NOTES
DISORDERS OF LABOR

PLACENTA ACCRETA

osms.it/placenta-accreta

PATHOLOGY & CAUSES

- A type of abnormally developed, invasive placenta
  - Normally a spontaneous, complete placenta separation from uterine wall (myometrium)
  - Maternal placenta side (decidua) separates from myometrium at stratum basalis layer
- Absent/underdeveloped decidua occurs in placenta accreta → adherence of fetal chorionic villi directly to myometrium → placenta fails to fully separate after fetus is delivered
  - Partial separation → profuse hemorrhage → hemorrhagic shock and coagulopathy
  - If no separation → hemorrhage is induced when manual separation is attempted

TYPES

- Placenta accreta; placenta increta; placenta percreta (based on invasiveness)
- Placenta accreta also increases risk of preterm bleeding
  - Association between placenta accreta, concurrent placenta previa

RISK FACTORS

- Previous uterine surgery
  - Cesarean section (most common), myomectomy, curettage
  - Scar tissue prevents normal placental implantation
- Previous placenta previa

SIGNS & SYMPTOMS

- Placenta fails to spontaneously deliver after fetus's birth
  - Manual separation attempts unsuccessful, provoke increased bleeding
- Severe hemorrhage
- Boggy (soft, spongy) uterus unresponsive to uterotonics/uterine massage

DIAGNOSIS

- Based on clinical presentation of hemorrhage post-delivery; severe hemorrhage after attempted manual placenta delivery
- Prenatal diagnosis allows planned management (e.g. cesarean birth, cesarean hysterectomy)

DIAGNOSTIC IMAGING

Ultrasound, color Doppler

- Evaluate alterations in intraplacental blood flow, status of placental-myometrial interface

LAB RESULTS

- Laboratory tests may show ↑ maternal serum alpha fetoprotein

TREATMENT

MEDICATIONS

- Circulatory support
  - Fluids, blood products

SURGERY

- Hysterectomy may be needed to control postpartum hemorrhage
  - Most common life-saving intervention
- Cesarean hysterectomy (fetus delivery followed by uterus + placenta removal as one unit) may be planned preoperatively with invasive placenta evidence

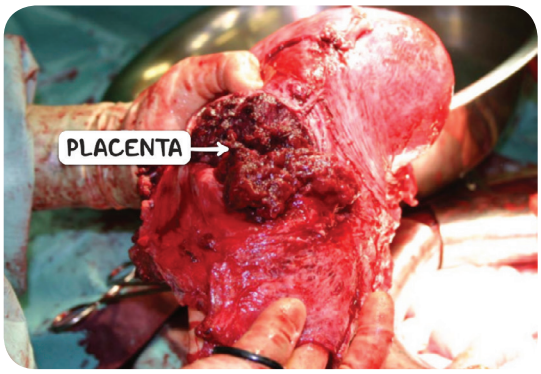

Figure 123.1 A uterus removed following cesarian section demonstrating complate invasion through the uterine wall by the placenta, known as placenta percreta.

PLACENTA PREVIA

osms.it/placenta-previa

PATHOLOGY & CAUSES

- Placenta implants in lower uterine segment (placenta previa = placenta first)
- Implantation is in lower uterine segment, close to/covering uterine opening (cervical os) → as pregnancy progresses, uterine segment grows → disruption of uterine blood vessels → bleeding (usually after 20 weeks of gestation)
- Classified by placenta's closeness to cervical os
  - *Complete:* placenta completely covers cervical os
  - *Partial:* placenta partially covers cervical os
  - *Marginal:* placenta edge extends to within 2cm/0.79in of cervical os

CAUSES

- Placenta implants lower in uterus when upper uterine endometrium is not well vascularized due to endometrial damage

RISK FACTORS

- Multiple placentas or placenta with a larger than normal surface area (e.g. multiple gestation)
- Previous cesarean section/any uterine surgery
- Multiparity
- Intrauterine fibroids
- Spontaneous/induced abortion
- Placenta accreta
- Maternal age ≥ 35 years old
- Smoking

COMPLICATIONS

- *Maternal:* hemorrhage
  - Severity depends on placenta location
  - Disseminated intravascular coagulation (DIC) if bleeding severe/prolonged
- *Fetal:* hypoxia, preterm birth

SIGNS & SYMPTOMS

- Bleeding
  - Painless
  - Bright red
  - Intermittent/continuous
  - Often increases during labor from uterine contractions, cervical dilation
- Uterine hyperactivity
- Electronic fetal monitoring tracings may show fetal heart rate deceleration, indicating hypoxia

DIAGNOSIS

DIAGNOSTIC IMAGING

Prenatal ultrasound

- During routine prenatal ultrasound

Transabdominal ultrasound

- When bleeding occurs during labor, determines placental location

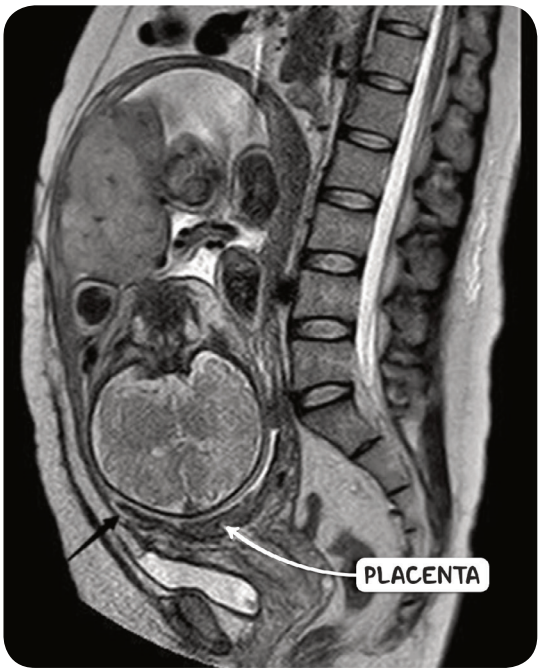

Figure 123.2 An MRI scan of the abdomen of a pregnant female demonstrating major placenta praevia. The internal cervical os is completely covered by the placenta.

TREATMENT

MEDICATIONS

- Corticosteroids as indicated to enhance fetal lung maturity

SURGERY

- Emergent cesarean delivery if placenta obstructs delivery or hemorrhage is severe
- After delivery, measures to control bleeding include
  - Hysterectomy/interventional radiology (e.g. uterine artery embolization)

OTHER INTERVENTIONS

- Manage maternal bleeding; support mother, fetus hemodynamic stability
  - Transfusion of blood products
  - IV fluids
- Continuous fetal heart rate monitoring

PLACENTAL ABRUPTION

osms.it/placental-abruption

PATHOLOGY & CAUSES

- Premature separation of all/section of otherwise normally implanted placenta from uterine wall after 20 weeks of gestation wall resulting in hemorrhage

TYPES

- *Partial/complete:* depending on separation degree
- *Concealed:* central separation may cause a pocket of blood to form, concealing bleeding between decidua basalis and uterine wall → hematoma promotes separation
- *Apparent:* bleeding is visualized

CAUSES

- Uterine artery degeneration in decidua basalis → diseased vessels rupture → hemorrhage → placenta separation

RISK FACTORS

- Previous placental abruption
- Chronic hypertension
- Preeclampsia/chronic hypertension
- Multiparity
- Rapid uterine decompression (e.g. as with polyhydramnios/multiple gestation)
- Trauma (e.g. car crash, fall, domestic violence)
- Smoking
- *Drugs:* cocaine, methamphetamine

COMPLICATIONS

- *Maternal:* hypovolemic shock, disseminated intravascular coagulation (DIC), end organ damage (e.g. renal failure, Sheehan syndrome (pituitary necrosis related to hypovolemia))
- *Fetal:* hypoxia; asphyxia; premature birth, related sequelae; death

SIGNS & SYMPTOMS

- Uterus
  - Pain in abruption area
  - Abdominal/back pain
  - Irritability, tachysystole, tetany
  - Mild to severe vaginal bleeding (evidence of consumptive coagulopathy if severe bleeding)
- Fetal hypoxia, bradycardia

DIAGNOSIS

- Ultrasound may show retroplacental blood collection
- Blood-stained amniotic fluid in vagina
- Abruption signs evidenced by fetal heart rate, uterine activity

DIAGNOSTIC IMAGING

Electronic fetal monitoring

- Decelerations may indicate fetal hypoxia, bradycardia

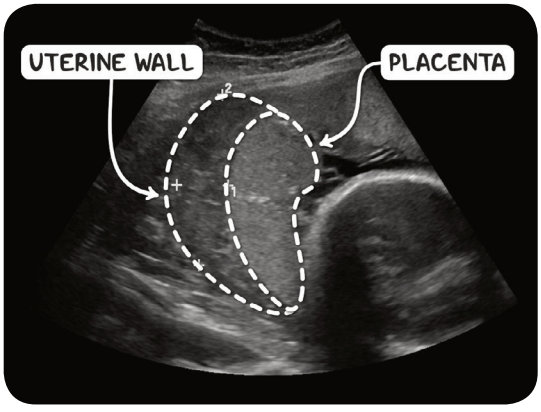

Figure 123.3 An ultrasound scan in pregnancy demonstrating a placental abruption. There is a crescent of avascular hypoechoic fluid between the placenta and the uterine wall.

TREATMENT

MEDICATIONS

- Corticosteroids as indicated to enhance fetal lung maturity

SURGERY

- Emergent delivery
  - Vaginal/cesarean, as indicated

OTHER INTERVENTIONS

- Expectant management for small abruptions
- For significant bleeding: support hemodynamic stability of mother, fetus
- Blood product transfusion
- IV fluids
- Continuous fetal heart rate monitoring

POSTPARTUM HEMORRHAGE

osms.it/postpartum-hemorrhage

PATHOLOGY & CAUSES

- Postpartum (*post* = after; *partum* = birth) hemorrhage (PPH) is excessive blood loss after giving birth
- Defined by estimated blood loss (EBL), mode of birth
  - > 500mL after vaginal delivery
  - > 1000mL after cesarean delivery

TYPES

- *Primary/early:* within 24 hours after delivery
- *Secondary/late:* after 24 hours, before six weeks postpartum

CAUSES

Four Ts

- *Tone:* soft, boggy uterus (uterine atony) and ineffective uterine contractions that normally cause uterine involution (return of uterus to its pre-pregnancy state) and provide tourniquet-like action on major blood vessels → hemorrhage from placental attachment site
  - Associated with uterine overdistension: multiple gestation or polyhydramnios (excessive myometrium stretching); uterine fatigue from prolonged labor; full bladder (interferes with contractions); medications (anesthetics, especially halothane)/preterm labor drugs (magnesium sulfate, nifedipine, terbutaline)
- *Trauma:* damage to reproductive/genital structures (e.g. uterus, cervix, vagina, perineum) → hemorrhage
  - *Surgical incision:* cesarean delivery or episiotomy
  - Large fetus/fetal malpresentation/shoulder dystocia (baby's shoulder impacted against maternal pubic symphysis) → soft tissue damage during descent through vaginal canal
  - Soft tissue laceration from instruments used in delivery (e.g. use of forceps, vacuum extraction), uterine rupture (lacerations may result in hematoma formation → hidden bleeding → interference with uterine involution → uterine atony → hemorrhage)
- *Tissue:* retained placental fragments, placenta accreta, excessive traction on umbilical cord → interferes with uterine contractions → uterine atony → hemorrhage from placental attachment site
- *Thrombin:* impaired clotting → hemorrhage
  - Associated with clotting disorders (e.g. von Willebrand disease)
  - Coagulopathy (e.g. disseminated intravascular coagulation) related to an obstetrical complication (e.g. eclampsia, placenta previa)

SIGNS & SYMPTOMS

- Excessive bleeding visualization
- Maternal physiological response to decreased circulating volume
  - ↑ heart rate
  - ↓ blood pressure
  - ↓ pulse pressure
  - ↓ oxygen saturation
  - ↓ hematocrit
  - Delayed capillary refill
  - Shock signs usually appear when hemorrhage is advanced due to normally ↑ pregnancy blood volume
- Soft, "boggy" uterus
- Clinical presentation suggesting hematoma

DIAGNOSIS

OTHER DIAGNOSTICS

- Based on clinical signs, symptoms
- Estimated blood loss

TREATMENT

MEDICATIONS

- *Uterotonics:* stimulate uterine contractions
  - Oxytocin
  - *Methylergonovine:* ergot derivative
  - Prostaglandins

SURGERY

- Laparoscopic arterial ligation
- Hysterectomy

OTHER INTERVENTIONS

- Maintain adequate circulating volume; clotting factors, as needed
  - IV fluids
  - Blood products
- Intrauterine packing/balloon tamponade
- Interventional radiology
  - Uterine artery embolization
- Address underlying cause (e.g. repair lacerations, remove retained placental fragments, assess for hematoma; repair ruptured uterus)
- Fundal massage
  - Massaging fundus (upper portion of uterus) often causes entire uterus to contract

PRETERM BIRTH

osms.it/preterm-birth

PATHOLOGY & CAUSES

- Birth is considered preterm when between 20–37 gestation weeks
  - *Moderate to late preterm:* 32–37 weeks
  - *Very preterm:* 28–32 weeks
  - *Extremely preterm:* < 28 weeks
- *Worldwide:* approximately 15 million babies are born prematurely each year
  - In the U.S., about 1 in 10 babies are born prematurely
- Maternal-fetal unit responds to one or more pathologic risk factors + gene-environment interaction influence → preterm labor, birth
- Pathologic processes activate major pathway components to labor, birth
  - Cervical changes (ripening) include softening, thinning, shortening
  - Enhanced uterine contractility (myometrial gap-junction formation → synchronized uterine contraction; ↑ oxytocin receptors)
  - Fetal membrane-maternal decidua interface disruption → preterm premature rupture of membranes (PPROM)

RISK FACTORS

Maternal

- *Obstetric history:* previous preterm birth, short interval between pregnancies, conception through assisted reproductive technology (ART)(e.g. *in vitro* fertilization), previous pregnancy termination, history of stillbirth
- *Family history of preterm birth:* associated genes include FSHR (follicle-stimulating hormone receptor), IGF1R (insulin-like growth factor 1 receptor)
- *Obstetric disorders:* preeclampsia, placenta previa, placental abruption, uterine or cervical anomalies (e.g. cervical insufficiency—cervix unable to sustain the pregnancy)
- *Distended uterus:* multiple gestation, polyhydramnios
- *Infections:* bacterial vaginosis, sexually-transmitted infections, urinary tract infections, periodontal disease
- *Concurrent medical diagnoses:* diabetes, pulmonary disease, heart disease, anemia (hemoglobin < 10g/dL)
- *Socioeconomic/personal factors:* low income, lack of prenatal care, ethnic minority, maternal age < 18 or > 40; stressful working conditions, intimate partner violence
- *Behavioral factors:* smoking, substance abuse, poor nutrition, inadequate weight gain, BMI < 19.6 or > 30

Fetal

- Intrauterine growth restriction, genetic anomalies, multiple gestation, twin-to-twin transfusion

COMPLICATIONS

Maternal

- Increased risk of hemorrhage, infection; complications from cesarean section

Fetal

- Increased fetal/neonatal morbidity, mortality; low birth weight (less than 2.5kg/5.5lbs), lung immaturity, hypoxic-ischemic encephalopathy, cerebral palsy

SIGNS & SYMPTOMS

- Vaginal discharge before completed gestation
  - Fluid or blood leak (bloody show)
  - Ruptured membranes may present as a sudden gush of water
- Lower abdominal or pelvic pressure
- Low, dull back pain
- Onset of contractions every 10 minutes or less
- Electronic fetal monitoring may show fetal tachycardia/decelerations (drops in heart rate during contractions)

DIAGNOSIS

- Pelvic exam shows cervical changes
  - Cervical shortening, softening, effacement (thinning)
  - Opening of cervical os

DIAGNOSTIC IMAGING

Transvaginal ultrasound

- Shows shortened cervix length

LAB RESULTS

- Fetal fibronectin (fFN) test
  - Glycoprotein that acts like a "glue" between maternal decidua and fetal membrane
  - Presence of fFN in cervicovaginal secretions indicates preterm labor, birth
- Cervical culture for Group B streptococcus if status unknown
- Bacterial infection that increases neonatal sepsis, pneumonia, meningitis risks

TREATMENT

MEDICATIONS

- Tocolytic medications (drugs that interfere with myometrial contractions) may delay birth for up to 48 hours. Allows time for corticosteroids to affect fetal lung development, for transport to a higher level of care if needed
  - *Nifedipine:* calcium channel blocker
  - *Indomethacin:* prostaglandin inhibitor
  - *Terbutaline:* beta 2-adrenergic
  - *Magnesium sulfate:* reduces calcium influx into muscle cell, relaxing myometrium; may have fetal neuroprotective benefit (e.g. reducing cerebral palsy risk)
- Antibiotics
  - If bacterial infection suspected/ confirmed
- Corticosteroids
  - To enhance fetal lung maturity, other organ development
  - Helpful if given between 24–34 gestation weeks

SURGERY

- Vaginal/cesarean birth as indicated

OTHER INTERVENTIONS

- Cervical cerclage
  - Stitch application to keep cervix closed, if indicated
- Adequate hydration
  - Dehydration may induce uterine irritability
- Lecithin/sphingomyelin (L/S) ratio in amniotic fluid: indication of fetal lung maturity; directes neonate treatment
- Continuous ante- and intrapartum surveillance of maternal and fetal status