3) Ultrasound in Pregnancy - Dr. Nasreen

Ultrasound in pregnancy

- US of the pregnant patient is simple to perform and has proved reliable in examining the fetus and detecting the complications of pregnancy. Unlike X-Ray examination.
- Radiation to the developing fetus can have catastrophic effects. As well as increased incidence of malformations induced in the developing fetus, it has been shown that the frequency with which leukaemia and other malignant neoplasm's developing within the first 10 years of life is increased in children exposed to diagnostic x-rays while in utero, probably by about 40% compared to normal population.
- X-raying a fetus should therefore be kept to the absolute minimum and preferably avoided.

US in pregnant women

- T-abdominal.
- T-vaginal give superior images and does not need a full bladder.
- US in first trimester
- GS
- CRL (crown rump length) is the longest fetal demonstrable length within the GS. This length is highly reliable method
- Multiple pregnancies can be recognized by presence of two or more gestational sacs.
- Nuchal translucency
- Measurement of the fluid on the back of the fetal necks to be made between 10 – 14 Wks gestation.
- If the nuchal translucency is more than 3 mm so chorion villous sampling is need.

Bleeding in first trimester

- Threatened abortion
- 20% of recognized pregnancies before 20 Ws
- Risk factor is maternal age.
- 50% of patients with threatened abortion will have normal deliveries.
- Most important in US to find viability of the fetus, collection of blood

Subchorionic haemorrhage (SCH)

- Definition: It is a frequent cause of first and second trimester bleeding.
- Sign and symptoms: asymptomatic. Symptoms include vaginal bleeding, abdominal pain, premature labor and threatened abortion

Ectopic pregnancy

- Ectopic pregnancy remains a common cause of morbidity and mortality in women of childbearing age, despite advances in both diagnosis and therapy.
- Diagnosis of ectopic pregnancy
- US findings
- Doppler US
- Trophoblastic Doppler flow signal is present. trophoblastic flow signals (high velocity, low impedance flow)
US in the second & third trimester

- Fetal maturity can be assessed by measuring both the BPD & FL.
- Accurate dating based on BPD carried out before 24 – 26 Wks. After 24-26 Ws there is a great deviation from the standard mean growth, so the best measurement of head size is head circumference.
- Cerebral ventricles should be measured, to exclude hydrocephalous, so the width of the ventricles should be less than one-third of the distance between the mid line and the internal surface of the skull (in transverse section).
- Lateral ventricles normally measure less than 10 mm.
- At 18 – 20 Wks of gestation the fetus is well formed and this is an appropriate time to obtain an accurate biparital diameter to estimate fetal maturation & also this is a suitable time to examine the fetus for fetal anomalies, so enabling for medical abortion if lethal abnormality is seen.
- Accurate dating is very helpful if in problems arise in late pregnancy.
- Sex of the fetus (for those where there is risk of sex – linked inherited disease).

Cervical incompetence

- Cervical incompetence is a common cause of pregnancy failure in the second trimester, manifesting as painless dilatation of the cervix that leads to preterm labor. Cervical incompetence may present with premature rupture of membranes, resulting in oligohydramnios.

The Placenta

- Is usually evaluated at 9th Wks, as it matures it undergoes successive changes which is of no significance.
- Hemorrhage from placenta praevia, the condition in which the placenta encroaches on the lower uterine segment, is a common cause of bleeding in the third trimester, occurring in about 0.5 – 1%.
- During the second trimester 1/3 – 1/2 of all placentas are low laying.
- Increased incidence depletion of the normal deciduas'
- Diagnosis of placenta previa.
- Abruptio placenta (accidental hemorrhage) occur in 1 – 2% of pregnancies. The majority of cases presented with vag bleeding but some are concealed.
- US show collection of blood separating the amniotic membrain from the uterine surface,
- Retromembranous hemorrhage under the chorion membrane may be seen particularly in early pregnancy.

Postpartum bleeding

- Causes:
- Predisposing factors include
  - the presence of a succenturiate lobe
  - placenta accreta, increta, or percreta.
- Sonographic findings:
- The color Doppler ultrasound image: shows poor vascularity of the mass and the endometrium. Exhibits low-resistance arterial flow, which is uncommonly seen with endometritis.
Large for date

- Causes
  - Mistake in calculating the date of conception.
  - Multiple pregnancy (fetal abnormality is more frequent in multiple pregnancy).
  - Trophoblastic disease: is spectrum of pathology ranging from benign hydatidiform mole to a malignant choriocarcinoma.

- US findings:
  - 1/3 of cases multilocular ovarian cysts called theca lutein cysts may be identified this is due to high FSH.
  - Polyhydramnios
  - Fibroid

Polyhydramnios

- Definition
- Prevalence:
  - Polyhydramnios in the second trimester is found in about 1 per 200 pregnancies
- Etiology: reduced fetal swallowing or absorption of amniotic fluid and increased fetal urination.

Diagnosis
- The sum of the vertical measurements of the largest pockets of amniotic fluid in the four quadrants of the uterus) of 20 cm or more. The vertical measurement of the largest single pocket of amniotic fluid free of fetal parts is used to classify polyhydramnios into mild (8-11 cm), moderate (12-15 cm) and severe (16 cm or more). Although 80% of cases with mild polyhydramnios are considered to be idiopathic.
  - Acute polyhydramnios at 18-24 weeks

Small for date

- Due to error in calculating the age from the menstrual history.
- Intrauterine growth restriction: which carries a greatly increased risk of perinatal death can be divided into two groups
  - Symmetrical: it is occur in early pregnancy both the body & head affected. It is associated with congenital abnormalities & IU infections.
  - Asymmetrical: affect fetal body before brain.
  - Asymmetrical growth retardation occurs in third trimester & is associated with placental insufficiency either due to
    - primary placental diseases.
    - Maternal causes (hypertension, diabetes).
- A standarts are available for head circumference & body circumference in order that the fetal growth may be assessed.
- Fetal monitoring Doppler US of the umbilical artery enables the blood flow in the umbilical artery to be studied, in a normal preg placental resistance is low and a large portion of fetal cardiac out put flows through the placenta. There is therefor a high diastolic flow show by the flow velocity waveform in the umbilical artery.
Oligohydramnios

- Oligohydramnios in the second trimester is found in about 1 per 500 pregnancies.
- Etiology: Oligohydramnios in the second trimester is usually the result of, 1- preterm premature rupture of the membranes, 2- uteroplacental insufficiency and, 3- urinary tract malformations (bilateral renal agenesis, multicystic or polycystic kidneys, or urethral obstruction).
- Diagnosis
  - Quantitative criteria include:
    - the largest single pocket of amniotic fluid being 1 cm or less, or
    - amniotic fluid index (the sum of the vertical measurements of the largest pockets of amniotic fluid in the four quadrants of the uterus) of 5 cm

Middle cerebral artery

- Fetal MCA: In normal fetus, there is little diastolic flow in MCA & S/D ratio is greater than 4. In asymmetric IUGR there is increased diastolic flow, a pattern believed to reflect brain sparing phenomena described in experimental models of fetal hypoxia

Fetal abnormality

- Early detection of fetal abnormality help us for appropriate management.
- The commonest abnormality is neural tube defect particularly spina bifida & anencephaly both identified by 18 ws, these may associated with elevated serum and amniotic alpha fetoprotein levels, sever cases may associated with meningocele or meningomyelocele. these may associated with polyhydramnios & since polyhydramnios is due to fetal anomaly in 20%.
- Anencephaly may be diagnosed after 12 wks.
- Tumours associated with spine can be diagnosed the most common is teratoma. & may contain calcification.
- Head hydroceplalus frequently associated with spina bifida. Cyst of choroid plexus, anencephaly may be diagnosed after 12 ws.
- Chest:
  - Pulmonary hypoplasia.
  - Congenital diaphragmatic hernia.
  - Heart the four-chamber view is the most riable view so diagnosis of some anomalies like hypoplastic left heart syndrome or A/V mal formation.
- GIT:
  - Duodenal atresia.
  - Omphalocele & gastroschiasis.
- Urinary tract: the kidneys contribute significantly to the amniotic fluid volium. The presence of profound oligohydramnios although most frequently due to premature rupture of the membranes, should raise the possibility of the renal abnormality.
  - Renal agenesis, the commonest are congenital hydronephrosis and dysplastic, multicystic kidney. Chronic bladder out let obstruction.
- Skeleton, dwarfism. the lethal form are usually associated with polyh
**Us for karyotyping**

- Three main techniques & all require US to guide the needle to required position.
  1. Chorion villus sampling which carried out between 10th – 14th Wks sample from placenta.
  2. Amniocentesis carried out at 16th Wks in order to
     a. analysis for chromosomal abnormality &
     b. for alpha fetoprotein level.
  3. Cordocentesis. Puncturing the umbilical vein.

- Amniocentesis is the simplest method but it may take up two Wks for karyotyping.
- While villus sampling & cordocentesis the results may be available within two to three days.

Fetal death.
A blighted ovum.
Abdominal problem in pregnancy
Doppler US can be used for suspected venous thrombosis.
For detection of IUCD.