Ultrasound and High-Risk Pregnancy

Chapter 54

Maternal Factors in High-Risk Pregnancy

- **Advanced maternal age**
- **Abnormal maternal lab values**
- **Vaginal bleeding**
- **Insulin-dependent diabetes mellitus (IDDM)**
- **Hypertension (HTN)**
- **Preeclampsia**
- **Maternal systemic disease**

Advanced Maternal Age

- **(AMA) refers to a patient who will be 35 or older at the time of delivery**
- **Incidence of Down's syndrome increases with age**
  - **Maternal age alone fails to account for approximately 66% of fetuses born with Down's syndrome**
- **Standard practice to offer AMA women genetic counseling, screening options, and invasive prenatal testing**

First Trimester Screening

- **Based on the patient's**
  - **PAPP-A**
  - **Free β-hCG lab value**
  - **Age**
  - **Nuchal translucency measurement**
    - **A more accurate risk calculation can be made for having a child with a chromosomal abnormality**
- **Special credentialing is required!!!**

Second Trimester Screening

- **Performed with:**
  - **Maternal serum quad screen lab value**
    - **Alpha-fetoprotein (AFP)**
    - **Human chorionic gonadotropin (hCG)**
    - **Unconjugated estriol (uE3)**
    - **Inhibin-A**
  - **Detailed fetal anatomic survey ultrasound examination**
    - **Table 54-1**

Detailed Fetal Anatomic Survey Ultrasound

- **Targeted evaluation of all fetal anatomy**
  - **–That can be seen at the time of examination**
- **Between 18 and 20 weeks’**

Immune and Nonimmune Hydrops

- **Hydrops fetalis**
  - **Condition in which excessive fluid accumulates within the fetal body cavities**
- **Fluid accumulation may result in:**
  - **Anasarca**
  - **Ascites**
  - **Pericardial effusion**
  - **Pleural effusion**
  - **Placental edema**
  - **Polyhydramnios**

Immune and Nonimmune Hydrops

- **Two classifications of fetal hydrops:**
  - **Immune**
  - **Nonimmune**
- **Nonimmune hydrops is not related to the presence of maternal serum IgG antibody against one of the fetal blood cell antigens**
- **By ultrasound evaluation, both types are characterized by extensive accumulation of fluids in fetal tissues or body cavities**

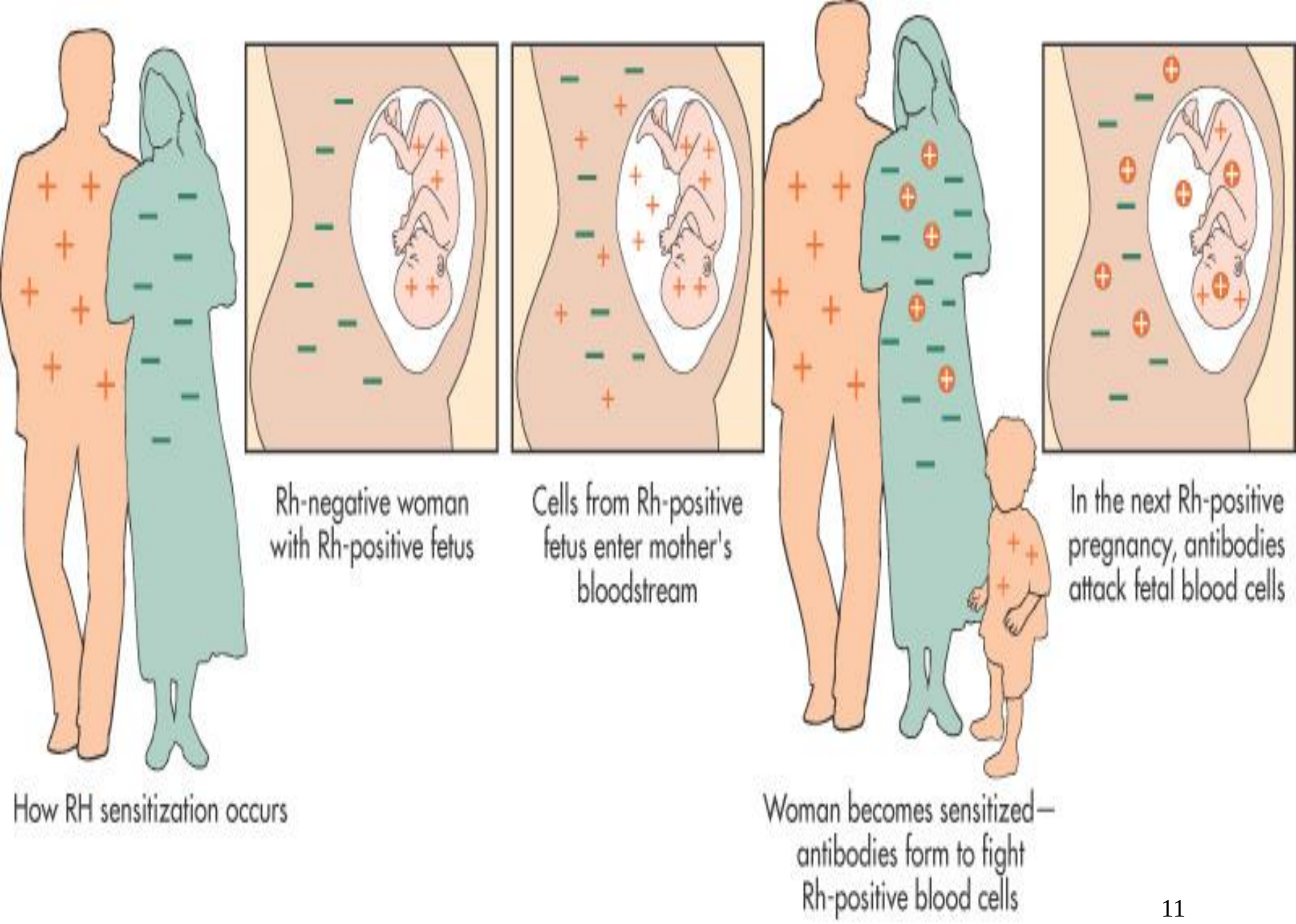
Immune Hydrops

- **Initiated by the presence of maternal serum immunoglobulin G (IgG) antibody against one of the fetal red blood cell antigens (known as sensitization)**
- **Antigen is any substance that elicits an immunologic response**
  - **Production of an antibody to that substance**
- **In pregnancy this can occur any time a mother is exposed to red blood cells antigens different from her own**

Immune Hydrops

- Father and fetus are Rh+
- Mother is Rh–, and there is a maternal–fetal hemorrhage (mixing of blood),
- Maternal antibodies can be produced against the Rh antigen

- In subsequent pregnancies, these antibodies can pass through the placenta and destroy fetal blood cells, causing the maternal serum immunoglobulin G titer to be elevated; resulting in fetal anemia
- Severe cases lead to immune hydrops

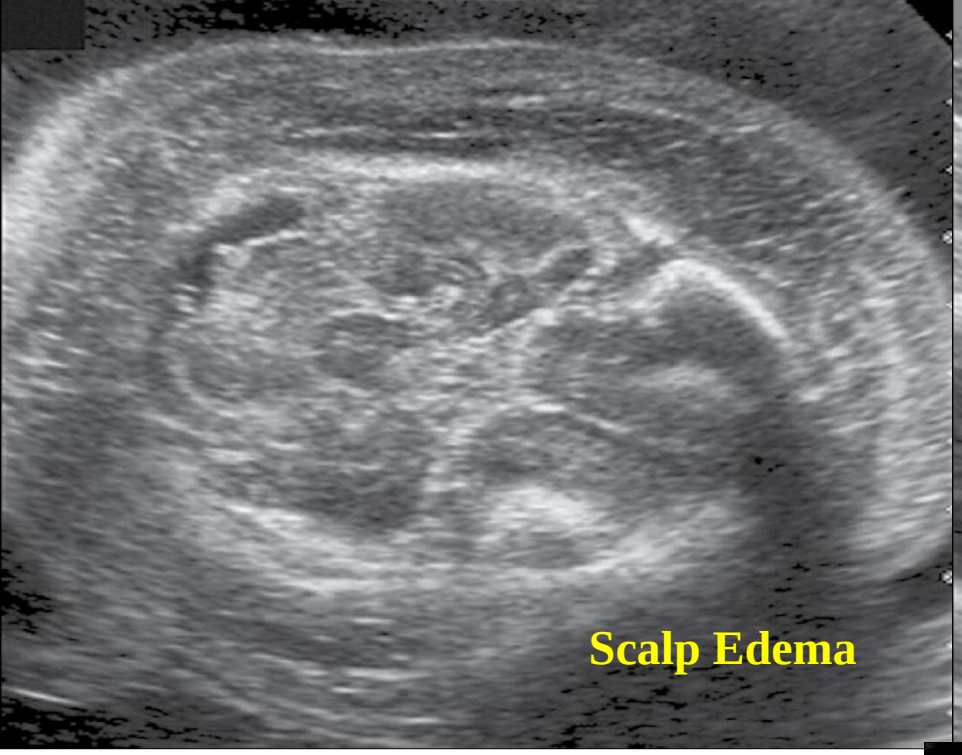


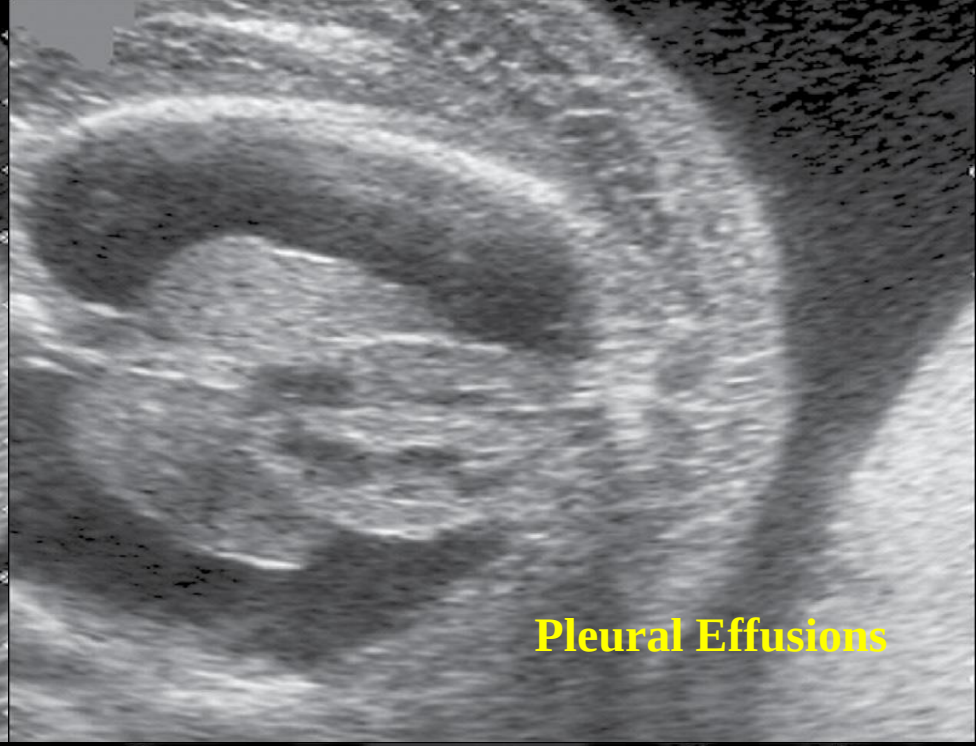
- **Condition is rare and can be prevented if RhoGAM is given any time there is potential mixing of the maternal and fetal circulation**
- **When a sensitized gravid uterus is not treated with RhoGAM, the mother develops an antibody, maternal IgG**
- **Antibody is able to cross the maternal–fetal barrier and enter the fetal circulation**
- **It attaches to the fetal red blood cell and destroys it (hemolysis)**

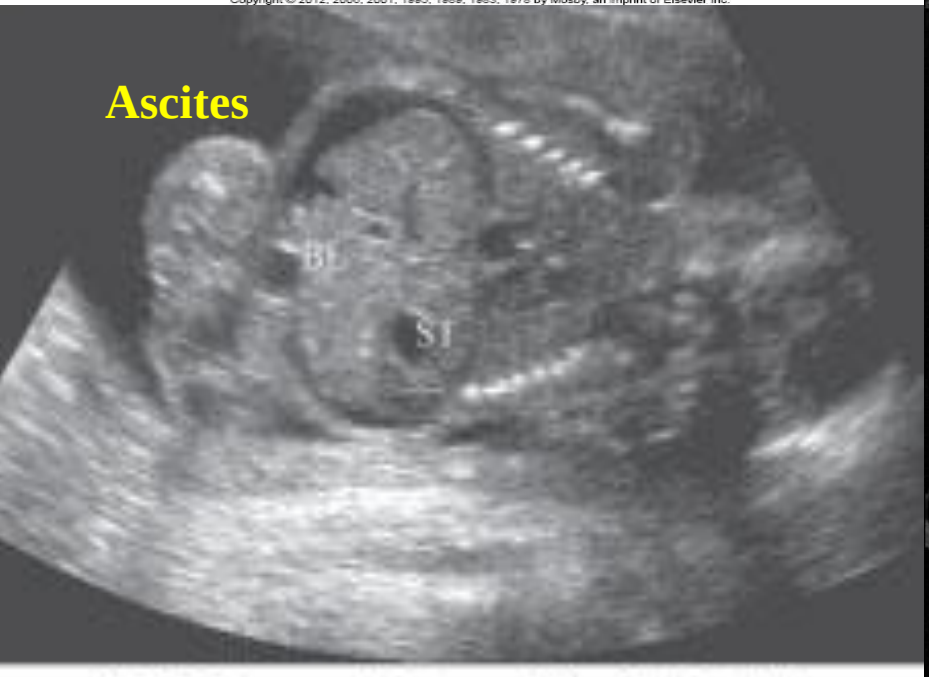
- **Fetal bone marrow then must replace the destroyed red blood cells**
- **If the bone marrow cannot keep up with the destruction**
  - **New sites are recruited to produce additional red blood cells**
- **This hemolysis can result in fetal anemia**
  - **Leading to congestive heart failure and edema of fetal tissues (anasarca)**

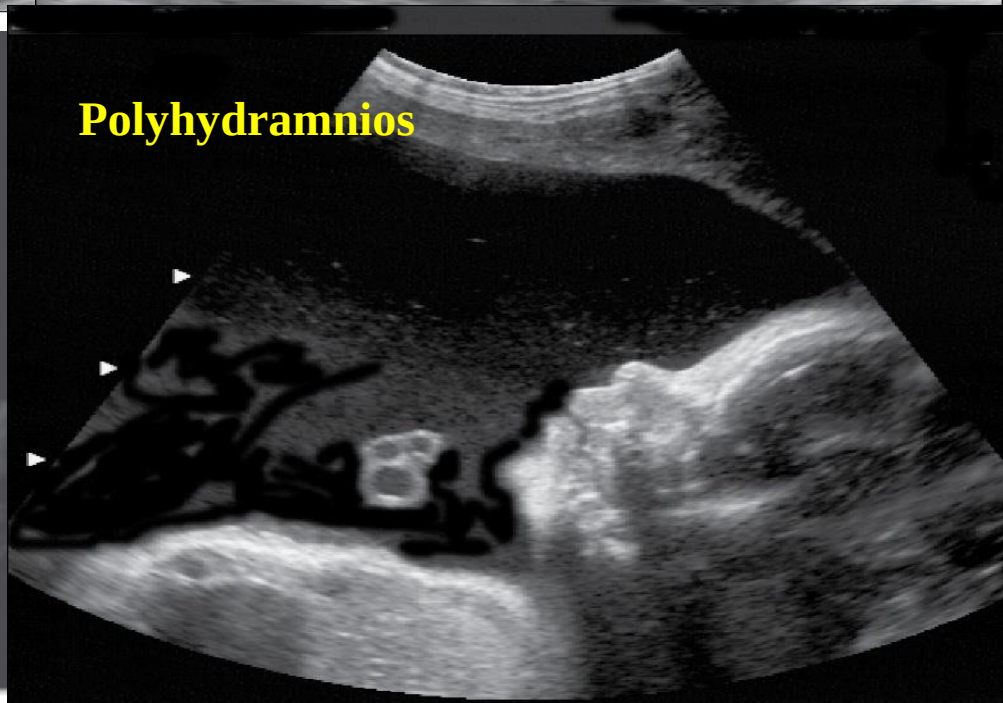
Ultrasound Finding of Hydrops

- Scalp edema
- Pleural effusion
- Pericardial effusion
- Ascites
- Polyhydramnios
- Thickened placenta



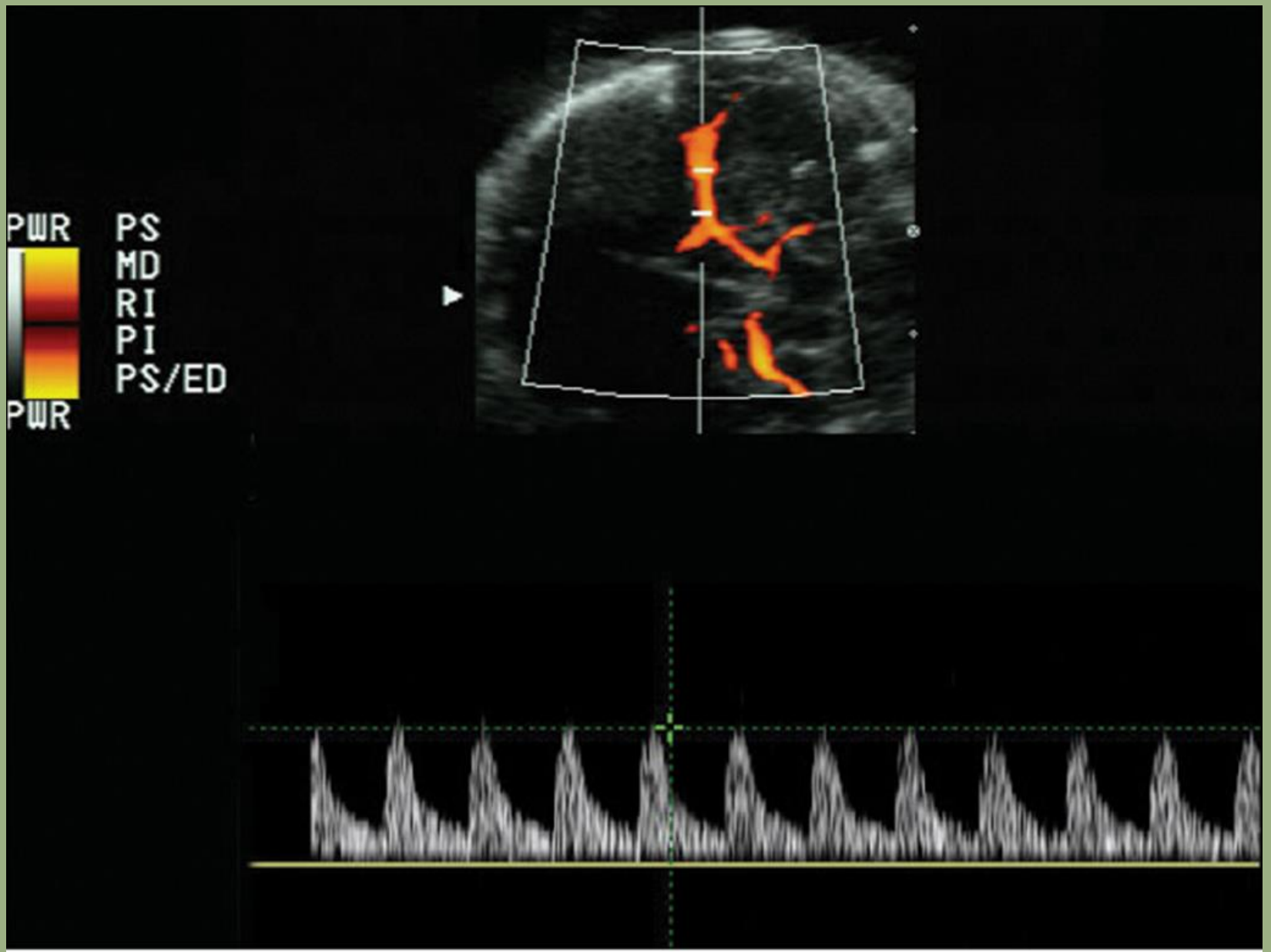






Ultrasound Surveillance

- **Hydrops can be due to fetal anemia**
- **Doppler evaluation of middle cerebral artery (MCA) helpful**
- **Anemia is a condition of fewer red blood cells, so blood viscosity is decreased**
  - **Decreases resistance to flow**
  - **Anemia shows an increase in velocity in MCA**



Amniocentesis

1. **Obtain a sample of amniotic fluid in which direct Rh testing of the fetus can be done**
2. **Monitor the isoimmunized pregnancy with delta optical density 450 analysis of amniotic fluid**

Amniocentesis

- **Because hemolysis results in breakdown of RBC's, bilirubin will stain the amniotic fluid**
- **Spectrophotometric analysis of the AF indirectly measures amount of bilirubin present and gives a measure of degree of hemolysis**
- **After amniotic sample is obtained, AF is sent for spectrophotometric analysis**
- **Sample is scored into three zones**

Amniocentesis

1. Low-zone: Rh-negative and fetus should be followed expectantly, deliver at term

2. Mid-zone: fetus is likely affected but it will survive, delivery should occur at 38 weeks

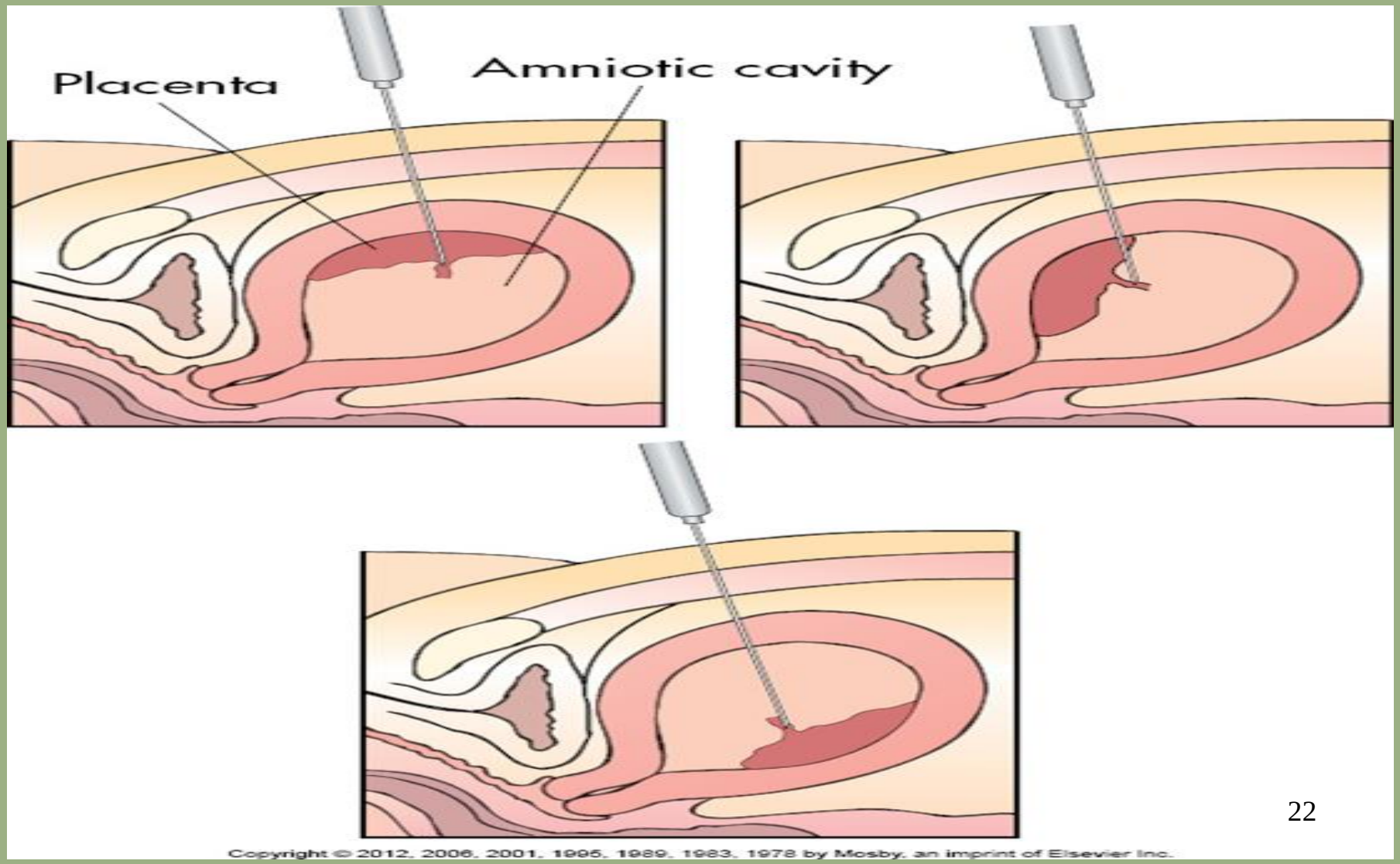
- **Earlier delivery if fetus in danger**

3. High-zone: fetal death will occur unless immediate treatment is given

Cordocentesis

- **Needle is placed into the fetal umbilical vein**
  - **Blood sample obtained**
- **Lab evaluates this sample for**
  - **fetal blood type**
  - **Hematocrit**
  - **Hemoglobin**
- **If indicated, a fetal transfusion may be performed**

Cordocentesis



Nonimmune Hydrops

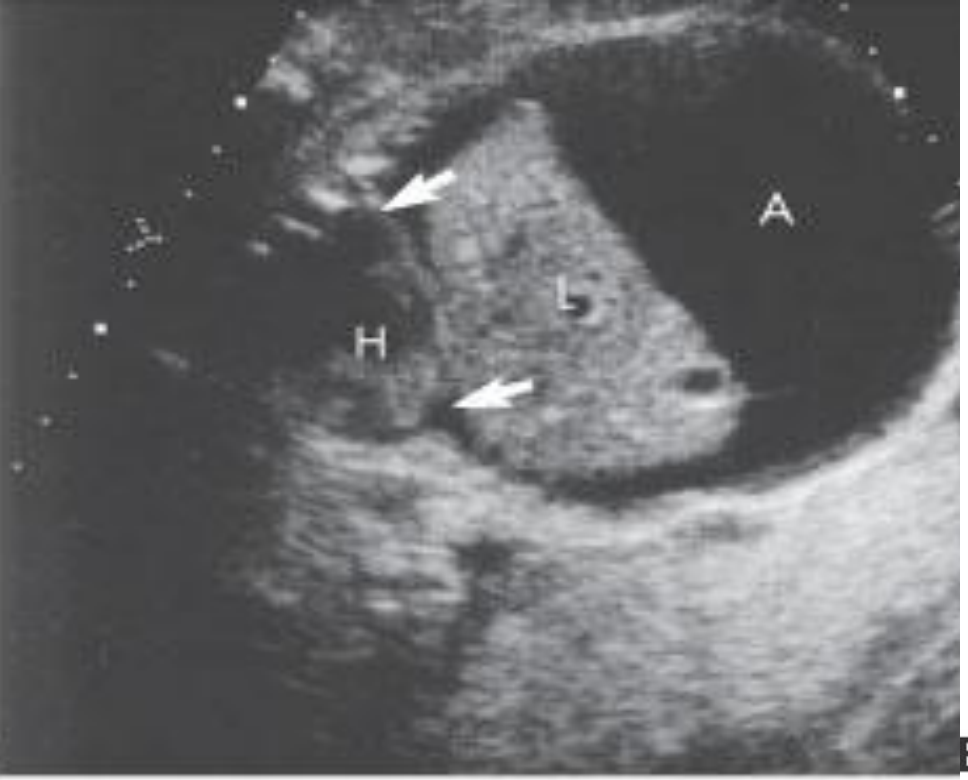
- **Describes a group of conditions in which hydrops is present in the fetus**
  - **Not a result of fetomaternal blood group incompatibility**
- **Numerous fetal, maternal, and placental disorders are known to cause or be associated with NIH**
  - **(see Box 54-1)**

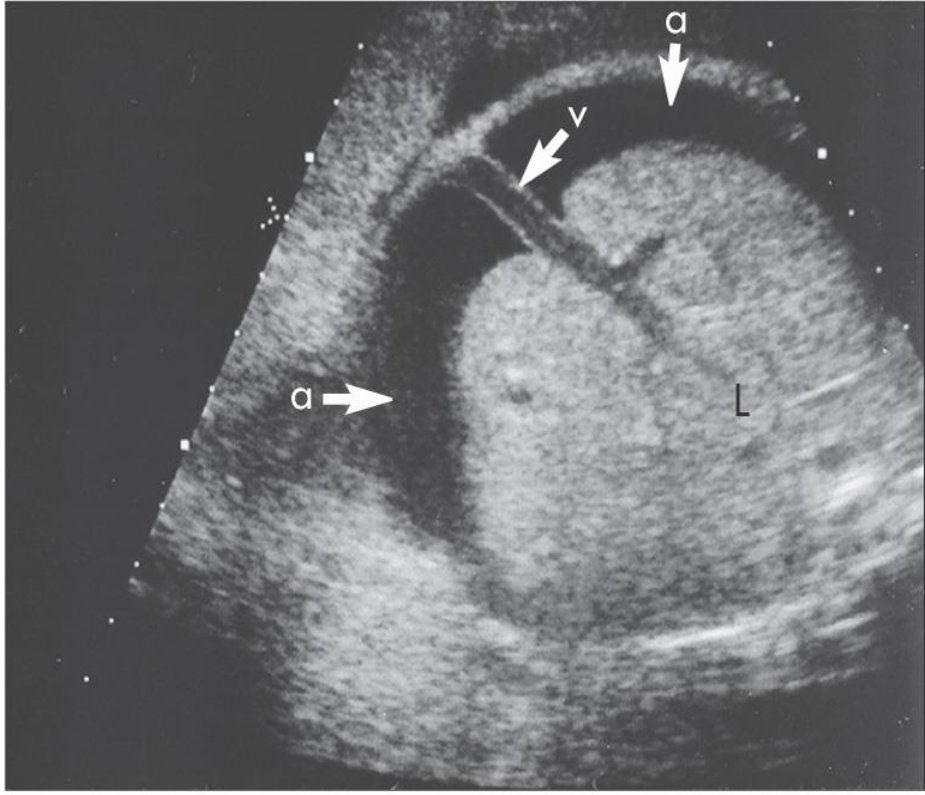
Nonimmune Hydrops

- **Exact mechanism of why NIH occurs is unclear although the same processes described for the hydrops associated with Rh sensitization may apply to NIH**
- **Cardiovascular lesions are often the most frequent causes of NIH.**
  - **Congestive heart failure may result from functional cardiac problems, as well as from structural anomalies**

Sonographic Findings

- Fetus may appear very similar to sensitized baby
- Scalp edema, pleural and pericardial effusions, may be present along with ascites
- If hydrops is a result of a cardiac tachyarrhythmia
  - Heart rate in the range of 200 to 240 is common
- If a diaphragmatic hernia is present
  - Bowel visible in the chest cavity
- Many times etiology cannot be determined





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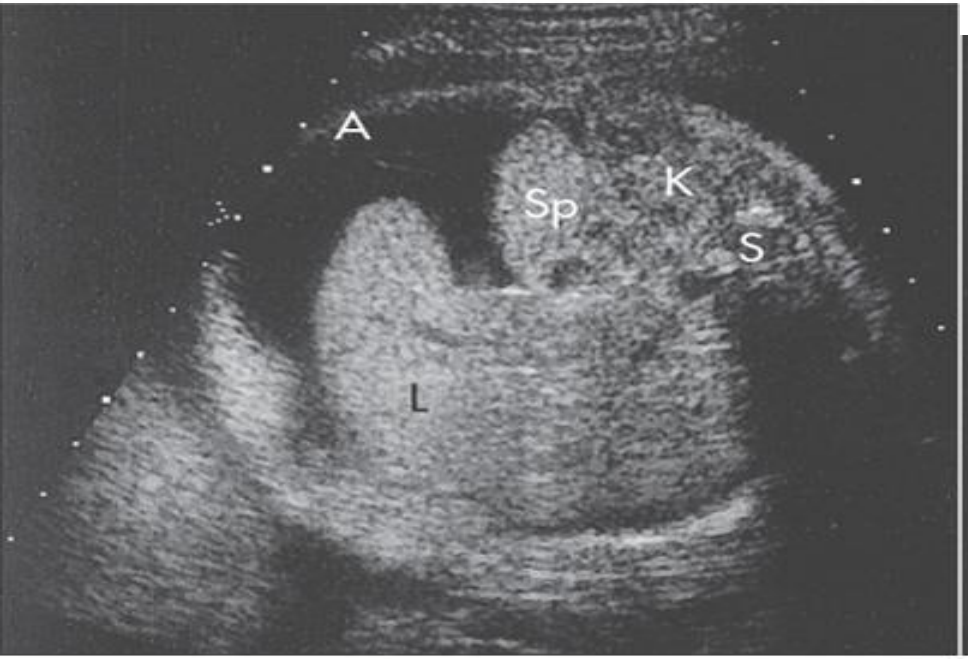
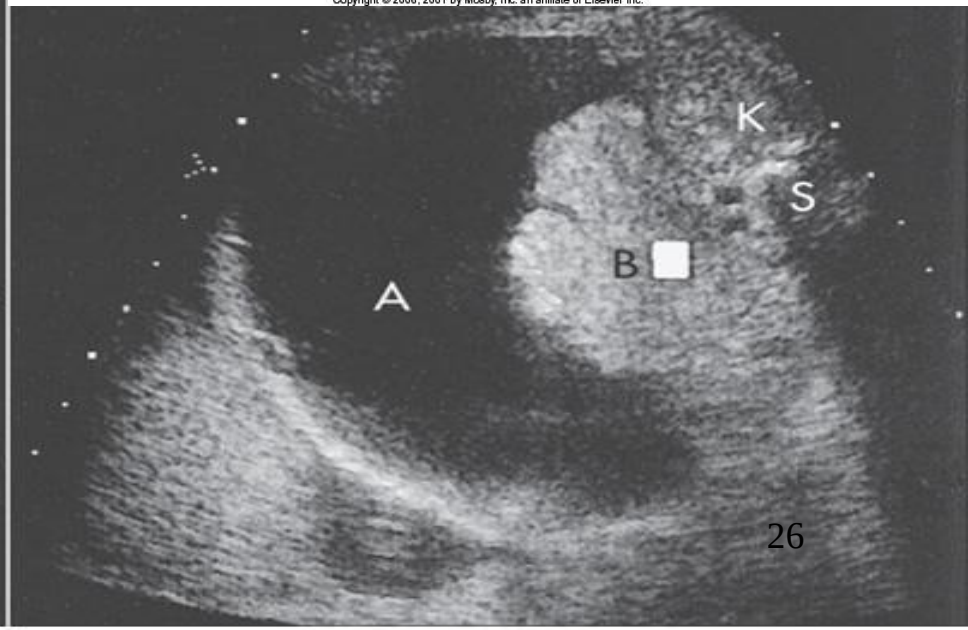


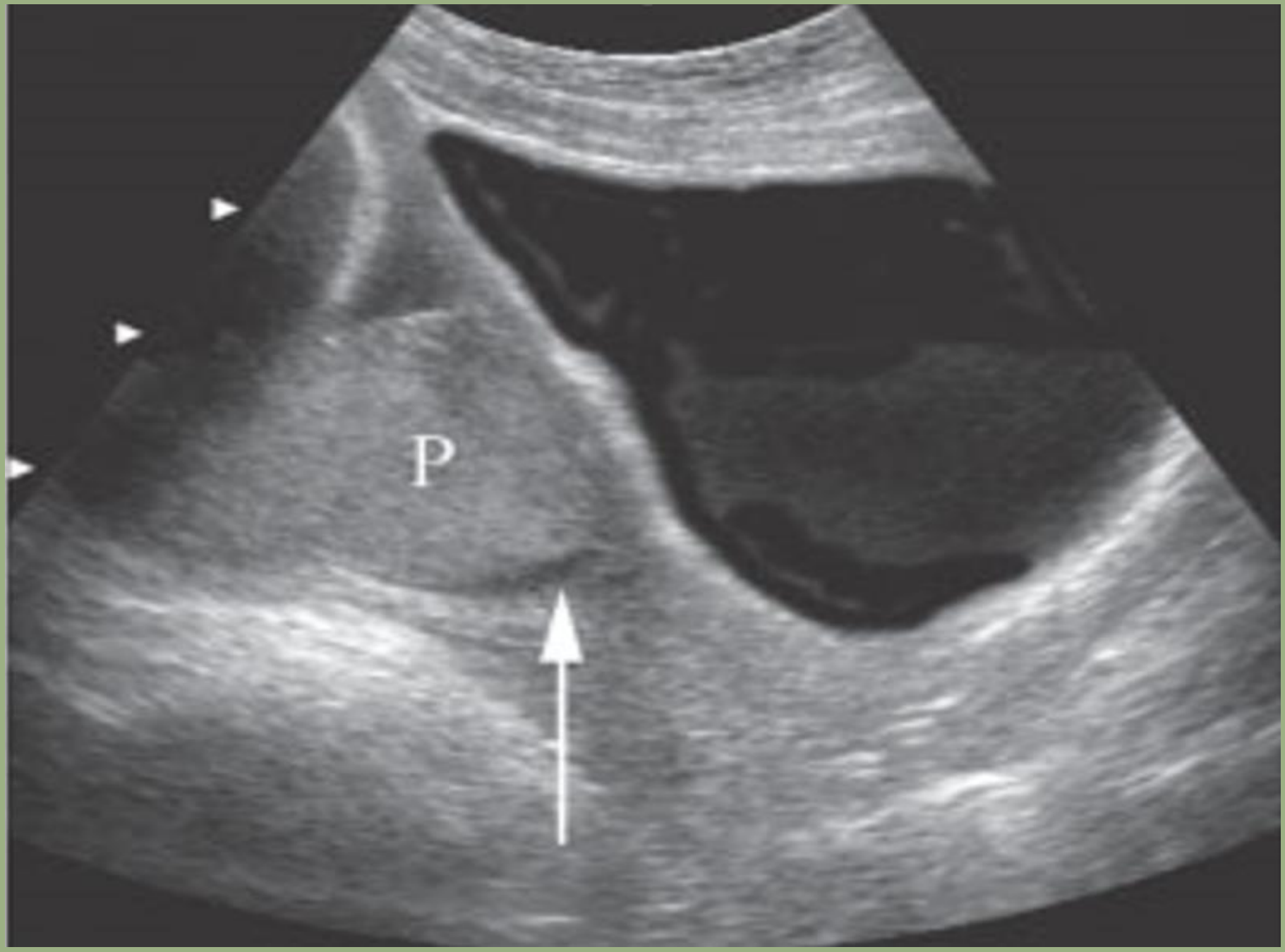


Vaginal Bleeding

- **Vaginal bleeding in the second and third trimesters can be associated with placental anomalies**
  - **Placenta previa**
  - **Placenta abruption**
- **Placenta previa is the main cause for third trimester bleeding**

Placenta Previa

- **Placenta covers internal cervical os and prohibits delivery of fetus**
- **If the cervical os dilates with labor, there is significant risk of the placenta detaching from the uterus, results in maternal hemorrhage, loss of oxygen and blood supply to fetus**
- **Use TV to evaluate relationship of cervical os to placental edge**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Vasa Previa

- **Rare condition in which umbilical cord is presenting part**
- **Life threatening to the fetus**
- **Associated with velamentous cord insertion or succenturiate lobe**
- **Use Color Doppler to evaluate any structures covering the cervical os**

Placental Abruption

- **Premature separation of the placenta from the uterine wall**
- **When evaluating for placenta abruption**
  - **Sonographer should be looking at the area between the placenta and uterine wall**
- **Normally this area is hypoechoic and only 1 to 2 cm thick**
- **If this area is thicker than 1 to 2 cm, it may be caused by an abruption or uterine contraction**

Placental Abruption

- **Abruptions can be difficult to diagnose because clotted blood has a similar echogenicity to the placenta**
  - **Ultrasound has a high false-negative rate**
- **If bleeding from the abruption was recent**
  - **May notice a thin echolucent area between the placenta and uterus**

Placental Abruption

- **Use color flow Doppler**
- **Blood clots from an abruption will not exhibit any color flow**
- **Retroplacental area is hypoechoic because of the large number of blood vessels located here**
- **When evaluating for an abruption**
  - **Use color Doppler looking for a flow void**
- **If flow void present**
  - **Suspicious for abruption**

Maternal Diseases of Pregnancy

Diabetes

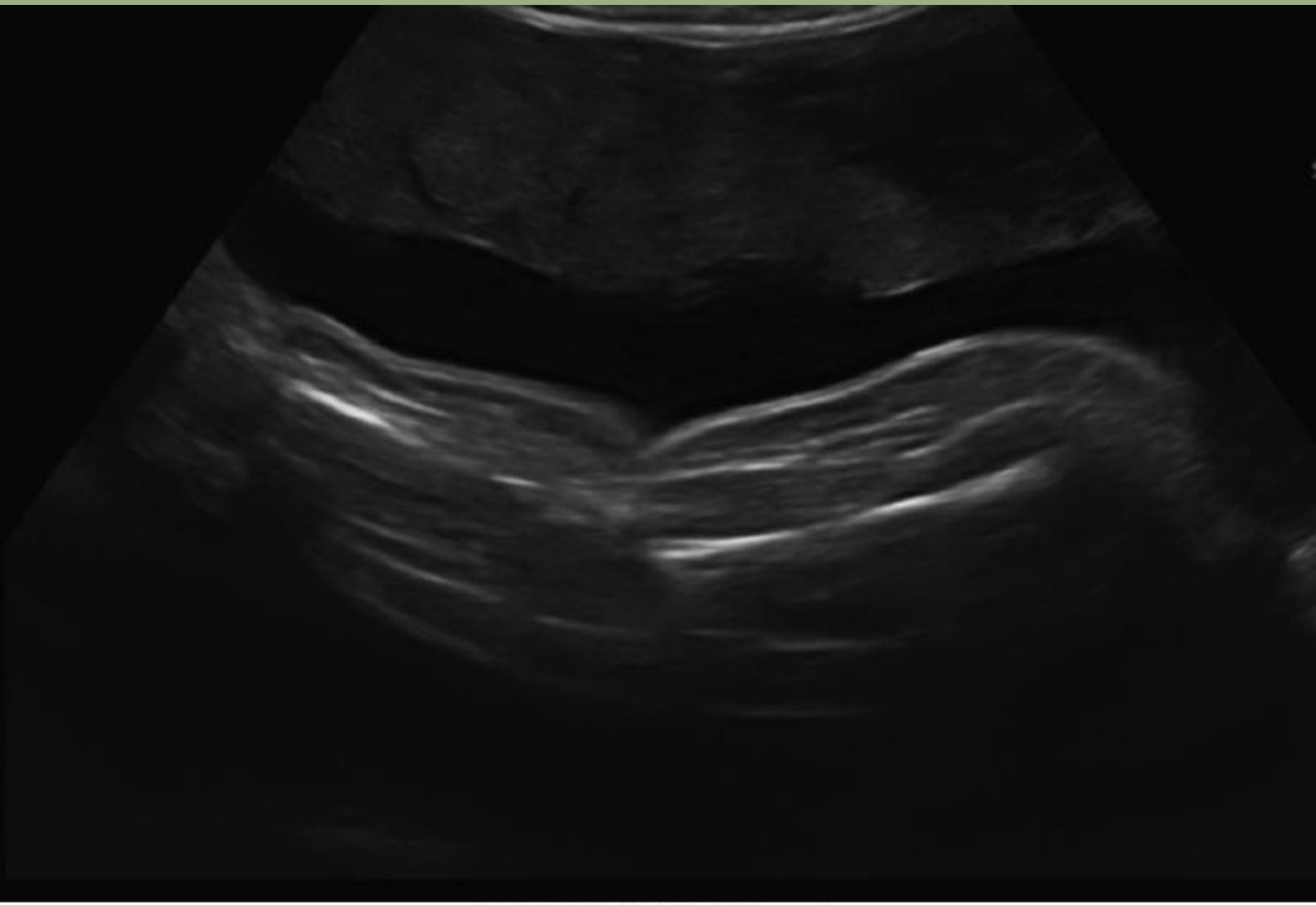
- **Insulin-dependent diabetes mellitus (IDDM) mothers are at an increased risk for pregnancy-related complications**
  - **Early and late trimester pregnancy loss**
  - **Congenital anomalies**
- **Glucose is the primary fuel for fetal growth**
- **If glucose levels are very high and uncontrolled**
  - **Fetus may become macrosomic**

Diabetes

- **Increased risk of early fetal demise**
  - **Presence of a fetal heart beat should be confirmed**
- **Increased risk of third trimester loss as well as other pregnancy complications**
  - **May necessitate the induction of labor before term**
- **A diabetic baby delivered preterm may have respiratory distress syndrome and require placement in the high-risk nursery**
- **Polyhydramnios may be seen**

Diabetes

- **Most common cardiac problems in fetus**
  - **Transposition of the great arteries**
  - **Tetralogy of Fallot**
- **In diabetics who have vasculopathy, fetuses may be at risk for IUGR**
- **Sonographic findings may include**
  - **Small for gestation growth patterns**
  - **Elevated S/D ratio if the umbilical artery**
- **Caudal regression syndrome (lack of development of the caudal spine and cord) is seen almost exclusively in diabetic individuals**



Hypertension

- **Both mother and fetus at risk**
- **Associated with small placentas**
  - **Because the effect of the hypertension on the blood vessels**
- **If the placenta develops poorly**
  - **Blood supply to the fetus may be restricted**
    - **Growth restriction may result**
- **Growth-restricted fetuses have increased risk of fetal distress and death in utero**

- **Pregnancy-induced hypertension includes**
  - **Preeclampsia**
    - **High blood pressure develops with proteinuria or edema**
  - **Severe preeclampsia**
    - **Generally indicates that the patient must be delivered immediately**
  - **Eclampsia**
    - **Occurrence of seizures or coma in a preeclamptic patient**
- **If the hypertension is neglected, the patient may develop seizures that can be life threatening to both mother and fetus**

Sonographic Findings

- **If fetal growth is falling off the normal growth curve or oligohydramnios occurs**
  - **May intervene and deliver the fetus**
    - **Fearing intrauterine fetal demise is imminent**
- **Doppler ultrasound also can give the physician information about the fetal and maternal circulatory status**
  - **May help determine the pregnancies at risk for developing IUGR**

Systemic Lupus Erythematosus

- **Chronic autoimmune disorder that can affect almost all organ systems in the body**
- **Placenta is affected by the immune complex deposits and inflammatory responses in the placental vessels**
  - **May account for the increased number of:**
    - **Spontaneous abortions**
    - **Stillbirths**
    - **IUGR fetuses**
- **Congenital heart block and pericardial effusion**

Other Maternal Disease

Hyperemesis Gravidarum

- **Vomit so much that dehydration and electrolyte imbalance occur**
  - **Hospitalization with IV administration**
- **Must ensure that the vomiting results strictly from pregnancy and not other diseases**
  - **Gallstones**
  - **Peptic ulcers**
  - **Trophoblastic disease**
    - **Can be ruled out easily by demonstrating a viable intrauterine pregnancy**

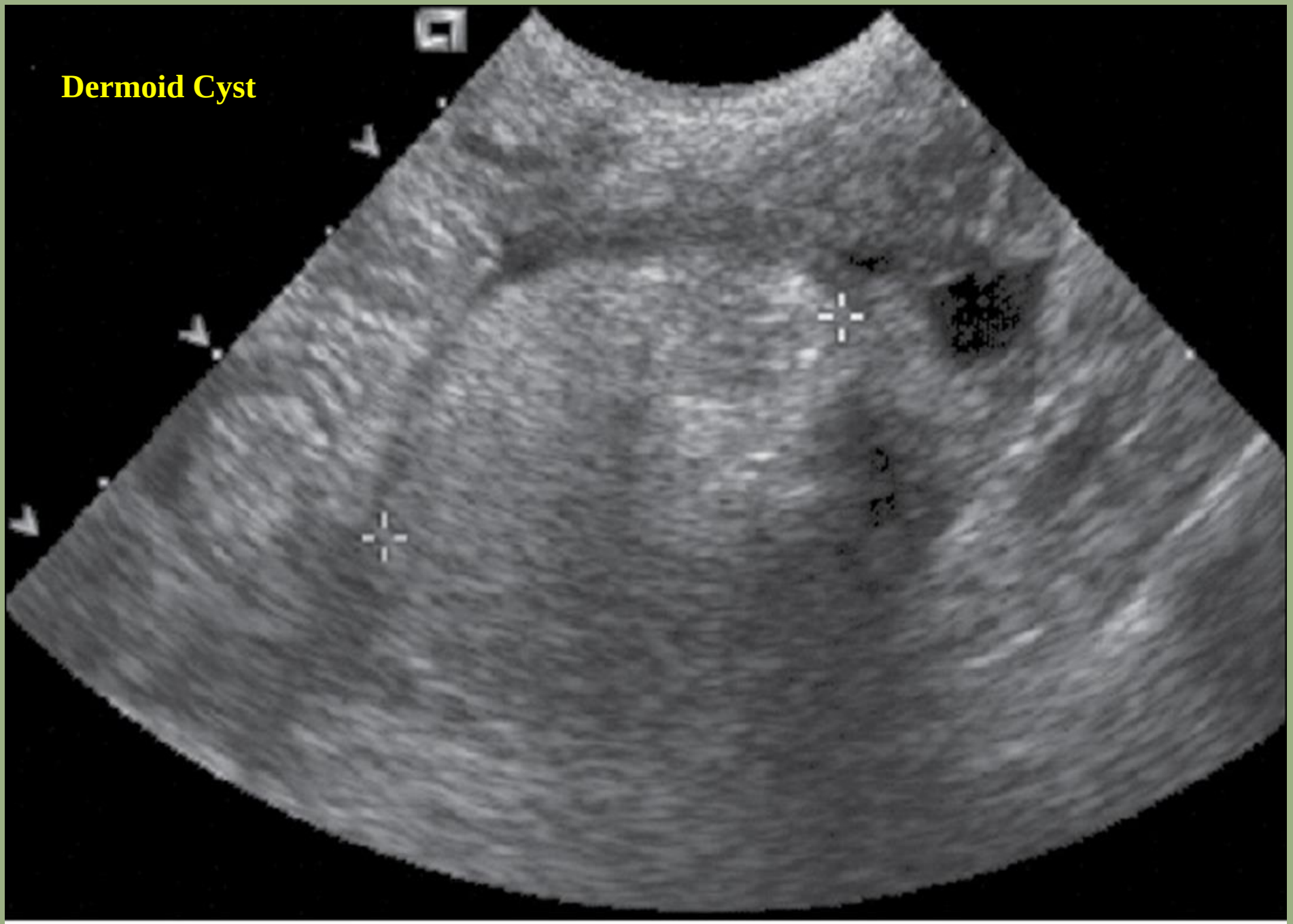
Urinary Tract Diseases

- **Pyelonephritis**
  - **Usually presents with:**
    - **Flank pain**
    - **Fever**
    - **White blood cells in the urine**
- **Hydronephrosis**
  - **Presents with flank pain**
    - **Progesterone has a dilatory effect on the smooth muscle of the ureter**
    - **Enlarging uterus also compresses the ureters at the pelvic brim**

Adnexal Cysts

- **Physiologic ovarian cysts may be associated with early pregnancy**
- **May be large, ranging from 8 to 10 cm**
- **May be associated with pelvic pain**
- **Should diminish as the pregnancy progresses**
- **If cyst does not resolve**
  - **Surgical exploration may be necessary to rule out other ovarian pathology:**
    - **Endometriomas**
    - **Dermoid cysts**
    - **Cancers**

Dermoid Cyst



Obesity

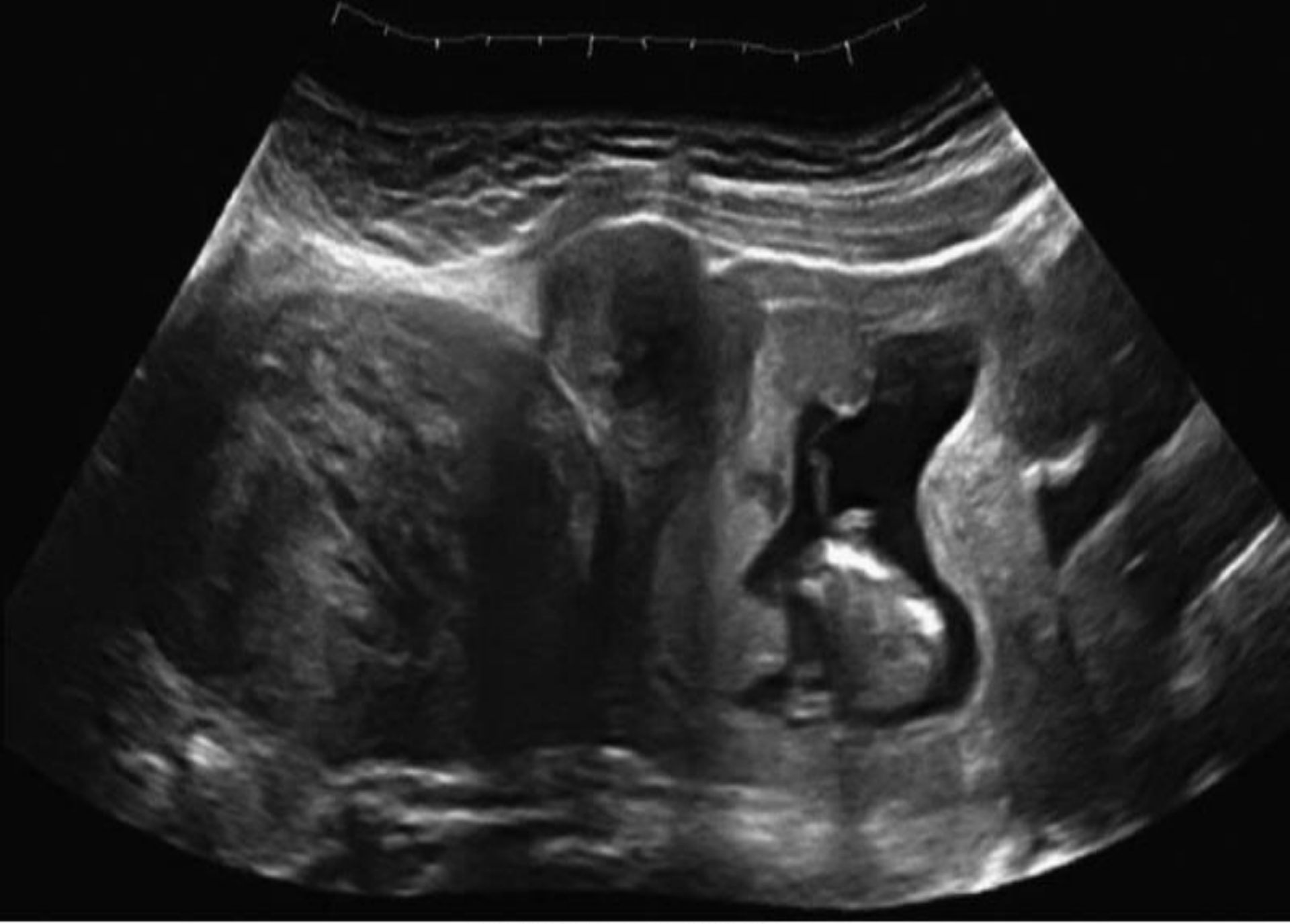
- **Associated with an increased incidence of neural tube defects**
  - **May be attributed to a deficiency in diet**
- **Obese women are at an increased risk for:**
  - **Pregnancy-induced hypertension**
  - **Severe eclampsia**
  - **Multiple births**
  - **Urinary tract infections**

Uterine Fibroids

- **May be stimulated to excessive growth by pregnancy hormones**
  - **Estrogen**
- **If growth is very rapid**
  - **Fibroid may outgrow its blood supply and undergo necrosis**
    - **This may cause pain and premature labor**

Uterine Fibroids

- **Important to document**
  - **Size**
  - **Location**
- **May obstruct a clear pathway for fetal delivery**
- **If placenta implants over a fibroid**
  - **May lead to poor placental profusion in that area**
  - **Can be a cause of intrauterine growth restriction**



Ultrasound in Labor and Delivery

Premature Delivery

- **Onset of labor before 37 weeks gestation**
- **Occurs in 15-20% of pregnancies**
- **Premature infants are at greater the risk for:**
  - **Respiratory distress syndrome**
  - **Intracranial hemorrhage**
  - **Bowel immaturity**
  - **Feeding problems**

Premature Delivery

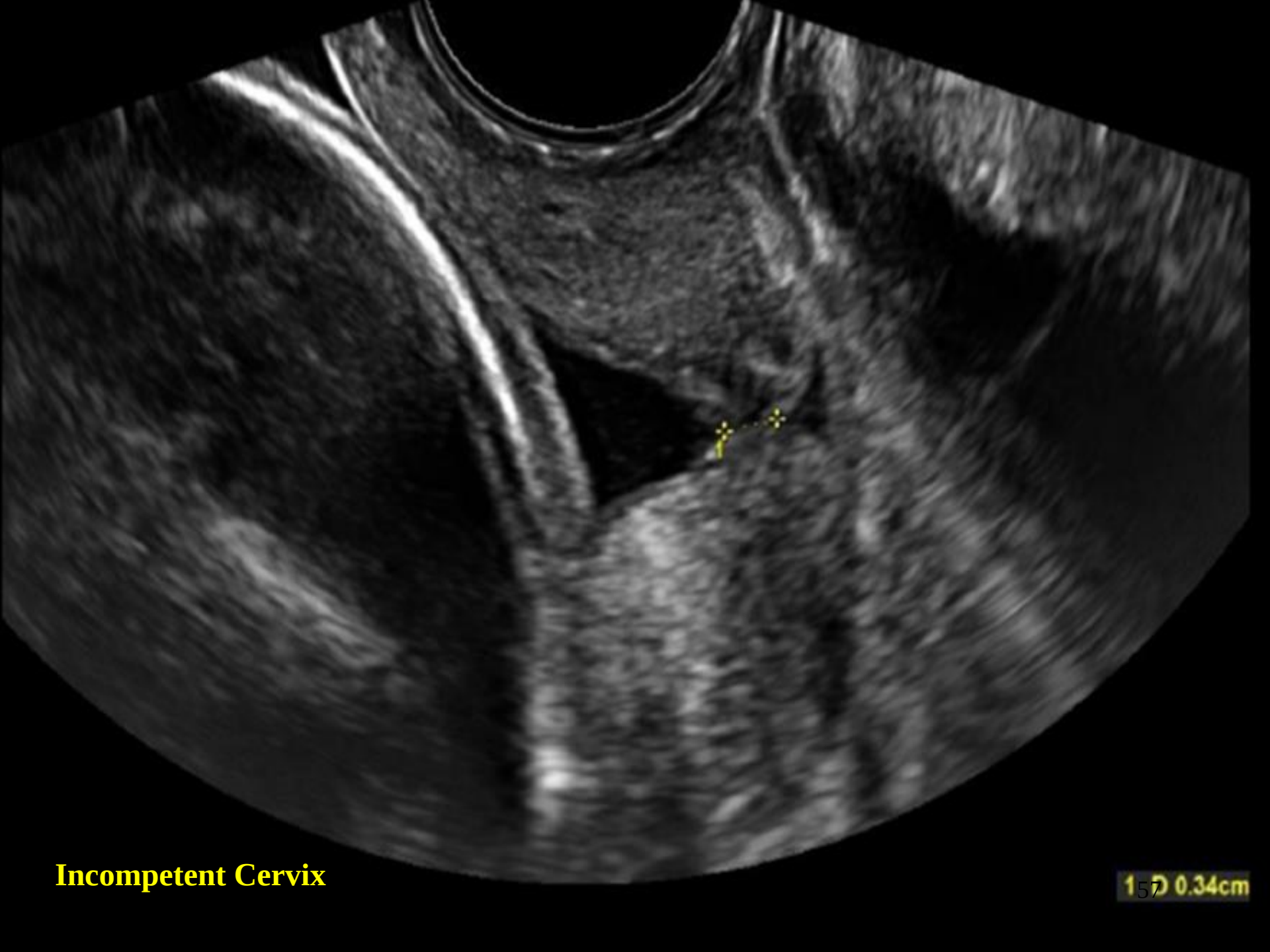
- **Potential causes of preterm labor include:**
  - **Premature rupture of membranes**
  - **Intrauterine infection**
  - **Bleeding**
  - **Fetal anomalies**
  - **Polyhydramnios**
  - **Multiple pregnancy**
  - **Growth restriction**
  - **Maternal illness such as diabetes or hypertension**
  - **Incompetent cervix**
  - **Uterine abnormalities**

Premature Delivery

- **Potential causes of preterm labor include:**
  - **Socioeconomic class**
  - **Maternal age**
  - **Weight**
  - **Height**
  - **Late prenatal care**
  - **Smoking**
  - **Coitus**
  - **History of cervical injury or surgery**
  - **Poor previous obstetric history**

Sonographic Findings

- **Ultrasound assessment of the preterm labor patient should include, but not be limited to**
  - **Amniotic fluid assessment**
  - **Endovaginal cervical assessment**
  - **Fetal number**
  - **Placental assessment**
  - **Targeted ultrasound**
- **Sonographer should be aware of the potential causes of preterm labor and tailor the examination accordingly**



Incompetent Cervix

Fetal Factors in High-Risk Pregnancy

Fetal Death

- **May occur at time during pregnancy**
- **Incidence of pregnancy loss in the first trimester**
  - **15 to 20 per 100 pregnancies**
  - **With most of the losses resulting from cytogenetic abnormalities**

Fetal Death

- **Cause of death cannot be determined in approximately half of the cases**
- **Known causes are:**
  - **Infection**
  - **Congenital or chromosomal abnormalities**
  - **Preeclampsia**
  - **Placental abruption**
  - **Diabetes**
  - **Growth restriction**
  - **Blood group isoimmunization**

Fetal Death

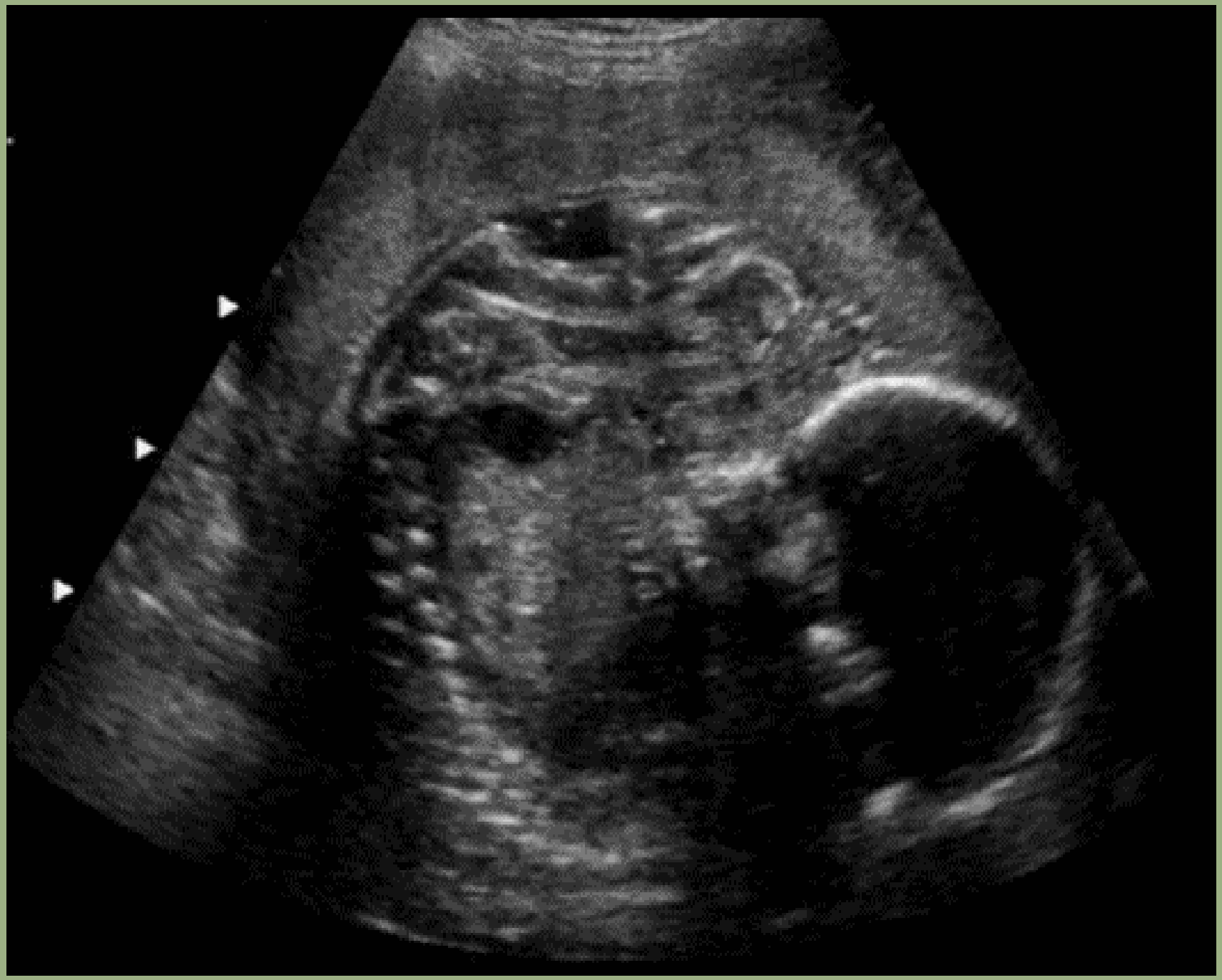
- First trimester pregnancy loss may be diagnosed when the patient presents to her physician with vaginal bleeding, cramping, or passage of tissue
  - Ultrasound examination may reveal a blighted ovum or a fetus with no heart motion
- Fetal heart tones should be heard with Doppler at approximately 10 to 12 weeks of gestation

Fetal Death

- **At 20 weeks of gestation**
  - **Uterine fundal height should have risen to the umbilicus**
  - **Uterus should measure approximately 20 cm above the symphysis pubis**
- **Should perceive fetal movements on a daily basis beginning at 16 to 20 weeks of gestation**

Sonographic Findings

- **Sonographic findings that are associated with fetal death are:**
  - **1. Absent heart beat**
  - **2. Absent fetal movement**
  - **3. Overlap of skull bones (Spalding's sign)**
  - **4. An exaggerated curvature of the fetal spine**
  - **5. Gas in the fetal abdomen**



Sonographic Findings

- **Brief ultrasound examination of the fetus for**
  - **Structural anomalies should be performed**
  - **Biometry obtained to determine estimated weight for delivery**
- **Care should be taken and consideration given to the family so as not add to their emotional stress during this difficult time**

Small for Gestational Age

- **Can be due to:**
  - **Chromosomal anomalies**
    - **Growth is often symmetrically affected**
  - **Intrauterine infection**
  - **Genetics**
  - **Placental insufficiency**
    - **Growth is often asymmetrically affected**
    - **Head-sparing effect**
- **All fetal measurements will be smaller than expected for gestational age**

Multiple Gestation Pregnancy

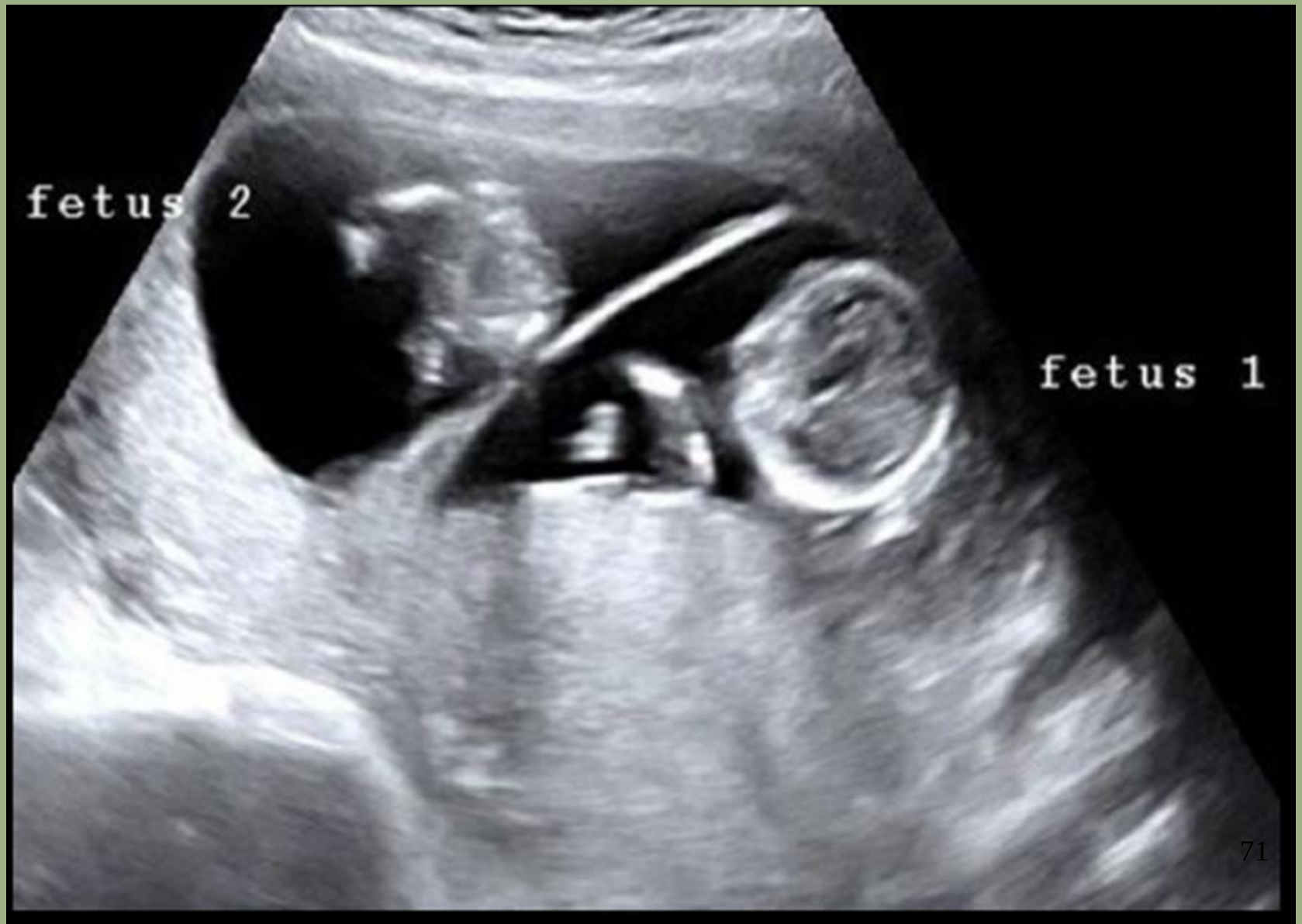
- **Mother with a multiple gestation is at increased risk for obstetric complications:**
  - **Preeclampsia**
  - **Third trimester bleeding**
  - **Prolapsed cord**
- **Fetuses are at increased risk of**
  - **Premature delivery**
  - **Congenital anomalies**
- **As a result:**
  - **A twin has a five times greater chance of perinatal death than a singleton fetus**

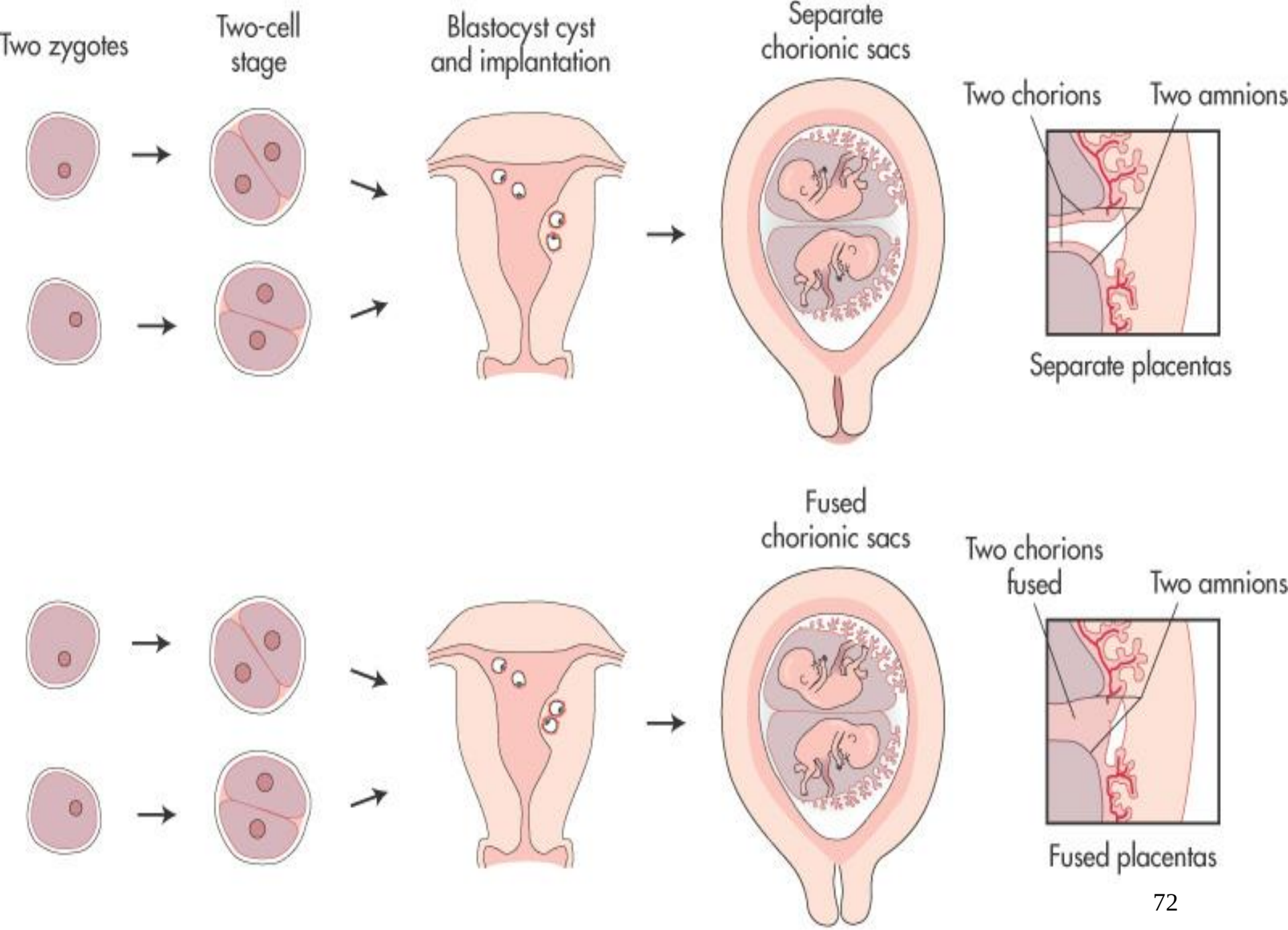
- **In second and third trimesters**
  - **Several clinical findings may prompt an ultrasound:**
    - **Patient's uterus may be larger on examination than expected for dates**
      - **Maternal serum alpha-fetoprotein (MSAFP) screening is performed routinely to detect neural tube defects**
    - **Elevation of MSAFP**
      - **Patient with elevated MSAFP may present for a scan to rule out neural tube defects and may be found to be carrying twins**

Dizygotic Twins (fraternal)

- **Arise from two separately fertilized ova**
- **Each ovum implants separately in the uterus and develops its own:**
  - **Placenta**
  - **Chorion**
  - **Amniotic sac**
  - **(diamniotic, dichorionic)**
- **Placentas may implant in different parts of the uterus and may be distinctly separate or may implant adjacent to each other and fuse**

Dizygotic Twins

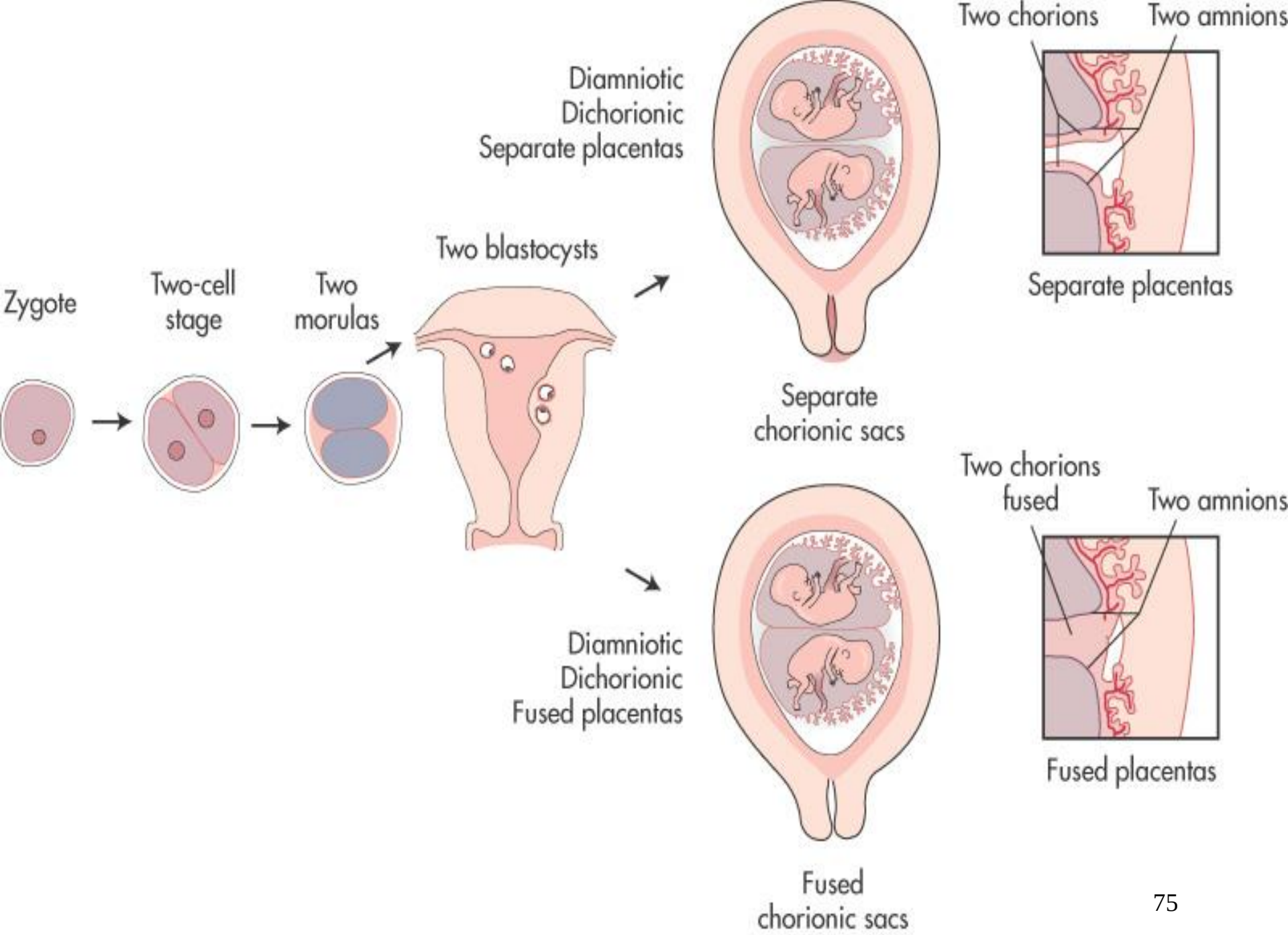




Monozygotic twins (identical)

- **Arise from a single fertilized egg, which divides, resulting in two genetically identical fetuses**
- **Depending on whether the fertilized egg divides early or late**
  - **There may be one *or* two**
    - **Placentas**
    - **Chorions**
    - **Amniotic sacs**

- **If the division occurs:**
  - **0 to 4 days postconception**
    - **Two amnions and two chorions**
    - **(dichorionic, diamniotic)**
  - **4 to 8 days**
    - **One chorion and two amniotic sacs**
    - **(monochorionic, diamniotic)**
  - **After 8 days**
    - **two fetuses will be present but only one chorion and one amnion**
    - **(monochorionic, monoamniotic)**
  - **After 13 days**
    - **Division may be incomplete**
    - **Conjoined twins may result**



dichorionic, diamniotic

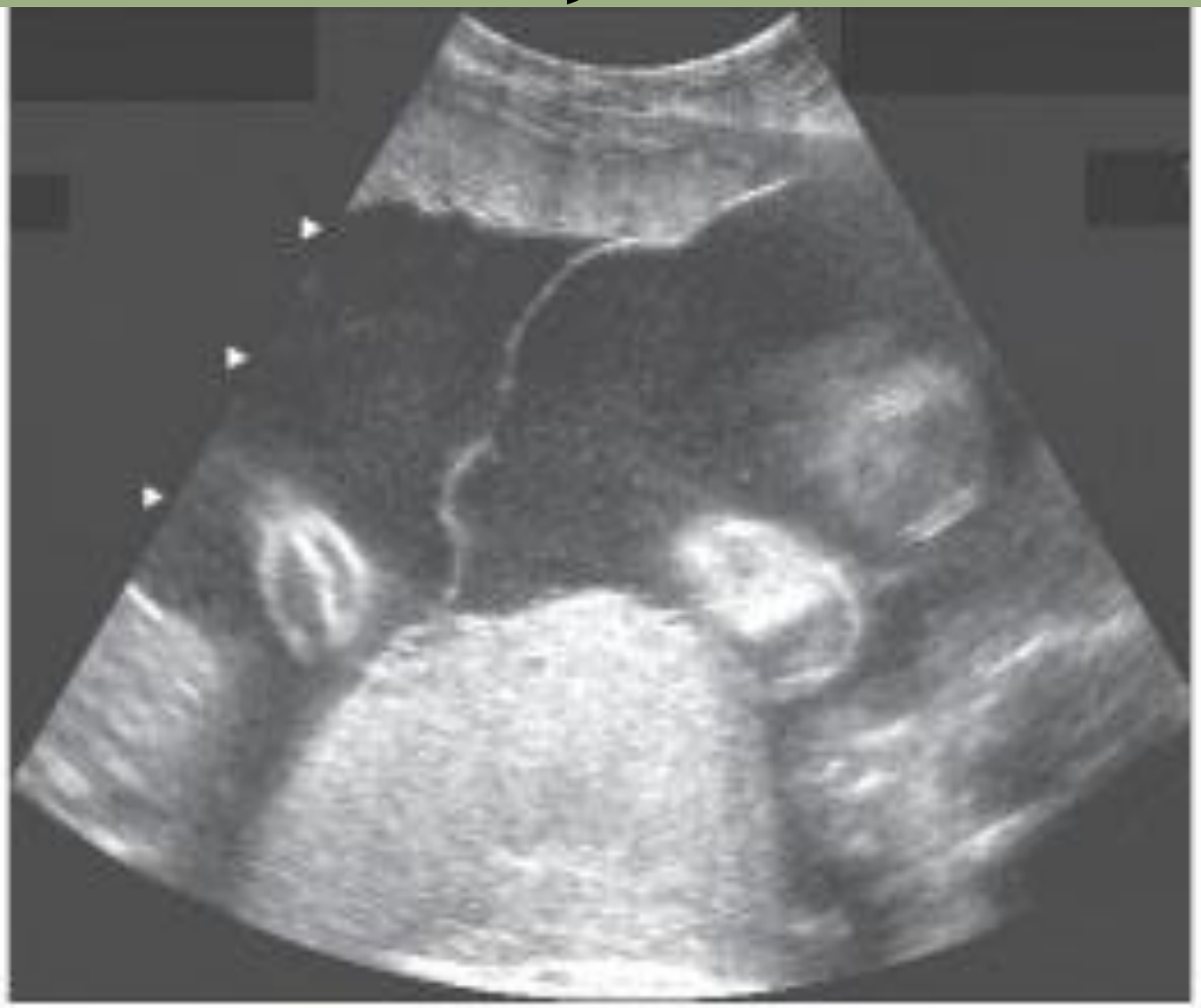
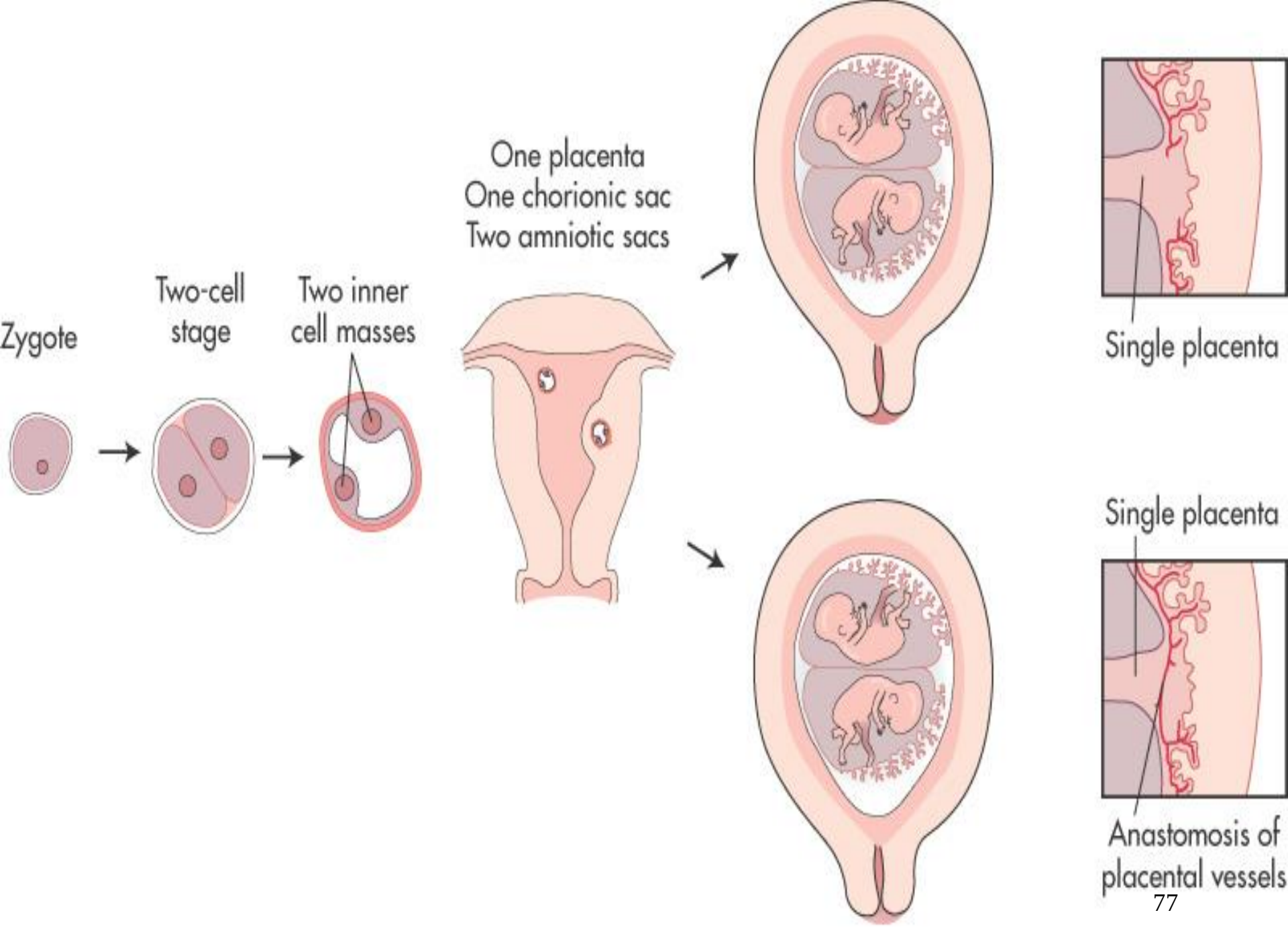
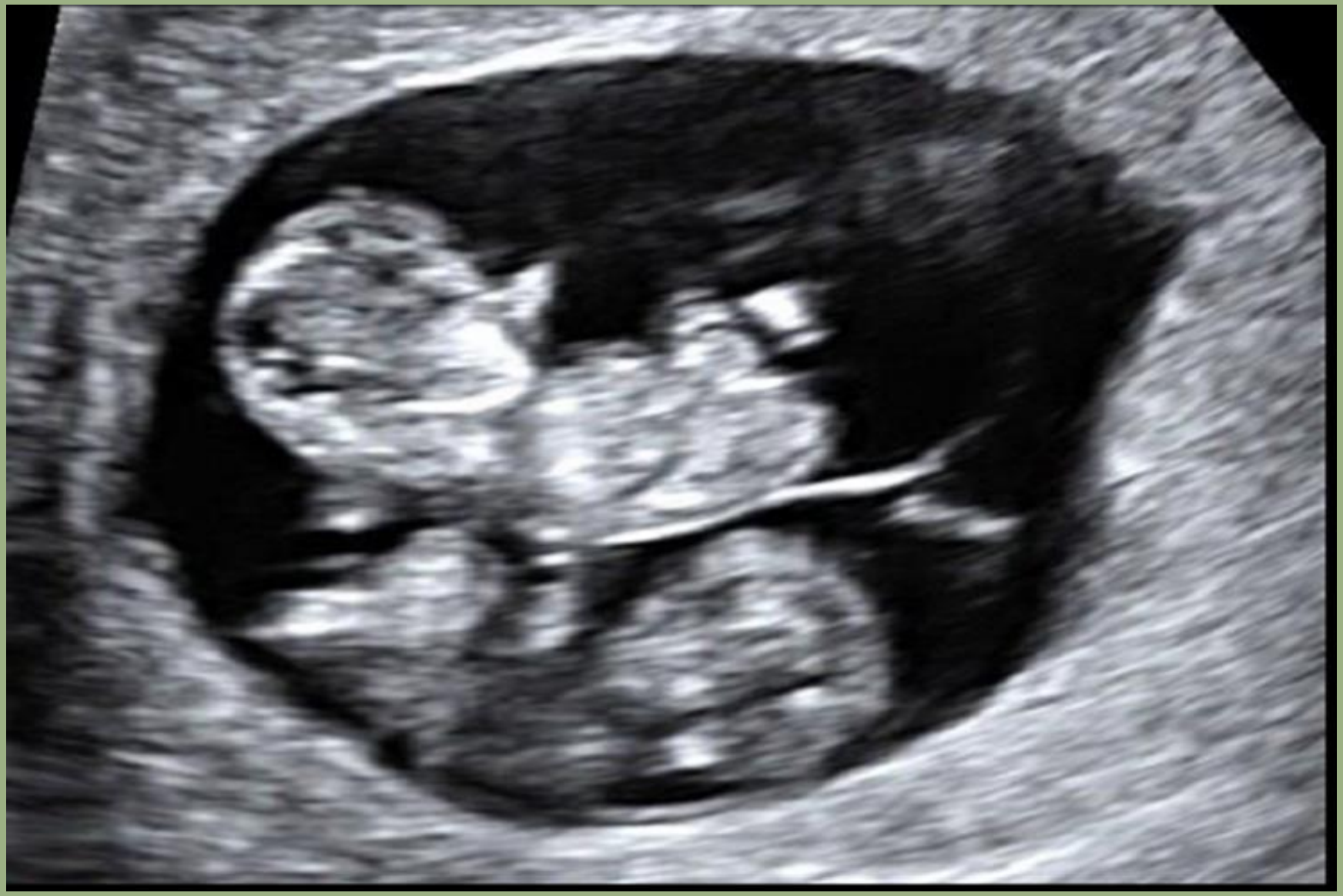
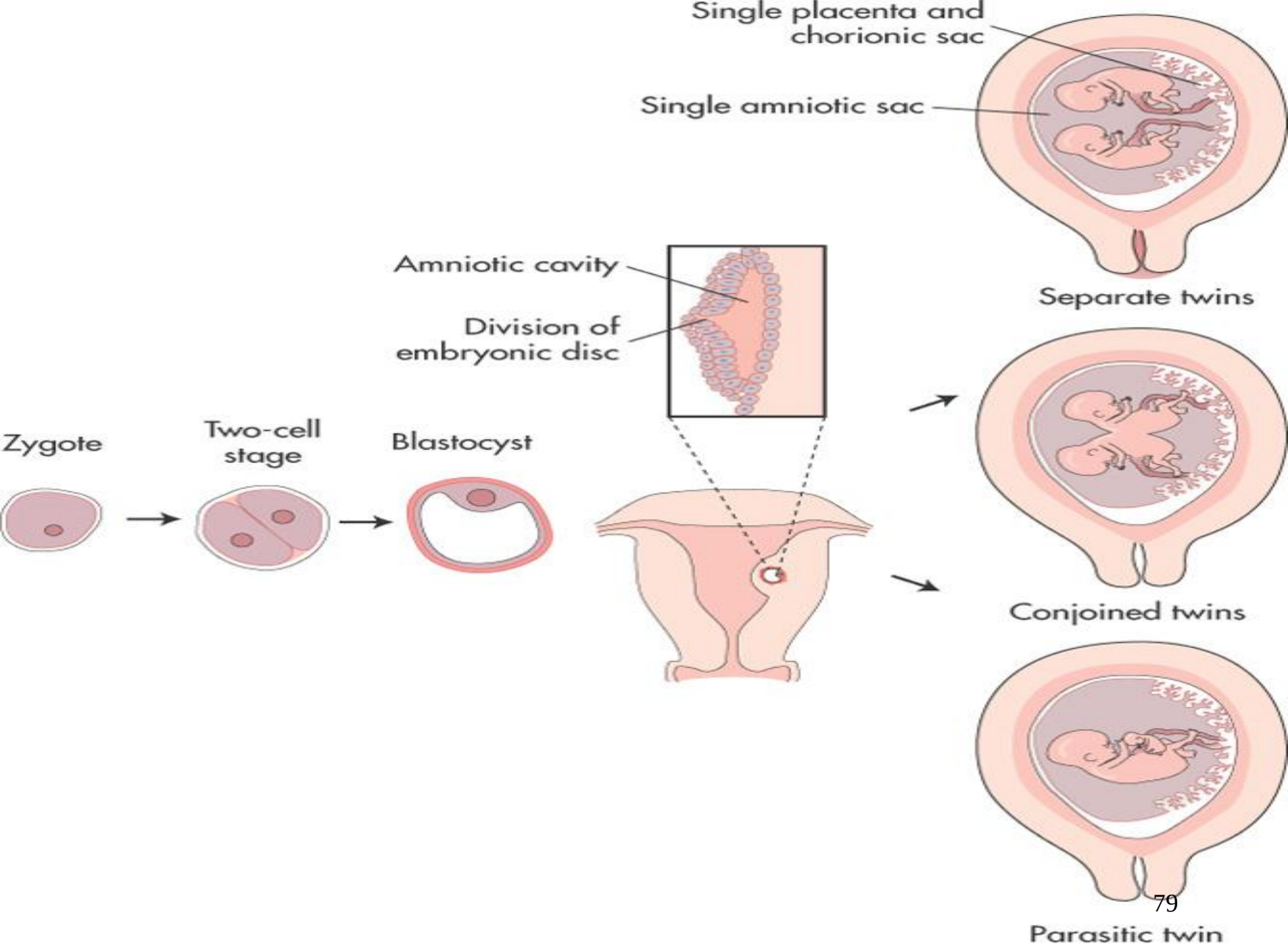


Figure 48-27 A dichorionic, diamniotic twin

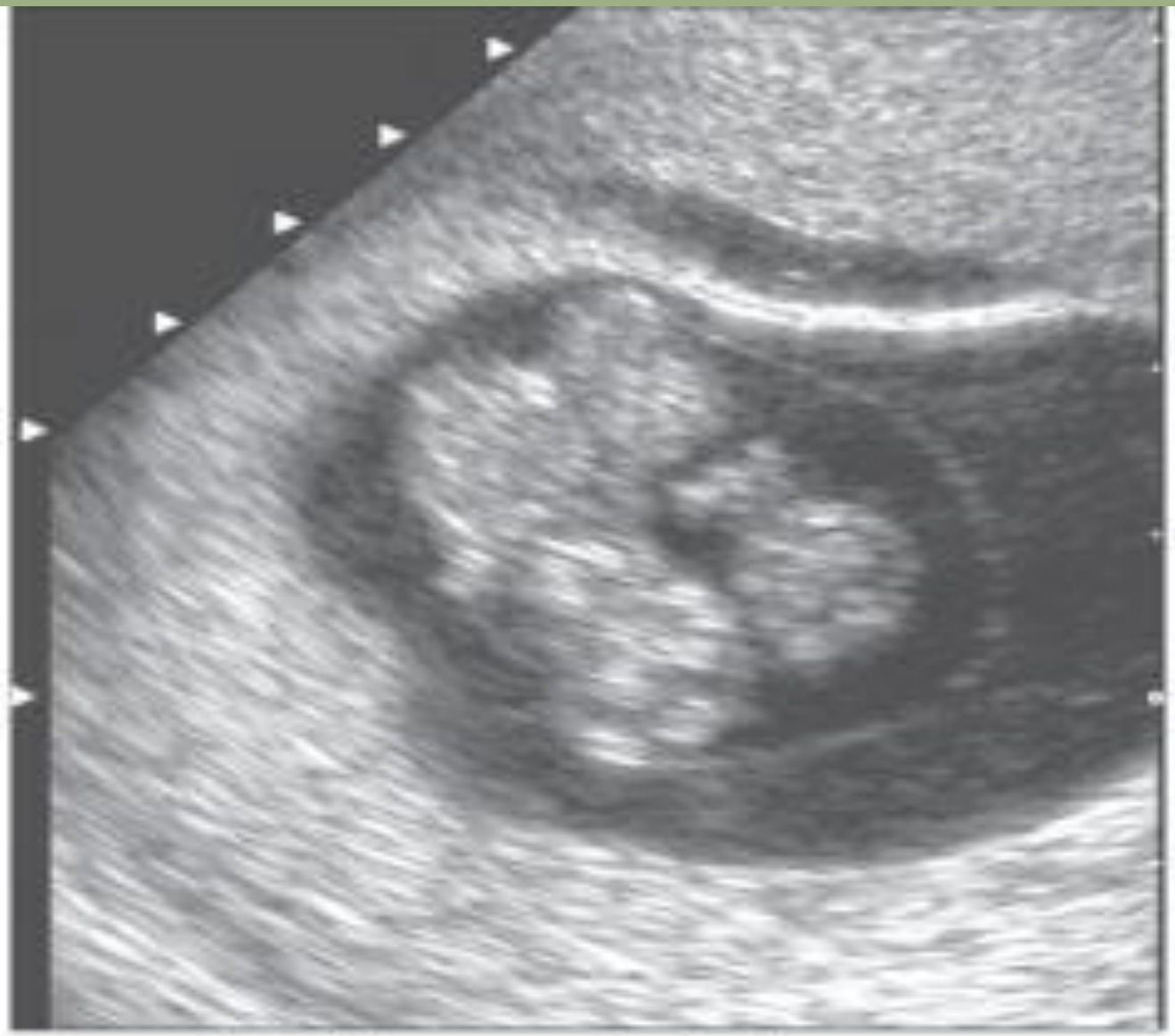


monochorionic, diamniotic

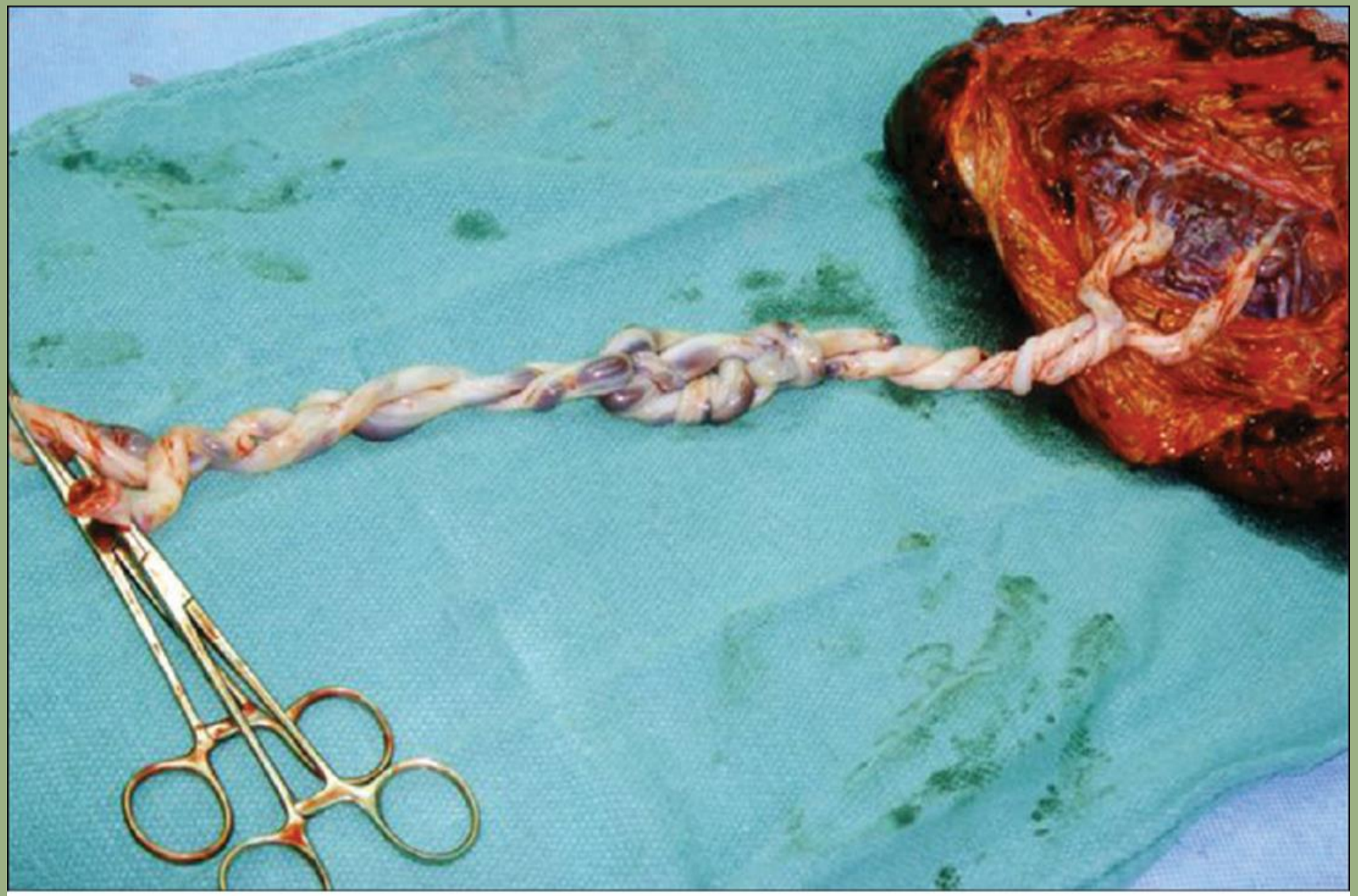




monochorionic, monoamniotic



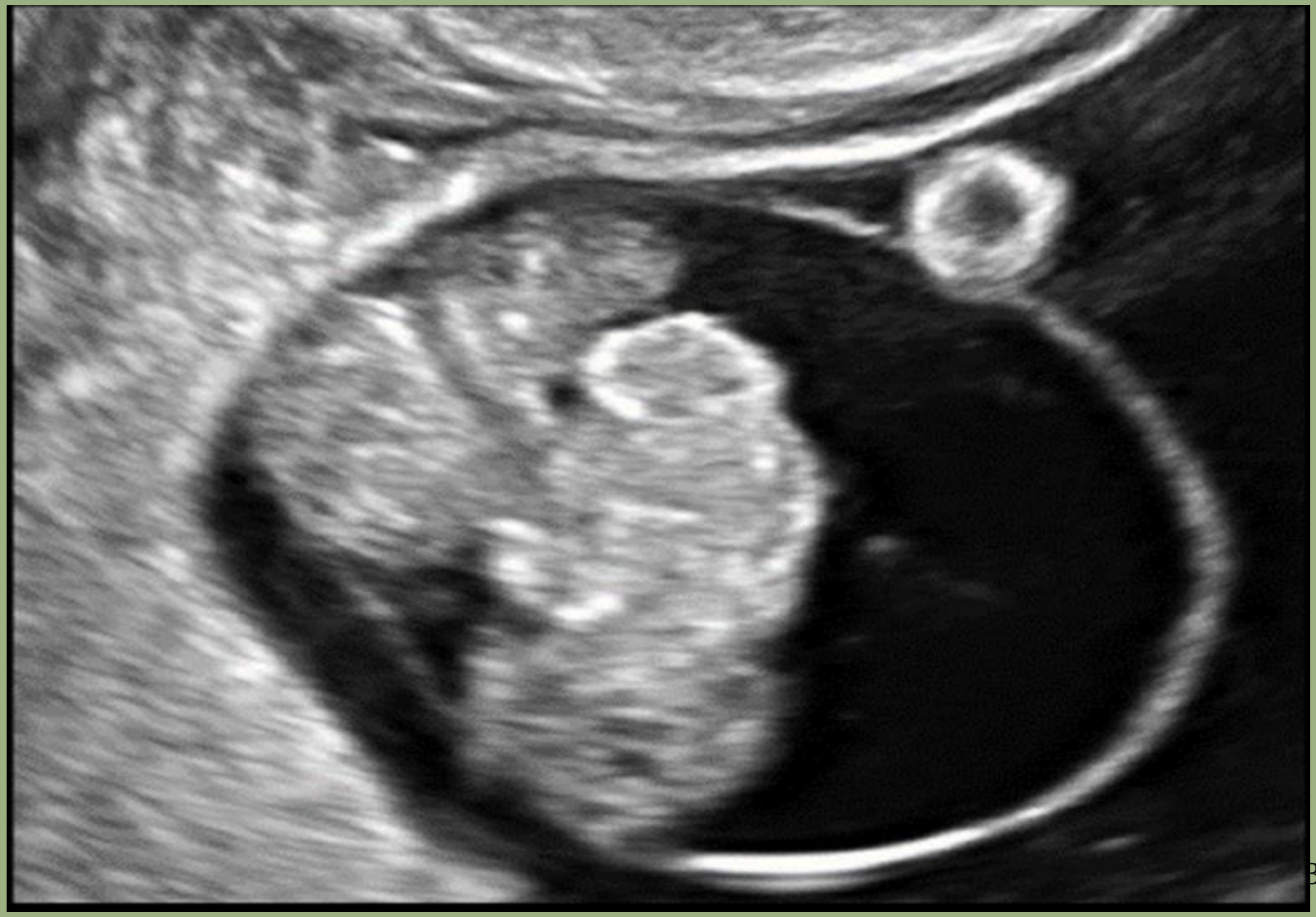
monochorionic, monoamniotic



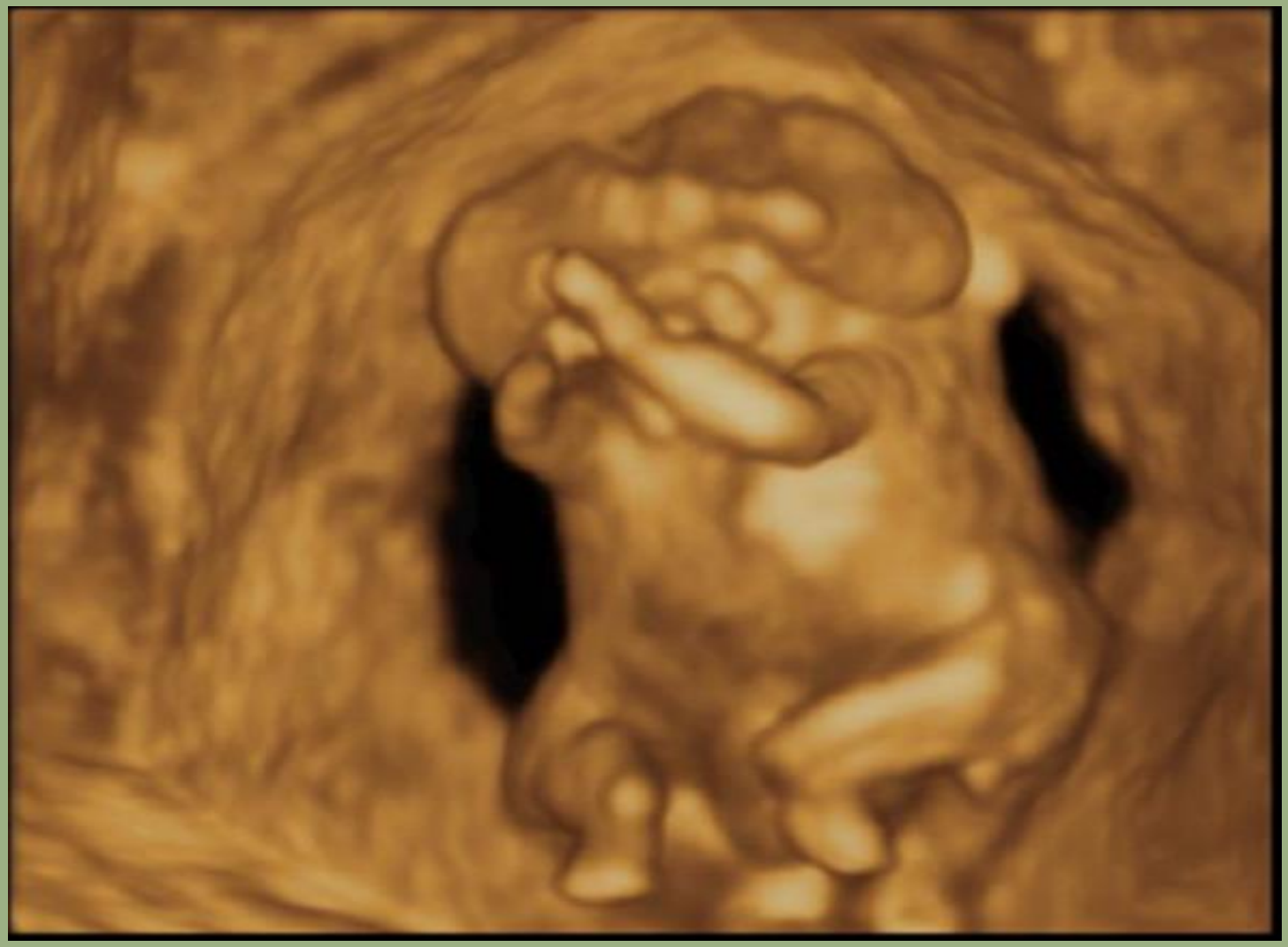
Conjoined Twins

- **Five types of conjoined twin have been described**
  - **Thoracopagus (joined at the thorax)**
  - **Omphalopagus (joined at the anterior wall)**
  - **Craniopagus (joined at the cranium, syncephalus, conjoined twins with one head)**
  - **Pygopagus (joined at the ischial region)**
  - **Ischiopagus (attached at the buttocks)**

Conjoined Twins



Conjoined Twins

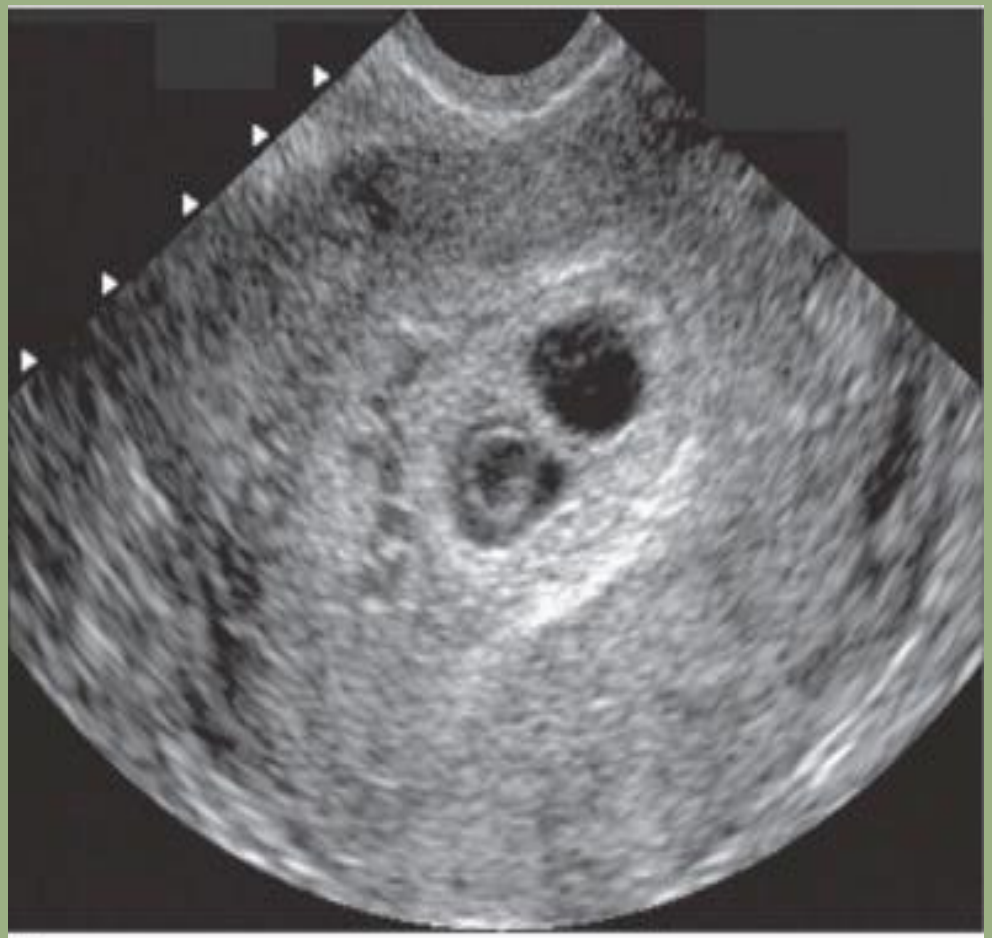


Conjoined Twins

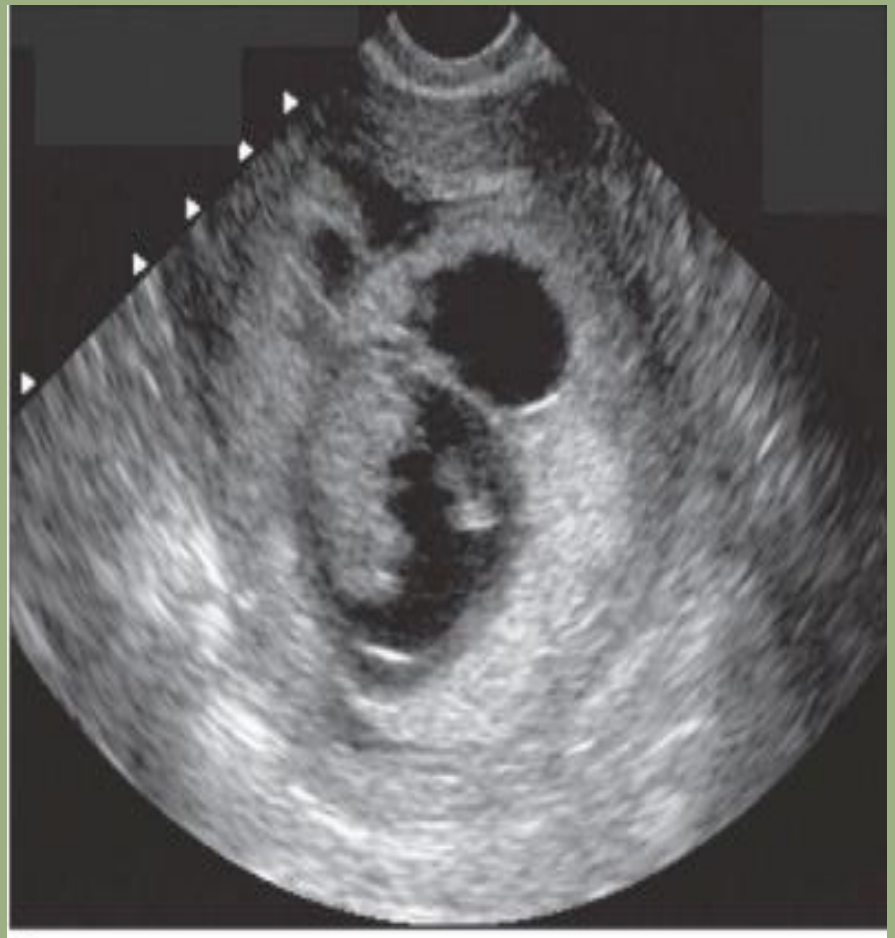
- **Monozygotic twins present a very high-risk situation**
  - **Associated with an increased incidence of fetal anomalies**
  - **If there is only one amniotic sac, the twins may entangle their umbilical cords, cutting off their blood supply**
  - **Because the circulations of the monozygotic twins communicate through a single placenta**
    - **They are at increased risk for a syndrome known as twin-to-twin transfusion**

The “vanishing” Twin

- One twin may die in utero and the other one continues to grow
- One study showed that 70% of pregnancies that began with twins ended with a singleton
  - Many losses occur very early and are never detected
- If the demise occurs very early, complete resorption of both embryo and gestational sac or early placenta may occur



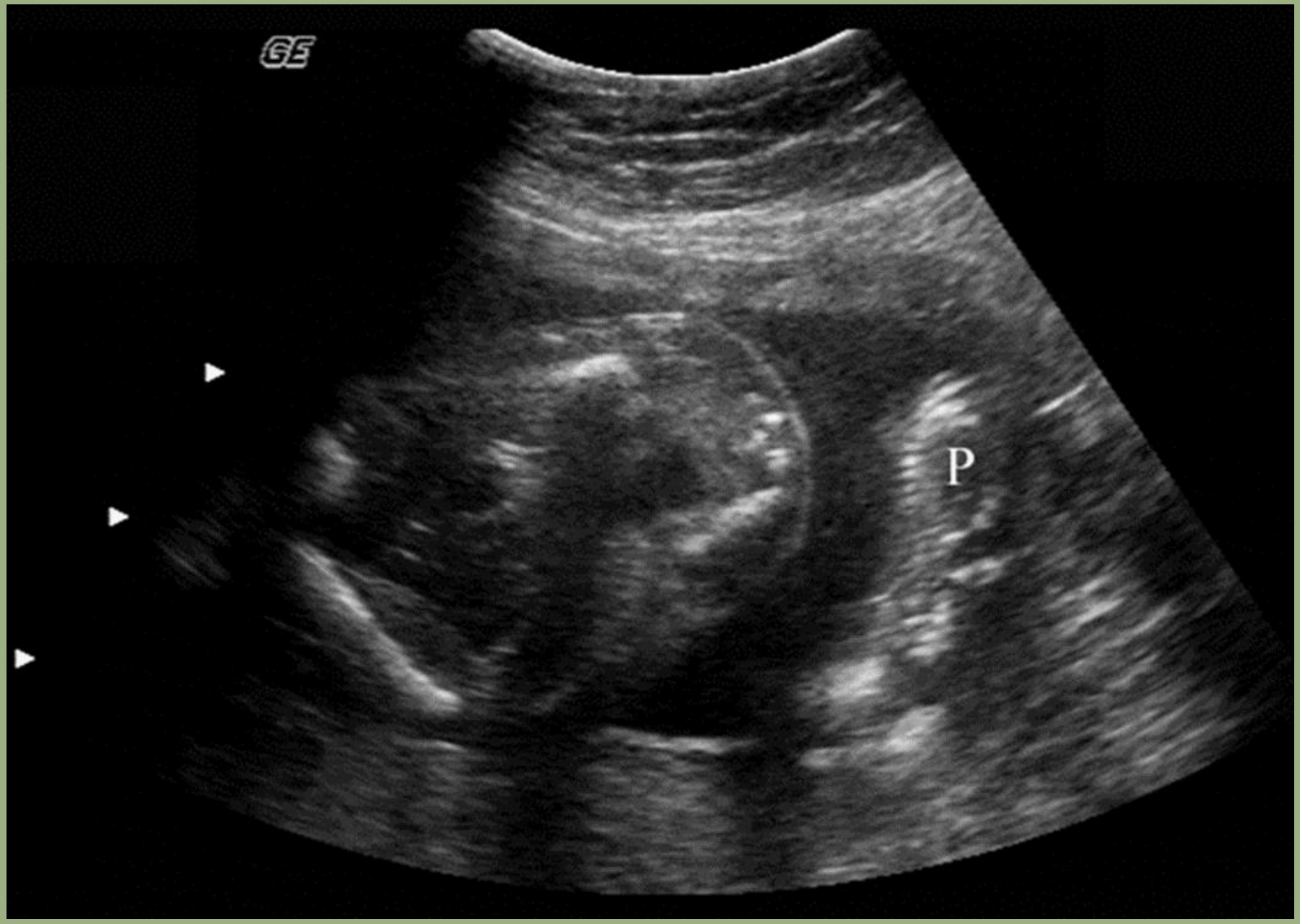
A



B

“Fetus Papyraceous”

- **If the fetus dies after reaching a size too large for resorption**
  - **Fetus is markedly flattened from loss of fluid and most of the soft tissue**


GE
P

The “Appearing” Twin

- **Just as a twin may appear to vanish**
  - **One may also “appear”**
- **Seen when ultrasound examinations are performed very early in gestation (5–6 weeks) and undercounting of the gestation sacs happens**

- **Undercounting can occur because of:**
  - **Discrepant gestational sac size**
  - **Locations of sacs**
  - **If scanned before yolk sacs seen**
  - **Monochorionic, monoamniotic gestation without crown-rump lengths**
  - **Failure of the operator to identify a second gestational sac**

Poly-Oli Sequence ("Stuck Twin")

- **Characterized by a diamniotic pregnancy with polyhydramnios in one sac and severe oligohydramnios and a smaller twin in the other sac**
- **This syndrome usually manifests at 16 to 26 weeks' gestation**
- **The majority involve monochorionic gestations**

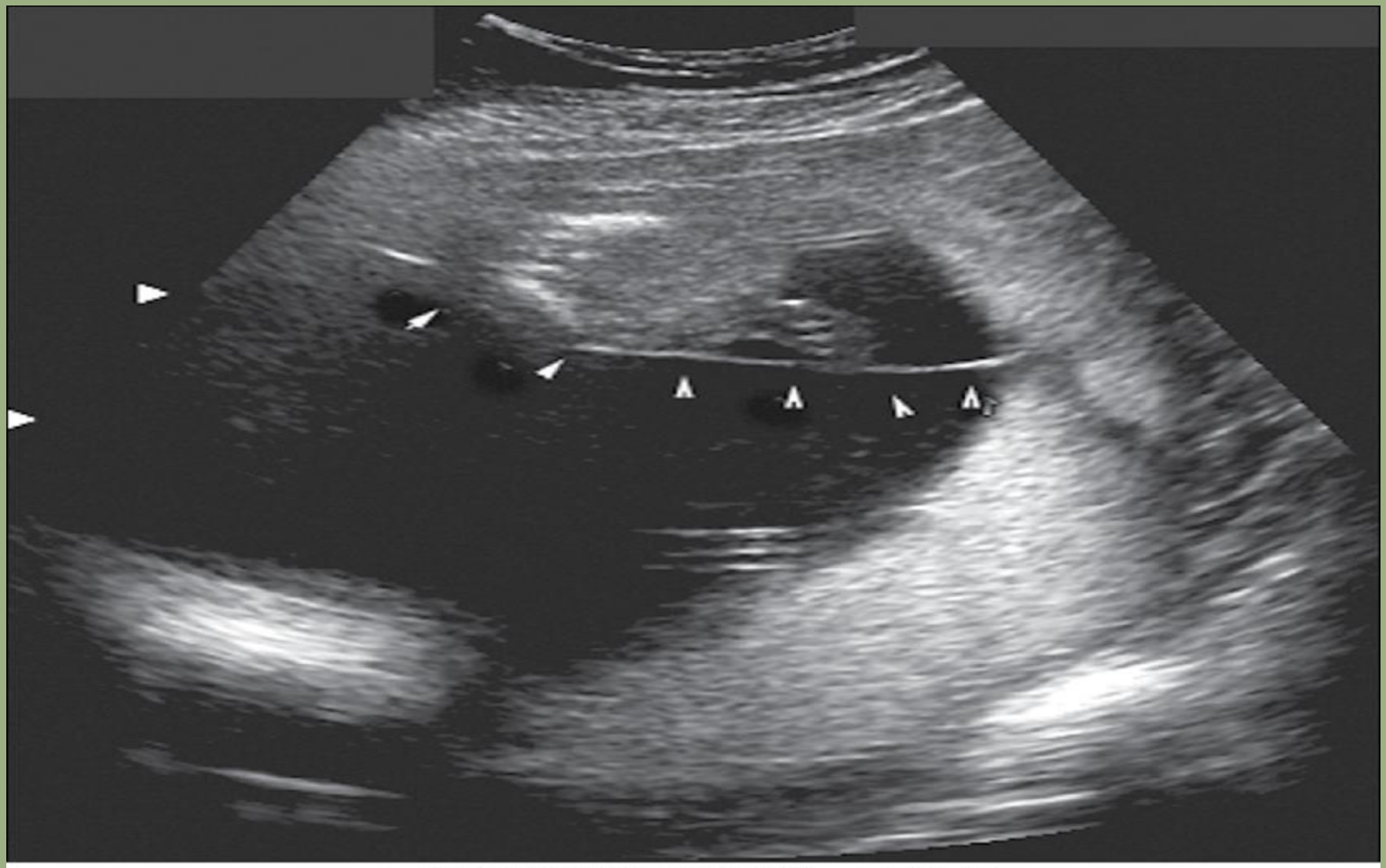
Poly-Oli Sequence ("Stuck Twin")

- **May be caused by fetal anomaly in one sac**
  - **Resulting in polyhydramnios**
  - **Compresses the blood flow in the normal twins' placenta**
    - **Results in oligohydramnios**
    - **Placental insufficiency in one placenta**
    - **Twin-to-twin transfusion syndrome**

Poly-Oli Sequence ("Stuck Twin")

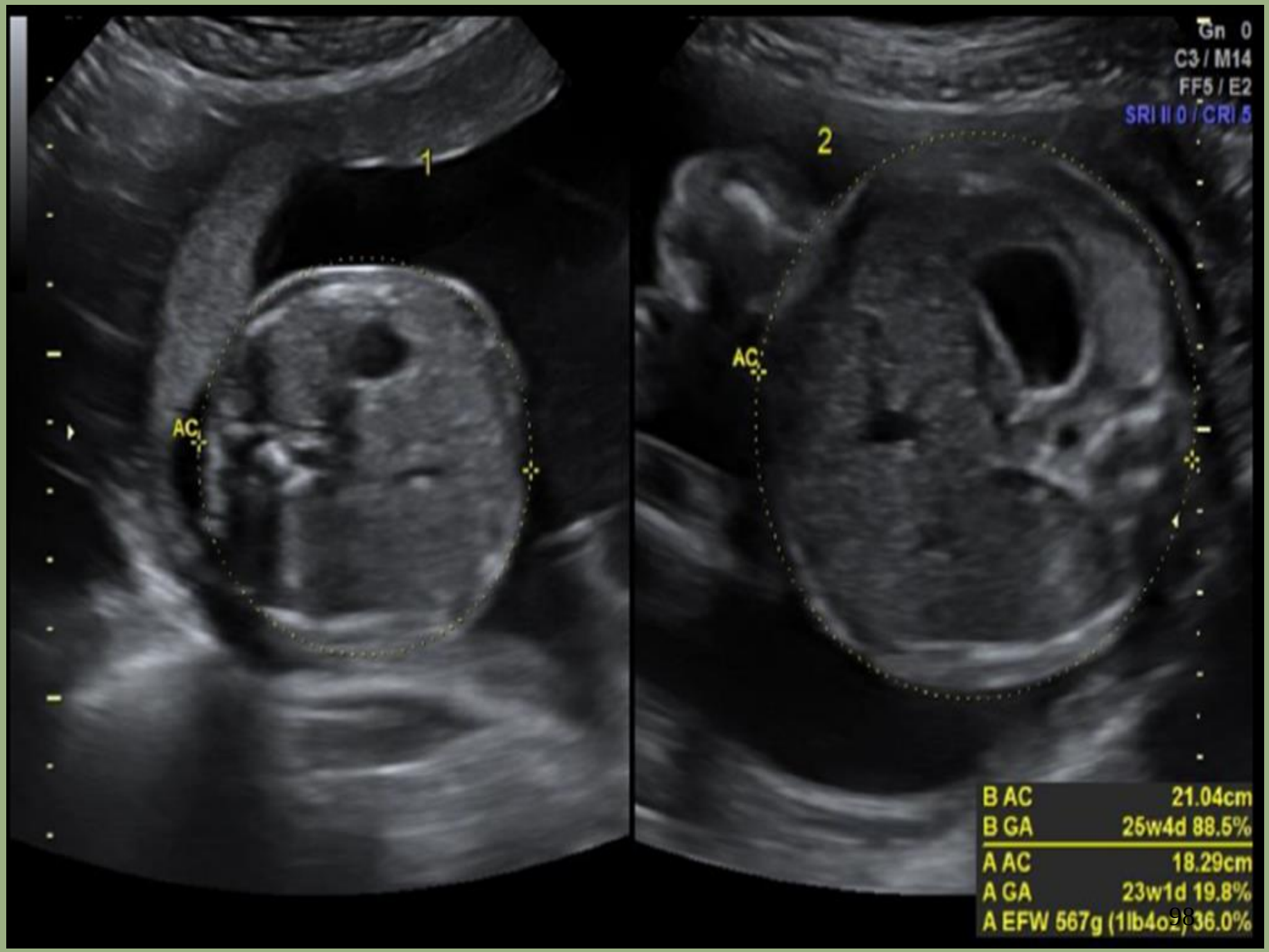
- **When oligohydramnios exists in one sac and polyhydramnios in the other**
  - **Small twin may appear stuck in position within the uterus**

“Stuck Twin”



Twin-to-Twin Transfusion Syndrome

- **Syndrome exists when there is an arteriovenous shunt within the placenta**
- **Arterial blood of one twin is pumped into the venous system of the other twin**
- **As a result, the donor twin becomes anemic and growth restricted**
  - **This twin has less blood flow through its kidneys, urinates less, and develops oligohydramnios**


Gn 0
C3 / M14
FF5 / E2
SRI II 0 / CRI 5
1
AC
2
AC
B AC 21.04cm
B GA 25w4d 88.5%
A AC 18.29cm
A GA 23w1d 19.8%
A EFW 567g (1lb4oz) 36.0%

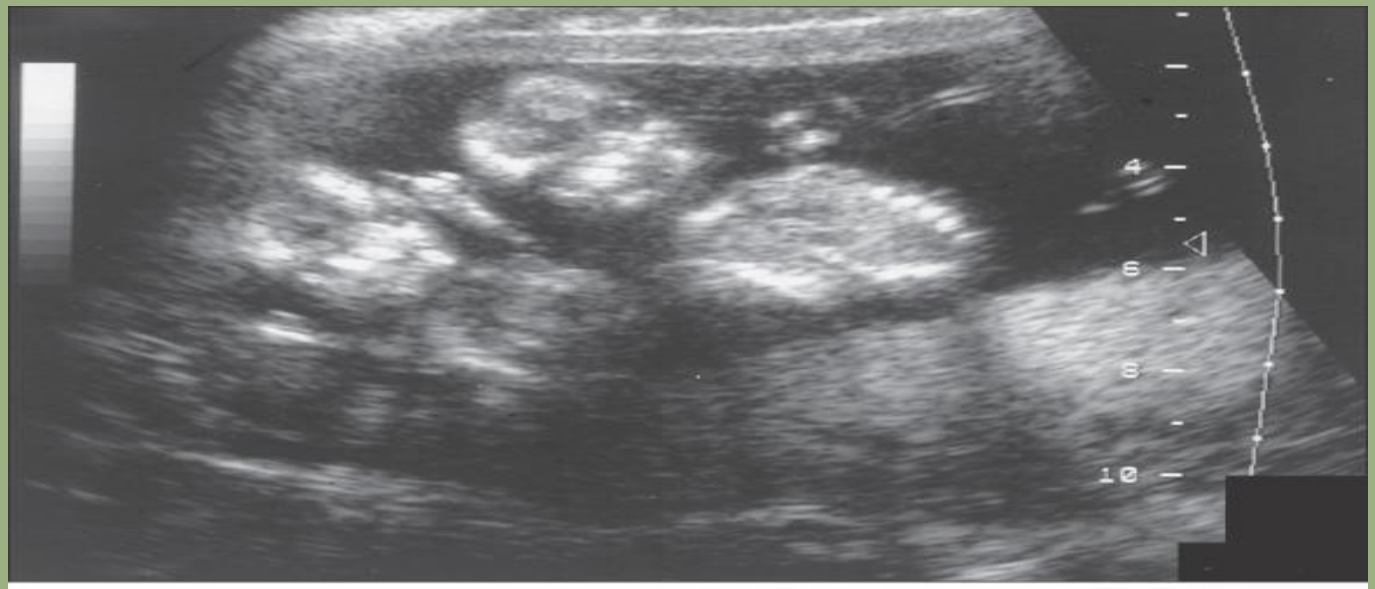
Twin-to-Twin Transfusion Syndrome

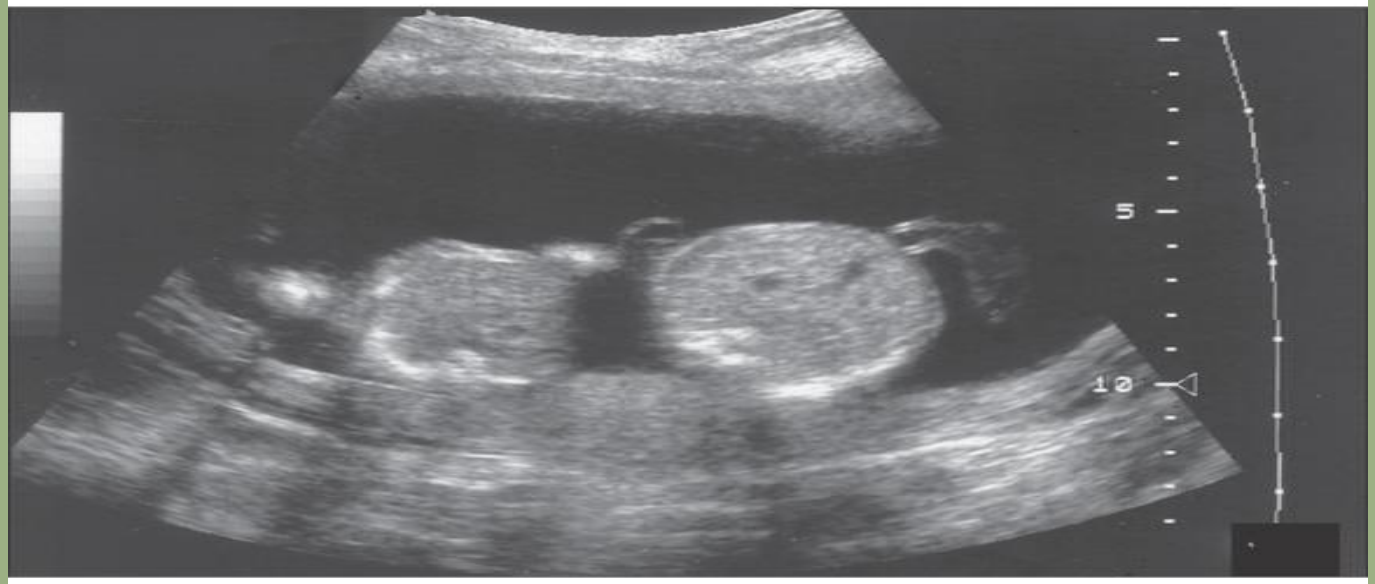
- The recipient twin gets too much blood flow
- The twin may be normal or large in size
  - This twin has excess blood flow through its kidneys and urinates too much, leading to polyhydramnios
- This twin may even go into heart failure and become hydropic

Twin-to-Twin Transfusion Syndrome

- **If twin-to-twin transfusion exists**
  - **Both twins are at risk of dying**
  - **Smaller one because its nutritional and oxygen rich blood supply is severely restricted**
  - **Larger one because of heart failure**
- **Depending on the gestational age**
  - **may be forced to deliver the fetuses early if it appears one or both of the twins are at risk of dying in utero**

Twin-to-Twin Transfusion Syndrome





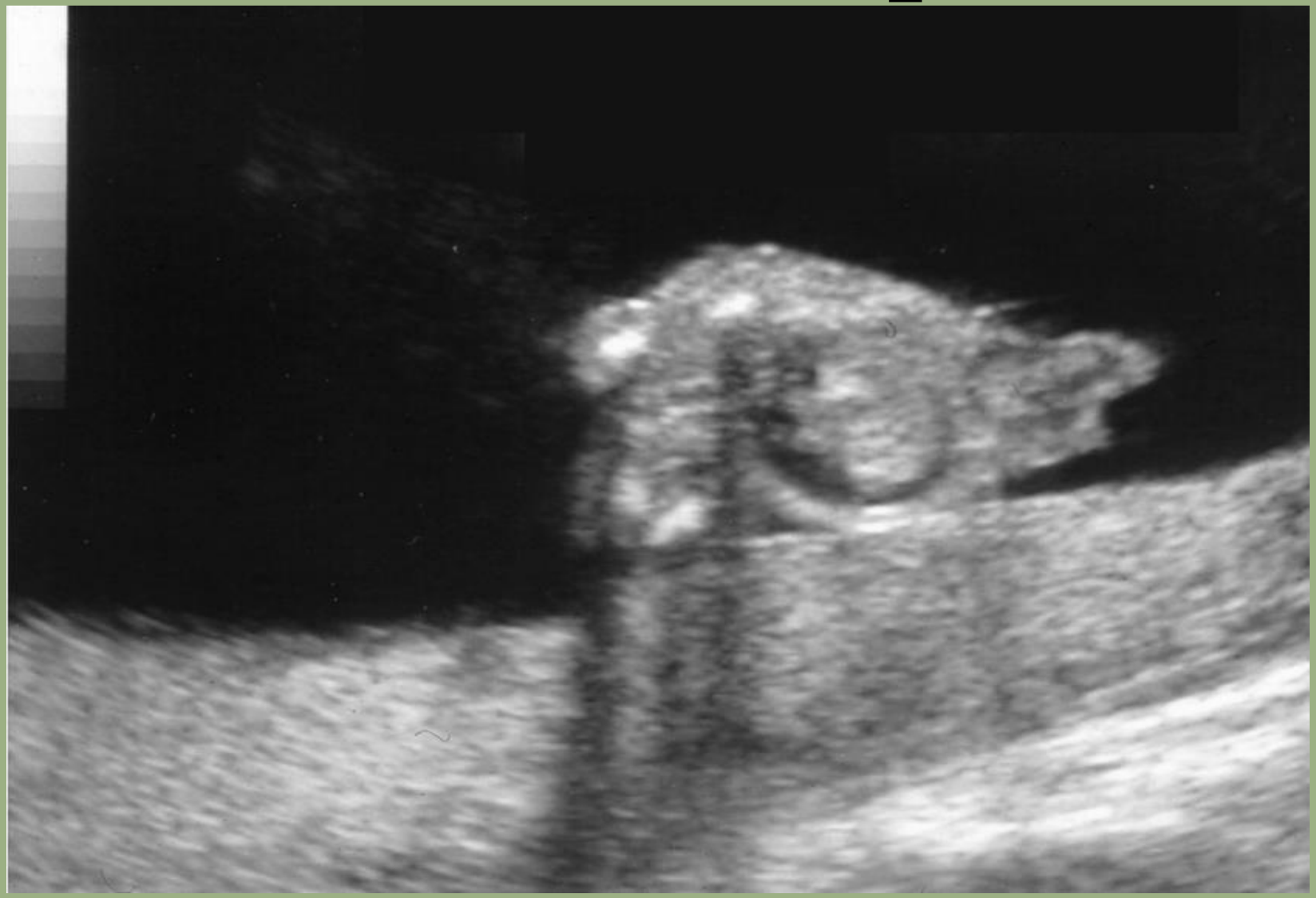
Acardiac Anomaly

- **Rare anomaly occurring in monochorionic twins**
  - **One twin develops without a heart and often absence of the upper half of the body**
- **It thought to occur because of an artery-to-artery connection in the placenta**
- **The reversed direction of blood flow in the abnormal twin alters the hemodynamic properties needed for normal cardiac formation**

Acardiac Anomaly

- **On ultrasound one sees**
  - **A monochorionic twin gestation with one normal fetus and one fetus with an absent heart**
- **The abnormal twin also has other anomalies such as:**
  - **Absent head**
  - **Absent organs in the thorax and abdomen**
  - **Absent or abnormal limbs**

Acardiac, Acephalic



Scanning Multiple Gestations

- **Gestational sacs should be assigned a label (typically an alphabetical letter) to consistently identify them in following examinations**
- **Sac and fetus directly over the internal os is labeled A**
- **Sacs should be additionally identified by their placental location or other identifying information such as left or right side of the uterus**

- **When scanning multiple gestations**
  - **Sonographer always should attempt to determine whether there are one or two amniotic sacs by locating the membrane that separates the sacs**
- **If two sacs are seen**
  - **Pregnancy is known to be diamniotic**
  - **Sonography will not be able to indicate whether the twins are identical**
- **Documentation of a membrane separating the fetuses confirms the presence of a diamniotic pregnancy**

- **In a twin pregnancy with two separate placentas**
  - **membrane extends between the fetuses obliquely across the uterus from the edge of the placenta to the contralateral edge of the other placenta**
- **If only one placental site exists**
  - **Membrane extends between the fetuses away from the central portion of the placental site**
- **Fetus may touch the membrane but does not cross it, and the membrane does not adhere to entrap the fetus**

- **If only one placenta is seen and a membrane cannot be visualized**
  - **Other features may assist in the prediction of amnionicity, chorionicity, and zygosity**
    - **A male and female fetus is dizygotic, diamniotic, and dichorionic**

- **The location of the placenta should be determined**
  - **An attempt also should be made to determine the number of placentas**
- **Occasionally, clearly separate placentas may be identified**
  - **If two placentas are implanted immediately adjacent to each other and fuse, it may be difficult to determine whether there are one or two placentas**
- **Placentas appear to be one large placenta.**
  - **The body of the placenta should be scanned to determine whether a line of separation can be seen**

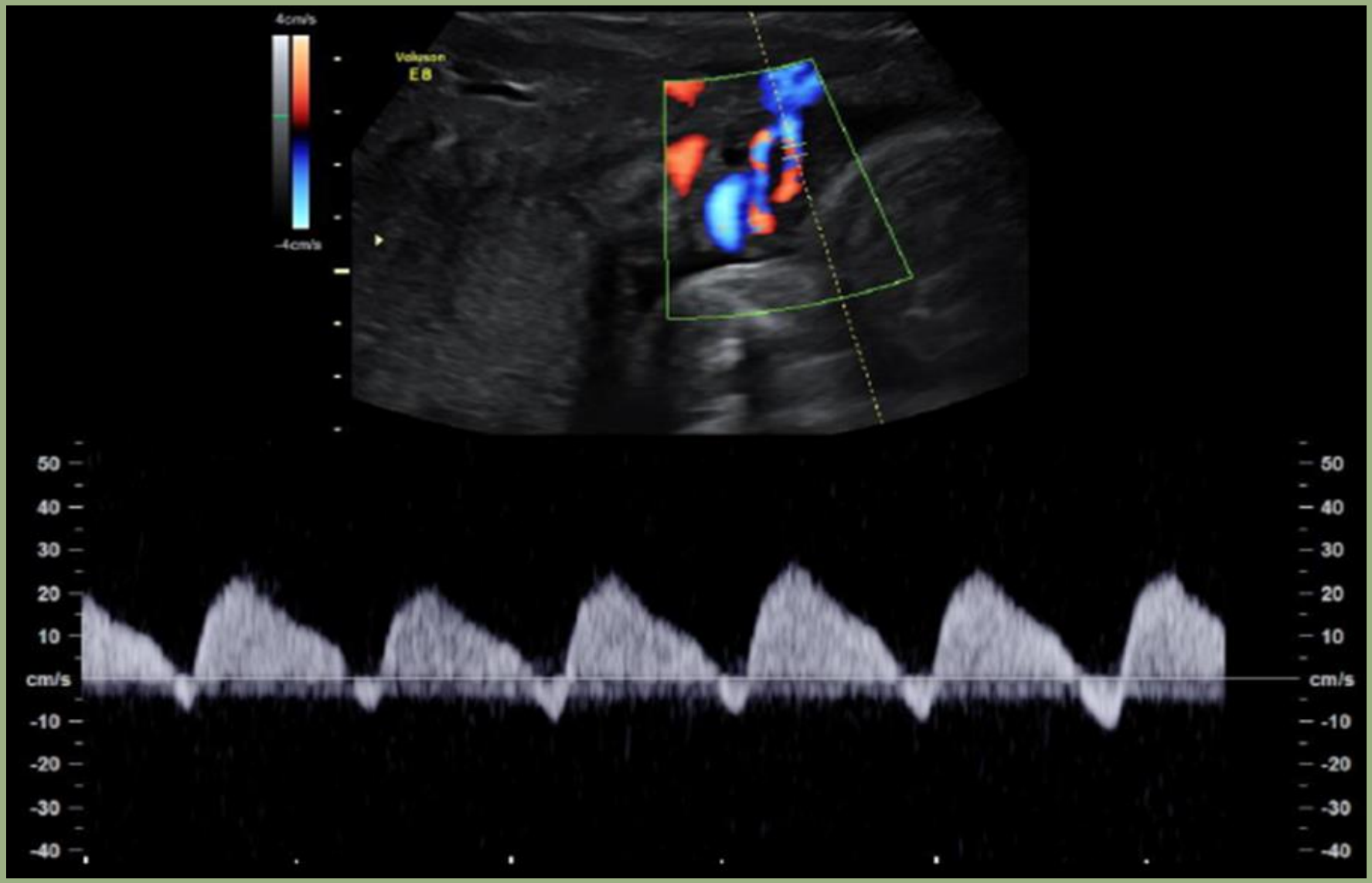
- **Be sure to use the specialized charts for multiple gestations to determine gestational age**
- **Twins should each be scanned for dates and size**
  - **BPD**
  - **HC**
  - **AC**
  - **FL**
- **Because the growth of twins is similar to that of singletons early in pregnancy, singleton growth charts generally are used**

- **Keep in mind that a fetus from a multiple gestation is usually smaller than a singleton fetus**
- **Twins are smaller in size at birth than singleton fetuses of comparable gestational age**
- **When attempting to determine whether only one twin is growth restricted**
  - **Differences between the measurements of the two twins must be examined**

- **Gender of the fetuses is important to determine**
- **If there is growth discrepancy between the twins but one is a male and one is a female**
  - **Twin-to-twin transfusion cannot exist**
- **If both twins are of the same sex, however, and growth discrepancy exists**
  - **Twin-to-twin transfusion syndrome may be a possibility**
- **Umbilical cord Doppler may be useful for fetal surveillance**

- **During the fetal cardiac cycle**
  - **Umbilical blood flows during both the systole and diastole phases of the heartbeat**
- **No flow (absent end-diastolic flow)**
- **Reverse flow during diastole (reverse end-diastolic flow)**
  - **Signs of fetal jeopardy**

Reverse flow during diastole



Selective Abortion

- **Multifetal pregnancy reduction method**
  - **Used on pregnancies with greater than four fetuses**
    - **To improve the survival chances of the remaining fetuses**
- **Procedure is performed toward the end of the first trimester**
  - **Guided injection of potassium chloride into the thoraxes of the fetuses to be aborted**