

# Obstetric Emergencies

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Obstetric emergencies may be maternal or fetal in origin, although ultimately both “patients” are at risk. Only in the obstetric patient can mortality be 200%! The following conditions will be discussed in terms of their etiology, diagnosis, obstetric management, and anesthetic management.

## Maternal Hemorrhage

### Antepartum

Placenta previa/accreta/percreta

Placental abruption

Uterine rupture

### Postpartum

Uterine inversion

Uterine atony

Birth trauma or lacerations

## FETAL DISTRESS

### Antepartum

Umbilical cord prolapse

Umbilical cord compression (variable decelerations)

Uteroplacental insufficiency (late decelerations)

### At delivery

Shoulder dystocia

Vaginal breech delivery (head entrapment)

## Maternal Hemorrhage—Antepartum

### *Placenta Previa/Accreta/Percreta*

*Etiology.* Placenta previa exists when all or part of the placenta lies over the cervical os in front of the fetal presenting part. Although the etiology is unknown, it is more likely to occur with a previous uterine scar, previous placenta previa, advanced maternal age, and multiparity. Placenta accreta is an abnormally adherent placenta that has grown into the myometrium. The risk of placenta accreta is linearly related to the number of previous uterine scars (usually Cesarean sections) in the presence of a placenta previa (Table 1) (1).

The combination of placenta previa and previous Cesarean section is dangerous! A placenta percreta has grown through the myometrium and often invaded other pelvic structures.

*Diagnosis.* Placenta previa usually presents as painless vaginal bleeding in the third trimester. The first episode of bleeding is often mild, but subsequent bleeds may be catastrophic. The obstetrician should never perform a cervical examination on a patient with vaginal bleeding before ultrasound to locate the position of the placenta! If the diagnosis is unsure by ultrasound, a “double set-up” may be performed. The patient is taken to the operating room, monitors are placed, and preparations are made for emergency delivery. The obstetrician does a careful cervical examination and, if placenta is palpated, surgery proceeds (emergently if bleeding has ensued). Placenta accreta and percreta are difficult to diagnosis antepartum. They are usually diagnosed when the placenta does not separate normally at delivery (vaginal or Cesarean). Before delivery, if the placenta is lying over a prior uterine scar, color Doppler sonography (2) or magnetic resonance imaging (3) may be able to correctly diagnose the problem. A new form of color Doppler imaging called three-dimensional angiohistography has promise for allowing early diagnosis of placenta previa increta/percreta (4).

*Obstetric Management.* Once placenta previa is diagnosed by ultrasound, an elective Cesarean section is scheduled. The presence of active labor or persistent bleeding will require a more urgent trip to the operating room. If the fetus is immature, the patient may be managed expectantly in the hospital until the fetus has documented lung maturity or until further bleeding occurs. The management of placenta accreta/percreta requires recognition by the obstetrician and a prompt decision to proceed with hysterectomy (5). Placenta percreta requires the presence of surgeons experienced in pelvic dissection in case surgical dissection of the bowel or bladder is required (6).

*Anesthetic Management.* The anesthetic issues for management of placenta previa are evaluation of the airway (in case emergency general anesthesia is required), large-bore IV access (two 14- or 16-gauge catheters), an available Level 1 or equivalent warmer, and blood typed and cross-matched. The anesthetic management of placenta accreta or percreta often involves major blood loss associated with a Cesarean

**Table 1.** Risk of Placenta Accreta

	Risk of Placenta Accreta
Placenta previa with an unscarred uterus	5%
Placenta previa with one previous Cesarean section	24%
Placenta previa with two previous Cesarean sections	47%
Placenta previa with four previous Cesarean sections	67%

hysterectomy. Again, large-bore IV access and a pressure/warming system are essential, as is rapid availability of crossmatched blood. Emergency (unplanned) hysterectomy will involve more blood loss than elective (planned), but there is no evidence that regional anesthesia should be avoided. A review of 350 consecutive cases of placenta previa found regional anesthesia was associated with less blood loss and reduced need for transfusion (7). The only indication for conversion from regional to general was for two spinal anesthetics because of the duration of hysterectomy for placenta accreta. Vasoactive drugs should be immediately available as well as a skilled assistant to help place invasive monitoring if needed.

Concerns regarding amniotic fluid embolism have limited the use of red blood cell salvage during Cesarean delivery to case reports of desperate situations. A comparison of maternal central venous blood with cell salvage combined with blood filtration using a leukocyte filter showed no difference in particulate contaminants (8).

Another therapeutic technique for real or potential uncontrolled hemorrhage involves interventional radiology, either preoperatively or when life-threatening hemorrhage occurs. Pelvic arterial embolization can be used to treat hemorrhage after vaginal or Cesarean deliveries when other measures have not been successful (9). Fertility is preserved and success rates appear to be high. Balloon catheters can be preoperatively placed prophylactically if placenta accreta or percreta are diagnosed antepartum.

### Placental Abruptio

*Etiology.* Known risk factors for abruptio include hypertension, advanced age and parity, smoking, cocaine use, trauma, premature rupture of membranes, and a history of previous abruptio.

*Diagnosis.* As the placenta separates from the decidua, bleeding occurs from the exposed vessels and fetal distress develops because there is less area for maternal-fetal gas exchange. Although the classic presentation is vaginal bleeding, uterine tenderness and hypertonicity, and fetal distress, the presentation can

be extremely variable. The abruptio may or may not be visible on ultrasound and vaginal bleeding may not occur if the clot is retroplacental.

*Obstetric Management.* The maternal risks are hemorrhage and coagulopathy. The fetal risks are hypoxia and prematurity. Initial management includes evaluation of fetal well-being by monitoring and biophysical profile (BPP), placement of large-bore IV lines, assuring blood availability by type-and-crossmatch, and obtaining maternal hematocrit and coagulation studies. A urinary catheter will be helpful to assess volume status. Although delivery of the fetus is the definitive treatment, the route of delivery and timing depends on the condition of the mother and fetus. If there is severe fetal distress or maternal hemodynamic instability, an urgent Cesarean section is required. However, if the fetus and mother are stable and there is a favorable cervical examination, induction of labor and vaginal delivery may be attempted.

*Anesthetic Management.* There is no contraindication to regional anesthesia for labor or Cesarean section if maternal volume status and coagulation studies are normal. If the mother is hemodynamically unstable and general anesthesia is used, etomidate or ketamine may be useful induction agents. Aggressive volume replacement with crystalloid and/or colloid is required and invasive monitoring with arterial line and central venous access may be helpful. Uterine atony is common, and oxytocic drugs such as Methergine and the prostaglandins should be available.

### Uterine Rupture

*Etiology.* Conditions associated with uterine rupture include previous uterine surgery, abdominal trauma, direct uterine trauma such as forceps or curettage, grand multiparity, and fetal macrosomia or malposition. Despite concerns about a trial of labor after Cesarean delivery, the incidence of uterine rupture is <1% in parturients who have a scarred uterus (10).

*Diagnosis.* In the appropriate clinical setting, uterine rupture should be suspected when there is fetal distress, vaginal bleeding, abdominal pain, and/or cessation of uterine contractions. Surprisingly, pain is not a sensitive indicator and fetal distress is actually the most common presenting sign.

*Obstetric Management.* Depending on the condition of the uterus, the obstetrician may be able to repair the rupture, but hysterectomy is sometimes required.

*Anesthetic Management.* Anesthetic involvement often begins as an emergency Cesarean delivery for fetal distress, with the uterine rupture discovered after skin incision. General anesthesia may be necessary if the case is lengthy or if there is hemodynamic instability. Volume replacement is the key to a successful outcome.

## Maternal Hemorrhage—Postpartum

### Uterine Inversion

*Etiology.* An uncommon problem, uterine inversion may be attributable to inappropriate fundal pressure during delivery or excessive traction on the umbilical cord, especially in the face of placenta accreta.

*Diagnosis.* The diagnosis is usually obvious with massive hemorrhage resulting from atony and a mass in the vagina or outside the perineum. Maternal shock and hypotension occur rapidly.

*Obstetric Management* Rapid replacement of the uterus is required, followed by administration of oxytocic drugs.

*Anesthetic Management.* Uterine relaxation is often necessary before it can be replaced, and analgesia for the procedure is also required. If no regional anesthetic is in place, rapid induction of general anesthesia with intubation and inhalation anesthesia will accomplish both of these objectives. If that seems inadvisable, ketamine plus a uterine relaxant such as nitroglycerine (100–500  $\mu\text{g}$  IV) can also be used. If the patient had an epidural catheter in place for delivery and is comfortable, uterine relaxation can be accomplished with nitroglycerine, magnesium, or terbutaline (11,12). Nitroglycerin is the shortest-acting, an important factor as uterine atony after replacement is common and administration of oxytocics should begin immediately. Depending on the amount of blood loss, large-bore IV access and volume resuscitation may be necessary.

### Uterine Atony

*Etiology.* Contraction of the uterus is the primary mechanism of controlling blood loss at delivery, and uterine atony is the most common cause of postpartum hemorrhage. Conditions associated with atony are listed in Table 2.

*Diagnosis.* Lack of uterine tone is usually diagnosed by vaginal bleeding, >500 mL, at vaginal delivery and manual examination of the uterine fundus.

*Obstetric Management.* Besides infusion of oxytocin, the obstetrician will perform bimanual compression of the uterus, massage, and evaluation for retained placenta. They may request other oxytocics (see below).

*Anesthetic Management.* The patient should be evaluated for hemodynamic stability and need for analgesia. Oxygen should be applied and monitors should be placed for blood pressure and heart rate. If blood loss is ongoing, additional IV access should be obtained for volume replacement. If the patient does not have a regional anesthetic in place and requires analgesia for obstetric maneuvers, IV fentanyl or ketamine may be given. If the patient is still in an LDR setting, consider moving to the operating room in case

**Table 2.** Conditions Associated with Atony

Multiple gestation	Chorioamnionitis
Macrosomia	Precipitous labor
Polyhydramnios	Augmented labor (oxytocin)
High parity (>5)	Tocolytic agents (including magnesium)
Prolonged labor	Halogenated agents (>0.5 MAC)

MAC = minimum alveolar concentration.

general anesthesia is needed or more aggressive obstetric management is indicated. The anesthesiologist should be aware of the dose, route, and major side effects of the oxytocic drugs that can be used (Table 3).

### Birth Trauma/Lacerations

*Etiology.* These lesions may range from an extensive episiotomy to a retroperitoneal hematoma requiring laparotomy. They may occur after difficult forceps delivery, precipitous vaginal delivery, or malpresentation of the fetal head (occiput posterior position). Laceration of pudendal vessels can also occur during pudendal nerve block.

*Diagnosis.* A vaginal or cervical laceration should be suspected when there is postpartum vaginal bleeding in the face of a tightly contracted uterus.

*Obstetric Management.* This will involve extensive (and often painful) examination of the perineum, vagina, and uterus and suturing of the lesion. Rarely, exploratory laparotomy may be required.

*Anesthetic Management.* The immediate requirement is often analgesia to allow the obstetrician to perform a thorough examination. If an epidural catheter is in place, it can be re-dosed for more dense analgesia. A spinal “saddle block” anesthetic may be placed if the patient is stable. The obstetrician may be able to place a pudendal block. If none of these is feasible, ketamine, fentanyl, or inhalational analgesia with nitrous oxide may be attempted. Keep in mind that this patient has a full stomach and an unprotected airway! When in doubt, move to the operating room and induce general anesthesia with full precautions. If epidural anesthesia has been used, leave the catheter in for postoperative analgesia. Single-dose epidural morphine can provide good analgesia. The catheter can also provide anesthesia if further examinations, procedures, or packing are necessary.

## Fetal Distress—Antepartum

### Umbilical Cord Prolapse

*Etiology.* This disastrous situation usually occurs when membranes rupture and the fetal head is not well applied to the cervix, either because of a high station or breech presentation.

**Table 3.** Oxytocic Drugs that Can Be Used in Case of Uterine Atony

Drug	Dose	Major Side Effects
Oxytocin	20–40 U/L	IV bolus doses cause vasodilation and hypotension, hyponatremia when given in hypotonic solutions
Methylergonovine	0.2 mg IM	Causes widespread vasoconstriction, increased PA pressures, coronary artery vasospasm, hypertension, nausea and vomiting
Prostaglandin F <sub>2-α</sub>	0.25 mg IM	May cause bronchospasm, increased PA pressures, VQ mismatching with hypoxia, nausea and diarrhea

PA = pulmonary artery.

*Diagnosis.* Acute severe fetal distress usually occurs, and the cord can be palpated on vaginal examination.

*Obstetric Management.* The obstetrician will try to push the presenting part away from the cervix to prevent compression of the cord while preparations are made for emergency Cesarean section.

*Anesthetic Management.* Regional anesthesia will be difficult or impossible to initiate (unless an epidural catheter is already in place and functioning well) because of the acuity of the situation and patient positioning. Rapid induction of general anesthesia is appropriate.

### *Umbilical Cord Compression (Variable Decelerations)*

*Etiology/Diagnosis.* Variable decelerations are the result of umbilical cord compression. They are usually abrupt in onset and cessation and they differ in duration, depth, and shape from contraction to contraction. If there is slow return to baseline or they are severe and repetitive (<70 beats per minute lasting more than 60 s), they are considered “nonreassuring” and require intervention. These patterns may be associated with decreased amniotic fluid resulting from rupture of membranes or oligohydramnios.

*Obstetric Management.* Interventions should include changing maternal position, oxygen, and stopping oxytocin if in use. Amnioinfusion, fetal scalp stimulation, and sampling of fetal scalp blood for acid-base status may also be helpful.

*Anesthetic Management.* Anesthesia for expedited delivery by forceps or Cesarean section should be anticipated. The patient should be evaluated in case operative intervention is necessary. Consider aspiration prophylaxis. If the patient has a regional anesthetic, she should be evaluated for hypotension, which may be contributing to the fetal stress.

### *Uteroplacental Insufficiency (Late Decelerations)*

*Etiology/Diagnosis.* Late decelerations are characterized by a decrease in FHR after the onset of contractions and a delay in return to baseline until the contraction is over. They are thought to result from uteroplacental insufficiency that may be associated

with postdates gestation, preeclampsia, diabetes, and intrauterine growth retardation. In combination with loss of beat-to-beat variability, they are particularly ominous.

*Obstetric Management.* All possible maneuvers to increase oxygen delivery to the fetus should be undertaken as described above. If uterine hypertonicity is a concern, a tocolytic agent such as terbutaline may be given to cause uterine relaxation and improve intervillous blood flow to the fetus. If fetal resuscitation in utero is unsuccessful, an expedited delivery should take place.

*Anesthetic Management.* The choice of anesthetic management in an urgent situation should be a joint clinical judgement between the anesthesiologist and obstetrician, and the value of a good relationship between the services is especially obvious in this situation. Anesthetic maternal mortality is more common during general than regional anesthesia (13). Nevertheless, in most situations a general anesthetic can be initiated safely and may be the best way to expedite delivery. The obstetrician must clearly communicate how quickly we need to proceed (urgent vs. STAT), and the anesthesiologist must clearly communicate if he/she anticipates airway difficulties. In most situations, fetal distress can be anticipated and an epidural catheter placed early and extended if needed. ACOG’s Anesthesia for Emergency Deliveries states that: “Cesarean deliveries that are performed for a nonreassuring fetal heart rate pattern do not necessarily preclude the use of regional anesthesia.”

## **Fetal Distress—At Delivery**

### *Shoulder Dystocia*

*Etiology/Diagnosis.* Shoulder dystocia is the inability to deliver the shoulders after downward traction and episiotomy. It is associated with postterm pregnancy, diabetes, maternal obesity, macrosomia, and shoulder dystocia in a previous pregnancy.

*Obstetric Management.* The obstetrician will try several maneuvers while obtaining additional help: extending the episiotomy, flexing the mother’s legs against the abdomen, applying suprapubic pressure, and occasionally deliberately fracturing the clavicles.



A trial of forceps is contraindicated if there are risk factors for shoulder dystocia.

*Anesthetic Management.* The possibility of a shoulder dystocia should be anticipated in the appropriate clinical situation. The patient should have an early preanesthetic evaluation, placement of a regional anesthetic to allow for a relaxed perineum and any necessary obstetric manipulations at delivery, and she should be prepared for Cesarean delivery if labor does not progress normally.

### *Vaginal Breech Delivery (Head Entrapment)*

*Etiology/Diagnosis.* When vaginal breech delivery is attempted, the smaller body may be pushed through the partially dilated cervix trapping the after-coming head in the uterus. This is a true obstetric emergency.

*Obstetric Management.* Vaginal breech delivery is now discouraged by ACOG. A multicenter worldwide study of over 2000 women randomized to have elective Cesarean delivery versus vaginal delivery for their breech fetuses found that 5% of infants born vaginally in the breech position died during or soon after birth compared with 1.6% of babies born via Cesarean delivery (14). If the patient strongly prefers vaginal delivery, the obstetrician may attempt external cephalic version close to term to convert the fetus into a breech position. Several studies have found regional anesthesia to improve success rates for this procedure without maternal or fetal complications (15).

If vaginal delivery is unavoidable and there is fetal head entrapment, the obstetrician has three options; he or she may request both skeletal muscle and cervical relaxation in an attempt to extract the head, Cesarean section may be initiated, or incisions may be made in the cervix to enlarge the opening. Blood loss may be massive with the latter option.

*Anesthetic Management.* The anesthesiologist should always be present when a vaginal breech delivery is attempted. Epidural analgesia is usually preferred in these labors to prevent early pushing before the cervix is completely dilated. It also relaxes the perineum if further maneuvers are necessary (16). Although there are only anecdotal reports, nitroglycerin has been used to relax the cervix emergently (17). If epidural

anesthesia is not in place or is inadequate, general anesthesia should be induced rapidly to achieve perineal and uterine relaxation.

## References

1. Clark SL, Koonings PP, Phelan JP. Placenta previa/accreta and prior cesarean section. *Obstet Gynecol* 1985;66:89–92.
2. Rosemond RL, Kepple DM. Transvaginal color doppler sonography in the prenatal diagnosis of placenta accreta. *Obstet Gynecol* 1992;80:508–10.
3. Thorp JM, Councill RB, Sandridge DA, et al. Antepartum diagnosis of placenta previa percreta by magnetic resonance imaging. *Obstet Gynecol* 1992;80:506–8.
4. Chou MM, Tseng JJ, Ho ESC, Hwang JI. Three-dimensional color power Doppler imaging in the assessment of uteroplacental neovascularization in placenta previa increta/percreta. *Am J Obstet Gynecol* 2001;185:1257–60.
5. Weckstein LN, Masserman JSH, Garite TJ. Placenta accreta: a problem of increasing clinical significance. *Obstet Gynecol* 1987;69:480–6.
6. O'Brien JM, Barton JR, Donaldson ES. The management of placenta percreta: conservative and operative strategies. *Am J Obstet Gynecol* 1996;175:1632–8.
7. Parekh N, Husaini SWU, Russell IF. Cesarean section for placenta praevia: a retrospective study of anaesthetic management. *Br J Anaesth* 2000;84:725–30.
8. Waters JH, Biscotti C, Potter PS, Phillipson E. Amniotic fluid removal during cell salvage in the cesarean section patient. *Anesthesiology* 2000;92:1531–6.
9. Vedantham S, Goodwin SC, McLucas B, Mohr G. Uterine artery embolization: an underutilized method of controlling pelvic hemorrhage. *Am J Obstet Gynecol* 1997;176:938–48.
10. Lydon-Rochelle M, Holt VL, Easterline TR, Martin DP. Risk of uterine rupture during labor among women with a prior cesarean delivery. *NEJM* 2001;345:3–8.
11. Riley ET, Flanagan B, Cohen SE, Chitkara U. Intravenous nitroglycerin: a potent uterine relaxant for emergency obstetric procedures. Review of the literature and report of three cases *IJOA* 1996;5:264–8.
12. Abouleish E, Ali V, Joumaa B, et al. Anaesthetic management of acute puerperal uterine inversion. *Br J Anaesth* 1995;75:486–7.
13. Hawkins JL, Koonin LM, Palmer SK, et al. Anesthesia-related deaths during obstetric delivery in the United States, 1979–1990. *Anesthesiology* 1997;86:135–43.
14. Hannah ME, Hannah WJ, Hewson SA, et al. Planned caesarean section versus planned vaginal birth for breech presentation at term: a randomised multicentre trial. *Lancet* 2000;356:1375–83.
15. Schorr SJ, Speights SE, Ross EL, et al. A randomized trial of epidural anesthesia to improve external cephalic version success. *Am J Obstet Gynecol* 1997;177:1133–7.
16. Van Zundert A, Vaes L, Soetens M et al. Are breech deliveries an indication for lumbar epidural analgesia? *Anesth Analg* 1991;72:399–403.
17. Rolbin S, Hew E, Bernstein A. Uterine relaxation can be life saving. *Can J Anaesth* 1991;38:939–40.