OB GYN SONOGRAPHY REVIEW

The Placenta

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Course Outline

- The Placenta
  - Normal anatomy
  - Placenta variants
  - Placental pathology

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The Placenta

Normal Anatomy

- The placenta provides for the nutrition, oxygenation, and physiological exchange of the fetus while *in utero*
- Measures 2 -4 cm thick and weighs ≈600 grams
- Two portions:
  - Maternal portion: arises from decidua basalis
  - Fetal portion: consists of functional units call villi which project into pools of maternal blood (intervillous spaces)

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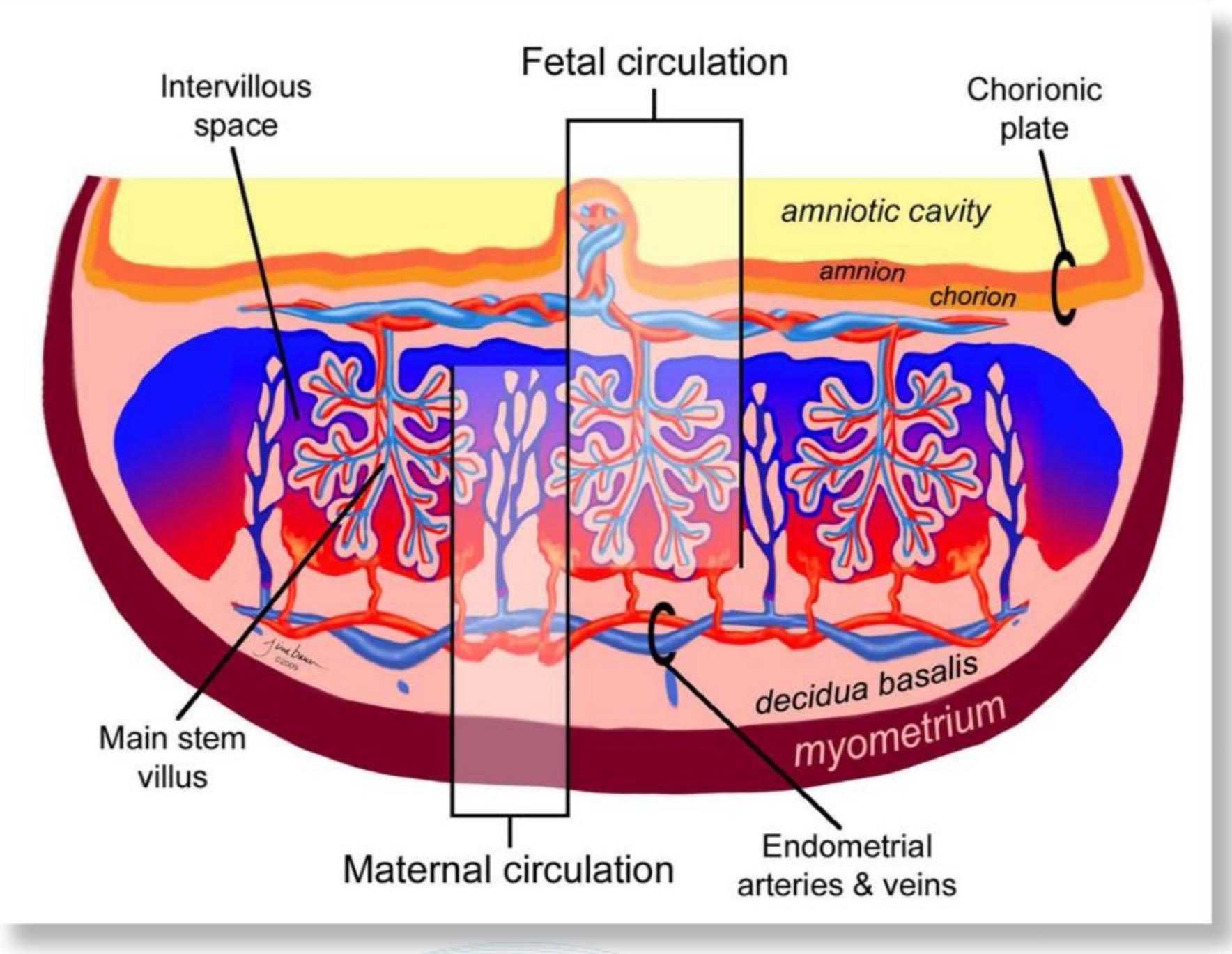
THE PLACENTA



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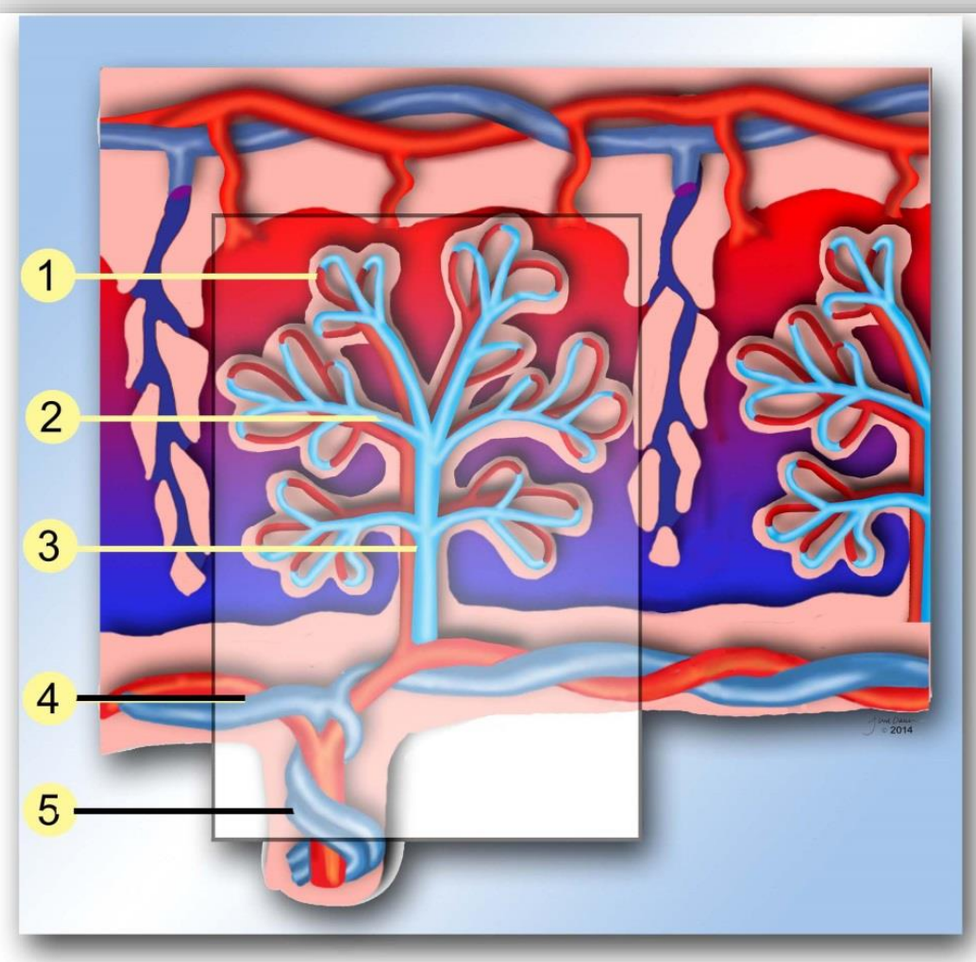
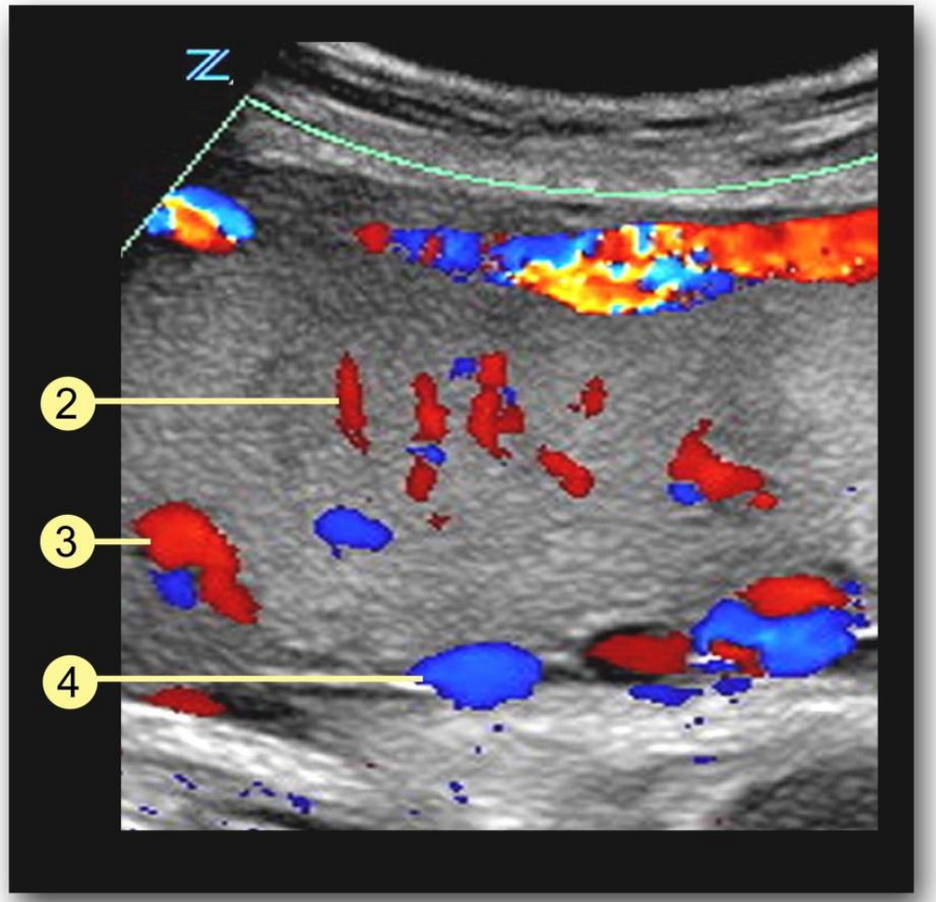
FETAL CIRCULATION





1 = terminal villi
2 = intermediate villi
3 = main stem villus

4 = subchorionic umbilcal vasculature
5 = umbilical vessels

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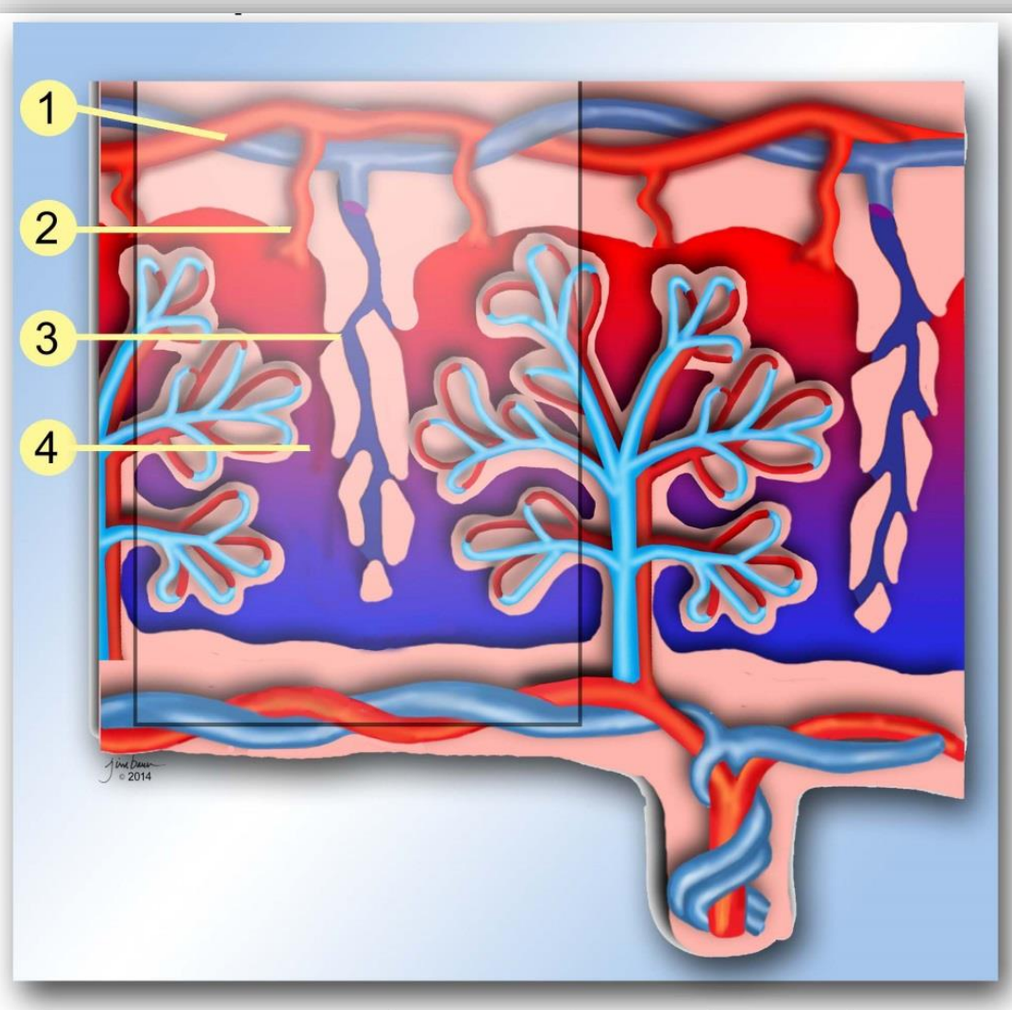
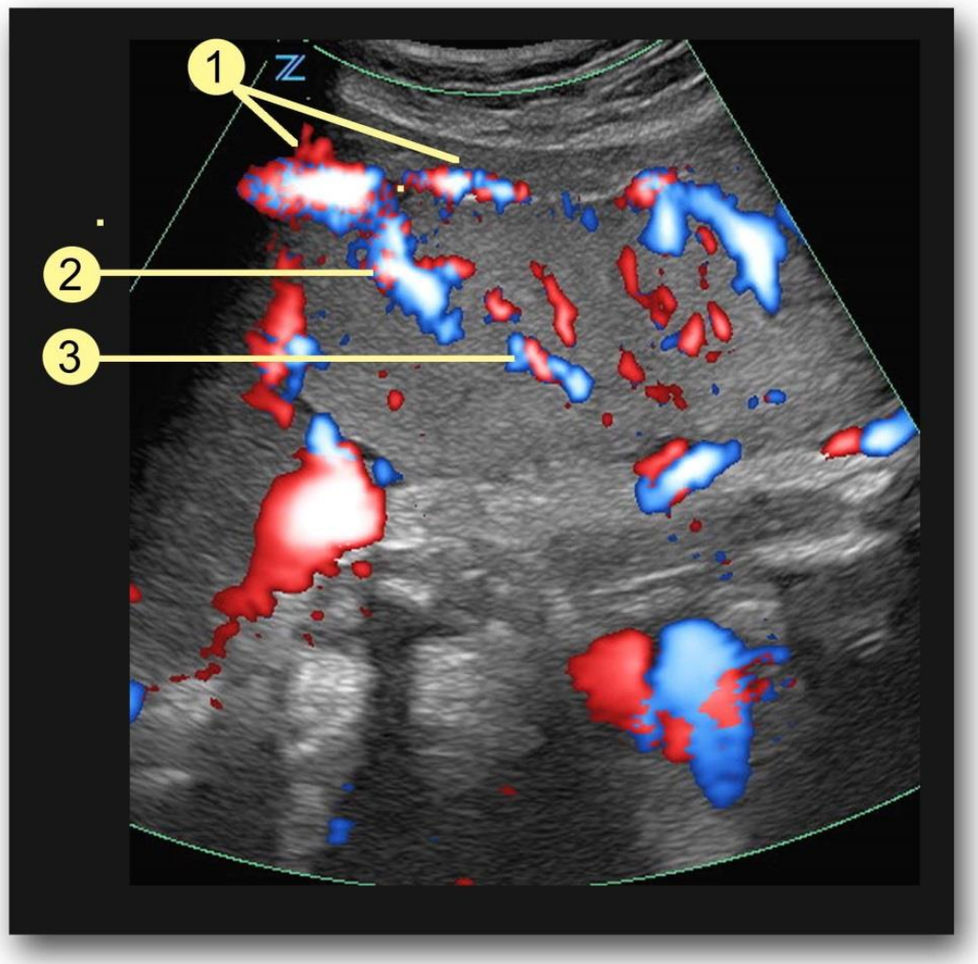
MATERNAL CIRCULATION





1 = retroplacental vasculature
2 = spiral artery

3 = maternal vein
4 = intervillous spaces

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Sonographic Anatomy

- Discoid shape
- Homogeneous, granular texture
- Chorionic membrane seen as bright, smooth, specular reflector covering fetal surface
- Subchorionic space appears smooth and uninterrupted except at site of cord insertion
- Retroplacental space hypoechoic, irregular area behind placenta

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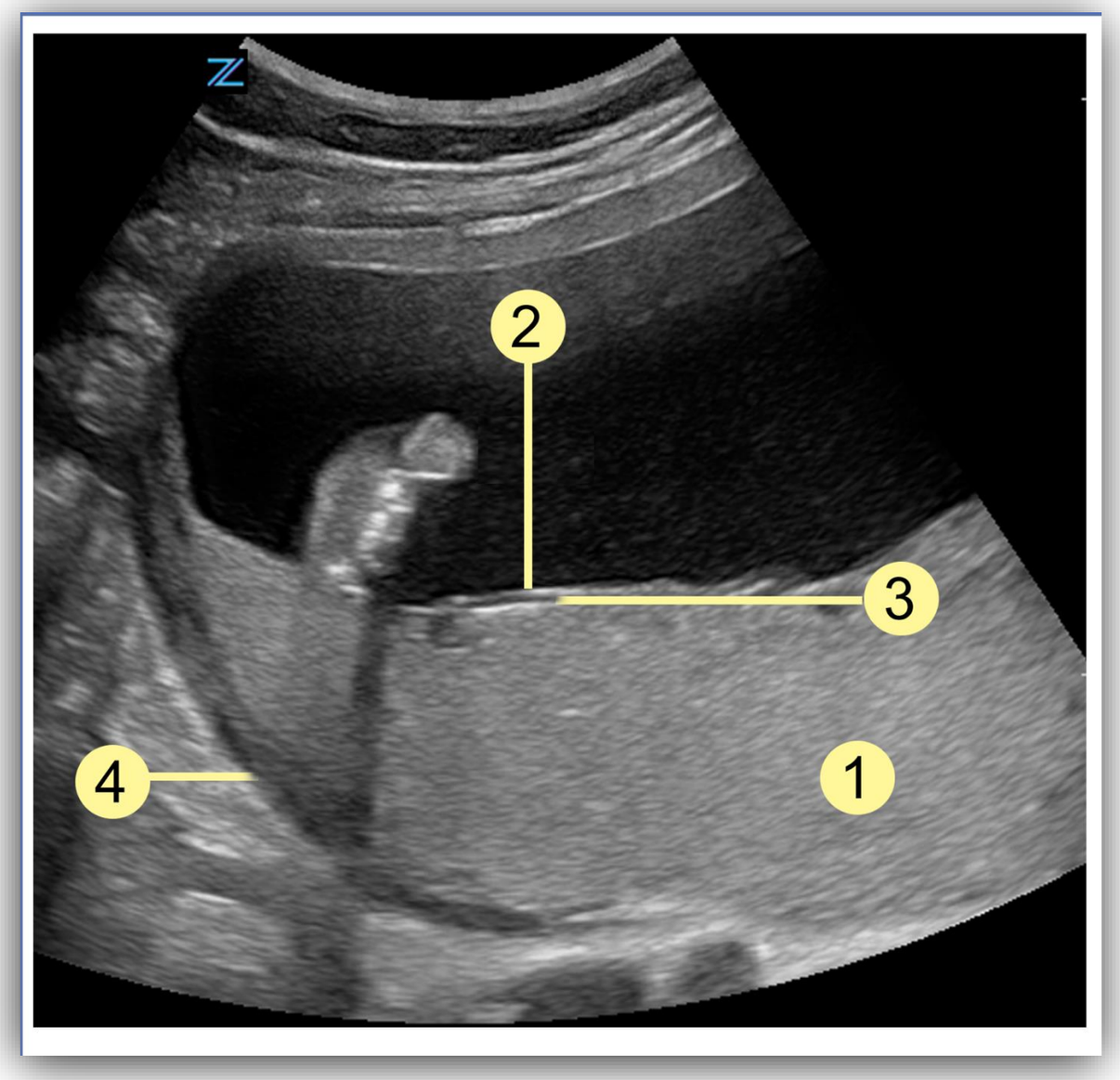
THE PLACENTA

1 = homogenous echotexture
2 = chorionic membrane
3 = subchorionic space
4 = retroplacental space



Normal sonographic anatomy

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Placental Grading

- Structurally, the placenta changes as it ages
- “Grading” was devised to help assess gestational age
- Poor statistical correlation with dating a pregnancy
- However, a prematurely aged placenta may indicate impending placental insufficiency

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PLACENTAL GRADING

Grannum's Grading System	
Placenta Grade	**Sonographic Characteristics**
0	Smooth echo pattern of parenchyma with no calcification or indentations
I	Diffuse, randomly distributed calcifications
II	Calcifications along basal plate, indentations of chorionic plate
III	Large calcifications; indentations of basal plate

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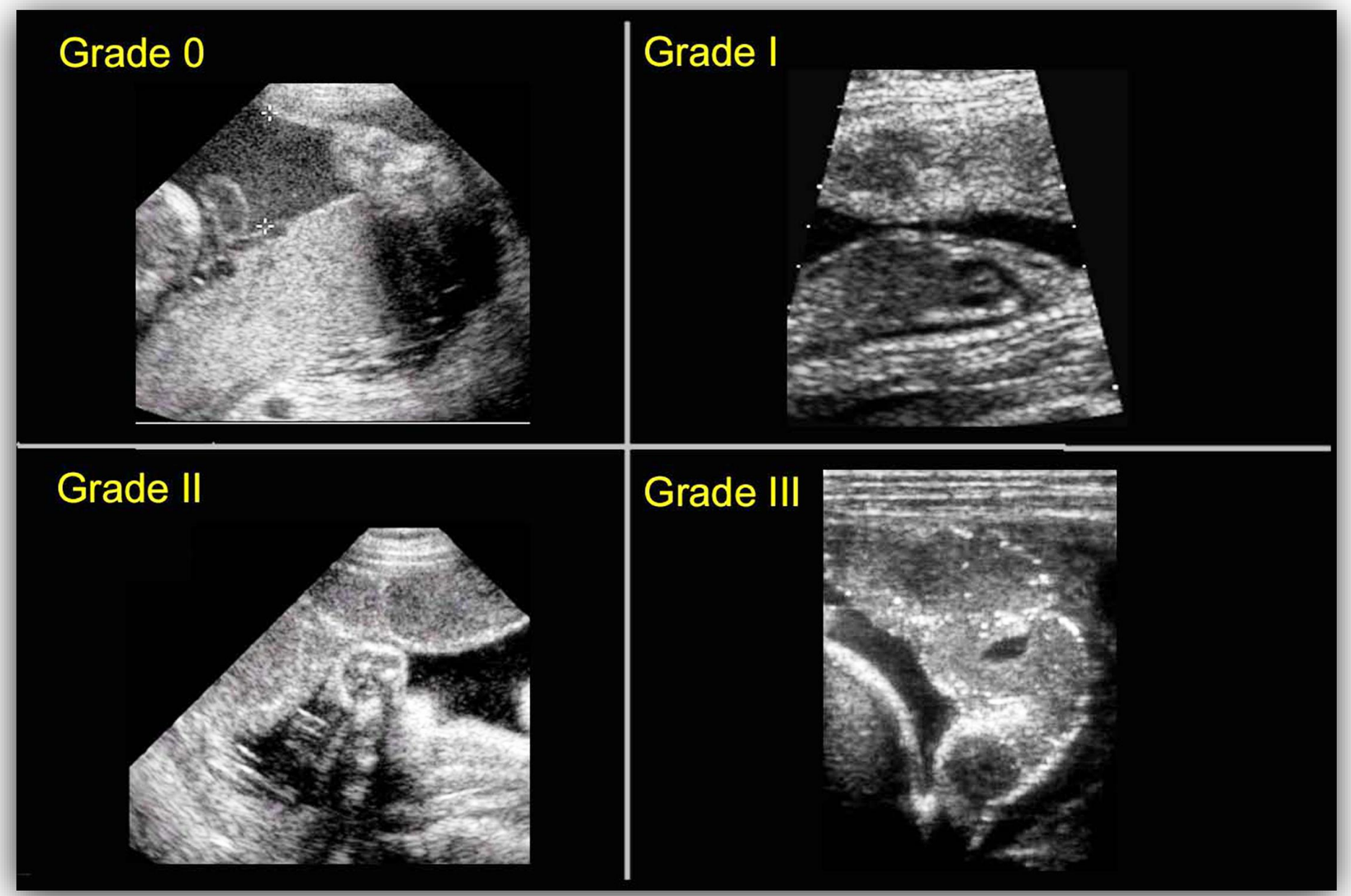
PLACENTAL GRADING



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PLACENTAL GRADING

Mature placenta

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Placental Variants

- Extrachorial types:
  - Circummarginate placenta
  - Circumvallate placenta
- Accessory types:
  - Succenturiate lobe
  - Bipartite placenta
  - Annular placenta

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Extrachorial Types

- Normally, chorionic membrane extends to very outer edge of placenta before taking off to envelope remainder of uterine cavity

- *Circummarginate*: short tight chorion does not extend to edge but takes off early. Not seen with US

- *Circumvallate*: loose, redundant chorion in-folds along fetal surface of placenta.

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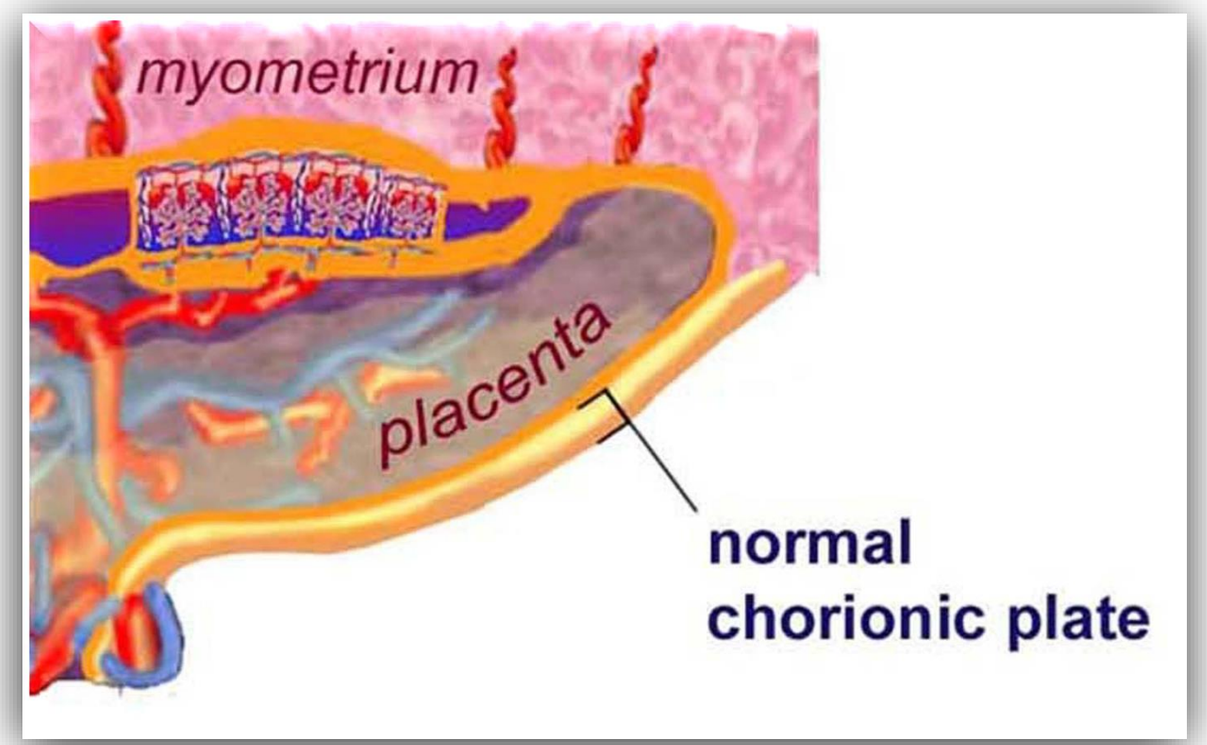
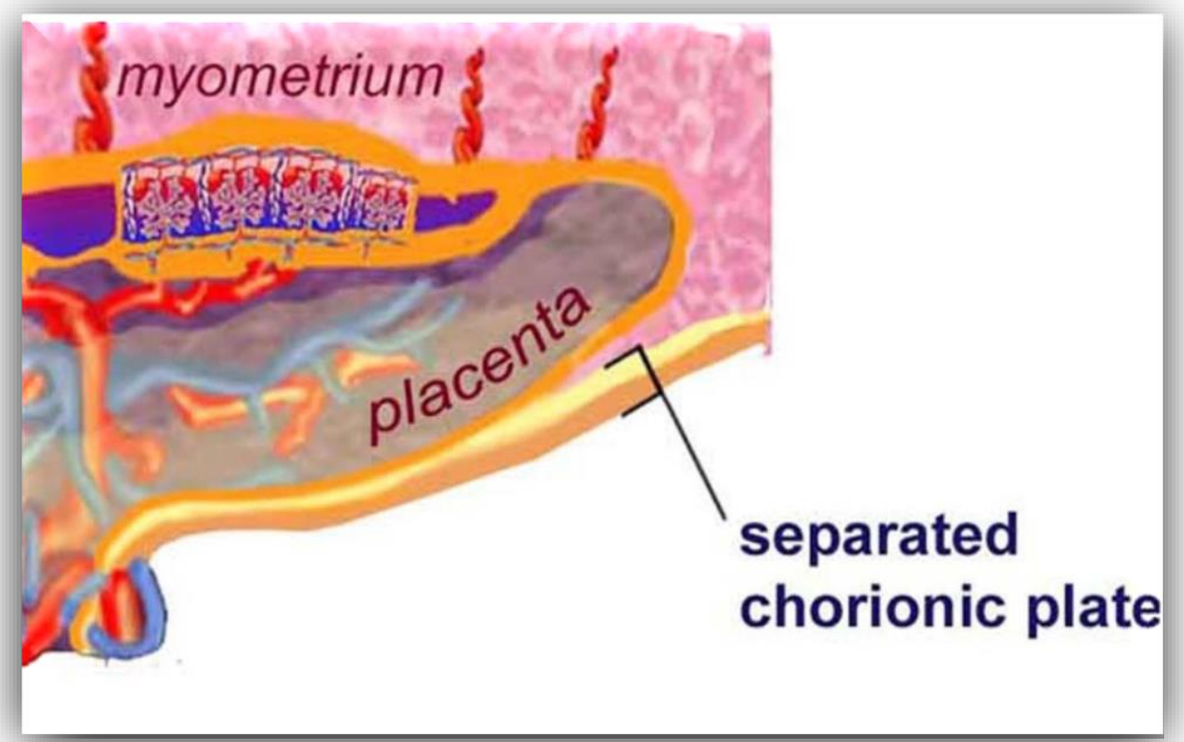
EXTRACHORIAL VARIANTS



Normal



Circummarginate

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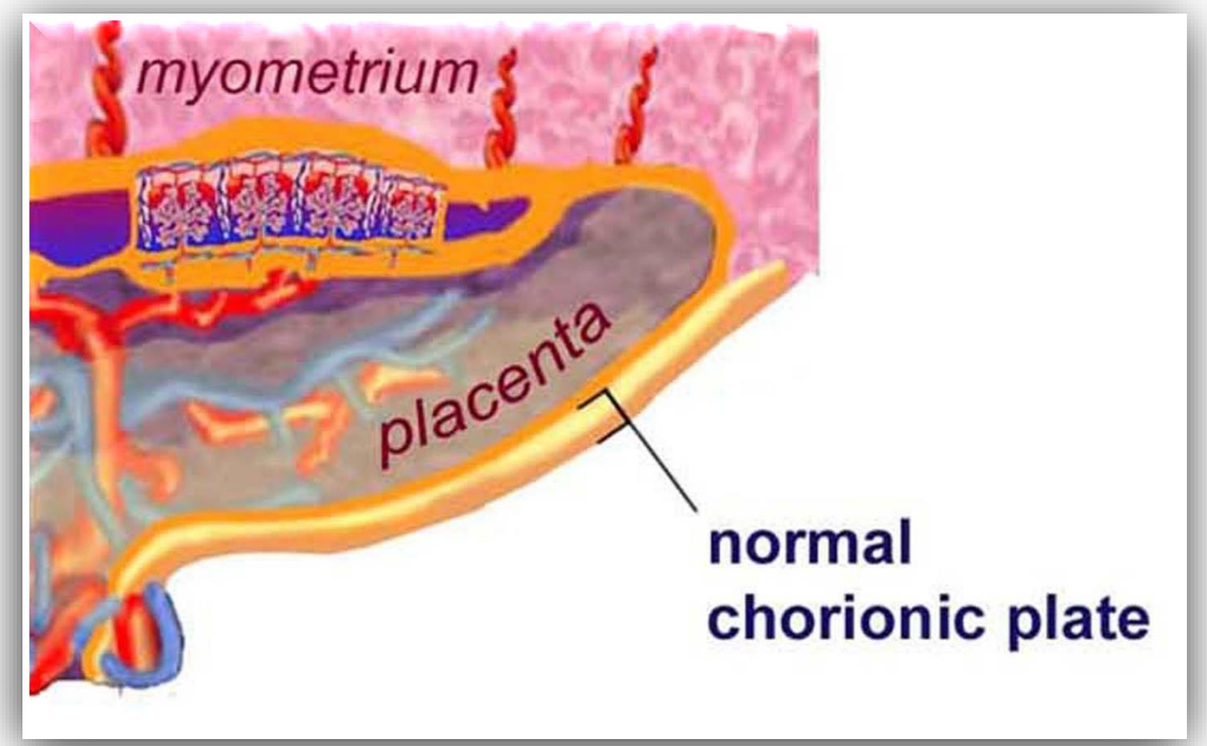
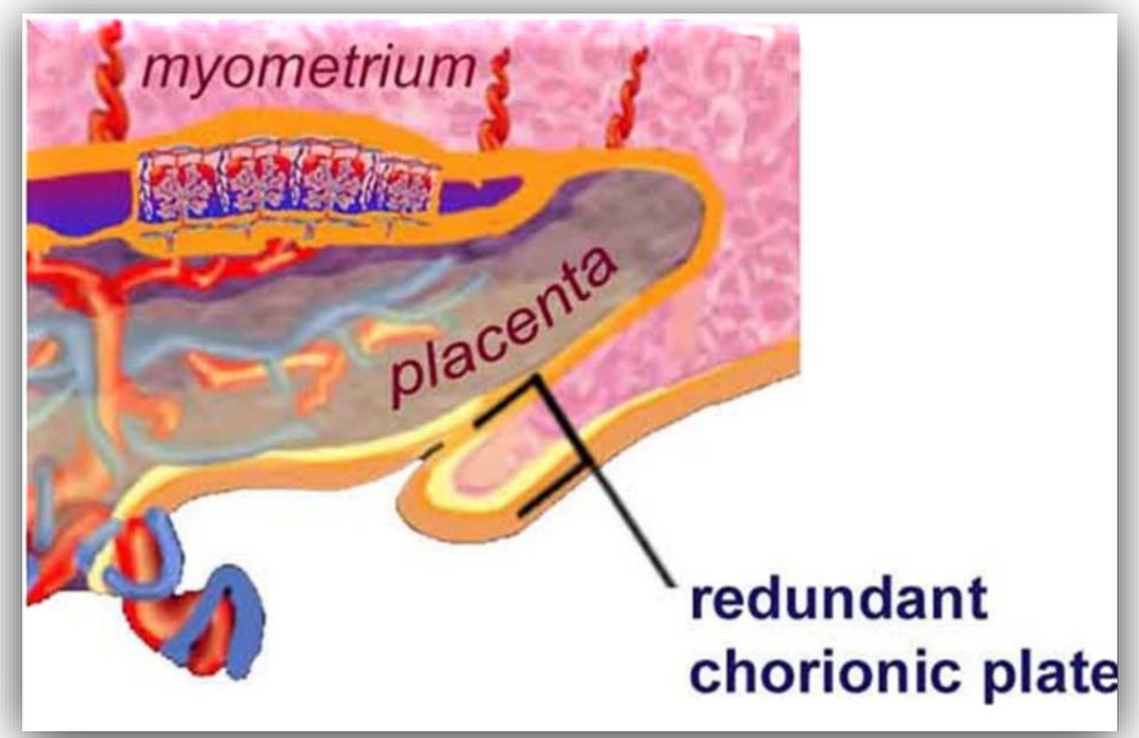
EXTRACHORIAL VARIANTS



Normal



Circumvallate

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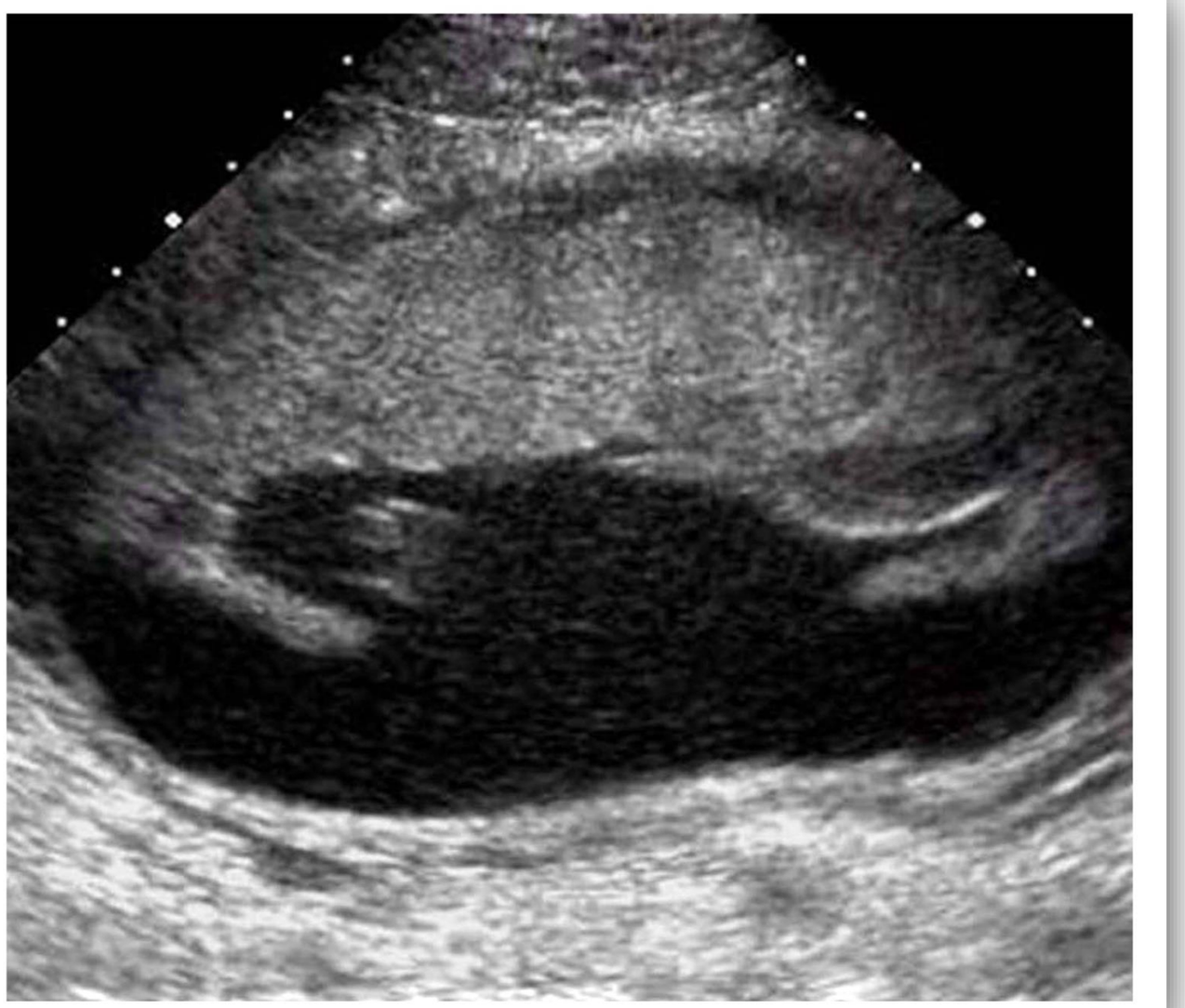
EXTRACHORIAL VARIANTS



Circumvallate placenta

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Accessory Types

- Alterations in the mechanism of early placentation cam result in three accessory types:

- *Succenturiate lobe*: an accessory cotyledon located away from the main placental body

- *Bipartite placenta*: a placenta divided into two approximately equal-sized lobes

- *Annular placenta*: ring-shaped placenta attaching circumferentially to myometrium

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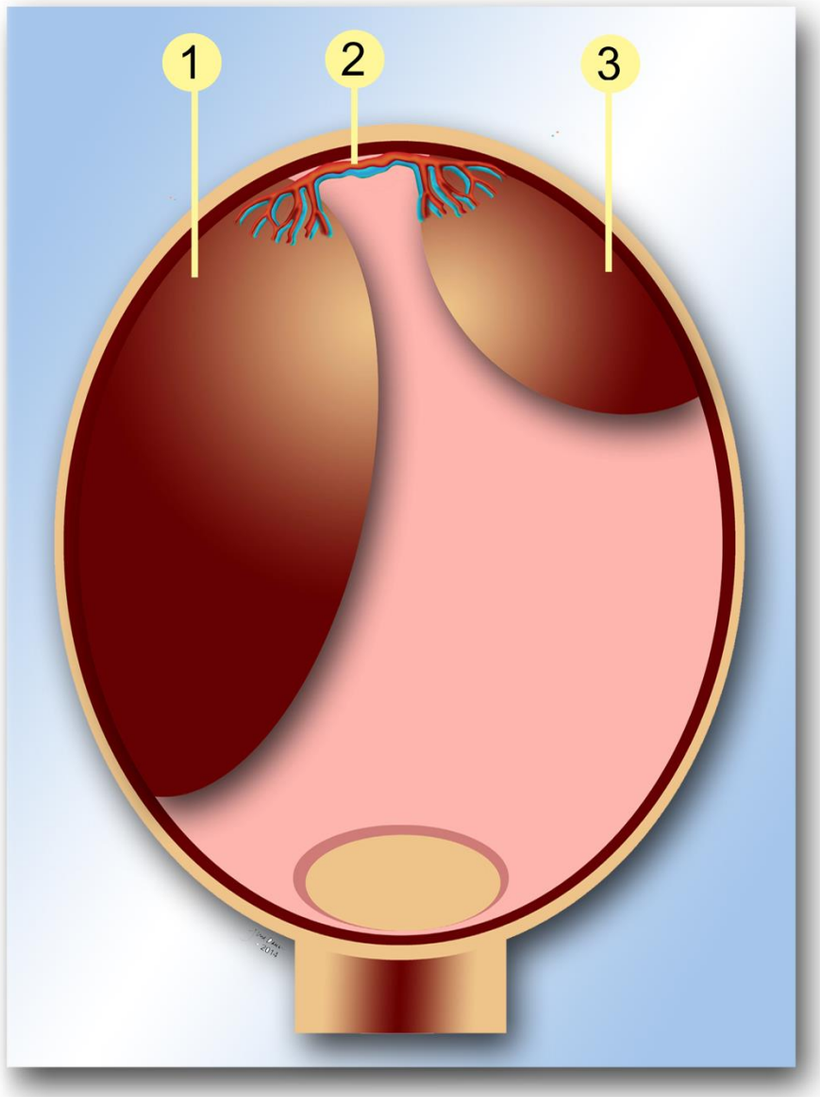
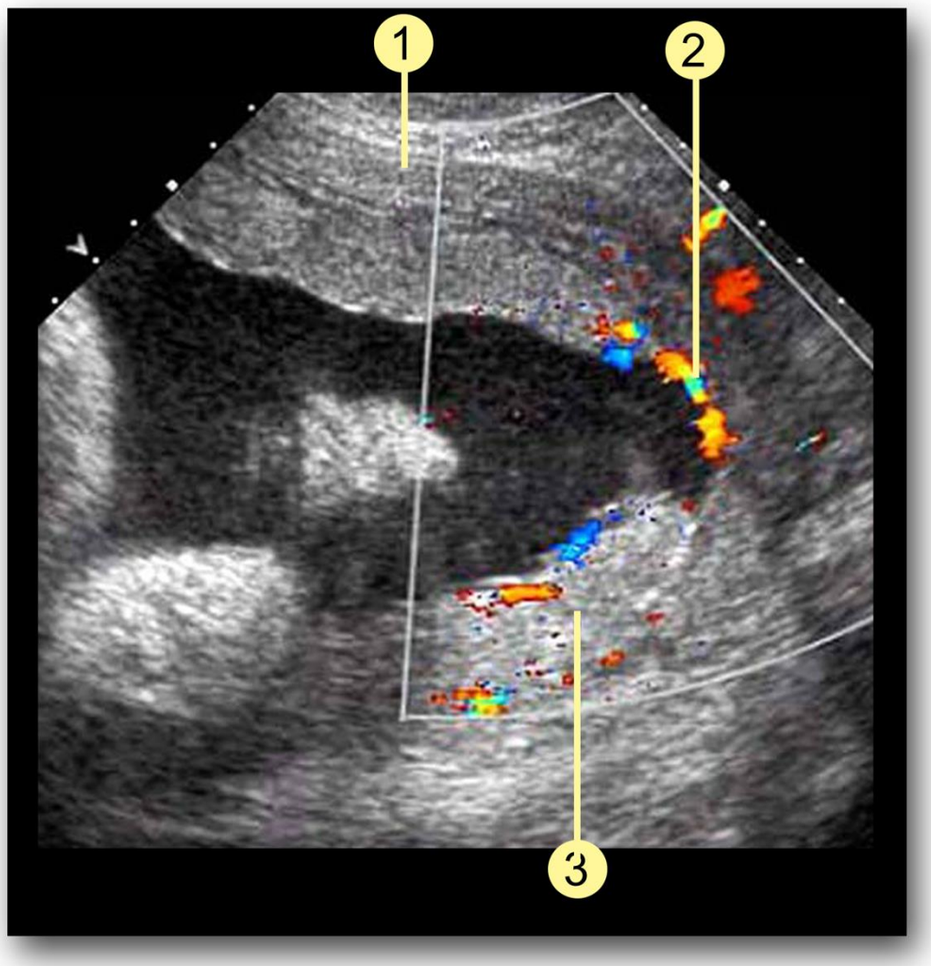
ACCESSORY VARIANTS



Succenturiate lobe



1 = main placental body
2 = connecting vasculature
3 = accessory lobe

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ACCESSORY VARIANTS

Succenturiate lobe

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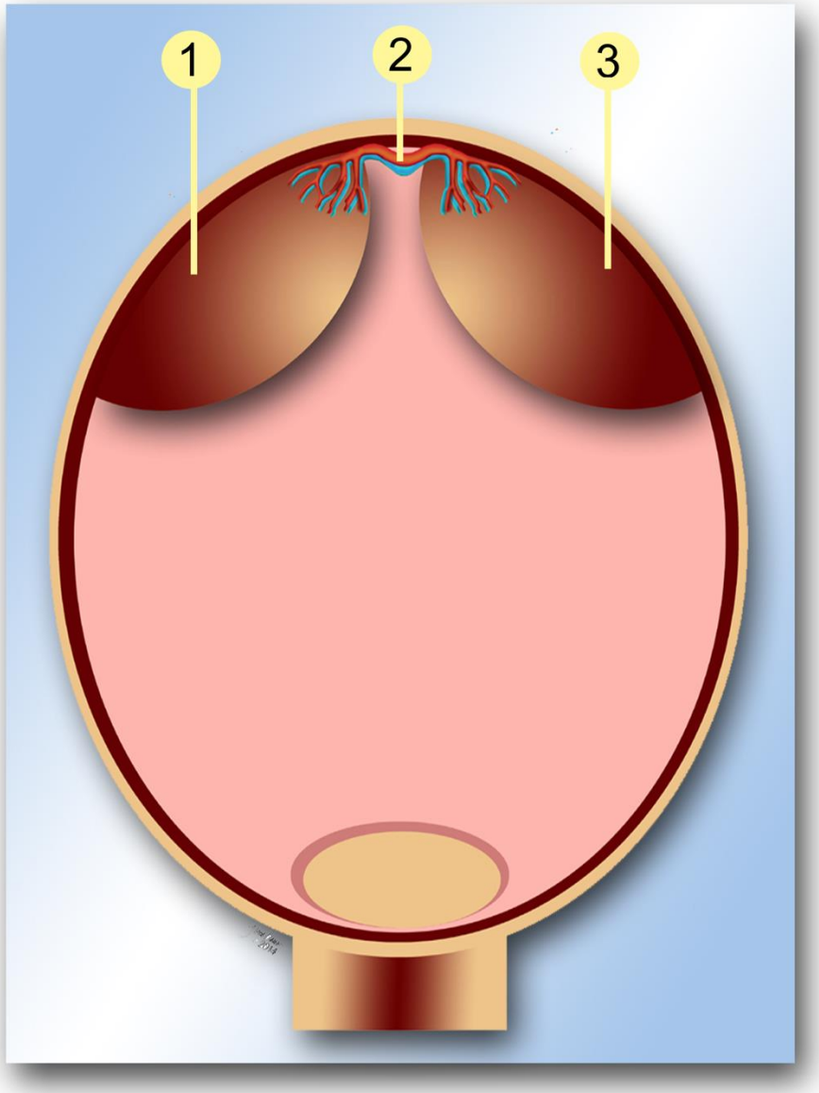
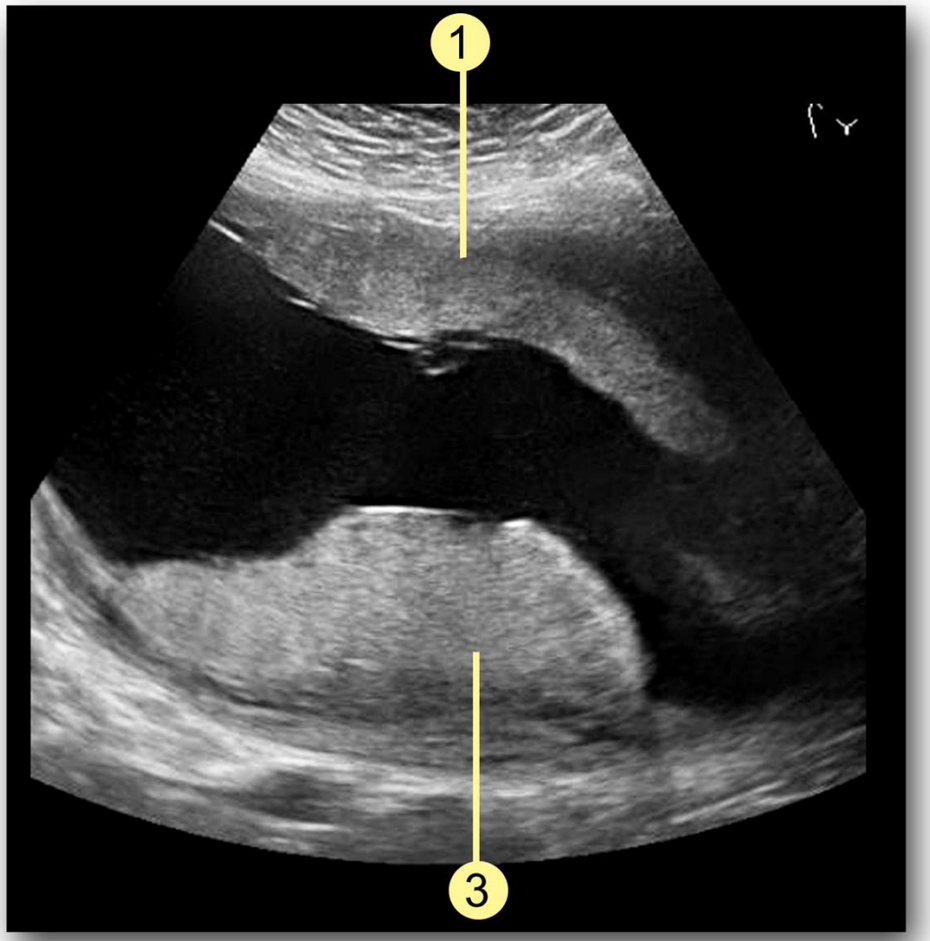
ACCESSORY VARIANTS





Bipartite placenta

1 = lobe 1
2 = connecting vasculature
3 = lobe 2

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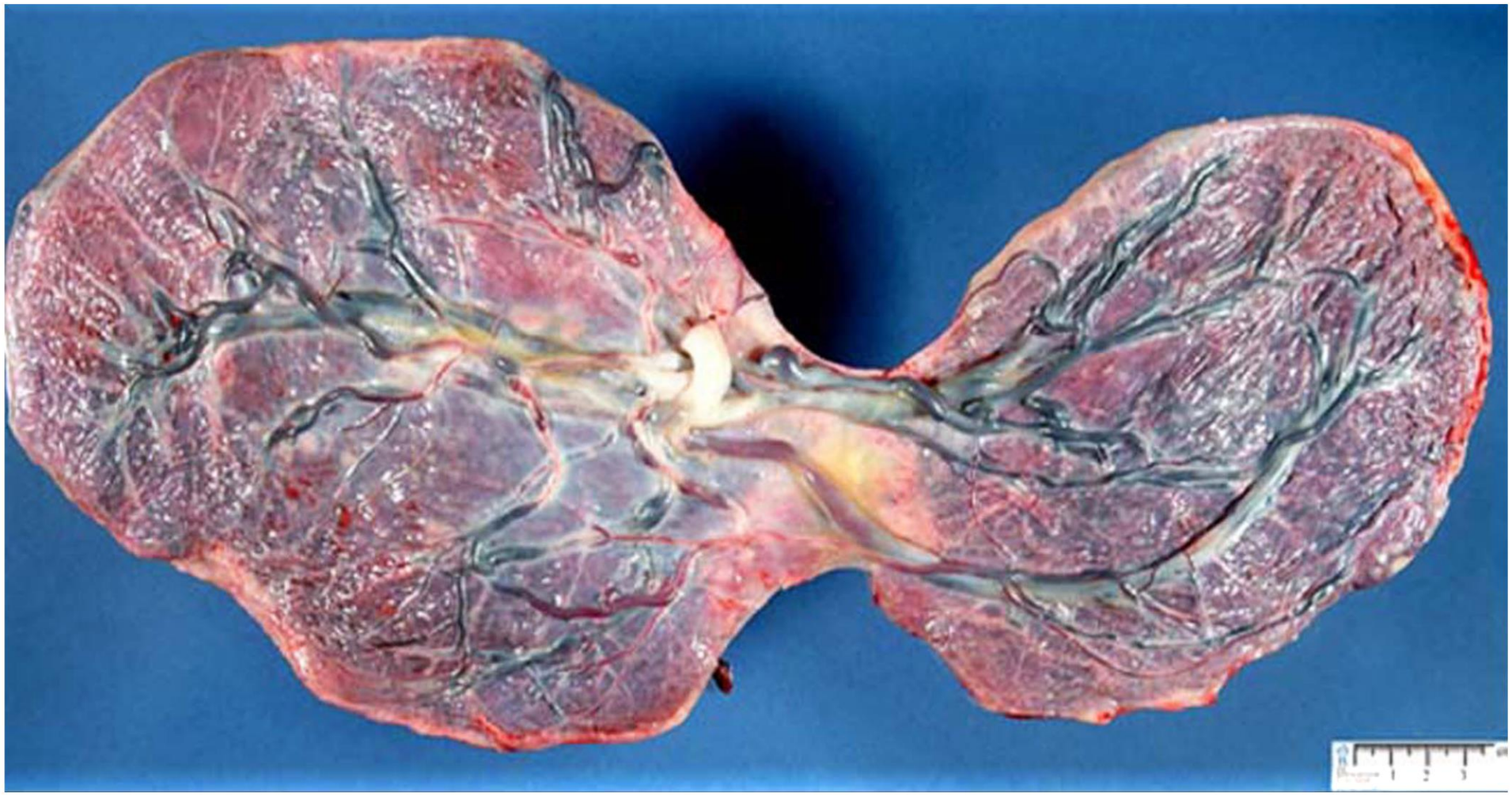
ACCESSORY VARIANTS



Bipartite placenta

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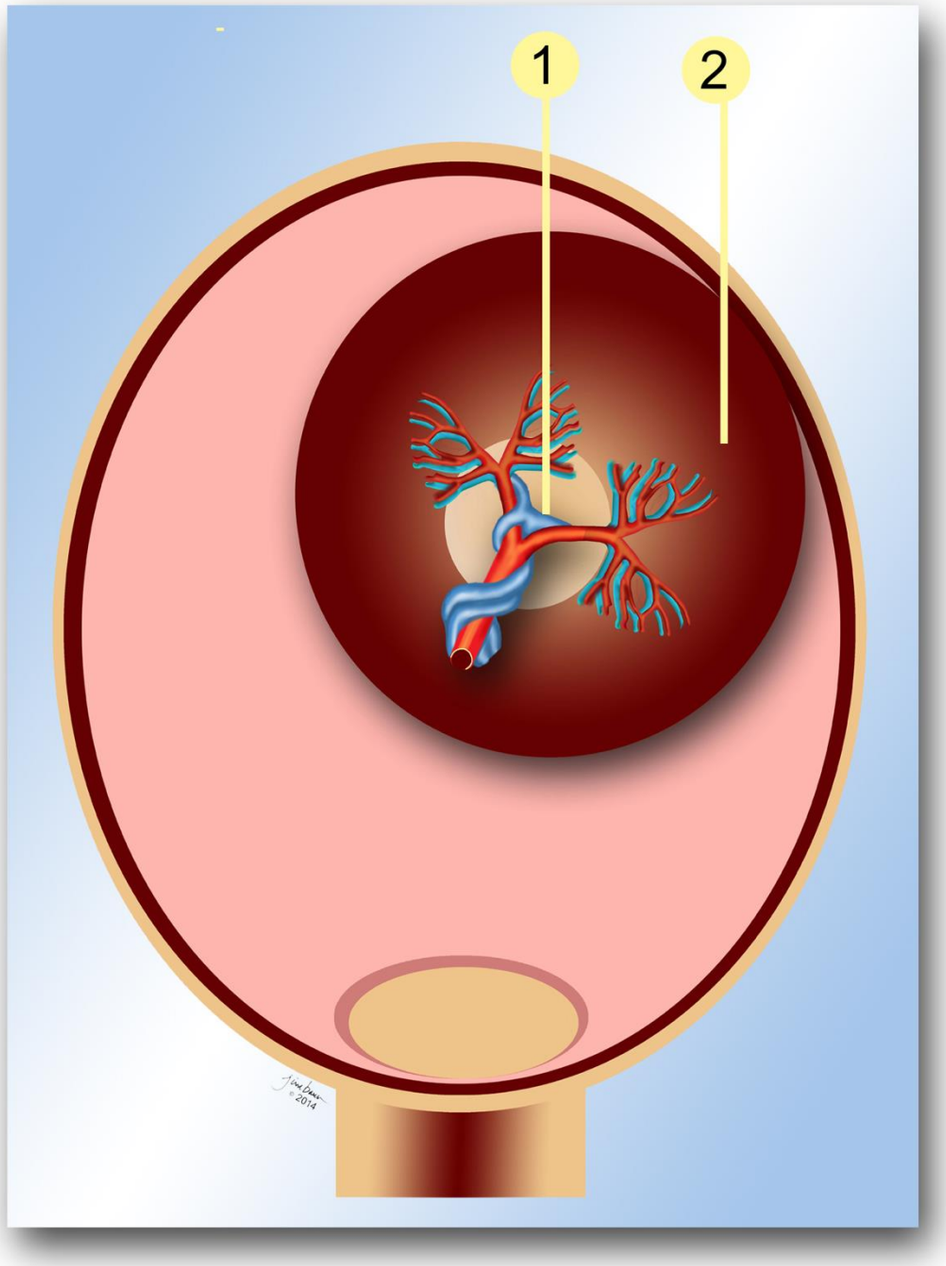
ACCESSORY VARIANTS

1 = central insertion of vessels
2 = disc-shaped placenta



Annular placenta

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Intraplacental Lesions

- *Placental calcifications*: a normal part of placental aging
- *Hypoechoic/cystic lesions*: common observation most of which are not clinically significant
  - Subchorionic lesions
  - Mid-placental lesions
  - Basal plate lesions

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INTRAPLACENTAL LESIONS

Placental calcifications

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Subchorionic Lesions

- Located immediately beneath chorionic membrane
- Typically thrombotic in nature:
  - Subamniotic hemorrhage
  - Subchorionic thrombosis

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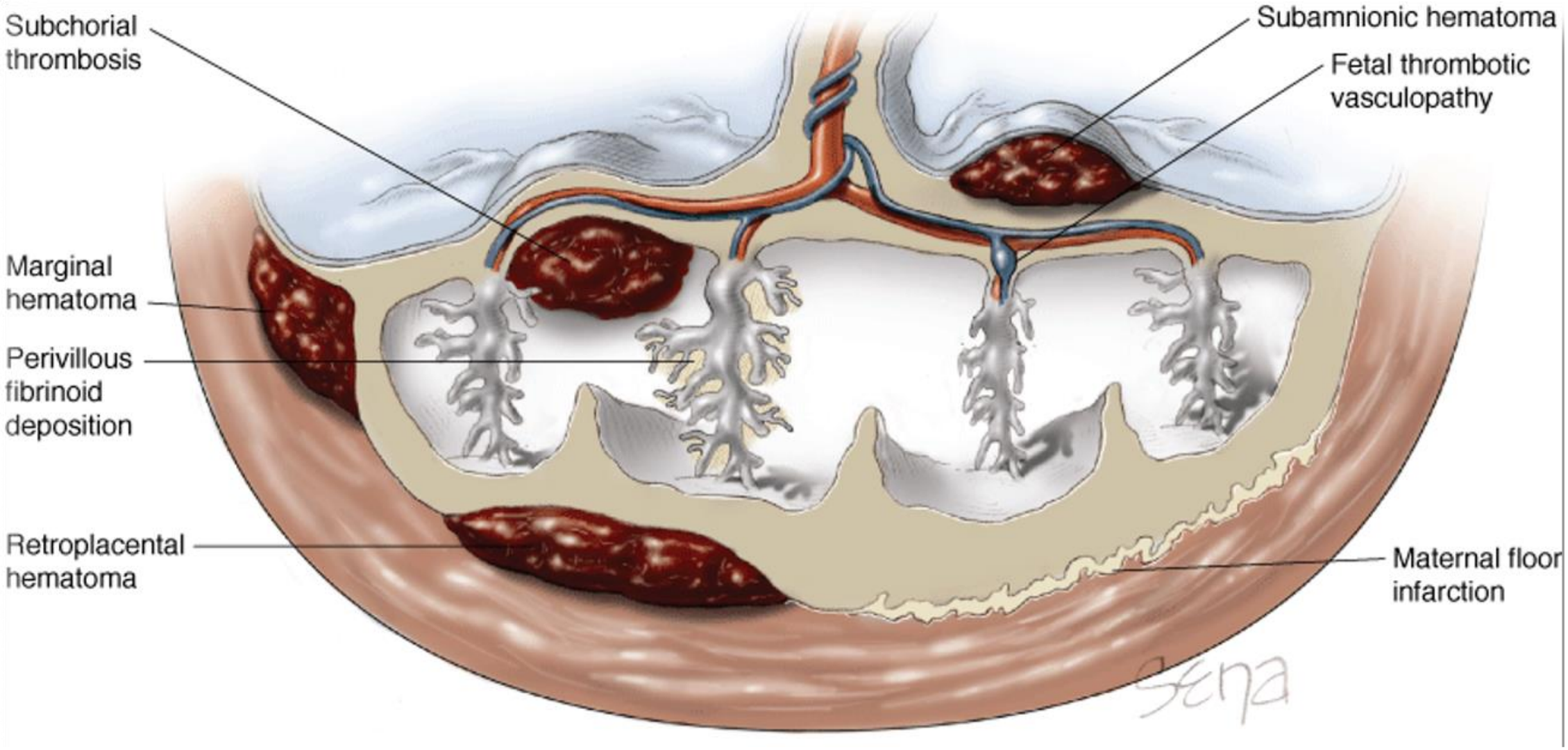
Subchorionic Lesions



SUBCHORIONIC LESIONS

Subamniotic hemorrhage

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SUBCHORIONIC LESIONS

Subchorionic thrombosis

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SUBCHORIONIC LESIONS

Subchorionic hematoma

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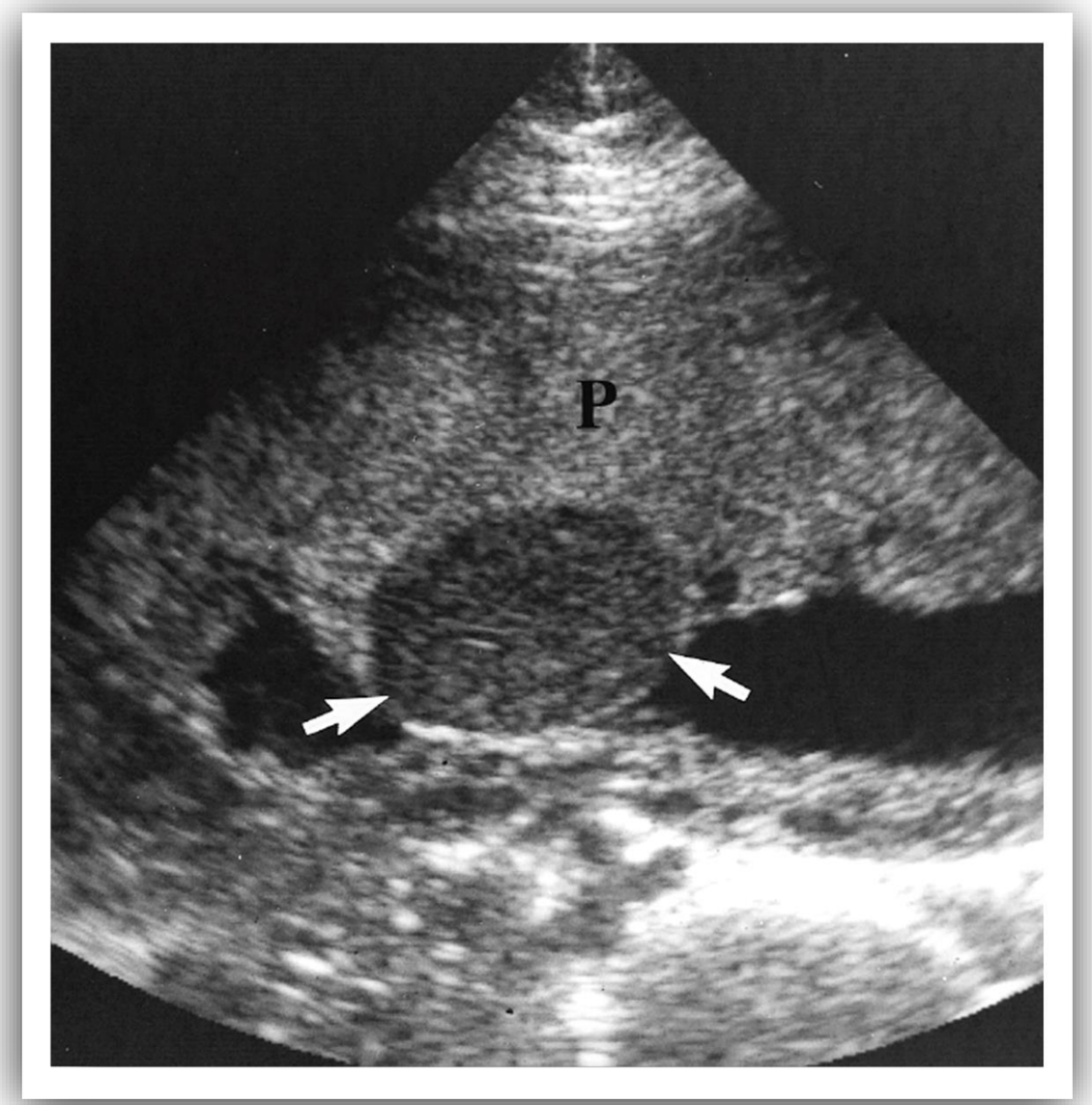
SUBCHORIONIC LESIONS



Subchorionic thrombosis

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Mid-Placental Lesions

- Found within the main placental body
- May be fluid collections or solid tissue:
  - Maternal lakes
  - Intervillous thrombosis

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MID-PLACENTAL LESIONS

Maternal lakes

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MID-PLACENTAL LESIONS

Intervillous thrombosis

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Basal Plate Lesions

- Found in the retroplacental region
- May present more significant clinical risk
  - Basal plate infarction
  - Basal plate hematoma
  - Placental abruption (*discussed later*)

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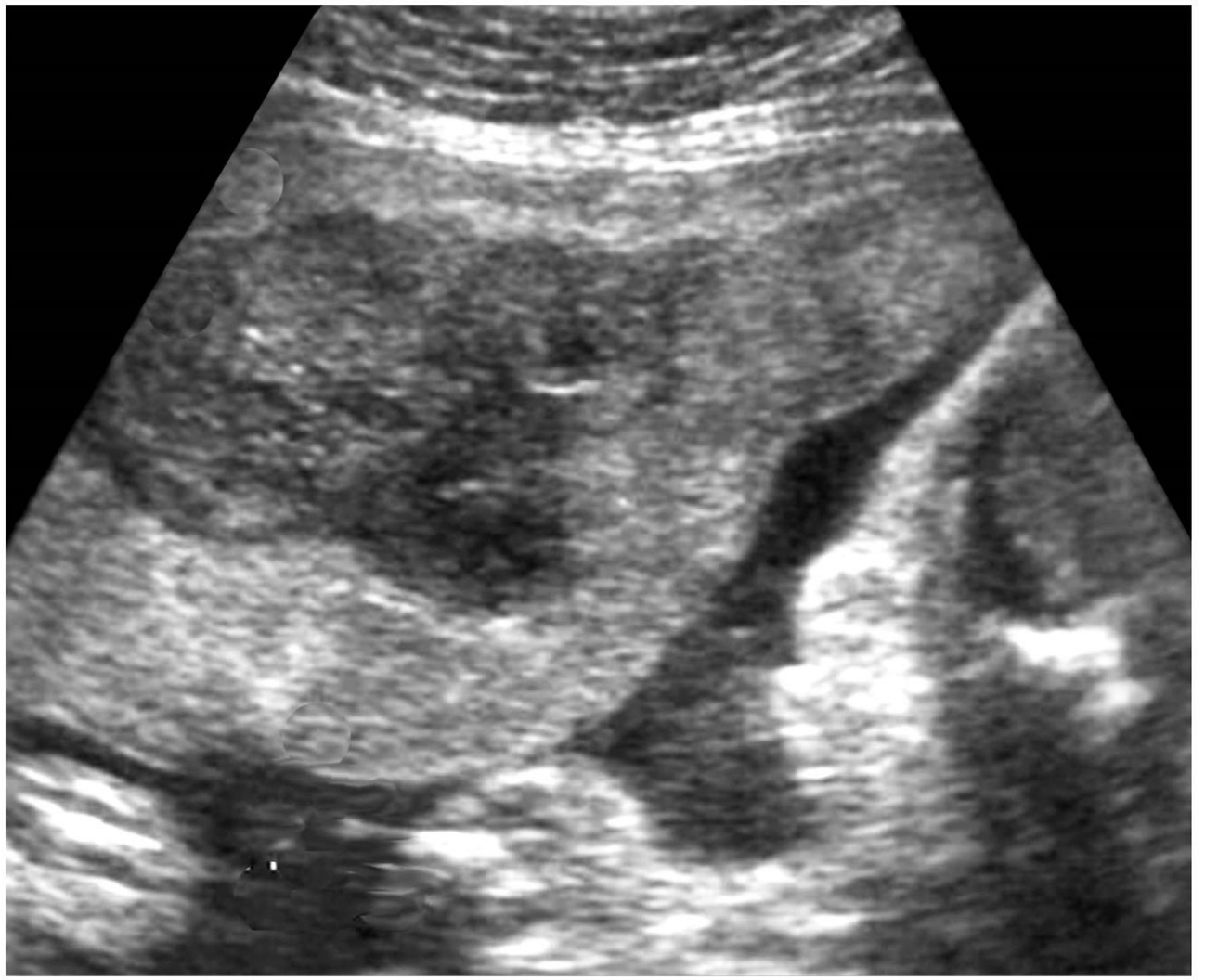
BASAL PLATE LESIONS



Basal plate infarction

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BASAL PLATE LESIONS

Basal plate hematoma

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Placental Pathology

- Categories of placental pathology include:
  - Placenta previa (*various classifications*)
  - Placental abruption
  - Abnormalities of adherence
  - Chorioangioma

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Placenta Previa

- Implantation of the placenta such that there is partial or complete coverage of the internal cervical os resulting in obstruction to descent of presenting part
- Frequency finding in earlier pregnancy. Usually regresses by term

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Placenta Previa

- Risk factors include:
  - Previous C-section
  - Previous abortion
  - Advanced maternal age
  - Multiparity
  - Cigarette smoking

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Placenta Previa

- Classifications of placenta previa are:
  - Complete previa
  - Partial previa
  - Marginal previa
  - Low lying placenta
  - Vasa previa

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Placenta Previa

- Clinical signs include:
  - Spotting during 1st and 2nd trimester
  - Sudden, painless, profuse bleeding in 3rd trimester
  - Occasionally mild cramping

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Complete Previa

- Complete covering of the internal os by placenta, membranes, or vasculature
- Sonographic signs include:
  - All or part of placenta covers internal cervical os

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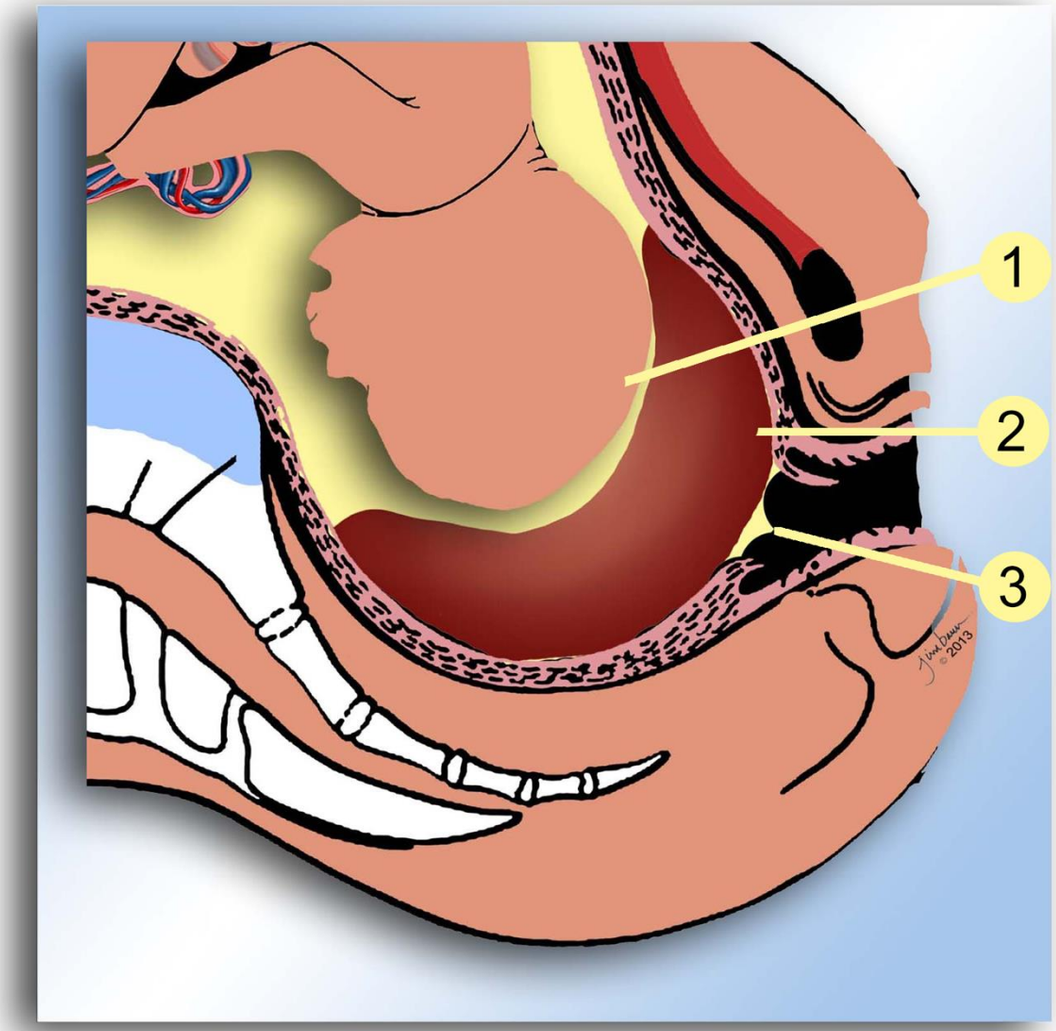
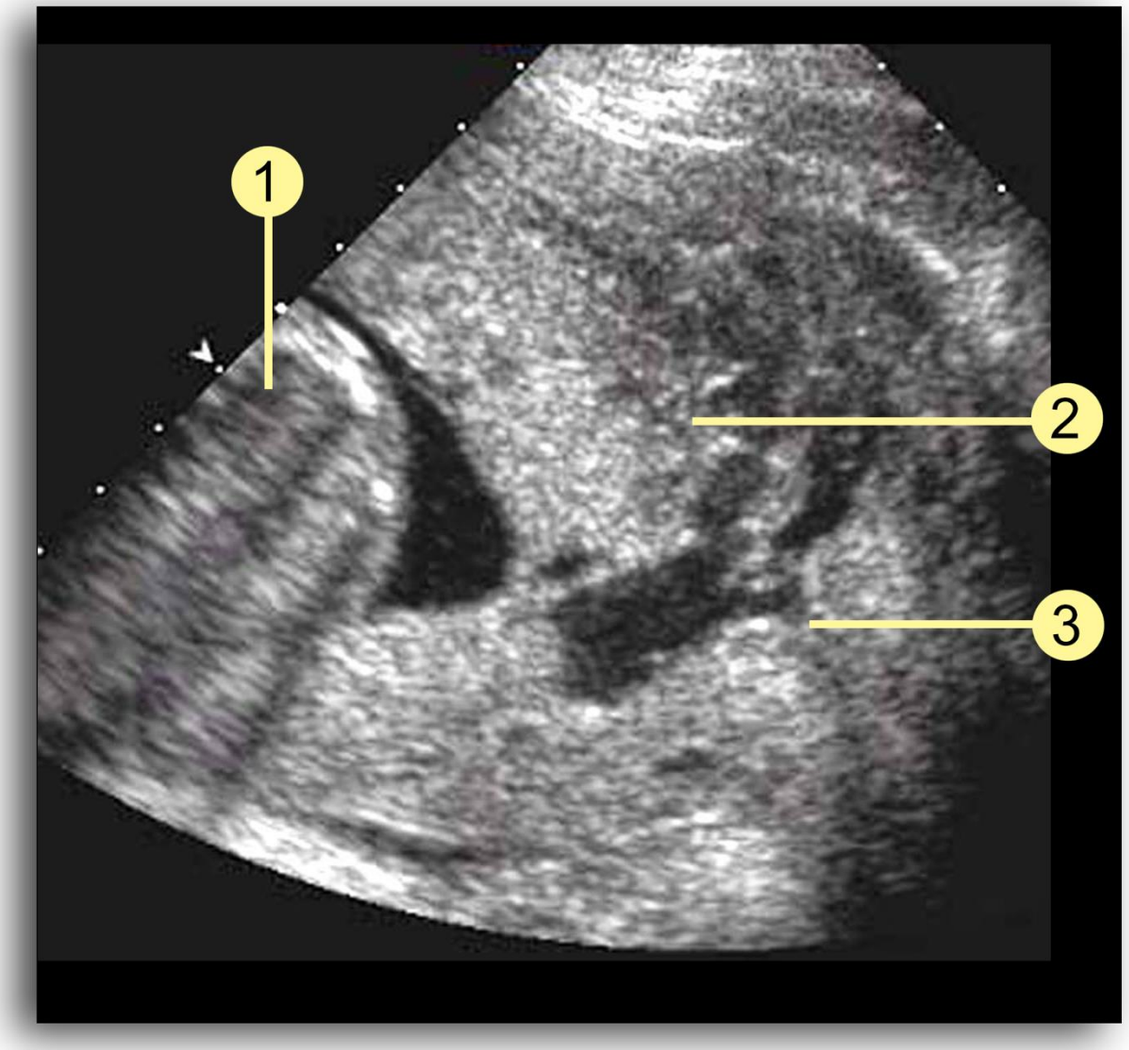
COMPLETE PREVIA





1 = fetal presenting part
2 = central placental implantation
3 = internal cervical os

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Partial Previa

- Incomplete covering of the internal os by placenta. Usually of little clinical significance
- Sonographic signs include:
  - Identification of placental tissue, retroplacental vasculature, or membranes partially covering internal cervical os
  - Differentiation of complete (non-centrally implanted) from partial sometimes impossible

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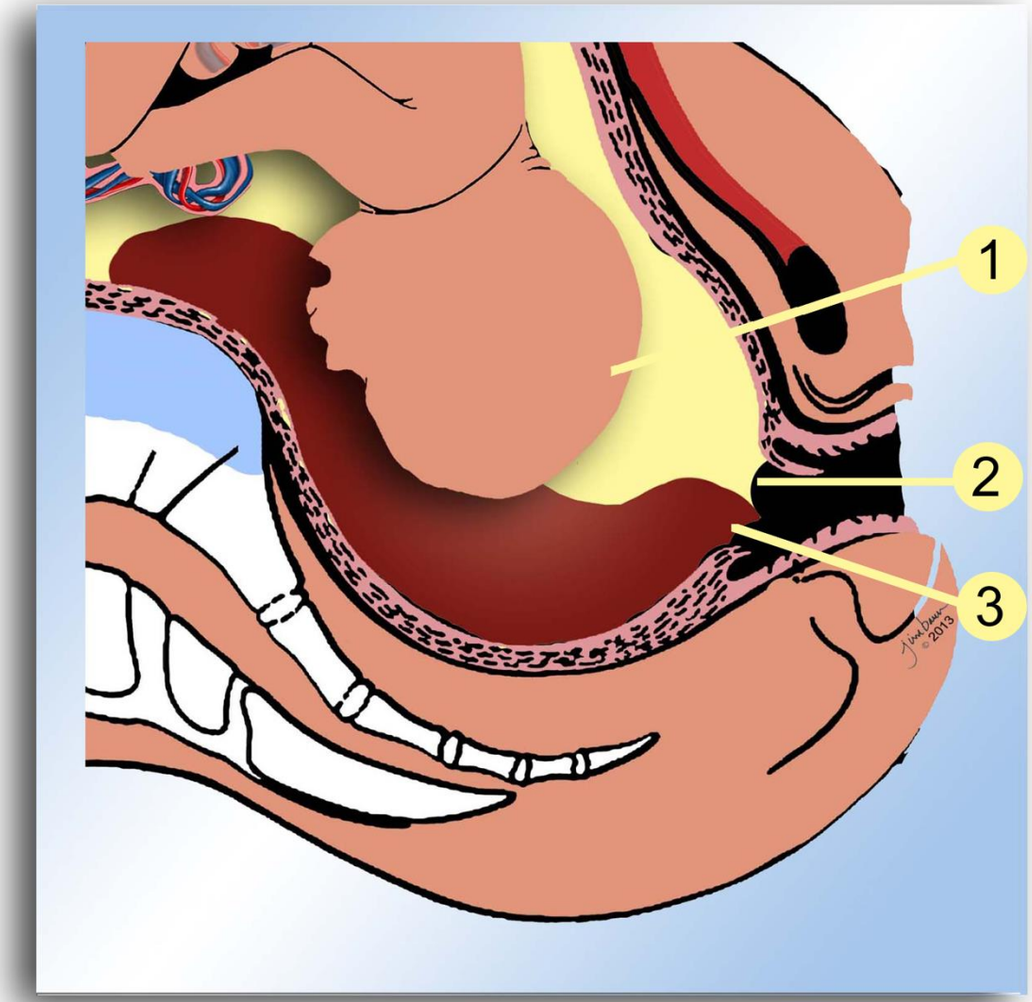
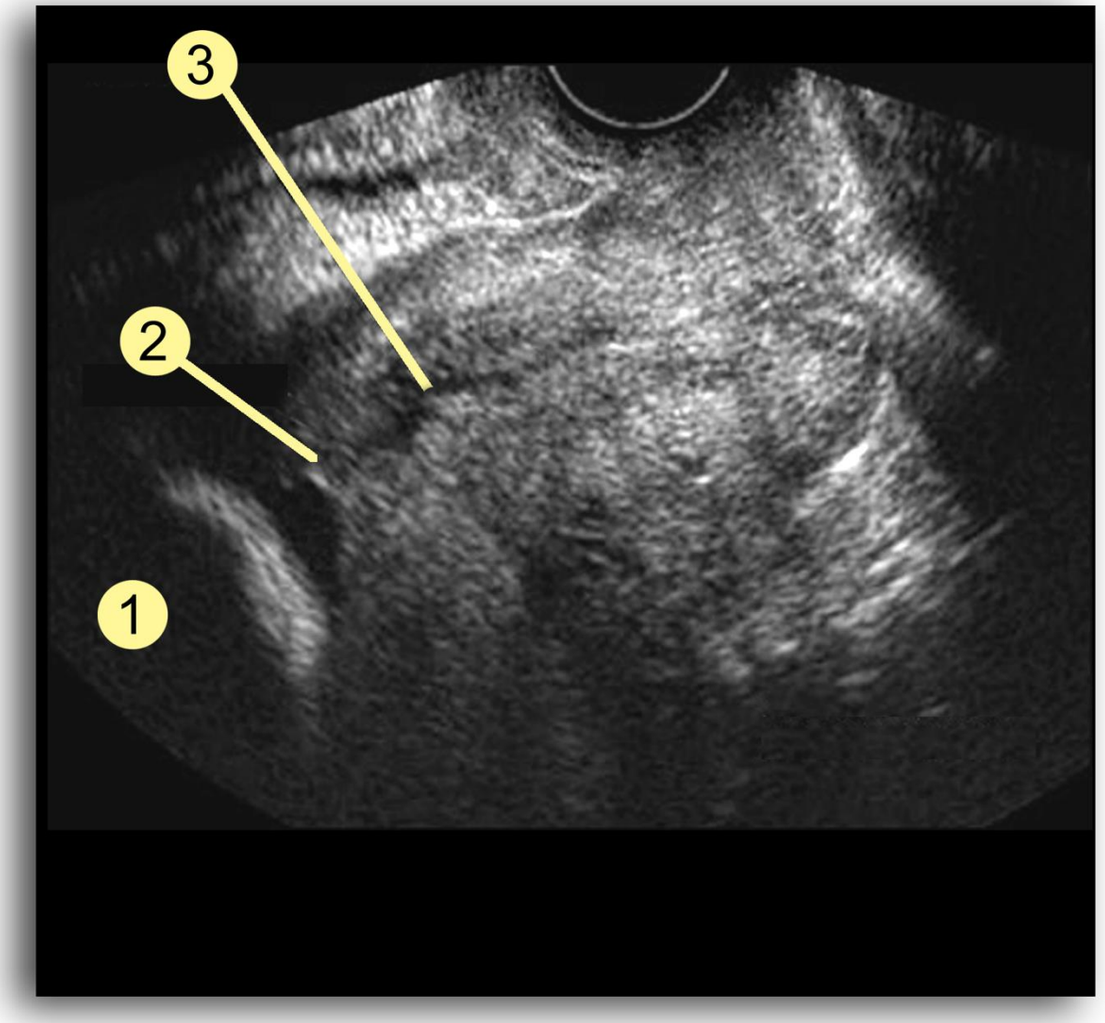
PARTIAL PREVIA





1 = fetal presenting part
2 = internal cervical os
3 = tip of placenta partially covering os

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Marginal Previa

- Placenta encroaches on internal cervical os but does not cover it
- Sonographic signs include:
  - Identification of placental tissue close to but not covering internal cervical os

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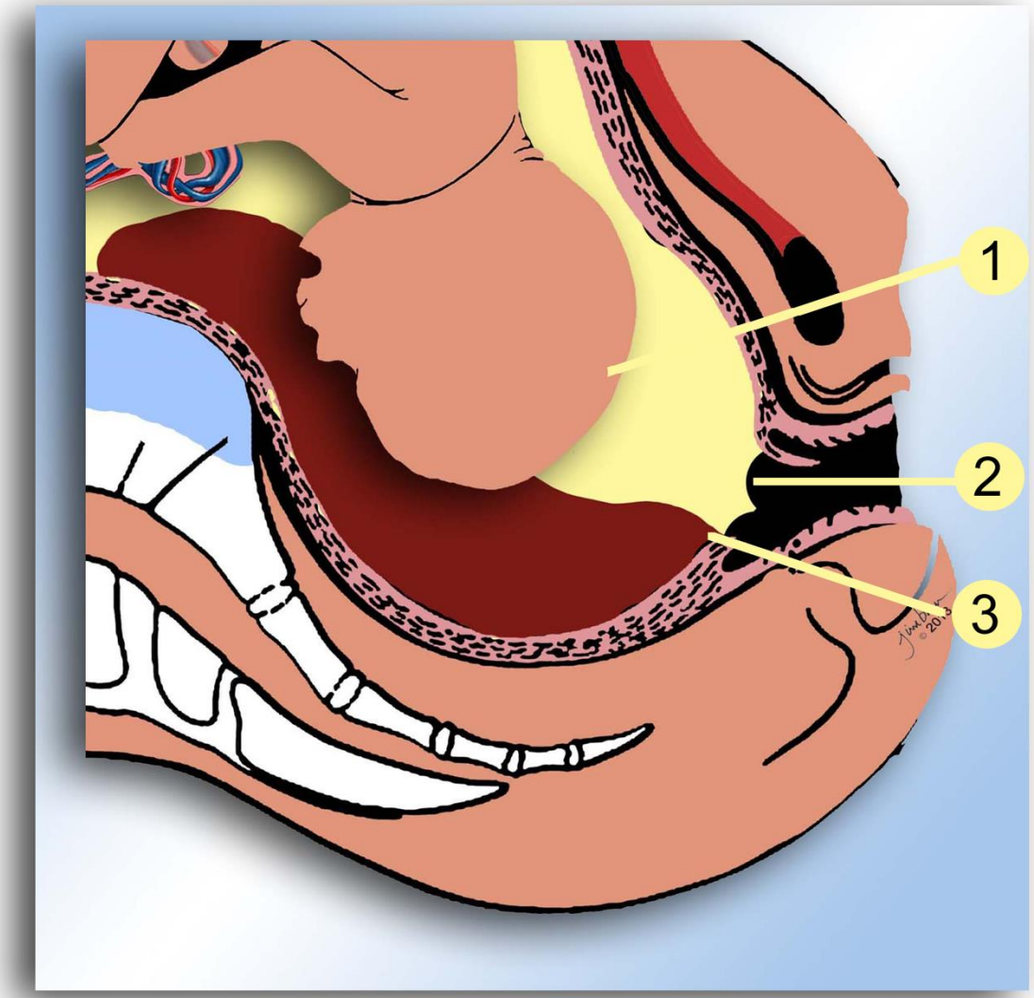
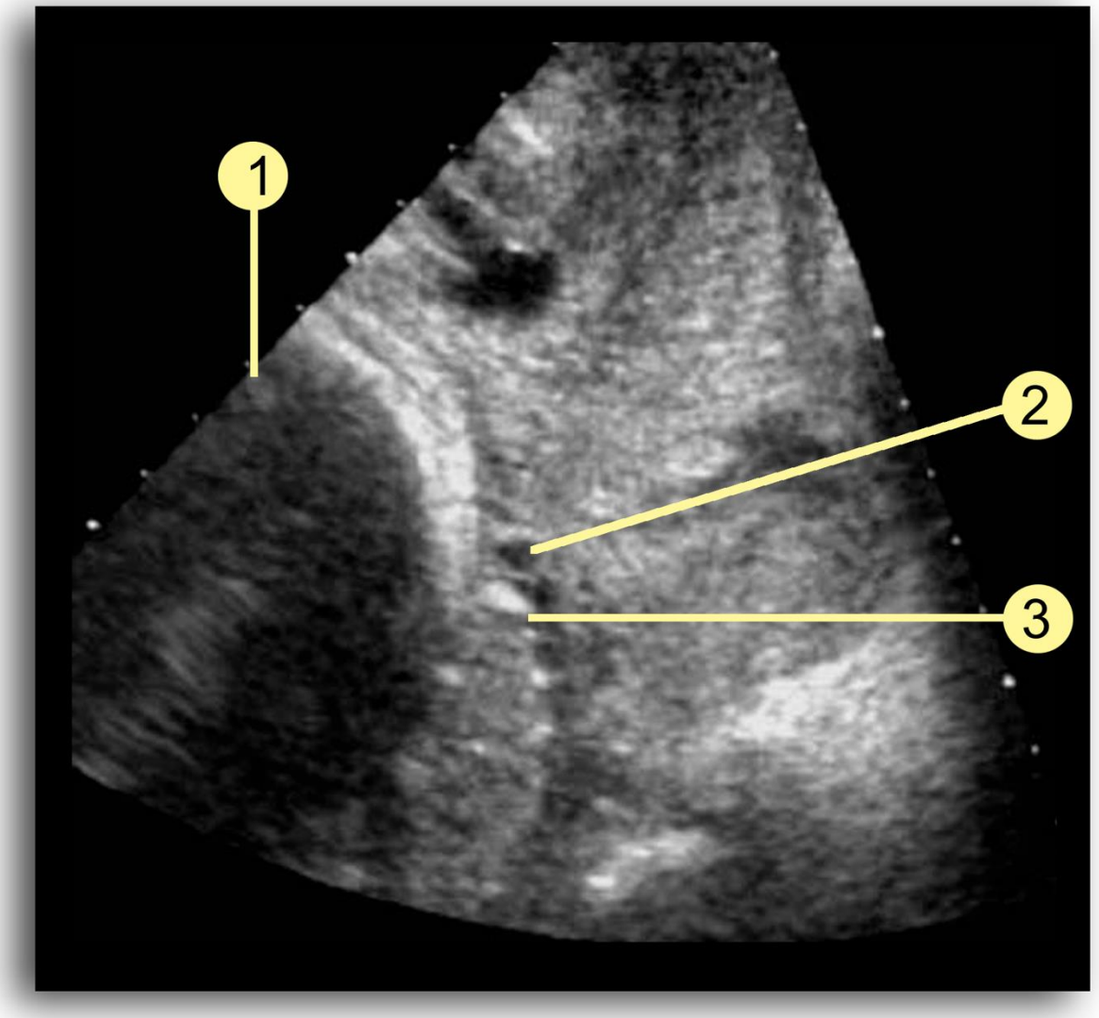
MARGINAL PREVIA





1 = fetal presenting part
2 = internal cervical os
3 = placenta encroaching on os

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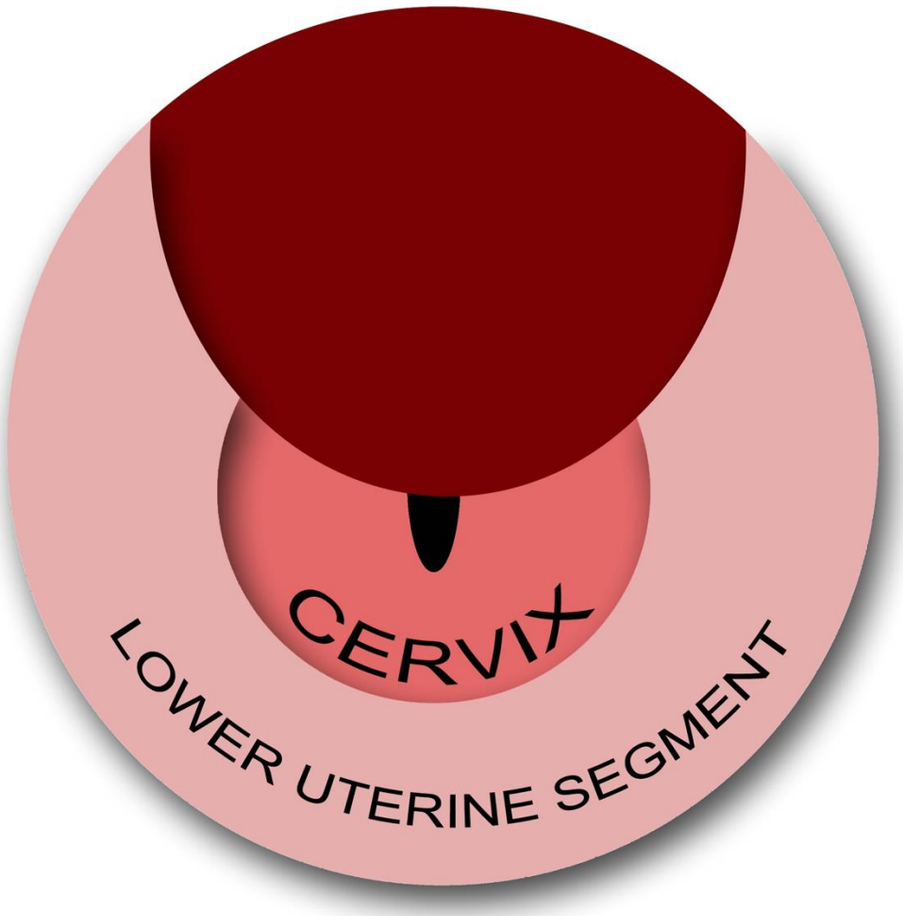
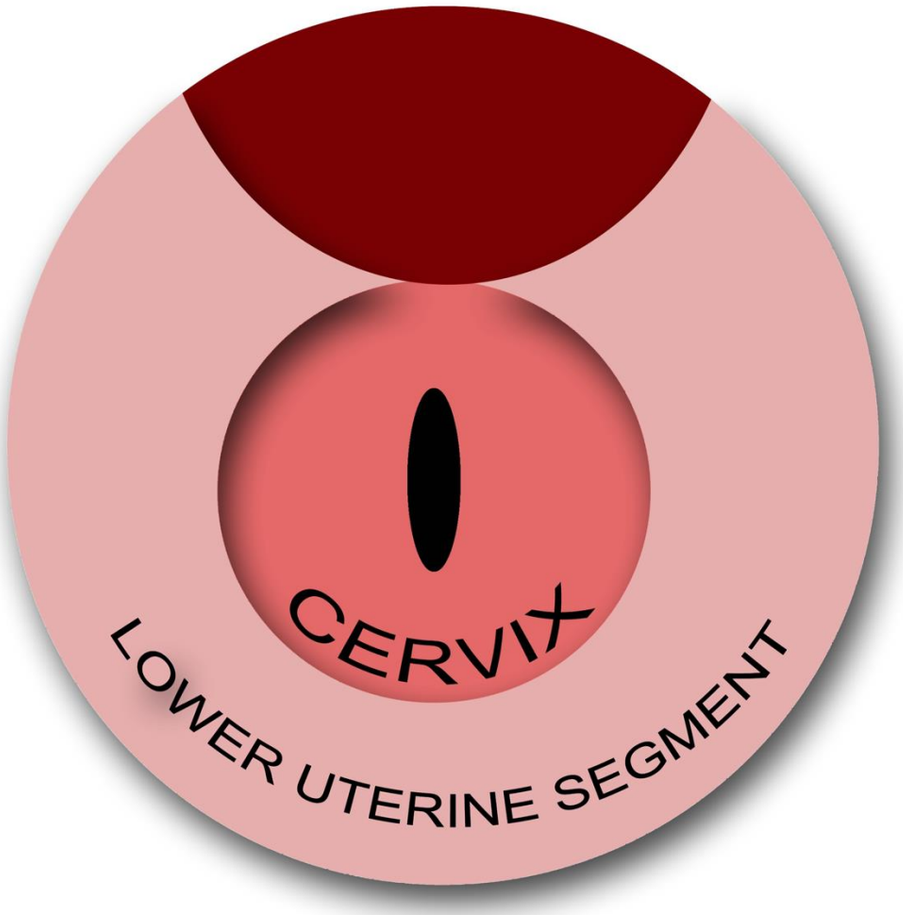
MARGINAL VS. PARTIAL PREVIA



Partial previa



Marginal previa

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Low Lying Placenta

- Lower edge of placenta within 2 cm of internal cervical os
- Sonographic signs include:
  - Identification of placental tissue in the lower uterine segment > 2cm above internal cervical os

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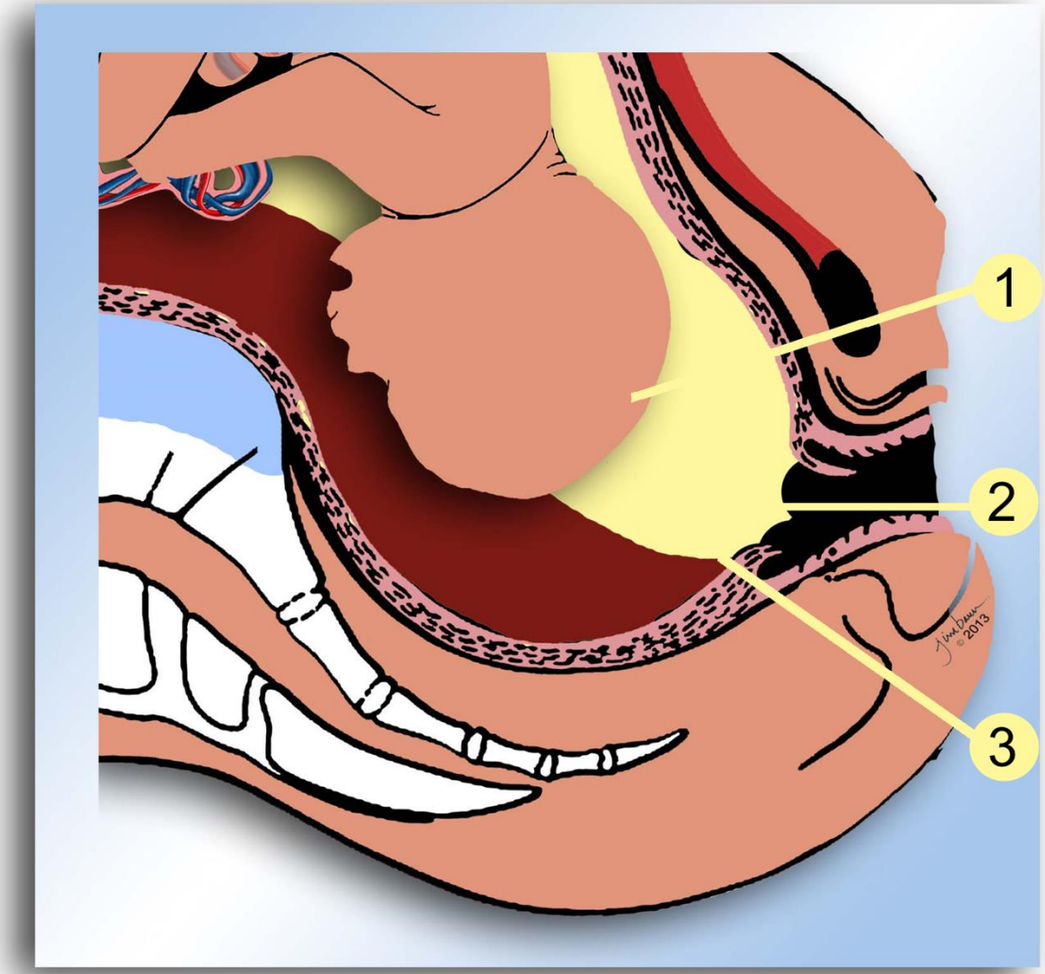
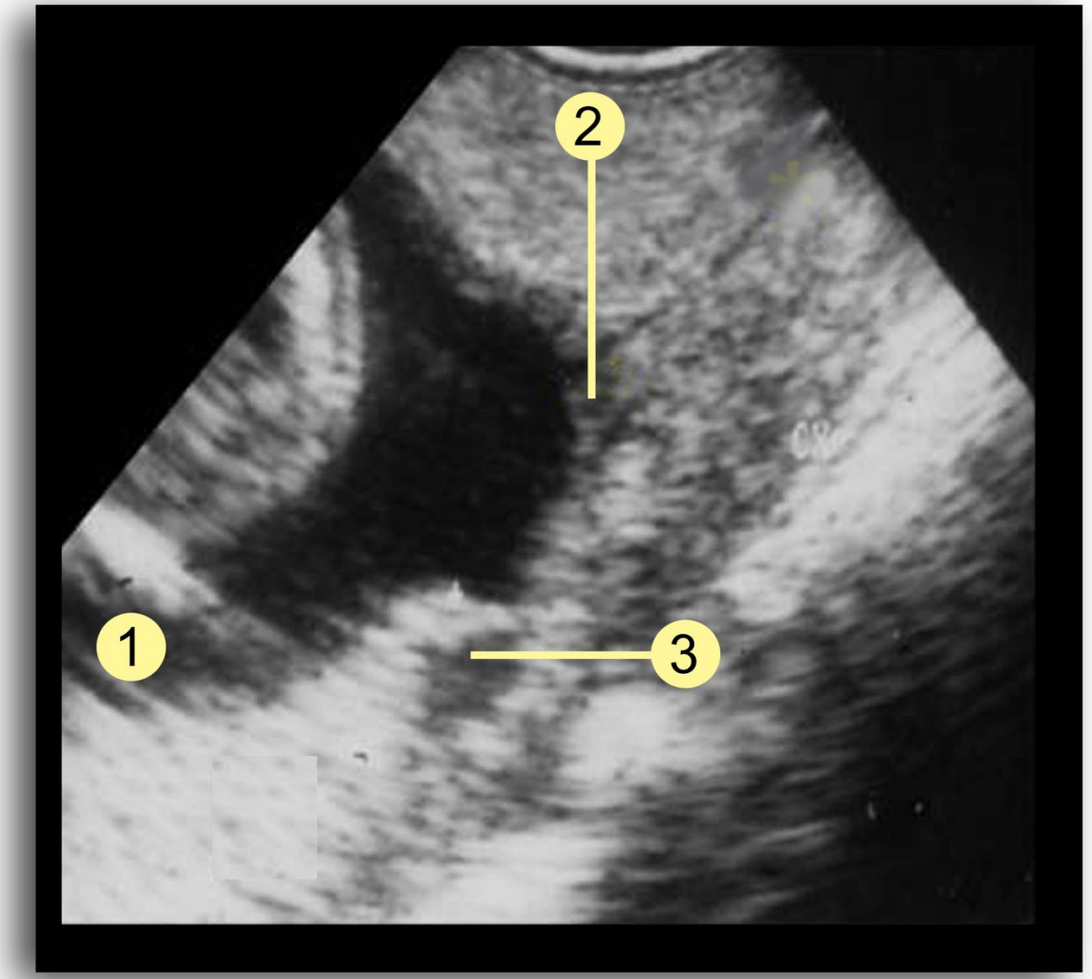
LOW LYING PLACENTA





1 = fetal presenting part
2 = internal cervical os
3 = placenta present in LUS

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Vasa Previa

- Clinically serious condition in which velamentously inserted cord vessels precede the fetal presenting part
- Body of placenta may be well away from os
- Sonographic signs include:
  - Identification of umbilical cord vasculature preceding the fetal presenting part
  - Color Doppler is a useful diagnostic aid

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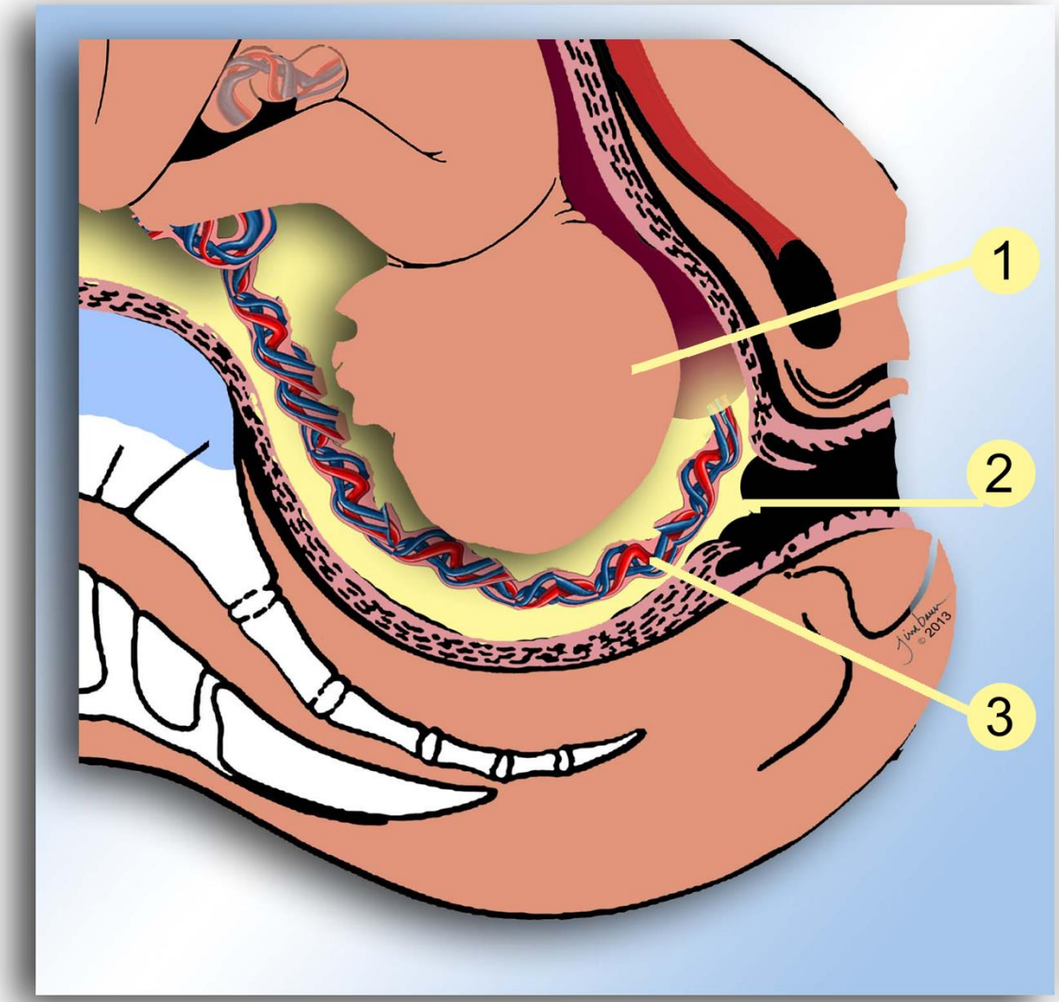
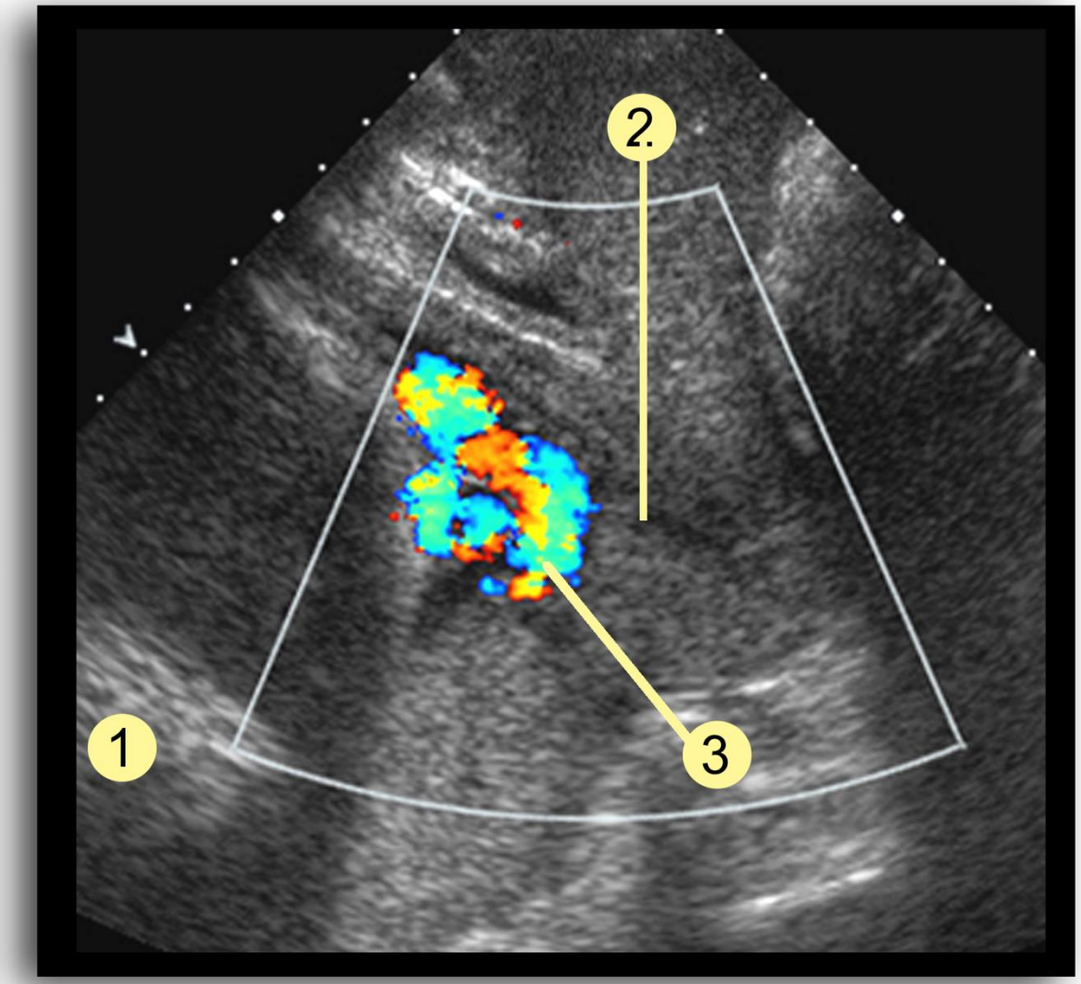
VASA PREVIA





1 = fetal presenting part
2 = internal cervical os
3 = cord vessels

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Placental Abruption

- Also called *abruptio placentae*, it is the premature separation of a normally implanted placenta from the uterine wall
- Classifications of placental abruption are:
  - Concealed
  - External
  - Chronic retroplacental hematoma
  - Marginal and subchorionic hemorrhage

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Placental Abruption

- Risk factors include:
  - Abdominal trauma
  - Maternal hypertension
  - Cocaine use

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Placental Abruption

- Clinical signs:
  - Uterine pain
  - Spastic uterus
  - Extensive vaginal bleeding (if external type)
  - Fetal distress
  - Hypovolemic shock
  - Disseminated intravascular coagulopathy (DIC)

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Placental Abruption

- Sonographic signs:
  - Depends on type of abruption and whether blood remains *in utero* or passes *per vaginum*
  - Placenta may be elevated from uterine wall
  - Retroplacental sonolucent or complex mass representing blood and/or hematoma
  - Normal, thickened, or heterogeneous appearance of placenta

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Concealed Abruption

- Hemorrhage confined to uterine cavity
- Occurs in ≈ 20% of cases
- May be diagnosed sonographically
- Detachment of placenta may be partial or complete

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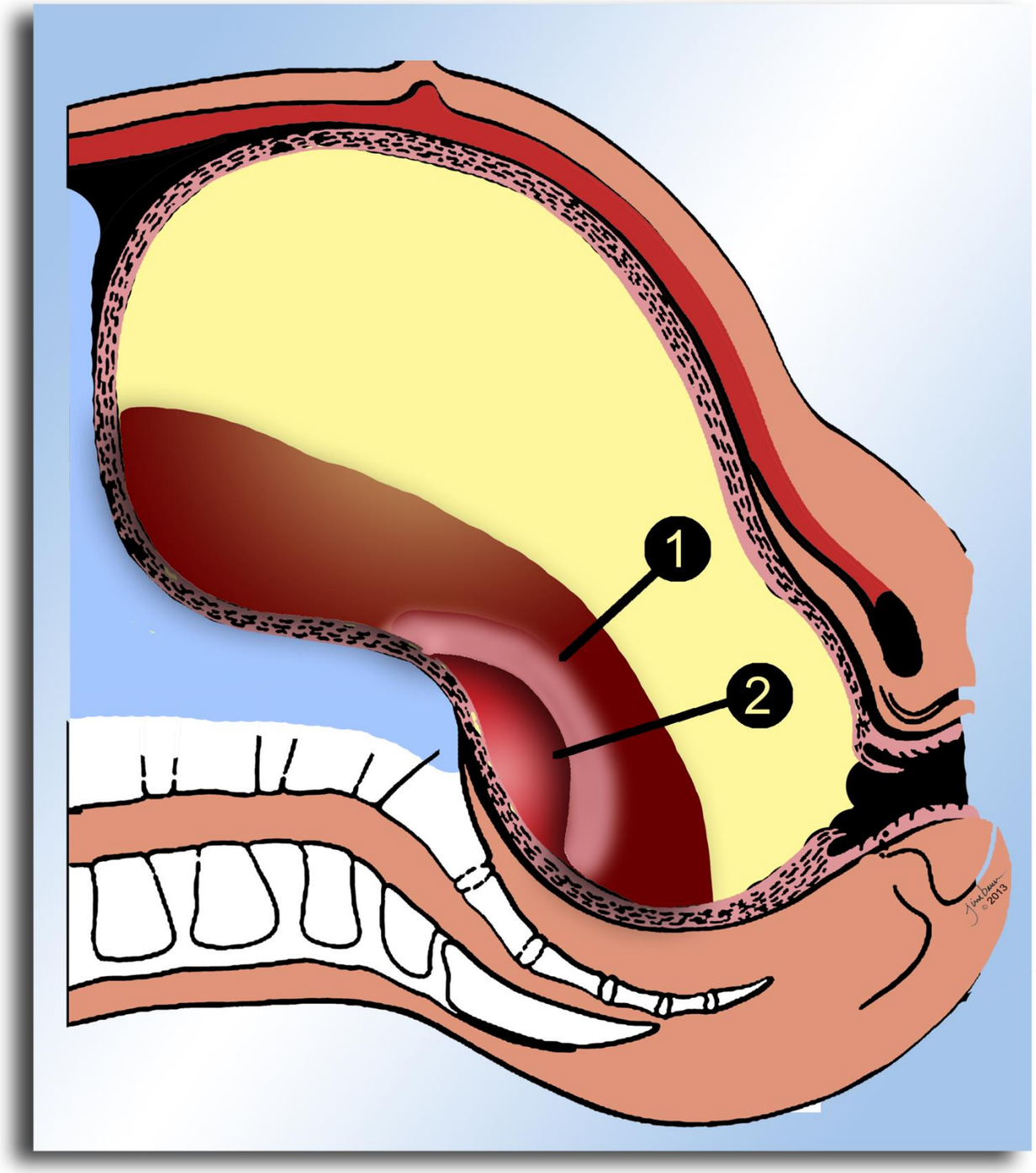
CONCEALED ABRUPTION

1 = elevated placenta
2 = retroplacental bleeding



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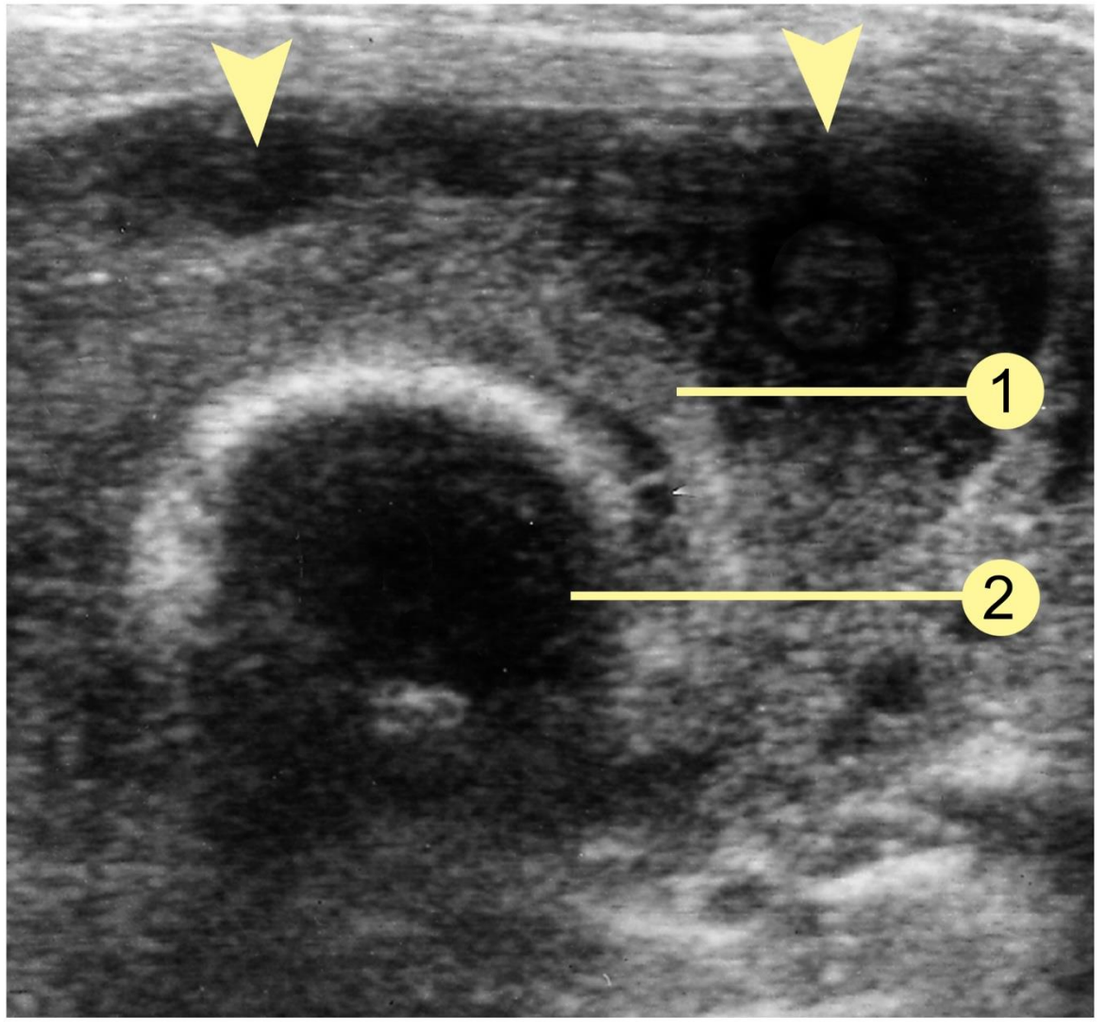
CONCEALED ABRUPTION

1 = elevated placenta
2 = fetal head



Arrows = retroplacental hematoma

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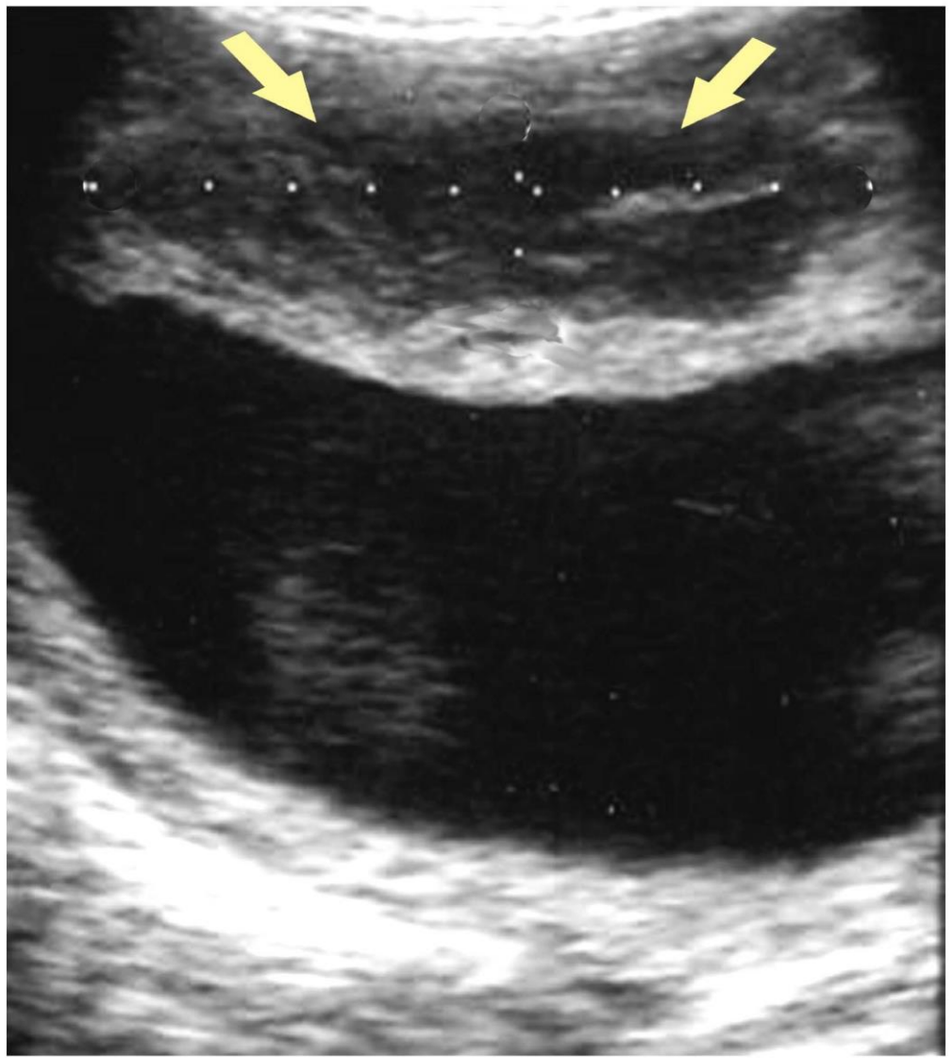
CONCEALED ABRUPTION



Arrows = retroplacental blood collection

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External Abruption

- Hemorrhage drains *per vaginum*
- May not be diagnosed sonographically if no blood remains in the retroplacental space
- Detachment is usually not as severe

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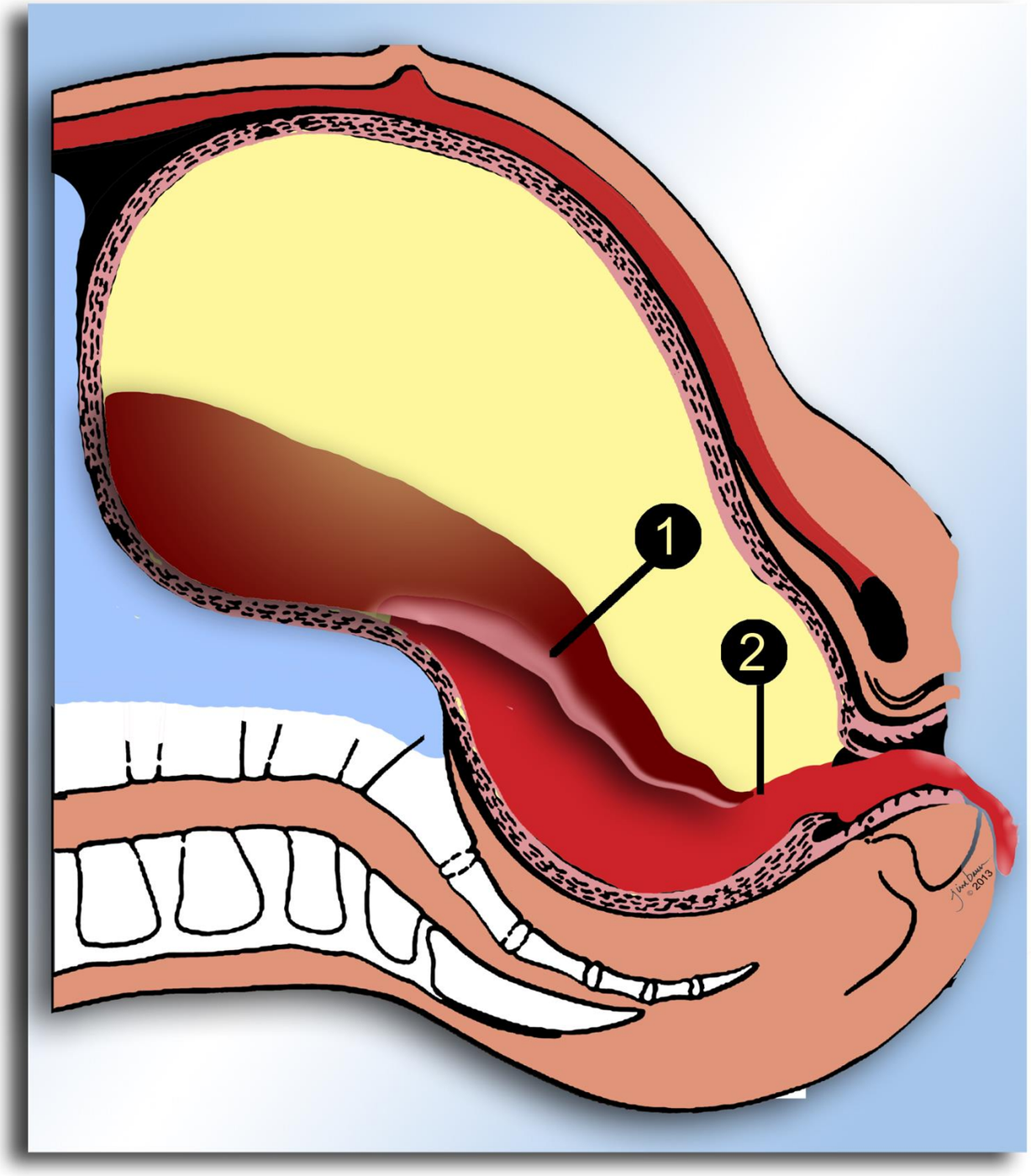
EXTERNAL ABRUPTION

1 = elevated placenta
2 = bleeding *per vaginum*



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Chronic Retroplacental Hematoma

- Persistence of unresolved blood clot in retroplacental space as result of of small placental abruption
- Usually, no association with clinical problems or poor outcome
- Typically resolve spontaneously
- May result in maternal disseminated intravascular coagulopathy (DIC)

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Marginal & Subchorionic Hemorrhage

- Hemorrhage and clot located at edge of placenta
- Usually no association with clinical problems or poor outcome
- Typically resolve spontaneously

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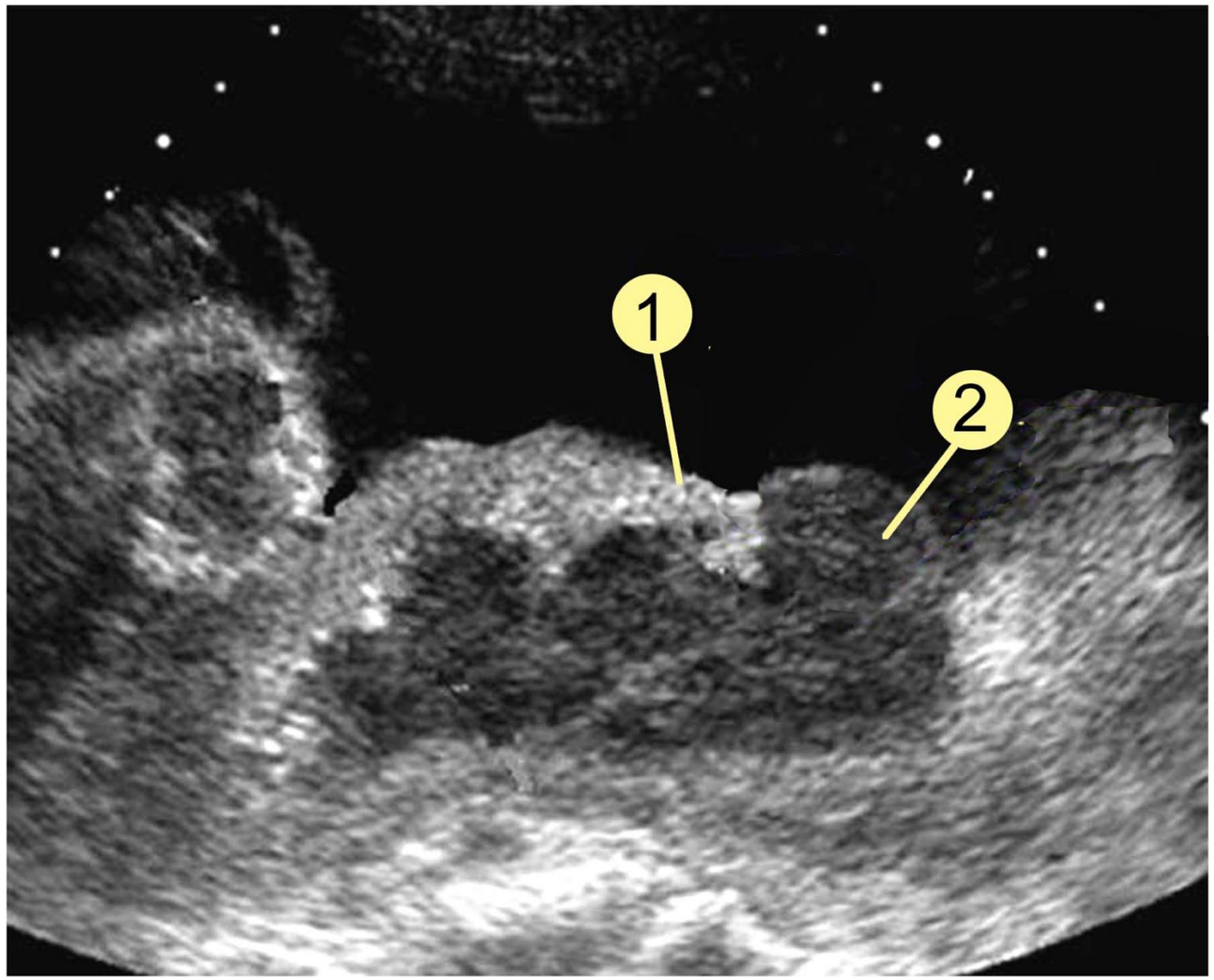
MARGINAL HEMORRHAGE

1 = elevated placenta
2 = marginal hematoma



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Abnormalities of Adherence

- Deficiency of decidua during implantation may cause placental villi to adhere directly to myometrium
- Classifications are:
  - *Placenta accreta*: villi attach to myometrium but do not invade
  - *Placenta increta*: villi invade deeply into myometrium
  - *Placenta percreta*: villi penetrate through the myometrium and serosal layer and may result in uterine rupture and invasion of parauterine tissues

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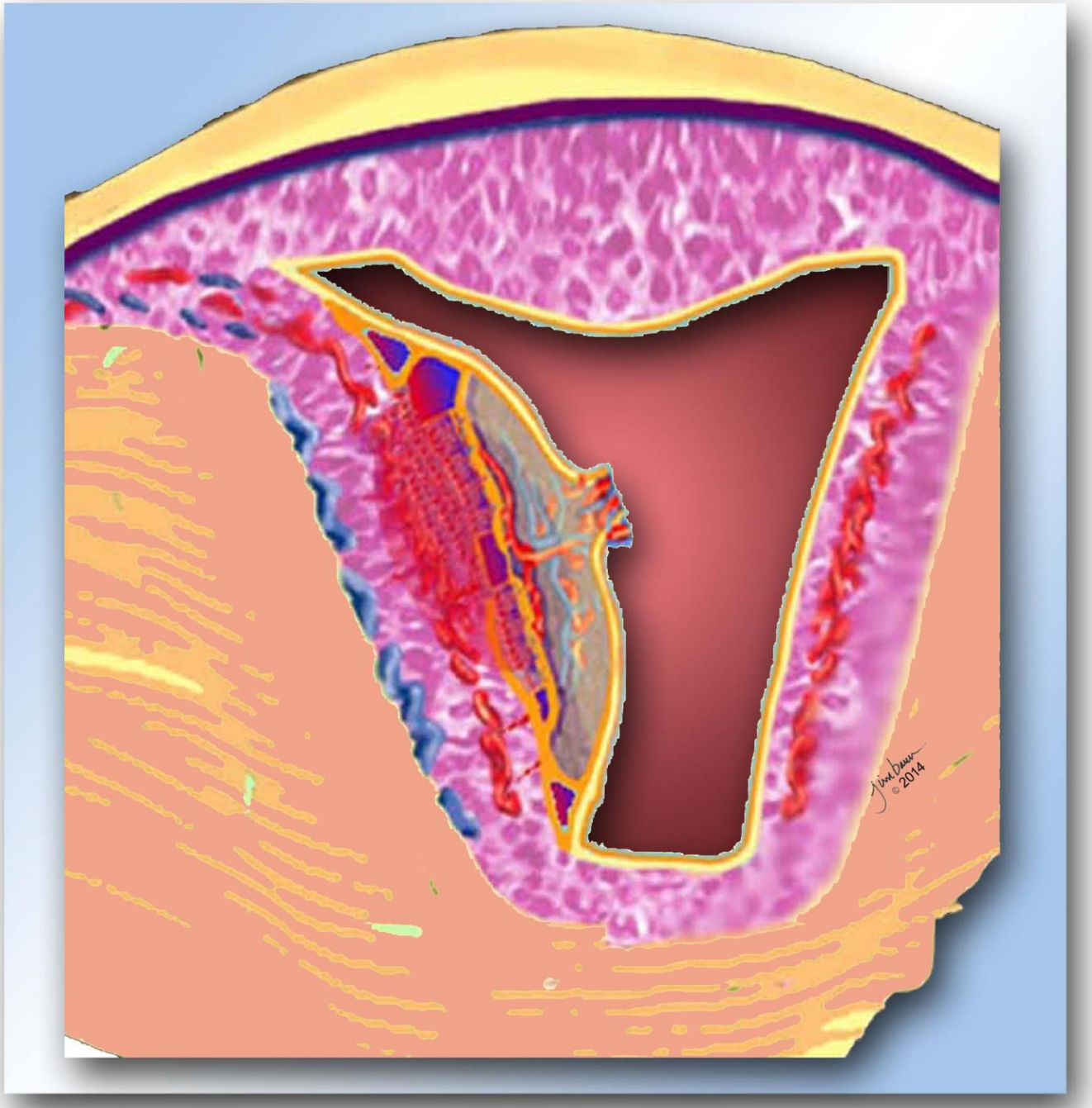
PLACENTA ACCRETA



Villi attach to myometrium but do not invade

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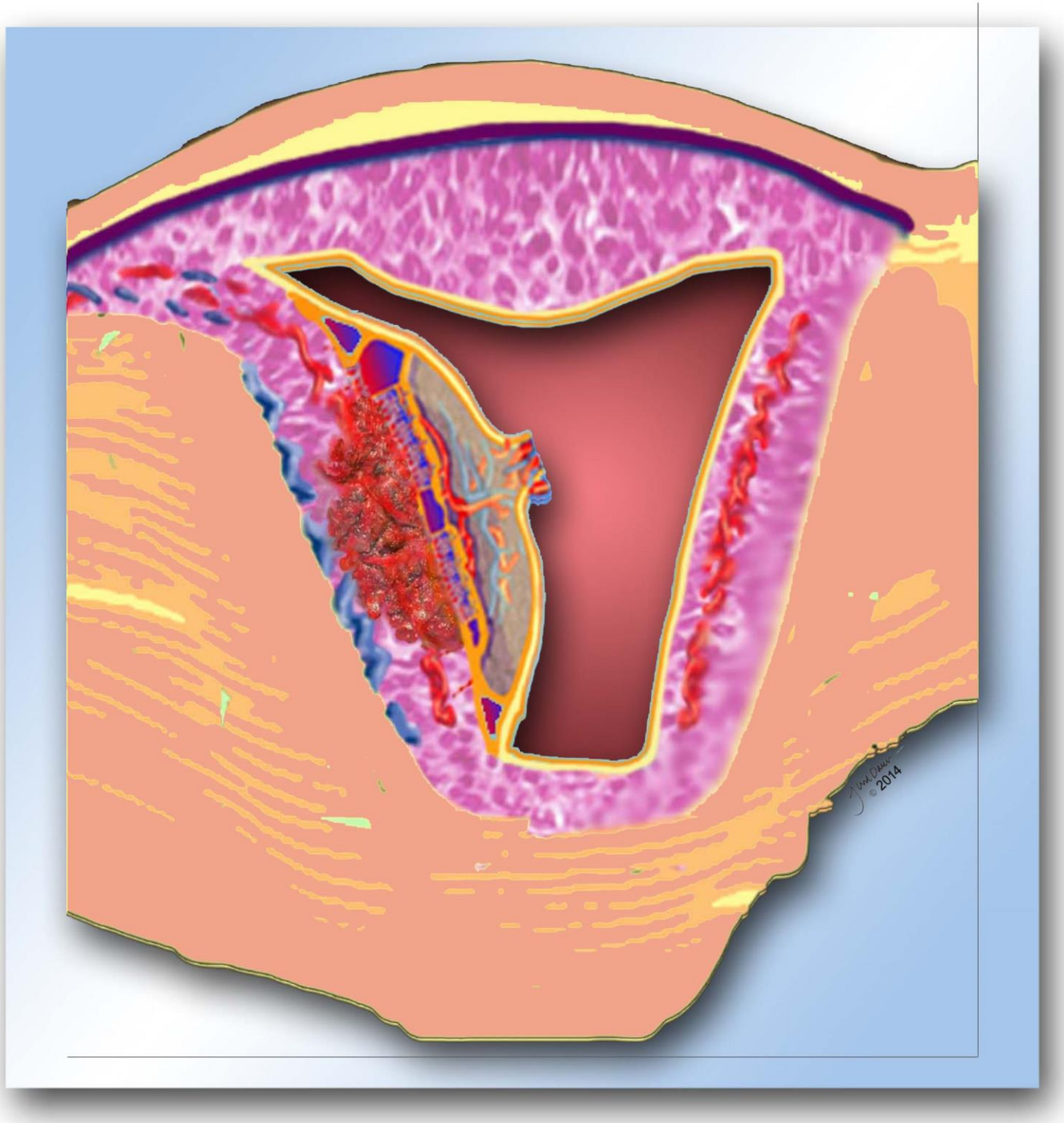
PLACENTA INCRETA



Villi invade myometrium but do not penetrate

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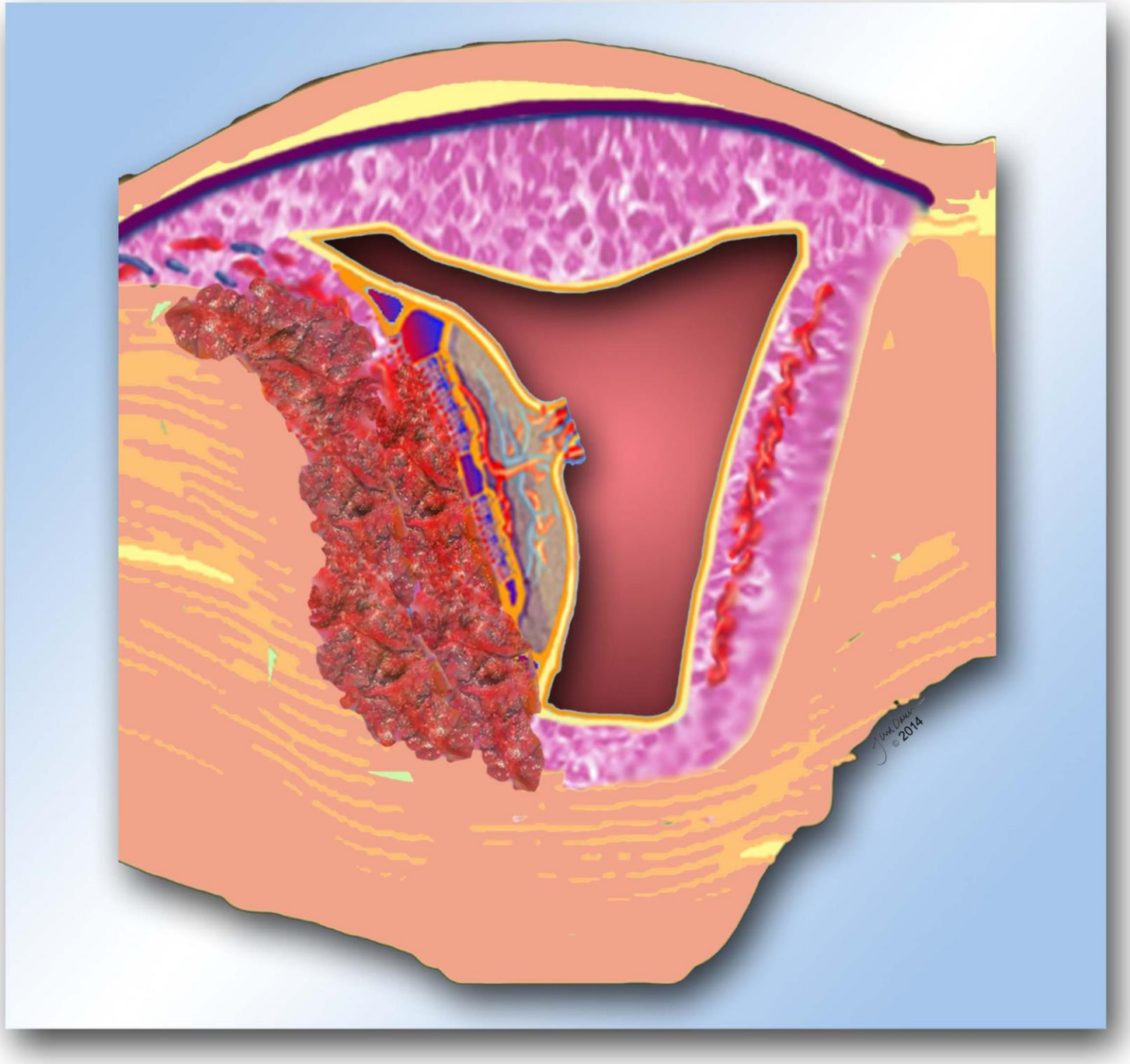
PLACENTA PERCRETA



Villi penetrate myometrium

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Abnormalities of Adherence

- Predisposing factors include:
  - Concomitant placenta previa (10%)
  - Prior dilatation & curettage
  - Grand multiparity
  - Endometritis
  - Submucosal fibroids
  - Uterine synechiae (Asherman’s syndrome)
  - Advanced maternal age (>35 years)
  - Smoking
  - Hypertension

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Placenta Accreta

- Sonographic signs include:
  - Thinning (< 2 mm) or absence of basal plate
  - Loss of myometrial/placental interface
  - Multiple hypoechoic/anechoic spaces in placenta (*Swiss cheese appearance)*
- Increased color Doppler flow in underlying area

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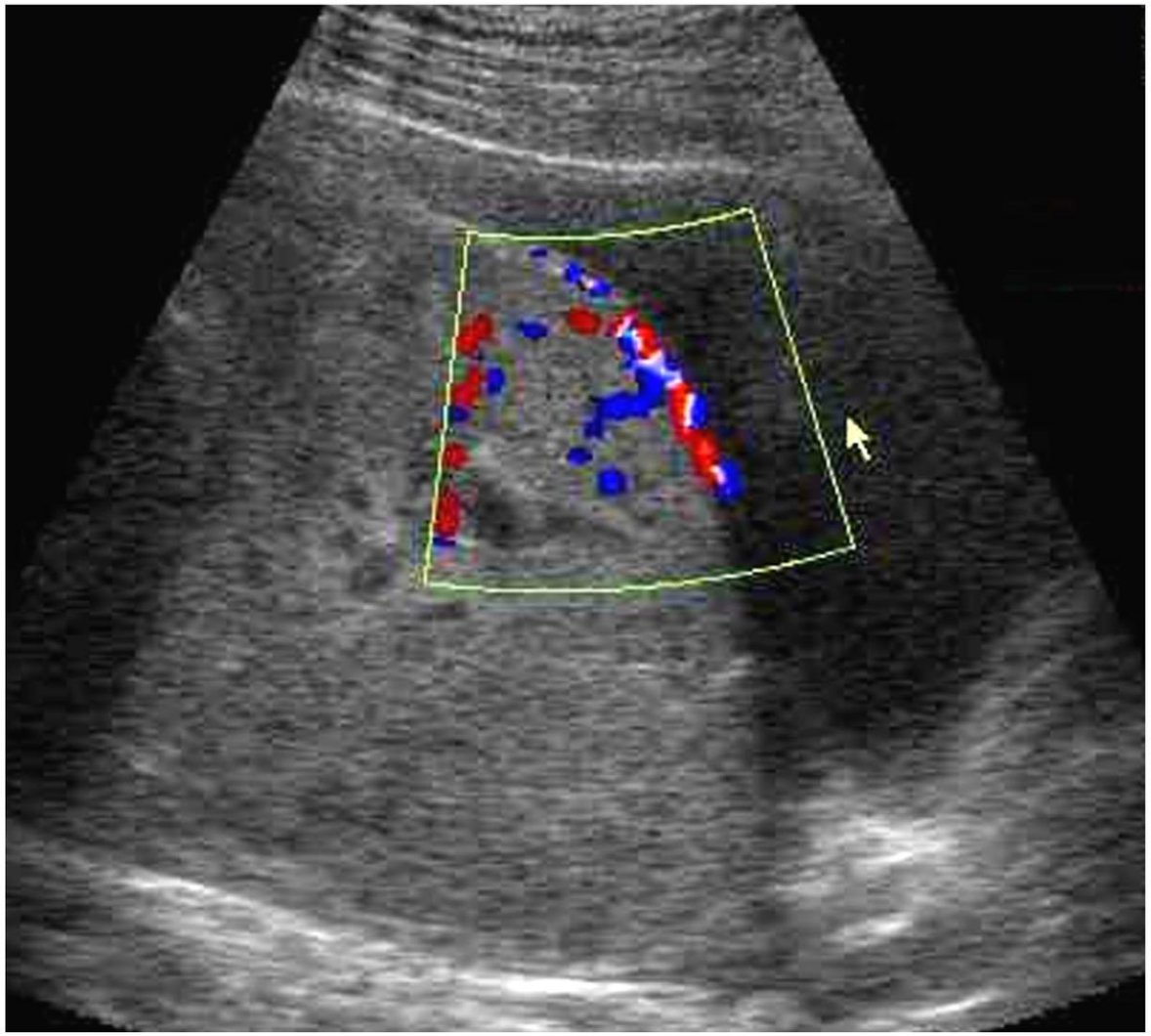
PLACENTA ACCRETA



- **Loss of placental/myometrial interface**
- **Increased color Doppler flow in area of interest**

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Placenta Increta & Percreta

- Sonographic signs include:
  - Loss of hypoechoic space between uterus and bladder
  - Invasion of bladder by infiltrating placental tissue
  - Disruption of normal bladder wall architecture
  - Aberrant vasculature in region of interest extending into bladder or other parauterine structures

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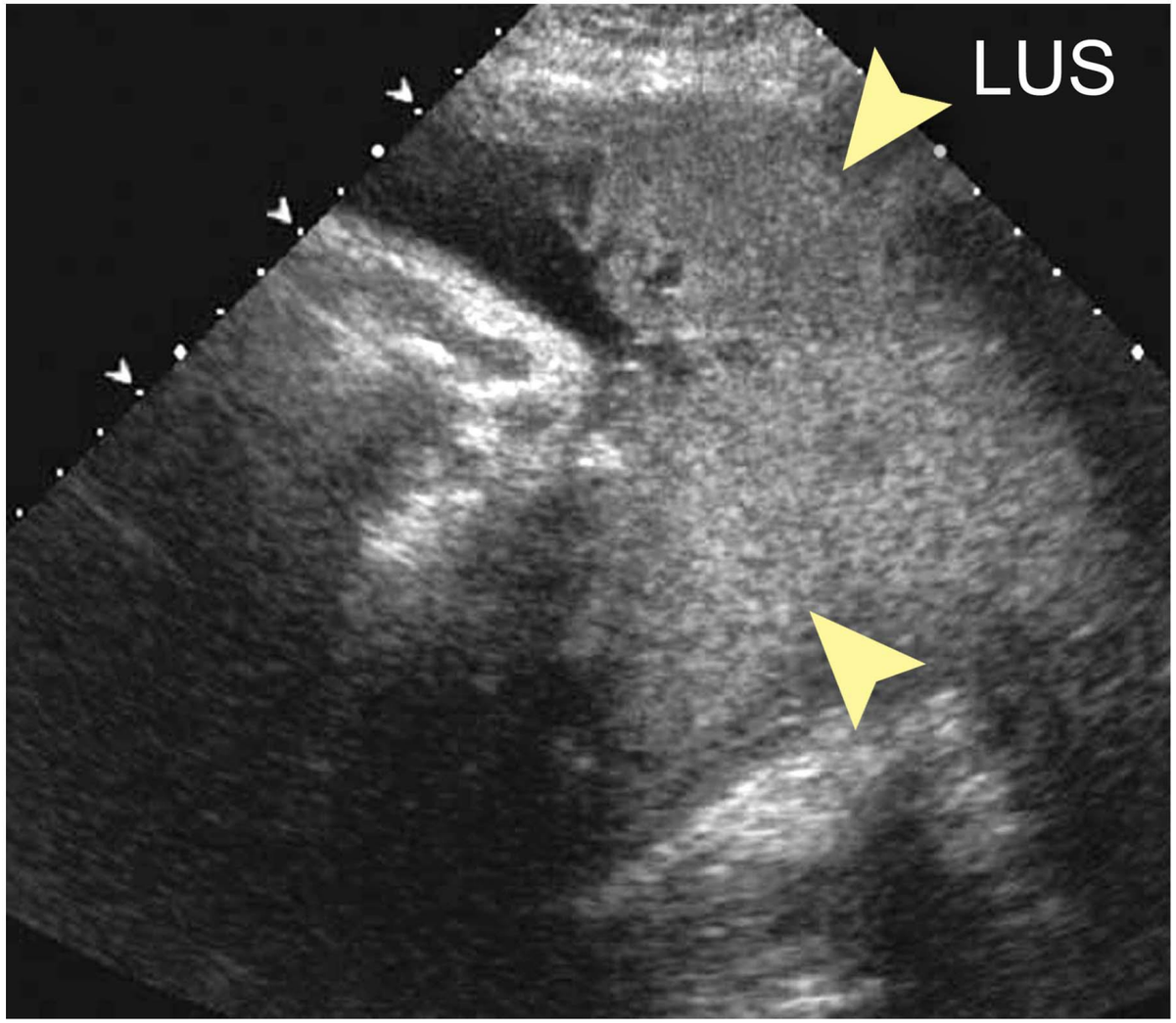
PLACENTA INCRETA & PERCRETA



- **Loss of placental/myometrial interface**
- **Invasion of bladder wall**

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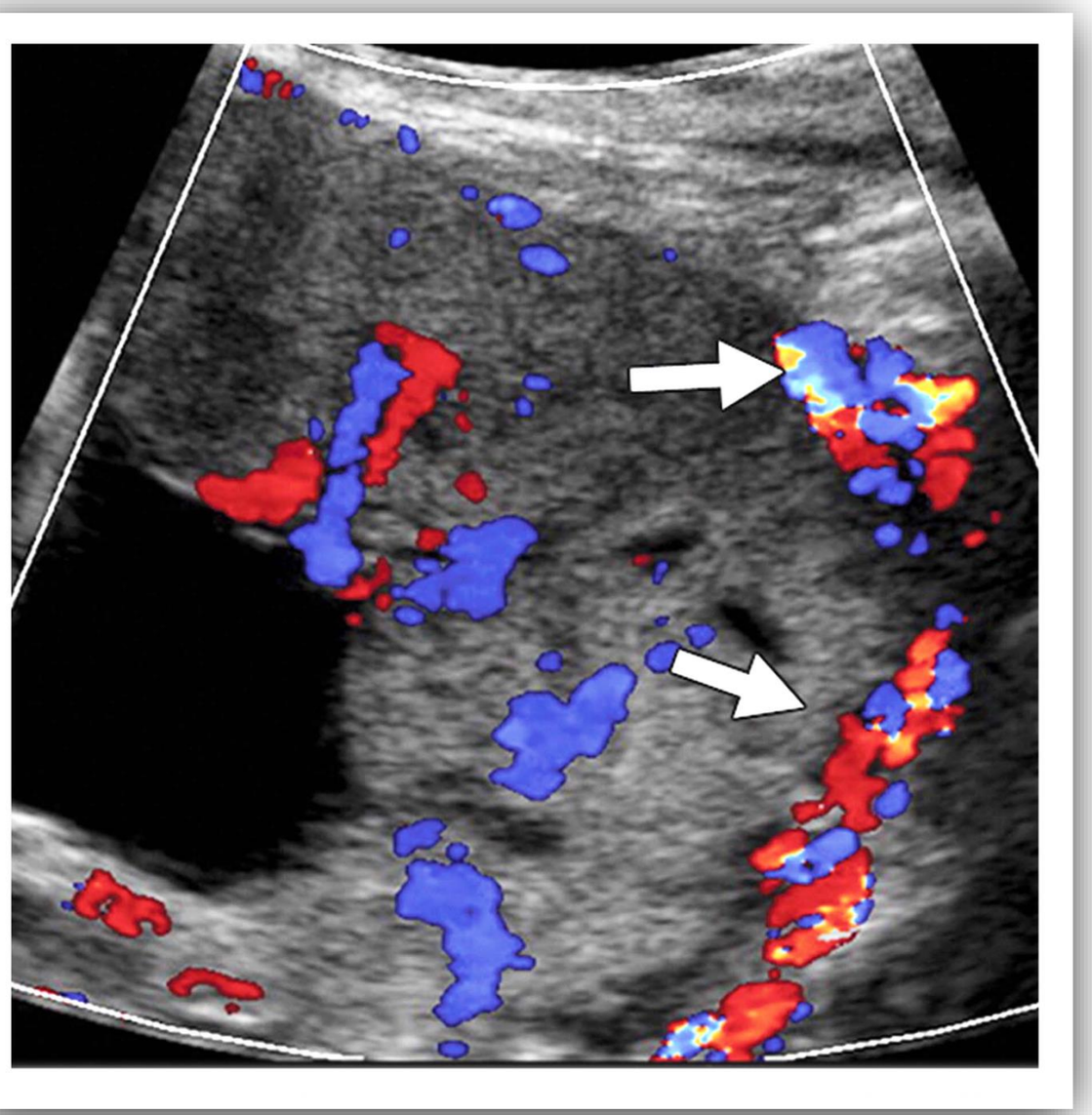
PLACENTA INCRETA & PERCRETA



Aberrant vasculature extending into adjacent structures

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OB GYN SONOGRAPHY REVIEW

The Placenta

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