433 Teams

OBSTETRICS & GYNECOLOGY

Antenatal Fetal assessment

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Objectives:

Describe how to test for each of the following:

- Fetal well-being
- Fetal growth
- Fetal movement
- Amniotic fluid
- Fetal lung maturity

Stay focused, time will pass

Fetal assessment (fetal well-being):

- Fetal assessment is to identify fetuses at risk of neurologic injury or death in order to prevent it.
- To prevent prenatal mortality & morbidity.

Fetal and neonatal complications of antepartum asphyxia:

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

Rational:

Fetal oxygenation challenged:

- blood flow directed to brain, heart & adrenal & blood flow away from the kidney decrease fetal urine production → decrease AF volume.
- CNS hypoxia → Fetal movement decrease.
- chemoreceptor's → vegally-mediated reflex → fetal heart rate abnormality late deceleration.

CONDITIONS ASSOCIATED WITH INCREASED PERINATAL MORBIDITY/ MORTALITY:

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

When to start fetal Assessment antenatally?

Risk assessed individually

**For D.M. fetal assessment should start from 32 weeks onward if uncomplicated.

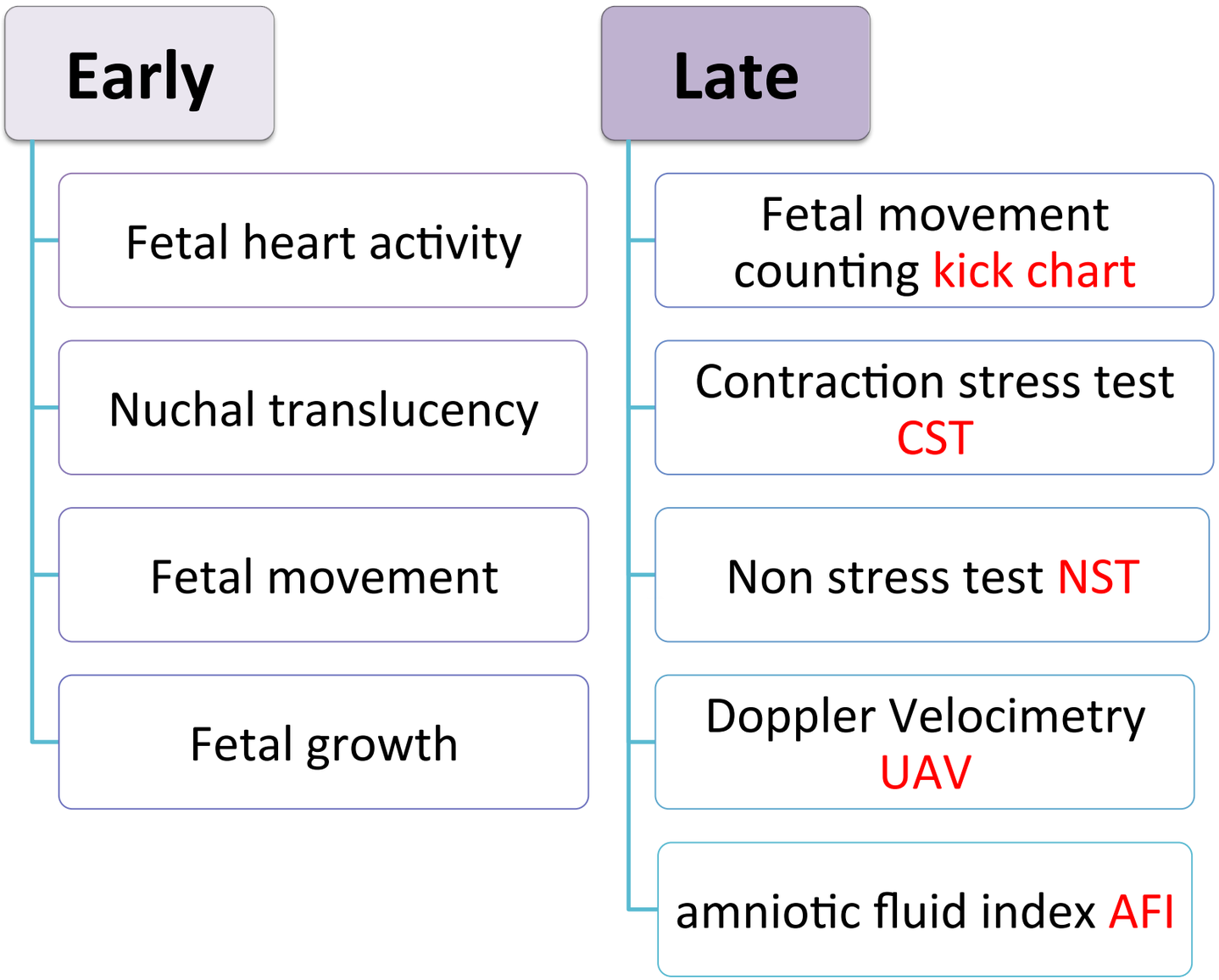
***If complicated D.M. start at 24 weeks onward.

**For Post date pregnancy start at 40 weeks.

**For any patient with decrease fetal movement start immediately.

** Fetal assessment is done once or twice weekly.

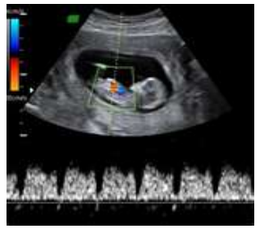
Pregnancy assessment:



Early pregnancy assessment

Fetal heart activity:

- fetal auscultation (special stethoscope or Doppler).
~12 weeks
- Can be seen from 6 weeks.



Fetal movement:

- Fetal movement are usually first perceptible to mother ~17w-20w (quickening)
- 50% of isolated limb movements are perceived
- 80% of trunk and limb movements

Nuchal translucency:

- measurement for early screening for chromosomal abnormality Between 11-13+ weeks

Fetal growth:

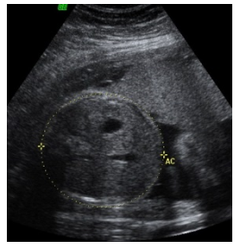
- By <u>fundal height measurement</u> in the clinic
- By <u>ultrasound</u>

Biometry:

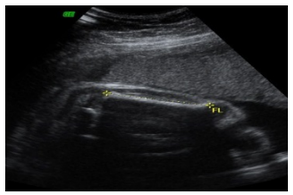
- Biparietal diameter (BPD)
- Abdominal Circumference (AC)
- Femur Length (FL)
- Head Circumference (HC)

Amniotic fluid

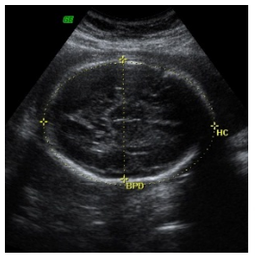
BPD



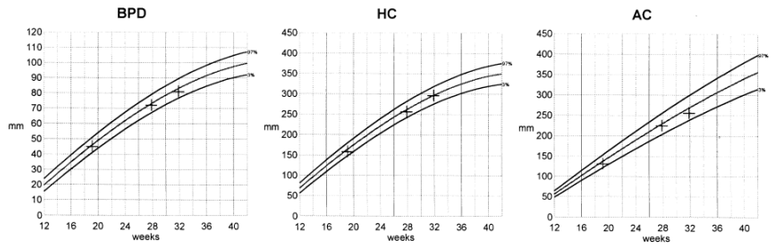
AC



FL



HC



<u>Growth chart</u>

Late pregnancy assessment

fetal movement counting:

- It should be started ~28w in normal pregnancy &~24w in high risk pregnancy.
- It can reduce avoidable stillbirth.

CARDIFF TECHNIQUE:

- 10 movement in 12 hours.
- If abnormal patient should get further assessment.

SADOVSKY TECHNIQUE:

- 4 movement /hour if not felt another hour.
- If not patient need more assessment.

From the book:

The mother assesses fetal movement each evening on her left side. She should recognize 10 movements in 1 hour, and if she does not, she should retest in 1 hour. If she still does not, she should contact her doctor.

Contraction stress test (CST):

- Is a test for uteroplacental dysfunction.
- Causing uterine contraction over 20 minutes .
- At least 2 uterine contractions.
- Uterine contraction restrict O2 delivery to the fetus
- Normal fetus will tolerate contraction
- Hypoxic fetus will have late deceleration
- High false positive rate ~50%

100% true negative rate

From the book:

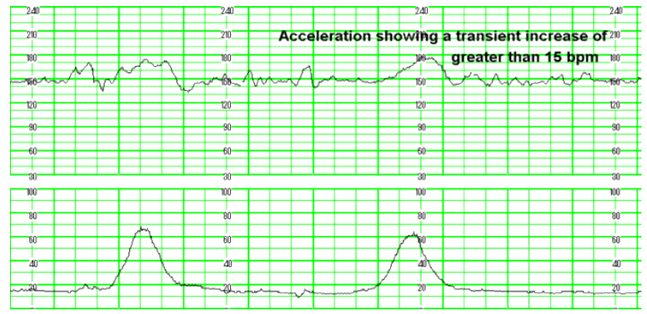
A dilute infusion of oxytocin is given to establish at least three uterine contractions in 10 minutes. If late decelerations are observed with each contraction, the test is positive (abnormal).

*When the test is positive, the baby should usually be delivered.

Late pregnancy assessment

Non stress test (NST):

- The first step in the assessment of fetal well-being.
- Main advantage over CST is no need for contraction.
- False +ve & false –ve higher than CST.
- The base line 120-160 beats/minute.
- Different criteria in fetuses < 32w.



Reactive:

- A normal fetus responds to fetal movement with an acceleration in fetal heart rate of 15 beats/minute or more above the baseline for at least 15 seconds.
- If at least two such accelerations occur in a 20-minute interval, the test is said to be reactive.

Non reactive:

- No acceleration after 20 minutes - proceed for another 20 minutes

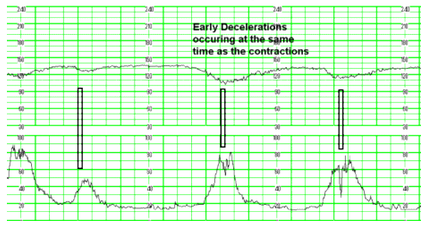
If non reactive in 40 minutes - proceed for contraction stress test or biophysical profile.

*The positive predictive value of NST to predict **fetal acidosis at birth is 55%.**

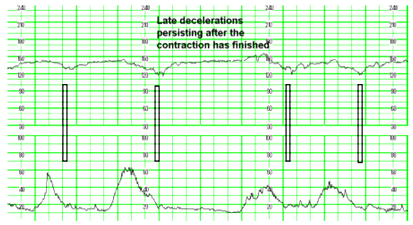
Interpretation of CTG*:

– Normal Baseline FHR 110–160 bpm
– Moderate bradycardia 100–109 bpm
– Moderate tachycardia 161–180 bpm
– Abnormal bradycardia < 100 bpm
– Abnormal tachycardia > 180 bpm

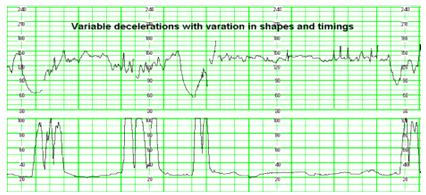
Early



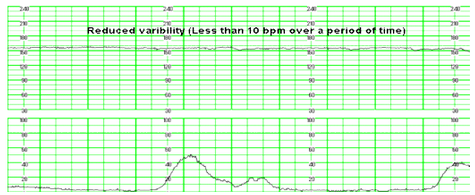
Late



Variable decelerations



Reduced variability



Deceleration:

EARLY:

- Occurring at the same time as the contraction, caused by Head compression.

LATE:

- Persisting after the contraction has finished, caused by uteroplacental Insufficiency.

VARIABLE Deceleration:

- Variation in shapes and timing, caused by cord compression and primary CNS dysfunction.

Reduced Variability:

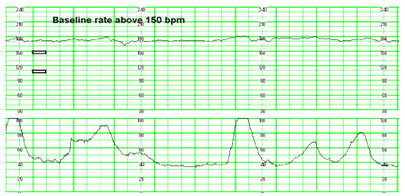
- Less than 10 pbm over a period of time.

Tachycardia:

usually associated with elevated maternal temperature or an intrauterine infection.

Other causes like: Hypoxia, Chorioamnionitis, B-Mimetic drugs, Fetal anemia, sepsis, heart failure and arrhythmias.

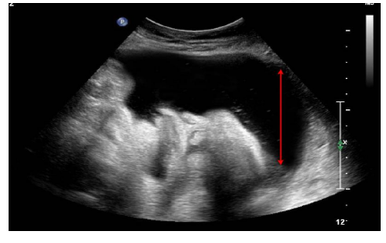
tachycardia

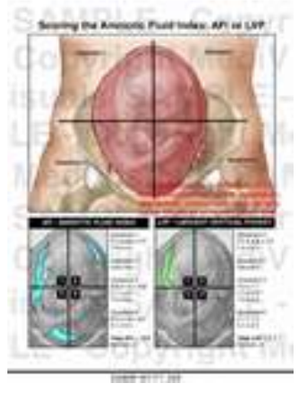


*CTG = cardiotocography = NST

Amniotic fluid index AFI:

- the sum of the maximum vertical fluid pocket diameter in four quarters
- the normal value 5-25cm
- < 5 oligohydramnios
- > 24cm polyhydramnios





Biophysical profile (BPP):

- Combines NST with USS estimation amniotic fluid volume, fetal breathing, fetal movement & fetal tone.
- it is a scoring system, done over 30 minute.
- It measures acute hypoxia (NST, fetal mov. &breathing) & chronic hypoxia (AFI)
- The risk of fetal death within 1 week if BPP is normal~ 1/1300.

Modified BPP (mBPP):

- Consists of NST & AFI only.
- low false negative 0.8/1000.
- high false positives ~60%.

Fetal Biophysical profile:

- Using NST → fetal heart rate.
- Using USS:

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	Single deepest vertical pocket of amniotic fluid > 2cm	Either no AF pockets or a pocket < / = 2 cm

***Two points for each variable and two points for a reactive NST.**

***A score of 8-10 is considered normal.**

Doppler velocimetry:

- Measurement of blood flow velocities in maternal & fetal vessels, Reflects feto-placental circulation.
- Doppler indices from UA, Uterine A & MCA
- Doppler studies is mostly valuable IUGR
- In IUGR absent or reversed EDF (end diastolic flow) associated with fetal hypoxia.

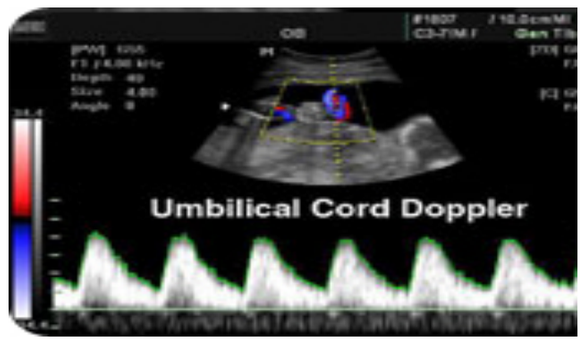
Normal pregnancy

Reduced end diastolic velocity

Absent end diastolic velocity

Reversed end diastolic velocity

umbilical artery waveform



Umbilical Artery Doppler

Indications for antepartum fetal surveillance

Maternal
Antiphospholipid syndrome
Poorly controlled hyperthyroidism
Hemoglobinopathies
Cyanotic heart disease
Systemic lupus erythematosis
Chronic renal disease
Type 1 diabetes mellitus
Hypertensive disorders
Pregnancy complications
Preeclampsia
Decreased fetal movement
Oligohydramnios
Polyhydramnios
Intrauterine growth restriction
Postterm pregnancy
Isoimmunization
Previous unexplained fetal demise
Multiple gestation

Antenatal testing methodologies

Name	Components	Results/scoring	False negative	False positive	References
Contraction stress test (oxytocin challenge test)	Continuous FHR monitoring At least 3 contractions of ≥40s duration within 10 min	**Negative:** no late or significant variable decelerations **Positive:** late decelerations following ≥50 percent of contractions, even if there are <3 contractions in 10 min **Equivocal - suspicious:** intermittent late decelerations or significant variable decelerations **Equivocal - hyperstimulatory:** decelerations with contractions occurring more frequently than q 2 min. or lasting >90s **Unsatisfactory:** <3 contractions in 10 min. or uninterpretable FHR tracing	0.04 percent	35-65 percent	[1,2]
Nonstress Test	Continuous FHR monitoring FHR accelerations: ≥32w: reaching 15 bpm above baseline and lasting ≥15s	**Reactive:** ≥2 accelerations within 20 min (may be extended to 40 min) **Nonreactive:** <2 accelerations in 40 min	0.2-0.65 percent	55-90 percent	[3-8]
Biophysical profile	Presence or absence of 5 components within 30 min: • Reactive NST • ≥1 episode of fetal breathing movements lasting ≥30s • ≥3 discrete body or limb movements • ≥1 episode of extremity extension with return to flexion or opening or closing of a hand • Maximum vertical AF pocket >2 cm or AFI >5 cm	Each component present is assigned score of 2 points; maximum score is 10/10 • **Normal:** ≥8/10 or 8/8 excluding NST • **Equivocal:** 6/10 • **Abnormal:** ≤4/10	0.07-0.08 percent	40-50 percent	[9-11]
Modified biophysical profile	NST AFI	**Normal:** Reactive NST *and* AFI >5 cm **Abnormal:** Nonreactive NST *and/or* AFI ≤5 cm	0.08 percent	60 percent	[12-15]

Invasive fetal assessment

Amniocentesis

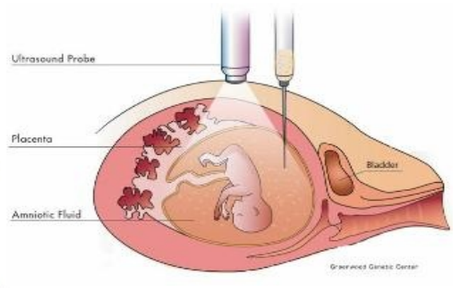
- Obtaining a sample of amniotic fluid during pregnancy.
- Usullay done after 15w (can be done after 11w).

Indication:

- genitic (karyotype)
- billirubin level (RH-isimunisation)
- fetal lung maturity (L/S)
- therputic in polyhydramnios

Risks:

Rupture of membrane ~1%, abortion 0.5%, infection 1/1000

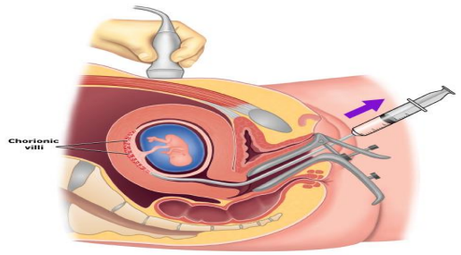


chorionic villus sampling (CVS)

- Usually done after 10w.
- It is the procedure of choice for first trimester prenatal diagnosis of genetic disorders.

Complication:

- fetal loss (0.7 percent within 14 days of a TA CVS procedure and 1.3 percent within 30 days), Procedure-induced limb defects
- Second trimester amniocentesis is associated with the lowest risk of pregnancy loss; *chorionic villus samplings safer than early (i.e, before 15 weeks) amniocentesis.*



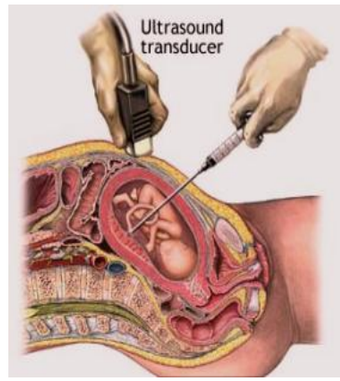
cordocentesis

Indication:

- rapid karyotyping.
- diagnosis of inherited disorders.
- fetal HB assessment.
- fetal plt level.
- fetal blood transfusion.

Complication:

bleeding, bradycardia, infection….



Fetal lung maturity (FLM):

- A test for fetal lung maturity is performed before semi-elective but medically indicated births < 39 weeks.
- Tests for fetal lung maturity are generally not performed before 32 weeks of gestation.
- Respiratory distress syndrome develops as a consequence of surfactant deficiency and immature lung development.
- L/S ratio (lecithin-sphingomyelin ratio) is the most commonly used (ratio should be 2:1 or greater).

Testing may have value in the following clinical situation:

- Premature rupture of membranes (≥ 32 weeks), if FLM test is mature, delivery is likely safer than "wait and see" approach.
- Assessment of need for NICU, possible only if early delivery has medical mandate and time allows for FLM testing.
- Other selected late preterm and early preterm pregnancy issues where FLM may guide management of at-risk pregnancy.

*All FLM tests require amniocentesis for obtaining amniotic fluid.

Comparison of FLM Laboratory Testing Options		
Lamellar body count (LBC)	**Phosphatidylglycerol (PG)**	**Lecithin-sphingomyelin ratio (L/S)**
•Initial FLM of choice •Rapid, sensitive •New data indicates that one can estimate risk of respiratory distress syndrome (RDS) as a function of gestational age and LBC	•Not useful unless gestational age ≥ 35 weeks •Limited availability •Sensitive	•Main role is in adjudication of immature LBC or PG • Last test of choice • Labor intensive, imprecise • Limited availability • Results take > 24 hrs unless performed at a local laboratory

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