ISUOG Basic Training

Examining the Abdomen & Anterior Abdominal Wall

Learning objectives

At the end of the lecture you will be able to:

- Describe how to obtain the 2 planes required to assess the fetal abdomen & anterior abdominal wall correctly
- Recognise the differences between the normal & most common abnormal ultrasound appearances of the abdomen & anterior abdominal wall

Key questions

- What are the key ultrasound features of plane 11?
- What are the key ultrasound features of plane 12?
- What probe movements are required to move from plane 11 to plane 12?
- Which abnormalities should be excluded after correct assessment of planes 11 & 12?

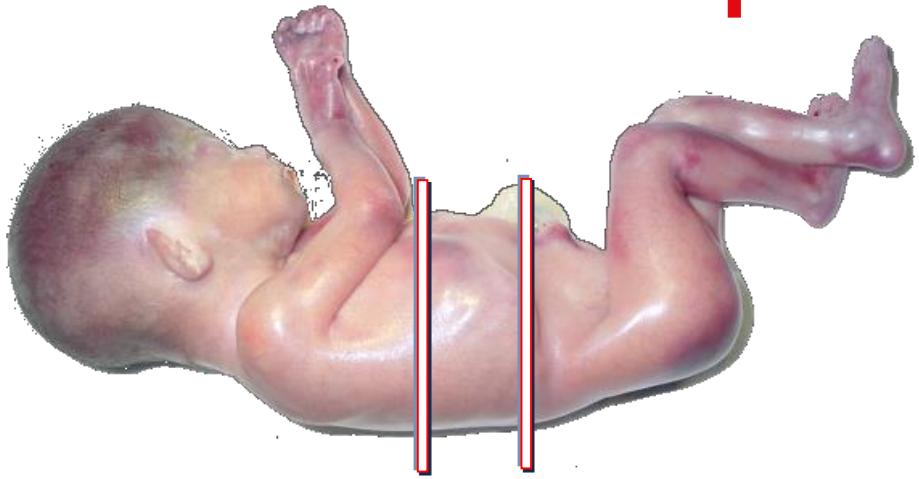
Recommended minimum requirements of basic mid-trimester fetal anatomical survey of the abdomen*

- Stomach in normal position
- Bowel not dilated
- Both kidneys present
- Cord insertion site
  - Intact anterior abdominal wall

Transverse sweep “pelvis to diaphragm”

*ISUOG Practice Guidelines. UOG 2011;37:116-126

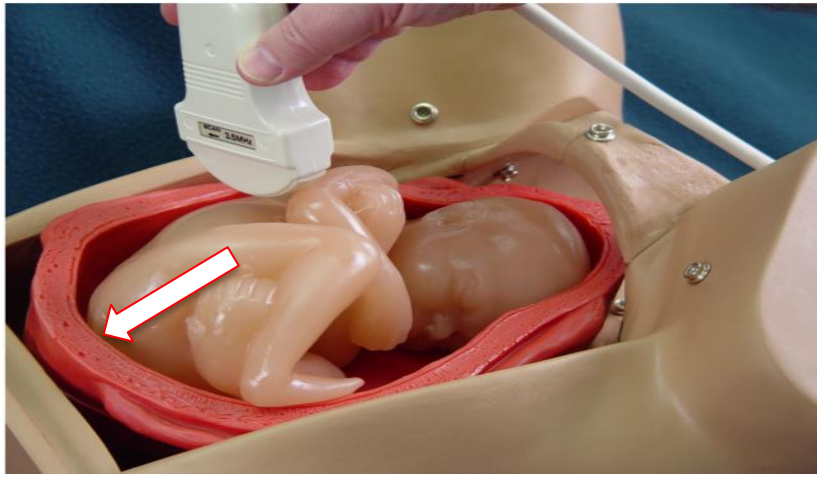
Fetal abdominal planes



Plane	Transverse view - axial plane
11	Just below diaphragm; stomach and intrahepatic umbilical vein, (area for abdominal circumference)
12	Cord insertion (anterior abdominal wall)

Moving from planes 11 to 12 (stomach to cord insertion)

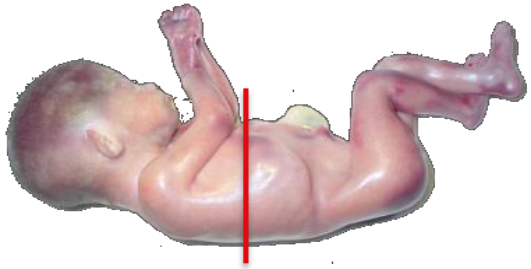
- Slide inferiorly from AC to sacrum
- Maintain cross sectional approach
- Cord inserts superior to bladder



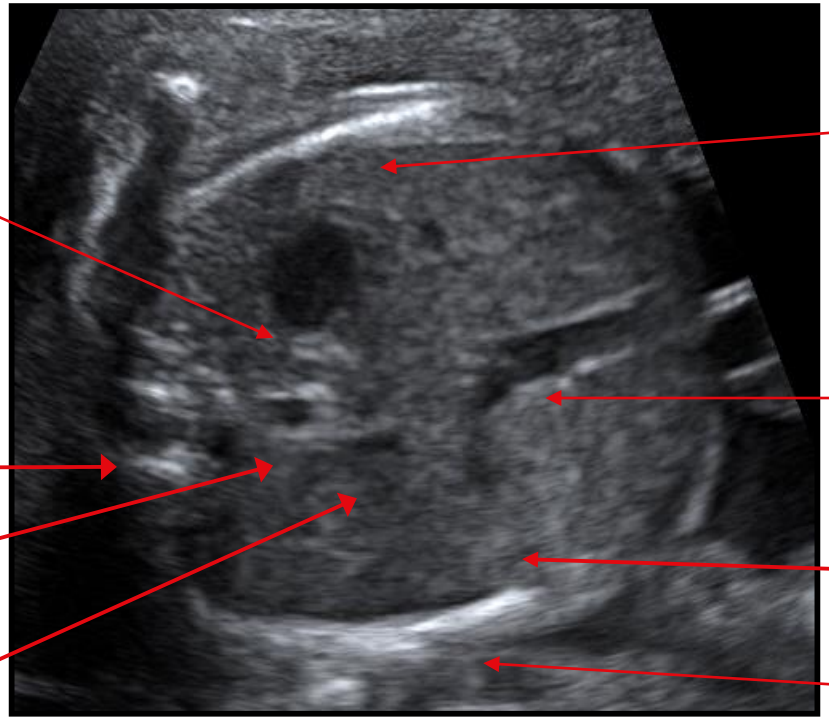
Plane 11
Upper abdomen - stomach

Ultrasound features

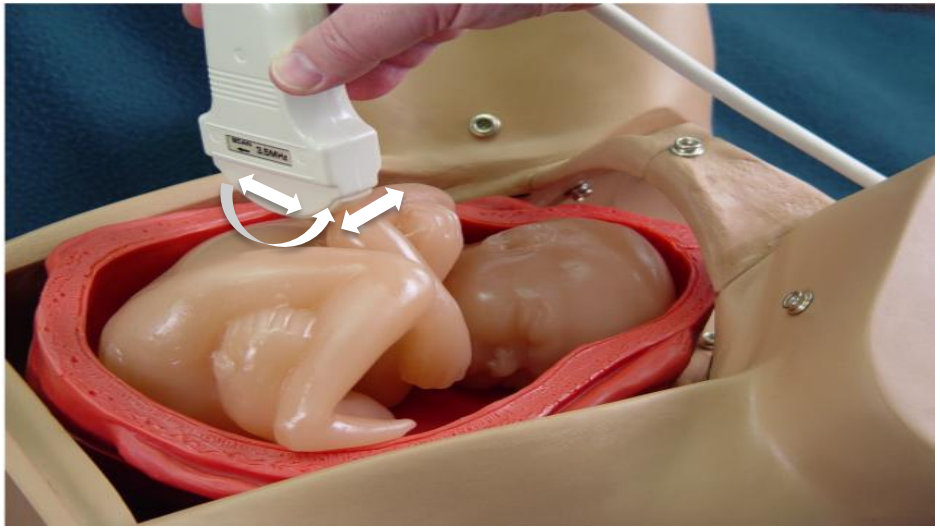
- Transverse section of abdomen
- Umbilical vein at the level of the portal sinus (in the liver)
- Stomach bubble visualized on the left (situs)
- Kidneys should not be visible



Plane 11
Upper abdomen - stomach

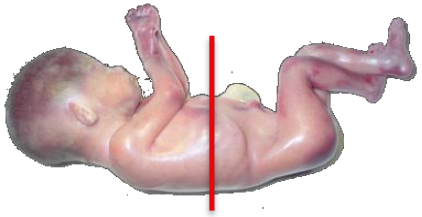


Plane 11
Upper abdomen - stomach



1. As circular as possible *(rotate or angle)*
2. Short length of umbilical vein / at level of portal sinus *(usually rotate)*
3. Stomach ‘bubble’ visualised *(slide)*
4. Kidneys should not be visible *(slide)*

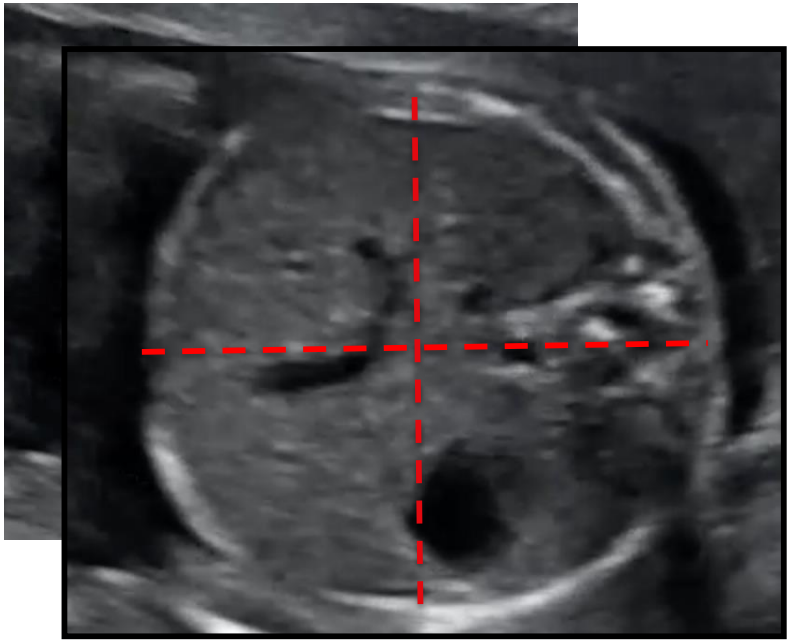
This is the plane required for abdominal circumference (AC) measurement



http://www.brooksidepress.org/Products/OBGYN_101/MyDocuments4/Ultrasound/2nd_and_3rd_Trimester_Ultrasound_Scanning.htm

Calculation of abdominal circumference

- Outer surface of skin line
- Ellipse calipers
- Linear measurements
  - Anteroposterior diameter (APAD)
  - Transverse abdominal diameter (TAD)
  - Diameters 90^0 to each other, outer to outer

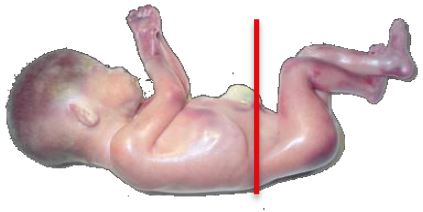


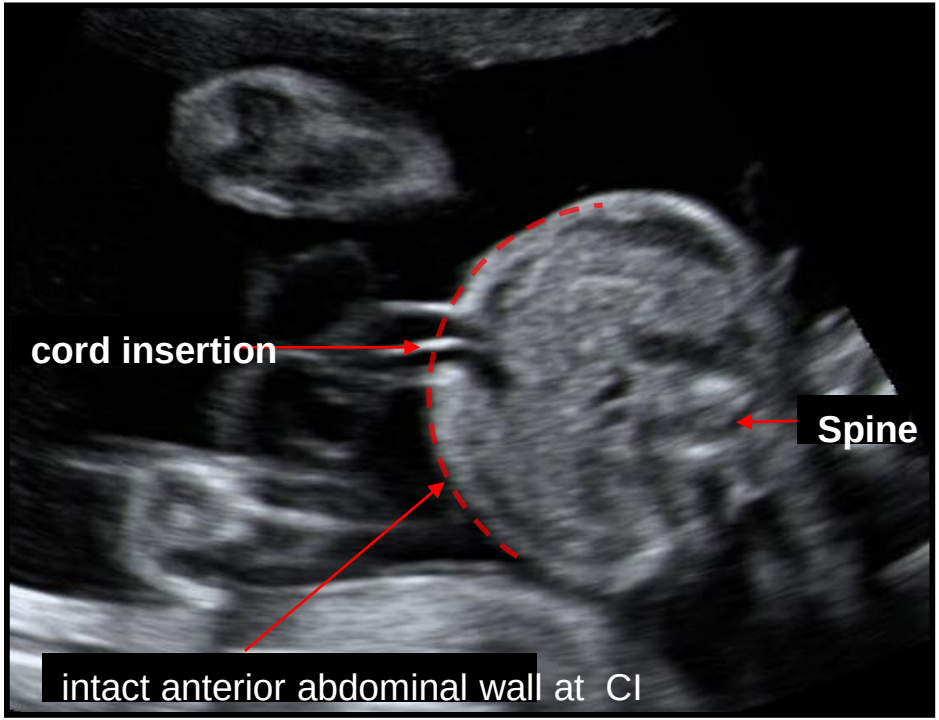
AC = (APAD + TAD) x 1.57

ISUOG Practice Guidelines. UOG 2011;37:116-126

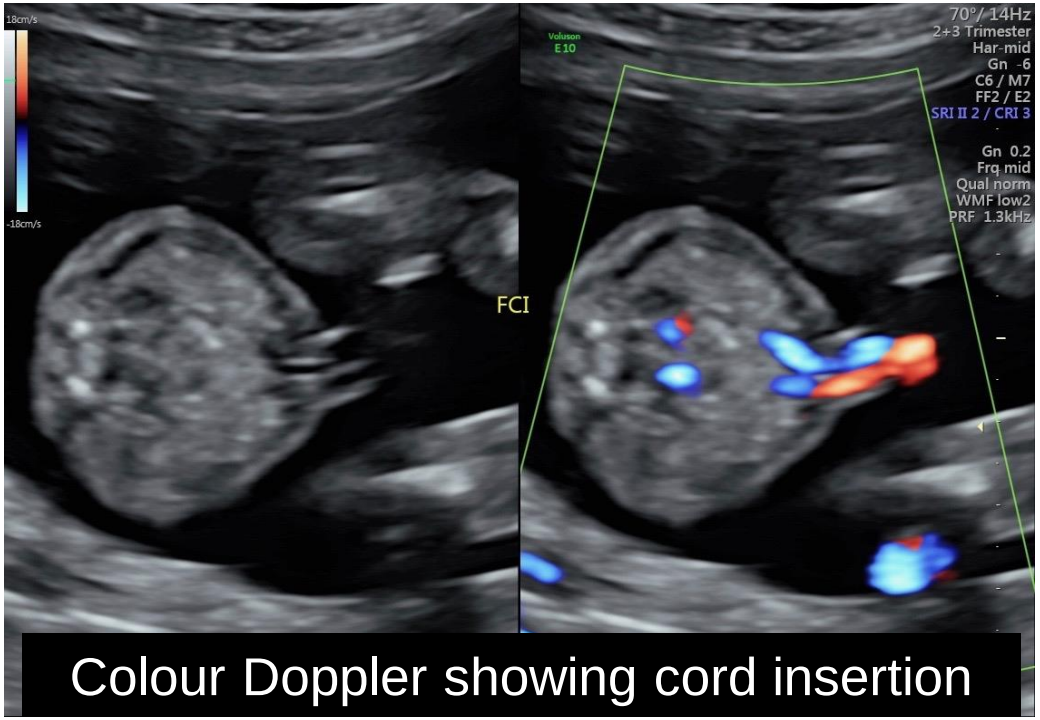
Plane 12
Cord insertion - ultrasound features

- Transverse view
- Spine
- Cord insertion at abdominal wall
- Above the urinary bladder
- Intact abdominal wall





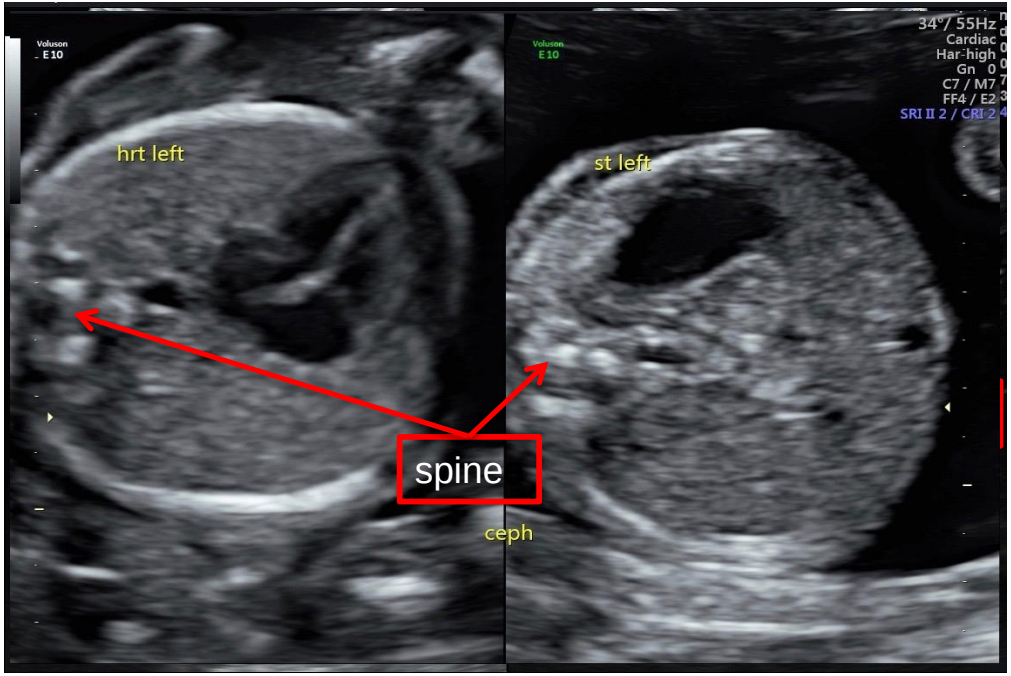
Plane 12
Umbilical cord insertion



Colour Doppler showing cord insertion

Fetal abdomen organ *situs*

- Left & right axes
- Important for cardiac & abdominal abnormalities



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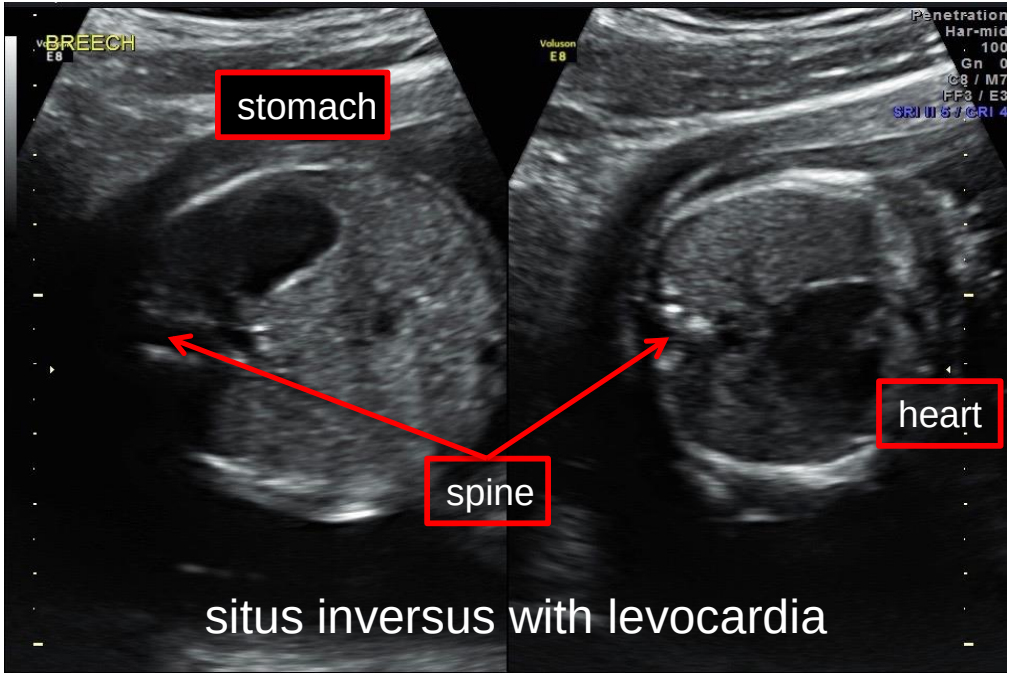
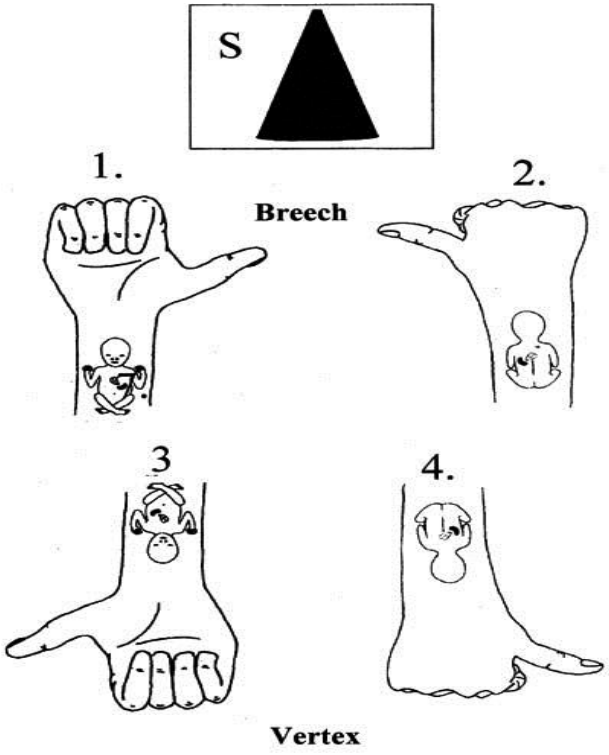


Sonographic definition of the fetal situs

Right-hand rule of thumb for TA scanning

Hand	Fetus
Dorsum	Back
Palm	Abdomen
Fist	Head
Thumb	Left



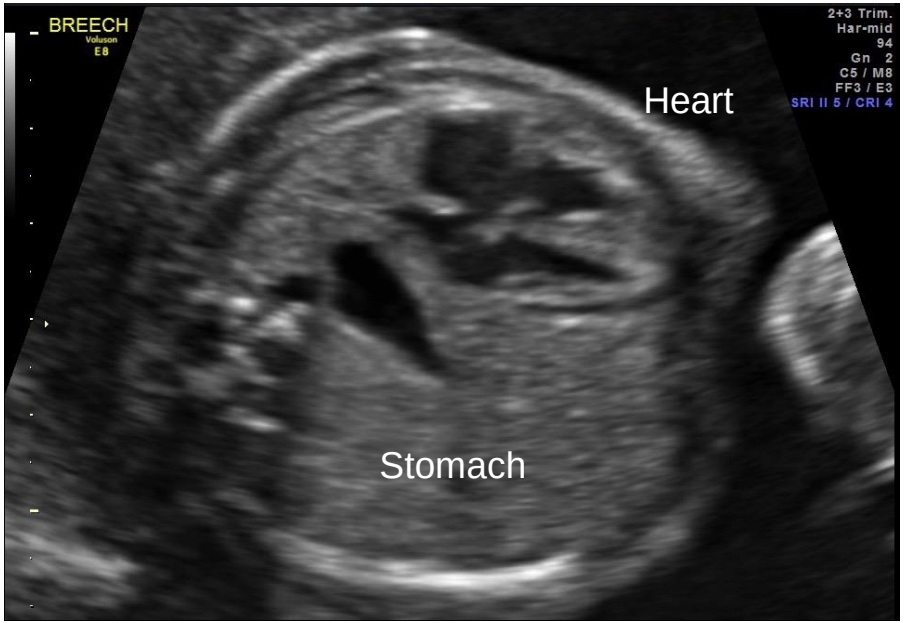
Bronshtein, M et al. Obstet Gynecol.2002; 99(6):1129-1130

Ultrasound assessment of fetal abdomen - stomach not seen

Normal amniotic fluid volume

- Most likely transient emptying
- Not clinically significant
- Wait 30-60 minutes

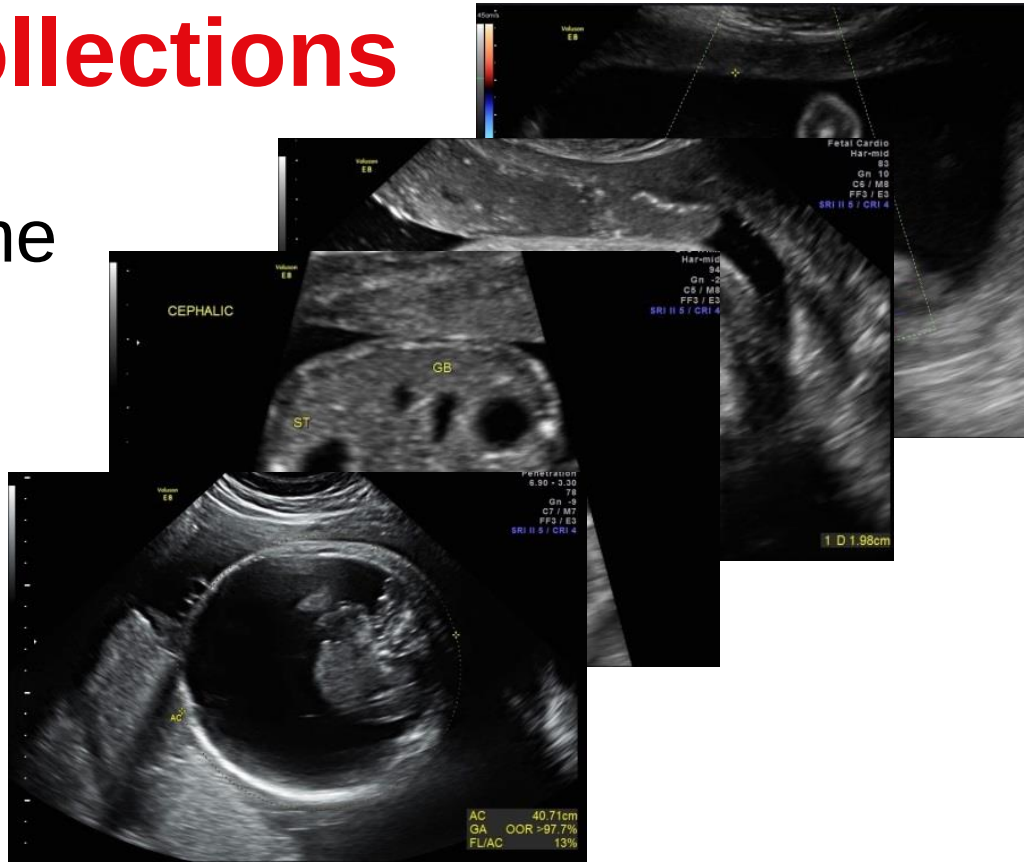
While you wait, look around - The stomach may appear or be found elsewhere



Left sided diaphragmatic hernia with stomach in the chest

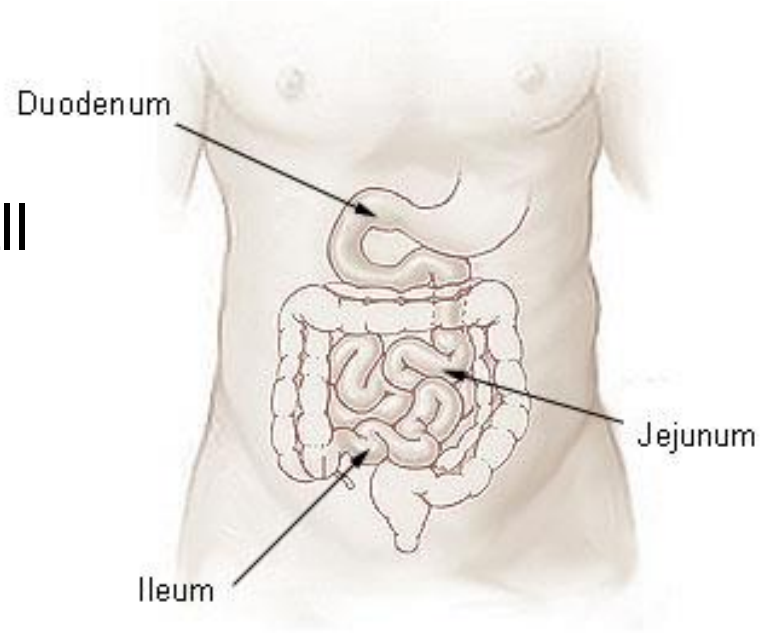
Abnormal fluid collections

- Amniotic fluid volume
- Intra-abdominal:
  - Enlarged stomach
  - Dilated bowel loops
  - Cysts
  - Ascites



Polyhydramnios gastrointestinal obstruction

- Diaphragmatic hernia
- Esophageal atresia
  - Absent or persistently small
- Small bowel obstruction
  - Pyloric stenosis
  - Duodenal atresia
  - Jejunal atresia



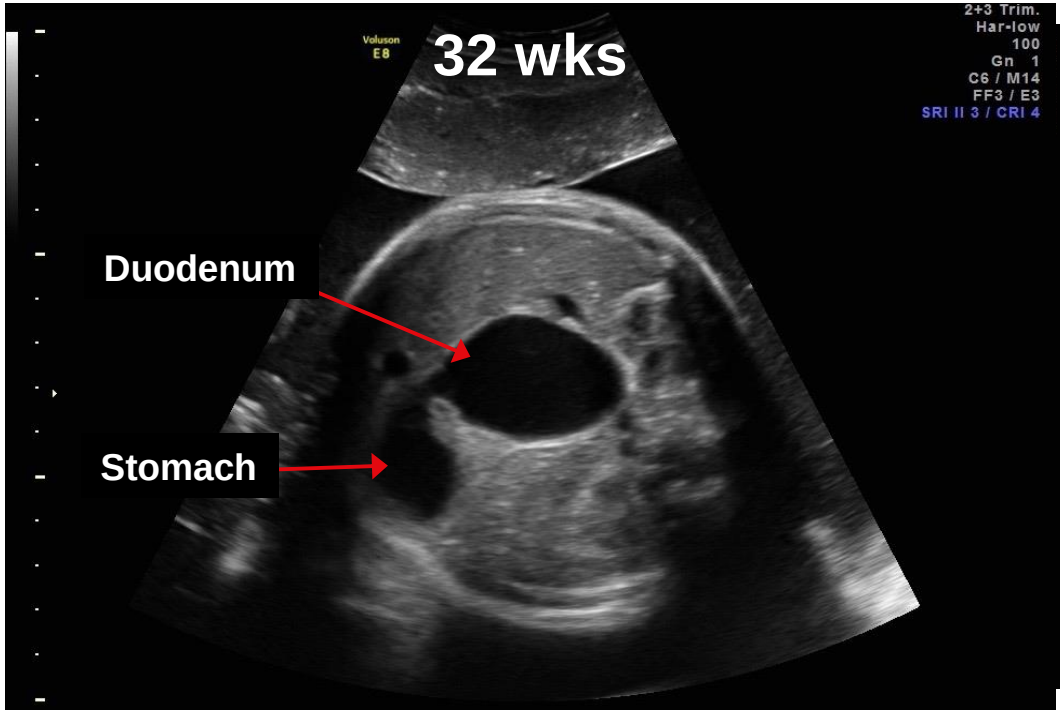
Esophageal atresia

- 1:3,500 live births
- Low prenatal detection rate
- Polyhydramnios
- Absent or small stomach
  - Partial obstruction
  - Tracheoesophageal fistula

Abnormal stomach – double bubble

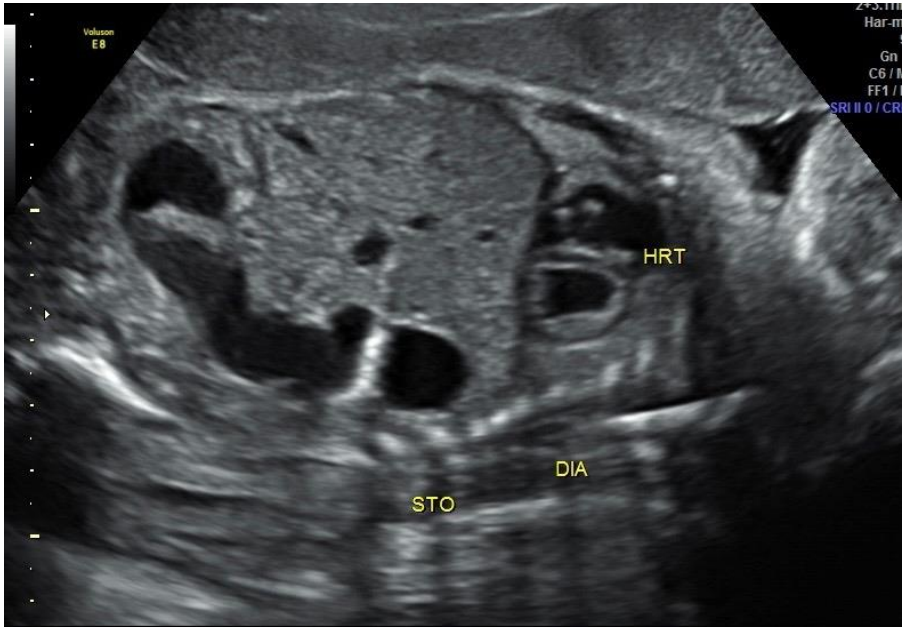
Duodenal atresia

- Most common perinatal intestinal obstruction
- 1: 10,000 live births
- Trisomy 21 20-40%
- Increased perinatal morbidity & mortality



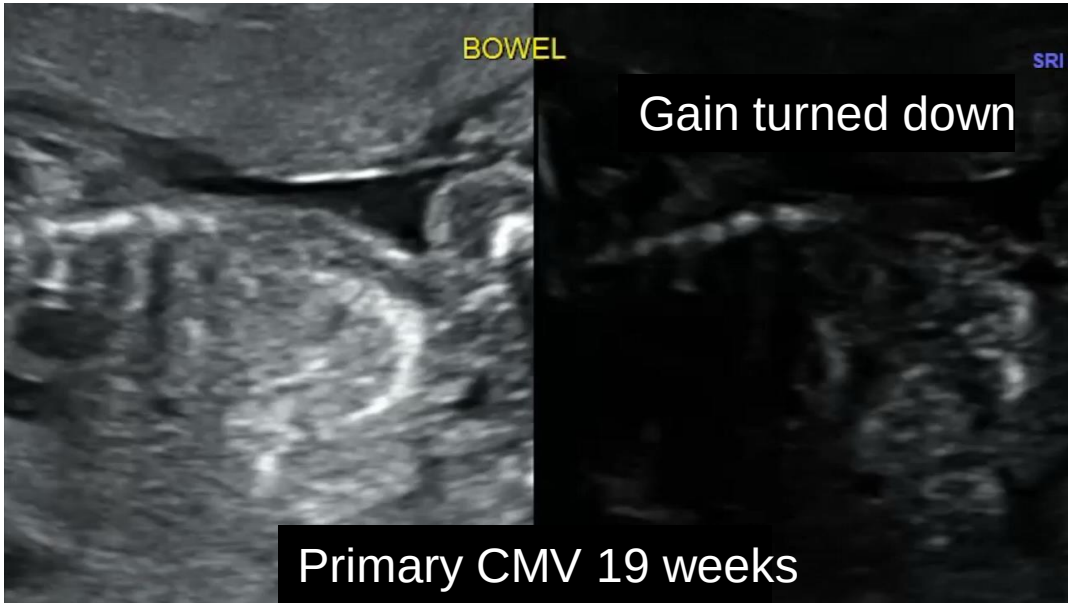
Dilatation of small and large bowel

Bowel	Upper limit
Small	6 mm
Colon	20 mm



Hyperechoic bowel loops

- Idiopathic - normal variant
- Trisomy 21
- Infection
  - Cytomegalovirus
  - Parvovirus
  - Toxoplasmosis
- Meconium peritonitis
  - Cystic fibrosis

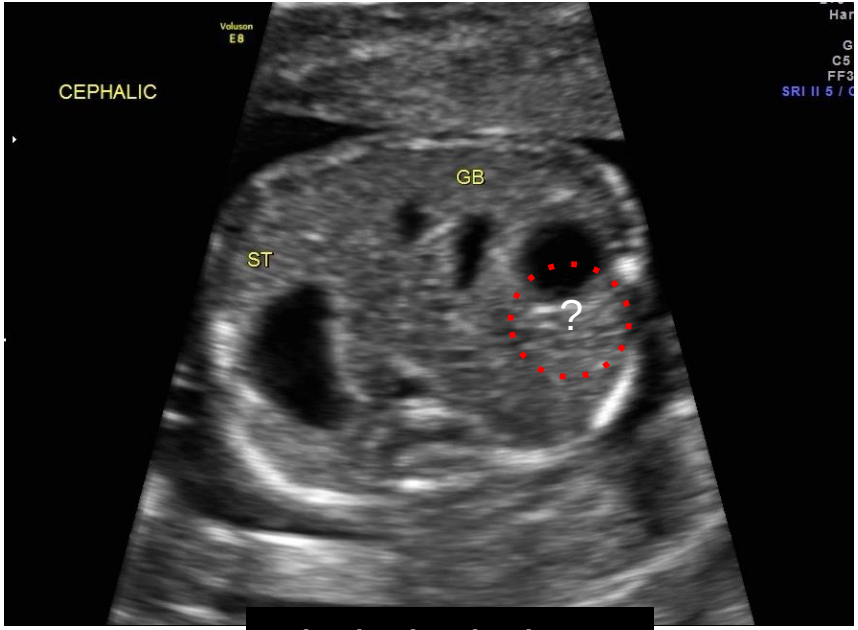


Clinically significant hyperechoic = *bright as bo*

Fetal abdominal cyst

Key to diagnosis - origin of cyst

- Reproductive ?Gender
- Bowel
- Mesentery
- Renal
- Other organ



Choledochal cyst

Any cystic structure should prompt referral

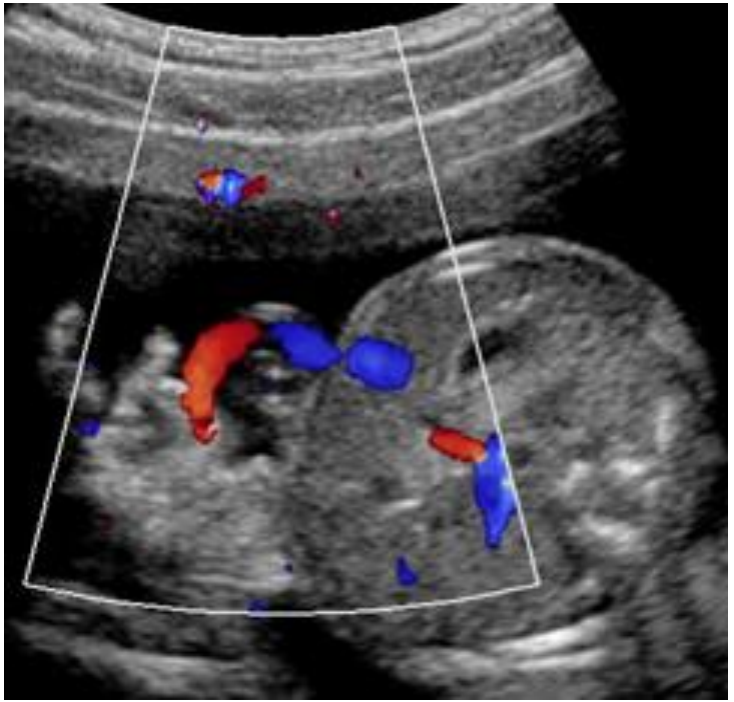
Abdominal wall defects- omphalocele

- Abnormal cord insertion
  - Cord inserts into apex of defect
  - Contains liver +/- bowel etc
  - Membrane covered
- Prenatal detection rate ~ 80%
- Abnormal karyotype ~ 50%
  - Trisomy 18

Physiological herniation
< week 12

Abdominal wall defect - omphalocele

Abdominal wall defect - gastroschisis



Abdominal wall defect - gastroschisis

- 1-6:10,000 live births
  - Young mothers
  - Normal karyotype
  - Majority isolated
  - Oligohydramnios
  - 10-15% late IUFD
- Normal cord insertion
  - Defect below & to right of cord insertion
  - Contains bowel only
  - Free floating

Key points

1. Sliding from the chest to through the abdomen to the pelvis in a transverse view, document location of:
   - The fetal stomach
   - The absence of abnormal fluid collection in the abdomen
   - Both kidneys
   - Umbilical cord insertion into an intact abdominal wall

2. If the stomach is not seen, or found to be “small”, with normal amniotic fluid volume, most likely to be normal emptying - but wait 30-60 minutes & look again

Key points

3. An accurate measurement requires that the AC be imaged in the correct transverse plane, with correct caliper placement,

4. Prompt referral for detailed ultrasound should be initiated if:
   - herniation of bowel after 14 weeks of gestation
   - abnormal fluid collection(s), such as dilated bowel loops or enteric cyst, are seen