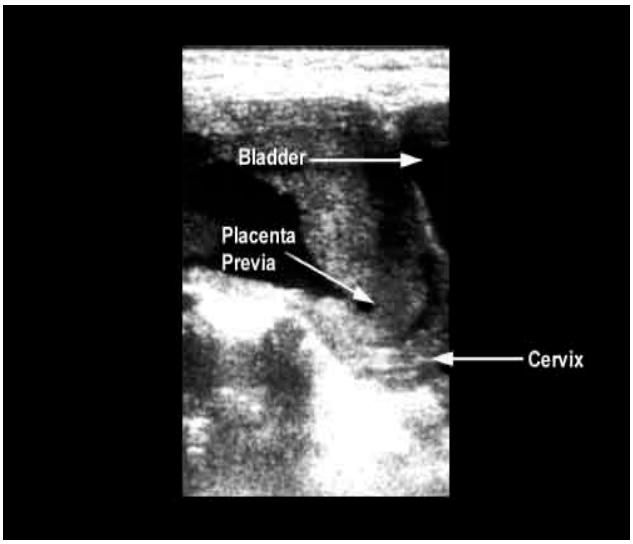
FL

Amniotic fluid



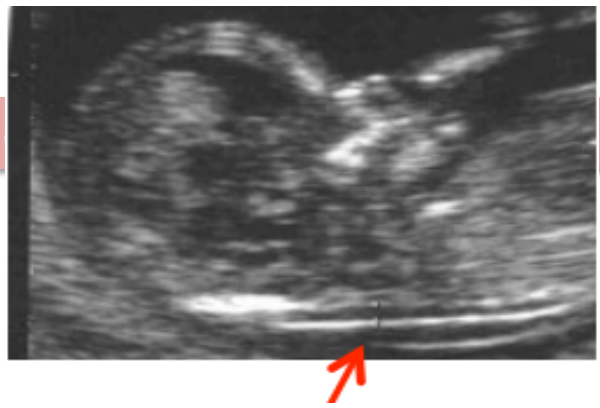
AFI
The 4-quadrant amniotic fluid index test assesses in centimeters the deepest single vertical amniotic fluid pocket in each of the 4 quadrants of the uterus. The sum of the pockets is known as the amniotic fluid index. “kaplan”

Placental localization



You correlate the placenta to the bladder

2) Assessment for Chromosomal Abnormality



Nuchal translucency (N.T)

Skin fold thickness behind the fetal cervical spine. Present at the Time between: (11-13 +6 days) weeks of pregnancy. Will be positive in 75-80% of trisomy 21. Can be positive in 5-10% of normal karyotype (but could be associated with cardiac defects, diaphragmatic hernia, Exomphalos).

Biophysical Variable	Normal (score=2)	Abnormal (score= 0)
Fetal breathing movements	1 episode FBM of at least 30 s duration in 30 min	Absent FBM or no episode >30 s in 30 min
Fetal movements	3 discrete body/limb movements in 30 min	2 or fewer body/limb movements in 30 min
Fetal tone	1 episode of active extension with return to flexion of fetal limb(s) or trunk. Opening and closing of the hand considered normal tone	Either slow extension with return to partial flexion or movement of limb in full extension Absent fetal movement
Amniotic fluid volume	1 pocket of AF that measures at least 2 cm in 2 perpendicular planes	Either no AF pockets or a pocket<2 cm in 2 perpendicular planes

And CTG

A complete BPP measures 5 components of fetal well-being: NST, amniotic fluid volume, fetal gross body movement, fetal extremity tone, and fetal breathing. The last 4 components are assessed using obstetric ultrasound. Score given for each component are 0 or 2, with maximum possible score 10 and minimum score 0.

1. Score of 8 – 10 highly reassuring of fetal well-being. Management is to repeat the test weekly or as indicated.
2. Score 0f 4 – 6 worrisome. Management is delivery if the fetus is ≥ 36 weeks or repeat the BPP in 12-24 h if < 36 weeks. An alternative is to perform CST.
3. Score of 0 – 2 highly predictive of fetal hypoxia, management is prompt delivery regardless of gestational age. ”From Kaplan lecture notes”

Umbilical Doppler Velocimetry

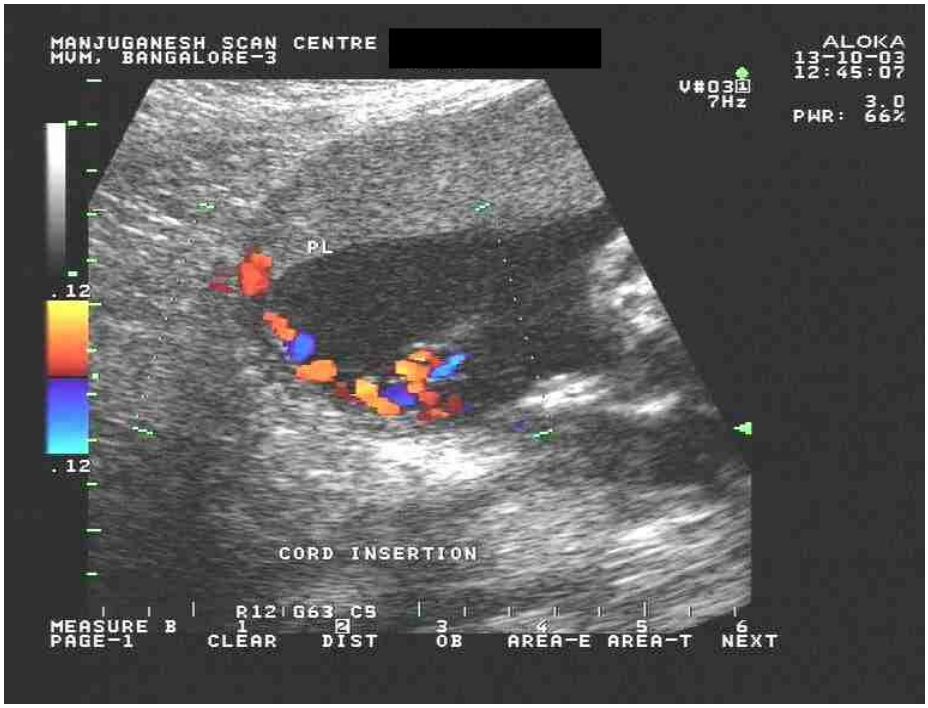
Indication:

IUGR

PET

D.M.
Any high risk pregnancy
Use a free loop of umbilical cord to measure blood flow in

Umbilical cord




Normal pregnancy


Reduced end diastolic velocity


Absent end diastolic velocity


Reversed end diastolic velocity

If you have an abnormal Doppler what will you do? It depends on fetal maturity, gestational age and obstetric history. In reversed and absent

diastolic flow deliver the fetus.

* Noninvasive used mainly to detect chromosomal abnormalities:

Biochemical Screening

1st trimester At week 10 of pregnancy	
PAPPA: Low level is associated with chromosomally abnormal fetus. Low levels are also associated with IUGR , preeclampsia and abortion	From the mother blood
β HCG: If you find it too high for the gestational age , the risk is very high to develop chromosomally abnormal baby	
2nd trimester	
Triple & quadruple Test	

Cell-free fetal DNA Free fetal DNA in maternal blood

A sample of maternal blood, where DNA of the fetus is separated from this Allows to know the age of the fetus, blood group, any type of abnormal genes and sex. Can be done as early as 10 weeks.

Indications

1. Detect chromosomal Abnormalities
2. Know the sex of the fetus
3. Know fetus blood group
4. Myotonic dystrophy
5. Beta thalassemia
6. Autosomal recessive disorders
7. Autosomal dominant disorders
8. Huntington disease
9. Cystic fibrosis

* Invasive:

Amniocentesis

Obtaining a sample of amniotic fluid surrounding the fetus during pregnancy.

It could be:

A) Diagnostic (at 11- 20 weeks , usually its done at 16weeks , the earlier it's done the more complications it causes):

Indications:

1. Chromosomal analysis (Down syndrome)
2. Spina bifida (Alpha fetoprotein)
3. Inherited diseases (muscular dystrophy)
4. Bilirubin level in isoimmunization
5. Fetal lung maturation (L/S ratio) ⟹ greater than 2 = minimal distress.

B) Therapeutic (at any time)

Indications:

1. Reduce maternal stress in polyhydramnios.
2. Mainly in twin-twin transfusion or if abnormality associated.

Complications:

1- Abdominal cramps
2- Leak or rupture membrane
3- Risk of abortion 1: 200
4- Bleeding
5- Infection e.g. chorioamniotis.
6- Injury by the needle.
7- If done therapeutically, the amount of fluid will be reduced and the fetus will be at risk of developing Club foot

Chorionic Villus Sampling (CVS)

Sampling is done to the cyto-trophoblasts between 10-14 weeks of

pregnancy

Indications for CVS:
A) Fetal karyotyping:

1. Advanced maternal age
2. Abnormal first trimester biochemical screen
3. Ultrasound findings
4. Personal and family history of trisomy
5. Abnormal parental karyotype

B) Genetic testing:
1. Family history of single gene disorder
2. Cystic fibrosis
3. Duchenne muscular dystrophy
4. Osteogenesis imperfecta

Complications:
1. Risk of abortion: 1:100 (higher than amniosentesis)

2. Risk of Rh- isoimmunization ➡ if the mother is Rh – if willing to do any procedure should be given anti D

3. False rate: 1 % (because of the mixture in the placenta between maternal and fetal blood, so it can be the mothers' blood)

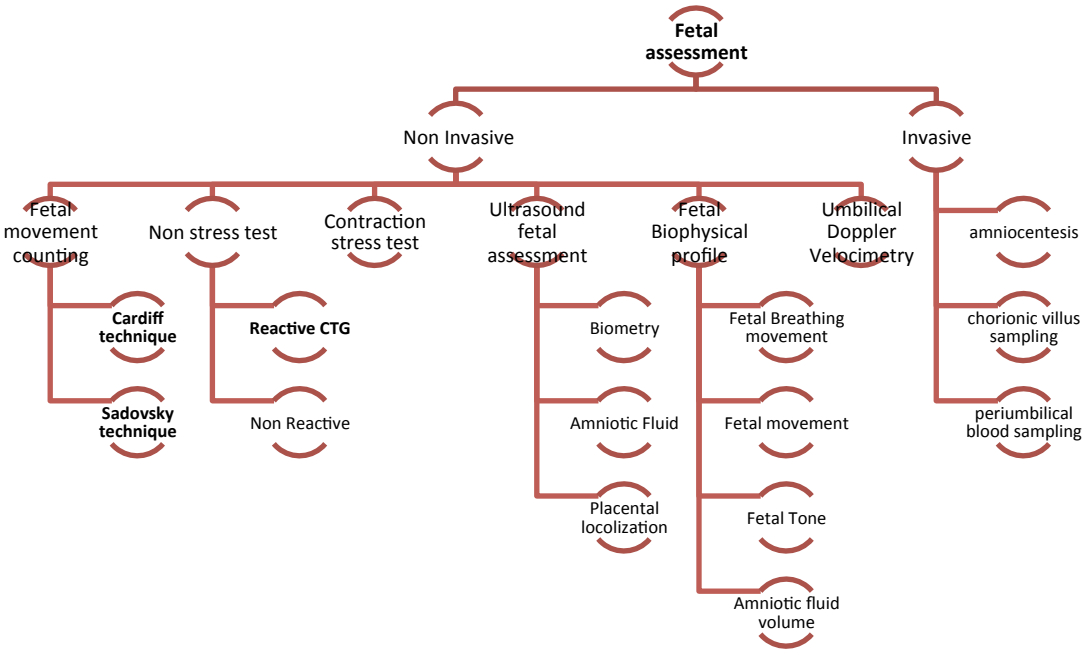
periumbilical blood sampling

Indications:
1- Genetic testing.
2- If the patient needed screening but presented too late for nuchal translucency or amniocentesis or the patient is oligohydromnious and can't do amniocentesis.
3- If you're suspecting that the fetus is infected, it can be performed to confirm the infection
4- Low fetal hg or blood level (fetal anemia). So blood transfusion can be done through umbilical cord.

Complications:
1-Fetal bradycardia.
2-Intrauterine death
3-Umbilical artery spasm

Due to its complications:
1- It is performed in the delivery room
2- Dexamethasone is given for maturation of lung of the fetus.
3- Neonatal intensive care is prepared to take the baby in case of delivery
4- OR is prepared for C-section

Summery


Fetal assessment
Non Invasive
Invasive
Fetal movement counting
Non stress test
Contraction stress test
Ultrasound fetal assessment
Fetal Biophysical profile
Umbilical Doppler Velocimetry
amniocentesis
Cardiff technique
Sadovsky technique
Reactive CTG
Non Reactive
Biometry
Amniotic Fluid
Placental locolization
Fetal Breathing movement
Fetal movement
Fetal Tone
Amniotic fluid volume
chorionic villus sampling
periumbilical blood sampling

MCQ's :

1. Components of biophysical profile include all of the following, EXCEPT:

A. Fetal movement
B. B.Placental thickness
C. Fetal tone
D. Fetal breathing movement
E. Amniotic fluid volume assessment

2. Antenatal fetal monitoring can NOT be accomplished by:

F. A. Fetal kick chart
G. . B. Fetal scalp sampling.
H. C. Non-stress test.
I. D. Obstetric U/S & Biophysical profile.
J. E. Acoustic stimulation.

4. Which of the following procedures allow the earliest retrieval of DNA for prenatal diagnosis in pregnancy:

K. A. Fetoscopy.
L. B. Amniocentesis.
M. C. Chorionic Villi Sampling (CVS)
N. D. Percutaneous Umbilical Blood Sampling (PUBS)
O. E. Fetal biopsy.

5. Regarding the biophysical profile:

P. A. Is usually done in labor.
Q. B. Never include an non-stress test.
R. C. Includes fetal movement, fetal tone, fetal breathing, fetal heart rate & amniotic fluid.
S. D. Includes a Doppler study.
T. E. Includes tone, movement & breathing.

6. Fetal assessment include the following EXCEPT:

U. A. Fetal biophysical profile.
V. B. Fetal Doppler velocimetry
W. . C. Fetal biometry.
X. D. Fetal Cardiotocography
Y. . E. Fetal blood sugar sample

7. Patients with high risk pregnancy should have:

A. Follow-up in ANC every 6 weeks
B. Fetal kick chart.
C. Fetal maternal transfusion
D. Fetal amniotomy
E. Fetal biophysical profile.

8. A biophysical profile includes all of the following assessment parameters EXCEPT:

A. Fetal movement.
B. Fetal weight.
C. Fetal tone.

D. Fetal breathing movements.
E. Amniotic fluid volume.