
# ISUOG Basic Training

## Assessing the Placenta & Amniotic Fluid in Singleton & Twin Pregnancies

# Learning objectives

At the end of this session, you will be able to:

- Recognise the differences in ultrasound appearance between placentas that are low lying & those which are not
- Describe how to distinguish between normal & abnormal amniotic fluid volumes in singleton and twin gestations

# Key questions

1. What are the key features that should be included in the correct ultrasound assessment & reporting of placental site?
2. How should amniotic fluid be correctly assessed & reported?
3. What fetal conditions are most frequently associated with olioghydramnios?
4. What fetal conditions are most frequently associated with polyhydramnios?

# Placenta

- How to evaluate the placenta
- Placenta previa
- Morbidly Adherent placenta
- Placental Abruption
- Placenta in twins

# Placenta in the 2nd trimester

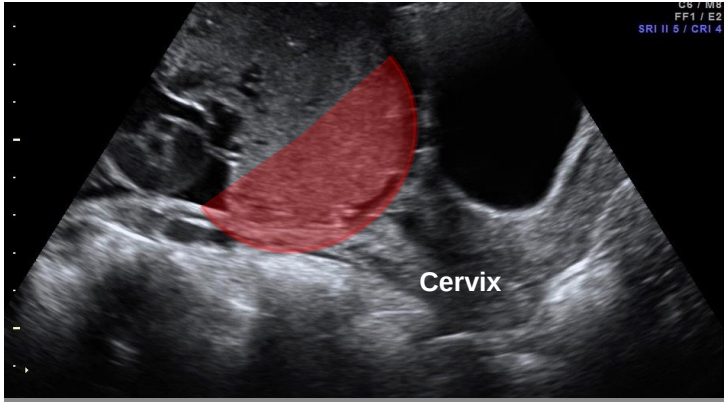
- Placental site
- Relationship of placenta to internal cervical os
- Distance from inferior edge  of placenta to internal os, for assessment of potential *placenta previa*
- TV imaging preferable to TA

22w anterior placenta

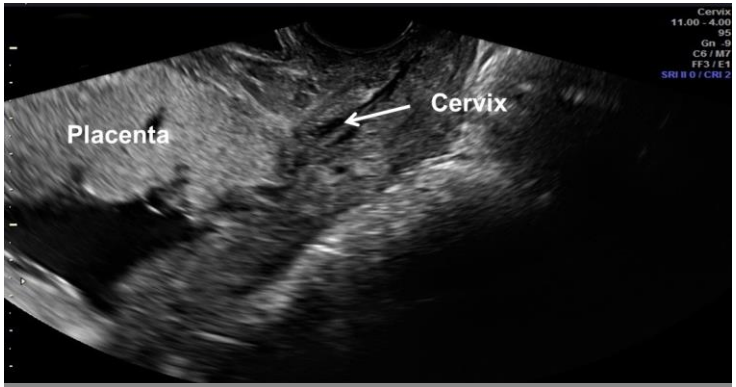

22w posterior placenta

# Placenta in the 2nd trimester

- Transabdominal ultrasound restricted by:
  - Need for full bladder
  - Maternal BMI or scars
  - Uterine contractures
- Transvaginal imaging preferable
- Safety is well established




Anterior placenta previa - TA



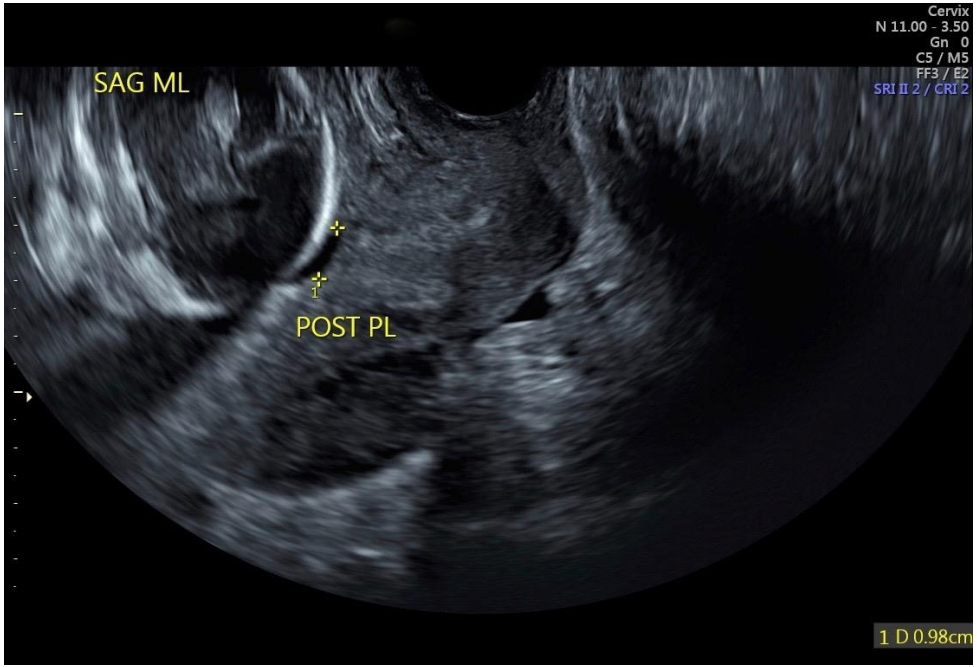

Anterior placenta (24w) - TV

# 2nd trimester TV

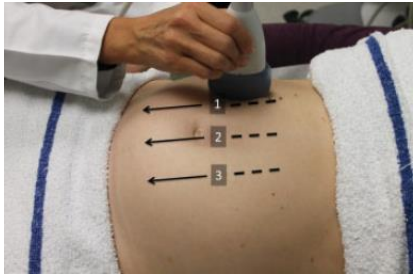
Normal


23 week singleton pregnancy

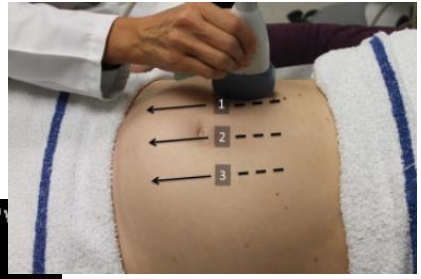
Low lying

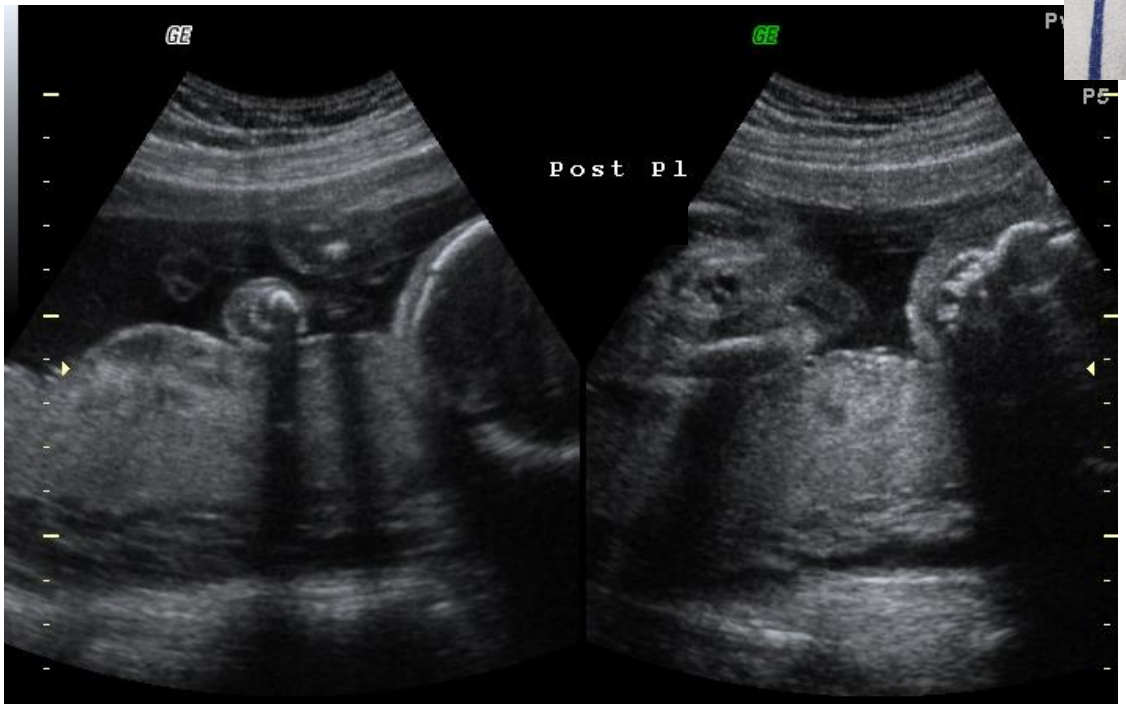


# Anterior placenta

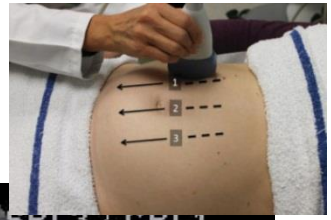


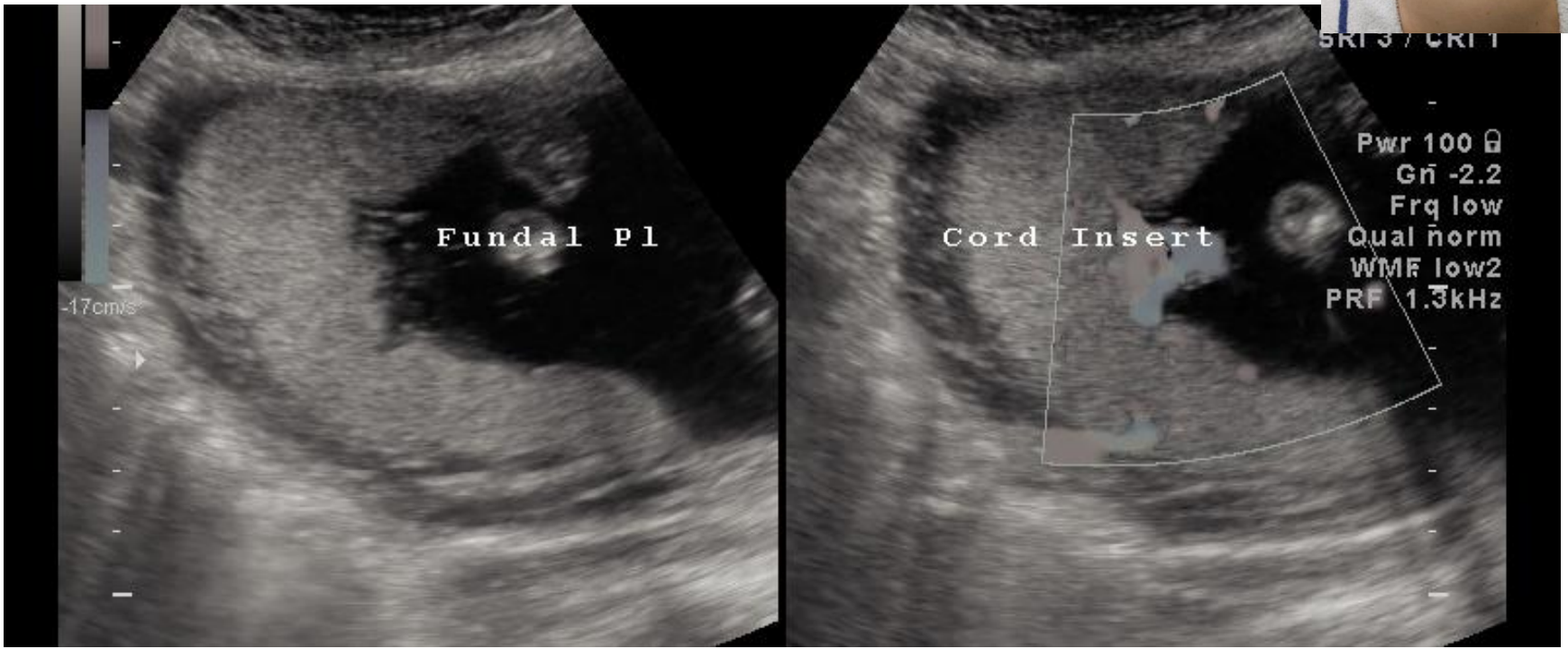
# Posterior placenta



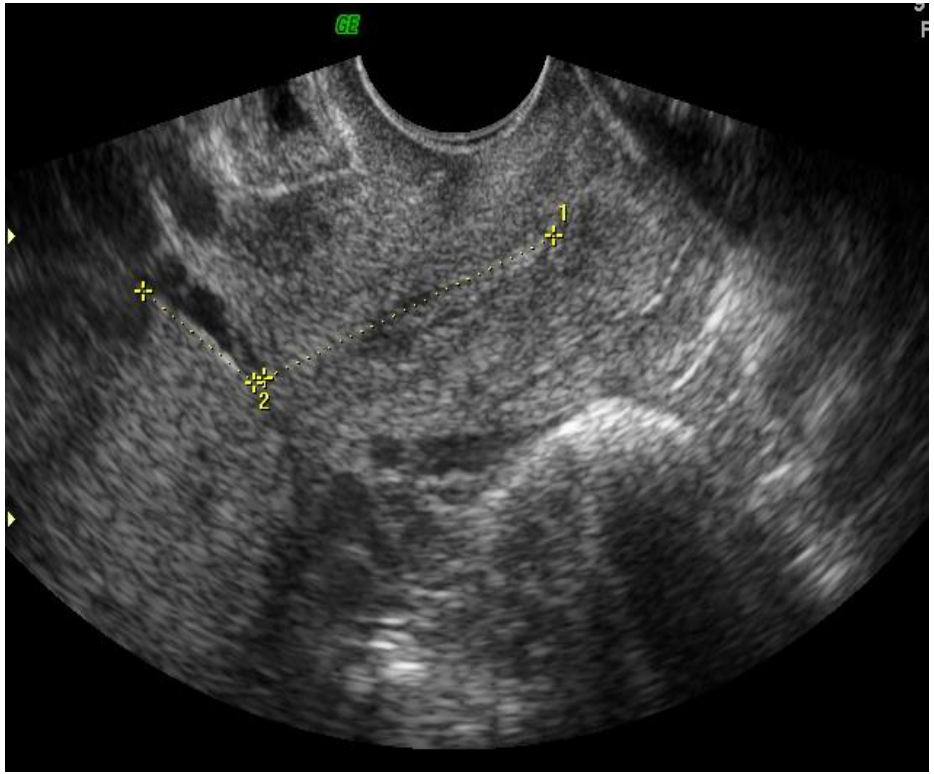



# Fundal placenta





# Placenta previa



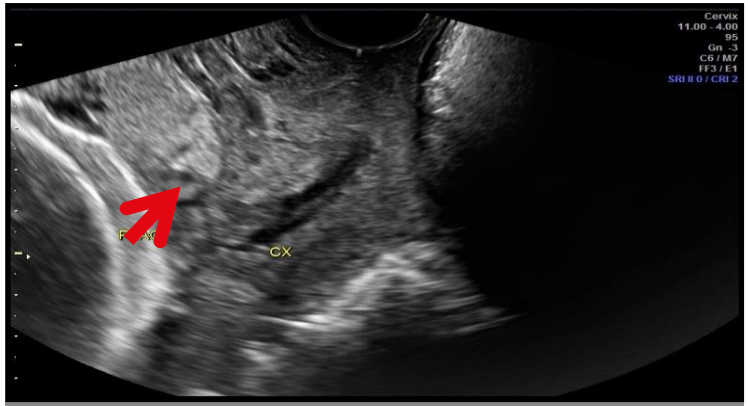
# Placenta previa

- Placenta covers part or all of the internal cervical os
- Incidence: 5/1,000 deliveries
- 2nd-3rd trimester painless vaginal bleeding, treat as previa until proven otherwise
- Clinical implications
  - Antepartum bleeding, transfusions
  - Hysterectomy
  - Sepsis
  - Maternal death
  - Prematurity, with 3-4 increase in perinatal mortality rate

# Placenta previa

- Placental edge < 2 cm, or covering, internal os from 16 weeks
- Resolved with advancing gestation, “placental migration” from lower segment

| Placenta relative to cervical os | Likelihood of resolution > 26 weeks |
|---|---|
| Covering os by >2cm | 0 |
| > 2 cm from os | 100% |
| < 2 cm from os | 89% |




32w TV, low lying

- 32 weeks TV, still present
- 36 weeks TV

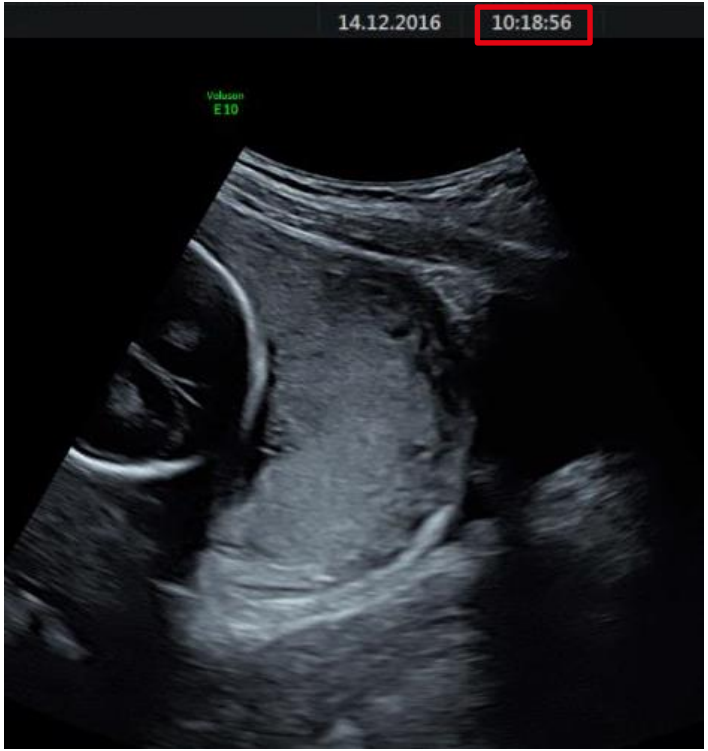
Oppenheimer L et al. UOG 2001,18:103-8

# Risk factors for placenta previa

- History of prior Cesarean delivery
- Prior pregnancy termination
- Prior uterine surgery
- Maternal smoking
- Advanced maternal age
- Multiparity
- Cocaine use
- Multiple pregnancy

Abuhamad et al. Ultrasound in Obstetrics & Gynecology: A Practical Approach, 2014

# Pitfalls in diagnosing placenta previa





40 minutes later, note effect of maternal bladder filling

# Pitfalls in diagnosing placent previa

20 minutes later, note effect of uterine relaxation

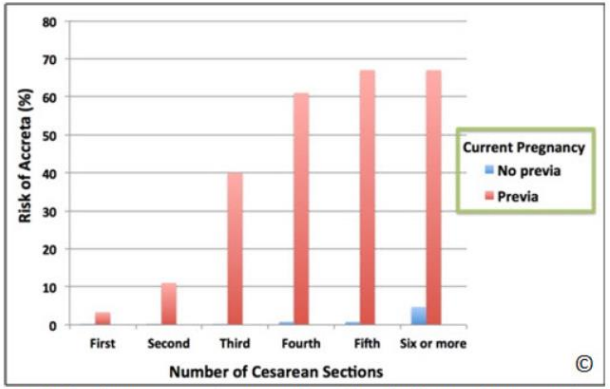
# Morbidly adherent placenta

- Abnormal implantation of placenta into the uterine wall
  - Accreta: adherent to the myometrium (75%)
  - Increta: invades the myometrium (18%)
  - Percreta: through the myometrium (7%)
- Associated with massive haemorrhage, transfusion, hysterectomy, multi-system organ failure & maternal death

**Prenatal diagnosis essential to optimise maternal-fetal outcomes**

# Risk factors for placenta accreta

- Placenta previa & prior Cesarean section
- Advanced maternal age
- Multiparity
- Uterine surgery or endometrial ablation
- Leiomyomas
- Uterine anomalies
- Hypertension
- Smoking

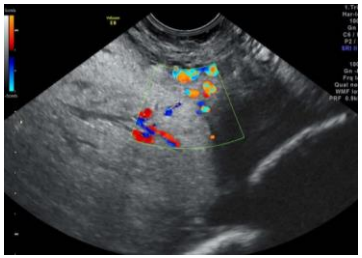


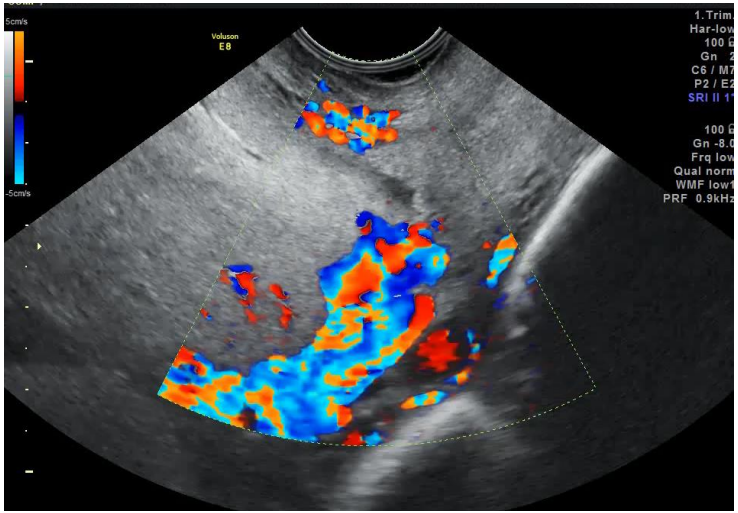

**Graph 8.1**: Risk for placenta accreta in pregnancies with and without a placenta previa and prior cesarean deliveries. Note that the risk of placenta accreta increases significantly as the number of prior cesarean deliveries increases in the presence of a placenta previa on ultrasound. When a placenta previa is not noted on ultrasound, the risk for placenta accreta remains small (< 1%), irrespective of the number of prior cesarean deliveries.


Abuhamad et al. Ultrasound in Obstetrics & Gynecology: A Practical Approach, 2014
Placental Abnormalities, Ultrasound in OB/GYN Practical Guide, 2014
Silver RM et al. Obstet Gynecol. 2006,107:1226-32

# Ultrasound findings in placenta accreta

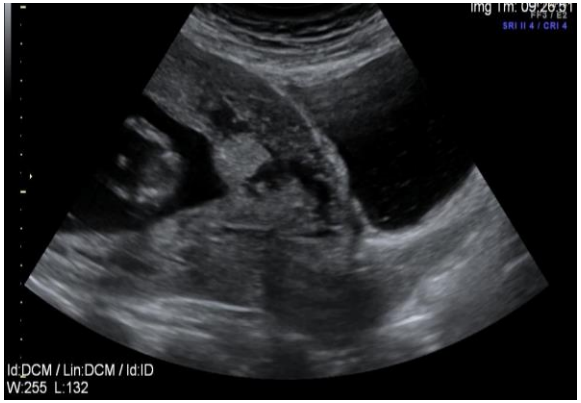
- Gestation sac implanted:
  - In lower uterine segment
  - In cesarean section scar
- Multiple vascular lacunae in 2nd & 3rd trimesters
- Loss of normal hypoechoic retroplacental zone
- Abnormality in uterine-serosa-bladder interface
- Retroplacental myometrial thickness of < 1 mm
- Turbulent blood flow with colour Doppler through lacunae
- Extension villi into myometrium, serosa or bladder

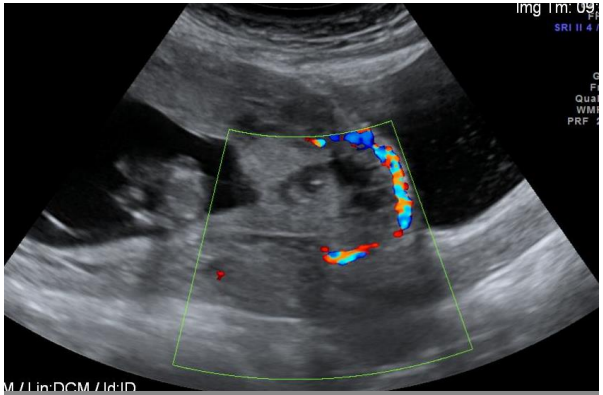




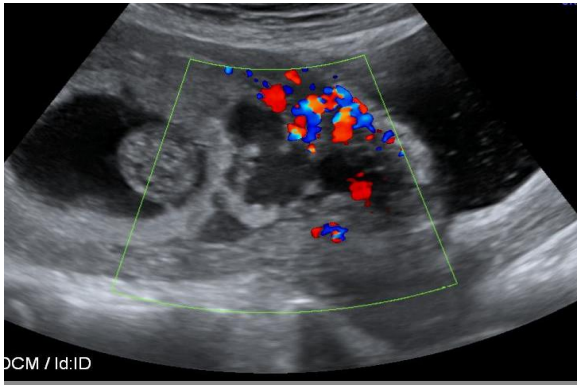

Abuhamad et al. Ultrasound in Obstetrics & Gynecology: A Practical Approach, 2014

# Ultrasound findings in placenta accreta



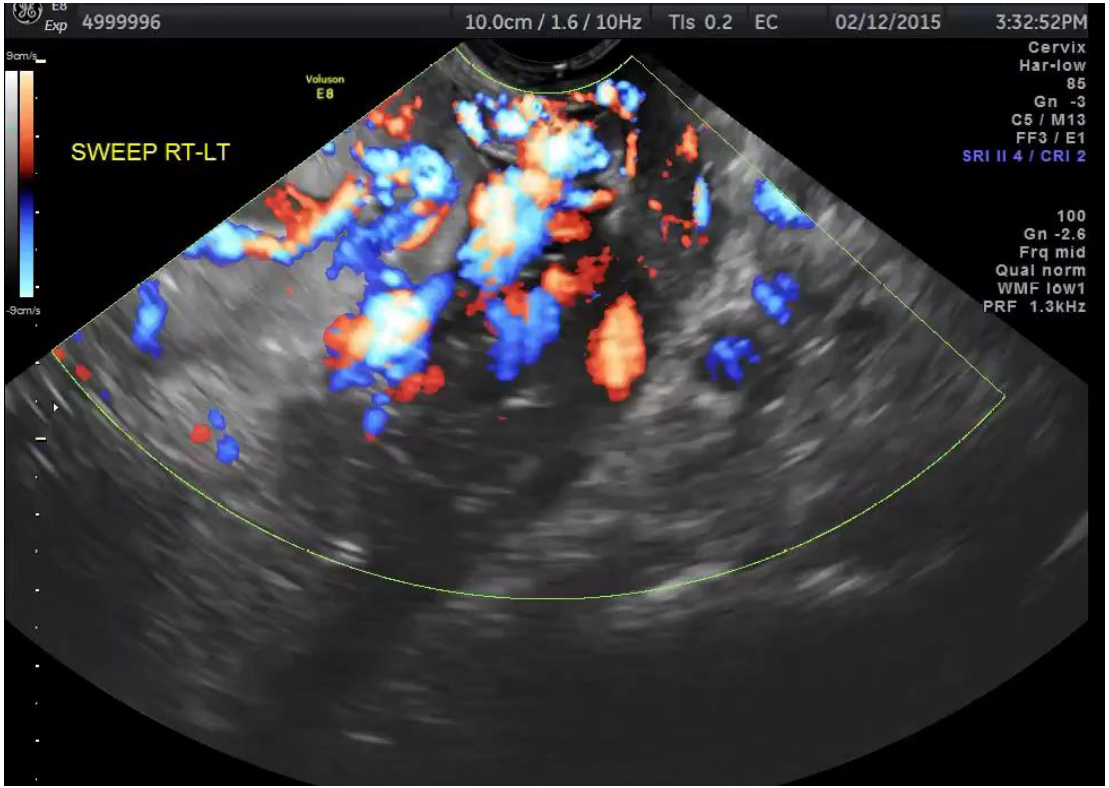



Loss of hypoechoic retroplacental zone




Vascular lacunae

# Placenta accreta 2nd & 3rd trimester TV



# US identification of invasive placentation*

| Diagnostic Method | Sensitivity | Specificity |
|---|---|---|
| Overall | 91% | 97% |
| Placental lacunae | 77% | 95% |
| Loss of hypoechoic space | 66% | 96% |
| Abnormal uterine bladder interface | 50% | 99% |
| Colour Doppler abnormal | 91% | 88% |

* At risk population: history of uterine surgery with placenta previa or low lying

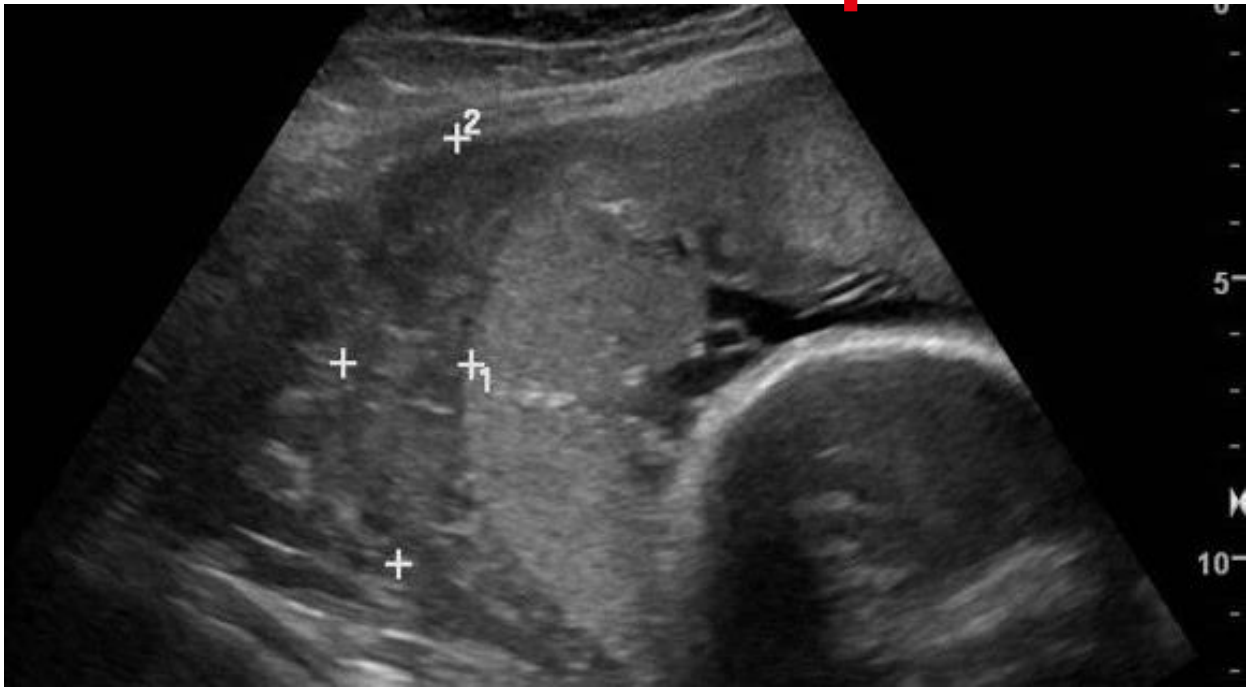
D'Antonio F, et al. UOG, 2013, 42:509-17

# Placenta abruption

- Bleeding behind or within the placenta
  - Painful uterine or lower back
  - With contractions
- Incidence 0.5-1%
- Hypoechoic subchorionic thickening
- Ultrasound detection rate - 50%
  - Normal ultrasound does not rule out an abruption

**Placental separation with active bleeding - materno-fetal emergency, immediate triage required**

# Placental abruption




Crescent of avascular, low echogenicity between placenta and uterine wall

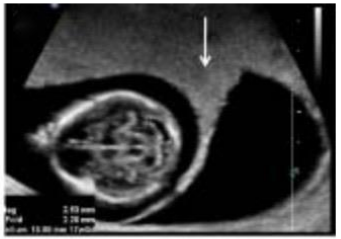
Case courtesy of Dr Andrew Dixon, Radiopaedia.org, RID: 14281

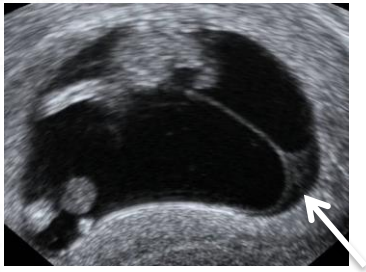
# Twins: amnionicity & chorionicity

Diamniotic- Dichorionic

Diamniotic-Monochorionic

Monoamniotic-Monochorionic





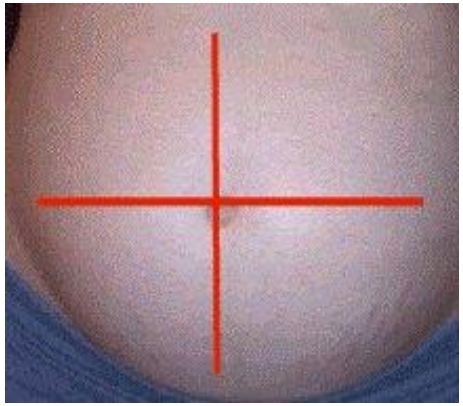
# Amniotic fluid

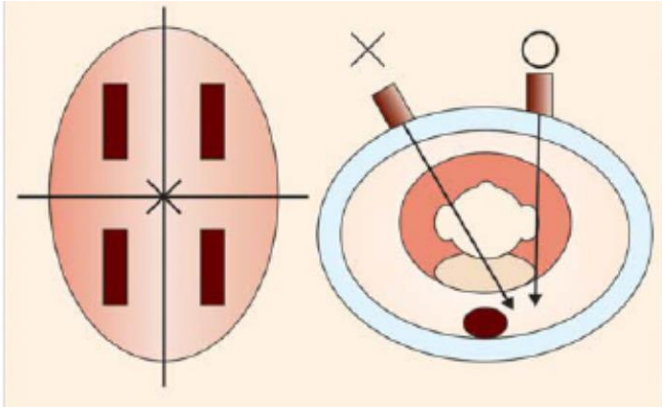
- How to evaluate
- Polyhydramnios
- Oligohydramnios
- Twins

# Amniotic fluid volume (AFV)

- 1st trimester
  - Production poorly understood
  - Multiple sources (maternal: placenta and membranes)
- 2nd & 3rd trimesters
  - Fetal urine major contributor, from 16 weeks' onwards (and lungs)
  - Assessment of AFV = assessment of fetal well being
- Abnormal amniotic fluid volume
  - Increased – polyhydramnios
  - Decreased – oligohydramnios
  - No fluid - anhydramnios

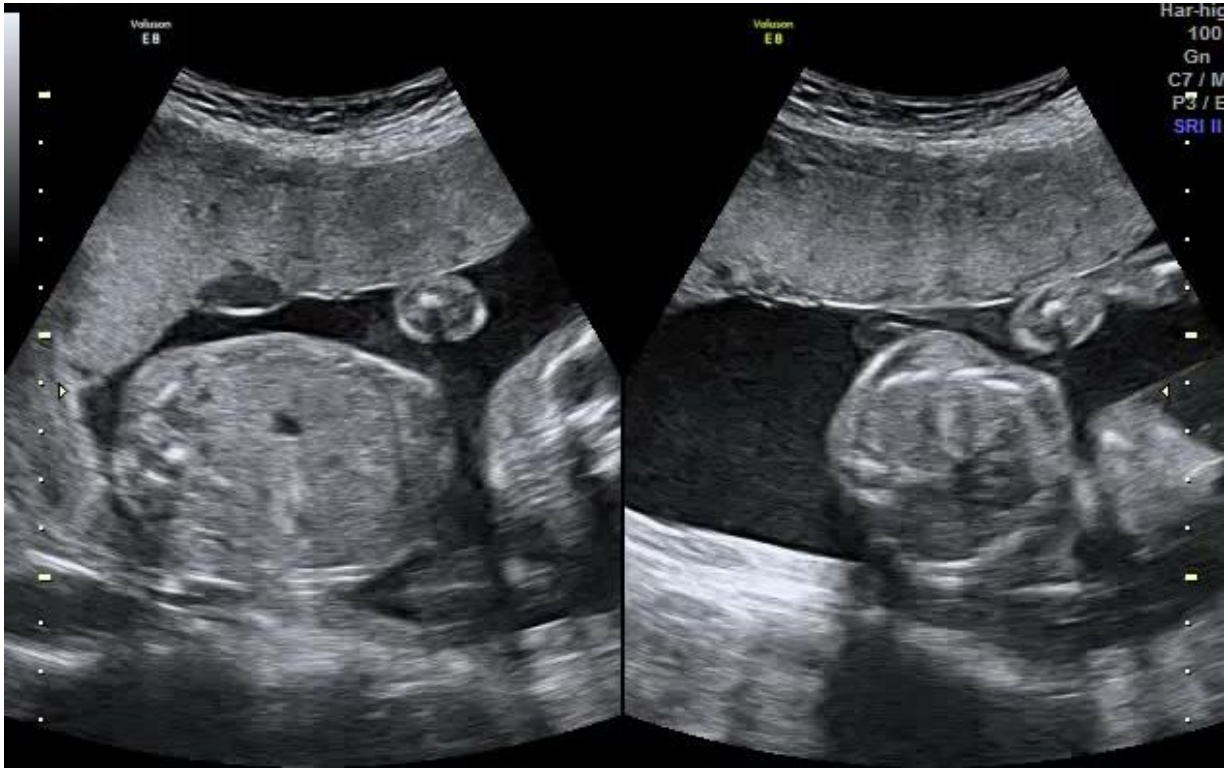
# Measuring amniotic fluid





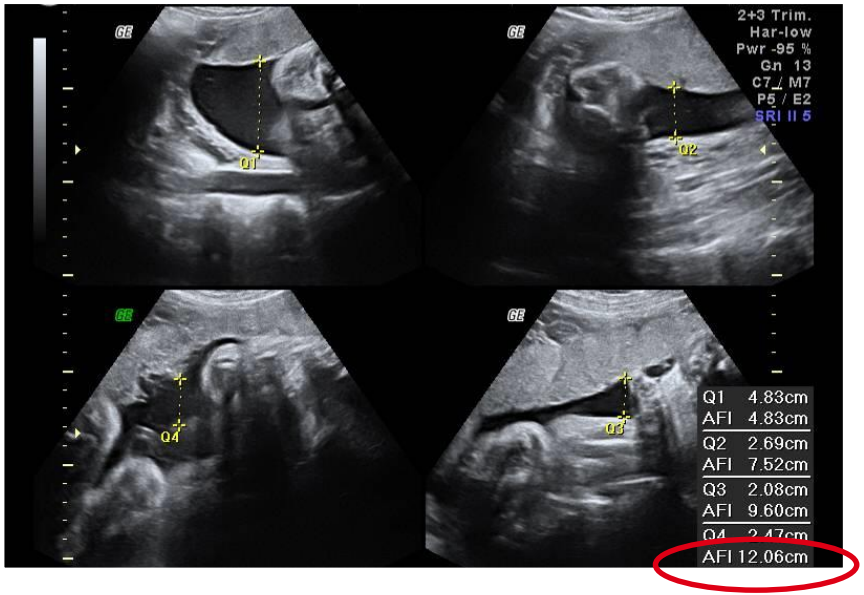
- Measurement of a pocket of amniotic fluid perpendicular to the floor

# Technique: minimise pressure



# Amniotic fluid index (AFI)

- Sum of deepest vertical pocket from 4 quadrants
- Measure > 16 weeks
- Normal AFI = 5 - 24 cm
- Oligohydramnios < 5 cm
- Polyhydramnios  > 24 cm

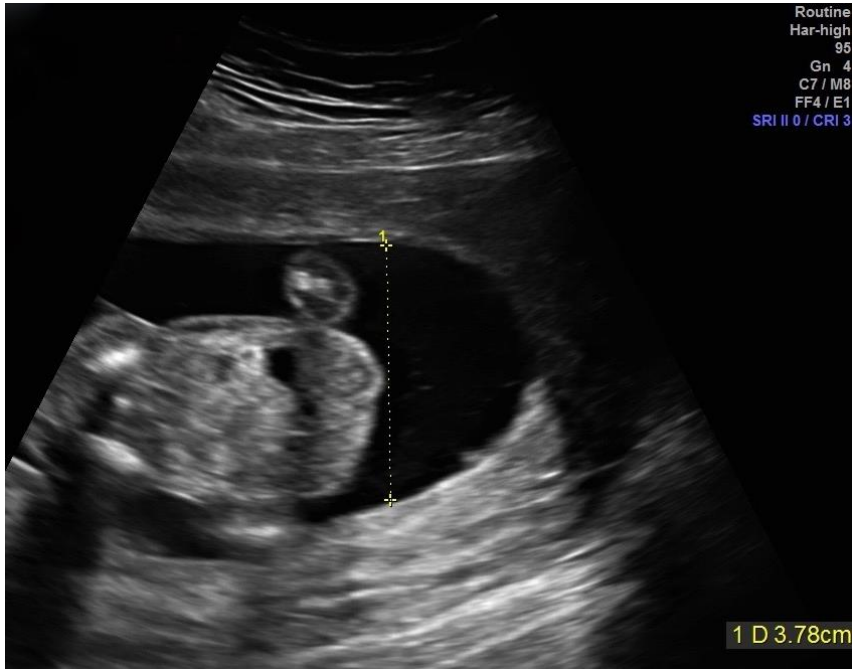



Phelan JP, J Reprod Med. 1987;32:601–604

# Deepest vertical pocket (DVP)

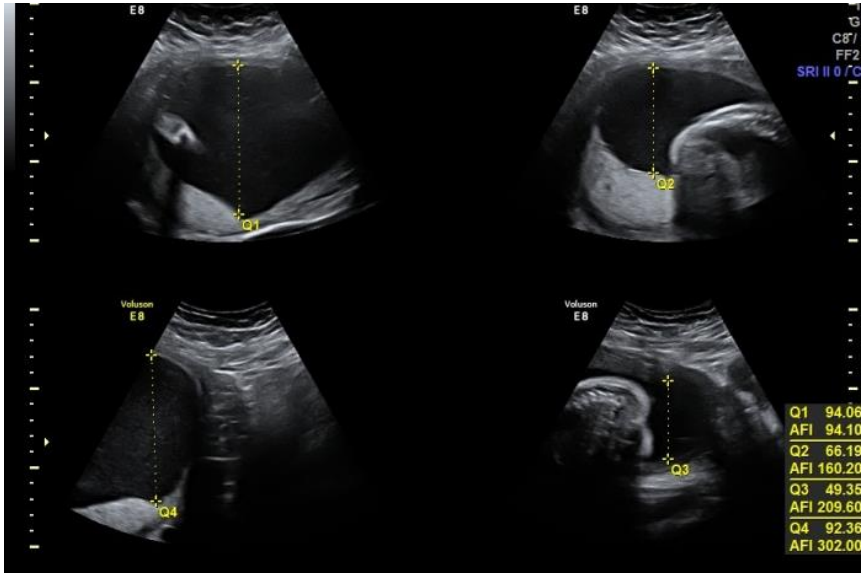
- Measure DVP in any quadrant of the uterus
  - Normal 2 - 8 cm
  - Oligohydramnios < 2 cm
  - Polyhydramnios > 8 cm

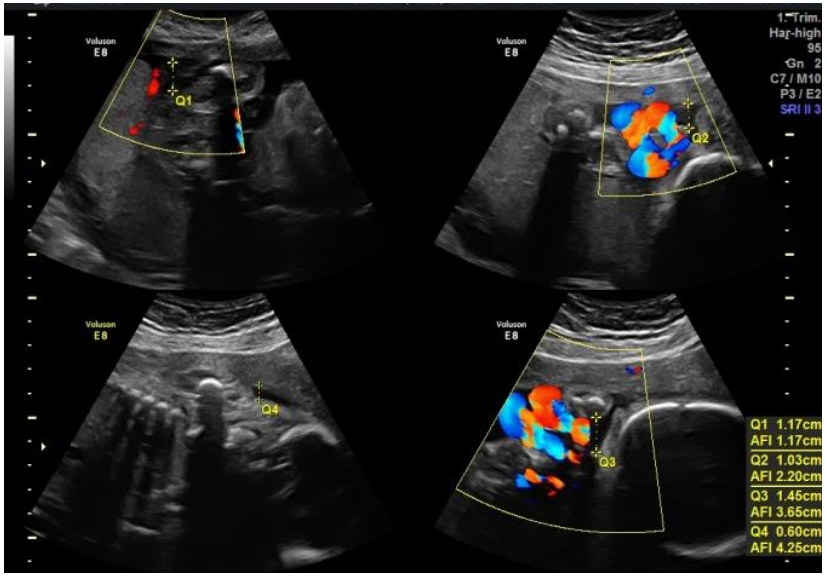
- DVP - diagnosis of oligohydramnios → fewer obstetrical interventions (with no difference in outcome) when compared to AFI




Moise KJ, Seminars Perinatology 2013;37:370-74

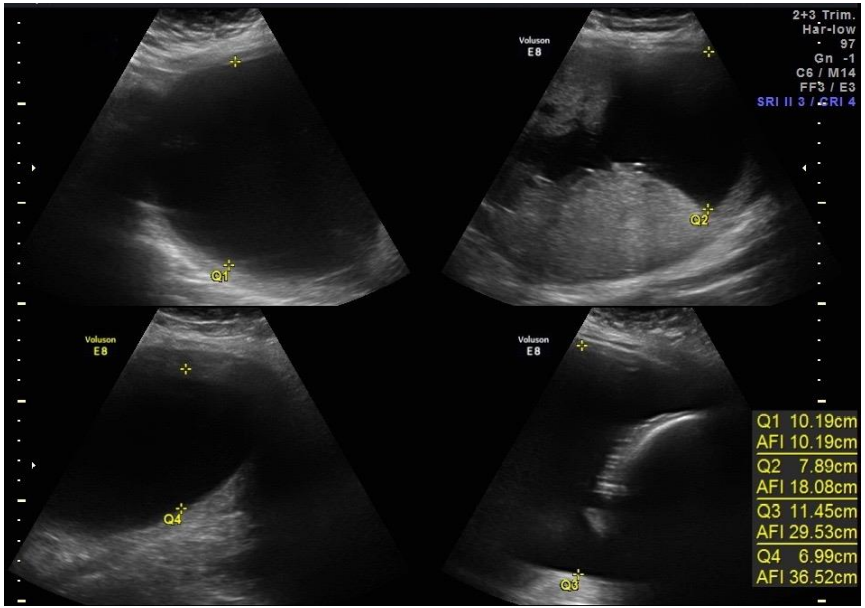
| | Polyhydramnios | Oligohydramnios |
|---|---|---|
| DVP | ≥ 8 cm | <2 cm |
| AFI | ≥ 24 cm | <5 cm |



# Polyhydramnios

- Idiopathic
- Maternal diabetes
- Fetal
  - Anemia
  - Structural malformations
  - Chromosomal abnormal
  - Infections
  - Genetic syndromes
  - Complicated twins




- Increased incidence of preterm labor & delivery; abruption

**2-5 fold ↑ perinatal mortality**

# Oligohydramnios

- PROM - most common reason
- Fetal condition
  - Bladder obstruction
  - Renal failure
- Placental insufficiency - IUGR
- Maternal disorders
  - Hypertension
  - Renal disease
- Multiple pregnancy
  - Twin-twin transfusion syndrome
  - Selective fetal growth restriction
- Other
  - Maternal  medication ingestion and substance abuse
  - Infections
- Increased Incidence of
  - Potter Cascade/deformations
  - Fetal heart rate abnormalities
  - Meconium stained fluid

**15-50 fold ↑perinatal morbidity & mortality**

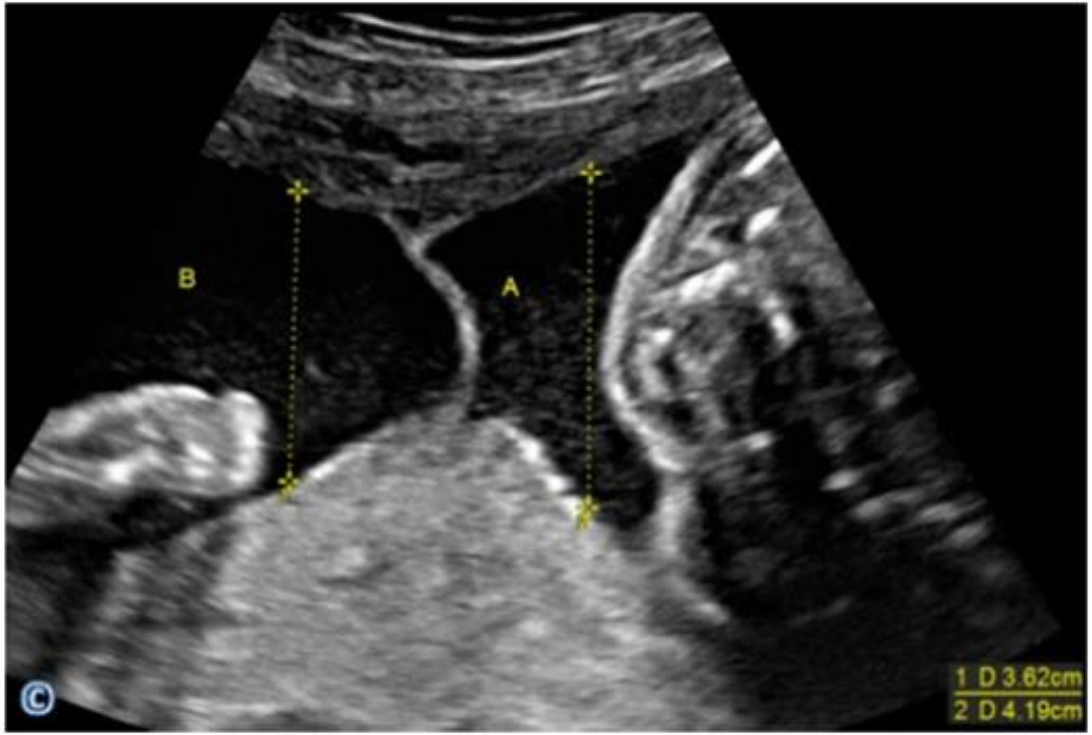
# Keep in mind

- Measure AFI with the transduce held sagitally and perpendicular to the floor
- In case of suspected polyhydramnios, measure all 4 vertical fluid pockets
- In case of oligohydramnios, measure the single deepest vertical pocket
- Look for maternal disease/fetal structural abnormalities with abnormal AFI
- Follow progression closely by ultrasound

# Amniotic fluid assessment in twins

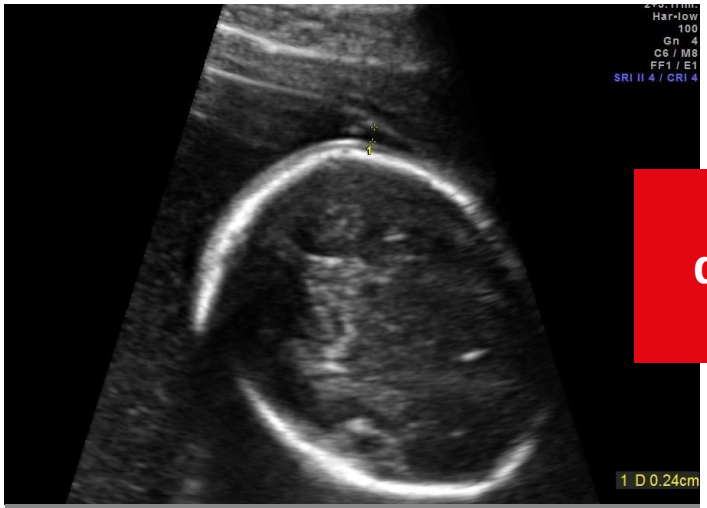
- Use DVP **not** AFI
- DVP
  - AFV stable in normal Monochorionic (MC) & Dichorionic (DC) twins between 17 & 37 weeks
  - Definitions for oligohydramnios & polyhydramnios for twins same as for singletons
- Dichorionic etiologies comparable to those of singletons
- Monochorionic
  - Twin to twin transfusion syndrome (oligo/poly)
  - Selective fetal growth restriction (oligo/normal)

# Amniotic fluid assessment in twins



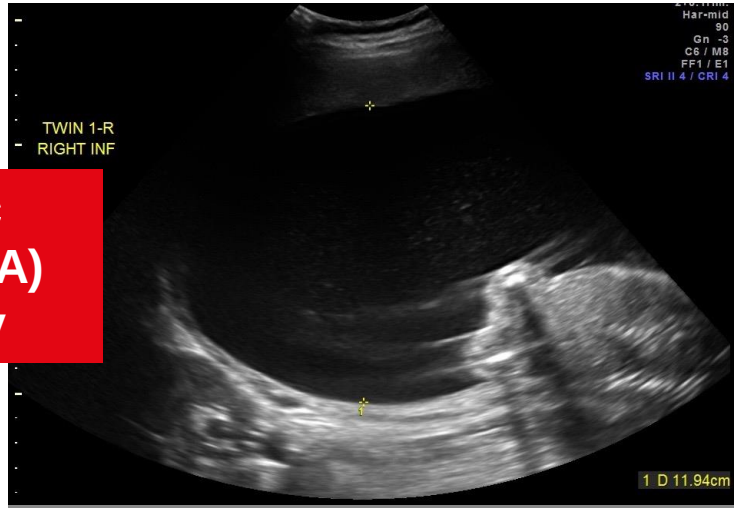

Abuhamad et al. Ultrasound in Obstetrics & Gynecology: A Practical Approach, 2014

# Amniotic fluid assessment in twins




Twin 2 – DVP 2.4mm

**Monochorionic diamniotic (MCDA) twin pregnancy**




Twin 1 – DVP 11.9cm (polyhydramnios)

**Diagnosis - twin to twin transfusion syndrome**

# Key points

1. A placental edge < 2 cm from the internal os should be considered an “at risk pregnancy”, additional ultrasound scans are required

2. Vaginal bleeding with ultrasound evidence of placental separation is an obstetric *emergency*

3. Placenta accreta should be excluded in all cases of  low anterior placenta with previous Cesarean section

# Key points

4. Normal amniotic fluid volume:
   - AFI = 5 – 24 cm
   - DVP = 2 – 8 cm

5. DVP, not AFI, should be used in assessment of amniotic fluid volume in twin pregnancies

5. Polyhydramnios is associate with increased risk of poor outcome due to preterm delivery