Radiology in obstetric

Ultrasound

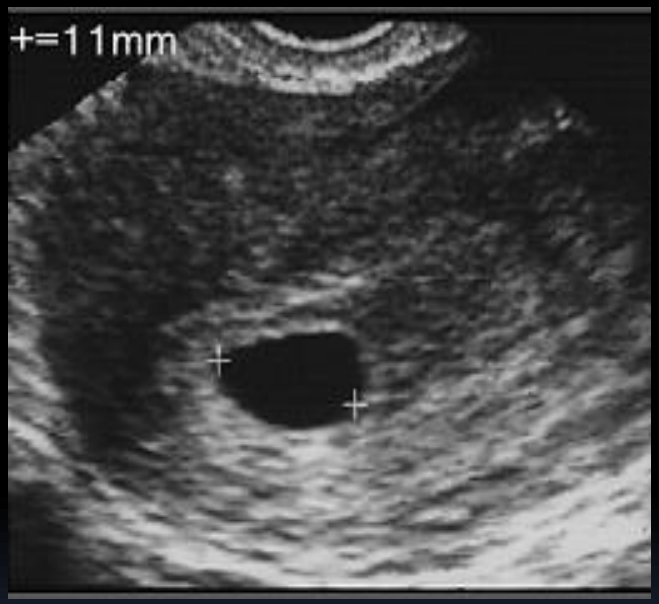
- Ultrasound in the investigation of choice
- No biological damage have been yet attributed it its use in obstetrical practice
- No fetal abnormality was detected during pregnancy over the several decades that the teqnique has been in use

Uses of US IN PREGNANCY

1-Diagnosis and confirmation of early pregnancy.

- The **gestational sac** can be visualized as early as four and a half weeks of gestation and the **yolk sac** at about five weeks. The embryo can be observed and measured by about five and a half weeks.

The gestational sac appears as small cystic structure within the uterine cavity and for measurement use mean sac diameter (MSD)



2-Vaginal bleeding in early pregnancy.

- The viability of the fetus can be documented in the presence of **vaginal bleeding in early pregnancy.** A visible heartbeat could be seen and detectable by **pulsed Doppler ultrasound** by about 6 weeks and is usually clearly detectable by 7 weeks.
- Missed abortions and **blighted ovum** will usually give typical pictures of a deformed gestational sac and **absence of fetal poles** or heart beat.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- The diagnosis of missed abortion is usually made by serial ultrasound scans demonstrating lack of gestational development.

3-Determination of gestational age and assessment of fetal size.

- Fetal body measurements reflect the gestational age of the fetus. This is particularly true in early gestation.
- **The following measurements are usually made:**

- **The Crown-rump length** (CRL) This measurement can be made between 7 to 13 weeks and gives very accurate estimation of the gestational age.

The fetus in theis age appears as linear echogenic stracture inside GS

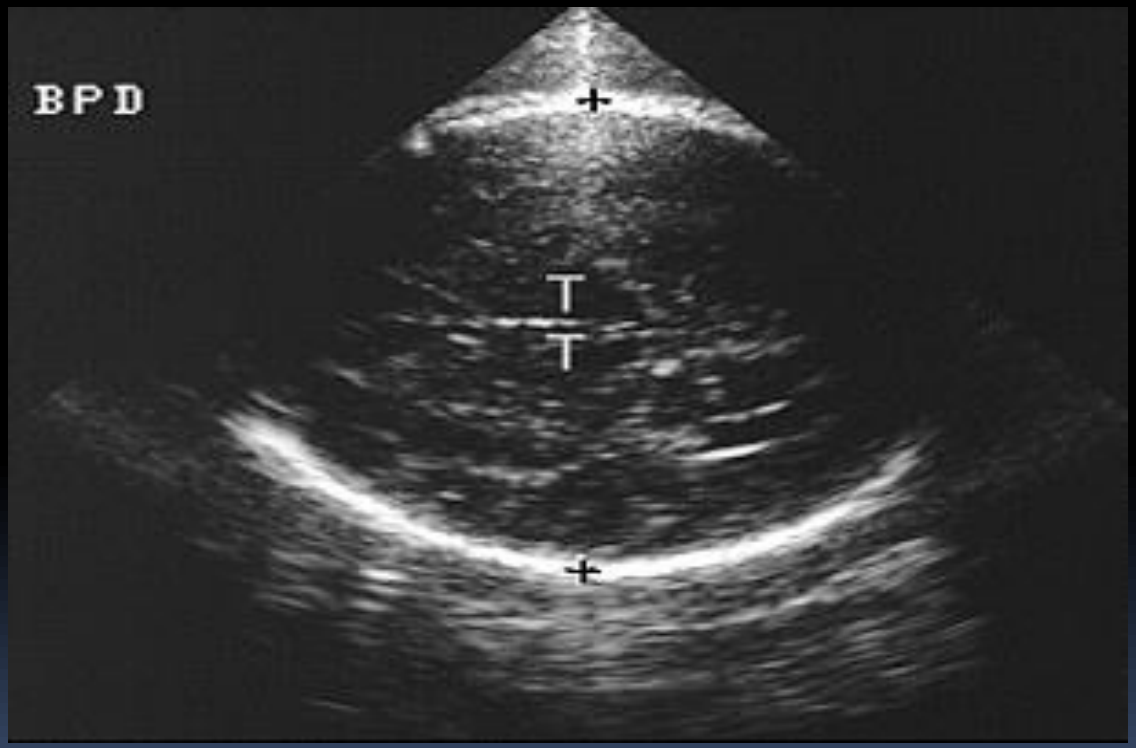
- The Biparietal diameter (BPD) The diameter between the 2 sides of the head. This is measured after 13 weeks.

- Different babies of the same weight can have different head size, therefore dating in the later part of pregnancy is generally considered unreliable.

falx mid line echo

thalami on either side of falx , rounded hypoechoic structures.

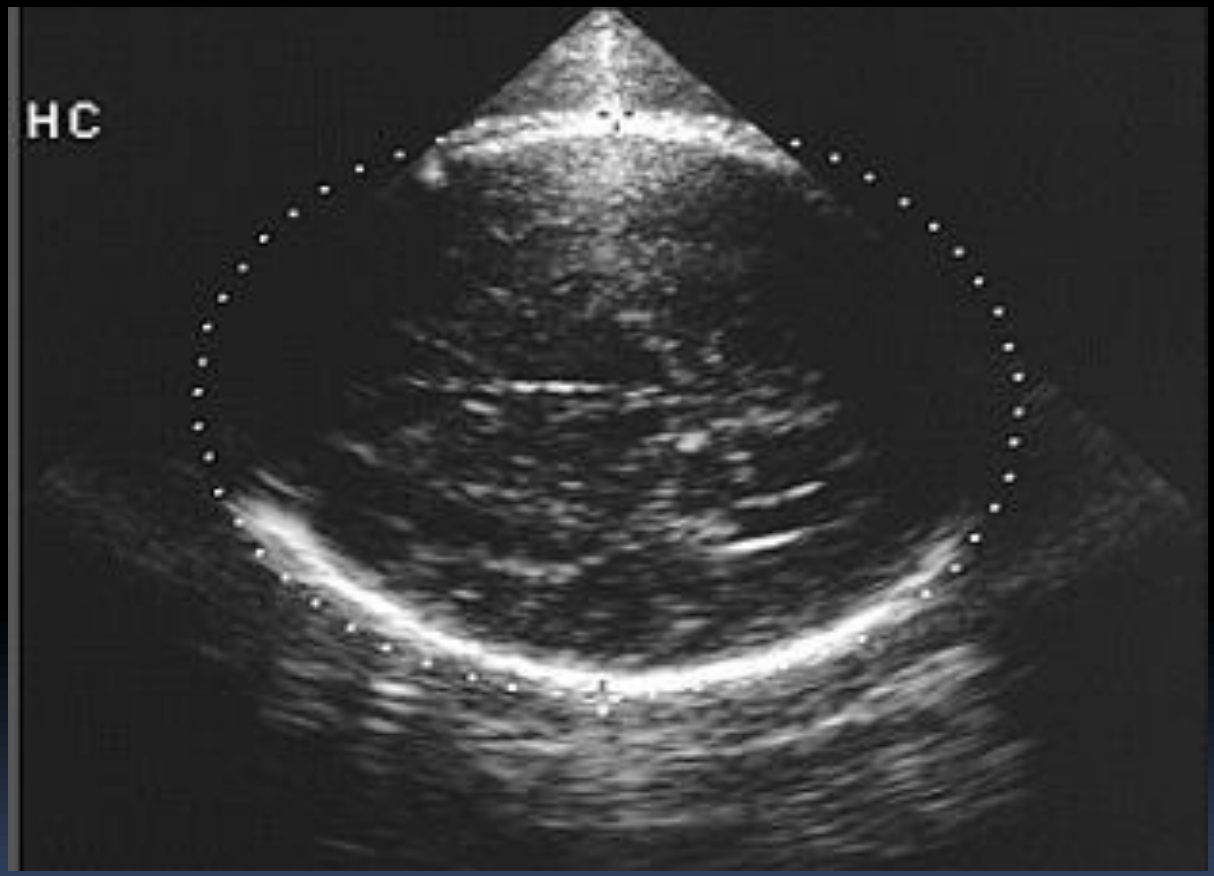
Measurement from the inner table to the outer table of the apposing parietal bones



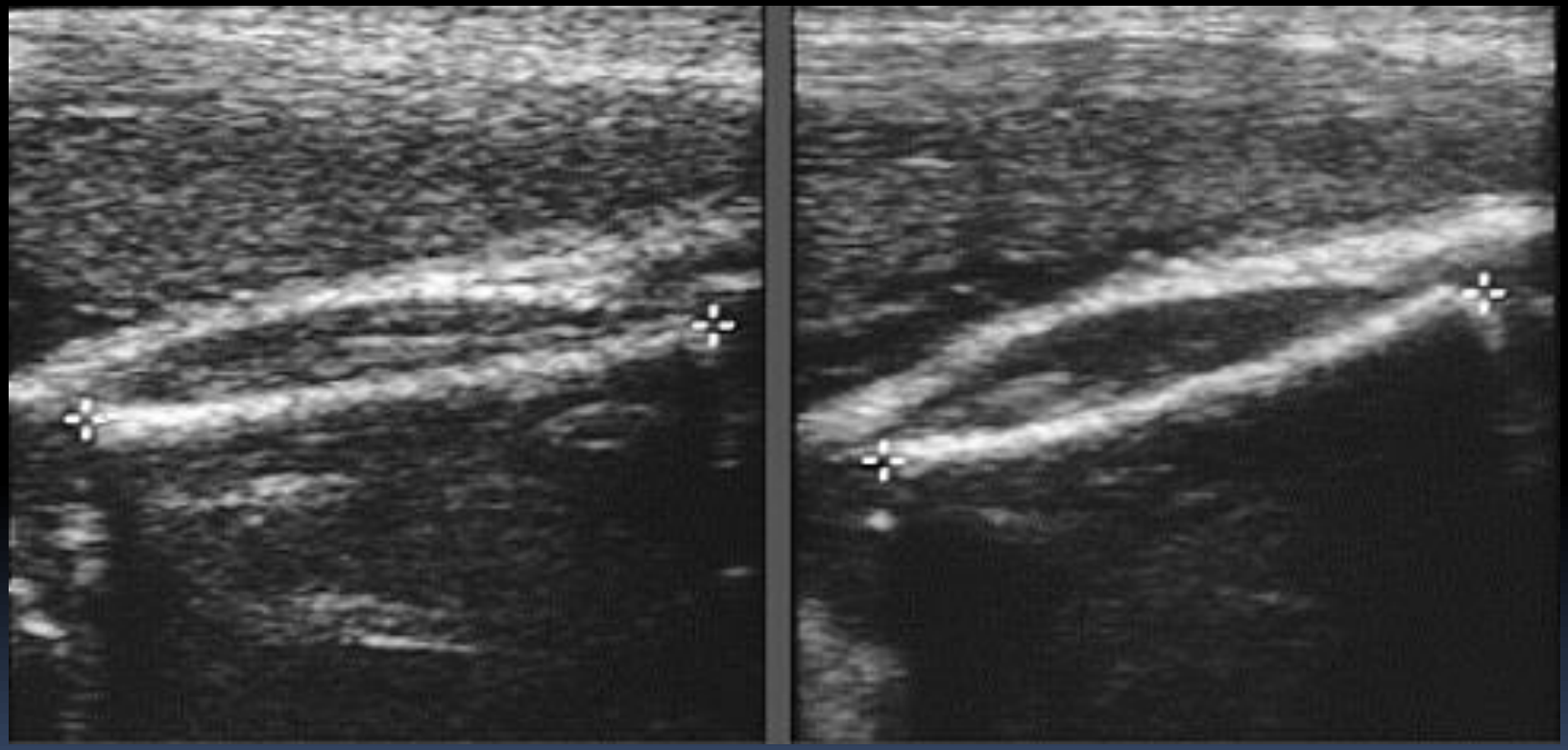
Head circumference is used after 26 WK

The same section of BPD is used

Measurement is made at the outer table



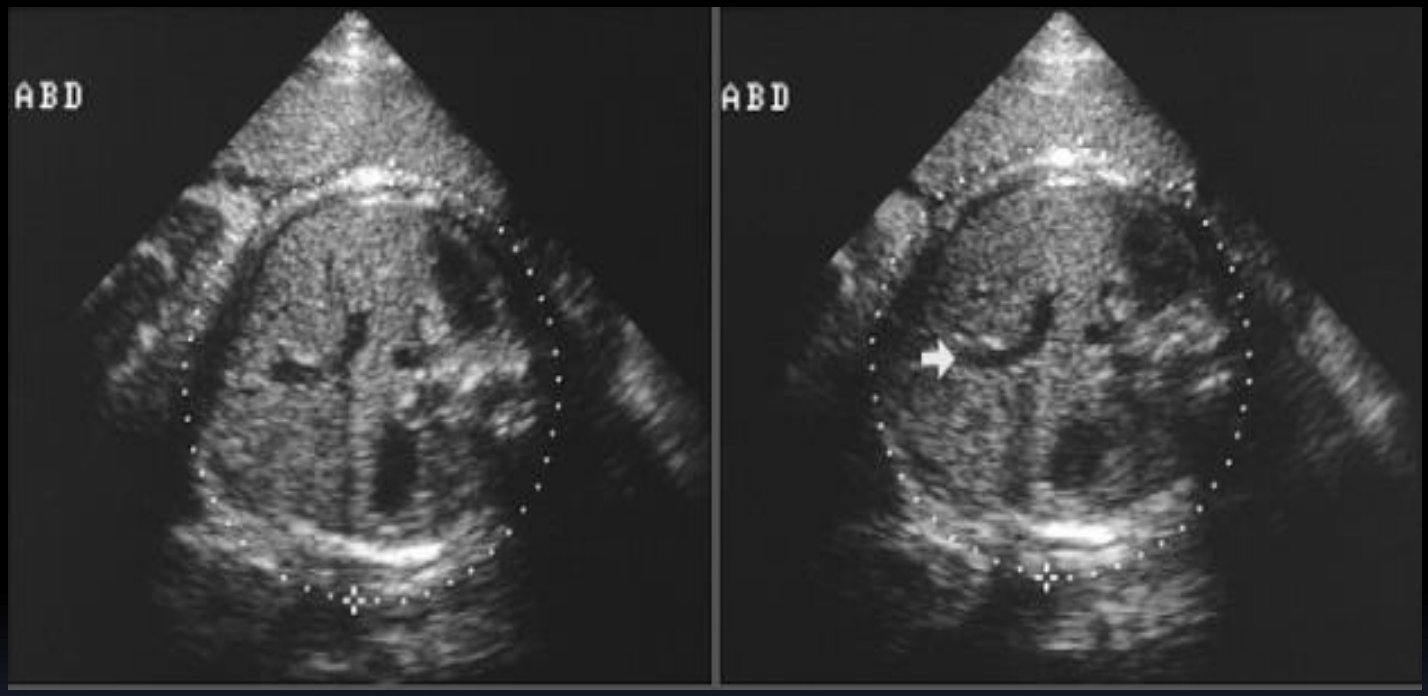
- The Femur length (FL) Measures the longest bone in the body and reflects the longitudinal growth of the fetus. Its usefulness is similar to the BPD.



- Using the BPD and FL .is most accurate between 18 -20 weaks

- The Abdominal circumference (AC) The single most important measurement to make in late pregnancy. It reflects more of fetal size and weight rather than age. Serial measurements are useful in monitoring growth of the fetus.

Comparing the AC with BPD , FL & HC on growth chart will distinguish symmetrical from asymmetrical IUGR



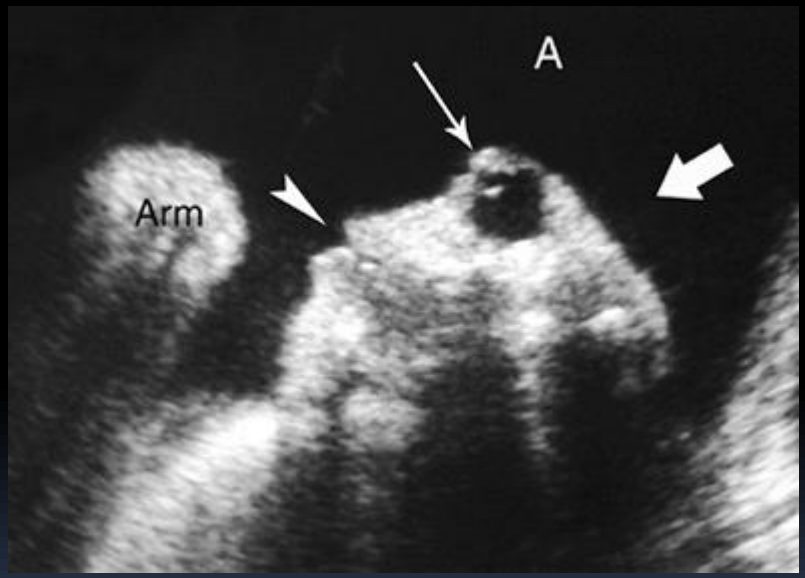
4- Diagnosis of fetal malformation.

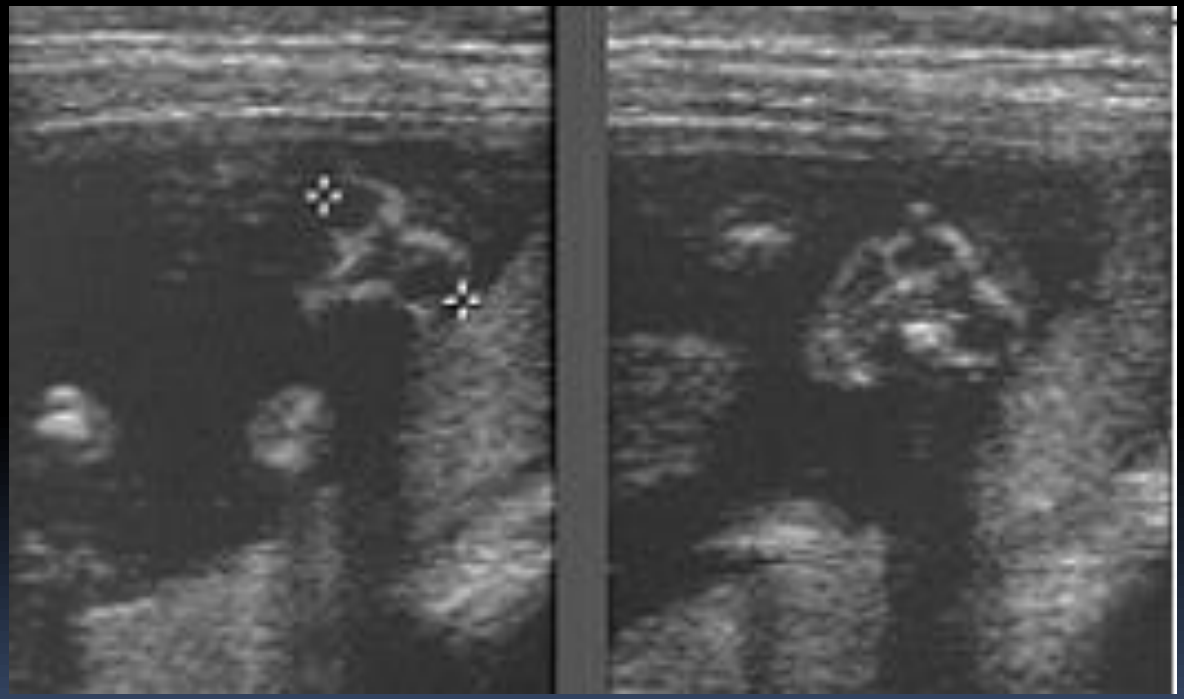
Many structural abnormalities in the fetus can be reliably diagnosed by an ultrasound scan,

- hydrocephalus, anencephaly, myelomeningocoele, achondroplasia , spina bifida, exomphalos, Gastroschisis, duodenal atresia and fetal hydrops. cleft lips/ palate congenital cardiac abnormalities

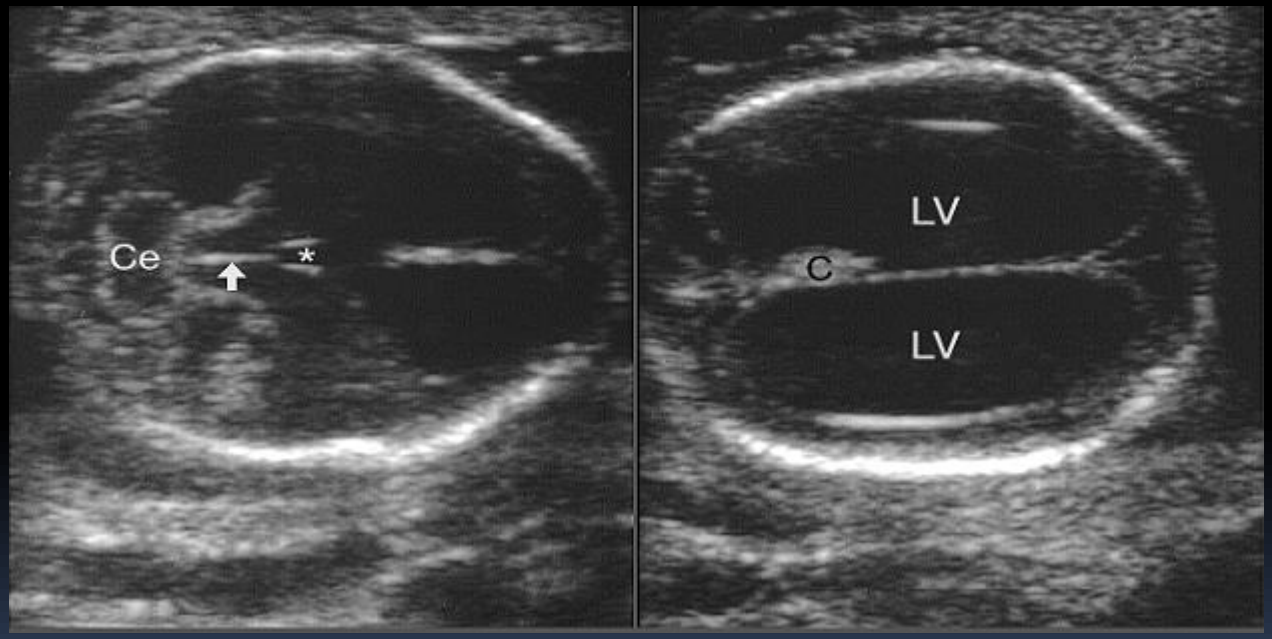
anencephaly : most common fetal congenital anomalies , identified in 12 WK gestation

Absence of the fetal skull vault with prominent orbit & facial structure

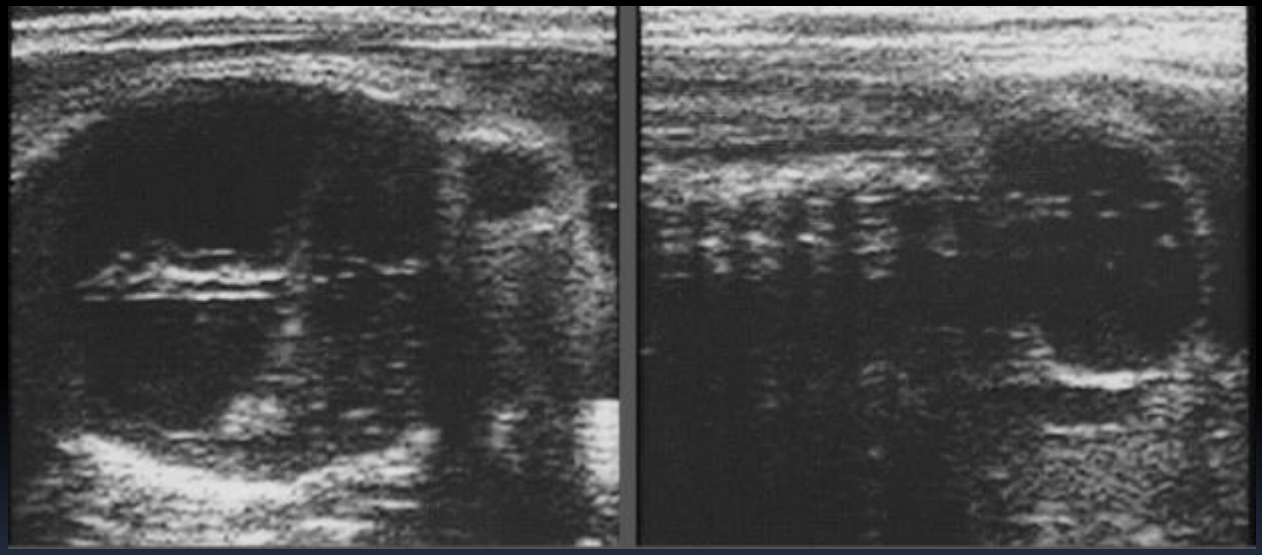




The lateral ventricles are identified from 16 WK
The choroid plexus seen as echogenic mass occupying the posterior aspect of the lat. V.
Hydrocephaly is diagnosed when the distance between lateral walls of the lateral V. is more than 50% of BPD



Lumbosacral spina bifida with meningocele + hydrocephaly

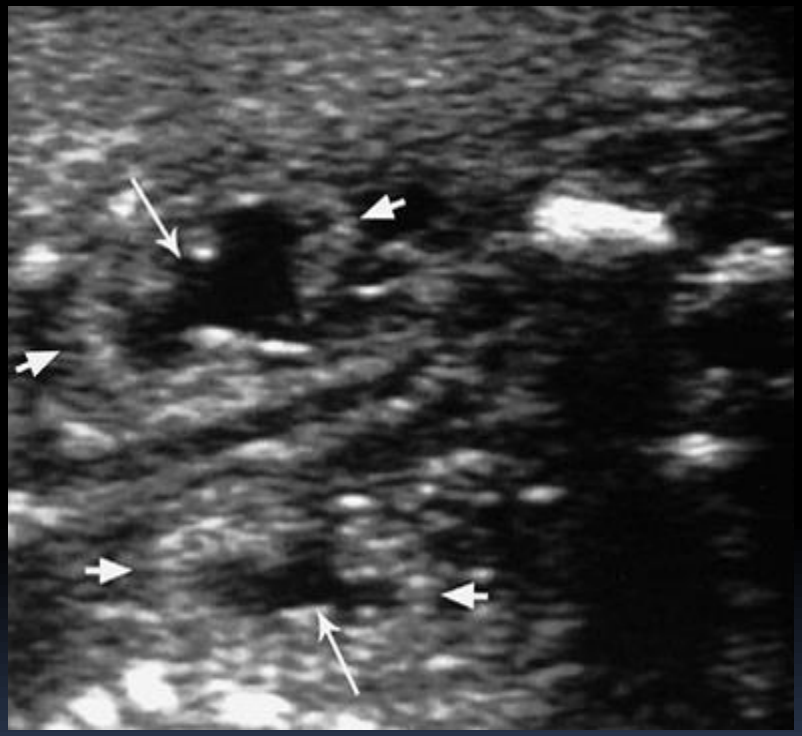


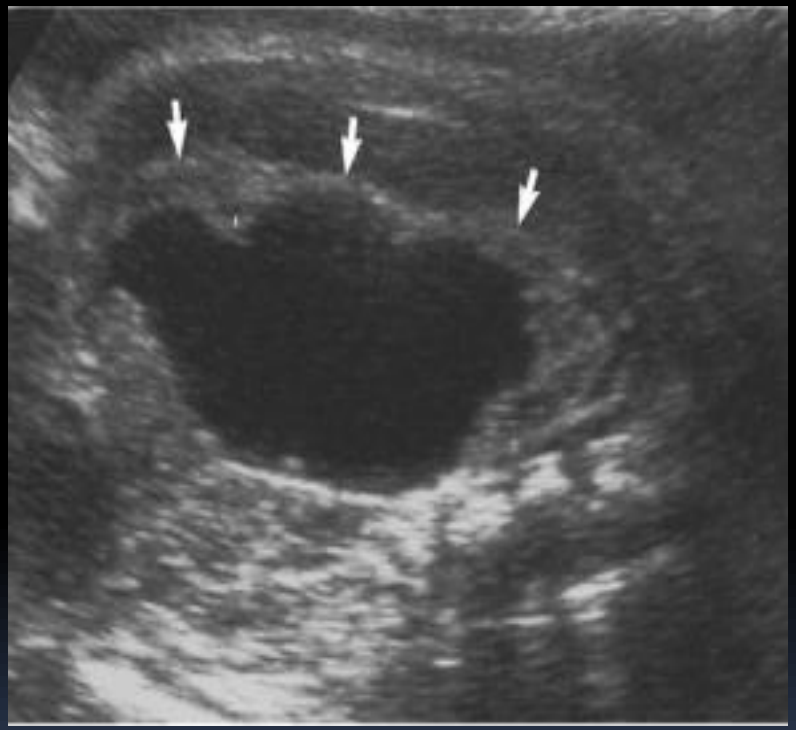
duodenal atrasia is the most common anomalies of the GIT
Polyhydramnios + double bubble appearance

Bilateral Renal agenesis or dysplastic kidneys result in sever oligohydramnios with absence of fetal bladder structure.
Unilateral anomalies with normal other kidney are associated with normal amniotic fluid volume

Posterior urethral valve results in dilatation of the both PCS, ureters & UB

PUJ obstruction results in dilatation of the PCS alone





Cleft lip

5-Ultrasound can also assist in other diagnostic procedures in prenatal diagnosis such as **amniocentesis**, **chorionic villus sampling**, **cordocentesis (percutaneous umbilical blood sampling)**

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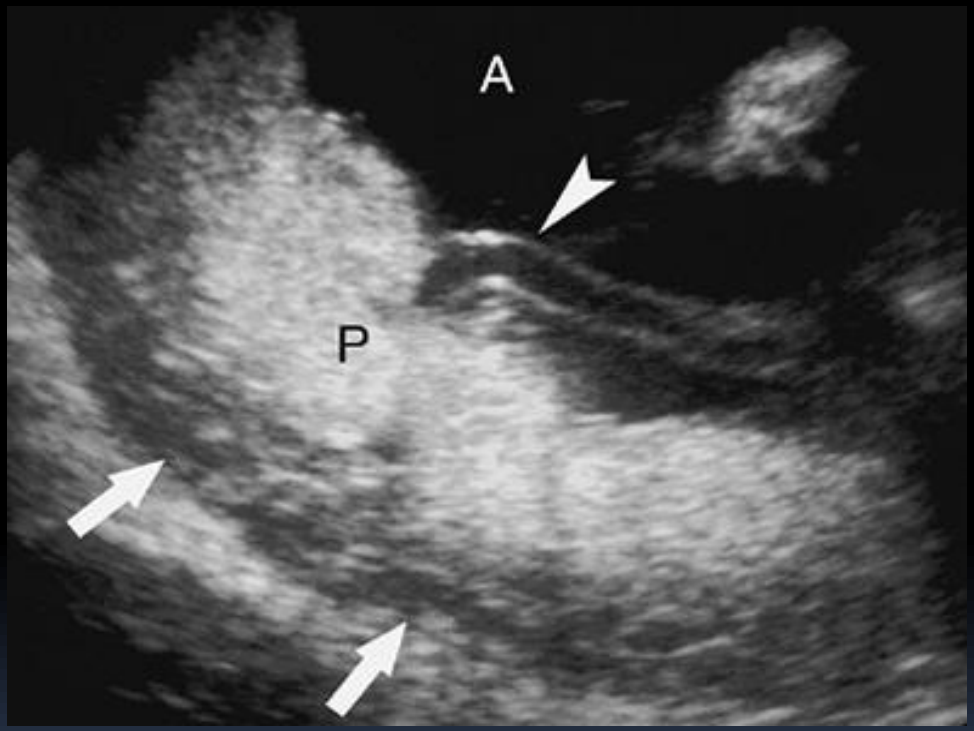
6. Placental localization.

- Ultrasonography used for localization of the site of the placenta and determining its lower edges,
- Its seen as well defined intrauterine structure lining the inner wall of apportion of the uterine cavity


A
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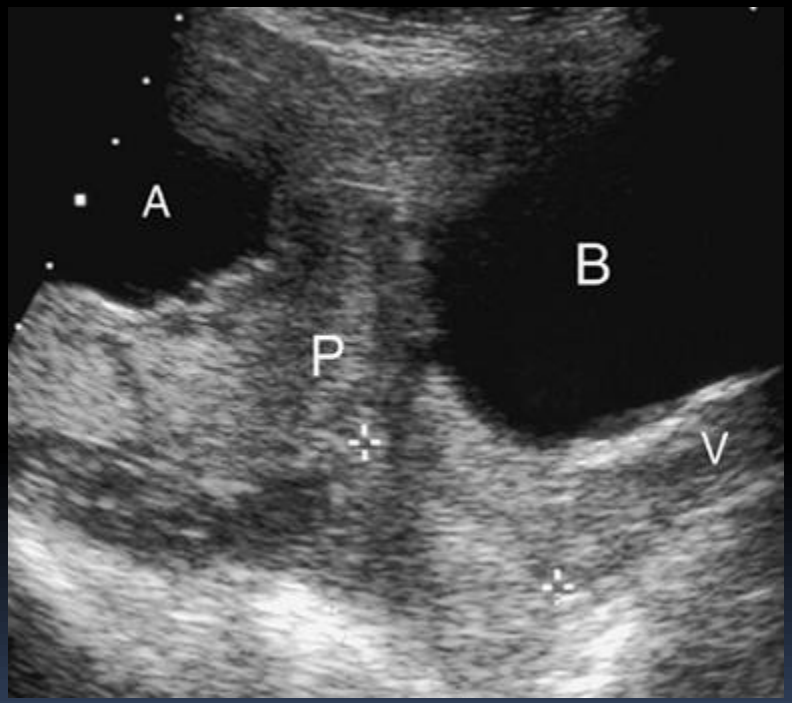
- **Can determine the placenta previa** condition in which the placenta remains positioned over the lower uterine segment after the thirty –sixth weak of pregnancy

- Other placental abnormalities in conditions such as **diabetes**, **fetal hydrops**, **Rh isoimmunization** **and severe intrauterine growth retardation** **can also be assessed.**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7-Multiple pregnancies.

- In this situation, ultrasonography is used for determining the number of fetuses, the chorionicity, fetal presentations, evidence of growth retardation and fetal anomaly, the presence of placenta previa, and any suggestion of twin-to-twin transfusion.
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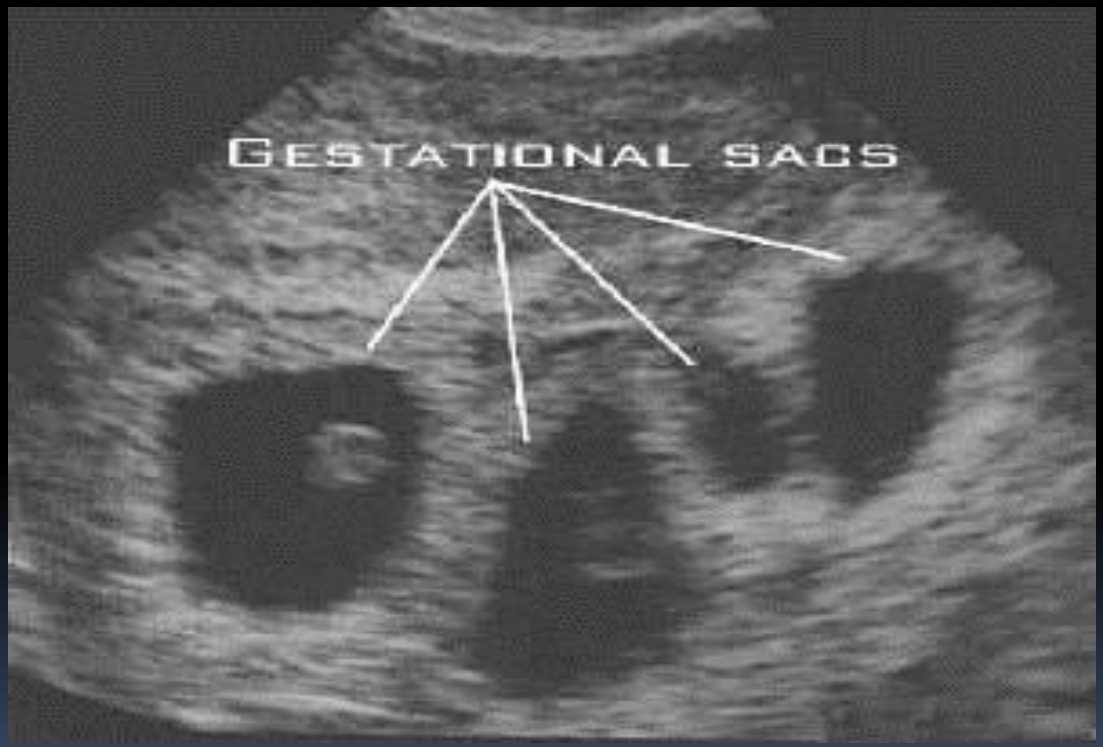
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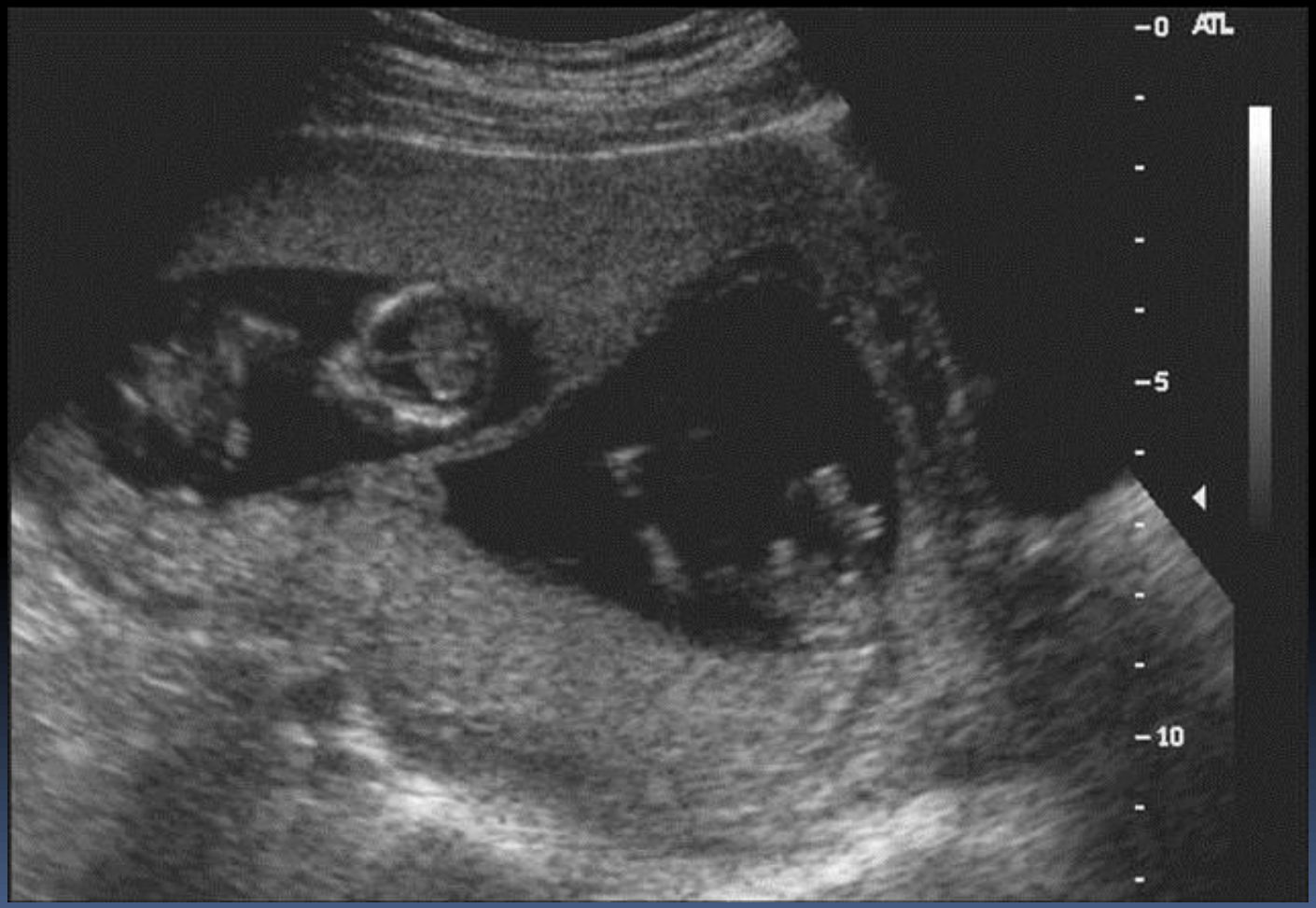
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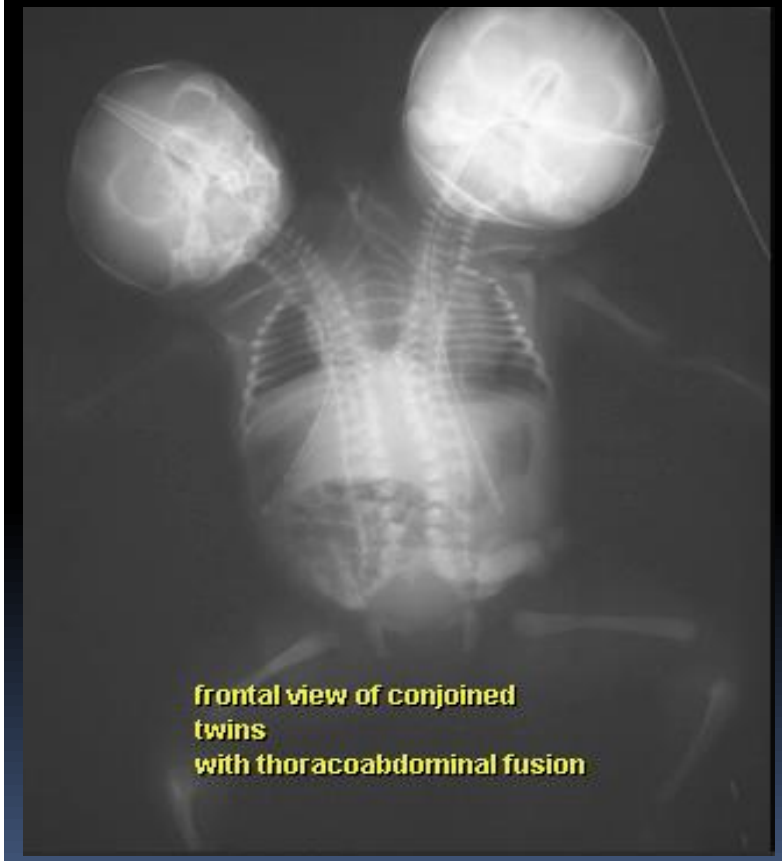
frontal view of conjoined
twins
with thoracoabdominal fusion


conjoined twins with
fusion of chest and
upper abdomen

- **8-. Hydramnios and Oligohydramnios.**
- Excessive or decreased amount of liquor (amniotic fluid) can be clearly depicted by ultrasound.
- Intraulterine growth retardation and congenital malformation in the fetus such as intestinal atresia, hydrops fetalis or renal dysplasia.

Polyhydramnios in Dudenal atrasia double bubble sign

- **9-Other areas.**
- Ultrasonography is of great value in other obstetric conditions such as:
- a) **Confirmation of intrauterine death.**
  b) Confirmation of fetal presentation in uncertain cases.
  c) Evaluating fetal movements, tone and breathing in the Biophysical Profile.
  d) Diagnosis of uterine and pelvic abnormalities during pregnancy e.g. fibromyomata and ovarian cyst.
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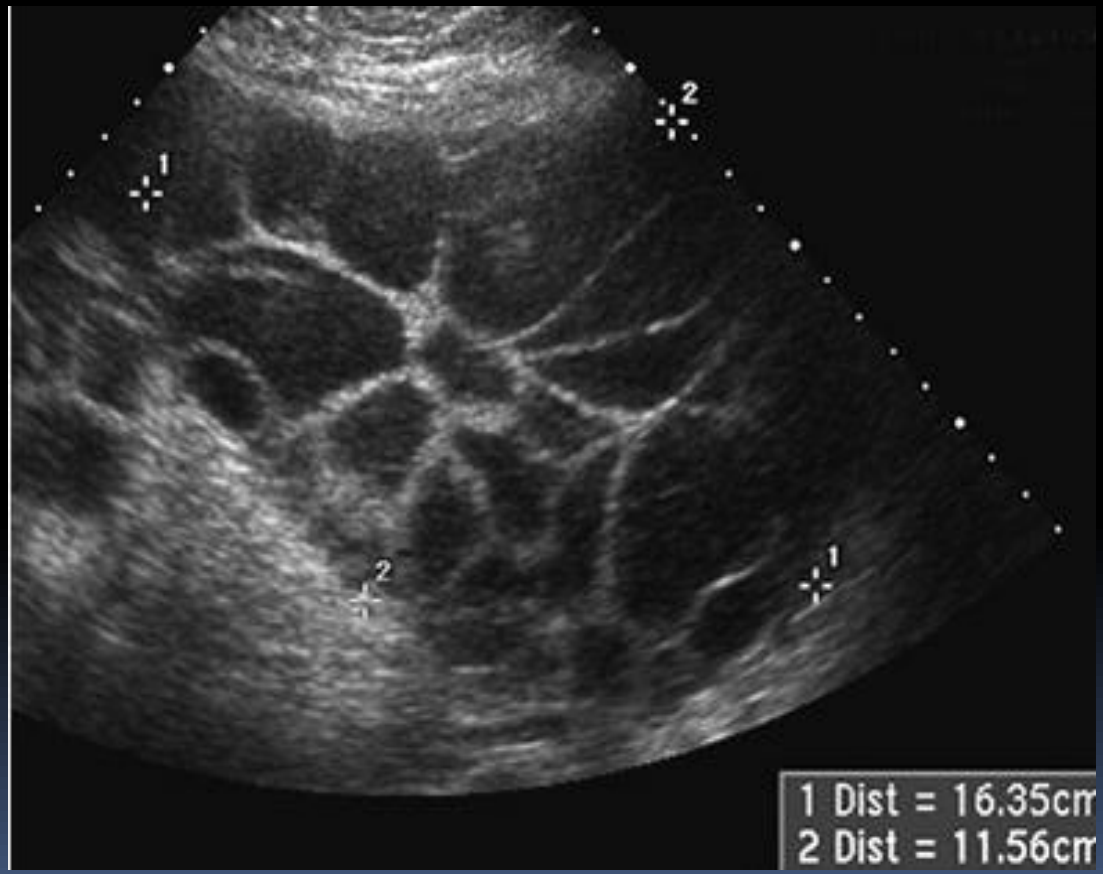
Trophoblastic diseases

Range from benign H.mole to malignant chorio CA

- US Can not distinguish benign from malignant lesions
- Complete molar pregnancy : most common, the uterus is filled with multiple small vesicle like structure
- Partial H mole: fetal parts may be seen
- In 1/3 of pt. theca luteal cysts

Partial mole


1
2
2
1
1 Dist = 16.35cm
2 Dist = 11.56cm

Ectopic pregnancy

- When the pregnancy test is positive with no intrauterine gestation can be identified the ectopic pregnancy should be excluded
- The ruptured ectopic pregnancy itself is not always visible but seen as adenexial mass have both solid and cystic parts and occasional the fetus can be seen within it
- May associated with free fluid in cul-de-sac


U
B

Differential diagnosis of ectopic pregnancy

PID

Ruptured adenexial cyst

Various neoplasm

Fetal death

- Possible to see the heart beating and observe the fetal movement from the seventh weaks of pregnancy
- Failure to observe these phenomena suggest fetal death

Large fordates utreus .

- Inaccurate date
- Multiple pregnancy
- Molar pregnancy
- Polyhydramnios ,,DM .conginital fetal anomalies as NTD.GIT
- Association of pregnancy with uterine or ovarian masses

Small for dates uterus

- Wrong date
- Symmetrical IUGR : early in pregnancy, both the BPD & AC are affected symmetrically , associated with congenital anomalies & intrauterine infections
- Asymmetrical IUGR : at the third trimester , affect the body > head , secondary to placental insufficiency
- Oligohydramina

What are the benefits vs. risks?

Benefits

- Most ultrasound scanning is noninvasive (no needles or injections).
- Occasionally, an ultrasound exam may be temporarily uncomfortable, but it is almost never painful.

- Ultrasound is widely available, easy-to-use and less expensive than other imaging methods.
- Ultrasound imaging is extremely safe and does not use any ionizing radiation.
- Ultrasound scanning gives a clear picture of soft tissues that do not show up well on x-ray images.

- Ultrasound is the preferred imaging modality for the diagnosis and monitoring of pregnant women and their unborn babies.
- Ultrasound allows the doctor to see inside the uterus and provides much information about the pregnancy.

What are the limitations of Obstetrical Ultrasound Imaging?

- Obstetric ultrasound cannot identify all fetal abnormalities. Consequently, when there are clinical or laboratory suspicions for a possible abnormality,

- A pregnant woman may have to undergo nonradiologic testing such as amniocentesis (the evaluation of fluid taken from the sac surrounding the fetus) or chorionic villus sampling (evaluation of placental tissue) to determine the health of the fetus,