ASSESSMENT - BIOPHYSICAL

Sharon Treesa Antony
First year M.sc Nursing
Govt. College of nursing
kottayam

Biophysical Tests

1. Fetal movement count
2. FHR monitoring
3. Cardio tocography
4. Non stress test
5. Contraction stress test
6. Amniotic fluid volume
7. USG

8.Biophysical profile

9.Modified biophysical profile

10.Doppler velocimetry

11.CT scan

12.MRI scan

Fetal movement count

- FM felt by 18 – 20 weeks
- Average 10 times/day

METHODS

- The Sandovsky method
- Cardiff ‘Count 10’formula
- Daily fetal movement count

Management of reduced FM

- Eat something
- Rest in a semirecumbent position
- Count fetal movement
- If 10 movements/hour reassure mother
- If <10 movements/hour go for NST

FHR monitoring

- Normal :120 -160 /min
- Doppler -10 -11th week
- Fetoscope -18-20th week

Rhythm Strip Monitoring

- Semifowler's position
- Attach fetal heart rate monitor abdominally
- Record for 20 min
- Baseline rate-average rate of the FHR /min
- Variability –small changes in rate.

VARIABILITY

- Categorised as:
- Absent – None apparent
- Minimal- <5 bpm
- Moderate –amplitude 6-25 bpm
- Marked –amplitude >25 bpm

Average fetus move about 2/10 min. So 2 or more FHR acceleration in a 20 min period

Cardiotocography

- Monitor FHR & the uterine contractions
- FHR obtained by USG & uterine contractions by tocodynamometer
- Types
- External
- Internal

Cardiotocograph

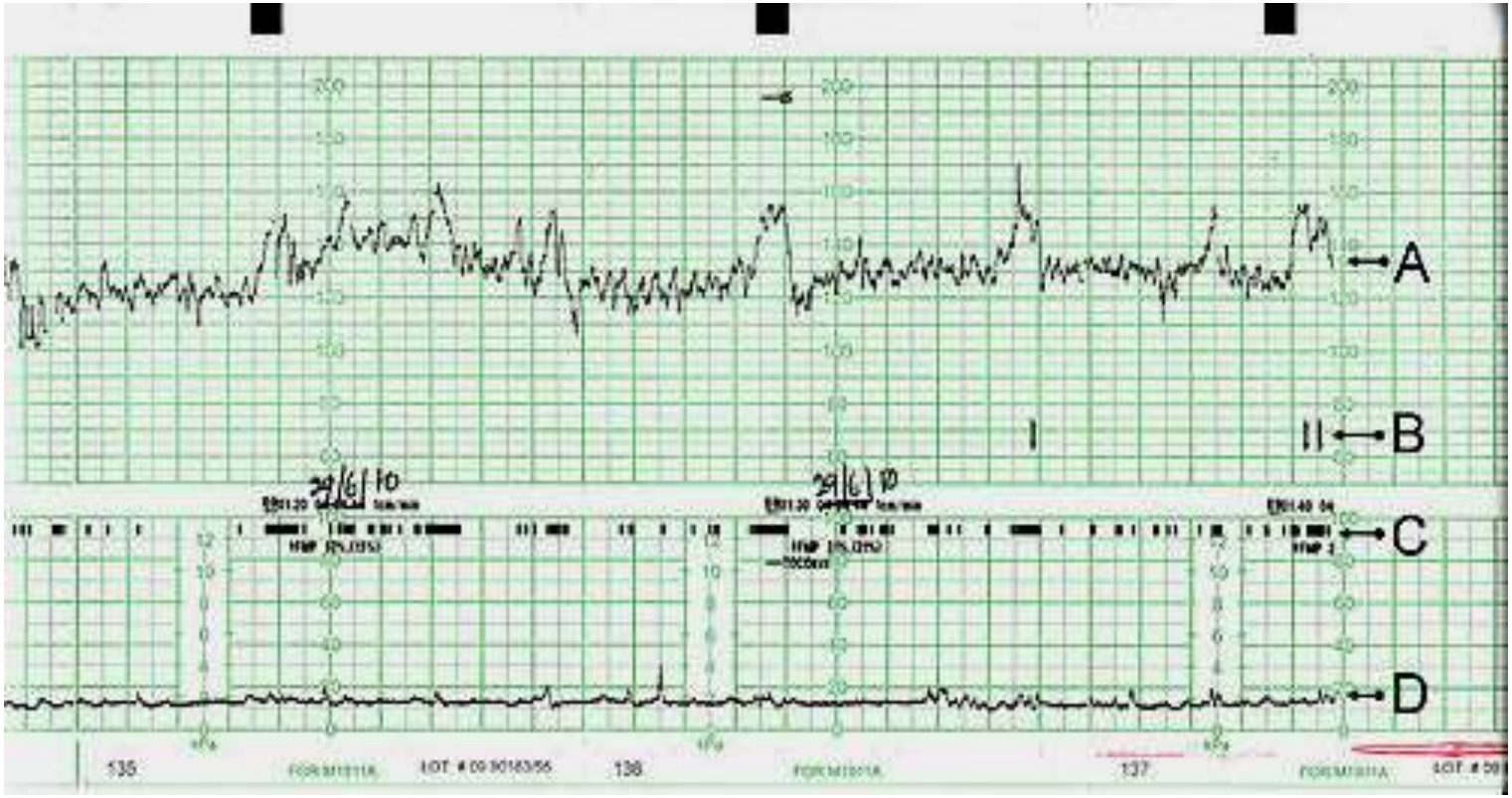
- Upper portion:FHR Pattern

- Lower portion: uterine contractions

Indications for continuous EFM

- MATERNAL
- Hypertension
- Previous CS
- Induced labour
- APH
- PROM

- FETAL
- Oligohydramnios
- IUGR
- Multiple pregnancy
- Abnormal FHR on auscultation


A
I
II
B
C
D
135
136
137

TERMS

- Baseline FHR- mean level of FHR (110-160 bpm)
- Baseline variability:oscillation in FHR except acceleration & deceleration
- Absent
- Minimal (<5 bpm)
- Moderate (6-25 bpm)
- Marked(> 25 bpm)

- Acceleration : increase in FHR by 15 bpm or more lasting for at least 15 sec
- Deceleration:decrease in FHR below baseline by 15 bpm or more lasting>15 sec
- **3 types**
- Early
- Late
- Variable

- Lag period :time taken by FHR to reach the nadir from apex of preceding uterine contraction.
- For deceleration lag period is >/= 30 sec
- Sinusoidal pattern
- stable baseline FHR
- fixed/absent baseline variability for >/=20 min
- Accelerations are absent

Interpretation of CTG

- Normal:accelarations+baseline variability 5-25 bpm
- Hypoxic fetus:absent acceleration+reduced variability
- Repeated late deceleration increase risk for low APGAR score & cerebral palsy
- Reduced variability&late/variable deceleration increases the risk for cerebral palsy

categorisation of FHR features

Feature	Baseline (bpm)	Variability (bpm)	Deceleration	Accelerations
Reassuring	110-160	>5	none	Present
Non reassuring	100-109 161-180	<5 for >/=40 min but<90 min	•Early decelratn •Variable dclrtn •Single prolngd dclrtn upto 3 min	absence of acceleration with an otherwise normal CTG is of uncertain significance.
Abnormal	<100 or >180 Sinusoidal pattern >/=10min	<5 for >90 min	•Atypical variable dclrtn •Late dclrtn>30 min •Single prolonged dclrtn>3 min	

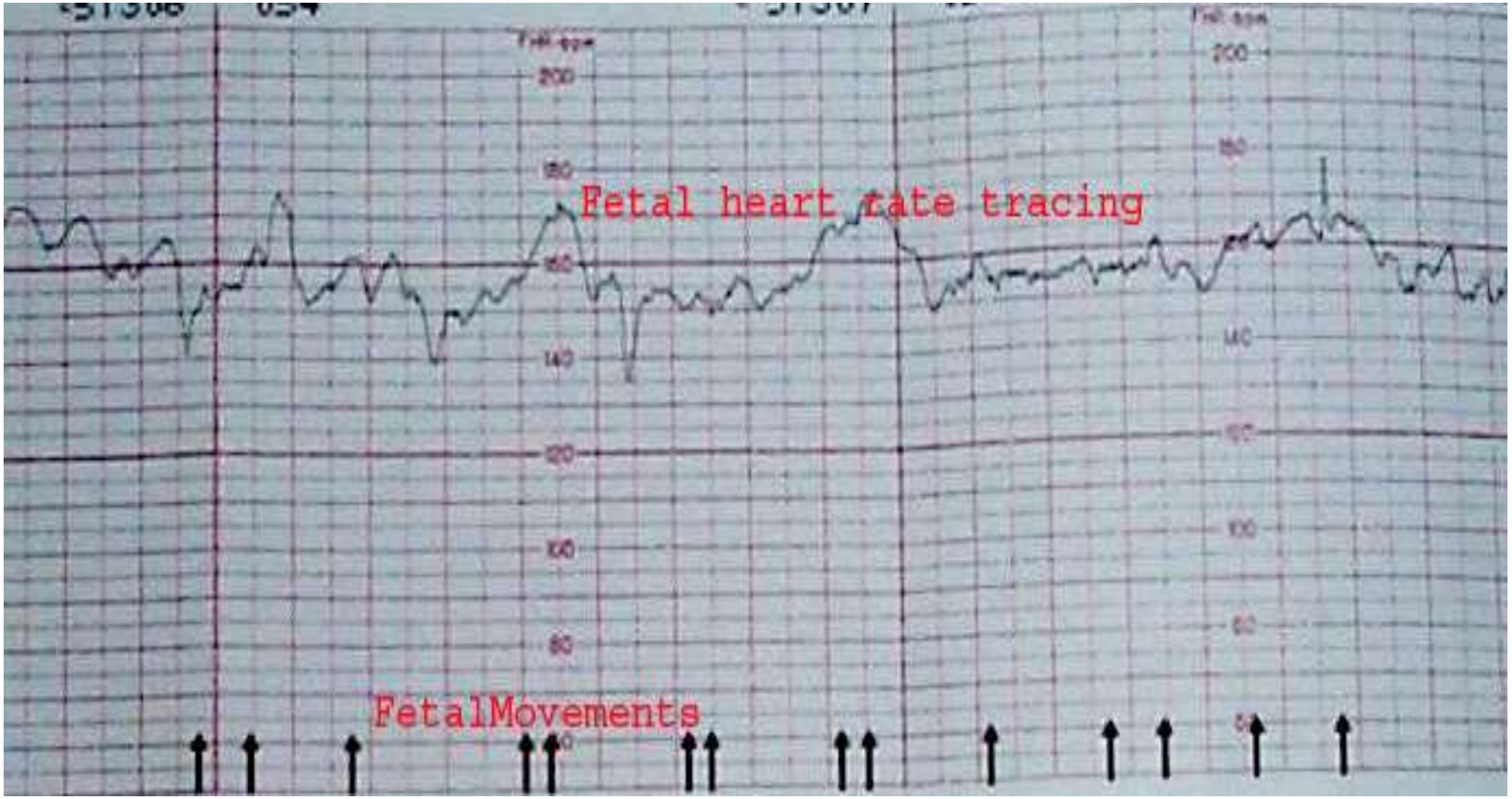
Categorisation of CTG

- Based on Baseline FHR, Variability, Decelerations, Accelerations

- Normal: all 4 features are reassuring
- Suspicious: 1 non reassuring
  3 reassuring
- Pathological: 2/ more features non reassuring

Non stress test

- FHR + fetal movement monitoring
- Duration : 20 min
- Interpretation
- REACTIVE:2/more accelerations of >15 bpm longer than 15 sec in duration
- NON REACTIVE:no accelerations with fetal movement/no fetal movement
- No movement for 40 min even with stimulation then it is non reactive


Fetal heart rate tracing
FetalMovements

Vibroacoustic stimulation test

- Solid indicator of fetal health & absence of fetal acidosis
- Uses stimulation with an artificial larynx for 1-3 sec
- Sound :80Hz & 82 db
- Sound ⟶ startle response&increased FHR

Response according to gestational age

- <24 weeks : nil
- 24-27 weeks : 30%
- 27-30 weeks : 80%
- >31 weeks : 96%

Results

- ABNORMAL:

no acceleration/deceleration
(chronic asphyxia)

- NORMAL :

- acceleration for several minutes
- 2- 5 accelerations lasting for 20-60 sec
- Maternal perception of fetal movements
- Acceleration even without maternal perception of FM

Contraction Stress Test

- Response of the fetus at risk for uteroplacental insufficiency in relation to contractions
- **Candidates**
- Postmaturity
- IUGR
- Hypertensive disorders
- Diabetes mellitus

Procedure

- Semi fowler's position
- Oxytocin /nipple stimulation
- Takes 1.5 -2 hours
- Monitor FHR&uterine contractions until return to baseline
- Terbutaline if uterine activity persists

Interpretation

- Positive :late deceleration with 50% of uterine contractions
- Negative:no late/significant variable deceleration
- Positive result associated with
- IUD
- Fetal distress in labour
- Low APGAR score

Contraindications

- Placenta previa
- Prior classical CS
- Prior extensive uterine surgery
- Preterm labour
- High risk preterm labour
- Preterm rupture of membrane

Amniotic Fluid Volume

- Amniotic Fluid Index
- Normal :5-24 cm or

single vertical pocket >/=2cm

Ultrasonography

Ultrasonography

- Low power sound :<100 mW
- Frequency:>20,000/cycle
- **Uses**
- Diagnose pregnancy at 6 weeks
- Locate placenta
- Diagnose fetal abnormalities
- Establish fetal sex

- Discover problems
- Oligo/poly hydramnios
- Ectopic pregnancy
- Miscarriage
- Placenta previa
- PROM
- Down’s syndrome,NTDs,urethral stenosis,diaphragmatic hernia

- Predict maturity of fetus
  - Crown to rump length

For dating, accuracy is

- ✓ +/- 3days (7-10 wks)
- ✓ +/- 5days(10-14wks)
  - Biparietal diameter(most reliable at 12-20wks)
- ✓ +/- 5-7 days(16 weeks)
- ✓ +/- 3weeks >28 weeks

- Cephalic index=BPD/occipito frontal diameter

Normal is 0.74-0.83

- Head circumference=(BPD+OFD)*1.57

Used to determine:

✓ gestational age

✓ IUGR

✓ Microcephaly

- Abdominal circumference=(TD+APD)*1.57
- ✓Used from 16 wks to term
- ✓To determine gestational age

- Femur length
- ✓Obtained as early as 10 weeks

Nurse's responsibility(abdominal USG)

- Full bladder
- Draping
- Towel roll under her right buttock
- No risk to fetus from procedure

Trans vaginal USG

- Remove clothing below waist
- Lithotomy with pillow under buttoks
- Transducer sheath /condom filled with coupling gel
- Lubricate transducer
- Disinfection

Biophysical profile

- NST+ USG
- USG
  - Fetal breathing movement
  - Foetal body movement
  - Fetal tone
  - Amniotic fluid volume

- Duration : 30 minutes
- Normal score : 2
- Abnormal score : 0

Parameters	Minimal normal criteria	Score
NST	Reactive	2
Fetal breathing movement	>/= 1 episode lasting >30 sec	2
Gross body movement	>/=3 discrete body/limb movement	2
Fetal muscle tone	>/= 1 episode of extension with return of flexion	2
Amniotic fluid	>/= one 2*2 cm pocket	2

BPP score & management

BPP score	Interpretation	Management
8-10	No fetal asphyxia	Repeat testing at weekly interval / more
6	Suspect chronic asphyxia	If>36 weeks ⟹ deliver, but if L/S ratio < 2.0 repeat test in 4-6 hours
4	Suspect chronic asphyxia	If > 36 weeks ⟹ deliver, If < 32 weeks repeat testing in 4-6 hours
0-2	Strongly suspect	Test for 120 minutes ⟹ persistent score <4 ⟹ deliver regardless of

Indications

- Non reactive NST
- High risk pregnancy

- **Test frequency**:
- weekly after a normal NST
- Twice weekly after an abnormal NST

Problems

- Do not consider the predictive value of individual component
- BPP variables depend on various CNS areas that become functional at different ages

✓ Fetal tone:7-9 wks(brain cortex)

✓ Breathing movement:20-21 wks(4 th ventricle)

✓ FHR reactivity:28-31 wks(hypothalamas&upper medulla)

- Some parameters change late in fetal hypoxia

First sign is Non reactive NST&absent breathing movements

- Difficulty in evaluating tone
- Definition of decreased amniotic fluid volume

Modified biophysical profile

- NST +AFI
- Abnormal when one / both is abnormal
- Time -20 minutes

Procedure

- Standard NST
- No acceleration within 5 min
- 1-2 sec stimulation(upto 3 times)
- Normal :2 acceleration within 10 min(VAS)

Guidelines

- If both normal:weekly fetal surveilance
- If both abnormal:

✓>36 weeks : delivery

✓<36 weeks:doppler, BPP, CST,

- If AFI less:search for placental insufficiency
- If NST non reactive:doppler ,CST, BPP

Doppler velocimetry

- Evaluate fetal circulation
- **The arterial doppler wave form**
- To measure peak systolic(S),peak diastolic(D),&mean diastolic volumes(M)
- Pulsatility index=S-D /M
- Resistance index=S-D/S
- Normally S/D ratio,PI,&RI decreases with gestational age

- Higher values indicates low diastolic velocities,&increased placental vascular resistance
- **S/D ratio normal values**
- 20 wks-4.0
- 30 wks-3.0
- 40 wks-2.0

- Increased S/D ratio → IUGR
- Maternal smoking → increased S/D ratio
- **Venous doppler wave forms**
- Indicates cardiac forward function
- Pulsatile flow in umbilical vein indicates abnormal cardiac function

Antenatal Doppler changes & suggestive features

Vessel	Change	Pathological basis	Clinical significance
Umbilical artery	Low/absent /reversed end diastolic flow	Failure of villous trophpblast invasion	Increased resistance in fetoplacental circulation
Middle cerebral artery	More diastolic velocity,low S/D or PI	Dialation of cerebral vessels	Brain sparing effect in response to hypoxemia
Ductus venosus	High Doppler indices,absent/ reversed Flow	High CVP	Fetal acidemia
Umbilical vein	High doppler index,pulsatile	High CVP ,low cardiac	Fetal acidemia

CT scan

- Better to be avoided in pregnancy

MRI Scan

- **Obstetric applications**
- Known/suspected Hydatidiform mole
- Placenta previa
- Fetal anomalies
- IUGR

THANK YOU