

# HIGH RISK PREGNANCY AND FOETAL EVALUATION

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# HIGH RISK PREGNANCY

ANY PREGNANCY WITH A SIGNIFICANT  
PROBABILITY FOR A POOR MATERNAL OR  
FOETAL OUTCOME

- Some recognized early in the first ante-natal visit
  - Poor obstetric history
  - Those with well-recognized medical complications
- Some become high risk by developing unexpected complications in the course of otherwise normal pregnancies



# HIGH RISK PREGNANCY

TO OPTIMIZE THE OUTCOME

- ⌘ Sophisticated maternal and fetal surveillance
- ⌘ Difficult management decisions

# HIGH RISK PREGNANCY

## MANAGEMENT

- ☞ Identification of women at high risk for abnormal pregnancy outcomes
- ☞ Appropriate Ante-natal care in prevention of morbid outcomes
- ☞ Foetal surveillance

# IDENTIFICATION OF HIGH-RISK PREGNANCY

## ∞ ACCESS TO ANTE-NATAL CARE

-Poverty, an important limiting factor for limiting access to health-care system

## ∞ QUALITY OF ANTE-NATAL CARE

-Services provided are many a times of marginal quality, thus rendering many high-risk pregnancies unidentifiable

HIGH RISK PREGNANCIES BELONG TO A SMALL SEGMENT OF THE OBSTETRICAL POULATION THAT PRODUCES THE MAJORITY OF THE MATERNAL AND INFANT MORTALITY AND MORBIDITY

# IDENTIFICATION OF HIGH-RISK PREGNANCY

A LIST OF HIGH-RISK FACTORS SHOULD BE SYSTEMATICALLY CHECKED DURING THE FIRST ANTE-NATAL VISIT TO FIND WOMEN AT RISK

# MEDICAL CONDITIONS PLACING PREGNANCY AT HIGH RISK

- ⌘ Malnutrition
- ⌘ Anaemia
- ⌘ Chronic hypertension
- ⌘ Diabetes
- ⌘ Asthma
- ⌘ Thrombophilia (history of DVT or PE)
- ⌘ Cardiac disorder
- ⌘ Seizure disorder
- ⌘ Family history of genetic disease
- ⌘ Hemoglobinopathy

# MEDICAL CONDITIONS PLACING PREGNANCY AT HIGH RISK

- ⌘ Renal disease
- ⌘ Psychiatric illness
- ⌘ Lupus erythematosus and other connective tissue disorders
- ⌘ Drug and alcohol abuse
- ⌘ Smoking
- ⌘ Rh alloimmunization
- ⌘ Hepatitis B carrier
- ⌘ Human immunodeficiency virus
- ⌘ Syphilis
- ⌘ Gonorrhoea and Chlamydial infection
- ⌘ Asymptomatic bacteriuria



# OBSTETRICAL HIGH-RISK FACTORS

- ⌘ H/O previous prolonged labour-instrumental assisted delivery
- ⌘ H/O previous obstructed labour/rupture-uterus/traumatic delivery
- ⌘ H/O PPH(high parity status)/obstetric shock
- ⌘ H/O puerperal sepsis
- ⌘ Prior preterm birth(<36,<32,<28 weeks)
- ⌘ H/O birth asphyxia/neonatal convulsions/birth injuries
- ⌘ Prior stillbirth
- ⌘ Prior foetal growth restricted infant
- ⌘ Second trimester pregnancy loss

# OBSTETRICAL HIGH-RISK FACTORS

- ⌘ Prior neonatal death
- ⌘ Prior infant with cerebral palsy
- ⌘ Prior caesarean delivery
- ⌘ Diagnosis of incompetent cervix in prior pregnancy
- ⌘ H/O preeclampsia before 32 weeks in prior pregnancy
- ⌘ Prior foetus with chromosomal disorder or congenital anatomic abnormalities
- ⌘ Anatomic abnormality of the uterus
- ⌘ H/O cervical trauma

# HIGH-RISK PATIENTS BENEFITTING BY REFERRAL/CONSULTATION WITH MATERNAL & FOETAL MEDICINE

1. Women with conditions requiring invasive procedures for foetal diagnosis or treatment
  - Rh alloimmunization
  - Nonimmunologic foetal hydrops
  - Foetal urinary tract obstruction
  - Need for CVS

## **HIGH-RISK PATIENTS BENEFITTING BY REFERRAL/CONSULTATION WITH MATERNAL &FOETAL MEDICINE**

2. Women with severe medical complications

affecting pregnancy :

- Insulin-dependent diabetes
- Artificial heart valves
- Cardiomyopathy
- Systemic lupus erythematosus
- Sickle cell disease/thalassemia
- Thromboembolic phenomena
- Seizure disorder

# HIGH-RISK PATIENTS BENEFITTING BY REFERRAL/CONSULTATION WITH MATERNAL &FOETAL MEDICINE

3. Women with recurrent poor obstetrical outcome :
  - Repetitive second trimester pregnancy losses
  - Recurrent stillbirths
  - Recurrent early preterm labour
  - Recurrent early rupture of membranes

# HIGH-RISK PATIENTS BENEFITTING BY REFERRAL/CONSULTATION WITH MATERNAL &FOETAL MEDICINE

4. Women with severe obstetrical complications :
  - Preeclampsia/eclampsia with renal failure, pulmonary oedema
  - Severe HELLP syndrome
  - Suspected cervical incompetence after 20 weeks gestation
  - Suspected twin-to-twin transfusion
  - Multiple gestation of high order(3 and above)

# PRECONCEPTIONAL COUNSELING

The best time to assess the potential impact of medical or obstetrical complications on the outcome of pregnancy is

BEFORE PREGNANCY OCCURS

The following points should be methodically reviewed by the obstetrician :

1. Relative importance of each of the high-risk factors identified through history & examination of the patient

# PRECONCEPTIONAL COUNSELING

2. The potential effects that each risk factor may have on the pregnancy
3. The changes or effects that pregnancy may cause upon each risk factor
4. The potential disability for the mother during pregnancy & the length of such disability
5. The tests required to monitor maternal & foetal well-being during pregnancy



# PRECONCEPTIONAL COUNSELING

6. The prognosis for the outcome of the pregnancy
7. The cost of pregnancy ,the loss of revenue as a result of prolonged hospitalization & frequent testing,need for help at home with other children and the monetary and emotional costs of dealing with effects of prematurity

# PRECONCEPTIONAL COUNSELING

Conditions benefiting :

- Maternal diabetes
- Rh alloimmunization
- History of recurrent stillbirths
- Patients at high risk for having foetuses with aneuploidy

# PRECONCEPTIONAL COUNSELING

- ❧ Women with a H/O birth of a baby with neural tube defect should be prescribed folic acid supplements for 3 months prior to attempting subsequent pregnancy
- ❧ Routine testing for rubella IgG antibodies prior to planning pregnancy is recommended
- ❧ Using iodized salt and practice of screening all patients for thyroid disorders are recommended

# ANTE-NATAL CARE

## PRIMARY OBJECTIVE :

- Prevention and treatment of abnormal maternal and foetal outcomes

## DETERMINATION OF GESTATIONAL AGE :

- An accurate determination of the gestational age and the expected date of delivery (EDD) Is fundamental to the management of high-risk pregnancies

# DETERMINATION OF GESTATIONAL AGE

- Best method is through neonatal evaluation. Although gold standard, it's not of much use to obstetricians
- Clinical dating
- Dating by ultrasound

# DETERMINATION OF GESTATIONAL AGE

## CLINICAL DATING

- Timing & characteristics of the LMP
- The findings on the initial pelvic examination
- The date on which foetal heart tones are first heard
- Relation between the date of first positive pregnancy test and the menstrual history

# CLINICAL DATING

➤ MENSTRUAL HISTORY ADEQUATE FOR EDD ONLY IF

-LMP normal in duration & amount of flow

-prior menstrual periods came at regular intervals

-patient has not used oral contraceptives within three months of her last period

30% patients do not fulfill these criteria, making estimation of EDD based on their LMPs unreliable

# CLINICAL DATING

## ➤ EVALUATION OF UTERINE SIZE –LIMITED VALUE

- maternal obesity
- observer experience
- position of the uterus
- amount of amniotic fluid
- multiple gestation
- presence of uterine myomas
- foetal growth disorders

Studies have demonstrated that physician's measurements tend to underestimate the gestational age & have a preference for even numbers



# CLINICAL DATING

➤ DATE ON WHICH FOETAL HEART TONES ARE FIRST AUDIBLE

-with Doppler ultrasound devices ( 10 weeks )

-with obstetrical stethoscopes ( 20 weeks )

But this is of value only when it agrees with other clinical indicators & with the ultrasound measurements

# CLINICAL DATING

## ➤ DATE OF THE FIRST POSITIVE PREGNANCY TEST

- highly sensitive

- allows diagnosis of pregnancy at 4-5 post-menstrual weeks

As such dates firmly established if patient has a positive pregnancy test 4-5 weeks after her LMP

# DATING BY ULTRASOUND

## FOETAL BIOMETRY :

- The ability to visualize with ultrasound, different foetal anatomical landmarks and to follow their growth during gestation
- Accurately determines the gestational age of the foetus and the adequacy of the foetal growth
- Uses CRL in the first trimester and the BPD, HC, FL, HL & AC in the second trimester

# DATING BY ULTRASOUND

Similar accuracy when performed between 11-14 weeks of gestation and 18-22 weeks of gestation

After 22 weeks the margin of error increases and then it is necessary to obtain serial measurements 3-4 weeks apart to avoid a significant error

# RELIABILITY OF EDD

## EXCELLENT DATES :

- Patients with adequate clinical information plus ultrasound examination between between 16-24 weeks
- Patients with inadequate or incomplete clinical information but with two ultrasound examinations between 16 and 24 weeks

# RELIABILITY OF EDD

## GOOD DATES :

- Patients with adequate clinical information and one confirming ultrasound examination obtained after 24 weeks of gestation
- Patients with inadequate or incomplete clinical information and two or more ultrasound examinations showing adequate growth and similar EDD

## POOR DATES :

Any clinical situation different from those listed above

# DATING BY ULTRASOUND

## CRL

- Measurement of CRL in the first trimester of pregnancy is the most accurate method to determine GA
- Predicts the menstrual age with a variation of +3 days when obtained between 7-10 weeks
- Possible source of error in presence of an embryo with chromosomal abnormalities

# DATING BY ULTRASOUND

BPD :

- Most accurate measurement to determine GA in the second trimester of pregnancy
- Cephalic Index ,ratio of the BPD to OFD,measured when foetal head looks flattened & elongated

HC :

- Not altered by dolichocephaly or brachycephaly of foetal head
- Usually measured by electronic calipers,but can also be calculated using the equation  $HC = BPD + OFD/2$



# DATING BY ULTRASOUND

FL :

- Excellent parameter ,as it is not significantly affected by alterations in the foetal growth.

HL :

- Relatively easy to obtain

AC :

- Less reliable parameter for GA estimation because it is very sensitive to alterations in foetal growth
- Most important parameter in the estimation of foetal weight

# DATING BY ULTRASOUND

## DETERMINATION OF GESTATIONAL AGE

Most USG machines have incorporated into their software, NOMOGRAMS to calculate GA using the BPD, HC, AC, FL, CRL, and HL

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

FUNDAMENTAL OBJECTIVE OF ANTE-NATAL CARE

- The worse outcomes are maternal and fetal death

MATERNAL DEATH

MMR(Maternal mortality rate) in India continues to be unacceptably high at about 162 per 100,000 live births

The International Classification of Diseases defines maternal death as the death of a woman while pregnant or within 42 days (or 1 year for late maternal deaths) of delivery, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by pregnancy, but not from accidental or incidental causes

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

According to WHO ,in India the leading direct causes of maternal mortality are haemorrhage,sepsis,preeclampsia & eclampsia,unsafe abortion,and obstructed labour.

Necessary to increase access to prenatal care to decrease maternal deaths secondary to preeclampsia/eclampsia/HELLP syndrome in developing countries.

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

Maternal death secondary to infection exhibited a significant decrease with availability of legal abortion but is on the rise again

Maternal death secondary to abortion is still a significant problem in developing and industrialized countries, explained partially by lack of availability of legal abortions.

Direct obstetric causes relate to maternal deaths resulting from complications of pregnancy, labour, puerperium due to interventions, omissions, or incorrect treatments, or from chain of events resulting from any of the above.

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

Most maternal deaths are preventable :

- Poverty alleviation
- Human rights assertion
- Individual efforts from health care providers
- Proper ante-natal care
- Identifying women at risk
- To aggressively treat complications

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## HEALTH SECTOR ACTIONS TO PREVENT OR REDUCE MATERNAL MORTALITY

- ✧ Basic antenatal, intranatal & postnatal care
- ✧ A skilled attendant & a functioning referral system
- ✧ Emergency obstetric care (EmOC)
- ✧ Good quality obstetric services
- ✧ Family planning services
- ✧ Frequent joint consultation among specialists in managing medical disorders in pregnancy
- ✧ Maternal mortality conferences
- ✧ Periodic refresher courses for education of the skilled personnels

## COMMUNITY, SOCIETY AND FAMILY ACTIONS :

Wide range of groups ( women's groups), health care professionals, religious leaders and safe motherhood committees can help the woman obtain the essential obstetric care.

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## HEALTH PLANNERS/POLICY MAKERS' ACTION :

- ❧ Community education, motivation & formation of safe motherhood committee at the local level
- ❧ Strengthening referral systems for obstetric emergencies
- ❧ Written management protocols for obstetric emergencies in the hospital
- ❧ Improving standard & quality of care by organizing refresher courses for health care personnels
- ❧ Periodic audit of existing health care delivery system & to implement changes as needed



# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## LEGISLATIVE AND POLICY ACTIONS :

- ☞ Girl children & adolescents should have good nutrition, education and economic opportunities
- ☞ Barriers to the access of health care facilities should be removed
- ☞ Decentralization of services
- ☞ Safe abortion services and post-abortion care
- ☞ Social inequalities & discrimination on grounds of gender, age & marital status , are to be removed

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## NEONATAL DEATH :

Death of the infant within 28 days after birth

The main causes of neonatal mortality in developing countries are

- Prematurity
- Infection
- Birth asphyxia

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

**STILL BIRTH** : Birth of a newborn after 28<sup>th</sup> completed week ,weighing 1000 gm or more,when the baby does not breathe or show any sign of life after delivery,both antepartum(macerated) and intrapartum(fresh stillbirths) deaths included

**PREVENTION OF STILLBIRTH AND NEONATAL DEATHS :**

- Skilled attendant at birth,effective management of obstetric complications
- Pre-pregnancy care,effective management of pregnancy complications
- Pre-conceptional genetic counselling,pre-natal diagnosis
- Effective care during pregnancy and labour.Clean delivery

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## PERINATAL MORTALITY :

Death among foetuses weighing 1000 gms or more at birth (28 wks gestation) who die before or during delivery or within first 7 days of delivery

PNMR of India is about 60 per 1000 total births to be reduced to 30-35/1000 births

## CAUSES :

- ✧ Prematurity
- ✧ Low birth weight
- ✧ Birth asphyxia
- ✧ Infections
- ✧ Congenital malformations
- ✧ Birth trauma
- ✧ Respiratory distress syndrome

# PREVENTION OF ABNORMAL MATERNAL AND FOETAL OUTCOMES

## PREVENTION OF PERINATAL MORTALITY :

- Pre-pregnancy health care and counseling
- Genetic counseling
- Regular ANC
- Detection & management of medical disorders in pregnancy
- Screening of high-risk patients
- Careful monitoring in labour
- Skilled birth attendant
- Provision of referral neonatal service
- Health care education of the mother about the care of the newborn
- Educating the community to utilize family planning services
- Autopsy studies of all perinatal deaths
- Continued study of perinatal mortality problems

# ANTEPARTUM FOETAL SURVEILLANCE

METHODS USED TO DETECT & EVALUATE THE SEVERITY OF ACUTE OR CHRONIC FOETAL HYPOXIA ARE BIOPHYSICAL IN NATURE

- Foetal movement count
- The nonstress test(NST)
- The contraction stress test (CST)
- The foetal biophysical profile (BPP)
- The modified biophysical profile (MBPP)
- Umbilical,cerebral,uterine,and venous Doppler
- Percutaneous umbilical blood sampling

# ANTEPARTUM FOETAL SURVEILLANCE

## FOETAL MOVEMENT COUNT :

- Simplest and least costly method for the evaluation of foetal well-being in the second half of pregnancy
- Cardiff 'count 10' formula :Patient counts foetal movements starting at 9am and count ends as soon as 10 movements perceived.She is instructed to report if less than 10 movements occur during 12 hours on 2 successive days or if no movements perceived even after 12 hours in a single day.
- Daily foetal movement count (DFMC): 3 counts each of 1 hour duration(morning,noon,evening )are recommended.Total count multiplied by 4 gives DFMC.If <10 movements in 12 hours,indicates foetal compromise.

LOSS OF FOETAL MOVEMENTS IS COMMONLY FOLLOWED BY DISAPPEARANCE OF FHR WITHIN NEXT 24 HOURS

# ANTEPARTUM FOETAL SURVEILLANCE

NON-STRESS TEST(NST) :

A CONTINUOUS ELECTRONIC MONITORING OF THE FOETAL HEART RATE ALONG WITH RECORDING OF FOETAL MOVEMENTS

The test looks for the presence of temporary accelerations of FHR associated with foetal movement.

Foetal sleep & foetal hypoxia are the most common physiologic & pathologic conditions respectively for absence of accelerations during a NST.



# ANTEPARTUM FOETAL SURVEILLANCE

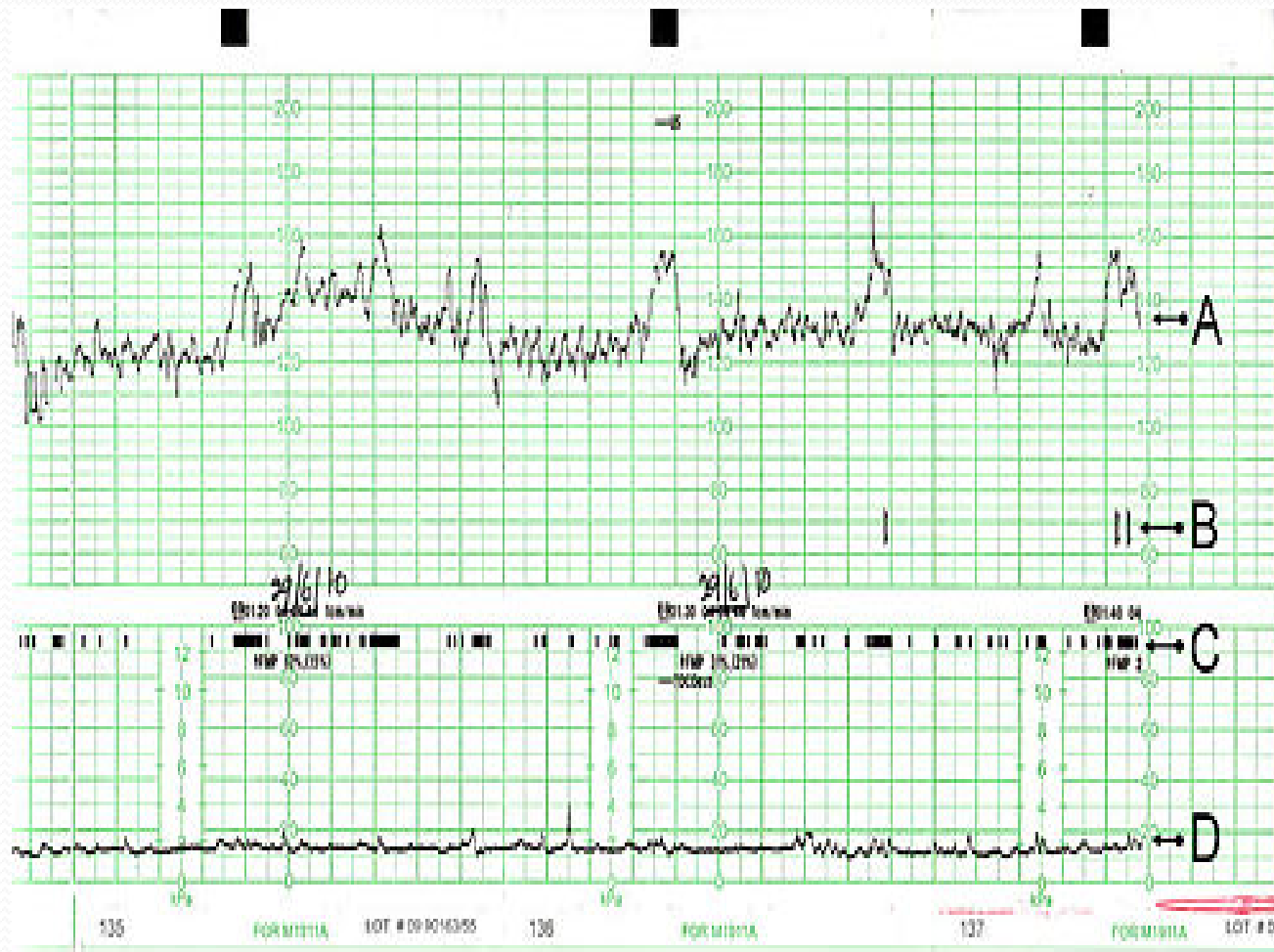
REACTIVE NST (normal) : Two or more FHR accelerations of at least 15 beats per minute & lasting at least 15 seconds from baseline to baseline within a 20 minute period with or without association with foetal movements as perceived by the woman

NON-REACTIVE NST : Lack of accelerations for a period of 40 minutes

Variables evaluated in NST :

- Baseline FHR
- Variability of FHR
- Presence or absence of accelerations
- Presence or absence of decelerations

# REACTIVE NST



# ANTEPARTUM FOETAL SURVEILLANCE

## NST VARIABLES :

- A normal baseline FHR is between 110 & 160 bpm
- FHR variability is of utmost importance & depends on the interaction of the foetal sympathetic & parasympathetic nervous systems
- Presence of accelerations of FHR with foetal movements or in response to foetal stimulation is reliable sign of foetal health
- The presence of spontaneous severe variable or late decelerations is worrisome ,indicating foetal compromise

# ANTEPARTUM FOETAL SURVEILLANCE

## CONTRACTION STRESS TEST :

- Test based on experimental evidences that the utero-placental blood flow decreases markedly or ceases during uterine contractions
- The end point of the CST is the presence or absence of late decelerations of the FHR following uterine contractions
- Late decelerations are one of the earliest indicators of foetal compromise
- CST used infrequently, rather most commonly used to follow a non-reactive NST

# ANTEPARTUM FOETAL SURVEILLANCE

THE BIOPHYSICAL PROFILE :

Combines the NST with the observation by ultrasound  
of four variables :

- foetal breathing movements
- foetal body movements
- foetal tone
- amniotic fluid volume

# ANTEPARTUM FOETAL SURVEILLANCE (BPP)

- ❧ Foetal breathing movement :
  - thirty seconds of sustained breathing movement during a 30-minute-observation period
- ❧ Foetal movement :
  - three or more gross body movements in a 30-minute-observation period
- ❧ Foetal tone :
  - one or more episodes of limb motion from a position of flexion to extension & a rapid return to flexion
- ❧ Foetal heart rate reactivity :
  - Two or more foetal heart rate accelerations associated with foetal movement of at least 15 bpm & lasting at least 15 seconds in 10 minutes(reactive NST)
- ❧ Fluid volume :
  - Presence of a pocket of amniotic fluid that measures at least 2 cm in two perpendicular planes

# ANTEPARTUM FOETAL

## SURVEILLANCE

### (BPP)

- ⌘ Each of the five components of the BPP assigned a numerical value of 2 (if present or normal) or 0 (if absent or abnormal)
- ⌘ A value of 8 or 10 indicates a normal or reassuring foetal status
- ⌘ A score of 6 is equivocal ,requires further test to verify foetal well being
- ⌘ A score of 4 or less is suggestive of foetal compromise

# ANTEPARTUM FOETAL SURVEILLANCE (MODIFIED BPP)

COMBINES THE OBSERVATION OF AN INDEX OF  
ACUTE FOETAL HYPOXIA ,  
THE NST WITH VAST,  
WITH A SECOND INDEX INDICATIVE OF CHRONIC  
FOETAL PROBLEMS,THE AMNIOTIC FLUID  
VOLUME



# ANTEPARTUM FOETAL SURVEILLANCE (DOPPLER ULTRASOUND VELOCIMETRY)

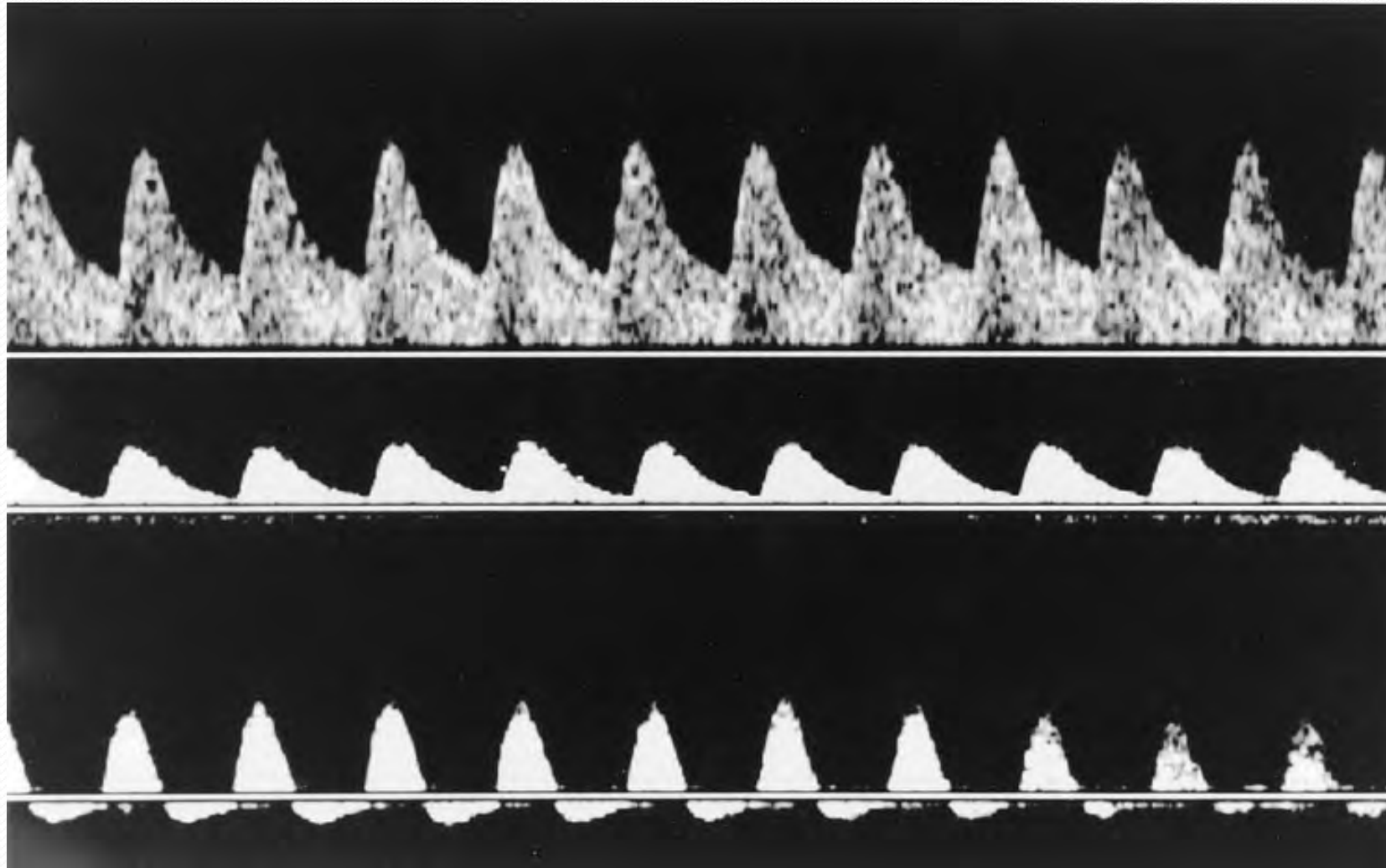
EVALUATION OF FOETAL CIRCULATION BASED ON  
THE PHYSICAL PRINCIPLE OF CHANGE IN  
FREQUENCY OF SOUND WAVE WHEN IT IS  
REFLECTED BY A MOVING OBJECT

# ANTEPARTUM FOETAL SURVEILLANCE (DOPPLER ULTRASOUND VELOCIMETRY)

## ARTERIAL DOPPLER :

- Waveforms helpful to assess the downstream vascular resistance
- Used to measure peak systolic(S), peak diastolic(D) & mean(M) volumes from which
  - S/D ratio
  - Pulsatility index (PI)[ $PI=(S-D/M)$ ]
  - Resistance index(RI)[ $RI=(S-D/S)$ ]
- In a normal pregnancy the S/D ratio ,PI & RI decreases as the gestational age advances
- Higher values greater than 2 SDs above the gestational age mean indicates reduced diastolic velocities & increased placental vascular resistance indicating adverse pregnancy outcome.

# THREE STUDIES OF FOETAL UMBILICAL ARTERY VELOCIMETRY



# ANTEPARTUM FOETAL SURVEILLANCE (DOPPLER ULTRASOUND VELOCIMETRY)

## VENOUS DOPPLER :

- Provide information about cardiac forward function (cardiac compliance, contractility & after load)
- Foetuses with abnormal cardiac function show pulsatile flow in the umbilical vein
- Normal UV flow is monophasic

# ANTEPARTUM FOETAL SURVEILLANCE FOETAL BLOOD SAMPLING(CORDOCENTESIS)

Percutaneous Umbilical Blood Sampling or  
Cordocentesis

- Easily performed after 24 weeks ,but can be done as early as 18 weeks too
- Placental insertion site preferred
- Requires high resolution ultrasound equipment
- Main risks are bleeding from puncture site and vagal reflex causing severe foetal bradycardia
- Use declined with development of less invasive technology for foetal diagnosis

# GOI,SAFE MOTHERHOOD PROGRAMME(CSSM)

ESSENTIAL OBSTETRIC CARE FOR ALL INCLUDES :

- Registration between 12-16 weeks
- Antenatal visits(minimum three) at 16,28,and 38 weeks gestation
- Document BP, Wt ,& obstetric examination findings at each visit
- Mandatory investigations include Hb%,ABO&Rh type,urine protein & sugar,stools,post prandial sugar
- Medications : oral iron,folic acid,and deworming agents after 16 weeks gestation

# GOI, SAFE MOTHERHOOD PROGRAMME (CSSM)

- Tetanus toxoid injection, two doses / 4-6 weeks apart
- Timely reference for emergency obstetric care
- Use of clean pregnancy kit for conducting delivery

The aim was to provide the ANMs/skilled birth attendants to conduct safe delivery under hygienic surroundings to minimize maternal deaths in rural settings.



*THANK YOU*