Medic 774 is dispatched along with a first-responding engine company to a woman in labor. Upon arrival, Eugene, a paramedic, and Matt, an EMT, are presented with 34-year-old Christina, lying in bed in active labor. A panicked look on her face, she tells Eugene, “The cord is sticking out.” A quick exam reveals a prolapsed umbilical cord and no presenting fetal part.

Christina says she’s 35 weeks pregnant and not due for another five weeks. This is her fifth pregnancy, and she has four healthy children, all of whom were birthed vaginally without complications. She has no significant medical history, takes no medications other than her prenatal vitamins, and has no allergies. Christina denies any abdominal pain other than her labor contractions, which she describes as “normal—this is the fifth time I’ve done this!” No vaginal bleeding is noted. The patient tells Eugene and Matt, “My doctor told me the baby was in an odd position and that I was at high risk of having a breech birth.”

The Data

The estimated number of live births in the United States in 2011, the last year for which data is available, was 3,953,590, for a birth rate of about 12.7 per 1,000 population. Preterm births accounted for 11.7% of all births. The mean maternal age at birth was 25.6 years, and 40.7% of all mothers were unmarried.1

Pregnancy has risks for both the mother and the fetus. The CDC has monitored pregnancy-related mortality since 1987, and the number of such deaths has steadily increased from 7.2 per 100,000 live births in 1987 to a high of 17.8 in 2009.2 Wide variations exist among races. From 2006–09, the pregnancy-related mortality ratios between women of different ethnic groups were:

- 11.7 deaths per 100,000 live births for white women;
- 35.6 deaths per 100,000 live births for black women;
- 31.4 deaths per 100,000 live births for Asian women;
- 24.0 deaths per 100,000 live births for Hispanic women.

What can go wrong, and how can you tell?

For additional information and resources on these topics, visit EMSWorld.com and search the database for the keywords: breech birth, preterm birth, maternal mortality, and fetal complications.

**Continuing Education**

This CE activity is approved by EMS World, an organization accredited by the Continuing Education Coordinating Board for Emergency Medical Services (CEC/EMS), for 1 CEU.

**Objectives**

- Review statistics for preterm births
- Discuss causes of third-trimester bleeding
- Review signs and symptoms of abnormal labor
- Discuss procedure for breech birth
• 17.6 deaths per 100,000 live births for women of other races.

Fetal mortality rates at 24 weeks of gestation or more for the period from 2004–06 were highest in Mississippi (6.04 per 100 live births), Alabama (5.8), South Carolina (5.45), Arkansas (5.10) and Wyoming (4.81). They were lowest (below 3.3) in Maine, New Mexico, Oregon and Utah. The CDC notes the variation may be due to state differences in reporting. 3

The U.S. fetal mortality rate (fetal death with presumed or stated gestation period of 20 weeks or greater) was 6.05 in 2006, 3% lower than in 2005. 3 Fetal mortality rates were higher for a number of groups, including teenagers, women 35 and over, unmarried women, male fetuses and multiple deliveries. A wide variety of risk factors have been identified, including maternal obesity, smoking during pregnancy, severe or uncontrolled hypertension or diabetes, congenital abnormalities, infections, placental and cord problems, intrauterine growth retardation, previous poor pregnancy outcome or perinatal death, and previous cesarean section (see Figure 1). 3

Worth noting is that delivery complications and fetal death happen with greater frequency in emergency departments, where fetal mortality is between 8%–10%. 4 There are multiple reasons for increased mortality in the ED, but selection bias certainly has a role. When a pregnant patient has a problem, there is a good chance she will call 9-1-1 or go to an ED for evaluation or care. The fact is that the ED, and by default the EMS system, is selected as a gateway into the healthcare system by a population of patients with a higher incidence of unexpected complications. In fact, numerous complications, including eclampsia, premature labor, placental abruption, precipitous delivery, umbilical cord presentation and breech birth, are overrepresented in the ED population. 4

Knowing this, it is worth revisiting some of these specific complications in anticipation that we may come into contact with them. The October EMS World continuing education article reviewed normal childbirth. This month we review the more common causes of fetal complications and how to respond to them.

**Placenta Previa, Placental Abruption and Uterine Rupture**

Placenta previa, placental abruption and uterine rupture are the three most common intrauterine causes of third-trimester bleeding. These conditions can also complicate labor and delivery.

Placenta previa occurs when the location of the placenta is close to or over the cervical os. It can be classified as complete, when the placenta completely covers the cervical os, or partial, when it covers part but not all. A low-lying placenta occurs when the placenta lies low in the uterus, near the cervical os but not over it. Most cases of partial placenta previa identified early in pregnancy resolve by the time of delivery as the uterus elongates to accommodate fetal growth and the placenta no longer covers the os. Complete placenta previa, conversely, rarely resolves spontaneously. 5

Signs and symptoms associated with placenta previa include episodes of painless, bright-red bleeding of variable amounts during the third trimester. Risk factors for placenta previa include previous episodes of previa, prior cesarean section or other uterine surgery, advanced maternal age, smoking, cocaine use and multiparity.

Placenta previa is associated with an increase in preterm birth and perinatal morbidity and mortality. In a worst-case scenario, a delivering fetus will rupture the placenta (which covers the cervical os) during childbirth, resulting in severe maternal hemorrhage and interruption of fetal blood flow. Such births are most often performed via cesarean section, usually at 36 to 37 weeks’ gestation in patients who are stable. 6

Any third-trimester bleeding is worrisome for both the expectant mother and the prehospital provider; however the bleeding associated with placenta previa is fairly easy to distinguish and much less serious than the bleeding associated with placental abruption, which is a true emergency.

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**Figure 1: Risk Factors for Fetal Mortality**

- Teenage pregnancy
- Maternal age >35 years
- Multiple pregnancies
- Maternal hypertension
- Morbid obesity

For More Information Circle 41 on Reader Service Card
Placental abruption is an abnormal premature separation of the placenta from the uterine wall. A complete abruption occurs when the entire placenta separates from the uterus. A partial abruption occurs when part of the placenta separates from the uterine wall, and a marginal abruption occurs when the separation occurs at the edge of the placenta. A concealed hemorrhage occurs when blood is trapped behind the placenta and unable to exit the uterus.

Placental abruption typically results in painful, dark-red vaginal bleeding, the degree of which may be variable. A patient may have a significant intrauterine hemorrhage, yet not be producing blood from her vagina. Table 1 describes the classifications of placental abruption, which range from 0 (found only upon inspection after childbirth and delivery of the placenta) to 3 (associated with fetal demise). About 20% of women with placental abruption will not experience pain or vaginal bleeding.7 Risk factors for placental abruption include preeclampsia, chronic hypertension, multiple gestation, advanced maternal age, smoking, cocaine use, multiparity and trauma. Trauma is a common precipitator of placental abruption and a life-threatening event. All females greater than 20 weeks pregnant who suffer traumatic mechanisms of injury, even relatively minor ones, should be transported to an ED for evaluation.

Uterine contractions during labor and delivery can precipitate placental abruption, and the uncontrolled hemorrhage can lead to maternal shock, poor fetal perfusion and death for both. Delivery in an OB unit is usually by cesarean section.

Uterine contractions during labor and delivery can also precipitate a uterine rupture, and most cases of uterine rupture occur at the site of a previous cesarean section. Complete rupture and expulsion of the fetus into the abdomen is associated with a high fetal mortality rate, about 50%–75%.8 Fetal survival depends in large part on whether the placenta remains attached to the uterine wall, allowing for continued fetal perfusion. It is possible to identify a suspected uterine rupture, as the limb or head of the fetus may be palpable outside the uterus. As with placenta previa and placental abruption, cesarean delivery is required in cases of uterine rupture to best ensure fetal and maternal survival.

The prehospital treatment of placenta previa, placental abruption and uterine rupture is mostly supportive and similar to the treatment you’d give a trauma patient with uncontrolled internal hemorrhage: Manage the airway, ensure adequate ventilation and oxygenation, attempt to support circulation, and provide rapid transport to an appropriate...
facility. All pregnant patients (especially full-term patients in labor) should be placed on their left side at 15 degrees to avoid supine hypotensive syndrome, which occurs when the gravid uterus lies on and occludes the inferior vena cava, decreasing blood return to the heart and resulting in hypotension.

All patients with vaginal bleeding, or even just suspected placenta previa, placental abruption or uterine rupture, should receive oxygen via the appropriate delivery device. A nasal cannula or nonrebreather mask can be used for patients with adequate breathing, and ventilation with a bag-valve mask should be performed in those with inadequate breathing. Administer oxygen to a target SpO2 of 100%. Remember, a normal physiologic change during pregnancy is a relative anemia, so the mother already has decreased oxygen-carrying capacity prior to any bleeding.

Because of their increased intravascular volume, pregnant patients can lose a significant amount of blood before tachycardia; cool, pale and diaphoretic skin; hypotension; and other signs of hypovolemic shock develop. As such, the placenta may be hypoperfused, and the fetus in distress, while the mother’s vital signs and condition appear stable. During the body’s natural response to hemorrhage, blood flow to nonessential organs is rapidly reduced. The mother’s body will consider the uterus and fetus nonessential organs before any of its own, so by the time the mother demonstrates symptoms of shock, the fetus is already in danger. Consider administering intravenous fluids prior to the onset of signs and symptoms of hypovolemia.

For patients who are actively hemorrhaging or showing signs and symptoms of hypovolemic shock, fluid volume administration should be performed to maintain a systolic blood pressure of 90 mmHg. When they occur during labor, placenta previa, placental abruption and uterine rupture are surgical emergencies and require specific OB care, and the patient must be transported to a hospital with OB capability. Exceptions can be made for patients who have also suffered trauma. Transport patients with trauma to a trauma center for evaluation and care.

Dystocia and Malpresentation
Abnormal labor, or dystocia, is characterized by the abnormal progression of labor and accounts for about one third of all cesarean sections and about half of all primary (or first-time) cesarean sections. The “three Ps” have been used to describe the three etiologic categories of factors that can contribute to normal labor: power, for normal uterine contractions (or the lack thereof); passenger, for...
fetal factors such as size; and passage, for maternal factors such as skeletal or soft-tissue abnormalities that interfere with childbirth through the birth canal. While we can consider these factors independently, dystocia often involves components of all three.

Malpresentation is a term used to describe any fetal presentation other than the normal vertex (top of the head first) position. Breech (1/25 live births), shoulder (1/300), face (1/550) and brow (1/1,400) presentations are the most common malpresentations.

### Breech Birth

The three types of breech birth are frank, complete and incomplete. Frank breech occurs when the hips are flexed and the knees extended, resulting in the fetus’ feet being up by their head and the buttocks entering the birth canal first. This accounts for about 66% of all breech presentations. Complete breech occurs when the hips and knees both flex, resulting in the buttocks and feet entering the birth canal first. Incomplete breech occurs when one hip and knee flexes and the other remains straight and enters the birth canal first. The main problem with any type of breech birth is that the buttocks and legs do not provide an adequate wedge to open the birth canal and accommodate the fetal head, interrupting childbirth. In addition, umbilical cord prolapse may occur. A number of risk factors are associ-
ated with breech birth, including prematurity, multiple pregnancy, hydrocephaly, and uterine abnormalities and tumors.

The full-term fetus will usually rotate into a vertex orientation in the uterus during the last week or two of pregnancy. Premature infants presenting in breech positions will often deliver spontaneously and without complication. As a fetus comes closer to full term and subsequently continues to grow and can be anticipated to have a larger size (macrosomia), dystocia becomes more common. In an OB unit, cesarean section is commonly performed in cases of breech delivery.

In the prehospital environment, prepare for breech delivery in the same manner you would for a normal delivery.

Position the mother, prepare your equipment (OB kit, oxygen, resuscitation area, etc.) and prepare yourself, your partner and the mother. Allow the presenting part (buttocks or leg) to deliver, supporting them to prevent explosive delivery. Be sure to support the trunk and chest during delivery, allowing the legs to dangle unsupported if necessary. The fetus will typically deliver in a facedown position, and you should allow the head to deliver naturally.

If the head delivers slowly or becomes trapped in the birth canal, you will need to insert your fingers into the birth canal and create a pocket between the fetus’ face and the wall of the birth canal. This is often accomplished by creating a V with your fingers and placing the fetus’ mouth and nose between them, creating an unobstructed airway.

If the fetus’ head becomes trapped in the birth canal, transport to a hospital with an OB unit should begin immediately. Administer oxygen at 15 lpm via nonrebreather mask to ensure adequate fetal oxygenation.

In the case of a limb presentation, such as a single arm or leg, the likelihood of a successful delivery is small. Place the mother in the knee-chest position, her hips elevated, and if possible the stretcher placed in the Trendelenburg position. This will tilt the mother’s pelvis and uterus, allowing gravity to help move the fetus away from the cervical os and birth canal.

Shoulder Dystocia

Shoulder dystocia occurs when, after normal delivery of the head, the infant’s shoulders cannot pass through the pelvic outlet, interrupting delivery. The consequences of shoulder dystocia to the infant can be severe. Hypoxic brain injury can occur via umbilical cord prolapse and interruption of blood flow. Clavicular fracture and brachial plexus injuries are also common complications. Maternal complications include vaginal, perianal and sphincter soft-tissue injuries.

The most common cause of obstruction is the inability of the anterior shoulder to pass below the pubic symphysis. Unlike breech presentation, which can be identified in the antepartum (near the time of birth) period, shoulder dystocia develops and is identified in the intrapartum (during childbirth) period. It is first identified after delivery of the fetal head, when normal downward traction does not deliver the anterior shoulder. Typically, after the head is delivered, it will retract tightly against the perineum, a situation called the “turtle sign.” Risk factors associated with shoulder dystocia include excessive birth weight, multiparity, multiple gestation and a history of shoulder dystocia.

Prehospital Limitations

To put it frankly, the prehospital environment is a suboptimal location for a complicated delivery. To begin with, the average EMT or paramedic does not have much experience with normal childbirth, let alone complicated ones. While it has been said that normal childbirth “happens on its own,” and perhaps an inexperienced practitioner can “get away” with a normal childbirth, the case is not the same with a complicated delivery.

For that matter, neither is the emergency department a desirable location for a complicated delivery. The preferred location for complicated childbirth is an obstetrical (OB) unit, with experienced OB staff with appropriate resources. These resources include equipment such as fetal scalp electrodes, intrauterine pressure monitors, tocometers, vacuum extractors and forceps to aid delivery. Maternal and prenatal care information is also a resource. Information such as accurate gestation dates, presence of multiple gestations, amniocentesis results, maternal blood type and Rh factor, estimated fetal weights, placental anatomy and prior documented OB complications can aid in the anticipation of a possible complicated delivery.
Two maneuvers may assist in releasing an infant presenting with shoulder dystocia: the McRoberts maneuver and suprapubic pressure. The McRoberts maneuver is accomplished by having the mother flex her legs into a knee-chest position. This maneuver allows the pubic symphisis to slide over the infant’s anterior shoulder and also flattens the maternal sacrum, allowing the posterior shoulder to slide past as well. The McRoberts maneuver is successful about 40% of the time.

If McRoberts maneuver is unsuccessful, suprapubic pressure may dislodge the impacted shoulder. The goal is to displace the infant posteriorly, allowing the anterior shoulder to slip under the pubic symphysis. As the name implies, suprapubic pressure is applied just above the pubic symphysis, and the goal is to push directly on the infant, still within the uterus. It is important to not apply pressure to the uterine fundus, as it will not aid in delivery, will increase intrauterine pressure and can result in uterine rupture.

If suprapubic pressure is unsuccessful in relieving shoulder dystocia, there are other maneuvers possible, including the Woods corkscrew maneuver (in which the fetus is rotated 180 degrees) and facilitating the delivery of a fetal arm. These maneuvers are generally considered to be beyond the scope of EMS providers. As such, failure to relieve shoulder dystocia with the McRoberts maneuver or suprapubic pressure indicates the need for rapid transport to a hospital with OB capability.

Nuchal Cord and Umbilical Cord Prolapse

Nuchal cord occurs when, during normal delivery, the umbilical cord is wrapped around the infant’s neck. If a nuchal cord is observed, simply work a finger under the umbilical cord, gently pull some slack on it and lift it up and over the infant’s neck, continuing with normal delivery. If you are unable to lift the cord up and over the infant’s head, you should clamp the cord, carefully cut it and continue with the delivery.

Umbilical cord prolapse is a more serious complication and occurs when the umbilical cord precedes the fetus into the birth canal. Subsequent entry of the fetus into the birth canal will result in compression of the cord and interrupted fetal perfusion. This can have disastrous effects on the fetus. Malpresentations such as shoulder dystocia and breech birth account for about half of all cases of cord prolapse, and cord prolapse may be the first indication of an impending malpresentation.

The definitive treatment for a prolapsed cord is cesarean section by an OB physician. In the prehospital environment, efforts to preserve umbilical perfusion are imperative. Place the

Micro-Preemie Simulator

For More Information Circle 46 on Reader Service Card
mother in the knee-chest position, her hips elevated, and if possible the stretcher placed in the Trendelenburg position. Tell the mother to not push during contractions, further preventing the fetus from entering the birth canal.

Attempt to palpate a pulse in the umbilical cord. If you feel one or see it pulsating, the cord is perfused, and in all likelihood so is the infant. If any part of a delivering infant, such as the head, enters the birth canal and compresses the cord, or if you cannot palpate a pulse or see pulsation in the cord, insert your hand into the birth canal and manually lift the presenting part off the cord, preserving fetal perfusion. If necessary, this procedure will be performed continuously during transport, in the ED, and up into the operating room until an emergent cesarean section is done. The presenting piece of umbilical cord can be wrapped in a moist, sterile dressing to prevent it from drying out. Needless to say, rapid transport to a hospital with OB capability is imperative. Administer the mother oxygen via nonrebreather mask at 15 lpm to ensure adequate fetal oxygenation as well.

Case Conclusion

Recognizing the seriousness of the situation, Matt immediately prepares the patient and stretcher for immediate transport while Eugene obtains Christina’s pertinent information. With the assistance of members of the engine company, they move her to the stretcher and place her in the knee-chest position. They administer oxygen via nonrebreather mask at 15 lpm and move the patient to the ambulance and transport her immediately to a local hospital with OB capability.

While en route, Eugene covers the exposed umbilical cord with a moist, sterile dressing. He notes that no part of the infant appears to have entered the birth canal, and the umbilical cord appears pink and perfused. Eugene reminds himself that if the infant enters the birth canal, and if the umbilical cord is compressed, he will have to put his hand into the birth canal and manually lift the presenting part off the cord.

Eugene also takes the time to explain the situation to Christina and ask her if she has any questions. She does, understandably, have many questions and concerns regarding the health of her unborn baby. Eugene explains to Christina that a prolapsed cord is a potentially bad situation, but that her baby has not yet entered the birth canal, and that the umbilical cord is nice and pink and appears to have blood flow.