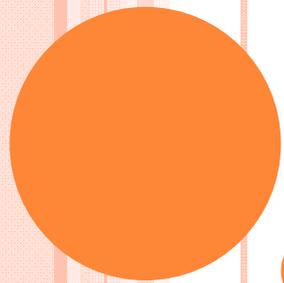


hello



POSTPARTUM HEMORRHAGE

Dr. Radnia

OB & GYN

Fellowship of pelvic floor disorders

PPH

- It is estimated that, worldwide, 140,000 women die of postpartum hemorrhage (PPH) each year—one every 4 minutes.
- More than half of all maternal deaths occur within 24 hours of delivery.
- In addition to death, serious morbidity may follow PPH.
- Sequelae include adult respiratory distress syndrome, coagulopathy, shock, loss of fertility, and pituitary necrosis (Sheehan syndrome).



DEFINITION

- The prevalence of PPH is about 4%.
- It can be sudden and profuse.
- PPH has been traditionally defined as a delivery-associated blood loss in excess of 500 mL for vaginal delivery and 1,000 mL for cesarean birth
- The estimation of blood loss is subjective, introducing wide variance and inaccuracy.



- More recently, the ACOG Revitalize program has recommended a single definition of PPH regardless of route of delivery:
- a cumulative blood loss of ≥ 1000 mL or blood loss accompanied by signs and symptoms of hypovolemia within 24 hours following delivery.



- For descriptive purposes, PPH is termed “*primary*” (also called immediate or early) if it occurs within 24 hours of delivery and “*secondary*” (delayed or late) if it occurs between 24 hours and (usually) 12 weeks after delivery.
- Primary PPH is of much greater importance, insofar as secondary PPH is less common and generally much less serious in nature.



RISK FACTORS FOR POSTPARTUM HEMORRHAGE

- Prolonged labor
 - Augmented labor
 - Rapid labor
 - History of postpartum hemorrhage
 - Episiotomy, especially mediolateral
 - Preeclampsia
 - Overdistended uterus (macrosomia, multiple gestation, and hydramnios)
 - Prior uterine surgery and other risk factors for abnormal placentation
 - Operative delivery
 - Asian or Hispanic ethnicity
 - Chorioamnionitis



SIGNS AND SYMPTOMS

- As blood loss approaches 15% to 20%, the first signs of intravascular depletion manifest, including *tachycardia*, *tachypnea*, and *delayed capillary refill*, followed by *orthostatic changes* and *narrowed pulse pressure* .
- Beyond approximately 30% volume loss, *breathing and heart rate* further *increase*, and overt *hypotension* develops.
- Finally, with profound blood loss above 40% to 50%, *oliguria, shock, coma, and death* may occur.



CAUSES

- The source and etiology of bleeding should be identified as soon as possible, and targeted interventions applied in order to minimize morbidity and prevent mortality.
- The most common cause of PPH is ***uterine atony***, representing about 80% of cases. ***Retained placenta, genital tract trauma lacerations***, and ***coagulation disorders*** are other causes.
- ***Hematomas*** can occur anywhere in the lower genital tract.
- ***Ruptured uterus*** and inverted uterus are rare but serious causes of PPH.



MANAGEMENT OF THE PATIENT WITH POSTPARTUM HEMORRHAGE

○ *General Measures*

- Evaluate excessive bleeding immediately Assess overall patient status
 - Notify other members of obstetrics team (i.e., obtain help!)
 - Monitor and maintain circulation
- Establish intravenous (IV) access: two large bore
- Type and cross-match blood
- Begin/increase crystalloid infusion
- Assess for clotting or check coagulation profile



REVIEW CLINICAL COURSE FOR PROBABLE CAUSE

- Any difficulty removing placenta?
- Were forceps used?
- Other predisposing factors?
- Have operating room (OR) and personnel on standby



EVALUATION

- Assess hemodynamic status
- Bimanual examination:
 - assess for atony
 - May palpate for retained placental fragments
 - May palpate uterine wall for rupture
 - Inspect perineum, vulva, vagina, and cervix
 - Identify lacerations, hematomas, inversions
 - Recruit assistance for exposure
 - You or assistant may re-inspect placenta
 - Assess clotting



TARGETED INTERVENTIONS

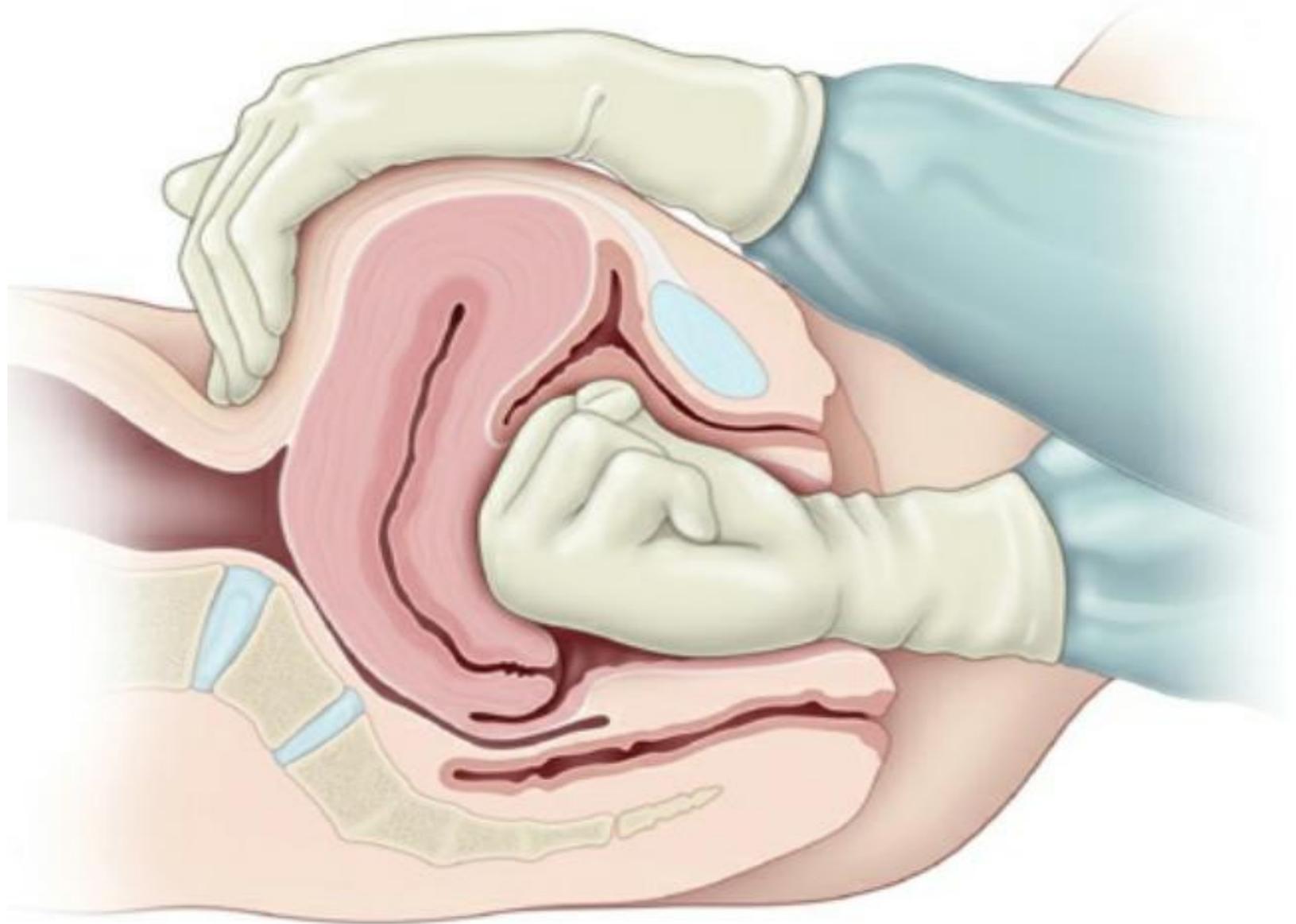
- ***Atony***
- Immediate bimanual massage
- Administer uterotonics (with requisite precautions)
- **Oxytocin**—IV: 10 to 40 units/1 L normal saline or lactated Ringer (solution, continuous)
- ***Methyl ergonovine***—intramuscular (IM): 0.2 mg IM; may repeat in 2 to 4 hours(contraindication:hypertension)
- **15-Methyl PGF₂α (Hemabate or carboprost)**—IM 0.25 mg every 15 to 90 minutes for up to 8 doses (contraindication: renal-liver-heart disease)
- **Dinoprostone (E2)**—Suppository: rectal or vaginal; 20 mg every 2 hours
- **Misoprostol(cytotec)(E1)** —600 to 1,000 µg (rectally;orally or sub lingually) one dose
- **Intrauterine tamponade—Bakri balloon, packing**



MAJOR CAUSES OF PPH AND THEIR MANAGEMENT

- ***Uterine Atony:***
- When contraction does not occur as expected, the resulting uterine atony leads to PPH.
- Conditions that predispose to uterine atony include those in which there is:
 - ***extraordinary enlargement of the uterus*** (e.g., hydramnios and multiple fetuses),
 - ***abnormal labor*** (both precipitous and prolonged or augmented by oxytocin)
 - ***conditions that interfere with contraction of the uterus*** (e.g., uterine leiomyomata and magnesium sulfate)





DIAGNOSIS OF ATONY:

- The clinical diagnosis of atony is based largely on the tone of the uterine muscle on palpation.
- Instead of the normally firm, contracted uterine corpus, a softer, more pliable—often called “boggy”—uterus is found.
- The cervix is usually open.
- Frequently, the uterus contracts briefly when massaged, only to become relaxed again when the manipulation ceases.
- Because hemorrhage can occur in the absence of atony, other etiologies must be sought in the presence of a firm fundus.



- The protocol for management of the third stage includes oxytocin infusion (usually 20 units in 1 L of normal saline infused at 200 to 500 mL/hour) initiated immediately following delivery of the infant or its anterior shoulder, gentle cord traction, and uterine massage.
- Some physicians do not begin oxytocin infusion until after delivery of the placenta to avoid placenta entrapment



MANAGEMENT OF UTERINE ATONY

- Management of uterine atony is both preventive and therapeutic.
- Active management of the third stage of labor (the interval between the delivery of the fetus and delivery of the placenta) has been shown to reduce the incidence of PPH by as much as 70%.



- Immediate breastfeeding may also enhance uterine contractility and, thus, reduce blood loss.
- In low resource settings, 10 units IM oxytocin may be given if there is no IV access, or 600 µg misoprostol may be given orally if no oxytocin is available.
- Bimanual uterine massage alone is often successful
in causing uterine contraction, and this should be done while preparations for other treatments are under way



UTEROTONIC AGENTS

- oxytocin,
- methylergonovine maleate,
- misoprostol (an analogue of prostaglandin E1),
- dinoprostone (an analogue of prostaglandin E2),
- 15-methyl prostaglandin F2 α ,
- administered separately or in combination



METHYLERGONOVINE MALEATE

- is a potent uterotonic agent that can cause uterine contractions within several minutes.
- It is always given intramuscularly,
- rapid intravenous administration can lead to dangerous hypertension, and its use is often avoided in those with hypertensive disorders.
- it should be avoided or used with extreme caution in those with cardiac, pulmonary, liver, or renal diseases

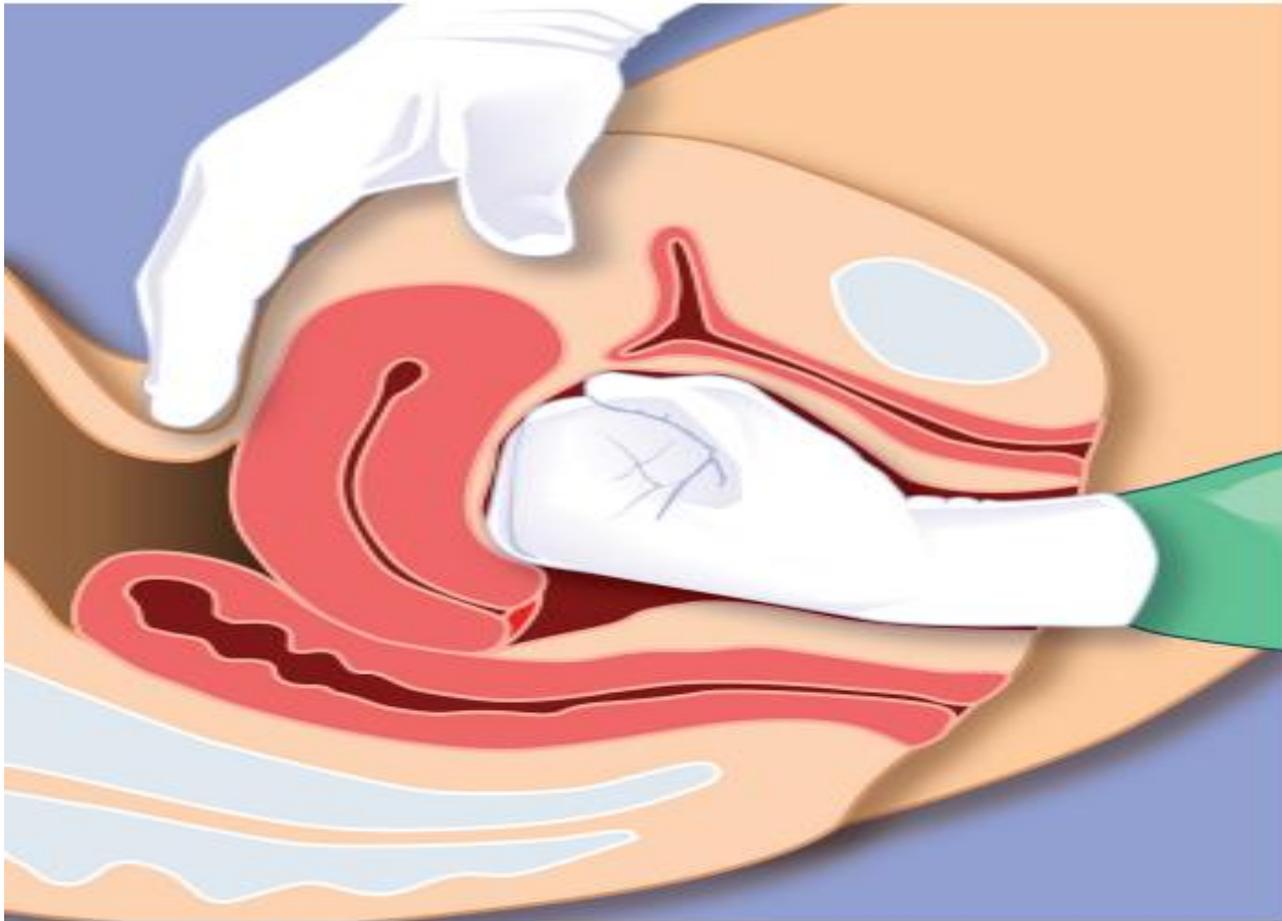


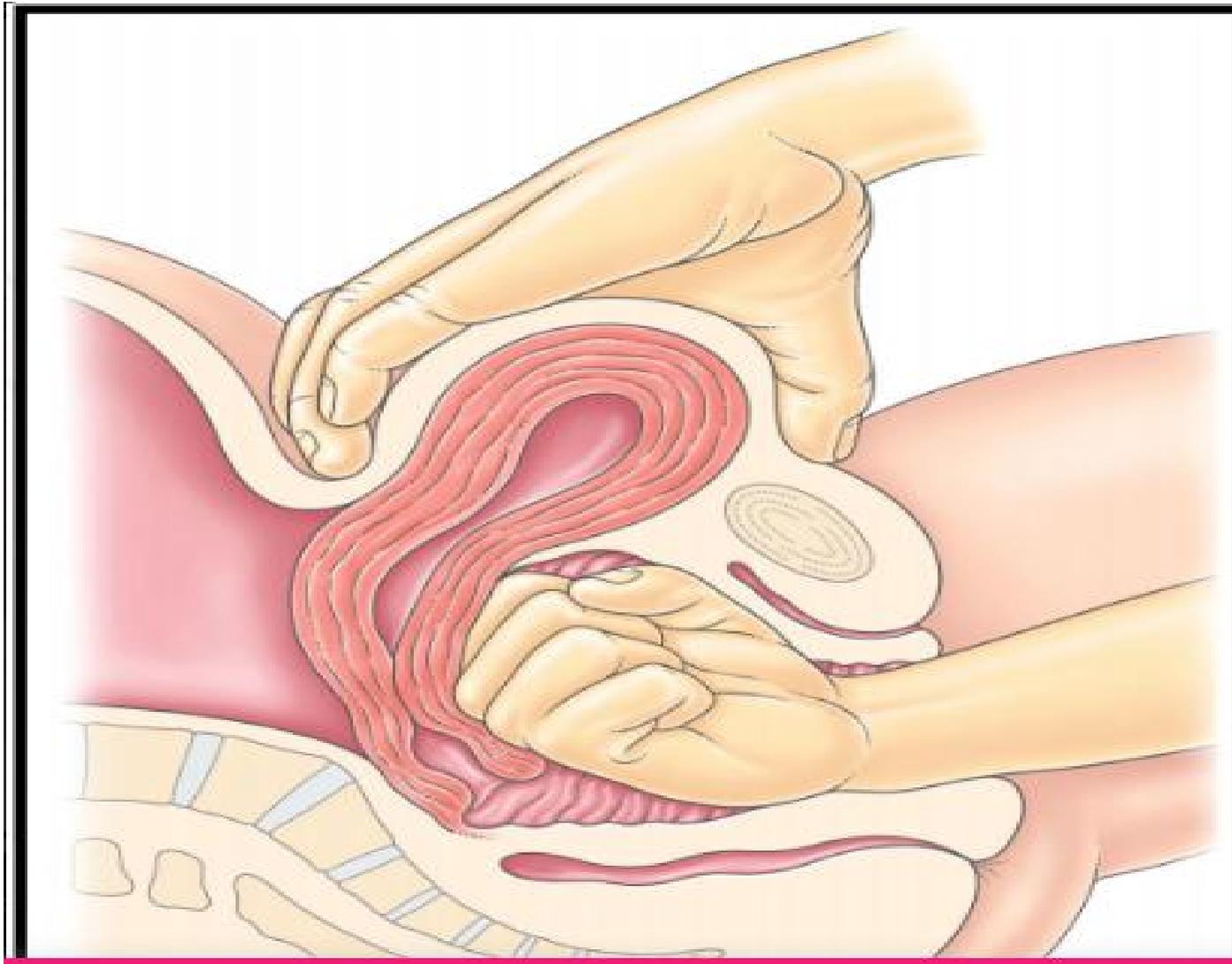
OTHER DRUGS: *PROSTAGLANDINS*

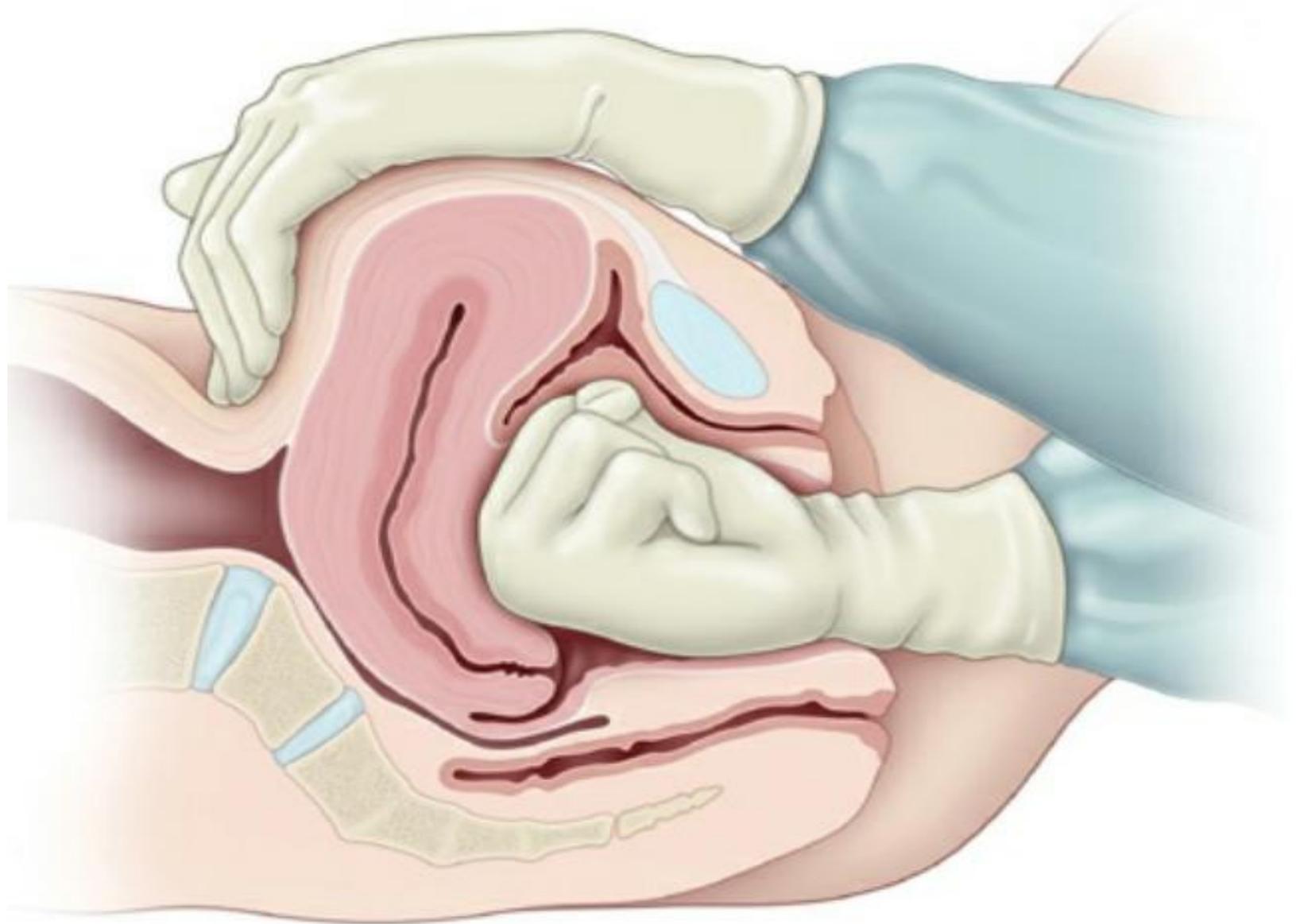
- *15-methyl prostaglandin F2 α* may be given intramuscularly or directly into the myometrium.
- *Dinoprostone* may be given by rectal suppository.
- *misoprostol* has been used for treatment and prevention of PPH.
- These prostaglandins result in strong uterine contractions.



BIMANUAL MASSAGE







- Typically, oxytocin is given prophylactically, as noted previously;
- if uterine atony occurs, the infusion rate is increased, and additional agents are given sequentially.
- Uterotonic agents are only effective for uterine atony.
- If the uterus is firm, the use of these agents is not necessary and other causes of bleeding should be explore



OTHER MANAGEMENT

- Occasionally, uterine massage and uterotonic agents are unsuccessful in bringing about adequate uterine contraction, and other measures must be used.
- Some practitioners use intrauterine compression with in utero packing or placement of a balloon compression device (e.g., Bakri, BTcath, and Foley catheters) as a means of halting blood loss while preserving the uterus.

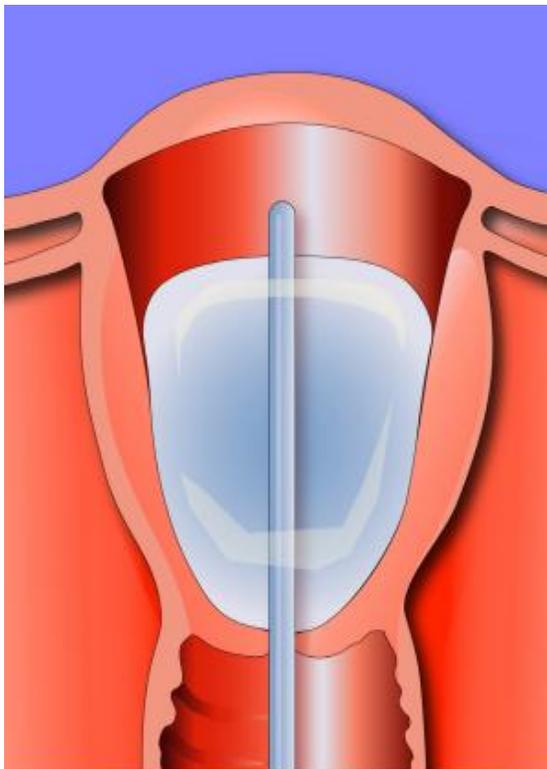


UTERINE PACKING:

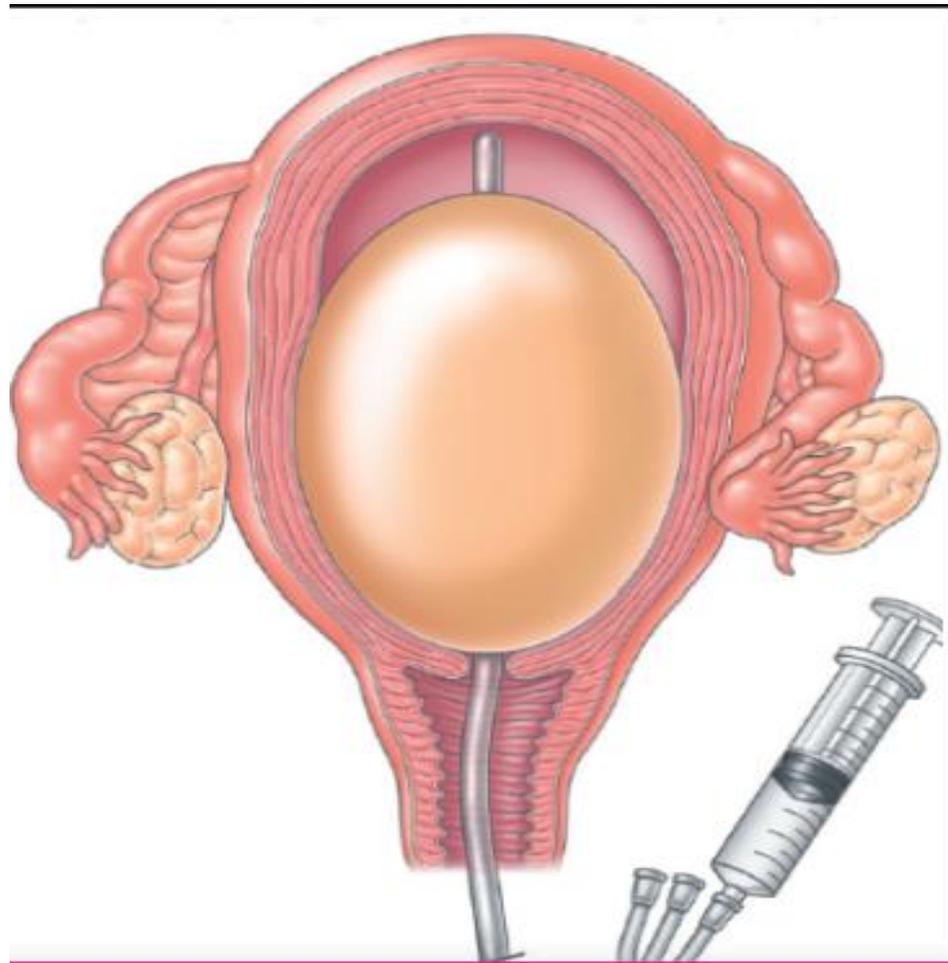
- 34F foley catheter that filled with 60-80 ml of saline.
- If bleeding subsides , the catheter is removed after 12 to 24 hours.
- Similar devices for tamponade include Segstaken-Blakemore , Rash and ebb balloons and condom catheters.
- Bakri Post partum Balloon: 150-300 ml (500).
Remove after 12 hours.



BAKRY BALLOON



BAKRY BALLOON



SURGICAL MANAGEMENT

- B-Lynch or multiple squares,
- sequential arterial ligation (ascending or descending branches of the uterine, utero-ovarian, then internal iliac arteries),
- selective arterial embolization
- hysterectomy



BLEEDING UNRESPONSIV TO UTEROTONIC AGENTS

- Bimanual uterine compression
- Immediately mobilize the emergent- care obstetrical team(whole blood or packed cell)
- Request urgent help
- Secure at least two large – bore IV
- Volume resuscitation with rapid intra venous infusion of crystalloid
- With sedation explore the uterin cavity for retained placental fragments (laceration or rupture)
- Inspect the cervix and vagina
- Blood transfusion

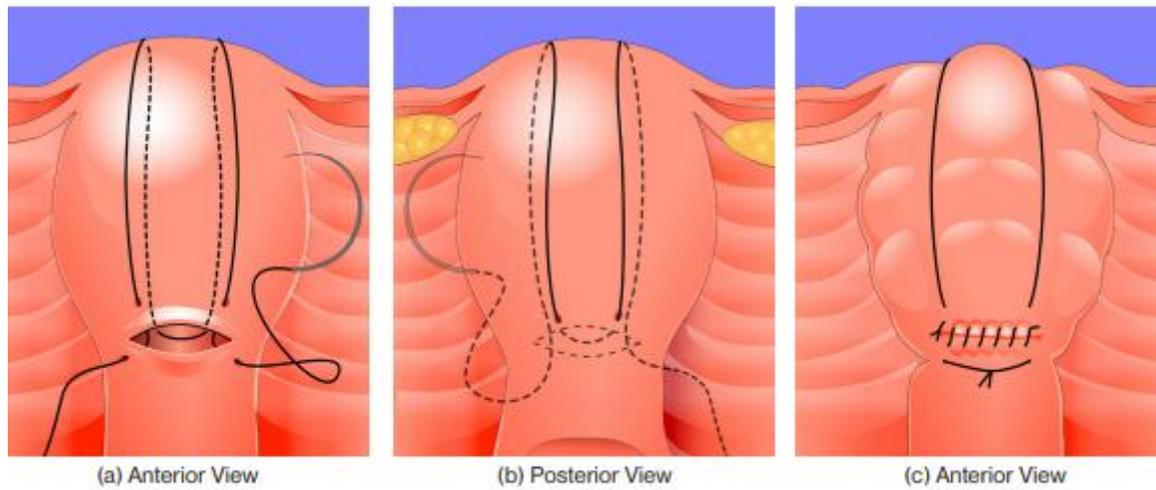


OPERATIVE MEASURES

- Uterine compression sutures (B-Lynch)
- Uterine arterial ligation or selective arterial embolization
- Hysterectomy

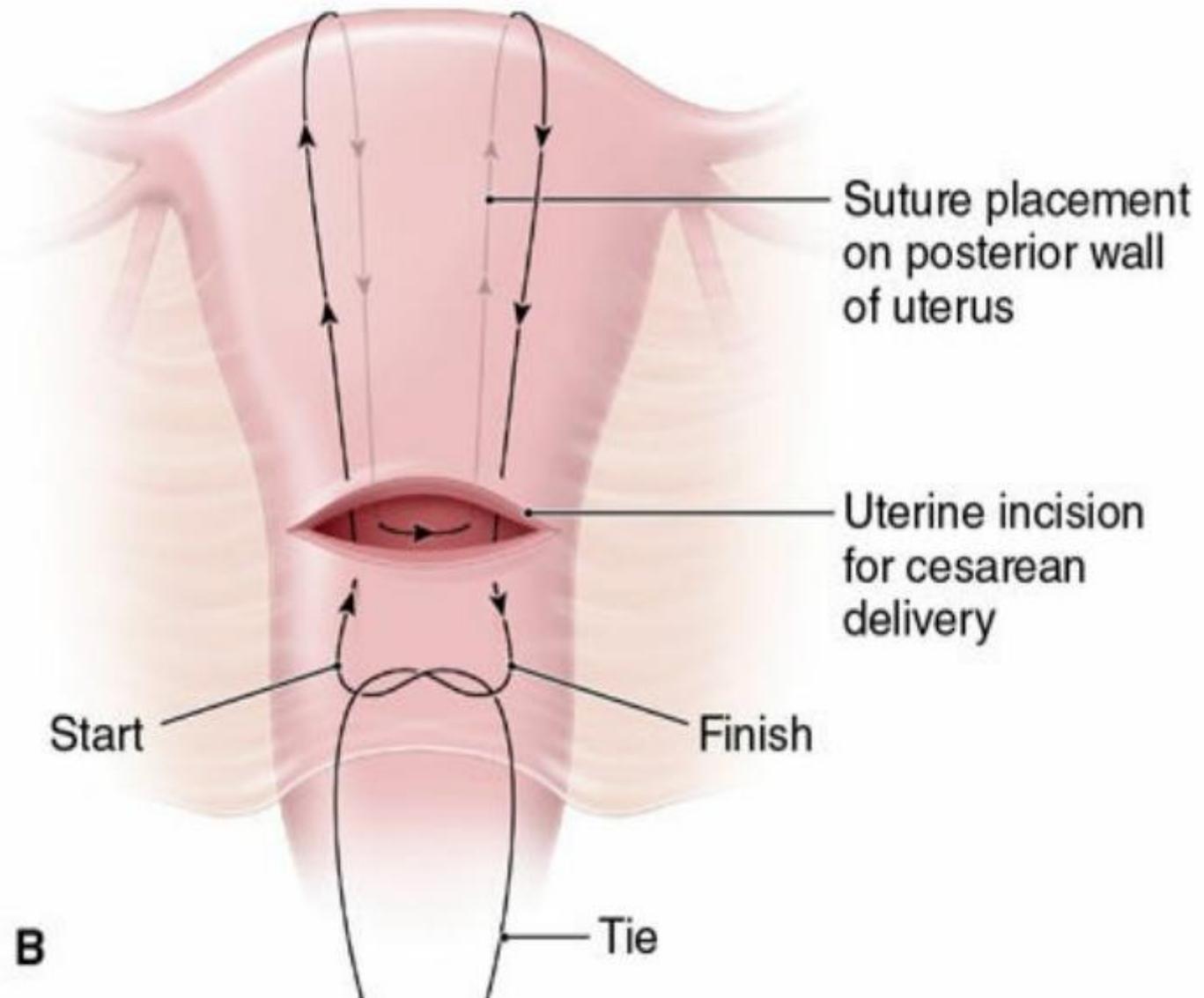


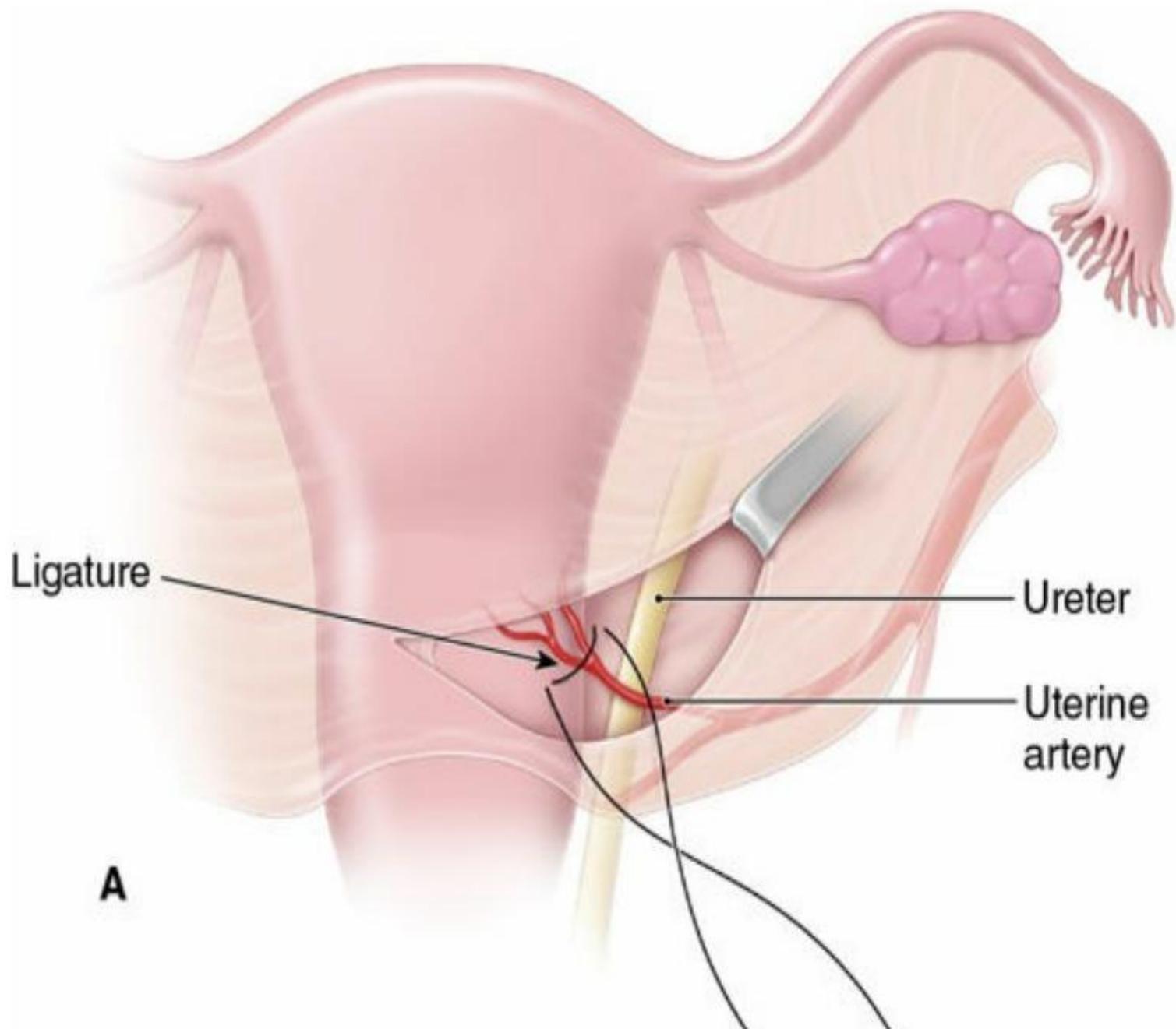
B-LYNCH



B-LYNCH







LACERATIONS OF THE LOWER GENITAL TRACT

- are far less common than uterine atony as a cause of PPH, but they can be serious and require prompt surgical repair.
- Predisposing factors include :
 - ❖ instrumented delivery,
 - ❖ presentations other than occiput anterior,
 - ❖ macrosomia.



GENITAL TRACT LACERATIONS AND HEMATOMAS

- Repair lacerations immediately
- Exposure critical—get assistance, move to OR
- No blindly placed sutures
- Packing may be necessary
- Observe stable, asymptomatic hematomas



- vaginal examination may require assistance to allow adequate visualization.
- As a rule, repair of these lacerations is usually not difficult, if adequate exposure is provided.
- Periurethral lacerations may be associated with sufficient edema to occlude the urethra, causing urinary retention; a Foley catheter for 12 to 24 hours usually alleviates this problem



RETAINED PLACENTA

- Normally, separation of the placenta from the uterus occurs because of cleavage between the zona basalis and the zona spongiosa facilitated by uterine contraction.
- Once separation occurs, expulsion is caused by strong uterine contractions.
- Retained placenta can occur when either the process of separation or the process of expulsion is incomplete.



RETAINED PLACENTA

- Manual removal; manage atony as above
- Ultrasound assessment/guidance to assure complete removal
- Suction curettage—ideally performed with ultrasound guidance in OR
- Maintain suspicion for accreta—additional intervention required



PREDISPOSING FACTORS

- previous cesarean delivery,
- uterine leiomyomata,
- prior uterine curettage,
- accessory (succenturiate) placental lobe.



- Placental tissue remaining in the uterus can prevent adequate contractions, leading to atony and excessive bleeding.
- After expulsion, every placenta should be inspected to detect missing placental cotyledons, which may remain in the uterus



- If retained placenta is suspected—either because of apparently absent cotyledons or because of excessive bleeding—it can often be removed by inserting two fingers through the cervix into the uterine cavity and manipulating the retained tissue downward into the vagina.
- If this is unsuccessful, an ultrasound examination of the uterus can be helpful.
- Curettage with a suction apparatus and/or a large, sharp curette may be used to remove the retained tissue.



COMPLICATIONS:

- perforation through the uterine fundus.
- Asherman syndrome:
- intrauterine adhesions can lead to a variety of complications, including:
 - menstrual irregularities,
 - infertility,
 - future pregnancy loss.



COAGULOPATHY

- Appropriate factor replacement
- Identify underlying cause Hemorrhage, infection, amniotic fluid embolism, other



- ***Other questions that may help direct assessment include the following:***
- Was expulsion of the placenta spontaneous and apparently complete? (Think: retained placental fragment?)
- Were forceps or other instrumentation used in delivery? (Think: laceration?)
- as the baby large or the delivery difficult or precipitous? (Think: uterine atony?)



- Were the cervix and vagina inspected for lacerations?
- What was the admission or baseline hematocrit?
- Is the blood clotting? (Think: coagulopathy?)



- While the cause of the hemorrhage is being identified, general supportive measures should be initiated .
- Such measures include large-bore intravenous access; rapid crystalloid infusions; type, cross-match, and administration of blood or blood components as needed;
- periodic assessment of hematocrit and coagulation profile; and monitoring of urinary output.



- The mainstay of blood replacement therapy is packed red blood cells (PRBCs), with other components used as indicated for various disorders of the clotting cascade.
- Depending on the clinical scenario, the use of laboratory measurements to guide transfusion of plasma, cryoprecipitate, and platelets may be reasonable.



- in the setting of severe, ongoing hemorrhage (4 or more units of PRBCs needed over 1 hour or 10 or more units over 12–24 hours),
- the current recommendation is to transfuse blood products in a 1:1 ratio (i.e., for each unit of PRBCs transfused, 1 unit of fresh frozen plasma and 1 unit of random donor platelets should also be transfused).



- The recent recommendation to avoid transfusion in stable, asymptomatic hospitalized patients with a hemoglobin >7 to 8 mg/dl does not apply in the setting of postpartum hemorrhage



TABLE 12.1 BLOOD COMPONENT THERAPY

Product	Contents	Volume (mL)	Effect
Packed RBCs	RBCs, WBCs, plasma	240	Increase Hct 3%/unit, hemoglobin by 1 g/dL
Platelets	Platelets, RBCs, WBCs, plasma	50	Increase platelet count 5,000–10,000/mm ³ per unit
Fresh frozen plasma	Factors V and VIII, fibrinogen, antithrombin III	250	Increase fibrinogen by 10 mg/dL
Cryoprecipitate	Factors VIII and XIII, fibrinogen, vWF	40	Increase fibrinogen by 10 mg/dL

Hct, hematocrit; RBC, red blood cell; vWF, von Willebrand factor; WBC, white blood cell.



PRECAUTIONARY MEASURES TO PREVENT OR MINIMIZE POSTPARTUM HEMORRHAGE

- **Before Delivery:**
- Baseline hematocrit
- Blood type and screen (cross-match for very high risk)
- Intravenous access
- Obtain baseline coagulation studies and platelet count, if indicated Identify risk factors



IN DELIVERY ROOM

- Avoid excessive traction on umbilical cord
- Use forceps and vacuum judiciously
- Inspect placenta for complete removal
- Perform digital exploration of uterus (if indicated)
- Active management of the third stage
- Visualize cervix and vagina
- Remove all clots in uterus and vagina before transfer to recovery area



IN RECOVERY AREA

- Closely observe patient for excessive bleeding
- Continue uterotonic agents
- Frequently palpate uterus with massage
- Determine vital signs frequently



ABNORMAL PLACENTAL SEPARATION

- Placental tissue may also remain in the uterus because separation of the placenta from the uterus may not occur normally
- placental villi penetrate the uterine wall to varying degrees, collectively called placenta accreta.



RISK FACTORS FOR PLACENTA ACCRETA

- placenta previa with and without prior uterine surgery,
- previous myomectomy,
- prior cesarean delivery,
- prior endometrial ablation
- Asherman's syndrome
- submucousal leiomyoma
- maternal age greater than 35 years



ABNORMAL PLACENTAL ATTACHMENT

- ***placenta accreta***: adherence of the placenta to the superficial lining of the uterus
- ***placenta increta***: penetration into the uterine muscle
- ***placenta percreta***: complete invasion through the thickness of the uterine muscle



- If this abnormal attachment involves the *entire* placenta, no part of the placenta separates.
- Much more commonly, however, attachment is *not complete*, with a portion of the placenta separating and the remainder attached.
- Major, lifethreatening hemorrhage can ensue.



- More recently, the term *morbidly adherent* placenta has been used to collectively describe placenta accreta, increta, and percreta.
- As the rate of cesarean delivery increases in the United States, the number of repeat cesarean deliveries increases as well.
- In a large prospective study of cesarean delivery without labor, the rate of morbidly adherent placenta increased with increasing number of cesarean sections; 0.2% with the first cesarean delivery, 0.3% with the second, 0.6% with the third, 2% with the fourth, and almost 7% with six or more cesarean deliveries.



- If the current pregnancy is complicated by placenta previa, the rate of morbidly adherent placenta is even higher;
- 3% with the first cesarean section,
- 11% with the second,
- 40% with the third,
- and greater than 60% with four or more cesarean deliveries.



- If a portion of the placenta separates and the remainder stays attached, hysterectomy is often required;
- however, an attempt to separate the placenta by curettage or other means of controlling the bleeding (such as surgical compression or sequential arterial ligation) may be appropriate in trying to avoid a hysterectomy in a woman who desires more children



OTHER CAUSES

- ***Hematomas:***
- can occur anywhere from the vulva to the upper vagina as a result of delivery trauma.
- may also develop at the site of episiotomy or perineal laceration.
- may occur without disruption of the vaginal mucosa such as when the fetus or forceps causes shearing of the submucosal tissues without mucosal tearing.



- Vulvar or vaginal hematomas are characterized by exquisite pain with or without signs of shock.
- Hematomas that are ≤ 5 cm in diameter and are not enlarging can usually be managed expectantly by frequent evaluation of the size of the hematoma and close monitoring of vital signs and urinary output.



- Application of ice packs can also be helpful.
- Larger and enlarging hematomas must be managed surgically.
- If the hematoma is at the site of episiotomy, the sutures should be removed, and a search made for the actual bleeding site, which is then ligated.



- If it is not at the episiotomy site, the hematoma should be opened at its most dependent portion and drained; the bleeding site identified, if possible; and the site closed with interlocking hemostatic sutures.
- Drains and vaginal packs are often used to prevent reaccumulation of blood.



- It should be noted that large amounts of blood can dissect and accumulate along tissue planes, especially into the ischiorectal fossa, precluding easy identification.
- This may be seen in those with trauma
- involving the vaginal side walls and sulci.
- Thus, careful monitoring of hemodynamic status is important in identifying those with occult bleeding



COAGULATION DEFECTS

- Virtually, any congenital or acquired abnormality in blood clotting can lead to PPH.
- Acquired disseminated intravascular coagulopathy :
 - Abruptio placentae,
 - amniotic fluid embolism,
 - acute fatty liver,
 - sepsis,
 - severe preeclampsia



- The treatment of coagulation disorders involves correction of the coagulation defect with appropriate factor replacement.
- It also should be recalled that profuse hemorrhage itself can lead to coagulopathy, thus creating a vicious cycle of bleeding.



AMNIOTIC FLUID EMBOLISM

- ***Amniotic fluid embolism*** is a rare, sudden, and sometimes fatal obstetric complication thought to be caused primarily by entry of amniotic fluid into the maternal circulation.
- five findings that occur In sequence:
 - 1)respiratory distress,
 - 2) cyanosis,
 - 3) cardiovascular collapse,
 - 4)hemorrhage,
 - 5) coma.
- Amniotic fluid embolism also often results in severe coagulopathy.
- Treatment is directed toward total support of the cardiovascular and coagulation systems



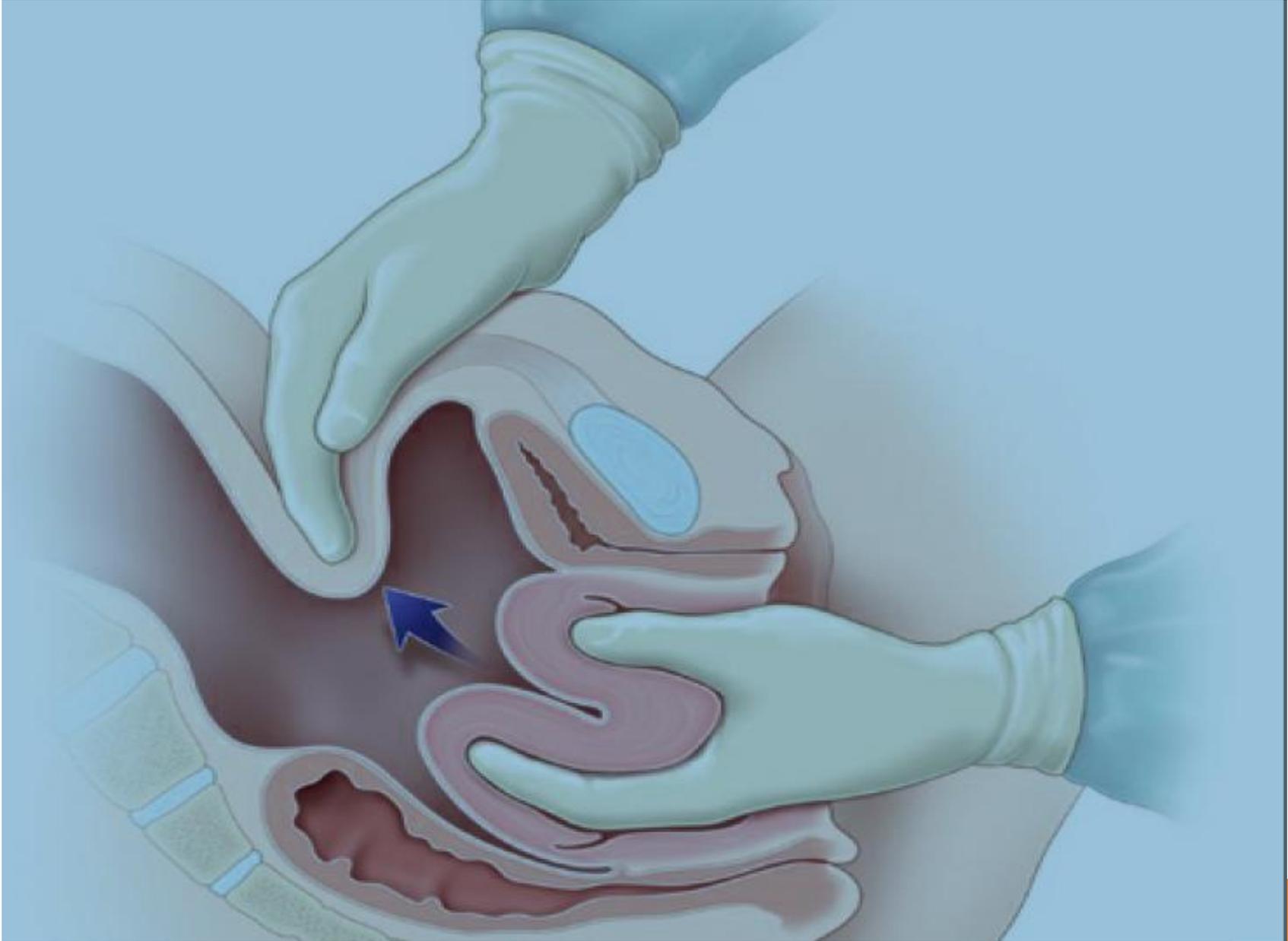
UTERINE INVERSION

- ***Uterine inversion*** is a rare condition in which the uterus literally turns inside out, with the top of the uterine fundus extending through the cervix into the vagina and sometimes even past the introitus
- Hemorrhage with uterine inversion is characteristically severe and sudden.



- Treatment includes manual replacement, which frequently requires administration of an agent that causes uterine relaxation (e.g., sublingual nitroglycerin, terbutaline, magnesium sulfate, and halogenated general anesthetics). If manual replacement fails, surgery is required





UTERINE RUPTURE

- Uterine rupture should be distinguished from dehiscence of a low transverse incision, insofar as the clinical connotations are quite different.
- A uterine rupture is a frank opening between the uterine cavity and the abdominal cavity.
- A uterine dehiscence is a “window” covered by the visceral peritoneum. Significantly higher rates of maternal and fetal morbidity, and even maternal and fetal mortality, occur in cases of overt rupture.



CAUSES

- Rupture can occur:
 - at the site of a previous cesarean delivery
 - other surgical procedure involving the uterine wall
 - intrauterine manipulation
 - trauma,
 - congenital malformation (e.g., small uterine horn),
 - spontaneously



OTHER CAUSES:

- Abnormal labor,
- operative delivery,
- and placenta accreta can lead to rupture



DIAGNOSIS:

- Careful assessment in the face of maternal hemodynamic changes
 - monitoring other signs (such as):
 - acute abdominal pain,
 - change in abdominal contour,
 - non reassuring fetal hearth patterns,
 - loss of fetal station,
- are critical in early detection and intervention in such cases.



MANAGEMENT:

- **Surgical repair** is required, with the specific approach tailored to reconstruct the uterus, if possible.
- Care depends on the extent and site of rupture, the patient's current clinical condition, and her desire for future childbearing.
- Rupture of a previous cesarean delivery scar often can be managed by revision of the edges of the prior incision, followed by primary closure.



CLINICAL FOLLOW-UP

- Postpartum hemorrhage is a serious complication seen in obstetrics.
- Clinicians must have a systematic plan for management.
- Diagnosis and treatment typically are generally simultaneous.
- A team approach, involving obstetricians, nurses, and anesthesia, is necessary to minimize morbidity for the patient



