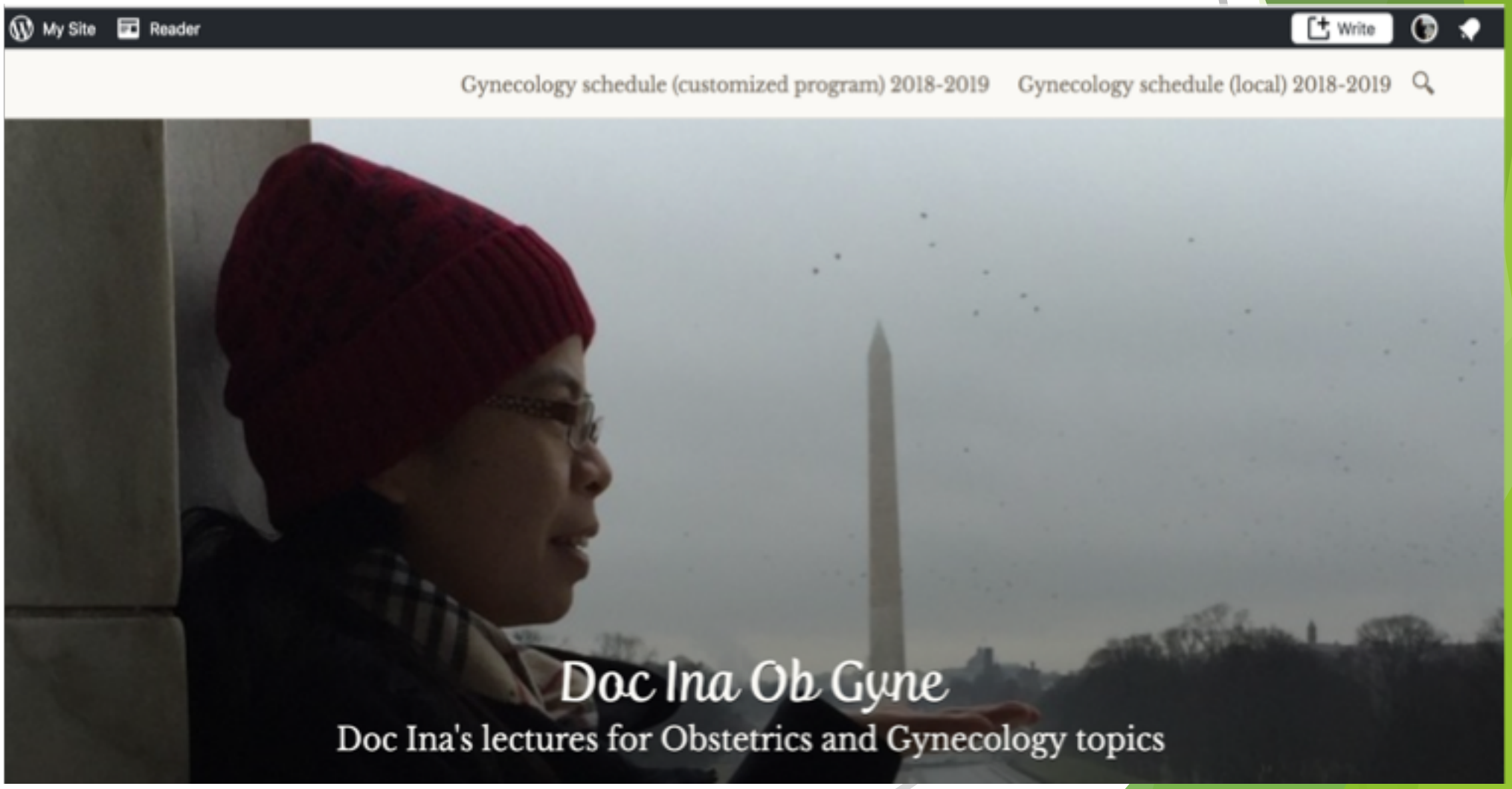
Obstetrical Hemorrhage

Ina S. Irabon, MD, FPOGS, FPSRM, FPSGE

Obstetrics and Gynecology

Reproductive Endocrinology and Infertility

To download lecture deck:



Reference

- Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL, Casey BM, Sheffield JS (eds).William's Obstetrics 25th edition; 2018; chapter 41 Obstetrical Hemorrhage

Outline

1. CAUSES OF OBSTETRICAL HEMORRHAGE
2. UTERINE ATONY
3. UTERINE INVERSION
4. INJURIES TO THE BIRTH CANAL
5. PUERPERAL HEMATOMAS
6. RUPTURE OF THE UTERUS
7. PLACENTAL ABRUPTION
8. PLACENTA PREVIA
9. PLACENTA ACCRETE SYNDROMES

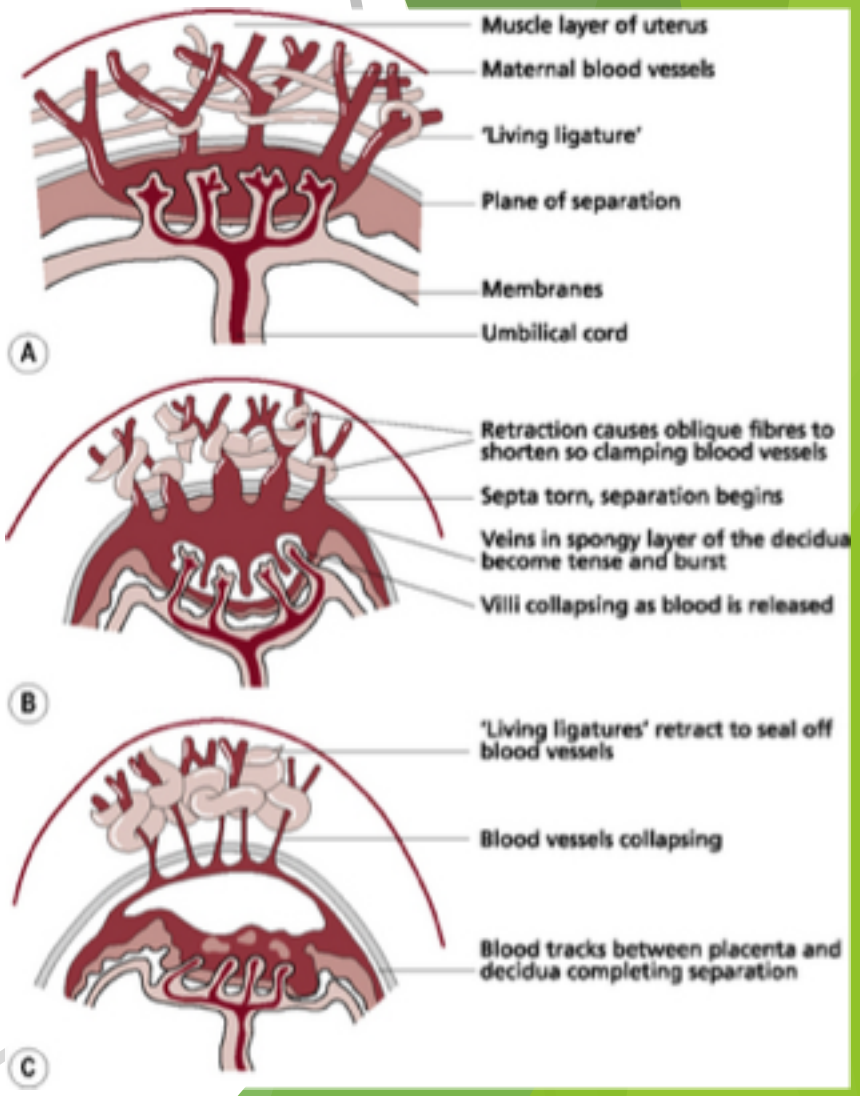
"Obstetrics is a bloody business"

Dr Jack Pritchard (1976)

Mechanisms of Normal Hemostasis

Mechanism of normal hemostasis after normal delivery:

- Amount of blood flow through spiral arteries near term: at least 600 mL/ min
- these vessels have no muscular layer because of their endotrophoblastic remodeling, which creates a low-pressure system.
- With placental separation, these vessels at the implantation site are avulsed, and hemostasis is achieved by myometrial contraction, which compresses this relatively large vessels
- Importantly, an intact coagulation system is not necessary for post- partum hemostasis unless there are lacerations in the uterus, birth canal, or perineum.



Definition

- Traditionally defined as loss of 500 mL of blood or more after completion of the third stage of labor (normal delivery) or >1000ml after a ceasarean delivery.
- a normal pregnant woman tolerates blood loss at delivery that approaches the volume of blood that she added during pregnancy
- Whenever the postpartum hematocrit is lower than one obtained on admission for delivery, blood loss can be estimated as:

  calculated pregnancy-added volume + 500 mL per 3 volume percent decrease of the hematocrit.

TABLE 41-1. Calculation of Maternal Total Blood Volume

Nonpregnant blood volume[a]:

$$\frac{[\text{Height (inches)} \times 50] + [\text{Weight (pounds)} \times 25]}{2} = \text{Blood volume (mL)}$$

Pregnancy blood volume:

Average increase is 30 to 60 percent of calculated nonpregnant volume

Increases across gestational age and plateaus at approximately 34 weeks

Usually larger with low normal-range hematocrit (~30) and smaller with high normal-range hematocrit (~40)

Average increase is 40 to 80 percent with multifetal gestation

Average increase is less with preeclampsia—volumes vary inversely with severity

Postpartum blood volume with serious hemorrhage:

Assume acute return to nonpregnant total volume after fluid resuscitation

Pregnancy hypervolemia cannot be restored postpartum

Obstetrical Hemorrhage: Causes, Predisposing Factors, and Vulnerable Patients

1. Abnormal Placentation

- Placenta previa
- Placental abruption
- Placenta accreta/increta/ percreta
- Ectopic pregnancy
- Hydatidiform mole

2. Injuries to the Birth Canal

- Episiotomy and lacerations
- Forceps or vacuum delivery
- Cesarean delivery or hysterectomy
  - Uterine rupture
  - Previously scarred uterus
  - High parity
  - Hyperstimulation
  - Obstructed labor
  - Intrauterine manipulation
  - Midforceps rotation
  - Breech extraction

3. Obstetrical Factors

- Obesity
- Previous postpartum hemorrhage
- Early preterm pregnancy
- Sepsis syndrome

4. Vulnerable Patients

- Preeclampsia/eclampsia
- Chronic renal insufficiency
- Constitutionally small size

Obstetrical Hemorrhage: Causes, Predisposing Factors, and Vulnerable Patients

5. Uterine Atony

- Uterine overdistention
  - Large fetus
  - Multiple fetuses
  - Hydramnios
  - Retained clots
- Labor induction
- Anesthesia or analgesia
  - Halogenated agents
  - Conduction analgesia with hypotension
- Labor abnormalities
  - Rapid labor
  - Prolonged labor
  - Augmented labor
  - Chorioamnionitis
- Previous uterine atony

6. Coagulation defects

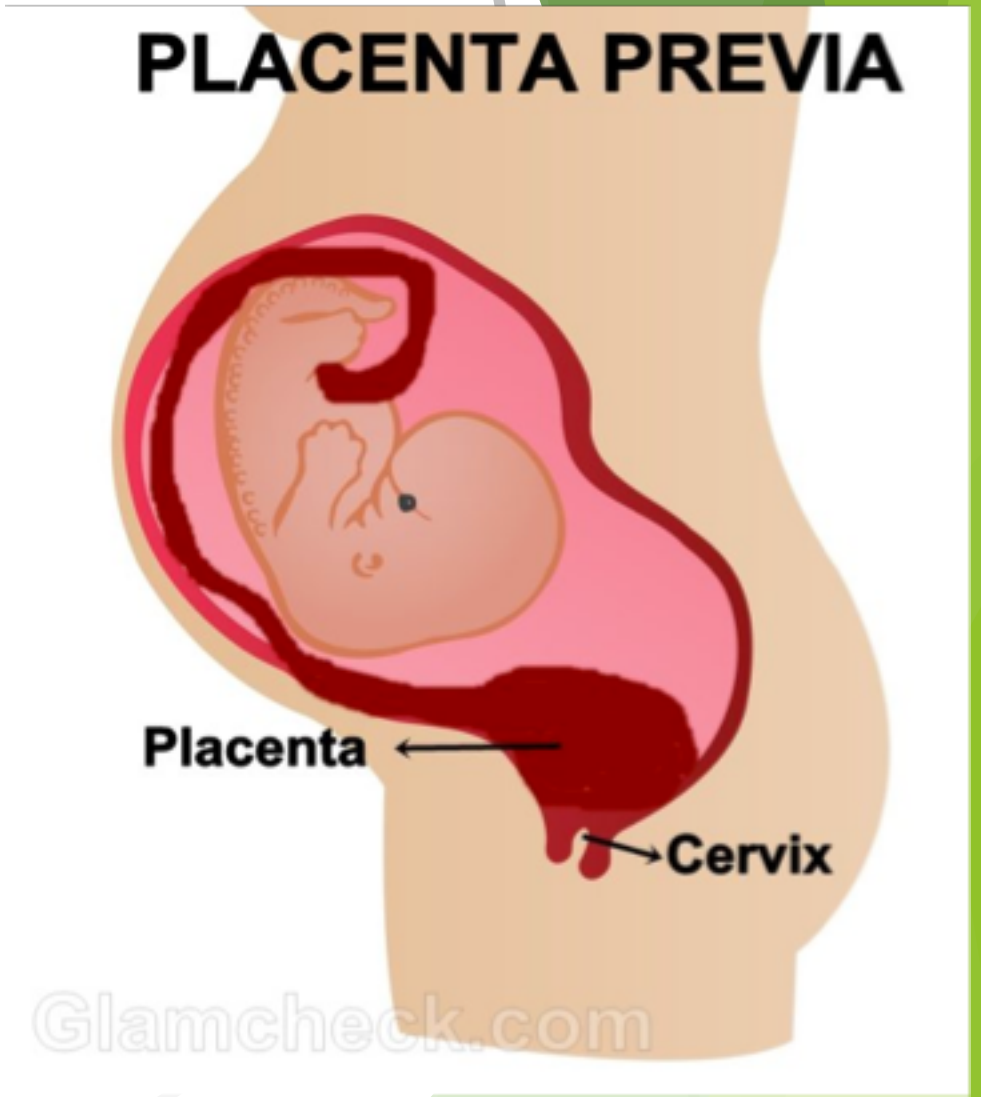
- Massive transfusions
- Placental abruption
- Sepsis syndrome
- Severe preeclampsia syndrome
- Acute fatty liver
- Anticoagulant treatment
- Congenital coagulopathies
- Amnionic-fluid embolism
- Prolonged retention of dead fetus
- Saline-induced abortion

"Estimated blood loss—like beauty—is in the eye of the beholder"

Timing of Hemorrhage

Antepartum Hemorrhage

- Bleeding during pregnancy (2nd or third trimester)
- Always rule out possibility of a "*bloody show*" (esp. for slight bleeding)
- Causes: placenta previa, abruptio placenta, vasa previa, uterine rupture
- any pregnancy with antepartum bleeding remains at increased risk for an adverse outcome even though bleeding has stopped and placenta previa has been excluded sonographically.



Timing of Hemorrhage

Postpartum Hemorrhage

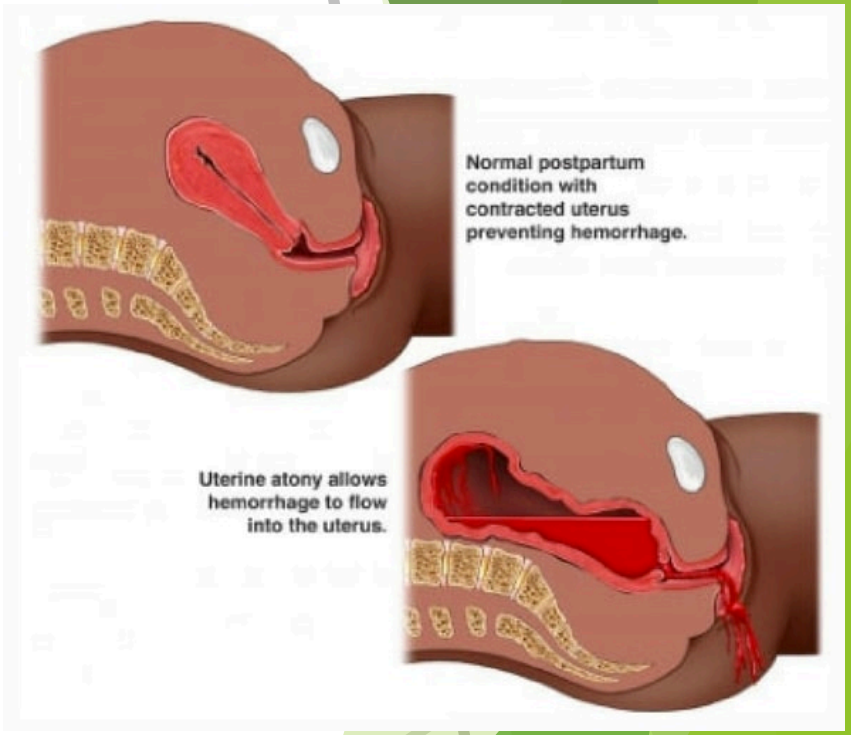
- Frequent causes are uterine atony with bleeding from the placental implantation site, genital tract trauma, or both
- Initial assessment should attempt to differentiate uterine atony from genital tract lacerations.
- Persistent bleeding despite a firm, well-contracted uterus suggests that hemorrhage most likely is from lacerations.
- To confirm that lacerations are a source of bleeding, careful inspection of the vagina, cervix, and uterus is essential.

Late Postpartum Hemorrhage

- Bleeding after the first 24 hours

Causes of Obstetrical hemorrhage
Uterine Atony

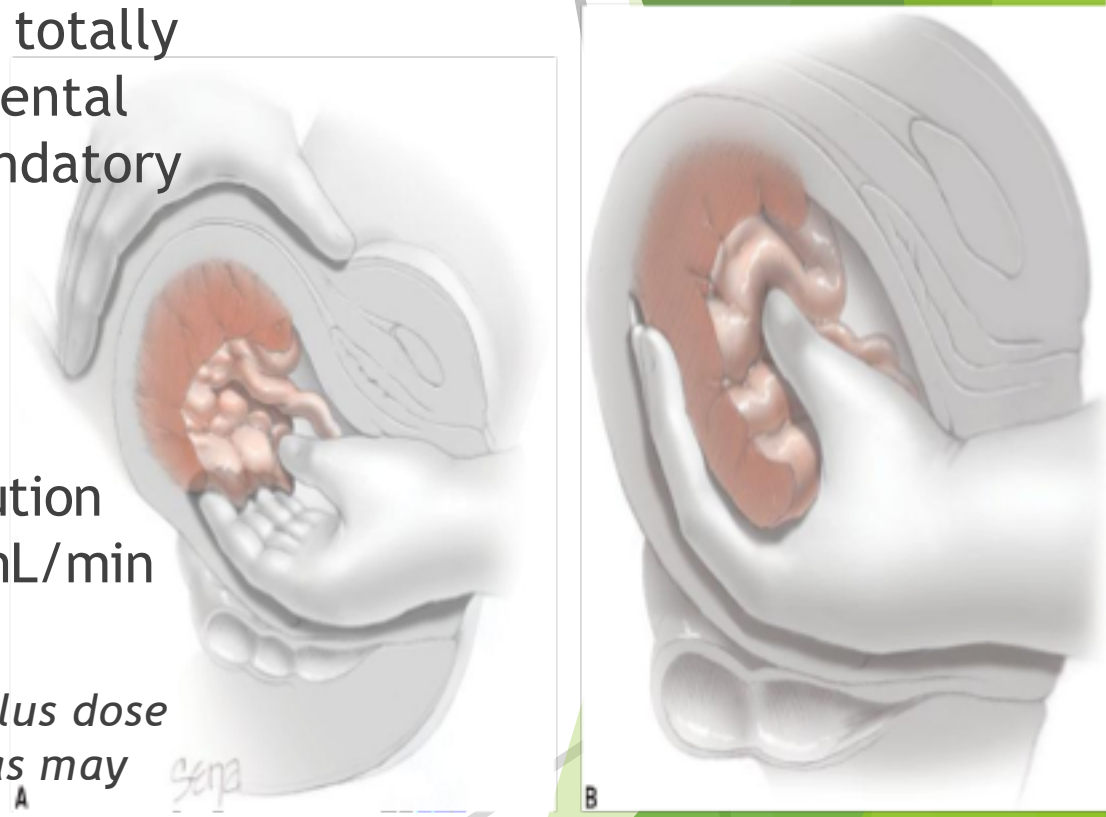
- the most frequent cause of obstetrical hemorrhage
- failure of the uterus to contract sufficiently after delivery and to arrest bleeding from vessels at the placental implantation site
  - *Recall: mechanisms of placental separation: Duncan (blood from the implantation site may escape into the vagina immediately) and Schultze (blood remainsconcealed behind the placenta and membranes until the placenta is delivered)*
  - *Recall also the 4 signs of placental separation!*
- With bleeding during the third stage, the uterus should be massaged if it is not contracted firmly.



Causes of Obstetrical hemorrhage

Uterine Atony

- If significant bleeding persists after delivery of the infant and while the placenta remains partially or totally attached (third stage bleeding), then manual placental removal is indicated → adequate analgesia is mandatory
- If uterine atony happens after placental delivery, do/give/apply:
  - Vigorous fundal massage
  - 20 units of oxytocin in 1000 mL of crystalloid solution will often be e ective given intravenously at 10 mL/min for a dose of 200 mU/min
    - *Oxytocin should never be given as an undiluted bolus dose because serious hypotension or cardiac arrhythmias may develop*.
  - Ice pack

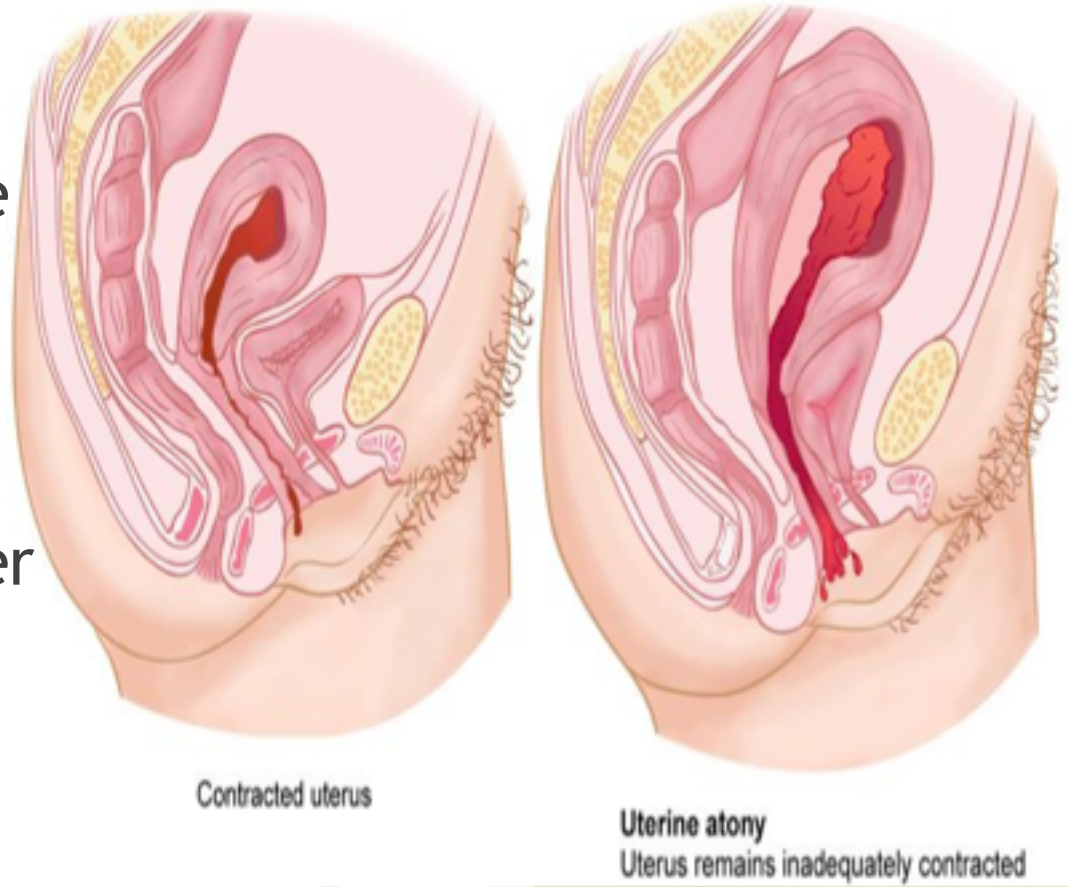


Causes of Obstetrical hemorrhage

Uterine Atony

Risk Factors

1. High parity
2. overdistended uterus (large fetus, multiple fetuses, or hydramnios)
3. Labor abnormalities
    1. hyper- or hypotonic labor.
4. labor induction or augmentation with either prostaglandins or
5. prior postpartum hemorrhage



Causes of Obstetrical hemorrhage

Uterine Atony

Evaluation:

- careful inspection is done to exclude birth canal laceration.
- inspection of the placenta after delivery should be routine (Because bleeding can be caused by retained placental fragments)
- Note for possible retention of a *succenturiate lobe* (accessory placental lobe) that was retained inside uterus

Causes of Obstetrical hemorrhage

Uterine Atony

Management: Administer uterotonic Agents

- Oxytocin is infused intravenously or given intramuscularly after placental delivery.
- Methylergonovine (Methergin) – *not given for hypertensive and asthmatic patients, or HIV patient on protease inhibitors!*
- Carboprost tromethamine *(Hemabate) – prostaglandin F2α*
- Dinoprostone -prostaglandin E2—is given as a 20-mg suppository per rectum or per vaginam every 2 hours.
- Sulprostone—Intravenous prostaglandin E2
- Misoprostol—Cytotec—synthetic prostaglandin E1 – prohibited use in the Philippines

Bleeding Unresponsive to Uterotonic Agents

1. Begin bimanual uterine compression: posterior uterine wall is massaged by one hand on the abdomen, while the other hand is made into a fist and placed into the vagina to knead the anterior uterine wall through the anterior vaginal wall
2. Immediately mobilize the emergent-care obstetrical team to the delivery room and call for whole blood or packed red cells.
3. Request urgent help from the anesthesia team.
4. Secure at least two large-bore intravenous catheters so that crystalloid with oxytocin is continued simultaneously with blood products. Insert an indwelling Foley catheter for continuous urine output monitoring.

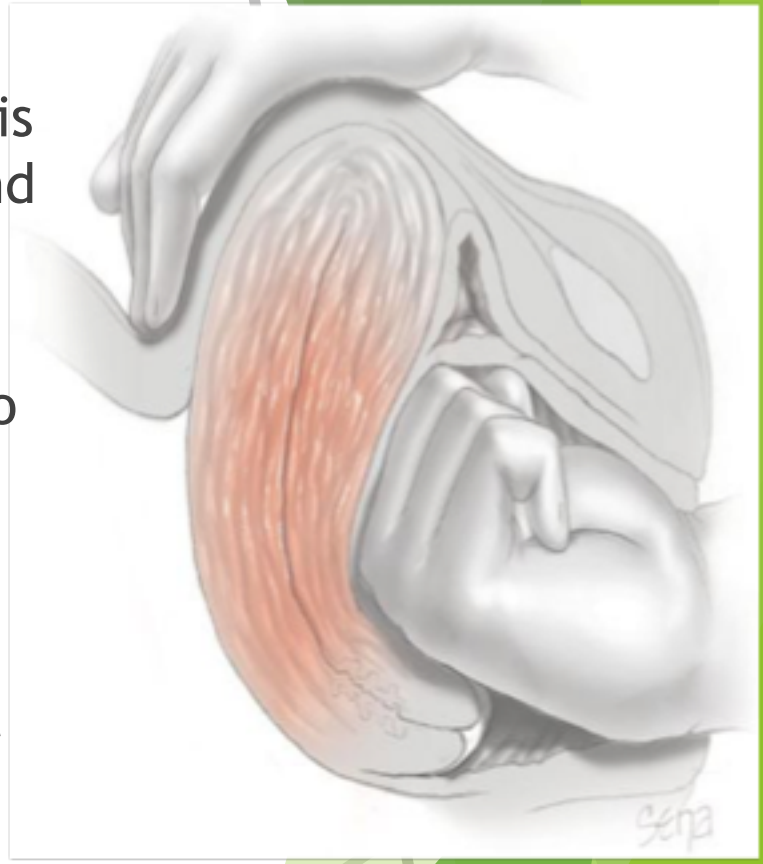


FIGURE 41-4 Bimanual compression for uterine atony. The uterus is positioned with the fist of one hand in the anterior fornix pushing against the anterior wall, which is held in place by the other hand on the abdomen. The abdominal hand is also used for uterine massage.

Bleeding Unresponsive to Uterotonic Agents

1. Begin volume resuscitation with rapid intravenous infusion of crystalloid
2. With sedation, analgesia, or anesthesia established and now with optimal exposure, manually explore the uterine cavity for retained placental fragments and for uterine abnormalities, including lacerations or rupture.
3. Thoroughly inspect the cervix and vagina again for lacerations that may have escaped attention.
4. If the woman is still unstable or if there is persistent hemorrhage, then blood transfusions are given

Bleeding Unresponsive to Uterotonic Agents

Other measures may include….

1. Uterine packing
2. Balloon tamponade
3. Uterine compression sutures (B lynch method)
4. Pelvic vessel ligation
5. Angiographic embolization
6. Hysterectomy

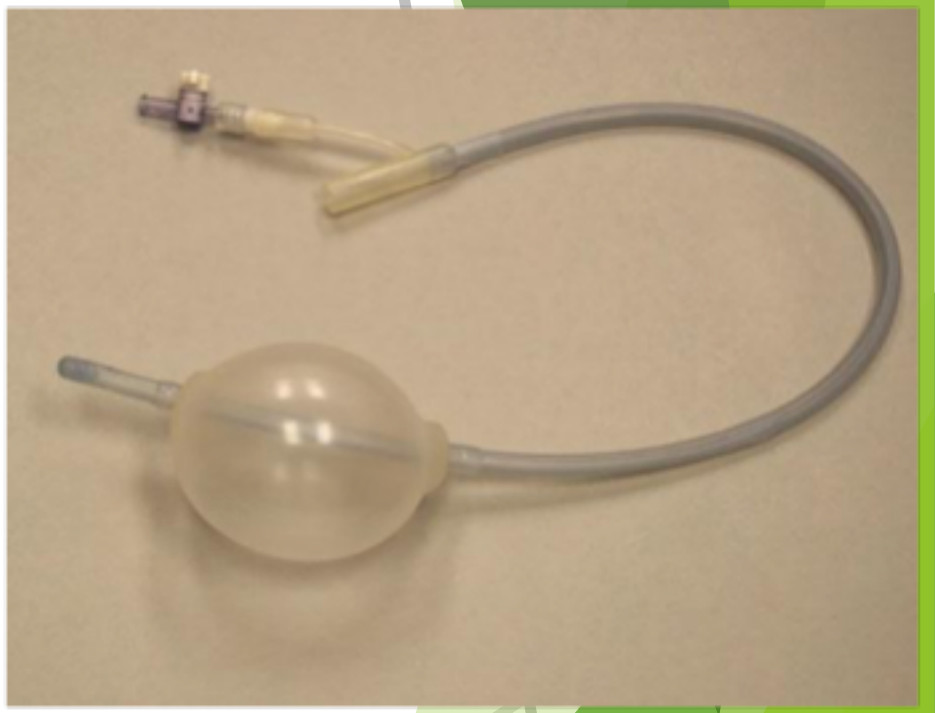


FIGURE 41-5 Intrauterine balloon for postpartum hemorrhage.

Causes of Obstetrical hemorrhage
Uterine Inversion

- Puerperal inversion of the uterus
- Risk factors include alone or in combination:
  - Fundal placental implantation,
  - Delayed-onset or inadequate uterine contractility after delivery of the fetus
  - Cord traction applied before placental separation
  - Abnormally adhered placentation such as placenta accreta
- *Recall: active management of 3rd stage of labor*

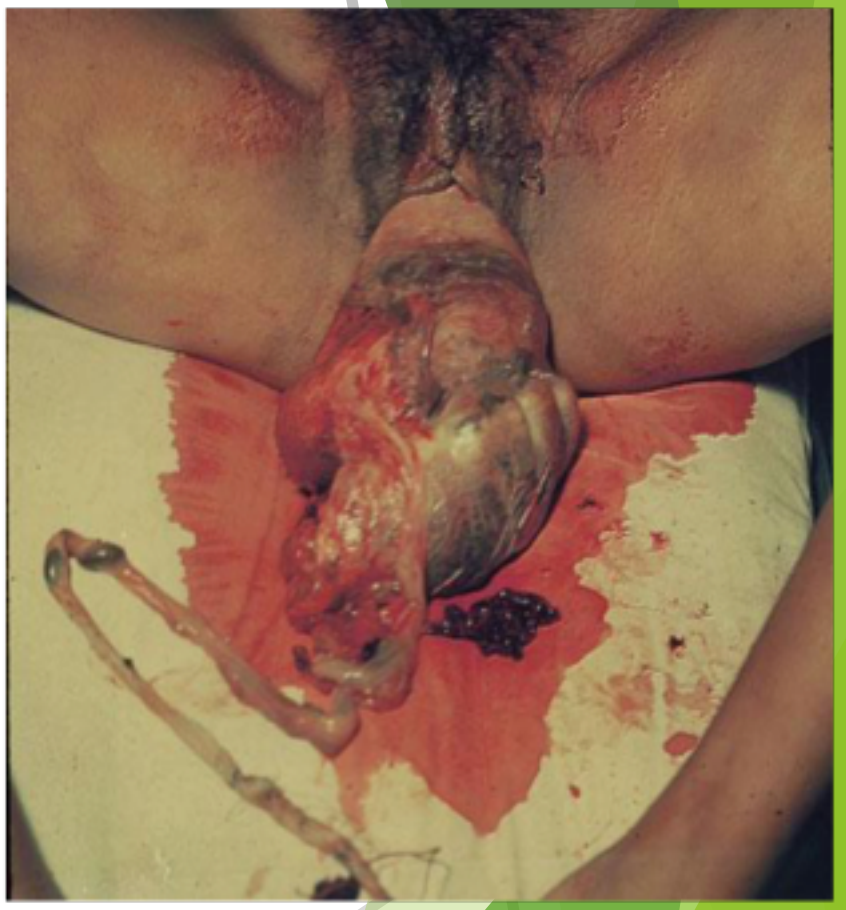


FIGURE 41-6 Maternal death from exsanguination caused by uterine inversion associated with a fundal placenta accreta during a home delivery.

Causes of Obstetrical hemorrhage
Uterine Inversion

Management

- Once any degree of uterine inversion is recognized, several steps must be implemented urgently and simultaneously:
- Immediate assistance is summoned, including obstetrical and anesthesia personnel.
- Blood is brought to the delivery suite in case it may be needed.
- the woman is evaluated for emergency general anesthesia. Large-bore intravenous infusion systems are secured to begin rapid crystalloid infusion to treat hypovolemia while awaiting arrival of blood for transfusion.

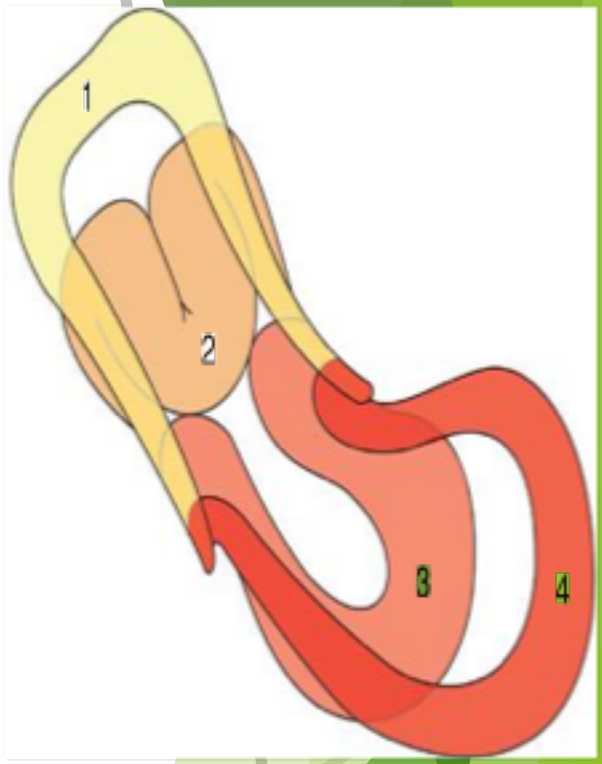


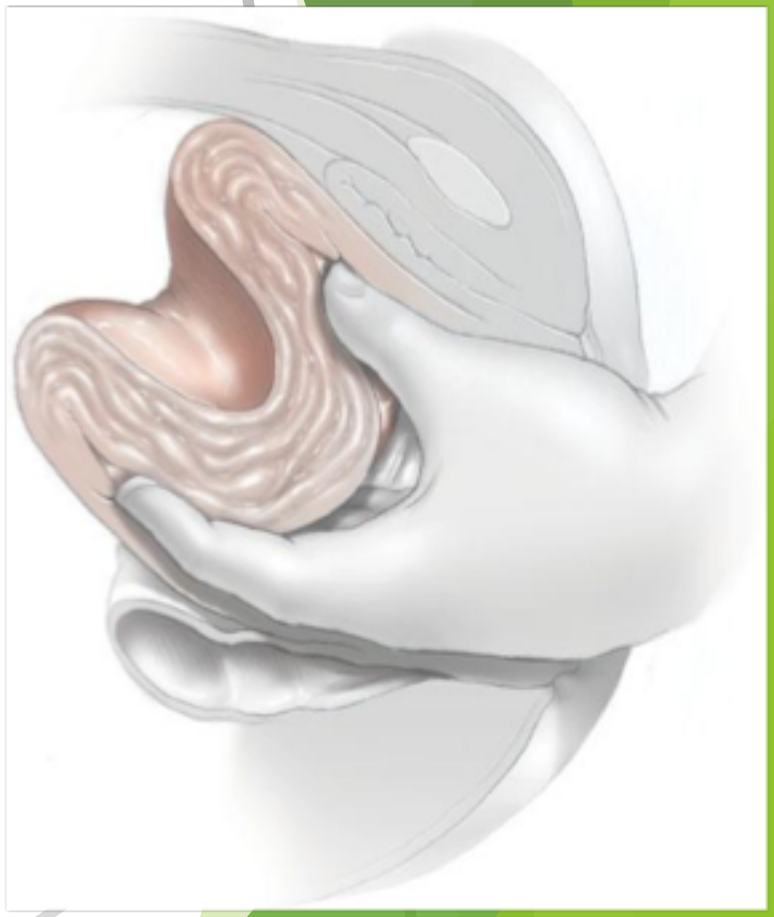
FIGURE 41-7 Progressive degrees of uterine inversion depicted. After the fundus begins and continues to invert (Nos. 1 and 2), it would not be visible externally until it was at the level of the introitus (No. 3) or completely inverted (No. 4).

Causes of Obstetrical hemorrhage

Uterine Inversion

Management

- If the inverted uterus has not contracted and if the placenta has already separated, the uterus may be replaced by pushing up on the inverted fundus with the palm of the hand and fingers in the direction of the long axis of the vagina
- If the placenta is still attached, it is not removed until infusion systems are operational and a uterine relaxant drug administered.
- After removing the placenta, steady pressure with the fist, palm, or fingers is applied to the inverted fundus in an attempt to push it up into and through the dilated cervix



Causes of Obstetrical hemorrhage

Uterine Inversion

Management

- Once the uterus is restored to its normal configuration, tocolysis is stopped. Oxytocin is then infused, and other uterotonics may be given as described for atony
- the operator maintains the fundus in its normal anatomical position while applying bimanual compression to control further hemorrhage until the uterus is well contracted
- the operator continues to monitor the uterus transvaginally for evidence of subsequent inversion.

Causes of Obstetrical hemorrhage

Uterine Inversion

Surgical intervention

- Huntington procedure: a combined effort is made to reposition the uterus by simultaneously pushing upward from below and pulling upward from above. Application of atraumatic clamps to each round ligament for upward traction
- Haultain incision—is vertical incision is made posteriorly through the constriction ring to expose the fundus and permit reinversion. After uterine replacement, tocolytics are stopped, oxytocin and other uterotonics are given, and the uterine incision is repaired.

Causes of Obstetrical hemorrhage

Injuries to the birth canal

Vulvovaginal Lacerations

- Small/superficial tears of the anterior vaginal wall with little to no bleeding do not require repair
- Minor superficial perineal and vaginal lacerations occasionally require sutures for hemostasis.
- Extensive vaginal or cervical tears should prompt a careful search for evidence of retroperitoneal hemorrhage or peritoneal perforation or hemorrhage.

Causes of Obstetrical hemorrhage

Injuries to the birth canal

Cervical Lacerations

In general, cervical lacerations of 1 and even 2 cm are not repaired unless they are bleeding. Such tears heal rapidly and are thought to be of no significance

Deep cervical tears usually require surgical repair, using either interrupted or continuous interlocking sutures

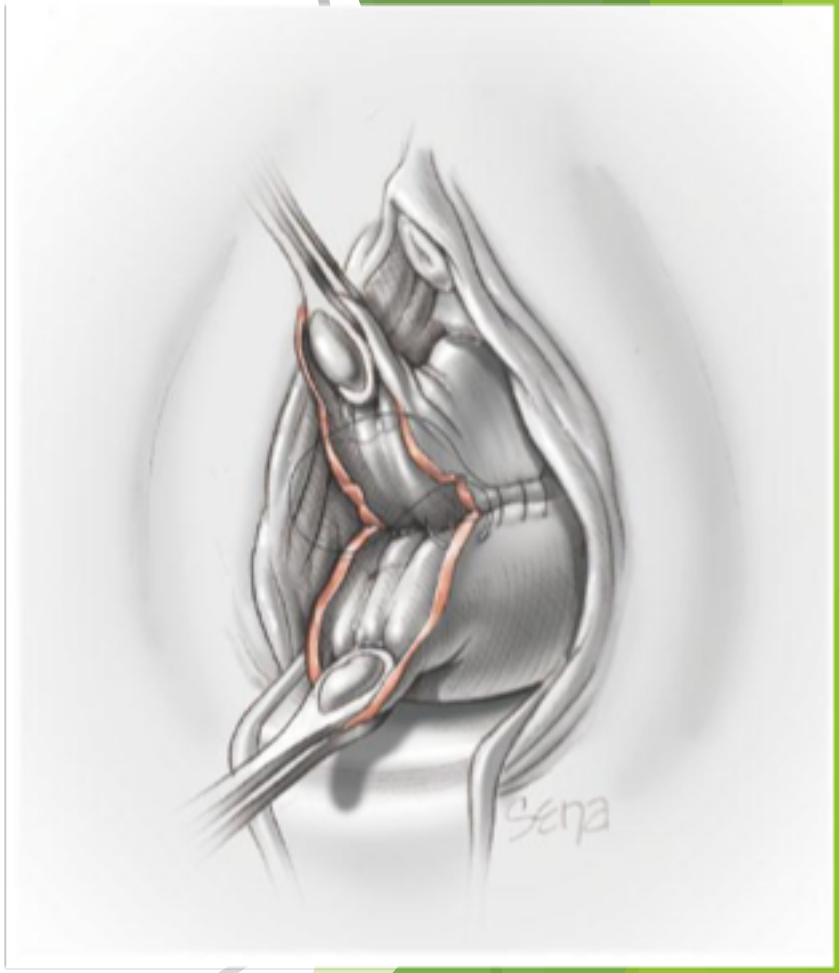


FIGURE 41-10 Repair of cervical laceration with appropriate surgical exposure. Continuous absorbable sutures are placed beginning at the upper angle of the laceration.

Causes of Obstetrical hemorrhage

Injuries to the birth canal

Cervical Lacerations

In general, cervical lacerations of 1 and even 2 cm are not repaired unless they are bleeding. Such tears heal rapidly and are thought to be of no significance

Deep cervical tears usually require surgical repair, using either interrupted or continuous interlocking sutures

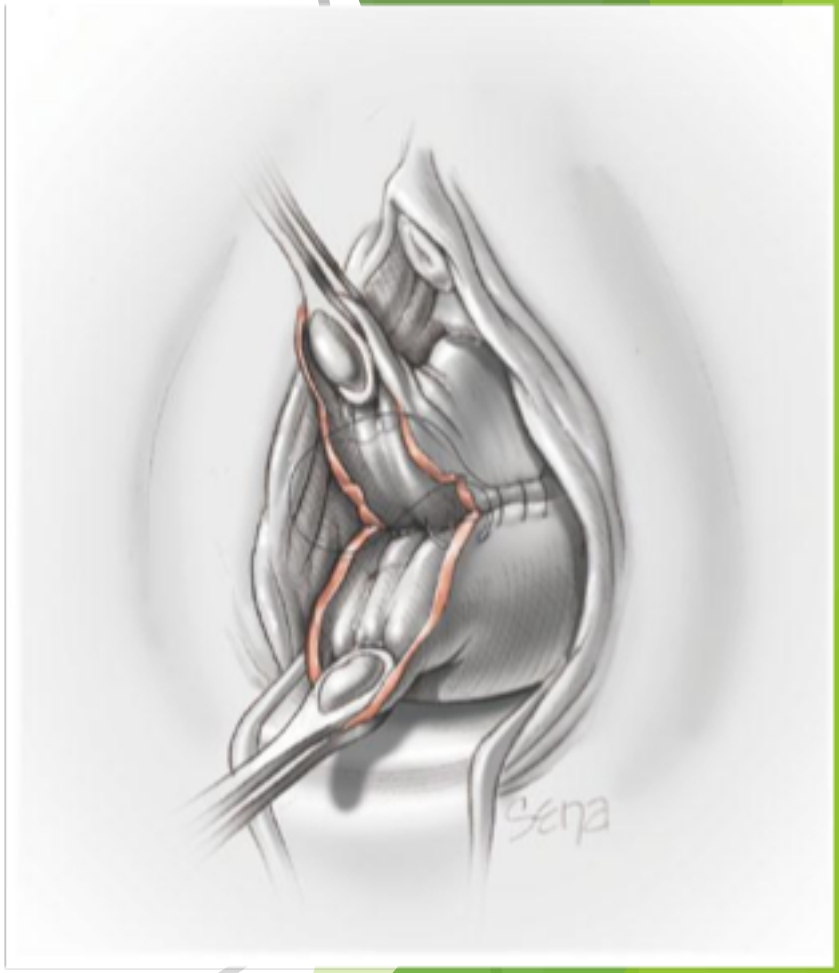


FIGURE 41-10 Repair of cervical laceration with appropriate surgical exposure. Continuous absorbable sutures are placed beginning at the upper angle of the laceration.

Causes of Obstetrical hemorrhage:

Puerperal hematoma

- most often associated with a laceration, episiotomy, or an operative delivery.
- Occasionally, they are associated with an underlying coagulopathy.
- Faulty clotting may be acquired, such as with consumptive coagulopathy from placental abruption or fatty liver failure, or may stem from a congenital bleeding disorder such as von Willebrand disease.
- Vulvar hematomas may involve the vestibular bulb or branches of the pudendal artery (inferior rectal, perineal, and clitoral arterie)s
- Paravaginal hematomas may involve the descending branch of the uterine artery).

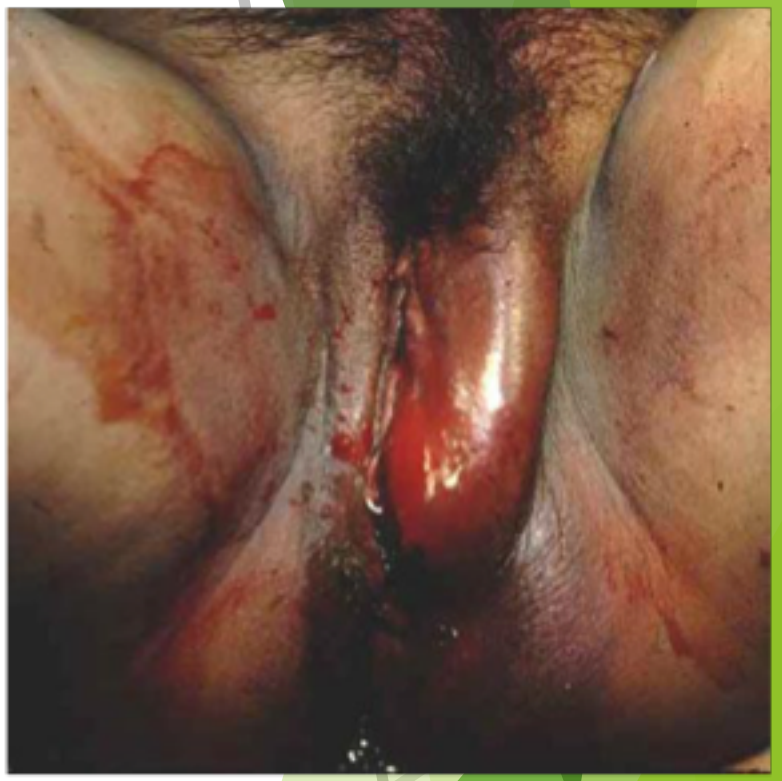


FIGURE 41-12 Left-sided anterior perineal triangle hematoma associated with a vaginal laceration following spontaneous delivery in a woman with consumptive coagulopathy from acute fatty liver of pregnancy.

Causes of Obstetrical hemorrhage:
Puerperal hematoma

- **Vulvovaginal Hematomas**: may develop rapidly and frequently cause excruciating pain/severe perineal pain.
  - A tense, fluctuant, and tender swelling or vulvovaginal area
  - smaller vulvar hematomas may be treated expectantly
  - if pain is severe or the hematoma continues to enlarge, then surgical exploration is preferable.

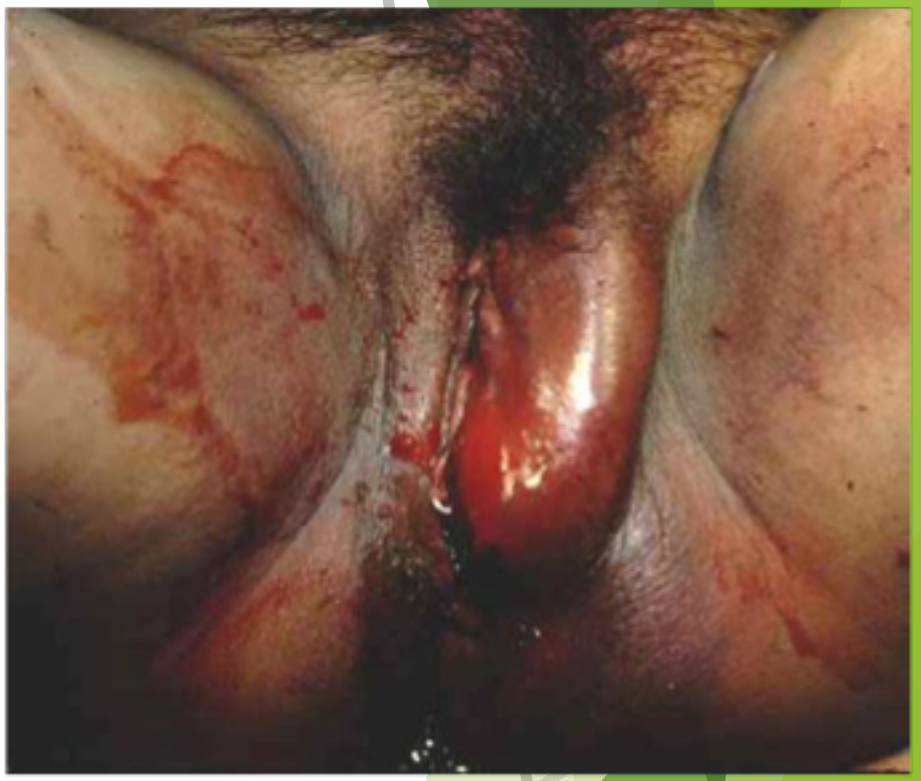


FIGURE 41-12 Left-sided anterior perineal triangle hematoma associated with a vaginal laceration following spontaneous delivery in a woman with consumptive coagulopathy from acute fatty liver of pregnancy.

Causes of Obstetrical hemorrhage:

Uterine rupture

- **Primary** (occurring in a previously intact or unscarred uterus)
- **Secondary** (associated with a preexisting myometrial incision, injury, or anomaly).

TABLE 41-3. Some Causes of Uterine Rupture

Preexisting Uterine Injury or Anomaly	Uterine Injury or Abnormality Incurred in Current Pregnancy
Surgery involving the myometrium: Cesarean delivery or hysterotomy Previously repaired uterine rupture Myomectomy incision through or to the endometrium Deep cornual resection of interstitial fallopian tube Metroplasty **Coincidental uterine trauma:** Abortion with instrumentation—sharp or suction curette, sounds Sharp or blunt trauma—assaults, vehicular accidents, bullets, knives Silent rupture in previous pregnancy **Congenital:** Pregnancy in undeveloped uterine horn Defective connective tissue—Marfan or Ehlers-Danlos syndrome	**Before delivery:** Persistent, intense, spontaneous contractions Labor stimulation—oxytocin or prostaglandins Intraamnionic instillation—saline or prostaglandins Perforation by internal uterine pressure catheter External trauma—sharp or blunt External version Uterine overdistention—hydramnios, multifetal pregnancy **During delivery:** Internal version second twin Difficult forceps delivery Rapid tumultuous labor and delivery Breech extraction Fetal anomaly distending lower segment Vigorous uterine pressure during delivery Difficult manual removal of placenta **Acquired:** Placental accrete syndromes Gestational trophoblastic neoplasia Adenomyosis Sacculation of entrapped retroverted uterus

Causes of Obstetrical hemorrhage:

Uterine rupture

- Classified as either:
  - complete when all layers of the uterine wall are separated
  - incomplete when the uterine muscle is separated but the visceral peritoneum is intact
    - also commonly referred to as *uterine dehiscence*.

- the most common sign of uterine rupture is a nonreassuring fetal heart rate pattern with variable heart rate decelerations that may evolve into late decelerations and bradycardia

- Can also present as loss of fetal station, cessation of uterine contractions

Causes of Obstetrical hemorrhage:

Uterine rupture

Predisposing Factors and Causes

- prior cesarean incision
- other previous operations or manipulations that traumatize the myo- metrium such as uterine curettage or perforation, endometrial ablation, myomectomy, or hysteroscopy
- Excessive uterine stimulation (ex. Use of oxytocin)

Causes of Obstetrical hemorrhage:

Uterine rupture

- Fetal condition depends on the degree to which the placental implantation remains intact, although this can change within minutes.
- With rupture, the only chance of fetal survival is afforded by immediate delivery—most often by exploratory laparotomy
- With complete rupture, hysterectomy may be required.
- In selected cases, however, suture repair with uterine preservation may be performed.

Causes of Obstetrical hemorrhage:

Uterine rupture

- Fetal condition depends on the degree to which the placental implantation remains intact, although this can change within minutes.
- With rupture, the only chance of fetal survival is afforded by immediate delivery—most often by exploratory laparotomy

Causes of Obstetrical hemorrhage:

Abruptio Placenta

- Separation of the placenta—either partially or totally—from its implantation site before delivery
- Placental abruption is initiated by hemorrhage into the decidua basalis → decidua splits, leaving a thin layer adhered to the myometrium.
- Abruption begins with rupture of a decidual spiral artery to cause a retroplacental hematoma → can expand to disrupt more vessels and extend placental separation

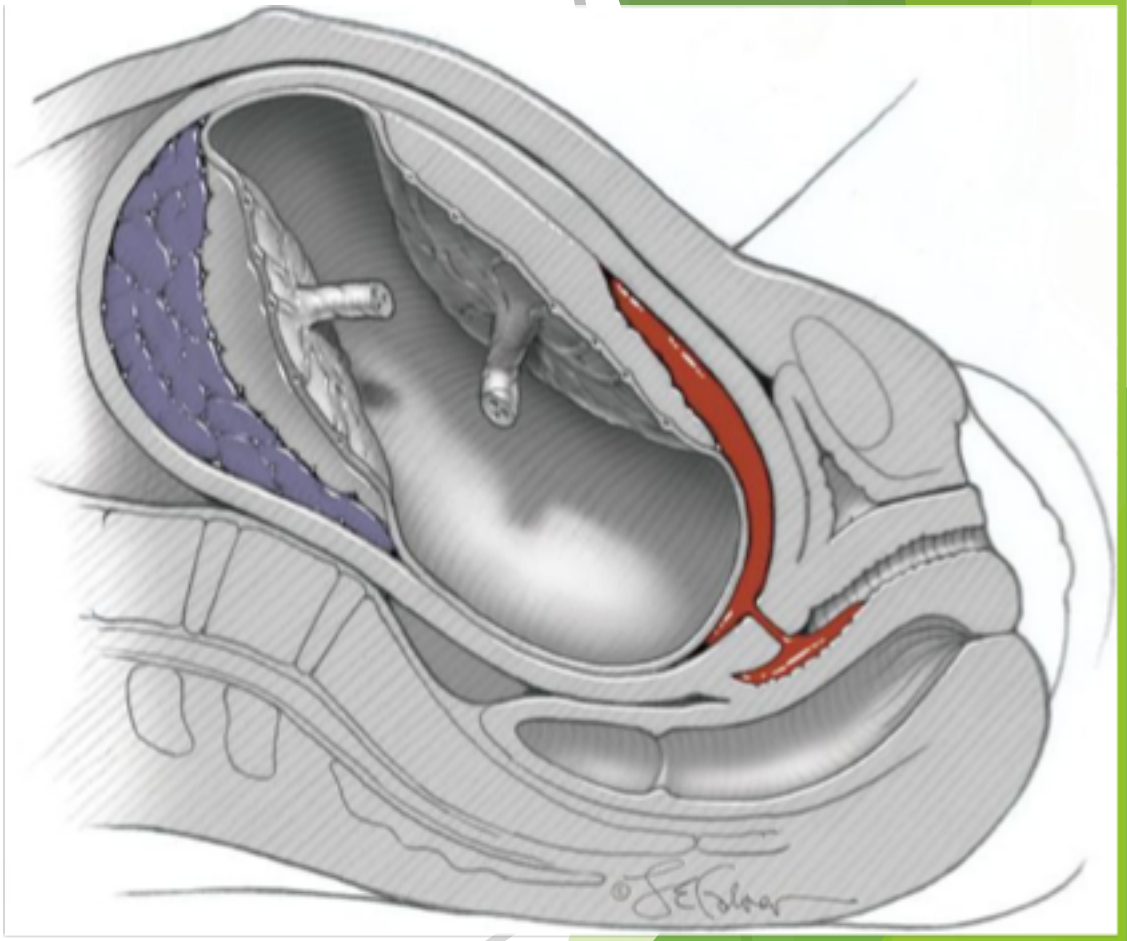


FIGURE 41-15 Schematic of placental abruption. Shown to left is a total placental abruption with concealed hemorrhage. To the right is a partial abruption with blood and clots dissecting between membranes and decidua to the internal cervical os and then externally into the vagina.

Causes of Obstetrical hemorrhage:
Abruptio Placenta

- Chronic Abruption : chronic placental separation beginning early in pregnancy.
  - In some cases of a chronic abruption, subsequent oligohydramnios develops— chronic abruption-oligohydramnios sequence—CAOS

- Traumatic Abruption: secondary to external trauma—usually from motor vehicle accidents or aggravated assault— that can cause placental separation.

Causes of Obstetrical hemorrhage:

Abruptio Placenta

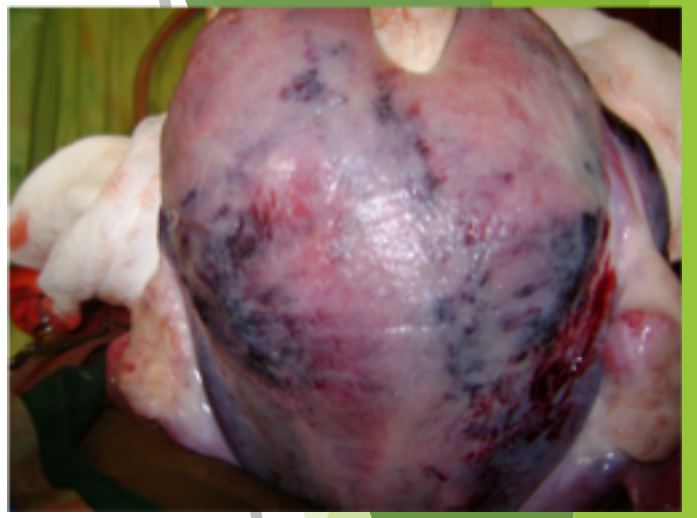
Risk factors

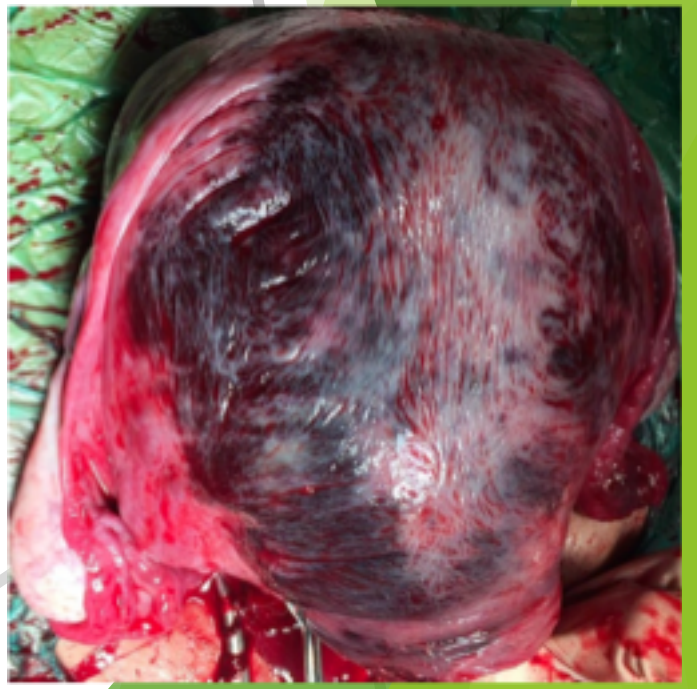
1. Age
2. Parity
3. Hypertension
4. Preterm premature rupture of membranes
5. Polyhydramnios
6. Uterine leiomyomas (if located near the mucosal surface behind the placental implantation site)
7. Cigarette/cocaine
8. Lupus anticoagulant/thrombophilia

Causes of Obstetrical hemorrhage:

Abruptio Placenta

- Presents as sudden-onset abdominal pain, vaginal bleeding, and uterine tenderness
- complicated by massive and sometimes torrential hemorrhage leading to hypovolemic shock
- one of the most common causes of ***defibrination syndrome***, which is currently referred to as ***consumptive coagulopathy or disseminated intravascular coagulation.***
  - Consumptive coagulopathy is more likely with a concealed abruption because intrauterine pressure is higher, thus forcing more thromboplastin into the large veins draining the implantation site.
- Can cause couvelaire uterus (widespread extravasation of blood into the uterine musculature and beneath the serosa) → "uteroplacental apoplexy".





Causes of Obstetrical hemorrhage:

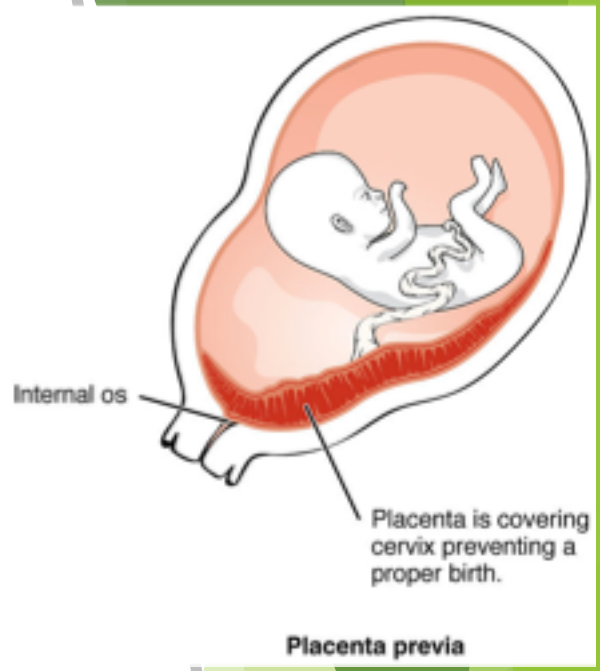
Abruptio Placenta

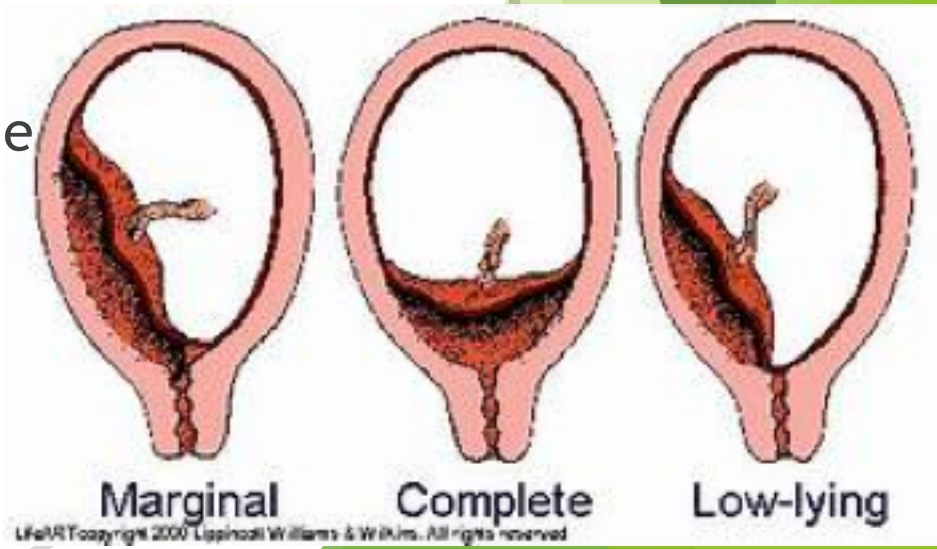
- Can cause pituitary failure or Sheehan Syndrome (failure of lactation, amenorrhea, breast atrophy, loss of pubic and axillary hair, hypothyroidism, and adrenal cortical insufficiency)
- With a living viable-size fetus and with vaginal delivery not imminent, emergency cesarean delivery is done
- If the fetus has died or if it is not considered mature enough to live outside the uterus, then vaginal delivery is preferable.

Causes of Obstetrical hemorrhage:

Placenta Previa

- The “placenta goes before the fetus into the birth canal”
- Total: placenta totally covering the internal os
- Partial: placental partially covering the internal os
- Low-lying placenta: implantation in the lower uterine segment, such that the placental edge does not reach the internal os and remains outside a 2-cm wide perimeter around the os.
- Marginal previa: placenta that was at the edge of the internal os but did not overlie it.





Causes of Obstetrical hemorrhage:
Placenta Previa

- Risk factors
  1. Advanced maternal age
  2. Prior cesarean delivery
  3. Multiparity
  4. Cigarette smoking
- Bleeding from a previa usually begins without warning and without pain or or contractions in a woman who has had an uneventful prenatal course.
- Performing internal (digital) examination is CONTRAINDICATED (can cause torrential hemorrhage)
- Ultrasound is used to localize the location of the placenta

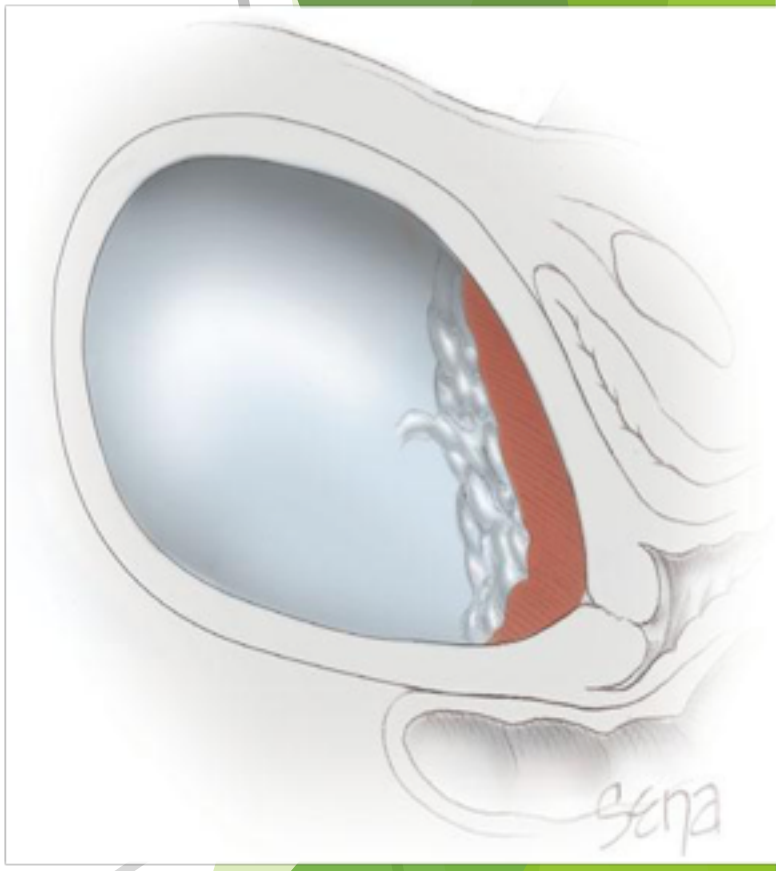


FIGURE 41-22 Total placenta previa showing that copious hemorrhage could be anticipated with any cervical dilatation.

Causes of Obstetrical hemorrhage:

Placenta Previa

- If the fetus is preterm and there is no persistent active bleeding, management favors close observation in an obstetrical unit.
- For women who are near term and who are not bleeding, plans are made for scheduled cesarean delivery.
- for women whose placenta previa is implanted anteriorly at the site of a prior uterine incision, there is an increased likelihood of associated placenta accrete syndrome and need for hysterectomy.

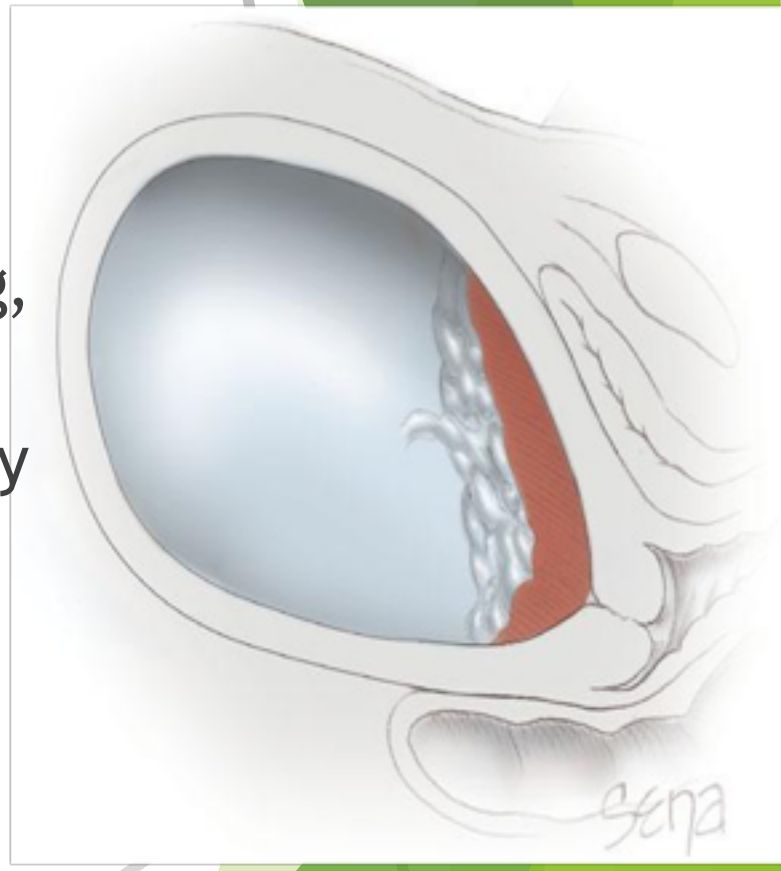
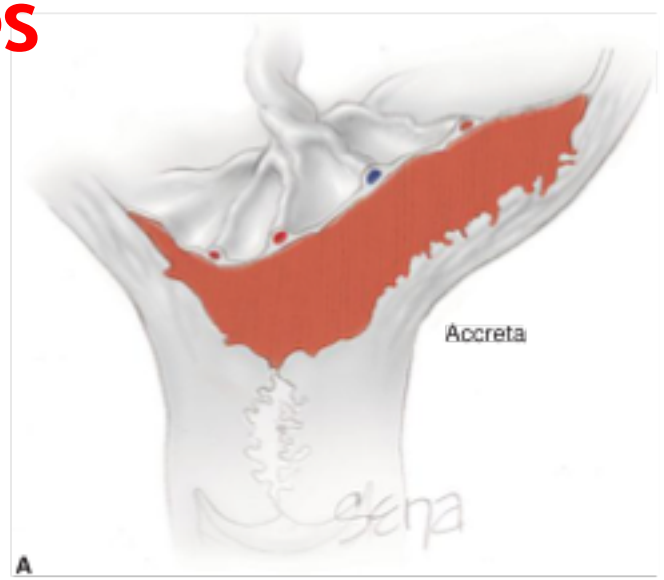


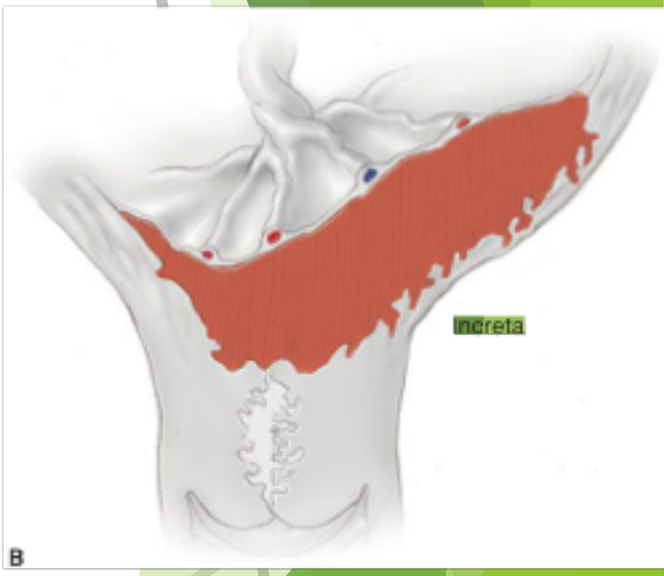
FIGURE 41-22 Total placenta previa showing that copious hemorrhage could be anticipated with any cervical dilatation.

Causes of Obstetrical hemorrhage:

Placenta Accrete syndromes

- any placental implantation with abnormally firm adherence to myometrium because of partial or total absence of the decidua basalis and imperfect development of the fibrinoid or **Nitabuch layer**.





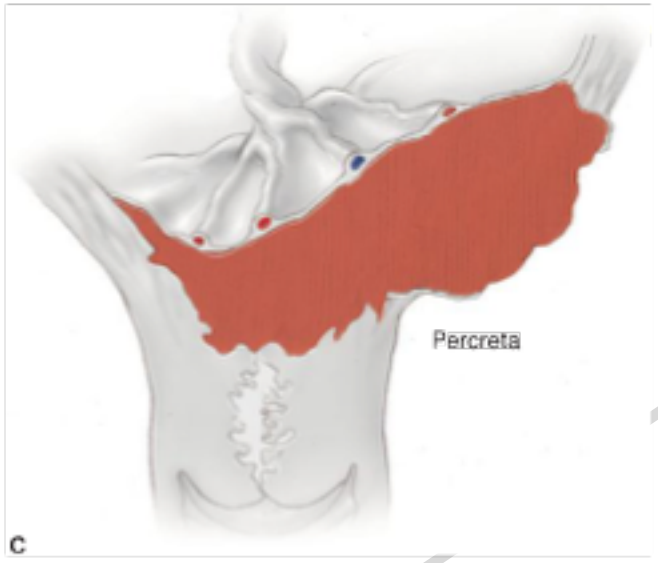
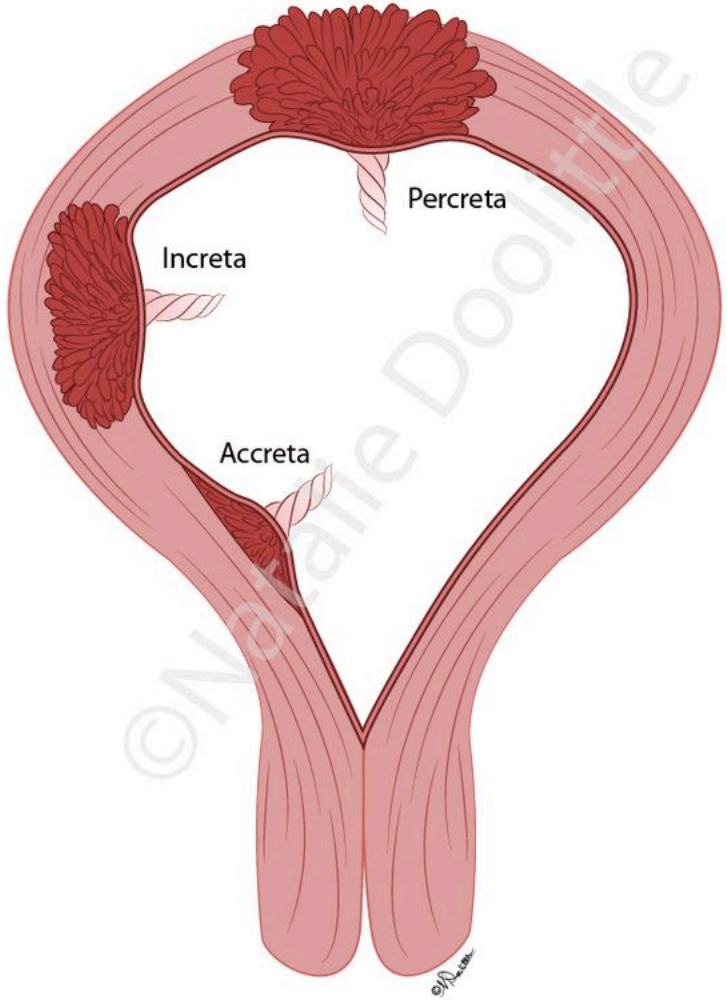


FIGURE 41-26 Placenta accrete syndromes. **A.** Placenta accreta. **B.** Placenta increta. **C.** Placenta percreta.

Causes of Obstetrical hemorrhage:

Placenta Accrete syndromes

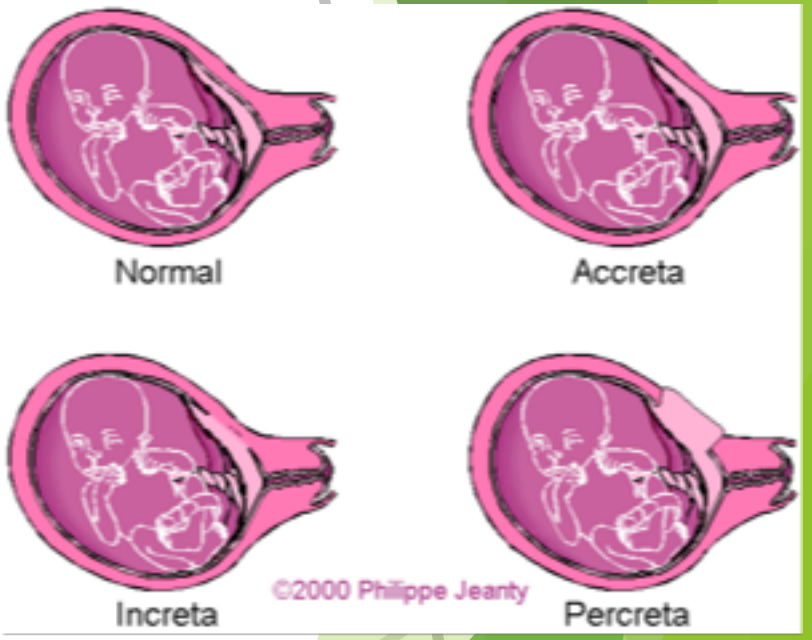
- **Placenta accrete**: villi are attached to the myometrium.
- **Placenta increta**: villi actually invade the myometrium
- **Placenta percreta:** villi that penetrate through the myometrium and to or through the serosa.
- ***total placenta accreta* – abnormal adherence of ALL lobules.
- ***focal placenta accreta* - if all or part of a single lobule is abnormally attached.



Causes of Obstetrical hemorrhage:

Placenta Accrete syndromes

- two most important risk factors are an associated previa, a prior cesarean delivery, and more likely a combination of the two.
- In cases of first- and second-trimester accrete syndromes, there is usually hemorrhage that is the consequence of coexisting placenta previa.
- In some women who do not have an associated previa, accreta may not be identified until third-stage labor when an adhered placenta is encountered.
- Fetus is delivered via Ceasarean section, with subsequent hysterectomy.
  - However, some of these abnormal placentations, especially if partial, may be amenable to placental delivery with hemostatic suture placement.



Thank you!

youtube channel: Ina Irabon

www.wordpress.com: Doc Ina OB Gyne