**Chapter 42
Emergencies of pregnancy**

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**Introduction**

Human pregnancy is generally divided into three 13-week trimesters. While this terminology is useful, it is easier to divide the pregnancy into two halves, each lasting about 20 weeks. The first half is commonly referred to as early pregnancy and the latter as late pregnancy. Each half of pregnancy has its own unique emergencies that the EMS physician should keep in mind.

The most common disorder of early pregnancy is miscarriage. Only 20% of miscarriages occur after the first trimester. Ectopic pregnancy is the most life-threatening emergency of early pregnancy. High suspicion for ectopic pregnancy should always be maintained for females of child-bearing age, and prompt diagnosis and therapy should be reflexive. The most common emergencies of late pregnancy include placenta previa and placental abruption.

**Evaluation of the pregnant patient**

An EMS physician should rapidly ascertain pertinent information from any pregnant patient. This includes estimated due date or weeks of gestation, last menstrual period, number of previous pregnancies, number and type of deliveries, contraction intervals, membrane rupture, bleeding, and complications with previous pregnancies such as gestational diabetes, preeclampsia, or preterm labor. The EMS physician’s challenge is to identify life threats and initiate treatment in spite of the fact that pregnancy status is often unknown by the patient.

**Miscarriage**

Miscarriage is the most common complication of early pregnancy. Approximately 15–20% of clinically evident pregnancies are miscarried [1]. Eighty percent of all miscarriages occur before the 12th week of gestation [2]. In most cases, the primary focus for the EMS physician is to provide psychological support to the patient and her family. If the patient has passed tissue it should be transported with the patient to the receiving facility. If the patient is showing signs or having symptoms of hemorrhagic shock, a large-bore intravenous catheter should be inserted for access and the patient appropriately resuscitated with boluses of normal saline.

**Ectopic pregnancy**

Ectopic pregnancy is the implantation of a fertilized ovum outside the endometrial cavity. It occurs in approximately 1.5–2.0% of pregnancies [3], with some studies reporting the incidence of ectopic pregnancy as high as 2.6% of all pregnancies [4–7]. The reported rise in incidence of ectopic pregnancy is strongly associated with an increased incidence of pelvic inflammatory disease [8].

The clinical use of sensitive pregnancy testing, transvaginal sonography, and diagnostic laparoscopy has had a major effect on the diagnosis of ectopic pregnancy before rupture. Nevertheless, ruptured ectopic pregnancies continue to occur, often because the clinician or the patient did not recognize the early signs and symptoms of the condition, and such pregnancies account for 6% of all maternal deaths and remain the leading cause of first-trimester pregnancy-related death [3]. The most frequent causes of death for women with ectopic pregnancies in the United States are hemorrhage, infection, and anesthetic complications.

The etiology of ectopic pregnancy is multifactorial and as many as 50% of women with ectopic pregnancies have no identifiable risks [9]. Factors that are strongly associated with an increased risk of ectopic pregnancy include damage to the ovarian tubes from pelvic inflammatory disease, previous tubal surgery, or a previous ectopic pregnancy. A history of cigarette smoking, age over 35 years, and many lifetime partners have been identified as minor factors ([Table 42.1](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/c42.xhtml#c42-tbl-0001)).

[**Table 42.1**](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/c42.xhtml#R_c42-tbl-0001) Relative risk factors for ectopic pregnancy

| **High** | **Moderate** | **Low** |
| --- | --- | --- |
| Prior ectopicTubular sterilizationUse of intrauterine contraceptive device (IUD)Pelvic inflammatory disease | ChlamydiaInfertilityPartners >1Smoking | Age <18Age >35 |

The risk of recurrence of ectopic pregnancy is approximately 10% among women with one previous ectopic pregnancy and at least 25% among women with two or more previous ectopic pregnancies [10]. Women in whom the affected fallopian tube has been removed are at increased risk for ectopic pregnancy in the remaining tube.

Ectopic pregnancies that involve implantation outside the fallopian tube account for less than 10% of all ectopic pregnancies. These unusual pregnancies are difficult to diagnose and are associated with high mortality [11]. Abdominal pregnancies occur in 10.9 per 100,000 pregnancies and in 9.2 per 1,000 ectopic pregnancies. The maternal mortality rate has been reported to be 7.7 times higher than that observed in tubal ectopic pregnancies, and 90 times higher than in an intrauterine pregnancy [12].

Heterotopic pregnancy, the co-occurrence of an ectopic pregnancy and intrauterine pregnancy, has increased in incidence and occurs in 0.3–0.8% of the general population and 1–3% of women pregnant as a result of assisted reproduction [13,14].

The patient history (including an assessment for risk factors) and physical examination are the principal tools used to evaluate a patient with possible ectopic pregnancy. In the out-of-hospital setting, any woman of reproductive age with abdominal pain or vaginal bleeding should be considered to have an ectopic pregnancy until proven otherwise.

**Patient history**

The location, nature, and severity of pain with ectopic pregnancy are highly variable. Colicky pain presents mainly in the hypogastric or iliac regions and is most likely due to small-volume intraperitoneal hemorrhage. Localized abdominal or pelvic pain is caused by acute distension of the fallopian tube at the site of implantation. Tubal rupture is typically associated with a longer-lasting, more generalized pain due to hemoperitoneum, but rupture may also be associated with a decrease in or resolution of pain altogether. Pain referred to the shoulder, indicating irritation of the diaphragm from intraperitoneal blood (Kehr’s sign), is a late sign. Vaginal bleeding may be small in volume (spotting) or equivalent to a menstrual period. The passage of tissue does not distinguish failing intrauterine from ectopic pregnancy and may simply represent a cast of endometrial tissue.

Classic signs and symptoms of tubal ectopic pregnancy include abdominal pain, vaginal bleeding, and delay of an expected menses with classic presentation around 6 to 8 weeks of gestation [9]. However, fewer than half of women with ectopic pregnancy have the classically described symptoms of abdominal pain and vaginal bleeding. In fact, these symptoms are more likely to indicate miscarriage [15].

**Physical examination**

Women with ectopic pregnancy may have pelvic or adnexal tenderness and vaginal bleeding. Hypovolemia, tachycardia, hypotension, diaphoresis, and shock are late signs that may indicate ruptured ectopic pregnancy with intraperitoneal hemorrhage. Although it is less common for women to present with these signs, due to improved diagnostic methods, a woman with hemodynamic instability or peritoneal signs and a positive pregnancy test result or a delay of an expected menses potentially has a ruptured ectopic pregnancy, and should have prompt evaluation by an obstetrician.

**Management**

For the EMS physician, the key to treating a pregnant patient with early obstetrical complaints is maintaining a high index of suspicion for a possible ectopic pregnancy and recognizing hemodynamic instability secondary to hemorrhagic shock. If the patient is in shock, large-bore intravenous access should be obtained and the patient resuscitated appropriately with crystalloids. In a woman of child-bearing age with abdominal pain and hypotension, the finding of free abdominal fluid on prehospital ultrasound should increase the suspicion of ruptured ectopic pregnancy.

**Placental abruption**

Placental abruption, defined as the premature separation of the placenta from the uterine wall, complicates approximately 1% of births [16]. Abruption is believed to account for approximately 30% of episodes of bleeding during the second half of pregnancy. It is associated with significant perinatal mortality and morbidity.

Abruption may be “revealed,” in which case blood tracks between the placenta and the endometrium, and escapes through the cervix into the vagina. The less common “concealed” abruption occurs when blood accumulates behind the placenta, with no obvious external bleeding. Finally, abruption may also be classified as total, involving the entire placenta, in which case it typically leads to fetal death, or partial, with only a portion of the placenta detached from the uterine wall.

Placental abruption has a wide spectrum of clinical significance, varying from minor bleeding with few or no consequences to massive abruption with fetal death and severe maternal morbidity. Maternal risks include massive bleeding, disseminated intravascular coagulopathy, and death. The risk to the fetus depends on both the severity of the abruption and the age at which the abruption occurs, whereas the danger to the mother is posed primarily by the severity of the abruption.

The incidence of placental abruption is reported to be between 1% and 3.8% of deliveries [17–22]. The incidence of abruption peaks at 24–26 weeks gestation and drops precipitously with advancing gestation [18,19]. Other risk factors include trauma, thrombophilias, dysfibrinogenemia, hydramnios, advanced maternal age, and intrauterine infections ([Table 42.2](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/c42.xhtml#c42-tbl-0002)) [23].

[**Table 42.2**](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/c42.xhtml#R_c42-tbl-0002) Risk factors for placental abruption

Source: Oyelese 2006 [18]. Reproduced with permission of Lippincott Williams & Wilkins Inc.

| **High** | **Moderate** | **Low** |
| --- | --- | --- |
| Cocaine and drug useChronic hypertension with preeclampsia | Cigarette smokingMultiple gestationsChronic hypertensionPreeclampsiaPremature rupture of membranesChorioamnionitis | Maternal age and parityOligohydramniosDietary and nutritional deficienciesCarrying a male fetus |

Bleeding in early pregnancy carries an increased risk of abruption in later pregnancy [24,25]. Placental abruption is usually the result of shearing forces, may occur without direct abdominal trauma, and is independent of placental location. Approximately 6% of all trauma cases [26] and 20–25% of major trauma cases are associated with placental abruption [27] but placental abruption is difficult to predict based on the severity of trauma [26]. Placental abruption usually manifests within 6–48 hours after trauma but can occur up to 5 days later [26,28,29]. Perhaps the greatest determination of abruption risk, however, is an abruption in a prior pregnancy [30]. When examined, the risk increased 15–20-fold in subsequent pregnancies when an earlier pregnancy was complicated by abruption [31].

The diagnosis of abruption is a clinical one and the condition should be suspected in women who present with vaginal bleeding or abdominal pain or both, a history of trauma, and those who present in otherwise preterm labor. The differential diagnosis includes all causes of abdominal pain and bleeding in pregnancy, such as placenta previa, appendicitis, urinary tract infection, preterm labor, ovarian pathology, and muscular pain.

**Patient history**

The clinical presentation of abruption varies widely. Classically, placental abruption presents with vaginal bleeding and abdominal pain. It is important to realize, however, that severe abruption may occur with neither or just one of these signs. Vaginal bleeding occurs in 80% of cases. The amount of vaginal bleeding correlates poorly with the degree of abruption [32]. The severity of symptoms depends on the location of the abruption, whether it is revealed or concealed, and the degree of abruption. Backache may be the only symptom, especially when the placental location is posterior [33]. Finally, abruption may present as idiopathic preterm labor.

In addition to the standard obstetric history, a history should be obtained that focuses on cocaine and drug use, hypertension, preeclampsia, and other predisposing factors.

**Physical examination**

Upon physical examination, typically there is uterine hypotonus with associated high-frequency, low-amplitude uterine contractions. The uterus is frequently tender and may feel hard on palpation. In cases of severe abruption, typically, the uterus is contracting vigorously and labor rapidly progresses. The remainder of the physical examination should be performed looking for signs of trauma, preeclampsia, or other predisposing factors.

The ultrasonographic appearance of abruption depends to a large extent on the size and location of the bleed, as well as the duration between the abruption and the time the ultrasonographic examination was performed. In cases of acute revealed abruption, the examiner may detect no abnormal ultrasonographic findings. The ultrasonographic appearance of abruption in the acute phase is hyperechoic to isoechoic when compared with the placenta [34]. The sensitivity, specificity, and positive and negative predictive values of ultrasonography for placental abruption are 24%, 96%, 88%, and 53% respectively [35]. Thus ultrasound will fail to detect at least one half of cases of abruption.

**Management**

A patient with signs or symptoms of placental abruption should have a large-bore IV catheter inserted for access and transport expeditiously to a facility with obstetrical capabilities. The patient should be monitored closely during transport, observing for the development of signs of shock.

Bleeding caused by placental abruption can lead to maternal hypovolemic shock. Blood loss may be underestimated because of a concealed abruption. If the patient exhibits signs or symptoms of shock, she should be resuscitated with boluses of normal saline.

In the case of trauma, transport expeditiously to a trauma center where the patient can be evaluated by both a trauma surgeon and an obstetrician and undergo fetal monitoring.

**Placenta previa**

Placenta previa is another cause of bleeding episodes during the second half of pregnancy. Placenta previa refers to a placenta that overlies or is proximate to the internal os of the cervix. Normally, the placenta implants in the upper uterine segment. In placenta previa, the placenta is either totally or partially within the lower uterine segment.

Morbidities associated with placenta previa include antepartum bleeding, need for hysterectomy, morbid adherence of the placenta, intrapartum hemorrhage, postpartum hemorrhage, blood transfusion, septicemia, and thrombophlebitis [36]. Placenta previa is also associated with an increase in preterm birth. In the United States, maternal mortality occurs in 0.03% of cases with placenta previa [37]. Placenta previa complicates approximately 0.3–0.5% of pregnancies [37]. The annual incidence in the United States is reported to be 4.8 per 1,000 deliveries [37].

The likelihood of placenta previa increases in a dose–response fashion with a greater number of prior cesarean sections and with greater parity, with a relative risk of placenta previa rising from 4.5 (95% confidence interval (CI) 3.6–5.5) in women with one prior cesarean section to 44.9 (95% CI 13.5–149.5) in women with four prior cesarean sections ([Box 42.1](https://jigsaw.vitalsource.com/books/9781118990827/epub/OPS/c42.xhtml#c42-fea-0001)) [38].

## Box 42.1 Risk factors for placenta previa

* Prior cesarean section
* Termination of pregnancy or uterine surgery
* Smoking
* Increasing age
* Multiparity
* Cocaine use
* Multiple pregnancies

### Patient history

The classic presentation is painless bleeding in the late second trimester or early third trimester. However, some patients with placenta previa will experience painful bleeding, possibly due to uterine contractions or placental separation, whereas others will experience no bleeding at all before labor [39].

### Physical examination

Women who present with bleeding in the second half of pregnancy should have a sonographic examination for placental location. Digital vaginal examination with a placenta previa may provoke catastrophic hemorrhage and should not be performed, either in the field or in the emergency department.

### Management

A large-bore intravenous cannula should be inserted and the patient transported expeditiously to a hospital. She should be closely monitored during transport. If at any time she shows signs of shock, fluid resuscitation with normal saline should be performed.

## Hypertension during pregnancy

Hypertension is observed in approximately 6–8% of pregnancies and is generally divided into several categories [40]. Gestational hypertension occurs during pregnancy, resolves during the postpartum period, and is recognized by a new blood pressure reading of 140/90 mmHg or higher. Preeclampsia is gestational hypertension with proteinuria, and eclampsia is the occurrence of seizures in the patient with signs of preeclampsia. Progression of preeclampsia to eclampsia is unpredictable and can occur rapidly [40].

Approximately 2–7% of pregnancies are complicated by pregnancy-induced hypertension. Hypertensive emergencies during pregnancy are the second leading cause of maternal deaths in the United States, with a 15% occurrence [41,42]. The incidence of eclampsia has progressively declined, but it is still one of the major causes of maternal mortality.

### Preeclampsia

Preeclampsia is a multisystem disorder characterized by the presence of hypertension and proteinuria after 20 weeks of gestation [42]. It affects 12% of pregnancies and is responsible for nearly 20% of maternal deaths in the United States [44]. Urinary protein excretion greater than 300 mg daily is required for diagnosis [45]. This amount of proteinuria usually corresponds to a positive reaction (+1) on a urine dipstick via random urine sample [46–51]. Severe preeclampsia is defined by blood pressure readings higher than 160/110 mmHg and more than 5 g of urinary protein excretion daily.

Preeclampsia may also be associated with many other signs and symptoms, such as edema, visual disturbance, headache, and epigastric pain. Features of severe preeclampsia include hypertensive emergency, acute renal failure, cerebral and visual disturbances, and pulmonary edema or cyanosis. Common risk factors for the development of preeclampsia include primiparity, multiple gestations, previous preeclampsia, obesity, diabetes mellitus, and connective tissue disorders [52].

### Management

The use of magnesium sulfate in all patients with preeclampsia for the prevention of eclampsia is controversial. The large “Magpie” prospective trial suggested that the prophylactic use of magnesium sulfate in preeclampsia decreased the overall risk of eclampsia and may reduce maternal death [53]. Prehospital treatment should be centered around supportive care and transport to an appropriate receiving facility.

### Eclampsia

Eclampsia is defined as the presence of new-onset grand mal seizures in a woman with preeclampsia [51]. Eclampsia is rare and occurs in less than 1% of preeclamptic patients and may occur in the absence of preeclampsia [43,51]. In 10–15% of patients with eclampsia, hypertension is absent or modest and/or proteinuria is not detected [54]. The incidence of eclampsia is about 1 in 3,250 pregnancies in the United States [55–57]. More than 90% of eclamptic seizures present after gestational week 28, but reports exist of eclampsia presenting as early as gestational week 16 [58] and as late as 23 days postpartum [59,60].

Eclampsia is associated with increased rates of abruptio placentae, microangiopathic hemolytic anemia, pulmonary edema, acute renal failure, and preterm delivery [61].

Eclamptic seizures can occur at any time during pregnancy and infrequently 48 hours to 1 month post partum. One-third or more of patients having eclamptic seizures in the postpartum period present without ever having manifested signs and symptoms of preeclampsia [62].

The rate of preeclampsia in subsequent pregnancies following a pregnancy complicated by eclampsia is as high as 25% [63].

Seizures from eclampsia are usually grand mal. Other clinical features of eclampsia include nausea, vomiting, hyperreflexia, severe headaches, and altered mental status. However, many of these features are also seen in preeclampsia. Rarely cortical blindness occurs with severe preeclampsia/eclampsia. Focal neurological signs are unusual, but have been reported [63].

### Management

Several large randomized controlled trials have demonstrated that parenteral magnesium sulfate is superior to both phenytoin and diazepam in preventing the initial and recurrent seizures and lowering maternal mortality. In the Collaborative Eclampsia Trial, magnesium sulfate reduced the risk of recurrent seizures in eclamptic women by 52% when compared to diazepam and by 67% when compared to phenytoin [64].

The American College of Obstetricians and Gynecologists recommends a 4–6 g loading dose given intravenously over 15–20 minutes, followed by a continuous infusion rate of 2 g/hour [51]. There is concern for magnesium toxicity while administering such high doses. Toxicity is manifested by loss of tendon reflexes, respiratory depression, muscular paralysis, respiratory arrest, and maternal cardiac arrest. Tendon reflexes disappear considerably before serious toxicity such as cardiac arrhythmias and respiratory arrest occur.

## Conclusion

The most important action that an EMS physician can undertake in any emergency of pregnancy is to maintain a high index of suspicion and protect the life of mother and child.

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